LEVEL 1 FLORA AND VEGETATION SURVEY AND LEVEL 1 FAUNA ASSESSMENT

Lots 1, 101, 112 and 220 Minilya–Exmouth Road, Learmonth

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Disclaimer

SUMMARY

MG Kailis Group (Kailis) proposes that a Town Planning Scheme amendment of Lots 1, 101, 112 and 220 Minilya–Exmouth Road is undertaken. Initial discussions with government authorities revealed that site-specific investigations may be required to support the proposed Scheme Amendment. As a result of these discussions, RPS was commissioned by Kailis to undertaken a Level 1 flora and vegetation assessment and a level 1 fauna assessment.

The main objective of the Level 1 Flora and Vegetation Survey and Level 1 Fauna Assessment is to assess the ecological values of the site and to assist in seeking environmental approvals to facilitate development of the landholding by Kailis.

The findings of the flora and vegetation survey and fauna assessment are summarised below:

Flora and Vegetation

- The vegetation of the subject land is considered to be representative of the Cape Range vegetation association (663); hummock grasslands, shrub steppe; waterwood over soft spinifex.

- Approximately 29, 016 hectares (95.65% of the pre European extent) of the Cape Range vegetation unit currently remains and approximately 22.5% of this vegetation type within the Carnarvon bioregion is in conservation reserves.

- The condition of the vegetation in the study area ranged from Good to Completely Degraded however a majority of the vegetation on the site was considered Degraded to Completely Degraded. A significant proportion of Lots 1, 101, 112 and 220 have been historically cleared of native vegetation during the construction of existing facilities associated with the prawn processing factory previously established on the site by Kailis.

- A total of 67 plant taxa (including subspecies and varieties) representing 52 genera and 26 plant families were recorded in the study area. This total is comprised of 64 native species and 3 introduced (exotic) species. The vegetation of the study area is considered to be of low diversity.

- No Threatened Rare Flora species listed by the DEC or species listed as matters of National Environmental Significance (NES) under the EPBC Act were recorded within the project area during the survey.

- Two Priority flora species were recorded during in the study area; *Corchorus congener* (P3) (two plants) and *Gymnanthera cunninghamii* (P3) (one plant). Both species are adequately represented at a local and regional scale. Proposed clearing of native vegetation on the site will not have a detrimental effect on the known populations of *Corchorus congener* (P3) and *Gymnanthera cunninghamii* (P3).

- Three introduced species (weeds) were recorded during the flora survey; **Cenchrus ciliaris*, **Cynodon dactylon* and **Aerva javonica*. None of these species are listed as Declared Plant species pursuant to section 37 of the *Agricultural and Related Resources Protection Act 1976* (WA). A majority of the site has been invaded by **Cenchrus ciliaris* (Buffel Grass).

- Six vegetation types were recorded during the flora and vegetation survey.

- There are no Threatened Ecological Communities (TECs) protected under the EPBC Act 1999 or TECs and Priority Ecological Communities (PECs) listed by the DEC (2011c/d) occurring on or in close proximity to the study area. None were recorded during the 2011 field survey.

- There are no wetlands located in the study area. One major ephemeral creek line dissects Lot 220 in the northern extent of the study area.

- A search of the DEC's Native Vegetation Viewer indicated that the entire extent of the study area is contained within an Environmentally Sensitive Area (ESA). This ESA is associated with the Cape Range Province and surrounding marine and coastal environment. It is unlikely that the proposed development of Lots 1, 101, 112 and 220 Minilya–Exmouth Road will negatively impact on the marine and coastal habitats adjacent to the site providing adequate environmental management plans are implemented by the proponent.

- It is highly unlikely that the proposed development of Lots 1, 101, 112 and 220 Minilya–Exmouth Road will impact on biodiversity values of the surrounding flora and vegetation.

