BHP Western Australian Iron Ore

Windfence Flora and Fauna Assessment

Level 1 Fauna and Reconnaissance Flora Survey

61-38460-00000-EN-RPT-001 Rev 3

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Executive summary

BHP Western Australian Iron Ore (BHP) commissioned GHD Pty Ltd (GHD) to undertake a reconnaissance flora and vegetation and Level 1 vertebrate fauna survey covering the Port Wind Fence Survey Area (hereafter referred to as the Survey Area). The Survey Area is located approximately 27 km from Port Hedland and covers an area of 3.77 hectares.

This report details the results from flora and vegetation and Level 1 vertebrate fauna survey undertaken in May 2020.

The field survey consisted a two day Level 1 assessment and flora and vegetation survey undertaken from 4-5 May 2020. The purpose of the survey was to identify and map key fauna habitats and flora and vegetation values as they occur in the survey area.

Key results

Flora

Two vegetation types were described and mapped within the survey area, excluding previously cleared areas (tracks/rail line). The vegetation types include; Saline Flat and Marsh (Low open forest of *Avicennia marina* (mangrove)) and Other - Embankment on track/rail line verge (Acacia shrubland).

The vegetation condition of the survey area ranged from Very good to cleared. The majority of the survey area was rated Very Good (1.82 ha / 48%). This is represented by low open forest of *Avicennia marina* (mangrove) which is largely intact with some rubbish on the edge.

Forty-seven flora taxa (including species and varieties) representing 30 families and 39 genera were recorded within the survey area. This total comprised 42 native and five introduced/naturalised taxa.

No EPBC Act or BC Act listed flora or DBCA listed Priority flora were recorded from the survey area.

Of the five introduced/naturalised flora taxa identified during the survey, one is listed as a Declared Pest under the *Biosecurity and Management Act 2007* (BAM Act); *Coccinia grandis*

All of the introduced flora have been previously recorded from the Port Hedland area.

Fauna

Two habitat types (not including cleared/disturbed land) were identified during the field survey. These comprise Mangrove low forest and Mixed Acacia shrubland (Embankment). The survey area also contains vehicle tracks which are completely modified and contain no habitat for fauna.

The field survey recorded 39 vertebrate fauna species within the survey area. These comprise 35 birds from 23 different families and four reptiles from three different families.

Two conservation significant fauna were recorded during the survey:

- Caspian Tern (*Sterna c*aspia) – listed as Migratory under the Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act) and Biodiversity Conservation Act 2016 (BC Act)
- Osprey (*Pandion haliaetus*) – listed as Migratory under the EPBC Act (1999) and BC Act (2016)

Both species are know from the region and opportunistically utilising the area as resources become available. Of the 57 conservation listed fauna species identified (including mangrove endemic birds) in the likelihood of occurrence assessment, 30 species are known or considered likely to occur in the survey area. All of these species would likely utilise the survey area opportunistically, however, would not be dependent on the survey area for continual persistence as suitable habitat is abundant outside the survey area.

Table of contents

Table index

Figure index

Appendices

1. Introduction

1.1 Project background

BHP Western Australian Iron Ore (BHP) requires a reconnaissance flora and vegetation and Level 1 vertebrate fauna survey covering the Port Wind Fence Survey Area (hereafter referred to as the Survey Area). The Survey Area is located approximately 27 km driving distance from Port Hedland and covers an area of 3.77 hectares (ha).

1.2 Purpose of this report

This reconnaissance flora and vegetation and Level 1 vertebrate fauna assessment will be used to inform future environmental approvals across the area; however as requested the survey report is general report not assessing any specific development proposed by BHP.

1.3 Project location

1.3.1 Survey area

The survey area assessed as part of this scope comprised 3.77 ha piece of land located on Finucane Island, Port Hedland in the Pilbara bioregion (Figure 1, Appendix A). This land lies on BHP tenement, BHP Freehold Leasehold Easements as well as off tenure land.

1.3.2 Study area

The study area comprises the survey area with a 10 km buffer. The study area is used to complete the desktop assessments.

1.4 Scope of works

The scope of works was to undertake a reconnaissance flora and vegetation survey and a Level 1 fauna survey of the survey area. The scope of works included:

- A desktop review of publicly available information and databases, to determine the flora and fauna values of the survey area
- A reconnaissance flora and vegetation survey to identify:
  - Broad vegetation types present, including any Threatened or Priority Ecological Communities (TECs or PECs)
  - Vegetation condition
  - Dominant flora species present including introduced species
  - The presence or likelihood of any Threatened or Priority flora
- A Level 1 fauna survey to identify:
  - Broad fauna habitat types
  - Fauna species present including introduced species
  - The presence or likelihood of any Threatened or Priority fauna
- Produce a technical report including the survey results in accordance with Section 3.9 of guidance document SPR-IEN-EMS-012 (fauna) and Section 3.10 of guidance document 0124627 (flora and vegetation).
- All data is to be submitted in accordance with SPR-IEN-EMS-015.

1.5 Report limitations and assumptions

This report has been prepared by GHD for BHP Western Australia Iron Ore and may only be used and relied on by BHP Western Australian Iron Ore for the purpose agreed between GHD and the BHP Western Australian Iron Ore as set out in section 1.2 of this report.

GHD otherwise disclaims responsibility to any person other than BHP Western Australian Iron Ore arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

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

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

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

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

GHD has not been involved in the preparation of the reports listed in 2.2.1 and has had no contribution to, or review of these documents. GHD shall not be liable to any person for any error in, omission from, or false or misleading statement in, any other part of the documents listed in 2.2.1.

2. Methodology

2.1 BHP requirements

BHP requirements applied to this survey are set out in Guidance for Vertebrate Fauna Surveys in the Pilbara (SPR-IEN-EMS-012 v6) and Vegetation and Flora Survey Procedure (0124627 v2.0). These document outlines BHP's expectations for survey components including the level of survey, desktop assessment, survey design and intensity, timing, habitat assessment, vegetation assessment and reporting requirements. Biological survey spatial data requirements (SPR-IEN-EMS-015 v11) set out all biodiversity data requirements to standard and consistent format. These standards enable analysis of survey data and comparison between surveys spatially and temporally.

2.2 Relevant legislation, conservation codes and background documents

In WA all native species and communities are protected under the *Biodiversity Conservation Act 2016* (BC Act). Species of high conservation status (conservation significant species) are further protected under Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). An overview of these key legislation and guidelines, conservation codes and background information relevant to this fauna survey is provided in Appendix B. In addition, regulatory authorities also provide a range of guidance and information on expected standards and protocols for environmental surveys.

2.3 Desktop assessment

Prior to the commencement of the field survey, a desktop assessment was undertaken to identity environmental information relevant to the study area. The search parameters used included a 10 km buffer.

2.3.1 Flora and vegetation

The flora and vegetation desktop assessment included a review of:

- A literature review, including map-based information searches of all current and relevant literature sources and databases to identify Threatened and Priority ecological communities (TECs and PECs) and Threatened (Declared Rare) and Priority listed flora species previously recorded within the Survey Areas, or that may potentially occur within the Survey Areas. This will include searches of:
    - The Department of Agriculture, Water and the Environment (DAWE) Protected Matters Search Tool (PMST) to identify species and communities listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) potentially occurring in the study area (DAWE 2020a) Appendix C
    - The DBCA *NatureMap* database for flora and fauna species previously recorded within the survey area (DBCA 2007-2019) Appendix C
    - The DBCA TEC and PEC database to determine the potential for TECs or PECs to be present within the study area
    - The DBCA Threatened and Priority Flora List (TPFL) and Western Australian Herbarium (WAHERB) databases for Threatened species listed under the *Biodiversity Conservation Act 2016* (BC Act) and listed as Priority by the DBCA, previously recorded within the study area (DBCA 2019a) Appendix D

- Review up to five existing reports and biological survey data relevant to the Survey Area (where provided by BHP) Appendix C
- Aerial photography, geology/soils, land systems and hydrology information to provide background information on the variability of the environment and likely vegetation and habitat types present
- A flora likelihood of occurrence assessment Appendix D and Appendix E.

2.3.2 Level 1 Fauna

The fauna desktop assessment included a review of:

- DAWE PMST database to identify fauna species listed under the EPBC Act potentially occurring within the study area (DAWE 2020a) (Appendix C)
- The DBCA Threatened and Priority Fauna database for the study area Appendix E.
- The DBCA NatureMap database for fauna species previously recorded within the study area Appendix C. This database comprises the following composite datasets:
  - Atlas of Australian birds
  - Pilbara Threatened Fauna
  - Bird data -Birdlife Australia
  - Fauna Survey Returns Database (New)
  - Pilbara Biological Survey (mammals, birds, reptiles)
  - Waterbirds or Pilbara Threatened Fauna
  - Western Australian Museum (WAM) databases (mammals, birds, reptiles)
- Aerial photography, geology/soils, land systems and hydrology information to provide background information on the variability of the environment and likely habitat types present
- Review up to five existing reports (to be provided by BHP) that have been completed within 10 km of the Survey Area Appendix C
- A fauna likelihood of occurrence assessment. For the purpose of this study, exclusively marine animals (fish, wales, turtles etc.) were excluded from the likelihood of occurrence assessment as they are not expected to interact with the survey area Appendix E.

2.3.3 Literature review

The literature review (Appendix C) was undertaken using the biological reports supplied by BHP including:

- Calibre Engenium Joint Venture (2009) *Finucane island causeway terrestrial fauna assessment*
- Biota Environmental Sciences (2008a) *A Biodiversity assessment of the Utah Point Berth Development, Port Hedland*
- Biota Environmental Sciences (2008b) *A flora and fauna assessment of RGP5 DMMA A, Port Hedland Harbour*
- ENV (2009) *Finucane Island rail project*
- Biota Environmental Sciences (2009) *A flora and fauna assessment of RPG5 spoil areas A and H, Port Hedland Harbour*
- ENV Australia (2011) *Port Hedland regional fauna assessment*

- ENV Australia (2010) *Hunt Point Beach flora and vegetation and fauna assessment*
- Bennelongia Environmental Consultants (2011) *Bird survey of Nelson Point Wetlands in April 2011*
- ENV Australia (2009a) *Outer harbour development fauna assessment*
- Bennelongia Environmental Sciences (2012) *Port Hedland migratory shorebird impact assessment: April and November surveys*
- ENV Australia (2010) *Tug harbour (Wedgefield) flora and vegetation survey and fauna assessment*
- Ecologia Environment (2009) *RGP5 fauna survey Nelson Point to Bing Siding.*

2.4 Field survey

2.4.1 Survey timing and personnel

The post-wet season reconnaissance flora and vegetation and Level 1 vertebrate fauna assessment was undertaken by Senior Ecologist Jo Williams from 4-5 May 2020.

2.4.2 Guiding documents

In addition to the BHP requirements listed in section 2.1, the survey methodology and data collection that GHD employed was consistent with:

- EPA Technical Guidance –Terrestrial Fauna Surveys, Perth, Environmental Protection Authority (EPA 2016a)
- EPA Technical Guidance – Sampling methods for terrestrial vertebrate fauna, Perth, Environmental Protection Authority (EPA 2016b)
- EPA Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment (EPA 2016c)
- Department of the Environment, Water, Heritage and the Arts (DEWHA) (2010a) Survey Guidelines for Australia's Threatened Bats
- DEWHA (2010b) Survey Guidelines for Australia's Threatened Mammals
- DEWHA (2010c) Survey Guidelines for Australia's Threatened Reptiles

2.4.3 Reconnaissance flora and vegetation

The reconnaissance vegetation survey was undertaken over two days in combination with the fauna assessment. The field survey was undertaken to identify and describe the dominant vegetation types, assess vegetation condition, and identify and record vascular flora taxa present at the time of survey. Opportunistic searches for conservation significant or other significant ecological communities and flora taxa were also undertaken during the field survey.

Data collection

Field survey methods involved a combination of low intensity relevé sampling and traversing the survey area by both vehicle and foot. Relevés were conducted along the survey area to describe the broad-scale vegetation and physical features. Five relevés were conducted throughout the survey area with the locations of each relevé presented in Appendix A. Field data at each relevé site was recorded on a pro-forma data sheet and included the parameters detailed in Table 2-1. Survey and relevé data are provided in Appendix D.

Table 2-1 Data collected during the field survey

Aspect	Measurement
Collection attributes	Site code, personnel/recorder, date, photograph of the site.
Physical features	Landform, slope, aspect, soil attributes, ground surface cover
Location	Coordinates recorded in GDA94 datum using a hand-held Global Positioning System (GPS) tool to accuracy approximately ± 5 m.
Vegetation condition	Broad-scale vegetation condition using the condition rating scale adapted by EPA (2016c) for the Eremaean Botanical Provinces.
Disturbance	Level and nature of disturbances (e.g. weed presence, fire and time since last fire, impacts from grazing, exploration activities).
Flora	List of dominant flora from each structural layer, list of all species at relevé including stratum, average height and cover using National Vegetation Information System (NVIS).

A flora inventory was compiled from taxa listed in the relevés/photo reference sites and from opportunistic floristic records throughout the survey area.

Vegetation types

Broad-scale vegetation types were identified and boundaries delineated using a combination of aerial photography, topographical features and field data/observations.

Vegetation types were described based on structure, dominant taxa and cover characteristics as defined by field observations. Vegetation type descriptions are consistent with NVIS Level V (Association). At Level V up to three taxa per stratum are used to describe the association (ESCAVI 2003).

Vegetation condition

The vegetation condition was assessed and mapped in accordance with the vegetation condition rating scale for the Eremaean Botanical Provinces (devised by Keighery (1994) and Trudgen (2002) and adapted by EPA (2016c)). The scale recognises the intactness of vegetation and consists of six rating levels. The vegetation condition rating scale is outlined in Appendix B.

Flora identification and nomenclature

Species well known to the survey ecologist were identified in the field; all other species were collected and assigned a unique collection number to facilitate tracking. All specimens collected were identified using taxonomic literature, local and regional flora keys.

The conservation status of all recorded flora was compared against the current lists available on FloraBase (WA Herbarium 1998–2020). Nomenclature used in this report follows that used by the WA Herbarium as reported on FloraBase (WA Herbarium 1998–2020).

Conservation significant flora

Prior to the field survey, information obtained from the desktop assessments (e.g. EPBC Act PMST, NatureMap and DBCA database search results) was reviewed to determine conservation significant flora taxa potentially present within the survey area and existing locations. Opportunistic searches for conservation significant flora were undertaken throughout the survey area. Where individuals were identified, the location and number of plants present were recorded using handheld GPS unit.

2.4.4 Vertebrate fauna

A single-season Level 1 vertebrate fauna survey was undertaken by sub-consultant Jo Williams (Senior Ecologist) of the survey area in conjunction with the vegetation and flora assessment from 4-5 May 2020. The survey area was traversed by vehicle and on foot over the course of the survey to identify and describe the dominant fauna habitat types present and their condition, assess habitat connectivity, and identify and record fauna species within the survey area. A total of four fauna habitat assessments were undertaken throughout the survey area with the locations of each presented in Figure 4 Appendix A. An assessment of the likelihood of conservation significant fauna and their habitats occurring within the survey area was also undertaken.

Habitat assessment

Habitat assessment was conducted in accordance with the BHP fauna survey guidelines as outlined in section 2.1.

Broad habitat types within the survey area were identified, mapped and described based on the following:

- Location within survey area
- Landscape position
- Geomorphology, topography and substrate
- Photos of representative habitat types
- Values to associated fauna including significant species (e.g. refuge, foraging, shelter)
- Disturbances (weeds, fire, ground disturbance)
- Comparison between broad habitat types
- Evaluation of the likelihood of occurrence of conservation significant fauna within the environments present (based on presence of suitable habitats and species recorded).

Fauna Habitat Mapping

The survey area was mapped utilising the habitat assessment and referencing BHP Vertebrate fauna survey and data guidelines for the correct habitat terminology.

Opportunistic observations

Opportunistic observations involve the recording of fauna taxa (physical presence and/or signs of presence) spatially throughout the survey area. Opportunistic observations include physical observations (sighting or hearing fauna), and indirect evidence (scats, tracks, diggings, nests, feathers, skeletal remains, pellets) which indicate the current or recent activity of a species. Wherever possible, numbers of individuals, microhabitat use and other relevant information was recorded.

2.4.5 Fauna identification and nomenclature

Species identification

Fauna were identified in the field using reference books and field guides and electronic guides (Table 2-2). Where identification was not possible, photographs of specimens were collected to be later identified.

Table 2-2 Fauna references

Fauna group	Field guide
Mammals	Menkhorst & Knight (2004), Van Dyck &Strahan (2008), Pizzey & Knight (2012)
Bats	Churchill (2008), Menkhorst & Knight (2004), Pizzey & Knight (2012)
Birds	Morcombe (2004)
Reptiles	Wilson & Swan (2017), Storr et al. (1999), Storr et. al. (2002)
Amphibians	Tyler & Doughty (2009)

Nomenclature

Nomenclature used in this report follows that used by WAM as reported on *NatureMap*. This nomenclature is deemed the most up-to-date species information for WA fauna.

2.5 Seasonal conditions

The survey area is located within the Pilbara region of WA. The climate of this region is arid to tropical with very hot summers and mild winters. Rainfall in the Pilbara is spatially and temporally variable. Rainfall in the eastern Pilbara (containing the site) is most influenced by tropical and monsoonal drivers which are predominantly active in the summer and autumn months (December – May) while rainfall in the western Pilbara is also influenced by southern mid-latitude drivers such as frontal systems during autumn and winter (March – August) (Sudmeyer 2016).

During summer and early autumn (December – March), average daily temperatures exceed 30°C across the region, with average daily maxima exceeding 35°C from October - March. During the winter months (June – August), average temperatures are around 20°C across the region.

The closest current weather station to the site is in Port Hedland (Station ID: 004032) located approximately 20 km southeast of the southern survey area boundary. Climate data from this station indicate:

- Mean maximum temperature ranges from 27.3 °C in July to 36.8 °C in March.
- Mean minimum temperature ranges from 12.4 °C in July to 25.6 °C in January
- Mean annual rainfall is 319.3 mm with an average of 20.5 rain days per year (BoM 2020).

Rainfall for the 6 months prior to the survey is presented in Table 2-3 (based on Port Hedland data), with the total rainfall for this period being 190.6 mm. This is approximately a quarter of the year's total for this region, however, is well below the long term average for these months (250.1 mm).

Table 2-3 Rainfall 6 months prior to the survey month

Date	Rainfall (mm)
April 2020	13.8
March 2020	28.0
February 2020	103.2
January 2020	43.6
December 2019	1.6
November 2019	0.4
Total	**190.6**

2.6 Limitations

2.6.1 Desktop limitations

Desktop investigations use a variety of online resources such as the DBCA searches, NatureMap database and the EPBC Act PMST. The responsibility for the accuracy of such data remains with the issuing authority, not with GHD.

The EPBC Act PMST is based on bioclimatic modelling for the potential presence of species. As such, this does not represent actual records of the species within the area. The records from the DBCA searches and NatureMap database provide more accurate information for the general area. However, some records of collections, sightings or trappings cannot be dated or have plain language locality descriptions and may misrepresent the current range of a species.

2.6.2 Survey limitations

The EPA technical guidance recommend flora and fauna survey reports for environmental impact assessment in WA should contain a section describing the limitations of the survey methods used. The limitations and constraints associated with this field survey are discussed in Table 2-4. Based on this assessment, the present survey effort has not been subject to any constraints which affect the thoroughness of the assessment and the conclusions which have been formed.

Table 2-4 Field survey limitations

Aspect	Constraint	Comment
Sources of information and availability of contextual information.	Nil	Adequate information is available for the survey area, this includes: • Broad scale (1:1,000,000) mapping by Beard (1975) • Database searches (DBCA and NatureMap).
Scope (what life forms were sampled etc.)	Nil	Vascular flora and terrestrial vertebrate fauna were sampled during the survey. Non-vascular flora, invertebrate and aquatic fauna were not surveyed.
Proportion of flora collected and identified (based on sampling, timing and intensity) Proportion of fauna identified, recorded and/or collected	Nil	The reconnaissance vegetation and flora survey was undertaken in Autumn 2020 which is the recommended timing for flora surveys in the Pilbara bioregion. The flora recorded from the field survey is detailed in 3.6.2 and a full flora list is presented in Appendix D The timing is considered appropriated due to the high proportion of species able to be identified at the time of the survey. The reconnaissance fauna survey was also undertaken in Autumn 2020. The fauna assessment sampled those species that can be easily seen, heard or have distinctive signs, such as tracks, scats, diggings, etc. Many cryptic species would not have been identified during a reconnaissance survey and seasonal variation within species often requires targeted surveys at a particular time of the year. Of the fauna species recorded during the survey, all were identified to species level. The fauna assessment was aimed at identifying habitat types and terrestrial vertebrate fauna utilising the survey area. No sampling for invertebrates or aquatic species occurred. The information available on the identification, distribution and conservation status of invertebrates is generally less extensive than vertebrate species. Diurnal survey only; limitations to nocturnal fauna species.
Flora determination	Nil	Flora determination was undertaken by the survey ecologist in the field. The taxonomy and conservation status of the WA flora is dynamic. This report was prepared with reliance on taxonomy and conservation status current at the time report development, but it should be noted this may change in response to ongoing research and review of International Union for Conservation Nature criteria.
Completeness and further work which might be needed (e.g. was the relevant area fully surveyed)	Nil	The survey area was entirely accessible and was accessed by vehicle/foot.

Aspect	Constraint	Comment
Mapping reliability	Minor	The vegetation was mapped using high-resolution ESRI aerial imagery obtained from Landgate, topographical features, previous broad scale mapping (Beard 1975) and field data. Data was recorded in the field using hand-held GPS tools (e.g. Samsung tablet and Garmin GPS). Certain atmospheric factors and other sources of error can affect the accuracy of GPS receivers. The Garmin GPS units used for this survey are accurate to within ±5 metres on average. Therefore the data points consisting of coordinates recorded from the GPS may contain inaccuracies.
Timing/weather/ season/cycle	Minor	The field surveys were conducted during autumn 2020 (May). In the six months prior to the spring survey (August-October), the Port Hedland weather recording station (Station ID: 004032) total rainfall for this period being 190.6 mm. This is approximately a quarter of the year's total for this region, however, is below the long term average for these months (250.1 mm). The weather conditions recorded during the survey periods are considered unlikely to have impacted upon the vegetation and flora survey. However, the hot and windy conditions did influence the fauna survey. During hot and windy conditions there is generally less activity of fauna groups as many species seek shelter. During periods of windy conditions fauna signs, such as tracks, are reduced or covered up and are not as easily observed. The survey timing was considered appropriate for the flora and fauna field survey.
Disturbances (e.g. fire, flood, accidental human intervention)	Nil	Highly active rail corridor has increased noise/ lighting/ vibrations/ dust/ general traffic and disturbance; likely to reduce fauna occupancy particularly in the track/ rail veg & habitat type area
Intensity (in retrospect, was the intensity adequate)	Nil	The vascular flora of the survey areas were sampled in accordance with EPA (2016a) and terrestrial fauna sampled in accordance to EPA (2016b). The survey area was sufficiently covered by the survey team during the survey.
Resources	Nil	Adequate resources were employed during the field survey. Two person days were spent undertaking the survey using one qualified senior ecologist.
Access restrictions	Nil	No access to within 3 m of train line; caused no major issue, as this area was visible from the adjacent track. No access on the actual embankment: caused no major issue as the embankment was visible from the lower areas (mostly) and the top along the track. This likely would have reduce fauna species recorded (reptiles particularly). This also meant that the survey relieve points are not evenly spread through the different vegetation/ habitat types. Limited access along road: there was deemed nowhere to safely stop along the road as the verge is very narrow with a steep drop off in to the mangroves.
Experience levels	Nil	The senior ecologist who executed the survey is a practitioner suitably qualified and experienced in their respective fields. Joe Williams has over 10 years' experience undertaking flora and fauna surveys within WA and on in the Pilbara bioregion.

3. Desktop Assessment Results

3.1 Regional biogeography

The study area is situated in the Eremaean Botanical Province, within the Pilbara bioregion and the Roebourne sub-region (PIL4) as described by the Interim Biogeographic Regionalisation of Australia.

The Pilbara bioregion is characterised by vast coastal plains and inland mountain ranges with cliffs and deep gorges. Vegetation is predominantly mulga low woodlands or snappy gum over bunch and hummock grasses. Tenure comprises Aboriginal land, leasehold (for grazing cattle) and conservation reserves. The bioregion provides the majority of Western Australia (WA)'s exports in petroleum, natural gas and iron ore. Major population centres are Karratha, Port Hedland, Newman and Tom Price.

The Roebourne sub-region is characterised by Quaternary alluvial and older colluvial coastal and subcoastal plains with a grass savannah of mixed bunch and hummock grasses, and dwarf shrub steppe of *Acacia stellaticeps* or *A. pyrifolia* and *A. inaequilatera* (Kendrick & Stanley 2001). The 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 river deltas. Resistant linear ranges of basalts occur across the coastal plains, with minor exposures of granite. Islands are either Quaternary sand accumulations, or composed of basalt or limestone, or combinations of any of these three. The climate is arid (semi-desert) tropical with highly variable rainfall, falling mainly in summer. Cyclonic activity is significant, with several systems affecting the coast and hinterland annually (Kendrick & Stanley 2001).

3.2 Land systems

The Department of Primary Industries and Regional Development (2018) provide a land system mapping database for the pastoral areas of Western Australia at a scale of 1:250,000,000. This database was used to assess the possible land systems which lie within the study area. According to this source, the study area incorporate two land systems: Littoral Land System and Uaroo Land System. These land systems are described in Table 3-1.

Table 3-1 Land systems within the study area

Land system	Description	Land type
Littoral Land System	Bare coastal mudflats with mangroves on seaward fringes, samphire flats, sandy islands, coastal dunes and beaches.	Coastal plains, cliffs, dunes, mudflats and beaches; various vegetation
Uaroo Land System	Broad sandy plains supporting shrubby hard and soft spinifex grasslands.	Sandplains and occasional dunes with spinifex grasslands

3.3 Soils

The Bureau of Rural Sciences (2009) indicates that two soil types lie with the survey area when viewed at a scale of 1:2,000,000. These soil types are described below in Table 3-2.

Table 3-2 Soil types within the study area

Soil type	Description
Lh1	Coastal plains mainly beyond marine flooding influence: main soils are pedal calcareous earths (Gc2.22) with some associated highly calcareous earths (Gc1.12). On the seaward side are firstly samphire flats (Gc1.1) and then bare saline mud (Uf). Calcareous dunes (Uc1.ll) commonly occur on the seaward edge of the plains
Ab19	Extensive sandy plains: chief soils are red earthy sands (Uc5.21) with extensive areas of red earths (Gn2.12) and with some hard red soils (Dr) along creek lines. Similar to unit AB21 but without sandstone residuals.

3.4 Geology

The Geological Survey of Western Australian 1:250,000 scale map indicates that there are seven geological units underlying the study area (Hickman 2012). These are described below Table 3-2.

Table 3-3 Geology underlying the study area

Geology	Description
Tm	Coastal (tide-dominated) mud and silt on mangrove flats
Tf	Tidal flat deposits; silt and mud in intertidal and supratidal flats and lagoons
Bb	Coastal dunes and beach deposits, shelly sand containing *Anadara granosa*; includes backshore deposits
Qbo-kla	Bossut Formation: calcarenite, minor calcirudite and calcilutite
Sd	Sand (undifferentiated)
Aggc	Aggregate, course
A1f	Floodplain deposits; sand, silt, clay and gravel adjacent to main drainage channels

3.5 Hydrology

The study area lies on the coast of Western Australia and as such, the hydrology is highly influenced by the ocean. The Port Hedland area consists of broad areas of intertidal and coastal mudflats and mangroves which periodically inundate with seawater during storm surges or particularly high tide events.