Fauna

- Landform features and vegetation types which provide important fauna habitat on type include
  - ephemeral drainage lines (in particular the sandy banks which provides nesting habitat for rainbow bee eaters)
  - coastal dunes
  - man made infrastructure (which provides perching and nesting opportunities for species such as osprey)
  - stockpiles of cleared material
  - native vegetation, in particular trees and shrubs which provide perching opportunities for feeding birds (in particular vegetation types V3 and V5), low scrub and spinifex such as is present in vegetation type V6 provides important shelter for reptile species.

- Database searches identified 135 species potentially occurring on the site. Of these
  - a total of 83 bird species were identified of which 16 were identified on the site including the rainbow bee eater which is listed as Migratory under the EPBC Act.

- a total of 17 mammal species were identified as potentially occurring in the area, of which three were identified on site. Two of these, the sheep and rabbit, were introduced species. No significant mammal species were identified on site

- thirty one reptile species were identified as potentially occurring on site, of these two were identified on site (Bungarra (*Varanus gouldii*)) and the Long-nosed Dragon (*Amphibolurus longirostris*)). No significant reptile species were identified on site

- four amphibian species were identified as potentially occurring on site, none of which were of conservation significance. No amphibian species were identified during the field surveys.

The rainbow bee-eater is listed as Migratory under the EPBC Act and under the Japan Australia Migratory Bird Agreement (JAMBA). Over ten individuals were seen on site at one time and it is considered likely that more were present. Mike Bamford (zoologist) confirmed that at least one of the burrows present along the drainage line had been created by rainbow bee eaters.

As breeding pairs usually excavate a new burrow for each breeding season (DSEWPC 2011b) and due to the mobile nature of the species and the presence of similar suitable habitat nearby, any impact on the rainbow bee eater due to proposed development of the site is not considered significant.

Based on the above, the following recommendations and general management guidelines are provided to minimise any potential adverse impacts to matters of environmental significance as a result of development:

- At the clearing stage of development, care should be taken to ensure that any fauna utilising the site is given every opportunity to relocate. To achieve this, clearing should be undertaken in a staged manner in the direction of vegetation to be retained and cleared vegetation should be left overnight in-situ to allow individuals further opportunity to disperse.

- The ephemeral creek line has been identified as a potential breeding site for rainbow bee eaters (as discussed above) and should preferably be retained and managed within any future development. Rainbow bee eaters are common through out the area, with similar habitat in surrounding areas. This combined with their mobile nature and the fact that they most often choose to excavate new burrow each season means that the proposed development is not likely to impact this species.

It is concluded that it is highly unlikely that any matters of environmental significance will be adversely impacted by the development, if undertaken in accordance with the above

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APPENDICES

1.0 INTRODUCTION

1.1 Background

MG Kailis Group (Kailis) proposes to initiate a Town Planning Scheme amendment of Lots 1, 101, 112 and 220 Minilya–Exmouth Road. The site is currently zoned 'Special Use' with a list of approved uses. The acceptance of the Scheme Amendment by the Shire of Exmouth will permit Kailis undertake further development of the site, including activities such as Storage Facility, Depot and Laydown Area. Currently the site is being utilised by Kailis for seafood processing and the retail sale of seafood product.

Initial discussions with Government authorities revealed that site specific investigations may be required to support the proposed Scheme Amendment. As a result of these discussions, RPS was commissioned by Kailis to undertaken a Level 1 flora and vegetation assessment and a Level 1 fauna assessment.

The site is located approximately 22 kilometres north-north-east of Exmouth and 10 kilometres south of Learmonth (Figure 1). The site abuts the Exmouth Gulf to the east and is situated opposite Charles Knife Road to the west. The total area of the site is 27.8 hectares.

1.2 Report Objectives

The main objective of this Level 1 Flora and Vegetation Survey and Level 1 Fauna Survey is to provide an initial investigation into the potential for the proposed development to impact on matters of environmental significance. No other environmental factors are considered as part of this report.

The flora and vegetation survey and fauna survey have been undertaken in accordance with the following Environmental Protection Authority (EPA) Guidance Statements:

- Position Statement 3 – Terrestrial Biological Surveys as an Element of Biodiversity Protection (EPA 2002)
- Guidance Statement 51 – Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia (EPA 2004a)
- Guidance Statement 56 – Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia (EPA 2004b).