Numerous intertidal creeks converge within the port, including West Creek, South West Creek, South Creek, East Creek and Stingray Creek. The inundation of seawater is important for reducing salinity in the groundwater adjacent to creeks which in turn enables the mangroves to survive (SKM 2007).

3.6 Vegetation and flora

3.6.1 Broad vegetation associations

Broad scale vegetation mapping of the area undertaken by Beard (1975) identified the following vegetation association within the survey area:

- Vegetation association 43 – Low forest (Kimberley) or thicket (Pilbara) mangroves *Avicennia marina, Rhizophora stylosa, Bruguiera exaristata*.

3.6.2 Flora diversity

The NatureMap database identified 286 flora taxa previously recorded within the study area (DBCA 2007-). This total includes 250 native and 36 naturalised (weed) species. The most common families include Fabaceae (60 species) and Poaceae (42 species). No conservation significant flora were detected in the PMST search.

The NatureMap database search for flora is provided in Appendix C.

3.6.3 Conversation significant flora

Searches of the EPBC Act PMST and *NatureMap*, WAHERB and TPFL databases identified the presence/potential presence of six conservation significant flora taxa within a 10 km buffer of the survey area. The desktop searches recorded six Priority taxa listed by the DBCA.

The locations of conservation significant flora registered on the DBCA databases are mapped on Figure 5, Appendix A.

3.6.4 Literature review

GHD reviewed six previous flora studies within or in close proximity to the study area. The aim of the review was to understand the flora taxa previously identified within or considered likely to occur within the survey area.

Two conservation significant flora species are known to occur within close proximity to the survey area:

- *Bulbostylis burbidgeae* (P3)
- *Tephrosia rosea* var. *venulosa* (P1)

3.6.5 Flora likelihood of occurrence based on desktop review

A likelihood of occurrence assessment was conducted for all conservation significant flora taxa identified in the desktop assessment prior to the field survey Appendix C. Of the six identified Priority species, *Bulbostylis burbidgeae* (P4) and *Tephrosia rosea* var. Port Hedland (A.S. George 1114) are considered to Possible to occur pre-survey.

3.7 Fauna

3.7.1 Fauna diversity

The *NatureMap* database identified 354 fauna species previously recorded within the study area (DBCA 2007-). This comprises 174 birds, 68 reptiles, 68 fish, 32 mammals, 7 amphibians and 4 invertebrates. One additional bird was recorded from the PMST search (DEE 2018a) and one other additional bird was detected from the DBCA Threatened and Priority Fauna Database (DBCA 2019). As there is no marine habitat within the survey area, exclusively marine fauna (dolphins, turtles, fish etc) will be excluded from further desktop assessment.

The full database search can be seen in Appendix C

3.7.2 Conservation significant fauna.

The EPBC Act PMST, DBCA Threatened and Priority Fauna database and *NatureMap* database identified the presence/potential presence of 51 conservation significance fauna taxa within the survey area. The species listed included 44 birds, six mammals and one reptile. The composition of conservation significant fauna comprise:

- 43 x Migratory (two also listed as Endangered, three also listed as Critically Endangered, one also listed as Vulnerable, one also listed as P4)
- 1 x Priority 1
- 1 x Priority 3 (also listed as Vulnerable)
- 3 x Priority 4 (1 also listed as Migratory)
- 3 x Critically Endangered (all also listed as Migratory)
- 3 x Endangered (2 also listed as Migratory)
- 5 x Vulnerable (one also listed as P3, one also listed as Vulnerable)

The likelihood of these conservation significant taxa within the survey area is discussed in section 3.8.

In addition to these, five mangrove endemic birds have been detected within the study area. None of these mangrove endemic birds have conservation significant status however they are discussed on this report as they are endemic to mangrove habitat which is contained within the survey area.

3.7.3 Literature review

GHD reviewed 12 previous fauna surveys within or in close proximity to the study area. The aim of the review was to understand the fauna taxa previously identified within or considered likely to occur within the survey area. Particular focus was placed on migratory shorebirds, migratory terrestrial birds, terns, mangrove endemic birds, bats and other mammals.

Fifty-one conservation significant fauna species and five mangrove endemic birds are known from or predicted to occur within the study area including:

- 26 migratory shorebirds
- Four migratory wetland birds
- Three migratory terrestrial birds
- Three migratory seabirds
- Eight terns

- Five mangrove endemic birds
- One reptile
- Six mammals (including one bat)

All species recorded in the literature review were also recorded in the database searches. A summary of key findings of this review is presented in Appendix C.

3.8 Fauna likelihood of occurrence based on desktop review

Based on the results from the desktop assessment a likelihood of occurrence (LOO) assessment was performed for fauna species of conservation significance that are known from or predicted to occur in the study area. Of the 57 species identified (including mangrove endemic birds), one species has been previously recorded; Common Greenshank (*Tringa nebularia*) (DBCA 2020). Twenty-nine species are known or considered likely to occur in the survey area including:

- 11 migratory shorebirds
- One migratory wetland bird
- Five terns
- Five mangrove endemic birds
- One bat.

These species are presented in Table 3-4 with the complete likelihood of occurrence assessment displayed in Appendix E.

Table 3-4 Fauna considered likely to occur in survey areaTable 3-5

Taxa	Common name	Status BC Act	EPBC	Likelihood of Occurrence
Migratory shore birds				
Actitis hypoleucos	Common Sandpiper	MI	MI	**Likely** Suitable habitat is available to support this species in the mangrove woodland. The closest know record is 500 m north-west of the survey area.
Arenaria interpres	Ruddy Turnstone	MI	MI	**Likely** Suitable habitat is available to support this species in the mangrove woodland. The closest known record lies within 20 m west of the survey area.
Calidris acuminata	Sharp-tailed Sandpiper	MI	MI	**Likely** Suitable habitat is available to support this species in the mangrove woodland. The closest known record lies within 3.6 km east of the survey area.
Calidris ferruginea	Curlew Sandpiper	CR	CR & MI	**Likely**

Taxa	Common name	Status BC Act	EPBC	Likelihood of Occurrence
				Suitable habitat is available to support this species. The closest know record is 500 m north-west of the survey area.
Calidris tenuirostris	Great Knot	CR	CR & MI	**Likely** Suitable habitat is available to support this species within the mangrove habitat. The closest known record is 500 m north-west of the survey area.
Charadrius leschenaultii	Greater Sand Plover	VU	VU & MI	**Likely** Suitable habitat is available to support this species. The closest known record lies within 20 m of the survey area.
Charadrius mongolus	Lesser Sand Plover	EN	EN & MI	**Likely** Suitable habitat is available to support this species in the mangrove habitat. The closest known record is 300 m east of the survey area.
Limosa lapponica (and associated sub species)	Bar-tailed Godwit	MI	MI	**Likely** Suitable habitat is available for this species in the mangrove woodland. The closest know record is 1.6 km north-west of the survey area.
Numenius madagascariensis	Eastern Curlew	CR	CR & MI	**Likely** Suitable habitat is available for this species in the mangrove woodland. The closest know record is 500 m north-west of the survey area.
Numenius phaeopus	Whimbrel	MI	MI	**Likely** Suitable habitat is available for this species in the mangrove woodland. The closest known record is within 20 m of the survey area boundary.
Pluvialis fulva	Pacific Golden Plover	MI	MI	**Likely** This species may utilise the mangrove woodland during the non-breeding season. The closest known record is greater than 5 km from the survey area.
Pluvialis squatarola	Grey Plover	MI	MI	**Likely** This species may utilise the mangrove woodland during the non-breeding season. The closest known record is 2.1 km north of the survey area.
Tringa brevipes	Grey-tailed Tattler	MI & P4	MI	**Likely** Suitable habitat is available for this species in the mangrove habitat. The closest known record is within 20 m of the survey area boundary.
Xenus cinereus	Terek Sandpiper	MI	MI	**Likely** Suitable habitat is available to support this species. The closest known record lies within 20 m of the survey area.
Tringa nebularia	Common Greenshank	MI	MI	**Present** This species has been recorded in the DBCA Threatened Fauna data within the survey area

Taxa	Common name	Status BC Act	EPBC	Likelihood of Occurrence
Limicola falcinellus	Broad-billed Sandpiper	MI	MI	**Likely** Suitable habitat may be available to support this species in the mangrove woodland. The closest known record is greater than 5 km from the survey area.
Migratory wetland birds				
Pandion cristatus	Osprey	MI	MI	**Present** This species was recorded flying over the survey area at the time of the survey/
Migratory seabirds				
Fregata ariel	Lesser Frigatebird	MI	MI	**Likely** Suitable habitat is available for this species in the mangrove habitat. The closest know record is 500 m north-west of the survey area.
Terns				
Hydroprogne caspia	Caspian Tern	MI	MI	**Present** This species was recorded flying over the survey area at the time of the field survey. It may opportunistically utilise the mangrove woodland.
Sterna hirundo	Common Tern	MI	MI	**Likely** Suitable habitat is available for this species in the mangrove woodland. Closest known record is 1.6 km east of the survey area.
Chlidonias leucopterus	White-winged Black Tern	MI	MI	**Likely** Suitable habitat is available for this species in the mangrove habitat. The closest known record is 3.4 km east of the survey area.
Sternula albifrons	Little Tern	MI	MI	**Likely** Suitable habitat is available for this species in the mangrove habitat. The closest know record is 500 m north-west of the survey area.
Sterna nereis nereis	Fairy Tern	Vu	Vu	**Likely** Suitable habitat is available for this species in the mangrove habitat. The closest know record is 500 m north-west of the survey area.
Thalasseus bergii	Crested Tern	MI	MI	**Likely** Suitable habitat is available for this species in the mangrove habitat. Closest known record is 1.6 km east of survey area.
Mangrove endemic birds				
Pachycephala melanura	Mangrove Golden Whistler			**Likely** Suitable habitat is available for this species in the mangrove habitat. The closest known record is 3.4 km east of the survey area.
Zosterops luteus	Yellow White-eye			**Likely** Suitable habitat is available for this species in the mangrove habitat. The closest know record is 500 m north-west of the survey area.
Pachycephala lanioides	White-breasted Whistler			**Likely** Suitable habitat is present for this species within the mangrove habitat type. The closest known record is less than 1 km north of survey area.
Rhipidura phasiana	Mangrove Grey Fantail			**Likely** Suitable habitat is present for this species within the mangrove habitat type. The closest known record is less than 1 km north of survey area.

Taxa	Common name	Status BC Act	EPBC	Likelihood of Occurrence
Peneonanthe pulverulenta	Mangrove Robin			**Likely** Suitable habitat is present for this species within the mangrove habitat type. The closest known record is greater than 5 km from the survey area.
Mammals				
Mormopterus cobourgianus	Northern Coastal Free-tailed Bat	P1		**Likely** Habitat is present for this species adjacent to and surrounding the survey area. The closest known record is 400 m south of the survey area in mangrove habitat.

4. Field results

4.1 Flora and vegetation

4.1.1 Vegetation types

The survey area consists of a saline flat mangrove vegetation with the remaining areas highly modified with road and rail line infrastructure. The survey area has experienced a long history of disturbances with the development of the iron mining port facilities.

Two vegetation types, not including cleared areas for tracks/rail line, have been mapped across the survey area:

- VT01 - Saline Flat and Marsh (SF), Low open forest of *Avicennia marina* (mangrove) (SF Am)
- VT02 – Other (OT) Embankment on track/rail line verge, *Acacia* shrubland
- Cleared areas for vehicle track and train line

The vegetation types are described in further detail in Table 4-1 and mapped in Figure 2.

Table 4-1 Vegetation types within the survey area

Landform	Vegetation type and code	Area (ha)	Vegetation type description	Relevé	Representative photograph
Saline Flat and Marsh (SF)	VT01 – SF Am	1.82	Low open forest of *Avicennia marina* (mangrove) on dark grey clay with some sand patches on tidal saline flats influenced by tidal inundation. VT01 does have tidal inundation in very high tides, however, influenced by road and rail line infrastructure.	R02, R04	

Landform	Vegetation type and code	Area (ha)	Vegetation type description	Relevé	Representative photograph
Other (OT) Embankment on track/rail line verge	VT02 – Embankment *Acacia* shrubland	1.11	Shrubland of *Acacia bivenosa, Acacia pyrifolia* and *Acacia colei* over **Cenchrus ciliaris* (Buffel Grass), *Eragrostis falcata and Eragrostis eriopoda* open tussock grasses over mixed herbs on embankment soil/large boulders and gravel. Other associated species include *Cleome viscosa* **Aerva javanica, Enchylaena tomentosa, Ipomoea pes-caprae* and *Bonamia media.* The area includes several open water drains that cut from the higher ground (along the vehicle track/rail line to the mangrove system). It rises approximately 4 m from the lower-lying mangrove system up to the completely modified road/ rail area and slope is about 45 degrees with a western facing aspect.	R03, R05	

Landform	Vegetation type and code	Area (ha)	Vegetation type description	Relevé	Representative photograph
Cleared areas - infrastructure (vehicle track/train line verge)	Cleared	0.85	Cleared vehicle track and train line verge that is regularly maintained. Occasional **Cenchrus ciliaris* (Buffel Grass), *Eragrostis falcata, Cleome viscosa* and **Aerva javanica* (Kapok). Completely modified area (built up on reclaimed area), party sealed vehicle access track along eastern section of study area and a section of raised sealed public road in the North West section of the study area	R01	

4.1.2 Conservation significant ecological communities

No TEC's listed under the EPBC Act or BC Act or PECs listed by the DBCA were identified within the survey area during the field survey.

4.1.3 Vegetation condition

The vegetation within the survey area ranged from *Very Good* to *Completely Degraded* condition. The survey area has been subject to mining infrastructure development, tracks and rail line. The VT01 Low open forest of *Avicennia marina* (mangrove) is largely intact with some rubbish on the edge. There is limited connectivity with the surround broader landscape. VT01 has been modified with the road and rail network in the area significantly influencing the movement of water through the area, and probably has reduced overall flow/ water levels. VT02 *Acacia* shrubland on embankment has been highly modified from road and rail line development and has been influenced by soil movement and construction activity.

The extents of the vegetation condition ratings mapped within the survey area are detailed in Table 4-2 with vegetation condition mapping shown on Figure 3, Appendix A.

Table 4-2 Vegetation condition ratings

Vegetation condition ratings	Extent (ha) (%)
Very Good	1.82
Degraded	1.1
Completely Degraded	0.85
Total	3.77

4.1.4 Flora diversity

During the field survey a total of 47 flora taxa (including species and varieties) representing 30 families and 39 genera were recorded within the survey area. This total comprised 42 native and 5 introduced/naturalised taxa.

Dominant families recorded from the survey included:

- Fabaceae (7 taxa)
- Poaceae (7 taxa)
- Chenopodiaceae (3 taxa)

The flora diversity recorded is not considered to be completely representative of the natural floristic diversity in the local area due to the general degraded nature of the site and long history of disturbances, including clearing.

The list of flora identified during the survey is provided in Appendix D

4.1.5 Introduced flora

Five introduced flora taxa were recorded in the survey area:

- **Cenchrus ciliaris* (Buffel)
- **Aerva javanica* (Kapok)
- **Citrullus amarus* (Melon)
- **Coccinia grandis*
- **Leucaena leucocephala*

Of the five introduced/naturalised flora taxa identified during the survey, one is listed as a Declared Pest under the *Biosecurity and Management Act 2007* (BAM Act); *Coccinia grandis.*

All of the introduced flora have been previously recorded from the Port Headland area.

4.1.6 Conservation significant flora

No EPBC Act or BC Act listed flora or DBCA listed Priority flora were recorded from the survey area.

Based on previous records, habitat requirements, efficacy of the survey, intensity of the survey, flowering times and condition of the site, all conservation significant flora identified within the desktop searches are considered unlikely to occur within the survey area.

4.2 Fauna

4.2.1 Habitat types

Two habitat types (not including cleared/disturbed land) were identified during the field survey. These comprise Mangrove low forest and Mixed *Acacia* shrubland (Embankment). The two habitat types described in Table 4-3 and mapped in Figure 4, Appendix A, closely align with the vegetation types.

The Mangrove low forest runs along the low-lying western edge of the survey area and covers approximately 2.04 ha. The soil is predominantly dark grey mud with some sandier sections. The mangroves in this area have a closed canopy however they are relatively young and contain few hollows. A complex root system creates micro-habitat on the ground level.

The Mixed *Acacia* shrubland (Embankment) habitat is completely modified and forms the transition from the roads to the mangroves. It is approximately 4 m wide from the low lying mangrove system to the completely modified road/rain area and covers approximately 1.22 ha of the survey area. Vegetation is very limited (30% cover) and provides little habitat for medium-large fauna.

The survey area also contains vehicle tracks which are completely modified and contain no habitat for fauna. These highly modified areas comprise a partly sealed vehicle access track along the eastern portion of the survey area and a section of raised sealed public road in the north-western portion of the survey area.

Table 4-3 Fauna habitat types from the survey area

Habitat type	Area (ha)	Photo
Mixed Acacia shrubland (Embankment) Open *Acacia* shrubland with grass/ herb ground cover on a steep rocky slope. This is a completely modified habitat which may provide refuge for small reptiles. The embankment wall has been constructed using a mixture of large boulders through to smaller rocks and gravel. Low vegetation persists on the embankment wall with approximately 30% coverage. Several open water drains are cut through the embankment from the road down to the mangrove habitat. The habitat is approximately 4 m wide and is at a 45° angle with a western facing aspect. Habitat values are somewhat limited due to the proximity of the study area to the port facility and the public road. Furthermore the study area is within a fragmented landscape (both in the immediately adjacent areas and the broader Port Hedland area). Microhabitat is available within the rocks however the habitat is not suitable for medium to large mammals and reptiles. **Conservation significant fauna** None **Habitat value:** Low	1.11	

Habitat type	Area (ha)	Photo
Mangrove Low Forest, Saline Flat and Marsh (SF) *Avicennia marina* dominated woodland over sparse low shrubs. This habitat is located along the western edge of the survey area. It is periodically inundated during high tides and as such has very little understory species. The mangrove trees have a closed canopy over most of the area providing refuge for bats and birds for both hunting and nesting/roosting. The trees within the survey area did not appear to contain any hollows suitable for nesting or roosting. A complex root system provides microhabitats for small ground dwelling fauna as well as foraging habitat for shorebirds. jhf Although the habitat is largely unmodified, the road/rail network in proximity to the survey area significantly influences the movements of water through the area and may reduce the flow/water levels overall. Other disturbances include rubbish and there is limited connectivity to the broader landscape. This habitat may support faunal groups such as bats, mangrove endemic birds, migratory shorebirds, migratory wetland birds, migratory seabirds and terns. **Conservation significant fauna:** • *Actitis hypoleucos* (Common Sandpiper) - foraging • *Arenaria interpres* (Ruddy Turnstone) – foraging • *Calidris acuminata* (Sharp-tailed Sandpiper) – foraging • *Calidris ferruginea* (Curlew Sandpiper) – foraging • *Calidris tenuirostris* (Great Knot) - foraging	1.82	

Habitat type	Area (ha)	Photo
• *Charadrius leschenaultia* (Greater Sand Plover) – foraging • *Charadrius mongolus* (Lesser Sand Plover) – foraging • *Limosa lapponica* (Bar-tailed Godwit) – foraging • *Numenius madagascariensis* (Eastern Curlew) – foraging • *Numenius phaeopus* (Whimbrel) - foraging • *Pluvialis fulva* (Pacific Golden Plover) – foraging • *Pluvialis squatarola* (Grey Plover) – foraging • *Tringa brevipes* (Grey-tailed Tattler) – foraging • *Xenus cinereus* (Terek Sandpiper) – foraging • *Tringa nebularia* (Common Greenshank) – foraging • *Limicola falcinellus* (Broad-billed Sandpiper) – foraging • *Pandion cristatus* (Osprey) – foraging • *Fregata ariel* (Lesser Frigatebird) – foraging • *Mormopterus loriae cobourgensis* (Little North-western Bat) – foraging and potential roosting • *Hydroprogne caspia* (Caspian Tern) – foraging • *Sterna hirundo* (Common Tern) – foraging • *Chlidonias leucopterus* (White-winged Black Tern) – foraging • *Sternula albifrons* (Little Tern) – foraging • *Sterna nereis nereis* (Fairy Tern) – foraging • *Thalasseus bergii* (Crested Tern) – foraging		

Habitat type	Area (ha)	Photo
• *Pachycephala melanura* (Mangrove Golden Whistler) – foraging and roosting • *Zosterops luteus* (Yellow White-eye) – fraging and roosting • *Pachycephala lanioides* (White-breasted Whistler) – foraging and roosting • *Rhipidura phasiana* (Mangrove Grey Fantail) – foraging and roosting • *Peneonanthe pulverulenta* (Mangrove Robin) – foraging and roosting **Habitat value:** High		
Cleared areas - Vehicle track/ train line A completely modified area (built up on reclaimed land) which includes partly sealed vehicle access track along the eastern section of the survey area and a section of raised sealed public road in the north west of the survey area. This area is likely sprayed/controlled as part of maintenance for the rail corridor. **Conservation significant fauna:** None **Habitat value:** Low	0.85	

4.2.2 Fauna diversity

The field survey recorded 39 vertebrate fauna species within the survey area. These comprise 35 birds from 23 different families and four reptiles from three different families. The list of fauna detected during the field survey is displayed in Appendix E.

The most specious families of birds were Accipitridae (5 species), Ardeidae (3 species) and Columbidae (3 species) Table 4-4. The most specious family of reptiles was Gekkonidae (2 species) Table 4-5.

Table 4-4 Bird families recorded during survey

Family	Number of species
Accipitridae	5
Alcedinidae	1
Anhingidae	1
Ardeidae	3
Artamidae	1
Cacatuidae	2
Campephagidae	1
Columbidae	3
Corvidae	1
Cuculidae	1
Estrildidae	1
Falconidae	2
Laridae	2
Maluridae	1
Meliphagidae	1
Meropidae	1
Monarchidae	1
Motacillidae	1
Pandionidae	1
Pelecanidae	1
Recurvirostridae	2
Threskiornithidae	1
Zosteropidae	1

Family	Number of species
Total	**35**

Table 4-5 Reptile families recorded during the field survey

Family	Number of species
Agamidae	1
Gekkonidae	2
Scincidae	1
Total	**4**

4.2.3 Conservation significant fauna

Two conservation significant fauna were recorded during the survey:

- Caspian Tern (*Sternia caspia*) – listed as Migratory under the Environmental Protection and Biodiversity Consecration (EPBC) Act (1999) and Biodiversity Conservation (BC) Act (2016)
- Osprey (*Pandion haliaetus*) – listed as Migratory under the EPBC Act (1999) and BC Act (2016)

Both of these species were recorded flying over the survey area and are known to frequent the area. The locations are shown on Figure 4. One species has been previously recorded on the DBCA database as occurring within the survey area; Common Greenshank (*Tringa nebularia*).

5. Discussion and conclusions

In total two vegetation types, not including cleared areas for tracks/rail line, were recorded in the survey area during the field survey. VT01 - Low open forest of *Avicennia marina* (mangrove) is widespread across the coast of the Pilbara bioregion and is not considered unique to the survey area. VT02 *Acacia shrubland* is considered a highly modified vegetation type with an embankment in place for the track and rail line. These vegetation types do not represent TEC's listed under the EPBC Act or BC Act or PECs listed by the DBCA.

A total of 47 flora taxa (including species and varieties) were recorded. Given the survey area's history of disturbance it was not expected to contain a high level of species diversity. No EPBC Act or BC Act listed flora or DBCA listed Priority flora were recorded from the survey area. Based on previous records, habitat requirements, efficacy of the survey, intensity of the survey, flowering times and condition of the site, all conservation significant flora identified within the desktop searches are considered unlikely to occur within the survey area. Of the five introduced/naturalised flora taxa identified during the survey, one is listed as a Declared Pest under BAM Act; ^*Coccinia grandis* was recorded.

Two fauna habitat types (not including cleared/disturbed land) were recorded within the survey area with these closely align with the vegetation types. The Mangrove low forest aligns with the Saline Flat and Marsh landform within the survey area. The habitats within the survey area are wide spread over the region and are not considered unique to the survey area.

The fauna survey recorded 39 vertebrate fauna species within the survey area. Two conservation significant fauna were recorded during the survey: Caspian Tern and Osprey. Both of these species were recorded flying over the survey area and are known to frequent the area. Both species are know from the region and opportunistically utilising the area as resources become available. One species has been previously recorded on the DBCA database as occurring within the survey area; Common Greenshank (*Tringa nebularia*). Of the 57 conservation listed fauna species identified (including mangrove endemic birds) in the likelihood of occurrence assessment, 30 species are known or considered likely to occur in the survey area. All of these species would likely utilise the survey area opportunistically, however, would not be dependent on the survey area for continual persistence as suitable habitat is abundant outside the survey area.

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Appendices

Appendix A – Figures

Legend

- Main road
- Highway
- 10km Buffer Study Area
- Survey Area

Wilson St

PORT HEDLAND

Wallwork Rd

Great Northern Hwy

Powell Rd

Hamilton Rd

SLIP POWERED BY LANDGATE

Paper Size ISO A3

0 0.5 1 1.5 2

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

GHD

BHP
Windfence Flora and Fauna Assessment

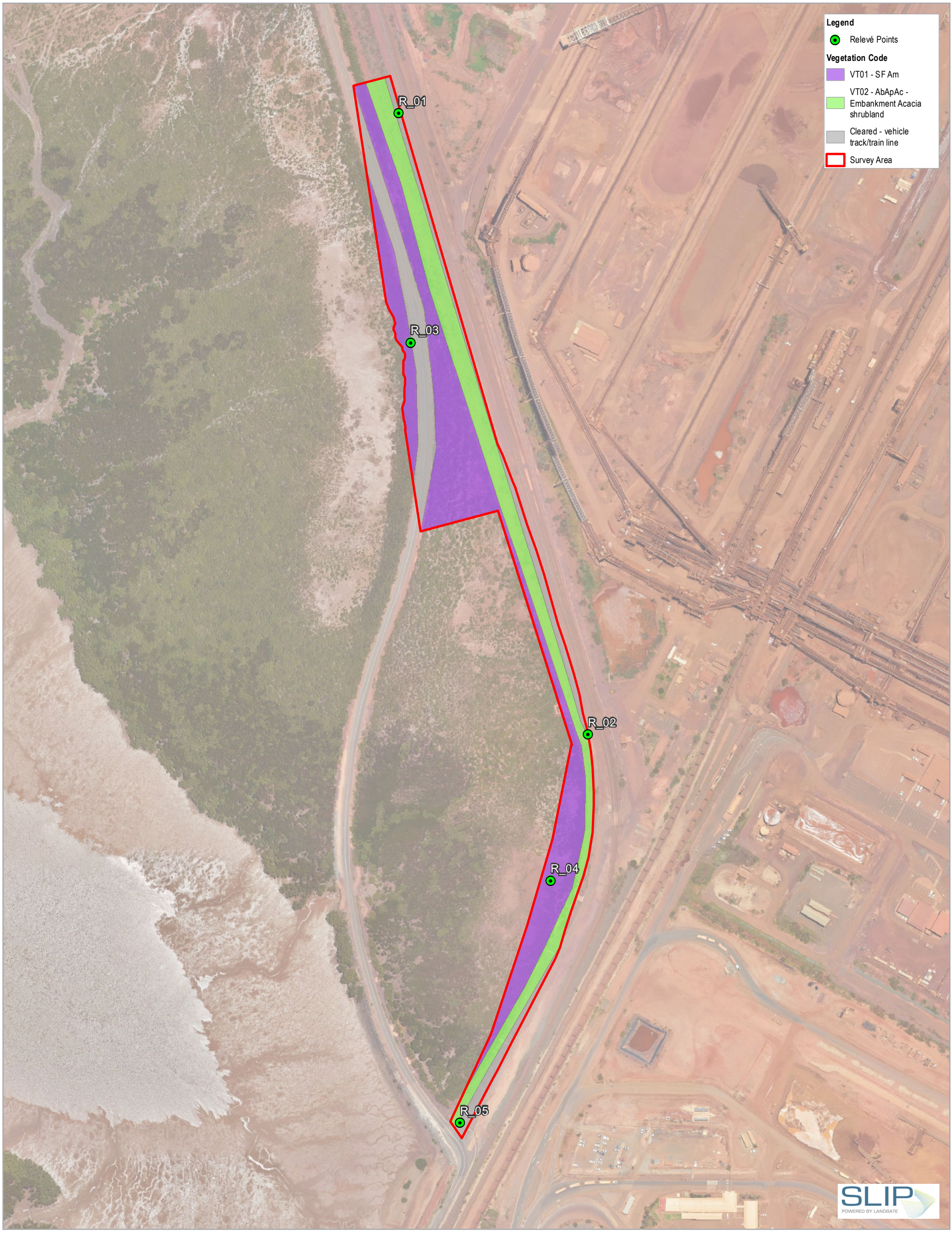
Location

Project No. **61-123530964**
Revision No. **0**
Date **08/07/2020**

FIGURE 1

G:\61\123530964\GIS\Maps\Working\61123530964_001_Rev0.mxd
Print date: 08 Jul 2020 - 13:15

Data source: BHP: Survey Area (2005); GA: Town (2007); Landgate: Imagery - WA Now (2019), Roads - 2019; GHD: 10km Buffer Study Area (2020). Created by: mmikkonen



Paper Size ISO A3

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Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

GHD

BHP
Windfence Flora and Fauna Assessment

Flora and Fauna Assessment - Vegetation type

Project No. **61-123530964**
Revision No. **0**
Date **08/07/2020**

FIGURE 2

G:\61\123530964\GIS\Maps\Working\61123530964_002_Rev0.mxd
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Data source: GHD: Releve Points (2020), Vegetation Type (2005); BHP: Survey Area (2005); Landgate: Imagery WA Now (2019). Created by: mmikkonen

Paper Size ISO A3

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Metres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

BHP
Windfence Flora and Fauna Assessment

Flora and Fauna Assessment - Vegetation condition

Project No. **61-123530964**
Revision No. **0**
Date **15/09/2020**

FIGURE 3

G:\61\123530964\GIS\Maps\Working\61123530964_003_Rev0.mxd
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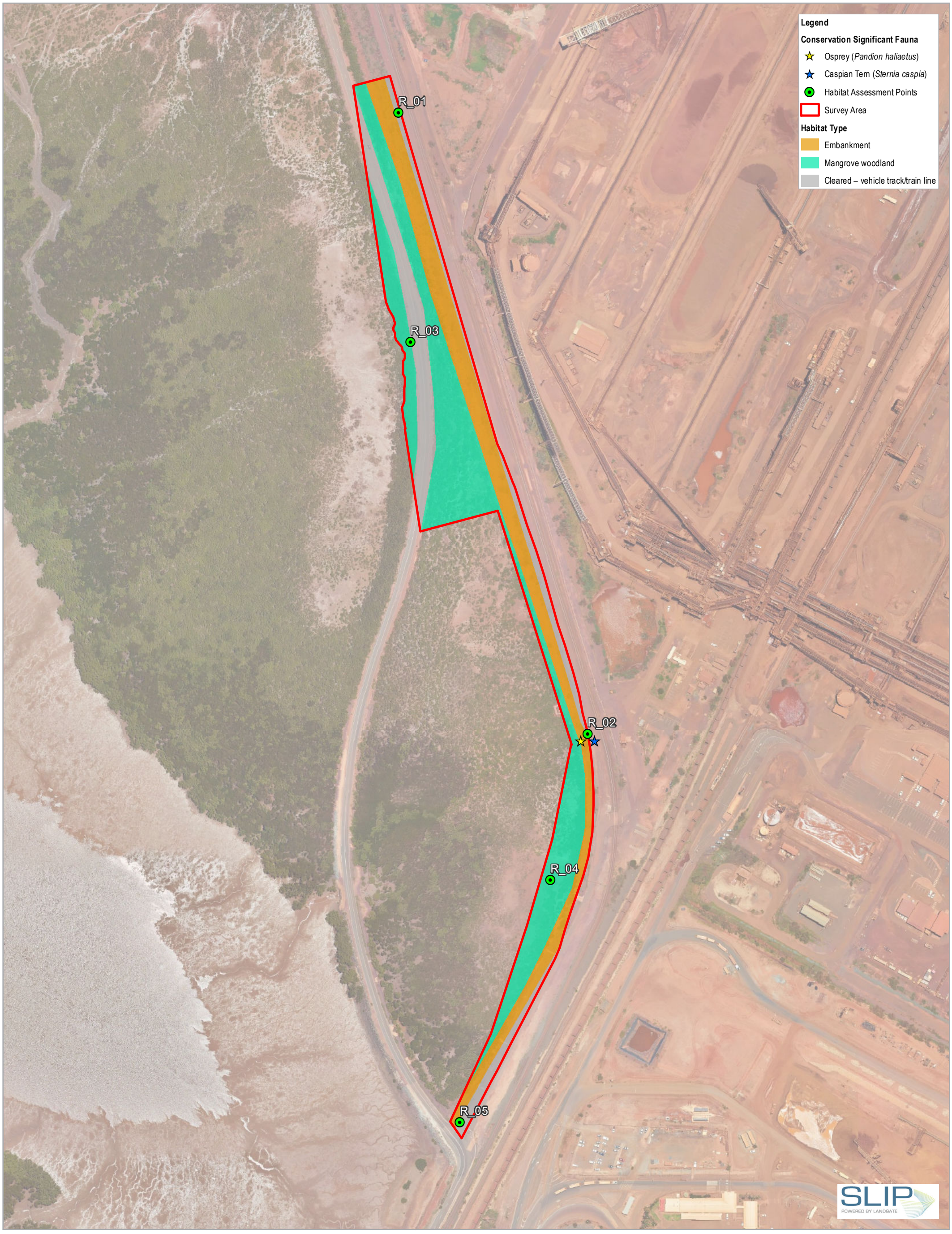
Data source: GHD: Vegetation Condition (2005); BHP: Survey Area (2005); SLIP: Imagery (2020). Created by: mmikkonen



Paper Size ISO A3

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Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

GHD

BHP
Windfence Flora and Fauna Assessment

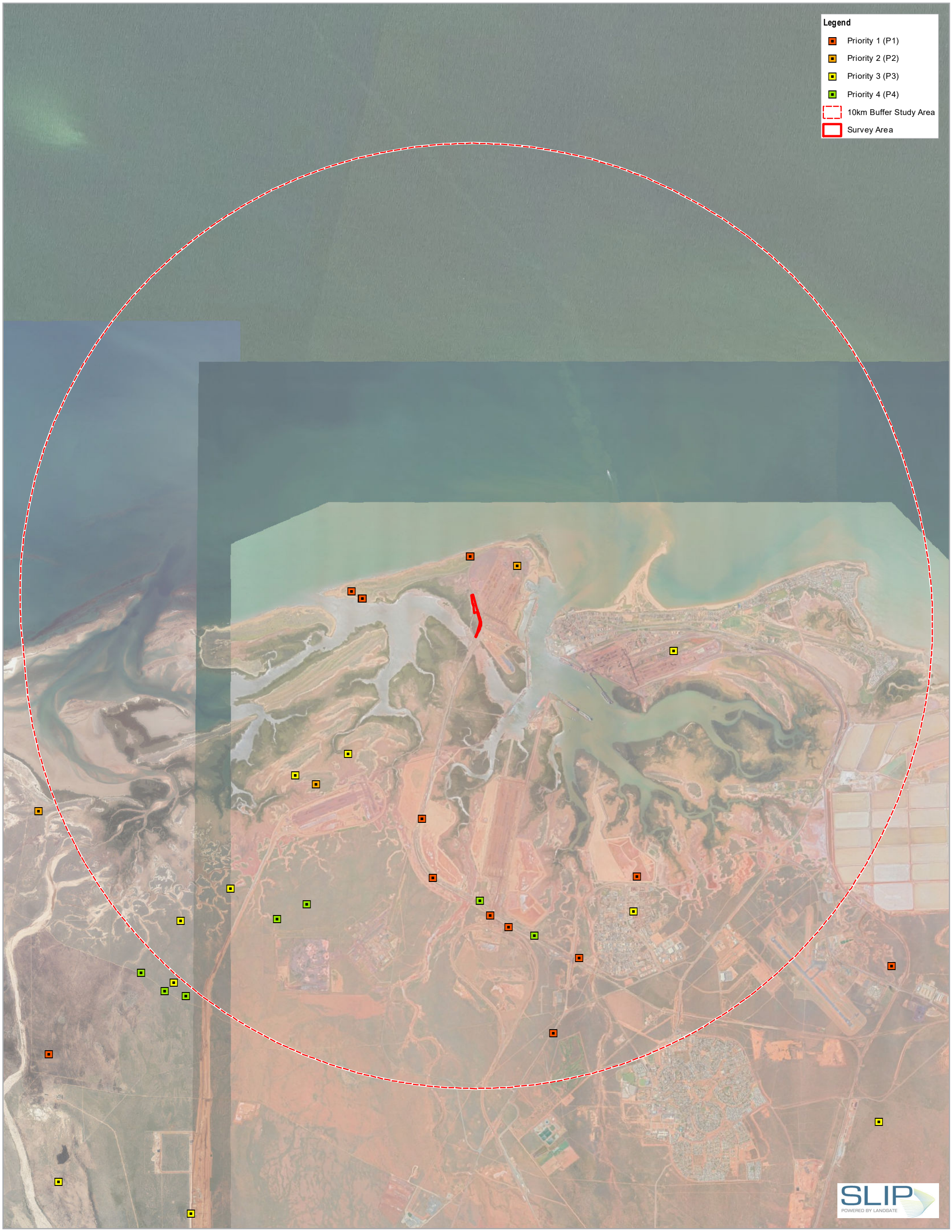
Flora and Fauna Assessment - Habitat type

Project No. **61-123530964**
Revision No. **1**
Date **09/07/2020**

FIGURE 4

G:\61\123530964\GIS\Maps\Working\61123530964_004_Rev1.mxd
Print date: 16 Sep 2020 - 13:32

Data source: GHD: Habitat Assessment Points, Habitat types, Conservation significant fauna - (2020); BHP: Survey Area (2005); Landgate: WA Now Imagery (2019). Created by: mmikkonen



Paper Size ISO A3

0 0.5 1 1.5 2

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

GHD

BHP
Windfence Flora and Fauna Assessment

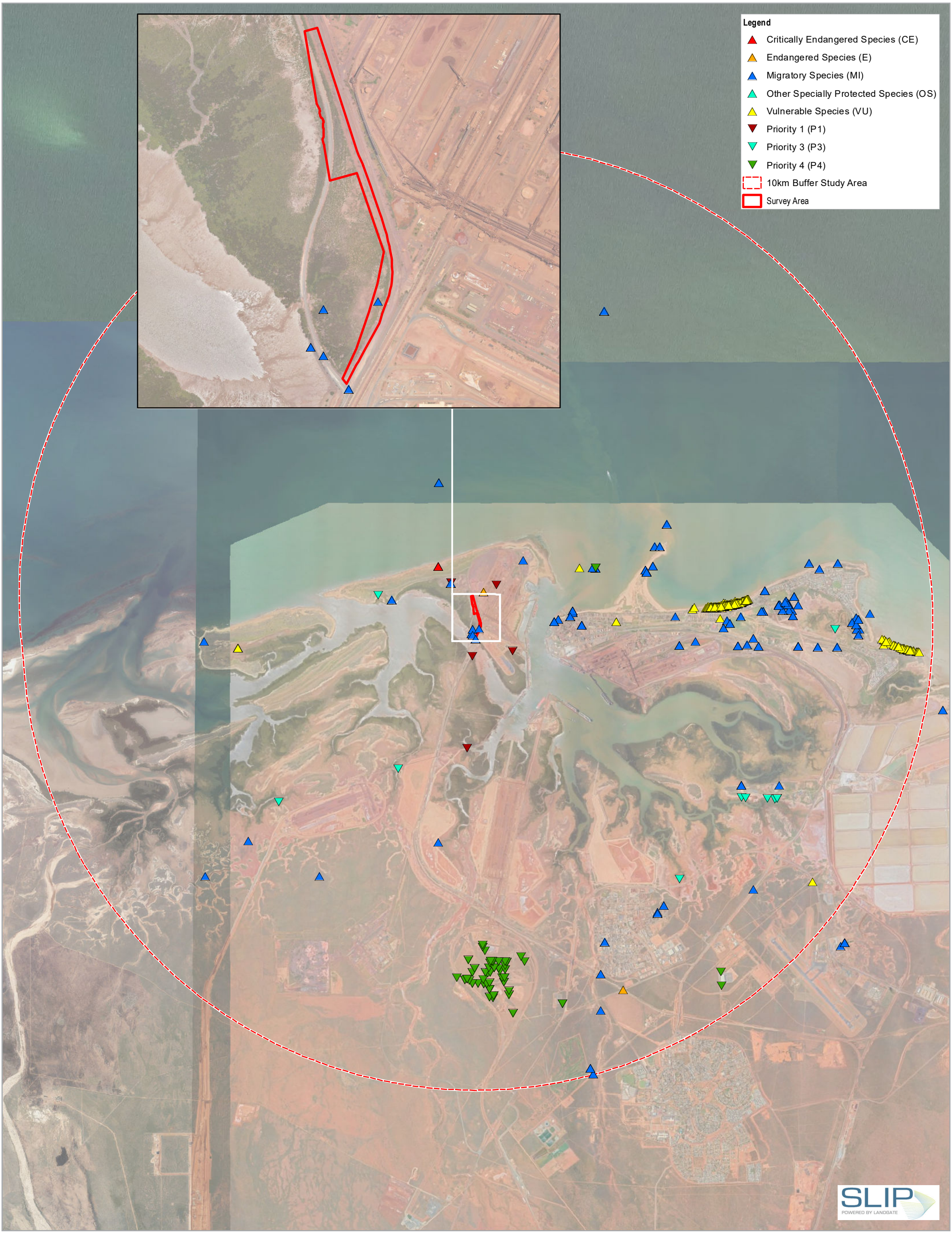
Project No. **61-123530964**
Revision No. **0**
Date **09/07/2020**

DBCA Threatened and Priority Flora

FIGURE 5

G:\61\123530964\GIS\Maps\Working\61123530964_005_Rev0.mxd
Print date: 09 Jul 2020 - 11:30

Data source: GHD: 10km Buffer Study Area (2020); DBCA: Threatened and Priority Flora (2020); BHP: Survey Area (2005); SLIP: Imagery (2019). Created by: mmikkonen



Paper Size ISO A3

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Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

GHD

BHP
Windfence Flora and Fauna Assessment

DBCA Threatened and Priority Fauna

Project No. **61-123530964**
Revision No. **0**
Date **09/07/2020**

FIGURE 6

G:\61\123530964\GIS\Maps\Working\61123530964_007_Rev0.mxd
Print date: 09 Jul 2020 - 11:33

Data source: GHD: 10km Buffer Study Area (2020); DBCA: Threatened and Priority Fauna (2020); BHP: Survey Area (2005); SLIP: Imagery (2019). Created by: mmikkonen

Appendix B – Conservation Codes and Relevant Legislations

Relevant legislation

Federal *Environment Protection and Biodiversity Conservation Act 1999*

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

The biological aspects listed as MNES include:

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

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

The EPBC Act is administered by the Department of Agriculture, Water and the Environment (DAWE).

State *Environmental Protection Act 1986*

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

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

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

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

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

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

e) Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.

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

g) Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.

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

i) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.

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

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

State *Biodiversity and Conservation Act 2016*

The *Biodiversity Conservation Act 2016* (BC Act) provides for the conservation and protection of biodiversity and biodiversity components, as well as the promotion of the ecologically sustainable use of biodiversity components in Western Australia. The BC Act replaces both the repealed *Wildlife Conservation Act 1950* (WC Act) and the *Sandalwood Act 1929* (Sandalwood Act), as well as their associated regulations. To attain the objectives of the BC Act, principles of ecological sustainable development have been established:

- Decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations
- If there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation
- The present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations
- The conservation of biodiversity and ecological integrity should be a fundamental consideration indecision-making
- Improved valuation, pricing and incentive mechanisms should be promoted.

The BC Act is administered by the Department of Biodiversity Conservation and Attractions (DBCA).

State *Biosecurity and Agriculture Management Act 2007*

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

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

The Western Australian Organism List (WAOL) provides the status of organisms which have been categorised under the BAM Act. A Declared Pest is a prohibited organism or an organism for which a declaration under Section 22(2) of the Act is in force. Declared Pests may be assigned a control category including: C1 (exclusion), C2 (eradication) and C3 (management). The category may apply to the whole of the State, LGAs, districts, individual properties or even paddocks, and all landholders are obliged to comply with the specific category of control. Categories of control are defined below.

DPIRD Categories for Declared Pests under the BAM Act

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

Background information

Environmentally Sensitive Areas

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

Aspects of ESAs

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

Reserves and conservation areas

Department of Biodiversity, Conservation and Attractions managed lands and waters

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

Vegetation extent and status

The National Objectives and Targets for Biodiversity Conservation 2001–2005 (Commonwealth of Australia 2001) recognise that the retention of 30 percent or more of the pre-clearing extent of each ecological community is necessary if Australia's biological diversity is to be protected. This is the

threshold level below which species loss appears to accelerate exponentially and loss below this level should not be permitted. This level of recognition is in keeping with the targets recommended in the review of the National Strategy for the Conservation of Australia's Biological Diversity (ANZECC 2000).

The extent of remnant native vegetation in WA has been assessed by Shepherd et al. (2002) and the GoWA (2018), based on broadscale vegetation association mapping by Beard (various publications). The GoWA produces Statewide Vegetation Statistics Reports that are used for a number of purposes including conservation planning, land use planning and when assessing development applications. The reports are updated at least every two years.

Vegetation condition

The vegetation condition can be assessed in accordance with the vegetation condition rating scale for the Eremaean and Northern Botanical Provinces (EPA 2016a). The scale recognises the intactness of vegetation and consists of six rating levels as outlined below.

Vegetation condition rating scale for the Eremaean and Northern Botanical Provinces

Condition	Eremaean and Northern Botanical Provinces 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.

Conservation codes

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

Ecological communities

Conservation significant communities

Ecological communities are defined as naturally occurring biological assemblages that occur in a particular type of habitat (English and Blyth 1997). Federally listed Threatened Ecological Communities (TECs) are protected under the EPBC Act. The BC Act provides for the Minister to list an ecological community as a TEC (section 27), or as a collapsed ecological community (section 31) statutory listing of State TECs by the Minister. The legislation also describes statutory processes for preparing recovery plans for TECs, the registration of their critical habitat, and penalties for unauthorised modification of TECs.

Possible TECs that do not meet survey criteria are added to the DBCA Priority Ecological Community (PEC) List under Priorities 1, 2 and 3. These are ecological communities that are adequately known; are rare but not threatened, or meet criteria for Near Threatened. PECs that have been recently removed from the threatened list are placed in Priority 4. These ecological communities require regular monitoring. Conservation dependent ecological communities are placed in Priority 5. PECs are not listed under any formal Federal or State legislation, however, may be listed as TECs under the EPBC Act.

Conservation codes and definitions for TECs listed under the EPBC Act and/ or BC Act

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

Categories	Definition
Critically Endangered (CR)	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or that was originally of limited distribution and is facing severe modification or destruction throughout its range in the immediate future, or is already severely degraded throughout its range but capable of being substantially restored or rehabilitated.
Endangered (EN)	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or was originally of limited distribution and is in danger of significant modification throughout its range or severe modification or destruction over most of its range in the near future.
Vulnerable (VU)	An ecological community that has been adequately surveyed and is found to be declining and/or has declined in distribution and/or condition and whose ultimate security has not yet been assured and/or a community that is still widespread but is believed likely to move into a category of higher threat in the near future if threatening processes continue or begin operating throughout its range.
Collapsed ecological communities	
An ecological community is eligible for listing as a collapsed ecological community at a particular time if, at that time – (a) there is no reasonable doubt that the last occurrence of the ecological community has collapsed); or (b) the ecological community has been so extensively modified throughout its range that no occurrence of it is likely to recover – (i) its species composition or structure; or (ii) its species composition and structure. Section 33 of the BC Act provides for a collapsed ecological community to be regarded as a threatened ecological community if it is discovered in a state that no longer makes it eligible for listing as a collapsed ecological community.	

Conservation categories and definitions for PECS as listed by the DBCA

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

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

Other significant vegetation

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

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

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

Flora and fauna

Conservation significant flora and fauna

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

The Federal conservation level of flora and fauna species and their significance status is assessed under the EPBC Act. The significance levels for flora and fauna used in the EPBC Act align with the International Union for Conservation of Nature (IUCN) Red List criteria, which are internationally recognised as providing best practice for assigning the conservation status of species. The EPBC Act also protects land and migratory species that are listed under International Agreements. The list of migratory species established under section 209 of the EPBC Act comprises:

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

The State conservation level of flora and fauna species and their significance status also follows the IUCN Red List criteria. Under the BC Act flora and fauna can be listed as Threatened, Extinct and as Specially Protected species.

Threatened species are those are species which have been adequately searched for and are deemed to be, in the wild, either rare, under identifiable threat of extinction, or otherwise in need of special protection, and have been gazetted as such. The assessment of the conservation status of Threatened species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria. Specially protected species meet 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 or Extinct species under the BC Act cannot also be listed as Specially Protected 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 flora or fauna.

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

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.

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

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

Conservation category	Definition
Threatened species	
Critically Endangered (CR)	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.
Endangered (EN)	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
Vulnerable (VU)	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.
Extinct species	
Extinct (EX)	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).
Extinct in the Wild (EW)	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).
Specially protected species	
Migratory (MI)	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

Conservation category	Definition
Species of special conservation interest (conservation dependent fauna) (CD)	Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened.
Other specially protected fauna (OS)	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).

Conservation codes for DBCA listed Priority flora and fauna

Priority category	Definition
Priority 1	Poorly-known taxa Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.
Priority 2	Poorly-known taxa Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.
Priority 3	Poorly-known taxa Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.
Priority 4	Rare, Near Threatened and other taxa in need of monitoring A. Rare: Taxa that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These taxa are usually represented on conservation lands. B. Near Threatened. Taxa that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable. C. Taxa that have been removed from the list of threatened taxa during the past five years for reasons other than taxonomy.

Other significant flora

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

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

Other significant fauna

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

Introduced plants (weeds)

Declared Pests

Information on species considered to be Declared Pests is provided under *State Biosecurity and Agriculture Management Act 2007.*

Weeds of National Significance

The spread of weeds across a range of land uses or ecosystems is important in the context of socio-economic and environmental values. The assessment of Weeds of National Significance (WoNS) is based on four major criteria:

- Invasiveness
- Impacts
- Potential for spread
- Socio-economic and environmental values

Australian state and territory governments have identified thirty-two Weeds of National Significance (WoNS); a list of 20 WoNS was endorsed in 1999 and a further 12 were added in 2012.

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GoWA 2018, *Statewide Vegetation Statistics incorporating the CAR Reserve Analysis (Full report)*, Current as of December 2017, Perth Western Australia, Department of Environment and Conservation, from https://www2.landgate.wa.gov.au/web/guest/downloader.

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Appendix C – Desktop assessment outputs

NatureMap

PMST

Literature Review

NatureMap
Mapping Western Australia's biodiversity

NatureMap Species Report

Created By Guest user on 05/05/2020

Kingdom Plantae
Current Names Only Yes
Core Datasets Only Yes
Method 'By Circle'
Centre 118° 34' 19" E,20° 18' 46" S
Buffer 10km
Group By Family

Family	Species	Records
Acanthaceae	2	6
Aizoaceae	4	19
Amaranthaceae	15	44
Anadyomenaceae	1	1
Apocynaceae	1	4
Asteraceae	15	21
Bignoniaceae	1	2
Bonnemaisoniaceae	1	1
Boraginaceae	5	7
Byblidaceae	1	2
Campanulaceae	1	1
Capparaceae	1	2
Caryophyllaceae	2	2
Caulerpaceae	2	4
Chenopodiaceae	19	64
Cladophoraceae	1	1
Cleomaceae	2	5
Commelinaceae	1	1
Convolvulaceae	8	10
Cucurbitaceae	3	3
Cymodoceaceae	1	2
Cyperaceae	4	7
Dasyaceae	1	3
Dasycladaceae	2	6
Droseraceae	1	1
Euphorbiaceae	9	17
Fabaceae	60	159
Frankeniaceae	1	5
Galaxauraceae	2	2
Gelidiellaceae	1	1
Goodeniaceae	6	13
Gyrostemonaceae	1	1
Haloragaceae	1	1
Hemerocallidaceae	2	8
Hydrocharitaceae	1	1
Loganiaceae	1	1
Loranthaceae	1	1
Malvaceae	21	39
Marsileaceae	1	1
Menispermaceae	1	2
Molluginaceae	2	2
Montiaceae	2	3
Moraceae	2	2
Myrtaceae	4	5
Nyctaginaceae	1	2
Papaveraceae	1	1
Phyllanthaceae	1	1
Pittosporaceae	1	1
Plantaginaceae	1	1
Plumbaginaceae	1	4
Poaceae	42	70
Portulacaceae	3	4
Proteaceae	1	2
Rhizophoraceae	3	13
Rhodomelaceae	1	3
Rubiaceae	1	1
Sapindaceae	1	1
Scrophulariaceae	1	1
Sebdeniaceae	1	1
Siphonocladaceae	1	1
Solanaceae	5	10
Stylidiaceae	1	1
Thymelaeaceae	1	1
Udoteaceae	2	6
Violaceae	1	1
Zygophyllaceae	1	5
TOTAL	**286**	**614**

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

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Acanthaceae					
1.	6828	*Avicennia marina (White Mangrove)*			
2.	14555	*Avicennia marina subsp. marina*			
Aizoaceae					
3.	44240	*Trianthema cusackianum*			
4.	2830	*Trianthema portulacastrum (Giant Pigweed)*	Y		
5.	44362	*Trianthema triquetrum*			
6.	44360	*Trianthema turgidifolium*			
Amaranthaceae					
7.	2646	*Aerva javanica (Kapok Bush)*	Y		
8.	18363	*Gomphrena canescens subsp. canescens*			
9.	2677	*Gomphrena celosioides (Gomphrena Weed)*	Y		
10.	2680	*Gomphrena cunninghamii*			
11.	2686	*Gomphrena pusilla*		P2	
12.	2695	*Ptilotus arthrolasius*			
13.	2696	*Ptilotus astrolasius*			
14.	2699	*Ptilotus axillaris (Mat Mulla Mulla)*			
15.	2704	*Ptilotus calostachyus (Weeping Mulla Mulla)*			
16.	2717	*Ptilotus divaricatus (Climbing Mulla Mulla)*			
17.	2721	*Ptilotus exaltatus (Tall Mulla Mulla)*			
18.	2725	*Ptilotus fusiformis*			
19.	2746	*Ptilotus nobilis (Tall Mulla Mulla)*			
20.	2766	*Ptilotus villosiflorus*			
21.	2768	*Pupalia lappacea*	Y		
Anadyomenaceae					
22.	35872	*Anadyomene plicata*			
Apocynaceae					
23.	12832	*Gymnanthera cunninghamii*		P3	
Asteraceae					
24.	7903	*Calotis hispidula (Bindy Eye)*			
25.	47174	*Chrysocephalum apiculatum subsp. pilbarense*			
26.	7939	*Conyza bonariensis (Flaxleaf Fleabane)*	Y		
27.	45972	*Cyanthillium cinereum var. cinereum*	Y		
28.	35558	*Flaveria trinervia (Speedy Weed)*	Y		
29.	17816	*Pluchea ferdinandi-muelleri*			
30.	8168	*Pluchea rubelliflora*			
31.	8170	*Pluchea tetranthera*			
32.	8189	*Pseudognaphalium luteoalbum (Jersey Cudweed)*			
33.	41224	*Pterocaulon intermedium*			
34.	8192	*Pterocaulon sphacelatum (Apple Bush, Fruit Salad Plant)*			
35.	8236	*Streptoglossa cylindriceps*			
36.	8240	*Streptoglossa odora*			
37.	25902	*Symphyotrichum squamatum (Bushy Starwort)*	Y		
38.	8252	*Tridax procumbens (Tridax, Tridax Daisy)*	Y		
Bignoniaceae					
39.	48390	*Dolichandrone occidentalis*			
Bonnemaisoniaceae					
40.	26486	*Asparagopsis taxiformis*			
Boraginaceae					
41.	6704	*Heliotropium conocarpum*			
42.	6705	*Heliotropium crispatum*			
43.	6706	*Heliotropium cunninghamii*			
44.	17309	*Heliotropium pachyphyllum*			
45.	6727	*Trichodesma zeylanicum (Camel Bush, Kumbalin)*			
Byblidaceae					
46.	18073	*Byblis filifolia*			
Campanulaceae					
47.	7393	*Wahlenbergia tumidifructa*			
Capparaceae					
48.	48291	*Capparis spinosa subsp. nummularia*			
Caryophyllaceae					
49.	2902	*Polycarpaea involucrata*			
50.	2903	*Polycarpaea longiflora*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Caulerpaceae					
51.	42620	*Caulerpa chemnitzia*			
52.	44539	*Caulerpa cylindracea*			
Chenopodiaceae					
53.	2476	*Atriplex semilunaris (Annual Saltbush)*			
54.	2499	*Dissocarpus paradoxus (Curious Saltbush)*			
55.	2504	*Dysphania plantaginella*			
56.	11890	*Dysphania rhadinostachya subsp. rhadinostachya*			
57.	12064	*Enchylaena tomentosa var. tomentosa (Barrier Saltbush)*			
58.	2573	*Neobassia astrocarpa*			
59.	2582	*Rhagodia eremaea (Thorny Saltbush)*			
60.	30434	*Salsola australis*			
61.	11650	*Sclerolaena bicornis var. bicornis (Goathead Burr)*			
62.	2616	*Sclerolaena glabra*			
63.	2617	*Sclerolaena hostilis*			
64.	2638	*Suaeda arbusculoides*			
65.	31616	*Tecticornia auriculata*			
66.	33236	*Tecticornia halocnemoides (Shrubby Samphire)*			
67.	33238	*Tecticornia halocnemoides subsp. tenuis*			
68.	33319	*Tecticornia indica subsp. bidens*			
69.	33318	*Tecticornia indica subsp. leiostachya (Samphire)*			
70.	33220	*Tecticornia pterygosperma subsp. denticulata*			
71.	2644	*Threlkeldia diffusa (Coast Bonefruit)*			
Cladophoraceae					
72.	26612	*Chaetomorpha melagonium*			
Cleomaceae					
73.	29101	*Cleome uncifera subsp. uncifera*			
74.	2988	*Cleome viscosa (Tickweed, Tjinduwadhu)*			
Commelinaceae					
75.	1165	*Commelina ensifolia (Wandering Jew, Buargu)*			
Convolvulaceae					
76.	11167	*Bonamia erecta*			
77.	6606	*Bonamia media*			
78.	11200	*Evolvulus alsinoides var. villosicalyx*			
79.	6635	*Ipomoea pes-caprae*			
80.	11312	*Ipomoea pes-caprae subsp. brasiliensis*			
81.	6637	*Ipomoea polymorpha*			
82.	6651	*Operculina aequisepala*			
83.	6653	*Polymeria ambigua (Morning Glory)*			
Cucurbitaceae					
84.	48838	*Citrullus amarus*	Y		
85.	15036	*Coccinia grandis*	Y		
86.	12032	*Trichosanthes cucumerina var. cucumerina*			
Cymodoceaceae					
87.	131	*Halodule uninervis*			
Cyperaceae					
88.	750	*Bulbostylis barbata*			
89.	751	*Bulbostylis burbidgeae*		P4	
90.	777	*Cyperus bulbosus (Bush Onion, Tjanmata)*			
91.	806	*Cyperus polystachyos (Bunchy Sedge)*			
Dasyaceae					
92.	26930	*Heterosiphonia crassipes*			
Dasycladaceae					
93.	44548	*Neomeris bilimbata*			
94.	27099	*Neomeris van-bosseae*			
Droseraceae					
95.	3093	*Drosera burmanni (Tropical Sundew)*			
Euphorbiaceae					
96.	4583	*Adriana tomentosa*			
97.	17422	*Adriana tomentosa var. tomentosa*			
98.	4617	*Euphorbia australis (Namana)*			
99.	35303	*Euphorbia australis var. subtomentosa*			
100.	4619	*Euphorbia biconvexa*			
101.	4635	*Euphorbia myrtoides*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
102.	12097	*Euphorbia tannensis subsp. eremophila (Desert Spurge)*			
103.	42879	*Euphorbia trigonosperma*			
104.	4656	*Jatropha gossypiifolia (Bellyache Bush)*	Y		

Fabaceae

105.	3198	*Acacia acradenia*			
106.	3214	*Acacia ancistrocarpa (Fitzroy Wattle)*			
107.	3241	*Acacia bivenosa*			
108.	44588	*Acacia bivenosa x sclerosperma subsp. sclerosperma*			
109.	17013	*Acacia colei var. colei*			
110.	3377	*Acacia inaequilatera (Baderi)*			
111.	3434	*Acacia maitlandii (Maitland's Wattle)*			
112.	29015	*Acacia pyrifolia var. pyrifolia*			
113.	30071	*Acacia robeorum*			
114.	13078	*Acacia sclerosperma subsp. sclerosperma*			
115.		*Acacia sp.*			
116.	19456	*Acacia stellaticeps*			
117.	13070	*Acacia synchronicia*			
118.	3579	*Acacia trachycarpa (Minni Ritchi, Balgali)*			
119.	20319	*Acacia tumida var. pilbarensis*			
120.	3609	*Albizia lebbeck*			
121.	17147	*Alysicarpus muelleri*			
122.	11055	*Cajanus cinereus*			
123.	10972	*Cajanus marmoratus*			
124.	3749	*Canavalia rosea (Wild Jack Bean)*			
125.	3769	*Clitoria ternatea*	Y		
126.	3774	*Crotalaria cunninghamii (Green Birdflower, Bilbun)*			
127.	19378	*Crotalaria dissitiflora subsp. benthamiana*			
128.	17118	*Cullen leucanthum*			
129.	15714	*Cullen stipulaceum*			
130.	19333	*Desmodium scorpiurus*	Y		
131.	3942	*Glycine tomentella (Woolly Glycine)*			
132.	14587	*Indigastrum parviflorum*			
133.	3973	*Indigofera colutea (Sticky Indigo)*			
134.	3981	*Indigofera linnaei (Birdsville Indigo)*			
135.	16061	*Indigofera oblongifolia*	Y		
136.	16062	*Indigofera sessiliflora*	Y		
137.	3987	*Indigofera trita*			
138.	4054	*Leptosema anomalum*			
139.	3613	*Leucaena leucocephala (Leucaena)*	Y		
140.	3614	*Neptunia dimorphantha (Sensitive Plant)*			
141.	3673	*Parkinsonia aculeata (Parkinsonia)*	Y		
142.	3675	*Petalostylis labicheoides (Slender Petalostylis)*			
143.	4191	*Rhynchosia minima (Rhynchosia)*			
144.	12307	*Senna glutinosa subsp. glutinosa*			
145.	12312	*Senna notabilis*			
146.	10848	*Senna occidentalis*	Y		
147.	18445	*Senna stricta*			
148.	4196	*Sesbania cannabina (Sesbania Pea)*			
149.	4198	*Sesbania formosa (White Dragon Tree)*			
150.	43320	*Stylosanthes guianensis var. guianensis*	Y		
151.	12353	*Stylosanthes hamata (Verano Stylo)*	Y		
152.	4242	*Swainsona pterostylis*			
153.	4272	*Tephrosia leptoclada*			
154.	4280	*Tephrosia rosea (Flinders River Poison, Bungoo'dah)*			
155.	41825	*Tephrosia rosea var. Fortescue creeks (M.I.H. Brooker 2186)*			
156.	41920	*Tephrosia rosea var. Port Hedland (A.S. George 1114)*		P1	
157.	19531	*Tephrosia rosea var. clementii*			
158.	19529	*Tephrosia rosea var. rosea*			
159.	4281	*Tephrosia simplicifolia*			
160.	15947	*Tephrosia sp. B Kimberley Flora (C.A. Gardner 7300)*			
161.	17768	*Tephrosia sp. Bungaroo Creek (M.E. Trudgen 11601)*			
162.	15949	*Tephrosia sp. D Kimberley Flora (R.D. Royce 1848)*			
163.	40060	*Tephrosia sp. clay soils (S. van Leeuwen et al. PBS 0273)*			
164.	18661	*Zornia muelleriana*			

Frankeniaceae

165.	5188	*Frankenia ambita*			

Galaxauraceae

166.	29615	*Dichotomaria obtusata*			
167.	26835	*Galaxaura rugosa*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Gelidiellaceae					
168.	26842	*Gelidiella acerosa*			
Goodeniaceae					
169.	7509	*Goodenia forrestii*			
170.	7526	*Goodenia microptera*			
171.	7530	*Goodenia nuda*		P4	
172.	10982	*Goodenia stobbsiana*			
173.	12723	*Scaevola amblyanthera*			
174.	13178	*Scaevola amblyanthera var. centralis*			
Gyrostemonaceae					
175.	2778	*Codonocarpus cotinifolius (Native Poplar, Kundurangu)*			
Haloragaceae					
176.	6174	*Haloragis gossei*			
Hemerocallidaceae					
177.	1285	*Corynotheca micrantha (Sand Lily)*			
178.	1286	*Corynotheca pungens*			
Hydrocharitaceae					
179.	169	*Thalassia hemprichii*			
Loganiaceae					
180.	6519	*Mitrasacme connata*			
Loranthaceae					
181.	2383	*Amyema preissii (Wireleaf Mistletoe)*			
Malvaceae					
182.	4895	*Abutilon lepidum*			
183.	18410	*Corchorus carnarvonensis*			
184.	4857	*Corchorus elachocarpus*			
185.	17339	*Corchorus incanus*			
186.	25847	*Corchorus incanus subsp. incanus*			
187.	13467	*Corchorus trilocularis*			
188.	4867	*Corchorus walcottii (Woolly Corchorus)*			
189.	4910	*Gossypium australe (Native Cotton)*			
190.	4913	*Gossypium hirsutum (Upland Cotton)*	Y		
191.	29317	*Hibiscus austrinus var. austrinus*			
192.	4922	*Hibiscus brachychlaenus*			
193.	4930	*Hibiscus goldsworthii*			
194.	4933	*Hibiscus leptocladus*			
195.	5051	*Melhania oblongifolia*			
196.	46816	*Seringia elliptica (Showy fire-bush)*			
197.	46821	*Seringia nephrosperma (Free carpel fire-bush)*			
198.	4972	*Sida clementii*			
199.	4977	*Sida fibulifera (Silver Sida)*			
200.	16993	*Sida sp. Rabbit Flat (B.J. Carter 626)*			
201.	13481	*Triumfetta ramosa*			
202.	5106	*Waltheria indica*			
Marsileaceae					
203.	76	*Marsilea hirsuta (Nardoo)*			
Menispermaceae					
204.	2942	*Tinospora smilacina (Snakevine, Oondala)*			
Molluginaceae					
205.	48203	*Hypertelis cerviana*			
206.	48201	*Trigastrotheca molluginea*			
Montiaceae					
207.	40825	*Calandrinia pentavalvis*			
208.	2872	*Calandrinia tepperiana*			
Moraceae					
209.	31578	*Ficus aculeata var. indecora (Ranji)*			
210.	19648	*Ficus brachypoda*			
Myrtaceae					
211.	17073	*Corymbia aspera*			
212.	14650	*Corymbia flavescens*			
213.	5923	*Melaleuca lasiandra*			
214.	6005	*Osbornia octodonta (Myrtle Mangrove)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Nyctaginaceae					
215.	2770	*Boerhavia coccinea (Tar Vine, Wituka)*			
Papaveraceae					
216.	17797	*Argemone ochroleuca subsp. ochroleuca*	Y		
Phyllanthaceae					
217.	4680	*Phyllanthus maderaspatensis*			
Pittosporaceae					
218.	19744	*Pittosporum angustifolium*			
Plantaginaceae					
219.	12489	*Stemodia lathraia*			
Plumbaginaceae					
220.	6490	*Muellerolimon salicorniaceum*			
Poaceae					
221.	17651	*Andropogon gayanus*	Y		
222.	211	*Aristida hygrometrica (Northern Kerosene Grass)*			
223.	240	*Bothriochloa ewartiana (Desert Bluegrass)*			
224.	258	*Cenchrus ciliaris (Buffel Grass)*	Y		
225.	41568	*Cenchrus setaceus (Fountain Grass)*	Y		
226.	29721	*Cenchrus setiger (Birdwood Grass)*	Y		
227.	266	*Chloris barbata (Purpletop Chloris)*	Y		
228.	272	*Chloris virgata (Feathertop Rhodes Grass)*	Y		
229.	280	*Cymbopogon bombycinus (Silky Oilgrass)*			
230.		*Cynodon radiatus*			
231.	288	*Dactyloctenium aegyptium (Coast Button Grass)*	Y		
232.	290	*Dactyloctenium radulans (Button Grass)*			
233.	311	*Digitaria ciliaris (Summer Grass)*	Y		
234.	48378	*Diplachne fusca subsp. fusca*			
235.	360	*Enneapogon lindleyanus (Wiry Nineawn, Purple-head Nineawn)*			
236.	365	*Enneapogon polyphyllus (Leafy Nineawn)*			
237.	12749	*Enneapogon purpurascens (Purple Nineawn)*			
238.	368	*Enteropogon ramosus (Windmill Grass, Curly Windmill Grass)*			
239.	16730	*Eragrostis crateriformis*		P3	
240.	375	*Eragrostis cumingii (Cuming's Love Grass)*			
241.	378	*Eragrostis dielsii (Mallee Lovegrass)*			
242.	380	*Eragrostis eriopoda (Woollybutt Grass, Wangurnu)*			
243.	381	*Eragrostis falcata (Sickle Lovegrass)*			
244.	17609	*Eragrostis pilosa*	Y		
245.	400	*Eriachne aristidea*			
246.	411	*Eriachne helmsii (Buck Wanderrie Grass)*			
247.	414	*Eriachne obtusa (Northern Wandarrie Grass)*			
248.	464	*Iseilema membranaceum (Small Flinders Grass)*			
249.	468	*Lamarckia aurea (Goldentop)*	Y		
250.	503	*Panicum decompositum (Native Millet, Kaltu-kaltu)*			
251.	518	*Paspalidium clementii (Clements Paspalidium)*			
252.	529	*Paspalum fasciculatum*	Y		
253.	606	*Setaria dielsii (Diels' Pigeon Grass)*			
254.	611	*Setaria sphacelata (South African Pigeon Grass)*	Y		
255.	619	*Sorghum plumosum (Plume Canegrass)*			
256.	625	*Spinifex longifolius (Beach Spinifex)*			
257.	672	*Themeda avenacea (Native Oatgrass)*			
258.	13131	*Triodia epactia*			
259.	700	*Triodia secunda*			
260.	706	*Triraphis mollis (Needle Grass)*			
261.	728	*Whiteochloa cymbiformis*			
262.	730	*Xerochloa imberbis (Rice Grass)*			
Portulacaceae					
263.	2875	*Portulaca australis*			
264.	43981	*Portulaca decipiens*			
265.	2884	*Portulaca oleracea (Purslane, Wakati)*			
Proteaceae					
266.	2079	*Grevillea pyramidalis (Caustic Bush, Tjungu)*			
Rhizophoraceae					
267.	5291	*Bruguiera exaristata (Ribbed Mangrove)*			
268.	39680	*Ceriops australis*			
269.	5295	*Rhizophora stylosa (Spotted-leaved Red Mangrove)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Rhodomelaceae					
270.	26441	*Acanthophora spicifera*			
Rubiaceae					
271.	13339	*Synaptantha tillaeacea var. tillaeacea*			
Sapindaceae					
272.	4759	*Dodonaea coriacea*			
Scrophulariaceae					
273.	17158	*Myoporum montanum (Native Myrtle)*			
Sebdeniaceae					
274.	27274	*Sebdenia flabellata*			
Siphonocladaceae					
275.	26769	*Dictyosphaeria cavernosa*			
Solanaceae					
276.	6971	*Nicotiana benthamiana (Tjuntiwari)*			
277.	11856	*Nicotiana occidentalis subsp. occidentalis*			
278.	20652	*Physalis angulata*	Y		
279.	7002	*Solanum diversiflorum*			
280.	7029	*Solanum phlomoides*			
Stylidiaceae					
281.	7711	*Stylidium desertorum*			
Thymelaeaceae					
282.	5230	*Pimelea ammocharis*			
Udoteaceae					
283.	27348	*Udotea argentea*			
284.	35302	*Udotea glaucescens*			
Violaceae					
285.	5215	*Hybanthus aurantiacus*			
Zygophyllaceae					
286.	4380	*Tribulus occidentalis (Perennial Caltrop)*			

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

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

NatureMap
Mapping Western Australia's biodiversity

NatureMap Species Report

Created By Guest user on 22/01/2020

Kingdom	Animalia
Current Names Only	Yes
Core Datasets Only	Yes
Method	'By Circle'
Centre	118° 34' 19" E,20° 18' 46" S
Buffer	10km
Group By	Species Group

Species Group	Species	Records
Amphibian	7	24
Bird	174	1980
Fish	68	102
Invertebrate	4	6
Mammal	32	214
Reptile	68	2345
TOTAL	**353**	**4671**

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Amphibian					
1.	25371	*Cyclorana australis (Giant Frog)*			
2.	25375	*Cyclorana maini (Sheep Frog)*			
3.	25392	*Litoria rubella (Little Red Tree Frog)*			
4.	25422	*Neobatrachus aquilonius (Northern Burrowing Frog)*			
5.	25430	*Notaden nichollsi (Desert Spadefoot)*			
6.	42306	*Platyplectrum spenceri (Centralian Burrowing Frog)*			
7.	25445	*Uperoleia russelli (Northwest Toadlet)*			
Bird					
8.	25535	*Accipiter cirrocephalus (Collared Sparrowhawk)*			
9.	41323	*Actitis hypoleucos (Common Sandpiper)*		IA	
10.	25544	*Aegotheles cristatus (Australian Owlet-nightjar)*			
11.	24312	*Anas gracilis (Grey Teal)*			
12.	24316	*Anas superciliosa (Pacific Black Duck)*			
13.	47414	*Anhinga novaehollandiae (Australasian Darter)*			
14.	25670	*Anthus australis (Australian Pipit)*			
15.	24285	*Aquila audax (Wedge-tailed Eagle)*			
16.	25557	*Ardea garzetta (Little Egret)*			
17.	25558	*Ardea ibis (Cattle Egret)*			
18.	25559	*Ardea intermedia (Intermediate Egret)*			
19.	41324	*Ardea modesta (great egret, white egret)*			
20.	24341	*Ardea pacifica (White-necked Heron)*			
21.	24610	*Ardeotis australis (Australian Bustard)*			
22.	25736	*Arenaria interpres (Ruddy Turnstone)*		IA	
23.	24778	*Arenaria interpres subsp. interpres (Ruddy Turnstone)*		IA	
24.	25566	*Artamus cinereus (Black-faced Woodswallow)*			
25.	24352	*Artamus cinereus subsp. melanops (Black-faced Woodswallow)*			
26.	25567	*Artamus leucorynchus (White-breasted Woodswallow)*			
27.	24354	*Artamus leucorynchus subsp. leucopygialis (White-breasted Woodswallow)*			
28.	24356	*Artamus personatus (Masked Woodswallow)*			
29.	24357	*Artamus superciliosus (White-browed Woodswallow)*			
30.	24318	*Aythya australis (Hardhead)*			
31.	47897	*Butorides striata (Striated Heron, Mangrove Heron)*			
32.	25715	*Cacatua roseicapilla (Galah)*			
33.	25716	*Cacatua sanguinea (Little Corella)*			
34.	42307	*Cacomantis pallidus (Pallid Cuckoo)*			
35.	24779	*Calidris acuminata (Sharp-tailed Sandpiper)*		IA	
36.	24780	*Calidris alba (Sanderling)*		IA	
37.	25738	*Calidris canutus (Red Knot, knot)*		IA	
38.	24784	*Calidris ferruginea (Curlew Sandpiper)*		T	
39.	24786	*Calidris melanotos (Pectoral Sandpiper)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
				IA	
40.	24788	*Calidris ruficollis (Red-necked Stint)*		IA	
41.	24789	*Calidris subminuta (Long-toed Stint)*		IA	
42.	24790	*Calidris tenuirostris (Great Knot)*		T	
43.	25600	*Centropus phasianinus (Pheasant Coucal)*			
44.	25575	*Charadrius leschenaultii (Greater Sand Plover)*		T	
45.	25576	*Charadrius mongolus (Lesser Sand Plover)*		T	
46.	24377	*Charadrius ruficapillus (Red-capped Plover)*			
47.	24378	*Charadrius veredus (Oriental Plover)*		IA	
48.	41332	*Chlidonias leucopterus (White-winged Black Tern, white-winged tern)*		IA	
49.		*Chroicocephalus novaehollandiae*			
50.	24431	*Chrysococcyx basalis (Horsfield's Bronze Cuckoo)*			
51.	24288	*Circus approximans (Swamp Harrier)*			
52.	24289	*Circus assimilis (Spotted Harrier)*			
53.	24774	*Cladorhynchus leucocephalus (Banded Stilt)*			
54.	25675	*Colluricincla harmonica (Grey Shrike-thrush)*			
55.	24399	*Columba livia (Domestic Pigeon)*	Y		
56.	25568	*Coracina novaehollandiae (Black-faced Cuckoo-shrike)*			
57.	24416	*Corvus bennetti (Little Crow)*			
58.	25593	*Corvus orru (Torresian Crow)*			
59.	24418	*Corvus orru subsp. cecilae (Western Crow)*			
60.	25701	*Coturnix ypsilophora (Brown Quail)*			
61.	24420	*Cracticus nigrogularis (Pied Butcherbird)*			
62.	24322	*Cygnus atratus (Black Swan)*			
63.	24324	*Dendrocygna arcuata (Wandering Whistling Duck, Chestnut Whistling Duck)*			
64.	24325	*Dendrocygna eytoni (Plumed Whistling Duck)*			
65.	24470	*Dromaius novaehollandiae (Emu)*			
66.		*Egretta garzetta*			
67.		*Egretta novaehollandiae*			
68.		*Elanus axillaris*			
69.	24290	*Elanus caeruleus subsp. axillaris (Australian Black-shouldered Kite)*			
70.	47937	*Elseyornis melanops (Black-fronted Dotterel)*			
71.	24631	*Emblema pictum (Painted Finch)*			
72.		*Eolophus roseicapillus*			
73.	24653	*Eopsaltria pulverulenta (Mangrove Robin)*			
74.	25578	*Ephippiorhynchus asiaticus (Black-necked Stork)*			
75.	24837	*Eremiornis carteri (Spinifex-bird)*			
76.	24379	*Erythrogonys cinctus (Red-kneed Dotterel)*			
77.	24368	*Eurostopodus argus (Spotted Nightjar)*			
78.	25621	*Falco berigora (Brown Falcon)*			
79.	25622	*Falco cenchroides (Australian Kestrel, Nankeen Kestrel)*			
80.	25623	*Falco longipennis (Australian Hobby)*			
81.	24478	*Fregata ariel (Lesser Frigatebird)*		IA	
82.	25727	*Fulica atra (Eurasian Coot)*			
83.	24793	*Gallinago stenura (Pin-tailed Snipe)*		IA	
84.	25730	*Gallirallus philippensis (Buff-banded Rail)*			
85.	47954	*Gelochelidon nilotica (Gull-billed Tern)*		IA	
86.	47955	*Gelochelidon nilotica subsp. affinis (Gull-billed Tern)*		IA	Y
87.	24401	*Geopelia cuneata (Diamond Dove)*			
88.	24402	*Geopelia humeralis (Bar-shouldered Dove)*			
89.	25585	*Geopelia striata (Zebra Dove)*			
90.	24403	*Geopelia striata subsp. placida (Peaceful Dove)*			
91.	24404	*Geophaps plumifera (Spinifex Pigeon)*			
92.	24276	*Gerygone tenebrosa (Dusky Gerygone)*			
93.	24481	*Glareola maldivarum (Oriental Pratincole)*		IA	
94.	24443	*Grallina cyanoleuca (Magpie-lark)*			
95.	25627	*Haematopus fuliginosus (Sooty Oystercatcher)*			
96.	24487	*Haematopus longirostris (Pied Oystercatcher)*			
97.	24293	*Haliaeetus leucogaster (White-bellied Sea-Eagle)*			
98.	25541	*Haliastur indus (Brahminy Kite)*			
99.	24295	*Haliastur sphenurus (Whistling Kite)*			
100.	47965	*Hieraaetus morphnoides (Little Eagle)*			
101.	25734	*Himantopus himantopus (Black-winged Stilt)*			
102.	24491	*Hirundo neoxena (Welcome Swallow)*			
103.	25630	*Hirundo rustica (Barn Swallow)*		IA	
104.	48587	*Hydroprogne caspia (Caspian Tern)*		IA	
105.	24367	*Lalage tricolor (White-winged Triller)*			
106.	25637	*Larus novaehollandiae (Silver Gull)*			
107.	25661	*Lichmera indistincta (Brown Honeyeater)*			
108.	25739	*Limicola falcinellus (Broad-billed Sandpiper)*		IA	

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
109.	24795	*Limnodromus semipalmatus (Asian Dowitcher)*		IA	
110.	30932	*Limosa lapponica (Bar-tailed Godwit)*		IA	
111.	24796	*Limosa lapponica subsp. menzbieri (Bar-tailed Godwit (northern Siberian))*		T	
112.	24326	*Malacorhynchus membranaceus (Pink-eared Duck)*			
113.	25651	*Malurus lamberti (Variegated Fairy-wren)*			
114.	25652	*Malurus leucopterus (White-winged Fairy-wren)*			
115.	24583	*Manorina flavigula (Yellow-throated Miner)*			
116.	24736	*Melopsittacus undulatus (Budgerigar)*			
117.	24598	*Merops ornatus (Rainbow Bee-eater)*			
118.		*Microcarbo melanoleucos*			
119.	25542	*Milvus migrans (Black Kite)*			
120.	25545	*Mirafra javanica (Horsfield's Bushlark, Singing Bushlark)*			
121.	24602	*Motacilla flava subsp. simillima (Yellow Wagtail)*		IA	Y
122.	25685	*Neochmia ruficauda (Star Finch)*			
123.	24798	*Numenius madagascariensis (Eastern Curlew)*		T	
124.	24799	*Numenius minutus (Little Curlew, Little Whimbrel)*		IA	
125.	25742	*Numenius phaeopus (Whimbrel)*		IA	
126.	24742	*Nymphicus hollandicus (Cockatiel)*			
127.	24497	*Oceanites oceanicus (Wilson's Storm-petrel)*		IA	
128.	24407	*Ocyphaps lophotes (Crested Pigeon)*			
129.	41347	*Onychoprion anaethetus (Bridled Tern)*		IA	
130.	24620	*Pachycephala lanioides (White-breasted Whistler)*			
131.	25678	*Pachycephala melanura (Mangrove Golden Whistler)*			
132.	25680	*Pachycephala rufiventris (Rufous Whistler)*			
133.	48591	*Pandion cristatus (Osprey, Eastern Osprey)*		IA	
134.	24627	*Pardalotus rubricatus (Red-browed Pardalote)*			
135.	24642	*Passer montanus (Eurasian Tree Sparrow)*	Y		
136.	24648	*Pelecanus conspicillatus (Australian Pelican)*			
137.		*Peneoenanthe pulverulenta*			
138.	48060	*Petrochelidon ariel (Fairy Martin)*			
139.	48061	*Petrochelidon nigricans (Tree Martin)*			
140.	25697	*Phalacrocorax carbo (Great Cormorant)*			
141.	25698	*Phalacrocorax melanoleucos (Little Pied Cormorant)*			
142.	24667	*Phalacrocorax sulcirostris (Little Black Cormorant)*			
143.	25699	*Phalacrocorax varius (Pied Cormorant)*			
144.	24411	*Phaps histrionica (Flock Bronzewing, Flock Pigeon)*			
145.	24842	*Platalea regia (Royal Spoonbill)*			
146.	24747	*Platycercus spurius (Red-capped Parrot)*			
147.	24843	*Plegadis falcinellus (Glossy Ibis)*		IA	
148.	24382	*Pluvialis fulva (Pacific Golden Plover)*		IA	
149.	24383	*Pluvialis squatarola (Grey Plover)*		IA	
150.	25703	*Podargus strigoides (Tawny Frogmouth)*			
151.	24681	*Poliocephalus poliocephalus (Hoary-headed Grebe)*			
152.	25731	*Porphyrio porphyrio (Purple Swamphen)*			
153.	24769	*Porzana fluminea (Australian Spotted Crake)*			
154.	24757	*Ptilonorhynchus maculatus subsp. guttatus (Western Bowerbird)*			
155.	24776	*Recurvirostra novaehollandiae (Red-necked Avocet)*			
156.	48096	*Rhipidura albiscapa (Grey Fantail)*			
157.	25614	*Rhipidura leucophrys (Willie Wagtail)*			
158.	24457	*Rhipidura phasiana (Mangrove Grey Fantail)*			
159.	30948	*Smicrornis brevirostris (Weebill)*			
160.	24521	*Sterna bengalensis (Lesser Crested Tern)*			
161.	25642	*Sterna hirundo (Common Tern)*		IA	
162.	25643	*Sterna hybrida (Whiskered Tern)*			
163.	48593	*Sternula albifrons (Little Tern)*		IA	
164.	24482	*Stiltia isabella (Australian Pratincole)*			
165.	25705	*Tachybaptus novaehollandiae (Australasian Grebe, Black-throated Grebe)*			
166.	30870	*Taeniopygia guttata (Zebra Finch)*			
167.		*Thalasseus bengalensis*			
168.	48597	*Thalasseus bergii (Crested Tern)*		IA	
169.	24845	*Threskiornis spinicollis (Straw-necked Ibis)*			
170.	25548	*Todiramphus chloris (Collared Kingfisher)*			
171.	42351	*Todiramphus pyrrhopygius (Red-backed Kingfisher)*			
172.	25549	*Todiramphus sanctus (Sacred Kingfisher)*			
173.	24803	*Tringa brevipes (Grey-tailed Tattler)*		P4	
174.	24806	*Tringa glareola (Wood Sandpiper)*		IA	
175.	24808	*Tringa nebularia (Common Greenshank, greenshank)*		IA	
176.	24809	*Tringa stagnatilis (Marsh Sandpiper, little greenshank)*		IA	
177.	24851	*Turnix velox (Little Button-quail)*			
178.		*Tyto delicatula*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
179.	25577	*Vanellus miles (Masked Lapwing)*			
180.	41351	*Xenus cinereus (Terek Sandpiper)*		IA	
181.	24857	*Zosterops luteus (Yellow White-eye)*			

Fish

182.		*? ?*			
183.		*Abudefduf bengalensis*			
184.		*Acanthopagrus australis*			
185.		*Acanthopagrus latus*			
186.		*Amniataba caudavittata*			
187.		*Amphiprion clarkii*			
188.		*Apogon rueppellii*			
189.		*Arrhamphus sclerolepis*			
190.		*Atelomycterus sp.*			Y
191.		*Bathygobius fuscus*			
192.		*Batrachomoeus dahli*			
193.		*Butis butis*			
194.		*Caranx ignobilis*			
195.		*Caranx sp.*			
196.		*Centrogenys vaigiensis*			
197.		*Cephalopholis boenak*			
198.		*Chiloscyllium punctatum*			
199.		*Choerodon cyanodus*			
200.		*Dactyloptena papilio*			
201.		*Drepane punctata*			
202.		*Eleutheronema tetradactylum*			
203.		*Epinephelus areolatus*			
204.		*Epinephelus malabaricus*			
205.		*Epinephelus quoyanus*			
206.		*Filicampus tigris*			
207.		*Gerres subfasciatus*			
208.		*Glossamia aprion*			
209.		*Halophryne diemensis*			
210.		*Herklotsichthys koningsbergeri*			
211.		*Herklotsichthys lippa*			
212.		*Hyporhamphus quoyi*			
213.		*Hyporhamphus sp.*			
214.		*Ichthyscopus spinosus*			
215.		*Kathala axillaris*			Y
216.		*Labracinus sp.*			Y
217.		*Leiopotherapon unicolor*			
218.		*Leptobrama muelleri*			
219.		*Liza vaigiensis*			
220.		*Lophiocharon trisignatus*			
221.		*Lutjanus carponotatus*			
222.		*Megalops cyprinoides*			
223.		*Monodactylus argenteus*			
224.		*Mugil cephalus*			
225.		*Nematalosa vlaminghi*			
226.		*Omobranchus sp.*			
227.		*Opistognathus inornatus*			
228.		*Ostracion sp.*			
229.		*Paraplotosus albilabris*			
230.		*Parascorpaena picta*			
231.		*Pentapodus porosus*			
232.		*Periophthalmodon freycineti*			
233.		*Protonibea diacanthus*			
234.		*Rastrelliger serventyi (invalid)*			Y
235.		*Rhynchostracion nasus*			
236.		*Salarias sexfilum*			
237.		*Salarias sp.*			
238.		*Scaevius milii*			
239.		*Scomberoides commersonnianus*			
240.		*Scomberomorus semifasciatus*			
241.		*Selenotoca multifasciata*			
242.		*Sillago analis*			
243.		*Sillago schomburgkii*			
244.		*Strongylura strongylura*			
245.		*Synanceia horrida*			
246.		*Synodus sageneus*			
247.		*Terapon jarbua*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
248.		*Yongeichthys nebulosus*			
249.		*Zabidius novemaculeatus*			
Invertebrate					
250.		*Austracantha minax*			
251.		*Latrodectus hasseltii*			
252.		*Morebilus diversus*			
253.		*Urodacus hoplurus*			
Mammal					
254.	24251	*Bos taurus (European Cattle)*	Y		
255.	48920	*Canis familiaris (Dog, Dingo)*	Y		
256.	24181	*Chaerephon jobensis (Greater Northern Freetail-bat, Northern Mastiff Bat)*			
257.	24186	*Chalinolobus gouldii (Gould's Wattled Bat)*			
258.	30903	*Dasycercus blythi (Brush-tailed Mulgara, Ampurta)*		P4	
259.	24089	*Dasycercus cristicauda (Crest-tailed Mulgara, minyiminyi)*		P4	
260.	24091	*Dasykaluta rosamondae (Little Red Kaluta)*			
261.	24093	*Dasyurus hallucatus (Northern Quoll)*		T	
262.	24084	*Dugong dugon (Dugong)*		S	
263.	24258	*Equus caballus (Horse)*	Y		
264.	24041	*Felis catus (Cat)*	Y		
265.	24128	*Lagostrophus fasciatus subsp. fasciatus (Banded hare-wallaby, Mernine)*		T	
266.	25489	*Macropus robustus (Euro, Biggada)*			
267.	24135	*Macropus robustus subsp. erubescens (Euro, Biggada)*			
268.	24168	*Macrotis lagotis (Bilby, Dalgyte, Ninu)*		T	
269.		*Mormopterus (Ozimops) cobourgianus*			
270.	24223	*Mus musculus (House Mouse)*	Y		
271.	24224	*Notomys alexis (Spinifex Hopping-mouse)*			
272.	24192	*Nyctophilus arnhemensis (Arnhem Land Long-eared Bat)*			
273.	24194	*Nyctophilus geoffroyi (Lesser Long-eared Bat)*			
274.	24085	*Oryctolagus cuniculus (Rabbit)*	Y		
275.	48034	*Osphranter robustus (Euro, Biggada)*			
276.	24234	*Pseudomys delicatulus (Delicate Mouse)*			
277.	24235	*Pseudomys desertor (Desert Mouse)*			
278.	24237	*Pseudomys hermannsburgensis (Sandy Inland Mouse)*			
279.	24239	*Pseudomys nanus (Western Chestnut Mouse)*			
280.	24174	*Saccolaimus flaviventris (Yellow-bellied Sheath-tailed Bat)*			
281.	24120	*Sminthopsis youngsoni (Lesser Hairy-footed Dunnart)*			
282.	24175	*Taphozous georgianus (Common Sheath-tailed Bat)*			
283.	30954	*Tursiops aduncus (Indo-Pacific Bottlenose Dolphin)*			
284.	24205	*Vespadelus finlaysoni (Finlayson's Cave Bat)*			
285.	24040	*Vulpes vulpes (Red Fox)*	Y		
Reptile					
286.	25243	*Acanthophis pyrrhus (Desert Death Adder)*			
287.		*Acanthophis wellsei*			
288.	25355	*Aipysurus laevis (Olive Seasnake)*			
289.	25318	*Antaresia perthensis (Pygmy Python)*			
290.	25320	*Aspidites melanocephalus (Black-headed Python)*			
291.	25236	*Aspidites ramsayi (Woma)*			
292.	25331	*Brachyurophis approximans (North-western Shovel-nosed Snake)*			
293.	25017	*Carlia triacantha (Desert Rainbow Skink)*			
294.	25336	*Chelonia mydas (Green Turtle)*		T	
295.	25458	*Ctenophorus caudicinctus (Ring-tailed Dragon)*			
296.	24865	*Ctenophorus caudicinctus subsp. caudicinctus (Ring-tailed Dragon)*			
297.	25459	*Ctenophorus isolepis (Crested Dragon, Military Dragon)*			
298.	24876	*Ctenophorus isolepis subsp. isolepis (Crested Dragon, Military Dragon)*			
299.	24882	*Ctenophorus nuchalis (Central Netted Dragon)*			
300.	25024	*Ctenotus angusticeps (Airlie Island Ctenotus, Northwestern coastal Ctenotus)*		P3	
301.	25036	*Ctenotus duricola*			
302.	25043	*Ctenotus grandis subsp. titan*			
303.	25044	*Ctenotus hanloni*			
304.	25045	*Ctenotus helenae*			
305.	25064	*Ctenotus pantherinus subsp. ocellifer (Leopard Ctenotus)*			
306.	25062	*Ctenotus piankai*			
307.	25069	*Ctenotus rufescens*			
308.	25073	*Ctenotus saxatilis (Rock Ctenotus)*			
309.	25077	*Ctenotus serventyi*			
310.	24997	*Delma butleri*			
311.	25004	*Delma tincta*			
312.	25297	*Demansia rufescens (Rufous Whipsnake)*			
313.		*Demansia torquata*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
					Y
314.	24926	*Diplodactylus conspicillatus (Fat-tailed Gecko)*			
315.	25092	*Egernia depressa (Southern Pygmy Spiny-tailed Skink)*			
316.	42404	*Eremiascincus isolepis*			
317.	41409	*Eremiascincus musivus (Mosaic Desert Skink)*			
318.	25342	*Eretmochelys imbricata subsp. bissa (Hawksbill Turtle)*		T	
319.	25327	*Fordonia leucobalia (White-bellied Mangrove Snake)*			
320.	25301	*Furina ornata (Moon Snake)*			
321.	24956	*Gehyra pilbara*			
322.	24958	*Gehyra punctata*			
323.	24959	*Gehyra variegata*			
324.	25232	*Hemidactylus frenatus (Asian House Gecko)*	Y		
325.	24961	*Heteronotia binoei (Bynoe's Gecko)*			
326.	25363	*Hydrelaps darwiniensis*			
327.	25366	*Hydrophis elegans (Elegant Seasnake, Bar-bellied Seasnake)*			
328.	43385	*Hydrophis stokesii (Stoke's Seasnake, Sea Snake)*			
329.	25125	*Lerista bipes*			
330.	30928	*Lerista clara*			
331.	25155	*Lerista muelleri*			
332.	25005	*Lialis burtonis*			
333.	30933	*Lucasium stenodactylum*			
334.	25184	*Menetia greyii*			
335.	25193	*Morethia ruficauda subsp. exquisita*			
336.	25344	*Natator depressus (Flatback Turtle)*		T	
337.	24969	*Nephrurus levis subsp. pilbarensis*			
338.	24907	*Pogona minor subsp. minor (Dwarf Bearded Dragon)*			
339.	24908	*Pogona minor subsp. mitchelli (Dwarf Bearded Dragon)*			
340.	25261	*Pseudechis australis (Mulga Snake)*			
341.	42416	*Pseudonaja mengdeni (Western Brown Snake)*			
342.	25263	*Pseudonaja modesta (Ringed Brown Snake)*			
343.	25264	*Pseudonaja nuchalis (Gwardar, Northern Brown Snake)*			
344.	25009	*Pygopus nigriceps*			
345.	25305	*Simoselaps anomalus (Desert Banded Snake)*			
346.	24924	*Strophurus ciliaris subsp. aberrans*			
347.	24932	*Strophurus jeanae*			
348.	25202	*Tiliqua multifasciata (Central Blue-tongue)*			
349.	25209	*Varanus acanthurus (Spiny-tailed Monitor)*			
350.	25210	*Varanus brevicauda (Short-tailed Pygmy Monitor)*			
351.	30825	*Varanus bushi (Pilbara Mulga Monitor)*			
352.	25212	*Varanus eremius (Pygmy Desert Monitor)*			
353.	25218	*Varanus gouldii (Bungarra or Sand Monitor)*			

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

[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.

Australian Government
Department of the Environment and Energy

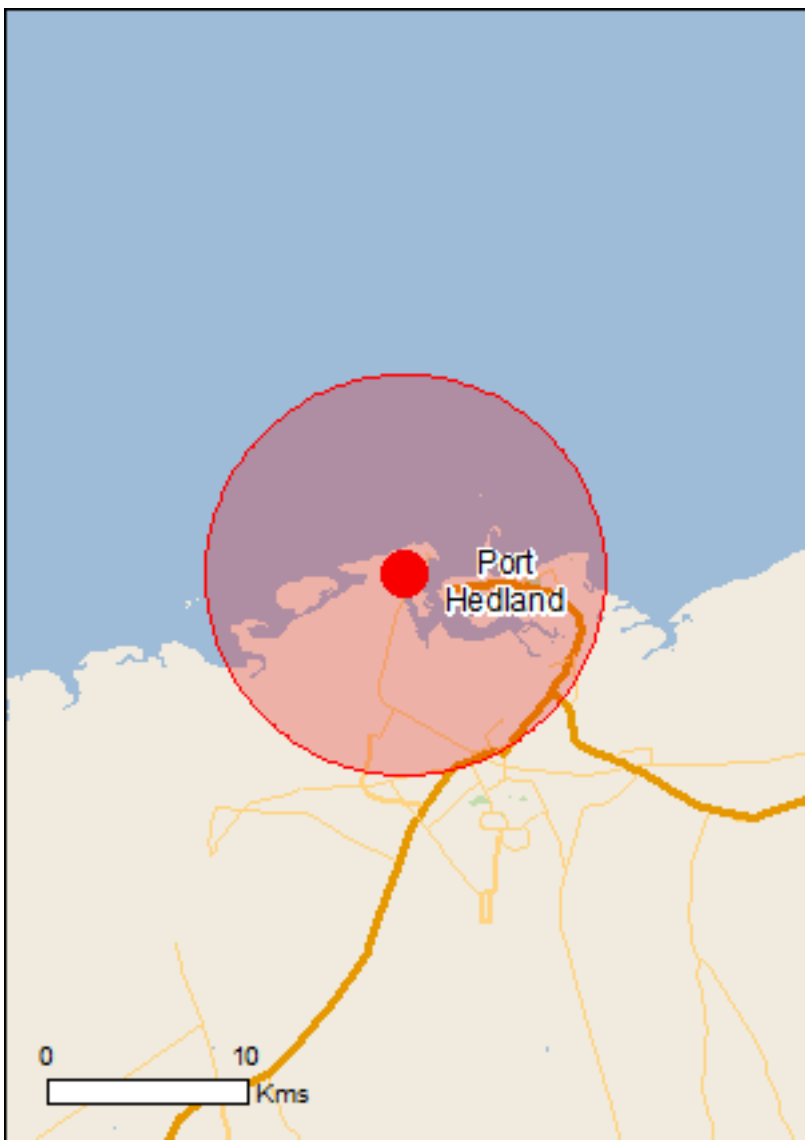
EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

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

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

Report created: 15/05/20 14:16:29



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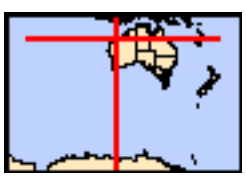
Coordinates
Buffer: 10.0Km



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:	1
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	28
Listed Migratory Species:	55

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the 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:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	95
Whales and Other Cetaceans:	12
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:	15
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Commonwealth Marine Area [Resource Information]

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside the Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area. Generally the Commonwealth Marine Area stretches from three nautical miles to two hundred nautical miles from the coast.

Name
EEZ and Territorial Sea

Marine Regions [Resource Information]

If you are planning to undertake action in an area in or close to the Commonwealth Marine Area, and a marine bioregional plan has been prepared for the Commonwealth Marine Area in that area, the marine bioregional plan may inform your decision as to whether to refer your proposed action under the EPBC Act.

Name
North-west

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Species or species habitat known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Species or species habitat known to occur within area
Limosa lapponica baueri Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat known to occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri) [86432]	Critically Endangered	Species or species habitat likely to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur

Name	Status	Type of Presence
		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		
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Dasyurus hallucatus Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat likely to occur within area
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
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Rhinonicteris aurantia (Pilbara form) Pilbara Leaf-nosed Bat [82790]	Vulnerable	Species or species habitat may occur within area
Reptiles		
Aipysurus apraefrontalis Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat likely to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Liasis olivaceus barroni Olive Python (Pilbara subspecies) [66699]	Vulnerable	Species or species habitat likely to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
Sharks		
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Breeding likely to occur within area

Name	Status	Type of Presence
[Rhincodon typus](#)		
Whale Shark [66680]	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
Migratory Marine Birds		
[Anous stolidus](#)		
Common Noddy [825]		Species or species habitat may occur within area
[Apus pacificus](#)		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
[Calonectris leucomelas](#)		
Streaked Shearwater [1077]		Species or species habitat may occur within area
[Fregata ariel](#)		
Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to occur within area
[Macronectes giganteus](#)		
Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Migratory Marine Species		
[Anoxypristis cuspidata](#)		
Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat likely to occur within area
[Balaenoptera edeni](#)		
Bryde's Whale [35]		Species or species habitat may occur within area
[Balaenoptera musculus](#)		
Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
[Carcharodon carcharias](#)		
White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
[Caretta caretta](#)		
Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
[Chelonia mydas](#)		
Green Turtle [1765]	Vulnerable	Breeding known to occur within area
[Dermochelys coriacea](#)		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
[Dugong dugon](#)		
Dugong [28]		Species or species habitat known to occur within area
[Eretmochelys imbricata](#)		
Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
[Manta alfredi](#)		
Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray [84994]		Species or species habitat known to occur within area
[Manta birostris](#)		
Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Breeding likely to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Species or species habitat likely to occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat known to occur within area
Migratory Terrestrial Species		
Hirundo rustica Barn Swallow [662]		Species or species habitat known 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 known to occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Arenaria interpres Ruddy Turnstone [872]		Species or species habitat known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris alba Sanderling [875]		Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Calidris ruficollis Red-necked Stint [860]		Species or species habitat known to occur within area
Calidris subminuta Long-toed Stint [861]		Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Species or species habitat known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Species or species habitat known to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat known to occur within area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area
Limicola falcinellus Broad-billed Sandpiper [842]		Species or species habitat known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Species or species habitat known to occur within area
Numenius phaeopus Whimbrel [849]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Species or species habitat known to occur within area
Pluvialis squatarola Grey Plover [865]		Species or species habitat known to occur within area
Tringa brevipes Grey-tailed Tattler [851]		Species or species habitat known to occur within area
Tringa glareola Wood Sandpiper [829]		Species or species habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species

Name	Threatened	Type of Presence
		habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Species or species habitat known to occur within area
Xenus cinereus Terek Sandpiper [59300]		Species or species habitat known to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

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

Name
Commonwealth Land -

Listed Marine Species [Resource Information]

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

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Anous stolidus Common Noddy [825]		Species or species habitat 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 known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Arenaria interpres Ruddy Turnstone [872]		Species or species habitat known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris alba Sanderling [875]		Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur

Name	Threatened	Type of Presence within area
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
[Calidris melanotos](#) Pectoral Sandpiper [858]		Species or species habitat likely to occur within area
[Calidris ruficollis](#) Red-necked Stint [860]		Species or species habitat known to occur within area
[Calidris subminuta](#) Long-toed Stint [861]		Species or species habitat known to occur within area
[Calidris tenuirostris](#) Great Knot [862]	Critically Endangered	Species or species habitat known to occur within area
[Calonectris leucomelas](#) Streaked Shearwater [1077]		Species or species habitat may occur within area
[Charadrius leschenaultii](#) Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
[Charadrius mongolus](#) Lesser Sand Plover, Mongolian Plover [879]	Endangered	Species or species habitat known to occur within area
[Charadrius ruficapillus](#) Red-capped Plover [881]		Species or species habitat known to occur within area
[Charadrius veredus](#) Oriental Plover, Oriental Dotterel [882]		Species or species habitat known to occur within area
[Chrysococcyx osculans](#) Black-eared Cuckoo [705]		Species or species habitat may occur within area
[Fregata ariel](#) Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to occur within area
[Glareola maldivarum](#) Oriental Pratincole [840]		Species or species habitat may occur within area
[Haliaeetus leucogaster](#) White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
[Heteroscelus brevipes](#) Grey-tailed Tattler [59311]		Species or species habitat known to occur within area
[Himantopus himantopus](#) Pied Stilt, Black-winged Stilt [870]		Species or species habitat known to occur within area
[Hirundo rustica](#) Barn Swallow [662]		Species or species habitat known to occur within area
[Limicola falcinellus](#) Broad-billed Sandpiper [842]		Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Species or species habitat known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Species or species habitat known to occur within area
Numenius phaeopus Whimbrel [849]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Species or species habitat known to occur within area
Pluvialis squatarola Grey Plover [865]		Species or species habitat known to occur within area
Recurvirostra novaehollandiae Red-necked Avocet [871]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area
Stiltia isabella Australian Pratincole [818]		Species or species habitat known to occur within area
Tringa glareola Wood Sandpiper [829]		Species or species habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Species or species habitat known to occur within area
Xenus cinereus Terek Sandpiper [59300]		Species or species

Name	Threatened	Type of Presence
		habitat known to occur within area
Fish		
Bulbonaricus brauni Braun's Pughead Pipefish, Pug-headed Pipefish [66189]		Species or species habitat may occur within area
Campichthys tricarinatus Three-keel Pipefish [66192]		Species or species habitat may occur within area
Choeroichthys brachysoma Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194]		Species or species habitat may occur within area
Choeroichthys suillus Pig-snouted Pipefish [66198]		Species or species habitat may occur within area
Doryrhamphus janssi Cleaner Pipefish, Janss' Pipefish [66212]		Species or species habitat may occur within area
Doryrhamphus negrosensis Flagtail Pipefish, Masthead Island Pipefish [66213]		Species or species habitat may occur within area
Festucalex scalaris Ladder Pipefish [66216]		Species or species habitat may occur within area
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area
Halicampus brocki Brock's Pipefish [66219]		Species or species habitat may occur within area
Halicampus grayi Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area
Halicampus nitidus Glittering Pipefish [66224]		Species or species habitat may occur within area
Halicampus spinirostris Spiny-snout Pipefish [66225]		Species or species habitat may occur within area
Haliichthys taeniophorus Ribboned Pipehorse, Ribboned Seadragon [66226]		Species or species habitat may occur within area
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
Hippocampus angustus Western Spiny Seahorse, Narrow-bellied Seahorse [66234]		Species or species habitat may occur within area
Hippocampus histrix Spiny Seahorse, Thorny Seahorse [66236]		Species or species habitat may occur within area
Hippocampus kuda Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within area
Hippocampus planifrons Flat-face Seahorse [66238]		Species or species

Name	Threatened	Type of Presence
		habitat may occur within area
Hippocampus trimaculatus Three-spot Seahorse, Low-crowned Seahorse, Flat-faced Seahorse [66720]		Species or species habitat may occur within area
Micrognathus micronotopterus Tidepool Pipefish [66255]		Species or species habitat may occur within area
Solegnathus hardwickii Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
Trachyrhamphus longirostris Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281]		Species or species habitat may occur within area
Mammals		
Dugong dugon Dugong [28]		Species or species habitat known to occur within area
Reptiles		
Acalyptophis peronii Horned Seasnake [1114]		Species or species habitat may occur within area
Aipysurus apraefrontalis Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat likely to occur within area
Aipysurus duboisii Dubois' Seasnake [1116]		Species or species habitat may occur within area
Aipysurus eydouxii Spine-tailed Seasnake [1117]		Species or species habitat may occur within area
Aipysurus laevis Olive Seasnake [1120]		Species or species habitat may occur within area
Aipysurus tenuis Brown-lined Seasnake [1121]		Species or species habitat may occur within area
Astrotia stokesii Stokes' Seasnake [1122]		Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area

Name	Threatened	Type of Presence
Chelonia mydas		
Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Disteira kingii		
Spectacled Seasnake [1123]		Species or species habitat may occur within area
Disteira major		
Olive-headed Seasnake [1124]		Species or species habitat may occur within area
Emydocephalus annulatus		
Turtle-headed Seasnake [1125]		Species or species habitat may occur within area
Ephalophis greyi		
North-western Mangrove Seasnake [1127]		Species or species habitat may occur within area
Eretmochelys imbricata		
Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Hydrelaps darwiniensis		
Black-ringed Seasnake [1100]		Species or species habitat may occur within area
Hydrophis czeblukovi		
Fine-spined Seasnake [59233]		Species or species habitat may occur within area
Hydrophis elegans		
Elegant Seasnake [1104]		Species or species habitat may occur within area
Hydrophis mcdowelli		
null [25926]		Species or species habitat may occur within area
Hydrophis ornatus		
Spotted Seasnake, Ornate Reef Seasnake [1111]		Species or species habitat may occur within area
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
Pelamis platurus		
Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area

Whales and other Cetaceans		[Resource Information]
Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata		
Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera edeni		
Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus		
Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Delphinus delphis		
Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area

Name	Status	Type of Presence
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Species or species habitat likely to occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat known to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area

Extra Information

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

Name	Status	Type of Presence
Mus musculus House Mouse [120]		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 habitat likely to occur within area
Plants		
Andropogon gayanus Gamba Grass [66895]		Species or species habitat likely to occur within area
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
Parkinsonia aculeata Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301]		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
Ramphotyphlops braminus Flowerpot Blind Snake, Brahminy Blind Snake, Cacing Besi [1258]		Species or species habitat may 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

-20.30744 118.55762

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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+61 2 6274 1111

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Type of study	Level 1 terrestrial fauna desktop and field assessment	Desktop assessment	Desktop assessment and field survey	Desktop review and field survey (L1)	Desktop review and field survey	Desktop review and field survey (L1)	Desktop assessment and field survey (L1)	Bird surveys at seven disturbed wetlands	Desktop review and field survey (L2)	Desktop assessment and field survey	Desktop assessment and field survey (L1)	Desktop assessment and reconnaissance survey
Study area	The study area of the report is within the GHD study area	The study area of the report is within the GHD study area	The study area of the report is within the GHD study area	The study area of the report is within the GHD study area	The study area of the report is within the GHD study area	The study area of the report is within the GHD study area	The study area of the report is within the GHD study area	The study area of the report is within the GHD study area	Contains GHD study area and additional areas south of the study area	Contains GHD survey area and an adjacent ~10 km of shoreline to the east	The study area of the report is within the GHD study area	Lies within GHD study area and extends adjacent south
Conservation significant fauna species considered likely to occur in study area	**Likely to occur within study area:** • Little Northern *Freetail*-bat (*Mormopterus loriae coburgiana*) • Sharp-tailed Sandpiper (*Calidris acuminata*) • Ruddy Turnstone (*Arenaria interpres*) • Broad-billed Sandpiper (*Limicola falcinellus*) • Little Curlew (*Numenius minutus*) • Wood Sandpiper (*Tringa glareola*) • Marsh Sandpiper (*Tringa stagnatilis*) • Grey Plover (*Pluvialis squatarola*)	**Potentially occurring in study area:** • Little North-western Mastiff Bat *(Mormopterus loriae cobourgensis)* • Whimbrel (*Numenius phaeopus variegatus*) • Common Sandpiper (*Tringa hypoleucos*) • Grey-tailed Tattler (*Tringa brevipes*) • Little Curlew (*Numenius minutus*) • Oriental Plover (*Charadrius veredu*) • Oriental Pratincole (*Glareola maldivarum*)	**Potentially occurring within study area:** • Little North-western Mastiff Bat *(Mormopterus loriae cobourgensis)* • Common Sandpiper (*Tringa hypoleucos*) • Grey-tailed Tattler (*Tringa brevipes*) • Little Curlew (*Numenius minutus*) • Oriental Plover (*Charadrius veredu*) • Oriental Pratincole (*Glareola*	NA	**Potentially occurring within study area:** • Little North-western Mastiff Bat *(Mormopterus loriae cobourgensis)* • Common Sandpiper (*Tringa hypoleucos*) • Grey-tailed Tattler (*Tringa brevipes*) • Little Curlew (*Numenius minutus*) • Oriental Pratincole (Glareola maldivarum)	NA	**Possibly occurring within study area:** • Sharp-tailed Sandpiper (*Calidris acuminata*) • Red Knot (Calidris canutus) • Pectoral Sandpiper (*Calidris melanotos*) • Marsh Sandpiper (*Tringa stagnatilis*) • Terek Sandpiper (*Xenus cinereus*) • Little Curlew (*Numenius minutus*) • Oriental Pratincole (*Glareola*	NA	**Possibly occurring within study area:** • Grey Falcon (*Falco hypoleucos*) • Peregrine Falcon (*Falco peregrinus*) • Night Parrot (*Pezoporus occidentalis*) • Fork-tailed Swift (*Apus pacificus*) • Sharp-tailed Sandpiper (*Calidris acuminate*) • Broad-billed Sandpiper (*Limicola falcinellus*) • Wood Sandpiper (*Tringa glareola*)	**Likely to occur in study area:** • Black-tailed Godwit (*Limosa limosa*) • Marsh Sandpiper (*Tringa stagnatilis*) • Wood Sandpiper (*Tringa glareola*) • Asian Dowitcher (*Limnodromus semipalmatus*) • Swinhoe's Snipe (*Gallinago megala*) • Oriental Pratincole (*Glareola maldivarum*)	**Possibly occurring within study area:** • Little Northern Freetail-bat (*Mormopterus loriae cobourgensis*) • Common Sandpiper (*Actitis hypoleucos*) • Barn Swallow (*Hirundo rustica*) • Oriental Plover (*Charadrius veredus*) • Brush-tailed Mulgara (*Dasycercus blythi*) **Likely to occur in study area:**	**Possibly occurring within study area:** • Fork-tailed Swift (*Apus pacificus*) • Oriental Plover (*Charadrius veredus*) • White-winged Black Tern (*Chlidonias leucopterus*) • Oriental Pratincole (*Glareola maldivarum*) • Grey Falcon (*Falco hypoleucos*) • Lakeland Downs Mouse (*Leggadina lakedownensis*)

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	• Oriental Plover (*Charadrius veredus*) • Common Tern (*Sterna hirundo*) • Oriental Pratincole (Glareola *maldivarum*) **Potentially occurring within study area:** • Fork-tailed Swift (*Apus pacificus*)	• Barn swallow (*Hirundo rustica*)					*maldivarum*) **Likely to occur in study area:** • Common Sandpiper (*Actitis hypoleucos*) • Sanderling (*Calidris alba*) • Red-necked Stint (*Calidris ruficollis*) • Red-necked Phalarope (*Phalaropus lobatus*) • Grey-tailed tattler (*Tringa brevipes*) • Greater Sand Plover (*Charadrius leschenaulti i*) • Lesser Sand Plover (*Charadrius mongolus*) • Pacific Golden Plover (*Pluvialis fulva*) • Grey Plover (*Pluvialis squatarola*)				• Peregrine Falcon (*Falco peregrinus*) • Fork-tailed Swift (*Apus pacificus*) • Woma (*Aspidites ramsayi*)	

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							• Oriental Plover (*Charadrius veredus*) • White-winged Black Tern (*Chlidonias leucopterus*) • Little Tern (*Sterna albifrons*) • Great Knot (*Calidris tenuirostris*)					
Conservation significant fauna species known to occur in study area	• Eastern Curlew (Numenius *madagascariensis*) • Grey-tailed Tattler (*Tringa brevipes*) • Common Greenshank (*Tringa nebularia*) • Terek Sandpiper (*Xenus cinereus* (previously *Tringa terek*)) • Common Sandpiper (*Actitis hypoleucos*) • Red Knot (*Calidris canutus*) • Red-necked Stint (*Calidris ruficollis*) • Great Knot (*Calidris tenuirostris*)	NA	• Whimbrel (*Numenius phaeopus variegatus*) • Eastern Curlew (*Numenius madagascariensis*)	NA	• Whimbrel (*Numenius phaeopus variegatus*) • Eastern Curlew (*Numenius madagascariensis*)	• Lesser Frigatebird (*Fregata ariel*) • Greater Sand Plover (*Charadrius leschenaultii*) • Lesser Sand Plover (*Charadrius mongolus*) • Grey Plover (*Pluvialis squatarola*) • Common Sandpiper (*Actitis hypoleucos*) • Ruddy Turnstone (*Arenaria interpres*) • Red Knot (*Calidris canutus*) • Wood Sandpiper (Tringa glareola)	• Ruddy Turnstone (*Arenaria interpres*) • Whimbrel (*Numenius phaeopus*) • Caspian Tern (*Sternula caspia*) • Peregrine Falcon (Falco peregrinus) • Fork-tailed Swift (Apus pacificus) • Rainbow Bee-eater (Merops ornatus) • Barn Swallow	• Little Curlew (*Numenius minutus*) • Whimbrel (*Numenius phaeopus*) • Grey-tailed Tattler (*Tringa brevipes*) • Wood Sandpiper (*Tringa glareola*) • Wood Sandpiper (*Tringa glareola*) • Caspian Tern (*Hydroprogne caspia*)	• Little Northern Freetail-bat (*Mormopterus loriae coburgiana*) • Little Red Flying-fox (*Pteropus scapulatus*) • Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*) • Common Sheathtail-bat (*Taphozous georgianus*) • Gould's Wattled Bat (*Chalinolobus gouldii*) • Little Broad-nosed Bat (*Scotorepens greyii*)	• Bar-tailed Godwit (*Limosa lapponica*) • Whimbrel (*Numenius phaeopus*) • Common Greenshank (*Tringa nebularia*) • Terek Sandpiper (*Xenus cinereus*) • Common Sandpiper (*Actitis hypoleucos*) • Grey-tailed Tattler (*Tringa brevipes*) • Ruddy Turnstone (*Arenaria interpres*) • Great Knot (*Calidris tenuirostris*) • Red Knot (*Calidris canutus*)	NA	NA

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	• Bar-tailed Godwit (*Limosa lapponica*) • Whimbrel (*Numenius phaeopus*) • Greater Sand Plover (*Charadrius leschenaultii*) • Lesser Sand Plover (*Charadrius mongolus*)					• Curlew Sandpiper (*Calidris ferruginea*) • Red-necked Stint (*Calidris ruficollis*) • Great Knot (*Calidris tenuirostris*) • Bar-tailed Godwit (*Limosa lapponica*) • Eastern Curlew (*Numenius madagascariensis*) • Little Curlew (*Numenius minutus*) • Whimbrel (*Numenius phaeopus*) • Grey-tailed Tattler (*Tringa brevipes*) • Common Greenshank (*Tringa nebularia*) • Marsh Sandpiper (*Tringa stagnatilis*) • Terek Sandpiper (*Xenus cinereus*) • Little Northern Freetail-bat (Mormopterus loriae cobourgensis) • Oriental Plover (*Charadrius veredus*)	(Hirundo rustica)		• Finlayson's Cave Bat (*Vespadelus finlaysoni*) • Lesser Long-eared Bat (*Nyctophilus geoffroyi*) • Arnhem Long-eared Bat (*Nyctophilus arnhemensis*) • Northern Freetail-bat (*Chaerephon jobensis*) • Beccari's Freetail-bat (*Mormopterus beccarii*) • Little Northern Freetail Bat (*Mormopterus loriae cobourgensis*) • Lesser Frigate Bird (*Fregata ariel*) • Striated Heron (*Butorides striatus*) • Bar-shouldered Dove (*Geopelia humeralis*) • Collared Kingfisher (*Todiramphus chloris*) • Mangrove Golden Whistler (*Pachycephala melanura*)	• Sanderling (*Calidris alba*) • Red-necked Stint (*Calidris ruficollis*) • Sharp-tailed Sandpiper (*Calidris acuminata*) • Curlew Sandpiper (*Calidris ferruginea*) • Broad-billed Sandpiper (*Limicola falcinellus*) • Pacific Golden Plover (*Pluvialis fulva*) • Grey Plover (*Pluvialis squatarola*) • Lesser Sand Plover (*Charadrius mongolus*) • Greater Sand Plover (*Charadrius leschenaultii*) • Little Curlew (*Numenius minutus*) • Eastern Curlew (*Numenius madagascariensis*) • Oriental Plover (*Charadrius veredus*)		

Literature source	Calibre Engenium Joint Venture (2009) *Finucane island causeway terrestrial fauna assessment*	Biota Environmental Sciences (2008a) *A Biodiversity assessment of the Utah Point Berth Development, Port Hedland*	Biota Environmental Sciences (2008b) *A flora and fauna assessment of RGP5 DMMA A, Port Hedland Harbour*	ENV (2009) *Finucane Island rail project*	Biota Environmental Sciences (2009) *A flora and fauna assessment of RPG5 spoil areas A and H, Port Hedland Harbour*	ENV Australia (2011) *Port Hedland regional fauna assessment*	ENV Australia (2010) *Hunt Point Beach flora and vegetation and fauna assessment*	Bennelongia Environmental Consultants (2011) *Bird survey of Nelson Point Wetlands in April 2011*	ENV Australia (2009a) *Outer harbour development fauna assessment*	Bennelongia Environmental Sciences (2012) *Port Hedland migratory shorebird impact assessment: April and November surveys*	ENV Australia (2010) *Tug harbour (Wedgefield) flora and vegetation survey and fauna assessment*	Ecologia Environment (2009) *RGP5 fauna survey Nelson Point to Bing Siding*
						• Little Tern (*Sterna albifrons*) • Caspian Tern (*Sterna caspia*) • Fairy Tern (*Sternula nereis*) • *Gehyra nana* (locally significant) • Woma (*Aspidites ramsayi*) • Northern Quoll (*Dasyurus hallucatus*) • Western Pebble-mouse (*Pseudomys chapmani*)			• Yellow White-eye (*Zosterops luteus*) • White-breasted Whistler (*Pachycephala lanioides*) • Mangrove Grey Fantail (*Rhipidura phasiana*) • Mangrove Robin (*Eopsaltria pulverulenta*) • Oriental Plover (*Charadrius veredus*) • Common Sandpiper (*Actitis hypoleucos*) • Ruddy Turnstone (*Arenaria interpres*) • Red Knot (*Calidris canutus*) • Curlew Sandpiper (*Calidris ferruginea*) • Red-necked Stint (*Calidris ruficollis*) • Great Knot (*Calidris tenuirostris*) • Bar-tailed Godwit (*Limosa lapponica*) • Eastern Curlew (*Numenius madagascariensis*)			

Literature source	Calibre Engenium Joint Venture (2009) *Finucane island causeway terrestrial fauna assessment*	Biota Environmental Sciences (2008a) *A Biodiversity assessment of the Utah Point Berth Development, Port Hedland*	Biota Environmental Sciences (2008b) *A flora and fauna assessment of RGP5 DMMA A, Port Hedland Harbour*	ENV (2009) *Finucane Island rail project*	Biota Environmental Sciences (2009) *A flora and fauna assessment of RPG5 spoil areas A and H, Port Hedland Harbour*	ENV Australia (2011) *Port Hedland regional fauna assessment*	ENV Australia (2010) *Hunt Point Beach flora and vegetation and fauna assessment*	Bennelongia Environmental Consultants (2011) *Bird survey of Nelson Point Wetlands in April 2011*	ENV Australia (2009a) *Outer harbour development fauna assessment*	Bennelongia Environmental Sciences (2012) *Port Hedland migratory shorebird impact assessment: April and November surveys*	ENV Australia (2010) *Tug harbour (Wedgefield) flora and vegetation survey and fauna assessment*	Ecologia Environment (2009) *RGP5 fauna survey Nelson Point to Bing Siding*
									• Whimbrel (*Numenius phaeopus*) • Grey-tailed tattler (*Tringa brevipes*) • Common Greenshank (*Tringa nebularia*) • Marsh Sandpiper (*Tringa stagnatilis*) • Terek Sandpiper (*Xenus cinereus*) • Greater Sand Plover (*Charadrius leschenaultia*) • Lesser Sand Plover (*Charadrius mongolus*) • Sooty Oystercatcher (*Haematopus fuliginosus*) • Greater Sand Plover (*Charadrius leschenaultia*) • Lesser Sand Plover (*Charadrius mongolus*) • Grey Plover (*Pluvialis squatarola*)			
Conservation significant flora species previously recorded within study	• n/a	• *Ptilotus appendiculatus* P1) • • *Gomphrena pusilla* (P2)	• *Ptilotus appendiculatus var. minor and Tephrosia andrewii)* P1)	*Tephrosia rosea var. venulosa* (P 1)	• *Ptilotus appendiculatus var. minor and Tephrosia andrewii* P1)	• n/a	• *Gomphrena pusilla* (P2), • *Pterocaulon sp. A*	• n/a	• n/a	• n/a	• *Gomphrena pusilla* (P2), • *Pterocaulon sp. A*	n/a

Literature source	Calibre Engenium Joint Venture (2009) *Finucane island causeway terrestrial fauna assessment*	Biota Environmental Sciences (2008a) *A Biodiversity assessment of the Utah Point Berth Development, Port Hedland*	Biota Environmental Sciences (2008b) *A flora and fauna assessment of RGP5 DMMA A, Port Hedland Harbour*	ENV (2009) *Finucane Island rail project*	Biota Environmental Sciences (2009) *A flora and fauna assessment of RPG5 spoil areas A and H, Port Hedland Harbour*	ENV Australia (2011) *Port Hedland regional fauna assessment*	ENV Australia (2010) *Hunt Point Beach flora and vegetation and fauna assessment*	Bennelongia Environmental Consultants (2011) *Bird survey of Nelson Point Wetlands in April 2011*	ENV Australia (2009a) *Outer harbour development fauna assessment*	Bennelongia Environmental Sciences (2012) *Port Hedland migratory shorebird impact assessment: April and November surveys*	ENV Australia (2010) *Tug harbour (Wedgefield) flora and vegetation survey and fauna assessment*	Ecologia Environment (2009) *RGP5 fauna survey Nelson Point to Bing Siding*
area boundaries			• • *Euphorbia clementii and Gomphrena pusilla* (P2) • *Acacia glaucocaesia, Goodenia pascua and Gymnanthera Cunninghamii* (P3) • *Bulbostylis burbidgeae* (P3)		• • *Euphorbia clementii and Gomphrena pusilla* (P2) • *Acacia glaucocaesia, Goodenia pascua and Gymnanthera Cunninghamii* (P3) • *Bulbostylis burbidgeae* (P3)		*Kimberley Flora (B.J. Carter 599)* (P2) • *Goodenia nuda (P4).*				*Kimberley Flora (B.J. Carter 599)* (P2) • *Goodenia nuda (P4).*	
Conservation significant flora species known to occur in study area	• n/a	• *Bulbostylis burbidgeae* (P3)	• n/a	• n/a	• n/a	• n/a	• *Tephrosia rosea var. venulosa (P1)*	• n/a	• n/a	• n/a	• *Tephrosia rosea var. venulosa (P1)*	n/a

Appendix D – Flora results

Species list

Raw site data

Likelihood of occurrence assessment

Flora species list

Family	Species	Common name	Status
Acanthaceae	*Avicennia marina*	White mangrove	
Amaranthaceae	*Gomphrena canescens*	Kapok bush	
Amaranthaceae	*Ptilotus exaltatus*		
Amarantheaceae	*Aerva javanica*	Barrier Saltbush	*
Asteraceae	*Tridax procumbens*	Tickweed	
Azioaceae	*Trianthema turgidifolium*		
Chenopodiaceae	*Dysphania plantaginella*		
Chenopodiaceae	*Enchylaena tomentosa*		
Chenopodiaceae	*Salsola australis*		
Chenopodiaceae	*Sclerolaena bicornis*	Fitzroy Wattle	
Chenopodiaceae	*Tecticornia auriculata*		
Chenopodiaceae	*Tecticornia halocnemoides*		
Cleomaceae	*Cleome viscosa*	Ranji Bush	
Convolvulaceae	*Bonamia media*		
Convolvulaceae	*Ipomoea pes-caprae*		
Convolvulaceae	*Ipomoea polymorpha*	Green Birdflower	
Convolvulaceae	*Polymeria ambigua*		
Cucurbitaceae	*Citrullus amarus*	Batchelors Buttons	*
Cucurbitaceae	*Coccinia grandis*		*DP
Euphorbiaceae	*Euphorbia australis*		
Fabaceae	*Acacia ancistrocarpa*		
Fabaceae	*Acacia bivenosa*		
Fabaceae	*Acacia colei*	Tar Vine	
Fabaceae	*Acacia pyrifolia*	Myrtle Mangrove	
Fabaceae	*Acacia stellaticeps*	Native Millet	
Fabaceae	*Acacia trachycarpa*	Clements Paspalidium	
Fabaceae	*Crotalaria cunninghamii*		
Fabaceae	*Leucaena leucocephala*	Buffel Grass	*
Fabaceae	*Rhynchosia minima*		
Fabaceae	*Senna notabilis*	Windmill Grass	
Fabaceae	*Sesbania cannabina*	Woollybutt Grass	
Fabaceae	*Tephrosia rosea*	Sickle Lovegrass	
Frankeniaceae	*Frankenia ambita*		
Malvaceae	*Abutilon lepidum*	Morning Glory	
Myrtaceae	*Osbornia octodonta*	Tall Mulla Mulla	
Nyctaginaceae	*Boerhavia coccinea*		
Poaceae	*Panicum decompositum*		

Family	Species	Common name	Status
Poaceae	*Paspalidium clementii*	Goathead Burr	
Poaceae	*Aristida sp*		
Poaceae	*Cenchrus ciliaris*	Sesbania Pea	*
Poaceae	*Chloris spc*		
Poaceae	*Enteropogon ramosus*	Shrubby Samphire	
Poaceae	*Eragrostis eriopoda*		
Poaceae	*Eragrostis falcata*		
Poaceae	*Eriachne spc*		
Poaceae	*Triodia epactia*		
Zygophyllaceae	*Tribulus occidentalis*		

* Introduced species, DP = Declared Pest Plant

Raw site data by vegetation type

Family	Taxon	VT01	VT02	Status
		% cover	% cover	
Acanthaceae	*Avicennia marina*	70%+		
Amaranthaceae	*Gomphrena canescens*		>2%	
Amaranthaceae	*Ptilotus exaltatus*		>2%	
Amarantheaceae	*Aerva javanica*		>2%	*
Asteraceae	*Tridax procumbens*		>2%	
Azioaceae	*Trianthema turgidifolium*	>2%	>2%	
Chenopodiaceae	*Dysphania plantaginella*		>2%	
Chenopodiaceae	*Enchylaena tomentosa*		>2%	
Chenopodiaceae	*Salsola australis*		>2%	
Chenopodiaceae	*Sclerolaena bicornis*			
Chenopodiaceae	*Tecticornia auriculata*	2-10 %		
Chenopodiaceae	*Tecticornia halocnemoides*	2-10 %		
Cleomaceae	*Cleome viscosa*		2-10 %	
Convolvulaceae	*Bonamia media*		2-10 %	
Convolvulaceae	*Ipomoea pes-caprae*		>2%	
Convolvulaceae	*Ipomoea polymorpha*		>2%	
Convolvulaceae	*Polymeria ambigua*		>2%	
Cucurbitaceae	*Citrullus amarus*			*
Cucurbitaceae	*Coccinia grandis*		>2%	*DP
Euphorbiaceae	*Euphorbia australis*		>2%	
Fabaceae	*Acacia ancistrocarpa*		>2%	
Fabaceae	*Acacia bivenosa*		2-10 %	
Fabaceae	*Acacia colei*		2-10 %	
Fabaceae	*Acacia pyrifolia*		2-10 %	
Fabaceae	*Acacia stellaticeps*		>2%	
Fabaceae	*Acacia trachycarpa*		>2%	
Fabaceae	*Crotalaria cunninghamii*		>2%	

Family	Taxon	VT01	VT02	Status
		% cover	% cover	
Fabaceae	*Leucaena leucocephala*	>2%		*
Fabaceae	*Rhynchosia minima*		>2%	
Fabaceae	*Senna notabilis*		>2%	
Fabaceae	*Sesbania cannabina*		>2%	
Fabaceae	*Tephrosia rosea*		>2%	
Frankeniaceae	*Frankenia ambita*			
Malvaceae	*Abutilon lepidum*		>2%	
Myrtaceae	*Osbornia octodonta*	2-10 %		
Nyctaginaceae	*Boerhavia coccinea*		2-10 %	
Poaceae	*Panicum decompositum*		>2%	
Poaceae	*Paspalidium clementii*		>2%	
Poaceae	*Aristida* sp		>2%	
Poaceae	*Cenchrus ciliaris*		2-10 %	*
Poaceae	*Chloris* sp		>2%	
Poaceae	*Enteropogon ramosus*		>2%	
Poaceae	*Eragrostis eriopoda*		>2%	
Poaceae	*Eragrostis falcata*		2-10 %	
Poaceae	*Eriachne* sp		>2%	
Poaceae	*Triodia epactia*		>2%	
Zygophyllaceae	*Tribulus occidentalis*		>2%	

DP = Declared Pest Plant

Releve location

Releve	Vegetation type	Location co-ordinates (decimal degrees)	Representative photo
R01	Cleared road verge. North end	118.5574 -20.3061	
R02	Saline Flat and Marsh (SF) on roadside edge	118.5575 -20.3079	

Releve	Vegetation type	Location co-ordinates (decimal degrees)	Representative photo
R03	VT02 – Embankment *Acacia* shrubland	118.5591 -20.3111	
R04	VT01 - Saline Flat and Marsh (SF)	118.5588 -20.3122	

Releve	Vegetation type	Location co-ordinates (decimal degrees)	Representative photo
R05	VT02 – Embankment *Acacia* shrubland	118.5581 -20.3142	

Flora likelihood of occurrence assessment guidelines

Likelihood of occurrence	Guideline
Known	Species recorded within survey area from field survey results.
Likely	Species previously recorded within 10 km and large areas of suitable habitat occur in the project area.
Possible	Species previously recorded within 10 km and areas of suitable habitat occur/may occur in the project area.
Unlikely	Species previously recorded within 10 km, but suitable habitat does not occur in the project area.
Highly unlikely	Species not previously recorded within 5 km, suitable habitat does not occur in the project area and/or the project area is outside the natural distribution of the species.
Other considerations	Intensity of survey, availability of access, growth form type, recorded flowering times, cryptic nature of species

Source information - desktop searches

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

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

NM – DBCA *NatureMap* (accessed May 2020)

Family	Taxon	Status		Description (if available) (WA Herbarium 1998–2020, DEE 2018)	Likelihood of occurrence (pre survey)	Likelihood of occurrence (post survey)	Source
		EPBC Act	BC Act /DBCA				
Amaranthaceae	*Gomphrena pusilla*	-	P2	Slender branching annual, herb, to 0.2 m high. Fl. white, Mar to Apr or Jun. Fine beach sand. Behind foredune, on limestone	Unlikely. Closest known records are more than 5 km east of the survey area.	Unlikely Suitable habitat does not occur in the survey area and suitable survey effort did not record the species.	NatureMap WAHERB
Apocynaceae	*Gymnanthera cunninghamii*	-	P3	Erect shrub, 1-2 m high. Fl. cream-yellow-green, Jan to Dec. Sandy soils	Unlikely Closest known records are 10 km south-west of the survey area.	Unlikely Suitable habitat may be present; however, suitable survey effort did not record the species.	NatureMap WAHERB TPFL

Family	Taxon	Status		Description (if available) (WA Herbarium 1998–2020, DEE 2018)	Likelihood of occurrence (pre survey)	Likelihood of occurrence (post survey)	Source
		EPBC Act	BC Act /DBCA				
Cyperaceae	*Bulbostylis burbidgeae*	-	P4	Tufted, erect to spreading annual, grass-like or herb (sedge), 0.03-0.25 m high, spikelets in a simple umbel or rarely solitary; stamens 3; involucral bracts long, hairy. Fl. brown, Mar or Jun to Aug. Granitic soils. Granite outcrops, cliff bases	Possible. Closest known record is immediately north of the survey area (Biota 2008a)	Unlikely. Suitable survey effort did not record the species and suitable habitat does not occur in the survey area.	NatureMap WAHERB
Fabaceae	*Tephrosia rosea* var. Port Hedland (A.S. George 1114)	-	P1	Erect, shrub, spindly shrub (broom-like). Stems terete, not spiny, hairy; pustules or glands absent. Leaves or phylloclades clearly present, compound, alternate, continuous with stem.	Possible Suitable habitat is present. Closest known record is immediately north of the survey area (Biota 2008a)	Unlikely Suitable habitat may be present; however, suitable survey effort did not record the species.	NatureMap WAHERB
Goodeniaceae	*Goodenia nuda*	-	P4	Erect to ascending herb, to 0.5 m high. Fl. yellow, Apr to Aug	Unlikely Closest known records are more than 7 km south-west of the survey ar.	Unlikely Suitable habitat may be present; however, suitable survey effort did not record the species.	NatureMap WAHERB
Poaceae	*Eragrostis crateriformis*		P3	Annual, grass-like or herb, 0.17-0.42 m high. Fl. Jan to May or Jul. Clayey loam or clay. Creek banks, depressions	Unlikely Closest known records are more than 7 km south-west of the survey area.	Unlikely. Suitable survey effort did not record the species and suitable habitat does not occur in the survey area.	NatureMap WAHERB

Appendix E – Fauna results

Fauna detected during field survey

Likelihood of occurrence assessment

Fauna detected during field survey

Family	Taxon	Common name	Status	
			BC Act	EPBC Act
Birds				
Accipitridae	*Elanus axillaris*	Black shouldered kite		
Accipitridae	*Haliaeetus leucogaster*	White-bellied Sea-Eagle		
Accipitridae	*Haliastur indus*	Brahminy Kite		
Accipitridae	*Haliastur sphenurus*	Whistling Kite		
Accipitridae	*Milvus migrans*	Black Kite		
Alcedinidae	*Todiramphus sanctus*	Sacred Kingfisher		
Anhingidae	*Anhinga novaehollandiae*	Australasian Darter		
Ardeidae	*Ardea pacifica*	White-necked Heron		
Ardeidae	*Egretta garzetta*	Little egret		
Ardeidae	*Egretta novaehollandiae*	White Faced Heron		
Artamidae	*Artamus leucorynchus*	White-breasted Woodswallow		
Cacatuidae	*Cacatua roseicapilla*	Galah		
Cacatuidae	*Cacatua sanguinea*	Little Corella		
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		
Columbidae	*Geopelia striata* subsp. *placida*	Peaceful Dove		
Columbidae	*Geophaps plumifera*	Spinifex Pigeon		
Columbidae	*Ocyphaps lophotes*	Crested Pigeon		
Corvidae	*Corvus orru*	Torresian Crow		
Cuculidae	*Cacomantis pallidus*	Pallid Cuckoo		
Estrildidae	*Taeniopygia guttata*	Zebra Finch		
Falconidae	*Falco berigora*	Brown Falcon		
Falconidae	*Falco cenchroides*	Australian Kestrel Nankeen Kestrel		
Laridae	*Hydroprogne caspia*	Caspian Tern	MI	MI
Laridae	*Larus novaehollandiae*	Silver Gull		
Maluridae	*Malurus leucopterus*	White-winged Fairy-wren		
Meliphagidae	*Manorina flavigula*	Yellow-throated Miner		
Meropidae	*Merops ornatus*	Rainbow Bee-eater		
Monarchidae	*Grallina cyanoleuca*	Magpie-lark		
Motacillidae	*Anthus australis*	Australian Pipit		
Pandionidae	*Pandion cristatus*	Osprey	MI	MI
Pelecanidae	*Pelecanus conspicillatus*	Australian Pelican		
Recurvirostridae	*Cladorhynchus leucocephalus*	Banded Stilt		
Recurvirostridae	*Himantopus himantopus*	Black-winged Stilt		
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		
Zosteropidae	*Zosterops luteus*	Australian Yellow White-eye		
Reptile				
Agamidae	*Ctenophorus caudicinctus*	Ring-tailed Dragon		
Gekkonidae	*Gehyra variegata*	Variegated Dtellla		
Gekkonidae	*Heteronotia binoei*	Bynoe's Gecko		
Scincidae	*Eremiascincus* sp.	Sand swimmer		

Parameters of fauna likelihood of occurrence assessment

Assessment outcome	Description
Present	Species recorded during the field survey or from recent, reliable records from within or close proximity to the study area.
Likely	Species are **likely** to occur in the study area where there is suitable habitat within the study area and there are recent records of occurrence of the species in close proximity to the study area. OR Species known distribution overlaps with the study area and there is suitable habitat within the study area.
Unlikely	Species assessed as **unlikely** include those species previously recorded within 10 km of the study area however: • There is limited (i.e. the type, quality and quantity of the habitat is generally poor or restricted) habitat in the study area. • The suitable habitat within the study area is isolated from other areas of suitable habitat and the species has no capacity to migrate into the study area. OR Those species that have a known distribution overlapping with the study area however: • There is limited habitat in the study area (i.e. the type, quality and quantity of the habitat is generally poor or restricted). • The suitable habitat within the study area is isolated from other areas of suitable habitat and the species has no capacity to migrate into the study area.
Highly unlikely	Species that are considered **highly unlikely** to occur in the study area include: • Those species that have no suitable habitat within the study area. • Those species that have become locally extinct, or are not known to have ever been present in the region of the study area.

Source information - desktop searches

PMST – DAWE Protected Matters Search Tool (PMST) to identify fauna listed under the EPBC Act potentially occurring within the survey area

DBCA (2007 - 2020) records of threatened fauna, database search within the study area

NM – DBCA NatureMap Fauna Database

DBCA 2017. WA Government, Department of Biodiversity, Conservation and Attractions Threatened and Priority fauna rankings – *Biodiversity Conservation Act 2016.*

Fauna Likelihood of occurrence assessment

Taxa	Common name	WA listing	EPBC listing	Description	Source	Likelihood of occurrence
Birds- migratory shorebirds						
Actitis hypoleucos	Common Sandpiper	MI	MI	The species utilises a wide range of coastal wetlands and some inland wetlands, with varying levels of salinity, and is mostly found around muddy margins or rocky shores and rarely on mudflats. The Common Sandpiper has been recorded in estuaries and deltas of streams, as well as on banks farther upstream; around lakes, pools, billabongs, reservoirs, dams and claypans, and occasionally piers and jetties. The muddy margins utilised by the species are often narrow, and may be steep. The species is often associated with mangroves, and sometimes found in areas of mud littered with rocks or snags (Geering et al. 2007; Higgins & Davies 1996).	NM, PMST, DBCA	**Likely** Suitable habitat is available to support this species in the mangrove woodland. The closest know record is 500 m north-west of the survey area.
Arenaria interpres	Ruddy Turnstone	MI	MI	In Australasia, the Ruddy Turnstone is mainly found on coastal regions with exposed rock coast lines or coral reefs. It also lives near platforms and shelves, often with shallow tidal pools and rocky, shingle or gravel beaches. It can, however, be found on sand, coral or shell beaches, shoals, cays and dry ridges of sand or coral. It has occasionally been sighted in estuaries, harbours, bays and coastal lagoons, among low saltmarsh or on exposed beds of seagrass, around sewage ponds and on mudflats. In north Australia it is known to occur in a wide variety of habitats, and may prefer wide mudflats. In southern Australia the Ruddy Turnstone prefers rockier coastlines and is less numerous on large embayments with extensive mudflats. Surveys demonstrate that the Ruddy Turnstone can live away from coastal areas in habitats such river beds, and on inland lakes and adjacent farmland (Higgins & Davies 1996).	NM, DBCA, PMST	**Likely** Suitable habitat is available to support this species in the mangrove woodland. The closest known record lies within 20 m west of the survey area.
Calidris acuminata	Sharp-tailed Sandpiper	MI	MI	In Australasia, the Sharp-tailed Sandpiper prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation. This includes lagoons, swamps, lakes and pools near the coast, and dams, waterholes, soaks, bore drains and bore swamps, saltpans and hypersaline saltlakes inland. They also occur in saltworks and sewage farms. They use flooded paddocks, sedgelands and other ephemeral wetlands, but leave when they dry. They use intertidal mudflats in sheltered bays, inlets, estuaries or seashores, and also swamps and creeks lined with mangroves. They tend to occupy coastal mudflats mainly after ephemeral terrestrial wetlands have dried out, moving back during the wet season. They may be attracted to mats of algae and water weed either floating or washed up around terrestrial wetlands, and coastal	NM, PMST	**Likely** Suitable habitat is available to support this species in the mangrove woodland. The closest known record lies within 3.6 km east of the survey area.

Taxa	Common name	WA listing	EPBC listing	Description	Source	Likelihood of occurrence
				areas with much beach cast seaweed. Sometimes they occur on rocky shores and rarely on exposed reefs (Higgins & Davies 1996).		
Calidris alba	Sanderling	MI	MI	In Australia, the species is almost always found on the coast, mostly on open sandy beaches exposed to open sea-swell, and also on exposed sandbars and spits, and shingle banks, where they forage in the wave-wash zone and amongst rotting seaweed. Sanderlings also occur on beaches that may contain wave-washed rocky outcrops. Less often the species occurs on more sheltered sandy shorelines of estuaries, inlets and harbours. Rarely, they are recorded in near-coastal wetlands, such as lagoons, hypersaline lakes, saltponds and samphire flats. There are rare inland records from sandy shores of ephemeral brackish lakes and brackish river-pools (Higgins & Davies 1996). They roost on/behind: bare sand high on the beach, clumps of washed-up kelp, coastal dunes, rocky reefs and ledges (Higgins & Davies 1996).	NM, DBCA, PMST	**Unlikely** Limited habitat is available to support this species. The closest known record is 1.7 km east of the survey area.
Calidris canutus	Red Knot	EN	EN & MI	In Australasia the Red Knot mainly inhabit intertidal mudflats, sandflats and sandy beaches of sheltered coasts, in estuaries, bays, inlets, lagoons and harbours; sometimes on sandy ocean beaches or shallow pools on exposed wave-cut rock platforms or coral reefs. They are occasionally seen on terrestrial saline wetlands near the coast, such as lakes, lagoons, pools and pans, and recorded on sewage ponds and saltworks, but rarely use freshwater swamps. They rarely use inland lakes or swamps (Higgins & Davies 1996).	NM, DBCA, PMST	**Unlikely** The survey area does not contain suitable habitat to support this species. The closest known record is 500 m north-west of the survey area.
Calidris ferruginea	Curlew Sandpiper	CR	CR & MI	Curlew Sandpipers mainly occur on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. They are also recorded inland, though less often, including around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand. They occur in both fresh and brackish waters. Occasionally they are recorded around floodwaters (Higgins & Davies 1996). In Roebuck Bay, northern Western Australia, they feed on part of the mudflats that have been exposed for a longer period, foraging in small groups (Tulp & de Goeij 1994). Curlew Sandpipers generally roost on bare dry shingle, shell or sand beaches, sandspits and islets in or around coastal or near-coastal lagoons and other wetlands, occasionally roosting in dunes during very high tides and sometimes in saltmarsh (Higgins & Davies 1996). They have also been recorded roosting in mangroves (Minton & Whitelaw 2000).	NM, DBCA, PMST	**Likely** Suitable habitat is available to support this species. The closest know record is 500 m north-west of the survey area.

Taxa	Common name	WA listing	EPBC listing	Description	Source	Likelihood of occurrence
Calidris melanotos	Pectoral Sandpiper	MI	MI	In Australasia, the Pectoral Sandpiper prefers shallow fresh to saline wetlands. The species is found at coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands. The species is usually found in coastal or near coastal habitat but occasionally found further inland. It prefers wetlands that have open fringing mudflats and low, emergent or fringing vegetation, such as grass or samphire. The species has also been recorded in swamp overgrown with lignum. They forage in shallow water or soft mud at the edge of wetlands (Higgins & Davies 1996).	NM, PMST	**Unlikely** Limited habitat is available to support this species. The closest know record is greater than 5 km from the survey area.
Calidris ruficollis	Red-necked Stint	MI	MI	In Australasia, the Red-necked Stint is mostly found in coastal areas, including in sheltered inlets, bays, lagoons and estuaries with intertidal mudflats, often near spits, islets and banks and, sometimes, on protected sandy or coralline shores. Occasionally they have been recorded on exposed or ocean beaches, and sometimes on stony or rocky shores, reefs or shoals. They also occur in saltworks and sewage farms; saltmarsh; ephemeral or permanent shallow wetlands near the coast or inland, including lagoons, lakes, swamps, riverbanks, waterholes, bore drains, dams, soaks and pools in saltflats. They sometimes use flooded paddocks or damp grasslands. They have occasionally been recorded on dry gibber plains, with little or no perennial vegetation (Higgins & Davies 1996).	NM, DBCA, PMST	**Unlikely** Limited habitat is available to support this species. The closest know record is 500 m north-west of the survey area.
Calidris subminuta	Long-toed Stint	MI	MI	In Australia, the Long-toed Stint occurs in a variety of terrestrial wetlands. They prefer shallow freshwater or brackish wetlands including lakes, swamps, river floodplains, streams, lagoons and sewage ponds. The species is also fond of areas of muddy shoreline, growths of short grass, weeds, sedges, low or floating aquatic vegetation, reeds, rushes and occasionally stunted samphire. It has also been observed at open, less vegetated shores of larger lakes and ponds and is common on muddy fringes of drying ephemeral lakes and swamps. The Long-toed Stint also frequents permanent wetlands such as reservoirs and artificial lakes. They are uncommon, but not unknown, at tidal estuaries, saline lakes, salt ponds and bore swamps (Higgnis & Davies 1996). The Long-toed Stint forages on wet mud or in shallow water, often among short grass, weeds and other vegetation on islets or around the edges of wetlands. They roost or loaf in sparse vegetation at the edges of wetlands and on damp mud near shallow water. It also roosts in small depressions in the mud (Higgins & Davies 1996).	NM, PMST	**Unlikely** Limited habitat is available to support this species. The closest know record is greater than 5 km from the survey area.

Taxa	Common name	WA listing	EPBC listing	Description	Source	Likelihood of occurrence
Calidris tenuirostris	Great Knot	CR	CR & MI	In Australasia, the species typically prefers sheltered coastal habitats, with large intertidal mudflats or sandflats. This includes inlets, bays, harbours, estuaries and lagoons. They are occasionally found on exposed reefs or rock platforms, shorelines with mangrove vegetation, ponds in saltworks, at swamps near the coast, saltlakes and non-tidal lagoons. The Great Knot rarely occurs on inland lakes and swamps (Higgins & Davies 1996). Typically, the Great Knot roosts in large groups in open areas, often at the waters edge or in shallow water close to feeding grounds (Higgins & Davies 1996; Rogers 2001). A group of approximately 8610 birds have been recorded roosting at an inland claypan near Roebuck Bay in north-west Western Australia (Collins et al. 2001).	NM, DBCA, PMST	**Likely** Suitable habitat is available to support this species within the mangrove habitat. The closest known record is 500 m north-west of the survey area.
Charadrius leschenaultii	Greater Sand Plover	VU	VU & MI	In the non-breeding grounds in Australasia, the species is almost entirely coastal, inhabiting littoral and estuarine habitats. They mainly occur on sheltered sandy, shelly or muddy beaches with large intertidal mudflats or sandbanks, as well as sandy estuarine lagoons and inshore reefs, rock platforms, small rocky islands or sand cays on coral reefs. They are occasionally recorded on near-coastal saltworks and saltlakes, including marginal saltmarsh, and on brackish swamps (Stewart et al. 2007).	NM, DBCA, PMST	**Likely** Suitable habitat is available to support this species. The closest known record lies within 20 m of the survey area.
Charadrius mongolus	Lesser Sand Plover	EN	EN & MI	In non-breeding grounds in Australia, this species usually occurs in coastal littoral and estuarine environments. It inhabits large intertidal sandflats or mudflats in sheltered bays, harbours and estuaries, and occasionally sandy ocean beaches, coral reefs, wave-cut rock platforms and rocky outcrops. In north-western Australia, the species appears to use the Port Hedland saltworks in preference to nearby beaches. The species is seldom recorded away from the coast, at margins of lakes, soaks and swamps associated with artesian bores (Marchant & Higgins 1993).	NM, DBCA, BHPMS TP	**Likely** Suitable habitat is available to support this species in the mangrove habitat. The closest known record is 300 m east of the survey area.
Limnodromus semipalmatus	Asian Dowitcher	MI	MI	The Asian Dowitcher occurs in sheltered coastal environments, such as embayments, coastal lagoons, estuaries and tidal creeks. They are known to frequent shallow water and exposed mudflats or sandflats. In Australia the Port Hedland Saltworks provides crucial habitat for the species. The species is commonly found in the round ponds and channels of saltworks and sewage farms. It is also found at near-coastal swamps and lakes (Higgins & Davies 1996).	NM	**Unlikely** Limited habitat is available to support this species. The closest know record is 3.5 km from the survey area.

Taxa	Common name	WA listing	EPBC listing	Description	Source	Likelihood of occurrence
Limosa lapponica (and associated sub species)	Bar-tailed Godwit	MI	MI	The Bar-tailed Godwit is found mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays. It is found often around beds of seagrass and, sometimes, in nearby saltmarsh. It has been sighted in coastal sewage farms and saltworks, saltlakes and brackish wetlands near coasts, sandy ocean beaches, rock platforms, and coral reef-flats. It is rarely found on inland wetlands or in areas of short grass, such as farmland, paddocks and airstrips, although it is commonly recorded in paddocks at some locations overseas (Marchant & Higgins 1993).	NM	**Likely** Suitable habitat is available for this species in the mangrove woodland. The closest know record is 1.6 km north-west of the survey area.
Limosa limosa	Black-tailed Godwit	MI	MI	In Australia the Black-tailed Godwit has a primarily coastal habitat environment. The species is commonly found in sheltered bays, estuaries and lagoons with large intertidal mudflats or sandflats, or spits and banks of mud, sand or shell-grit; occasionally recorded on rocky coasts or coral islets. The use of habitat often depends on the stage of the tide. It is also found in shallow and sparsely vegetated, near-coastal, wetlands; such as saltmarsh, saltflats, river pools, swamps, lagoons and floodplains. There are a few inland records, around shallow, freshwater and saline lakes, swamps, dams and bore-overflows. They also use lagoons in sewage farms and saltworks (Higgins & Davies 1996).	DBCA	**Unlikely** Limited habitat is available to support this species. The closest know record is greater than 5 km from the survey area.
Numenius madagascariensis	Eastern Curlew	CR	CR & MI	The Eastern Curlew is a large non-breeding migratory shorebird, found commonly along the north coast of Western Australia, but rarely south of Shark Bay. The species is found along the coastline from Barrow Island and Dampier Archipelago, through the Kimberley in WA to the NT. It is found in estuaries, bays, harbours, inlets and coastal lagoons, saltworks and sewerage farms, areas (e.g. intertidal mudflats or sandflats fringed by mangroves) often with beds of seagrass and occasionally on ocean beaches, coral reefs, rock platforms and rocky islets. The Eastern Curlew forages on soft, sheltered, intertidal sand- or mudflats, often near mangroves, on saltflats, saltmarshes, rockpools, coastal reefs and ocean beaches near the tideline. The species roosts in large flocks, separate from other waders on sandy spits and islets, dry beach sand near the high-water mark, among coastal vegetation (including low saltmarsh and mangroves) and occasionally on reef-flats, in the shallow water of lagoons, near-coastal wetlands, in trees and posts (Morcombe 2004).	NM, DBCA, PMST	**Likely** Suitable habitat is available for this species in the mangrove woodland. The closest know record is 500 m north-west of the survey area.
Numenius minutus	Little Curlew	MI	MI	When resting during the heat of day, the Little Curlew congregates around pools, river beds and water-filled tidal channels, and shallow water at edges of billabongs. The species prefers pools with bare dry mud (including mudbanks in shallow water) and they do not use pools if they are totally dry,	NM, DBCA, PMST	**Unlikely** Limited habitat is available to support

Taxa	Common name	WA listing	EPBC listing	Description	Source	Likelihood of occurrence
				flooded or heavily vegetated (Higgins & Davies 1996). Birds may also rest in grassy, open woodlands and on bare blacksoil plains, or on dry or recently burnt grasslands on floodplains, which may be without vegetation for hundreds of metres, and occasionally on mudflats when nearby grasslands are unburnt, or around swamps. Resting has also been recorded under partly submerged vegetation. After freshwater pools dry up, roosting may occur in the shallows of reservoirs and the sea (Higgins & Davies 1996).		this species. The closest know record is 1.4 km east of the survey area.
Numenius phaeopus	Whimbrel	MI	MI	The Whimbrel is often found on the intertidal mudflats of sheltered coasts. It is also found in harbours, lagoons, estuaries and river deltas, often those with mangroves, but also open, unvegetated mudflats. It is occasionally found on sandy or rocky beaches, on coral or rocky islets, or on intertidal reefs and platforms. It has been infrequently recorded using saline or brackish lakes near coastal areas. It also used saltflats with saltmarsh, or saline grasslands with standing water left after high spring-tides, and in similar habitats in sewage farms and saltfields (Higgins & Davies 1996). There are a small number of inland records from saline lakes and canegrass swamps. It has also been recorded in coastal dunes and on a football field (Smith & Chafer 1987).	NM, DBCA, PMST	**Likely** Suitable habitat is available for this species in the mangrove woodland. The closest known record is within 20 m of the survey area boundary.
Pluvialis fulva	Pacific Golden Plover	MI	MI	In non-breeding grounds in Australia this species usually inhabits coastal habitats, though it occasionally occurs around inland wetlands. Pacific Golden Plovers usually occur on beaches, mudflats and sandflats (sometimes in vegetation such as mangroves, low saltmarsh such as Sarcocornia, or beds of seagrass) in sheltered areas including harbours, estuaries and lagoons, and also in evaporation ponds in saltworks. The species is also sometimes recorded on islands, sand and coral cays and exposed reefs and rocks. They are less often recorded in terrestrial habitats, usually wetlands such as fresh, brackish or saline lakes, billabongs, pools, swamps and wet claypans, especially those with muddy margins and often with submerged vegetation or short emergent grass. Other terrestrial habitats inhabited include short (or, occasionally, long) grass in paddocks, crops or airstrips, or ploughed or recently burnt areas, and they are very occasionally recorded well away from water (Marchant & Higgins 1993). This species usually forages on sandy or muddy shores (including mudflats and sandflats) or margins of sheltered areas such as estuaries and lagoons, though it also feeds on rocky shores, islands or reefs. In addition, Pacific Golden Plovers occasionally forage among vegetation, such as saltmarsh, mangroves or in pasture or crops (Evans 1975; Ewart 1973).	NM, DBCA, PMST	**Likely** This species may utilise the mangrove woodland during the non-breeding season. The closest known record is greater than 5 km from the survey area.

Taxa	Common name	WA listing	EPBC listing	Description	Source	Likelihood of occurrence
Pluvialis squatarola	Grey Plover	MI	MI	In non-breeding grounds in Australia, Grey Plovers occur almost entirely in coastal areas, where they usually inhabit sheltered embayments, estuaries and lagoons with mudflats and sandflats, and occasionally on rocky coasts with wave-cut platforms or reef-flats, or on reefs within muddy lagoons. They also occur around terrestrial wetlands such as near-coastal lakes and swamps, or salt-lakes. The species is also very occasionally recorded further inland, where they occur around wetlands or salt-lakes (Marchant & Higgins 1993).	NM, DBCA, PMST	**Likely** This species may utilise the mangrove woodland during the non-breeding season. The closest known record is 2.1 km north of the survey area.
Tringa brevipes	Grey-tailed Tattler	MI & P4	MI	The Grey-tailed Tattler is often found on sheltered coasts with reefs and rock platforms or with intertidal mudflats. It can also be found at intertidal rocky, coral or stony reefs as well as platforms and islets that are exposed at low tide. It has been found around shores of rock, shingle, gravel or shells and also on intertidal mudflats in embayments, estuaries and coastal lagoons, especially fringed with mangroves. In Moreton Bay, Queensland, it is most abundant in areas with dense beds of seagrass. In Tasmania it is also abundant in areas with seagrass beds. It is less often on open flat sandy beaches or sandbanks, especially around accumulated seaweed or isolated clumps of dead coral. It is occasionally found around near-coastal wetlands, such as lagoons and lakes and ponds in sewage farms and saltworks. Inland records for the species are rare with sightings on river banks and the edges of rock pools (Higgins & Davies 1996).	NM, DBCA, PMST	**Likely** Suitable habitat is available for this species in the mangrove habitat. The closest known record is within 20 m of the survey area boundary.
Tringa glareola	Wood Sandpiper	MI	MI	The Wood Sandpiper uses well-vegetated, shallow, freshwater wetlands, such as swamps, billabongs, lakes, pools and waterholes. They are typically associated with emergent, aquatic plants or grass, and dominated by taller fringing vegetation, such as dense stands of rushes or reeds, shrubs, or dead or live trees, especially Melaleuca and River Red Gums *Eucalyptus camaldulensis* and often with fallen timber. They also frequent inundated grasslands, short herbage or wooded floodplains, where floodwaters are temporary or receding, and irrigated crops. They are also found at some small wetlands only when they are drying. They are rarely found using brackish wetlands, or dry stunted saltmarsh. Typically they do not use coastal flats, but are occasionally recorded in stony wetlands. This species uses artificial wetlands, including open sewage ponds, reservoirs, large farm dams, and bore drains (Higgins & Davies 1996). In Western Australia, within wetlands, birds often occur within a few metres of one another and are concentrated at a few sites in a wetland (Higgins & Davies 1996).	NM, DBCA, PMST	**Unlikely** The survey area does not contain suitable habitat to support this species. The closest known record is 1.5 km north-west of the survey area.

Taxa	Common name	WA listing	EPBC listing	Description	Source	Likelihood of occurrence
Tringa stagnatilis	Marsh Sandpiper	MI	MI	The Marsh Sandpiper lives in permanent or ephemeral wetlands of varying salinity, including swamps, lagoons, billabongs, saltpans, saltmarshes, estuaries, pools on inundated floodplains, and intertidal mudflats and also regularly at sewage farms and saltworks. They are recorded less often at reservoirs, waterholes, soaks, bore-drain swamps and flooded inland lakes. In north Australia they prefer intertidal mudflats (Higgins & Davies 1996), although surveys in Kakadu National Park recorded more birds around shallow freshwater lakes than in areas influenced by tide (Bamford 1988). At the Top End they often use ephemeral pools on inundated freshwater and tidal floodplains (Higgins & Davies 1996). Three of the five sites with highest recorded numbers are saltwater habitats (Hunter Estuary, NSW; Port Hedland Saltworks, Western Australia; Tullakool Evaporation Ponds, NSW) (Watkins 1993). In the south-east Gulf of Carpentaria they have been recorded round both saline and fresh waters (Garnett 1989). Elsewhere they said to avoid, or rarely occur in, tidal habitats, and rarely occur on beaches. In Western Australia they prefer freshwater to marine environments. In south-east Australia they prefer inland saline lakes and coastal saltworks. They are found infrequently around mangroves (Higgins & Davies 1996).	NM, PMST	**Unlikely** Habitat is present in the region however this species is less often recorded around mangrove. The closest known record is 500 m north-west of the survey area.
Xenus cinereus	Terek Sandpiper	MI	MI	The Terek Sandpiper mostly forages in the open, on soft wet intertidal mudflats or in sheltered estuaries, embayments, harbours or lagoons. The species has also been recorded on islets, mudbanks, sandbanks and spits, and near mangroves and occasionally in samphire (Halosarcia spp.). Birds are seldom near the edge of water, however, birds may wade into the water (Marchant & Higgins 1993). Occasionally, on sandy beaches, among seaweed and other debris and in rocky areas, Terek Sandpipers will use the supralittoral or upper littoral zone, where a film of water covers the sand. However, on exposed rock platforms, the species forages in the lower littoral zone and not the supralittoral or upper littoral zones (Marchant & Higgins 1993). Less often seen on sandy or shingle beaches, or on rock or coral reefs or platforms, Terek Sandpipers are occasionally sighted around drying sewage ponds and saltpans if surrounded by mudflats. The species is also found around brackish coastal swamps, lagoons and dune-lakes; and also on gravel or rocky edges of estuarine pools and freshwater river-pools (Marchant & Higgins 1993). Very occasionally, birds use swampy, grassy or cultivated paddocks near the coast (Marchant & Higgins 1993). Preferring to roost in or among mangroves, birds may perch in branches or roots up to 2 m from the ground, or beneath them in the shade on hot days. Occasionally, they roost in dead trees or among tangled driftwood. In Westernport Bay,	NM, DBCA, PMST	**Likely** Suitable habitat is available to support this species. The closest known record lies within 20 m of the survey area.

Taxa	Common name	WA listing	EPBC listing	Description	Source	Likelihood of occurrence
				Victoria, the Terek Sandpiper prefers to roost on isolated banks of mangroves, surrounded by water. Elsewhere, they may roost with other waders on flat shores, on muddy spits, islets or banks, and sometimes on sandy and pebbly beaches (Marchant & Higgins 1993).		
Tringa nebularia	Common Greenshank	MI	MI	The Common Greenshank is found in a wide variety of inland wetlands and sheltered coastal habitats of varying salinity. It occurs in sheltered coastal habitats, typically with large mudflats and saltmarsh, mangroves or seagrass. Habitats include embayments, harbours, river estuaries, deltas and lagoons and are recorded less often in round tidal pools, rock-flats and rock platforms. The species uses both permanent and ephemeral terrestrial wetlands, including swamps, lakes, dams, rivers, creeks, billabongs, waterholes and inundated floodplains, claypans and saltflats. It will also use artificial wetlands, including sewage farms and saltworks dams, inundated rice crops and bores. The edges of the wetlands used are generally of mud or clay, occasionally of sand, and may be bare or with emergent or fringing vegetation, including short sedges and saltmarsh, mangroves, thickets of rushes, and dead or live trees. It was once recorded with Black-winged Stilts (Himantopus himantopus) in pasture, but are generally not found in dry grassland (Higgins & Davies 1996).	NM, DBCA	**Known** This species has been recorded in the DBCA Threatened Fauna data within the survey area
Limicola falcinellus	Broad-billed Sandpiper	MI	MI	The Broad-billed Sandpiper occurs in sheltered parts of the coast, favouring estuarine mudflats but also occasionally occur on saltmarshes, shallow freshwater lagoons, saltworks and sewage farms, and in areas with large soft intertidal mudflats, which may have shell or sandbanks nearby. Occasionally they occur on reefs or rocky platforms. They have also been recorded in creeks, swamps and lakes near the coast, particularly those with bare mudflats or sand exposed by receding water. They often favour mud among, or fringed by, mangroves, particularly on the seaward side and sometimes occur in estuaries edged by saltmarsh. They are rarely recorded inland. Foraging occurs on exposed flats of soft mud or wet sand at edges of coastal and near-coastal wetlands, often around channels on mudflats or in accumulated mud in swales between shell banks. In northern Australia, they forage in soft mud near mangroves, but may remain on same muddy section, even though fresher substrate may be exposed by the receding tide. They also forage in shallow water on muddy edges of ponds. They roost on the banks of sheltered sandy, shelly or shingly beaches (Higgins & Davies 1996). They nest on the ground, frequently in the top of a tussock (Cramp 1985).	NM, DBCA, PMST	**Likely** Suitable habitat may be available to support this species in the mangrove woodland. The closest known record is greater than 5 km from the survey area.

Taxa	Common name	WA listing	EPBC listing	Description	Source	Likelihood of occurrence
Birds migratory wetland						
Plegadis falcinellus	Glossy Ibis	MI	MI	The Glossy Ibis' preferred habitat for foraging and breeding are fresh water marshes at the edges of lakes and rivers, lagoons, flood-plains, wet meadows, swamps, reservoirs, sewage ponds, rice-fields and cultivated areas under irrigation. The species is occasionally found in coastal locations such as estuaries, deltas, saltmarshes and coastal lagoons. Within Australia, the largest contiguous areas of prime habitat is inland and northern floodplains (Marchant & Higgins 1993).	NM, PMST	**Unlikely** Limited habitat is available to support this species. The closest known record is greater than 5 km from the survey area.
Pandion cristatus	Osprey	MI	MI	Eastern Ospreys occur in littoral and coastal habitats and terrestrial wetlands of tropical and temperate Australia and offshore islands. They are mostly found in coastal areas but occasionally travel inland along major rivers, particularly in northern Australia. They require extensive areas of open fresh, brackish or saline water for foraging (Marchant & Higgins 1993). They frequent a variety of wetland habitats including inshore waters, reefs, bays, coastal cliffs, beaches, estuaries, mangrove swamps, broad rivers, reservoirs and large lakes and waterholes. They exhibit a preference for coastal cliffs and elevated islands in some parts of their range, but may also occur on low sandy, muddy or rocky shores and over coral cays.	NM, PMST	**Known** This species was recorded flying over the survey area at the time of the survey/
Glareola maldivarum	Oriental Pratincole	MI	MI	In non-breeding grounds in Australia, the Oriental Pratincole usually inhabits open plains, floodplains or short grassland (including farmland or airstrips), often with extensive bare areas. They often occur near terrestrial wetlands, such as billabongs, lakes or creeks, and artificial wetlands such as reservoirs, saltworks and sewage farms, especially around the margins. The species also occurs along the coast, inhabiting beaches, mudflats and islands, or around coastal lagoons (Lloyd and Lloyd, 1991).	NM, PMST	**Unlikely** Species may be a non-breeding seasonal visitor and may occasionally have opportunistic use of mangrove habitat. Limited habitat is available to support this species.
Gallinago stenura	Pin-tailed Snipe	MI	MI	During non-breeding period the Pin-tailed Snipe occurs most often in or at the edges of shallow freshwater swamps, ponds and lakes with emergent, sparse to dense cover of grass/sedge or other vegetation. The species is also found in drier, more open wetlands such as claypans in more arid parts of species' range. It is also commonly seen at sewage ponds; not normally in saline or inter-tidal wetlands (Higgins & Davies 1996).	NM, PMST	**Unlikely** Species may be a non-breeding seasonal visitor and may occasionally have opportunistic

Taxa	Common name	WA listing	EPBC listing	Description	Source	Likelihood of occurrence
						use of mangrove habitat. Limited habitat is available to support this species.
Birds migratory terrestrial						
Charadrius veredus	Oriental Plover	MI	MI	Immediately after arriving in non-breeding grounds in northern Australia, Oriental Plovers spend a few weeks in coastal habitats such as estuarine mudflats and sandbanks, on sandy or rocky ocean beaches or nearby reefs, or in near-coastal grasslands, before dispersing further inland. Thereafter they usually inhabit flat, open, semi-arid or arid grasslands, where the grass is short and sparse, and interspersed with hard, bare ground, such as claypans, dry paddocks, playing fields, lawns and cattle camps or open areas that have been recently burnt (Storr, 1980).	NM, DBCA, PMST	**Unlikely** Species may be a non-breeding seasonal visitor and may occasionally have opportunistic use of mangrove habitat. Limited habitat is available to support this species. Closest known record is 500 m north-wets of survey area.
Hirundo rustica	Barn Swallow	MI	MI	In Australia, the Barn Swallow is recorded in open country in coastal lowlands, often near water, towns and cities. Birds are often sighted perched on overhead wires and also in or over freshwater wetlands, paperbark Melaleuca woodland, mesophyll shrub thickets and tussock grassland.	NM, PMST	**Unlikely** Species may be a non-breeding seasonal visitor and may occasionally have opportunistic use of mangrove habitat. Limited habitat is available to support this species. Closest known record is greater than 5 km east of the survey area.

Taxa	Common name	WA listing	EPBC listing	Description	Source	Likelihood of occurrence
Motacilla flava subsp. simillima	Yellow Wagtail	MI	MI	A migratory species that regularly visits northern Australia particularly the area from Broome to Darwin (Morcombe 2004). The species prefers coastal habitat near to water where it prefers to forage. However the species has been recorded further inland feeding on plains (Morcombe 2004).	NM, PMST	**Unlikely** Species may be a non-breeding seasonal visitor and may occasionally have opportunistic use of mangrove habitat. Limited habitat is available to support this species. The closest known record is 2.4 km northeast of the survey area.
Birds migratory seabirds						
Oceanites oceanicus	Wilson's storm Petrel	MI	MI	Wilson's Storm-Petrel is a pelagic (marine) species distributed throughout most of the world's oceans. Its distribution stretches north through the mid-latitudes of the Northern Hemisphere and south through the oceans surrounding Australia and the Australian Antarctic Territory. The species is a rare vagrant to mainland Australia and likely observed during storm events or due to illness.	NM, PMST	**Unlikely** The survey area does not provide suitable habitat to support this species. The closest known record is 2.6 km north-east of the survey area.
Sula leucogaster	Brown Booby	MI	MI	The Brown Booby is a large seabird which it is one of the most common and widespread of seabirds of the Atlantic and Pacific oceans. It has a pantropical range, which overlaps with that of other booby species and in Australia extends from Dampier in WA to Brisbane in Queensland. The gregarious brown booby commutes and forages at low height over inshore waters and breeds on islands and inshore coastal areas. The Brown Booby will generally stay inshore and rarely venture over terrestrial habitats.	NM, PMST,	**Unlikely** The survey area does not provide suitable habitat to support this species. The closest known record is 2.6 km north-east of the survey area.
Fregata ariel	Lesser Frigatebird	MI	MI	The Lesser Frigatebird breeds on small, remote tropical and sub-tropical islands, in mangroves or bushes, and even on bare ground. Major breeding populations of the Lesser Frigatebird are found in tropical waters of the	NM, DBCA	**Likely** Suitable habitat is available for this

Taxa	Common name	WA listing	EPBC listing	Description	Source	Likelihood of occurrence
				Indian and Pacific Ocean (excluding the east Pacific), as well as one population in the South Atlantic. Outside the breeding season it is sedentary, with immature and non-breeding individuals dispersing throughout tropical seas, especially off the Indian and Pacific Ocean (DAWE 2020b).		species in the mangrove habitat. The closest know record is 500 m north-west of the survey area.
Birds -Terns						
Onychoprion anaethetus	Bridled Tern	MI	MI	Bridled Terns occupy tropical and subtropical seas, breeding on islands, including vegetated coral cays, rocky continental islands and rock stacks (Chatto 2001). Bridled Terns are only rarely found in inshore continental waters and along mainland coastlines, though the species is reported to breed on the mainland of far southern Western Australia (Higgins & Davies 1996; Johnstone & Storr 1998). Typically, Bridled Terns breed on islands where nests are usually found in rocky areas or on coral, concealed in crevices, under rocks, among talus or coral rubble, on ledges of cliffs, or on the ground beneath low shrubs, roots of Pandanus, vines or among grasses.	NM, PMST	**Unlikely** The survey area does not contain suitable habitat to support this species. It may opportunistically interact with the mangrove habitat but this is considered to be an infrequent occurrence.
Hydroprogne caspia	Caspian Tern	MI	MI	The Caspian Tern is mostly found in sheltered coastal embayments (harbours, lagoons, inlets, bays, estuaries and river deltas) and those with sandy or muddy margins are preferred. They also occur on near-coastal or inland terrestrial wetlands that are either fresh or saline, especially lakes (including ephemeral lakes), waterholes, reservoirs, rivers and creeks. They also use artificial wetlands, including reservoirs, sewage ponds and saltworks. In offshore areas the species prefers sheltered situations, particularly near islands, and is rarely seen beyond reefs (Higgins & Davis 1996). Large numbers may shelter along the coast, behind coastal sand-dunes or coastal lakes during rough weather, and have been recorded inland after storms (Higgins & Davies 1996).	NM, DBCA, PMST	**Known** This species was recorded flying over the survey area at the time of the field survey. It may opportunistically utilise the mangrove woodland.
Sterna hirundo	Common Tern	MI	MI	Common Terns are marine, pelagic and coastal. In Australia, they are recorded in all marine zones, but are commonly observed in near-coastal waters, both on ocean beaches, platforms and headlands and in sheltered waters, such as bays, harbours and estuaries with muddy, sandy or rocky shores. Occasionally they are recorded in coastal and near-coastal wetlands, either saline or freshwater, including lagoons, rivers, lakes, swamps and	NM, PMST	**Likely** Suitable habitat is available for this species in the mangrove woodland.

Taxa	Common name	WA listing	EPBC listing	Description	Source	Likelihood of occurrence
				saltworks. Sometimes they occur in mangroves or saltmarsh and, in bad weather, in coastal sand-dunes or coastal embayments (Brandis et al. 1992; Chatto 2006; Higgins & Davies 1996; Hitchcock 1965; Wood 1991). Common Terns forage in marine environments, often close to the shore, including sheltered embayments and in the surf-zone, but also well out to sea. They also forage in near-coastal terrestrial wetlands, including estuaries, rivers and swamps (Higgins & Davies 1996; Hitchcock 1965; Nisbet 2002). Common Terns nest on the ground in the open, usually on bare substrates, occasionally near vegetation or in it, or on a floating mat of vegetation. They usually nest on islands, either marine or in lakes, only sometimes on mainland beaches or promontories or salt or freshwater marshes.		Closest known record is 1.6 km east of the survey area.
Gelochelidon nilotica	Gull-billed Tern	MI	MI	Habitat for this species includes beaches, mudflats, fresh, brackish wetlands including far inland, grasslands, crops, ploughed fields and airfields. Breeding occurs inland in in Western Australia when conditions are suitable (Pizzey & Knight 2012).	NM, DBCA, PMST	**Unlikely** Limited habitat is available to support this species. The closest known record is 500 m north-west of the survey area.
Chlidonias leucopterus	White-winged Black Tern	MI	MI	In Australia, and elsewhere in their non-breeding range, the species mostly inhabits fresh, brackish or saline, and coastal or subcoastal wetlands. White-winged Black Terns frequent tidal wetlands, such as harbours, bays, estuaries and lagoons, and their associated tidal sandflats and mudflats. Terrestrial wetlands, including swamps, lakes, billabongs, rivers, floodplains, reservoirs, saltworks, sewage ponds and outfalls are also inhabited. Wetlands may be open, or with floating emergent or marginal vegetation. They rarely occur on inland wetlands in Australia (DAWE 2020b).	NM, PMST	**Likely** Suitable habitat is available for this species in the mangrove habitat. The closest known record is 3.4 km east of the survey area.
Sternula albifrons	Little Tern	MI	MI	n Australia, Little Terns inhabit sheltered coastal environments, including lagoons, estuaries, river mouths and deltas, lakes, bays, harbours and inlets, especially those with exposed sandbanks or sand-spits, and also on exposed ocean beaches. Little Terns are widespread on islands off the Northern Territory coast. In the Northern Territory, Little Terns are commonly seen in sandy coastal habitats and in mangrove-mudflat habitats along the coast or in bays and estuaries, but not recorded on wetlands more than 1 km from the coast (Chatto 2001). Little Terns nest on sand-spits, banks, ridges or islets in sheltered coastal environments, such as coastal lakes, estuaries and inlets,	NM, DBCA, PMST	**Likely** Suitable habitat is available for this species in the mangrove habitat. The closest know record is 500 m north-west of the survey area.

Taxa	Common name	WA listing	EPBC listing	Description	Source	Likelihood of occurrence
				and also on wide and flat or gently sloping sandy ocean beaches, and also, occasionally, in sand-dunes (DAWE 2020b).		
Sterna nereis nereis	Fairy Tern	Vu	Vu	The habitat of the fairy tern is essentially marine, including sheltered coasts, bays, inlets, estuaries, coastal lagoons, ocean beaches but rarely out to sea or out of sight of land. They also inhabit wetlands near the coast including salt ponds and lakes. This species favours sites with sand spits and small sand islets in river mouth channels (Morcombe 2004).	PMST	**Likely** Suitable habitat is available for this species in the mangrove habitat. The closest know record is 500 m north-west of the survey area.
Thalasseus bergii	Crested Tern	MI	MI	The Crested Tern can be found in coastal habitats, offshore waters, beaches, bays, inlets, tidal rivers, salt swamps, lakes and larger rivers. Breeding occurs in most months in northern and western Australia although it also breeds in other regions. Eggs are laid in scrape or rock in colonies often on islands (Pizzey & Knight 2012).	NM, PMST	**Likely** Suitable habitat is available for this species in the mangrove habitat. Closest known record is 1.6 km east of survey area.
Birds Mangrove endemic						
Pachycephala melanura	Mangrove Golden Whistler			The mangrove golden whistler is a Chunky, rounded songbird with heavy thick bill in the family Pachycephalidae. It is found in mangrove forests and adjacent wet forests of Papua New Guinea and northern Australia.	NM, DBCA	**Likely** Suitable habitat is present for this species within the mangrove habitat type. The closest known record is less than 1 km north of survey area.
Zosterops luteus	Yellow White-eye			The Yellow White-eyes is a common bird that occurs in mangroves in northern Australia. They range from Shark Bay in W.A. to Cape York in Qld and south to near Bowen at the mouth of the Burdekin River. They are not restricted to mangroves but do move into other habitats at times in search of food and also away from the coast along some river margins where suitable habitat is present.	NM, DBCA	**Likely** Suitable habitat is present for this species within the mangrove habitat type. The closest known record is less

Taxa	Common name	WA listing	EPBC listing	Description	Source	Likelihood of occurrence
						than 1 km north of survey area.
Pachycephala lanioides	White-breasted Whistler			White-breasted Whistlers are generally restricted to coastal mangroves from near Carnarvon north to the Kimberley and across northern Australia to Karumba on the Gulf of Carpentaria. Few records have also been made outside of mangroves in adjoining suitable vegetation such as monsoon forest. Adult White-breasted Whistlers appear to be mainly resident and occur as pairs in permanent territories - only the juveniles and immatures would wander far afield. The results of bird banding, mainly at Broome Bird Observatory have shown that they hardly ever move further than 10 kilometres. They feed largely on or close to the ground in mangroves and their large hooked bill is ideally suited to dealing with larger prey, such as crabs. They have been observed breaking open the shells of molluscs by bashing them on the trunks of mangroves (Boles 2020).	NM, DBCA	**Likely** Suitable habitat is present for this species within the mangrove habitat type. The closest known record is less than 1 km north of survey area.
Rhipidura phasiana	Mangrove Grey Fantail			The Mangrove Grey Fantail are generally restricted to coastal mangroves from Shark Bay north to the Kimberley and patchily distributed across northern Australia to Edward River in Queensland. The species will venture into other habitats including open or closed forest, woodland, shrubland or dense chenopods, however mangroves are there primary habitat. The species feeds on Insects; beetles (Coleoptera), flies (Diptera), bugs (Hemiptera) and wasps (Hymenoptera) and spiders (Boles 2020).	NM, DBCA	**Likely** Suitable habitat is present for this species within the mangrove habitat type. The closest known record is less than 1 km north of survey area.
Peneonanthe pulverulenta	Mangrove Robin			The Mangrove Robin are generally restricted to coastal mangroves from Port Hedland north to the Kimberley and patchily distributed across northern Australia to south east coast in Queensland. The species is primarily a mangrove specialist however has been recorded in adjacent paperbark swamps (Boles 2020).	NM, DBCA	**Likely** Suitable habitat is present for this species within the mangrove habitat type. The closest known record is greater than 5 km from the survey area.
Reptiles						
Ctenotus angusticeps	Airlie Island Ctenotus	P3	VU	This species was formerly known from only two widely separated localities in Western Australia: Airlie Island, off the north-west coast and Roebuck Bay,	NM, PMST	**Unlikely**

Taxa	Common name	WA listing	EPBC listing	Description	Source	Likelihood of occurrence
				just south of Broome. On Airlie Island it inhabits Acacia shrublands, coastal spinifex and tussock grasses. On the mainland, the Airlie Island Ctenotus generally inhabits samphire shrubland in the intertidal zone along mangrove (Grey Mangrove (*Avicennia marina*) with occasional Red Mangrove (*Rhizophora stylosa*) margins, however, subtle differences in vegetation/topography exist among sites where the species has been recorded. The Roebuck Bay lizards have been observed on coastal mudflats vegetated with samphire (Wilson and Swan 2017). In 2012 this species was recorded in Port Hedland in samphire adjacent to mangroves. Recent surveys to determine the extent of this species' distribution outside of Port Hedland recorded species 70 km west and 50 km east of Port Hedland and an additional 10 locations between Karratha and Broome (BHPB pers. comm.) therefore showing the distribution of this species is more widespread than previously thought.		The species is known from the tidal mud flat high tide ecotone where marine grass, Triodia, mangroves meet. No habitat is available for this species in the survey area. The closest known record is 500 m north-east of the survey area.
Mammals						
Dasycercus blythi	Brush-tailed Mulgara	P4		The Brush-tailed Mulgara is primarily nocturnal, shelters in burrows and feeds on insects, other arthropods and small vertebrates. This species inhabits spinifex grasslands and, in central Australia, lives in burrows that it digs on the flats between low sand dunes (Van Dyck and Strahan 2008). The Mulgara is a solitary species exhibiting high site fidelity and a low propensity for dispersal once a home range has been established (Masters and Crowther 2003). Males and females maintain home ranges of 1.4 to 14 hectares (Masters and Crowther 2003) which on average, overlap by less than 20% (Masters and Crowther 2003).	NM, PMST	**Unlikely** The species is known from the Triodia plains around Wedgefield and FMG rail areas however no habitat is available for this species in the survey area. The closest known record is greater than 5 km from the survey area.
Dasycercus cristicauda	Crest-tailed Mulgara	P4		The Crest-tailed Mulgara inhabits the inland sandy deserts of central Australia, primarily amongst Spinifex grasslands. It has also been found in dunes dominated by sandhill canegrass, nitre bush grasslands and sandhill canegrass flats near salt lakes (Woolley 2010). This contrasts with the habitat of the Brush-tailed Mulgara, which is generally spinifex grasslands with medium to dense cover (Van Dyck and Strahan 2008). Because the recognition of *D. blythi* as a species has been so recent the identity of	NM, PMST	**Highly unlikely** This species is not known from the region. Historical records of this species around Port Hedland have been identified as error

Taxa	Common name	WA listing	EPBC listing	Description	Source	Likelihood of occurrence
				museum specimens must be re-checked before the true range limits of both it and *D. cristicauda* can be determined (Woolley 2005 and 2008).		and all assigned to D. blythi.
Dasyurus hallucatus	Northern Quoll	EN	EN	The Northern Quoll once occurred across the majority of northern Australia but its range has significantly contracted. It occurs in the Pilbara region but in disjunct populations. The Northern Quoll inhabits a range of vegetation associations but is especially abundant on dissected rocky escarpment and eucalypt woodland within 200 km of the coast. It is known to den in rock crevices and rock piles and favours rocky areas. They are predominantly nocturnal but are occasionally active during the day, particularly during the mating season and are known to have a large home range (Van Dyck and Strahan 2008).	NM, PMST	**Unlikely** Periodically transient individuals are found around Wedgefield and FMG rail areas however little habitat is available for this species in the survey area.
Lagostrophus fasciatus fasciatus	Banded hare-wallaby	VU	VU	The banded hare-wallaby is an endangered macropod currently extinct on mainland Australia. This species is restricted to Bernier and Dorre Islands in Shark Bay, Western Australia. On these islands it is commonly found among dense thickets of *Acacia ligulata, A. coriacea* and *Alectryon oleifolium* scrub on sandplains and *Diplolaena dampeiri* and *A. oleifolium* on the dunes (Van Dyck and Strahan 2008).	NM, PMST	**Highly Unlikely** This species no longer persists naturally on the mainland
Macrotis lagotis	Bilby	VU	VU	The Greater Bilby distribution in Western Australia is restricted to the north, including the Pilbara, Sandy and Gibson Deserts. The Greater Bilby usually spends the daytime in burrows, often built against termite mounds, spinifex hummock or shrubs (Van Dyck and Strahan 2008). Extant population of the Greater Bilby occur in a variety of habitats, usually on landforms with level to low slope topography and light to medium soils. It occupies three major vegetation types; open tussock grassland on uplands and hills, mulga woodland/shrubland growing on ridges and rises, and hummock grassland in plains and alluvial areas. Laterite and rock feature substrates are an important part of Greater Bilby habitat. These habitat support shrub species, such as Acacia kempeana, A. hilliana and A. rhodophylla, which have root-dwelling larvae that provide a constant food source for the Greater Bilby. After dark they leave their burrows to feed and populations are known to move long distances when current habitat ranges become unsuitable. Bilbies are largely solitary, widely dispersed and found in low numbers. The current occurrence of the Greater Bilby is strongly associated with higher rainfall and temperatures, which promote areas of higher plant and food production. The Greater Bilby may also prefer these conditions as higher rainfall and temperatures are not well tolerated by foxes (Pavey 2006; Southgate et al. 2007).	NM, PMST	**Highly Unlikely** No habitat available to support this species. The closest known record is greater than 5 km from the survey area.

Taxa	Common name	WA listing	EPBC listing	Description	Source	Likelihood of occurrence
Mormopterus cobourgianus	Northern Coastal Free-tailed Bat	P1		The Little North-western Mastiff Bat is known from 12 locations in Western Australia (DPaW 2007–) and four in the Northern Territory, and within this distribution it is restricted to a few localised habitats, and can appear to be locally common because it aggregates. In Western Australia, this species inhabits mangrove stands, and has been recorded roosting in hollows and or crevices in mangroves (van Dyck *et al.* 2013). There are records of the Little North-western Mastiff Bat from mangroves at Exmouth to the northern Pilbara.	NM, PMST	**Likely** Habitat is present for this species adjacent to and surrounding the survey area. The closest known record is 400 m south of the survey area in mangrove habitat.

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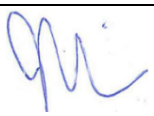
Rev 3	N Barratt, J Collins, M Roberts	J Collins		R Radford	 Russell Radford 2020.09.16 14:19:56 +08'00'	16/9/2020

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