This report presents the findings of the Level 1 Flora and Vegetation Survey and the Level 1 Fauna Survey.

The flora and vegetation survey involved the following components:

- a desktop review of all available reports and literature on the flora and vegetation of the site including significant flora species identified in the Department of Environment and Conservation (DEC) database search
- mapping of vegetation types (and vegetation condition using the Bush Forever condition rating scale) using a combination of interpretation of recent aerial photography and field survey
- a list of all native and non-native plant species recorded from low intensity sampling within representative vegetation types identified from the site and from a thorough site walkover
- the location of any conservation significant species (TRF and Priority) identified on site
- a description of the vegetation types and vegetation condition occurring on the site
- an assessment of the conservation significance of the flora and vegetation at a regional and local level

The fauna survey involved the following components:

- a comprehensive fauna database search and literature review to compile background information relevant to the project area
- compilation of an inventory of vertebrate fauna potentially occurring in the project area
- identification of vertebrate fauna of conservation significance potentially occurring in the project area
- identification of broad fauna habitats and sensitive fauna habitats that may be expected to occur over the project area (based on vegetation mapping and landform)
- an opportunistic terrestrial fauna reconnaissance survey of project area
- recommendations of general management guidelines to minimise impacts of the proposed development program on terrestrial fauna and habitat in the project area.

1.3 Relevant Legislation and Policies

1.3.1 Conservation Significant Vegetation, Threatened and Priority Ecological Communities

1.3.1.1 Threatened Ecological Communities

Within Western Australia, TECs are defined by the Department of Environment and Conservation (DEC) as those communities which are found to fit into one of the categories listed in Table 1 below. The categories 'Data Deficient' and 'Lower Risk' can be used to provide a list of communities not classified as threatened, but that require more information. Within Western Australia, TECs have limited protection under the current *Wildlife Conservation Act 1950* and the *Environmental Protection Act 1986* (as amended). TECs will be protected by the proposed Biodiversity Conservation Act (in preparation).

The Environment Protection and Biodiversity Act 1999 (EPBC Act) provides protection for TECs under federal legislation, which are defined as those communities which are:

- **Critically Endangered** (if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future)
- **Endangered** (if, at that time, it is not critically endangered and is facing a very high risk of extinction in the wild in the near future)
- **Vulnerable** (if, at that time, it is not critically endangered or endangered, and is facing a high risk of extinction in the wild in the medium term future).

Table 1: Threatened Ecological Communities Category of Threat (English and Blyth 1997)

Category	Definition
Presumed Totally Destroyed (PD)	An ecological community will be listed as presumed totally destroyed if there are no recent records of the community being extant and either of the following applies: A) Records within the last 50 years have not been confirmed despite thorough searches or known or likely habitats or B) All occurrences recorded within the last 50 years have since been destroyed.

Category	Definition
Critically Endangered (CR)	An ecological community will be listed as **Critically Endangered** when it has been adequately surveyed and is found to be facing an extremely high risk of total destruction in the immediate future. This will be determined on the basis of the best available information, by it meeting **any one or more** of the following criteria: A) The estimated geographic range, and/or total area occupied, and/or number of discrete occurrences since European settlement have been reduced by at least 90% and **either or both** of the following apply: ▪ geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is imminent (within approximately five years) ▪ modification throughout its range is continuing such that in the immediate future (within approximately five years) the community is unlikely to be capable of being substantially rehabilitated. B) Current distribution is limited, and **one or more** of the following apply (i, ii or iii): i. Geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the immediate future (within approximately five years). ii. There are very few occurrences, each of which is small and/or isolated and extremely vulnerable to known threatening processes. iii. There may be many occurrences but total area is very small and each occurrence is small and/or isolated and extremely vulnerable to known threatening processes. C) The ecological community exists only as highly modified occurrences which may be capable of being rehabilitated if such work begins in the immediate future (within approximately five years).
Endangered (EN)	An ecological community will be listed as Endangered when it has been adequately surveyed and is not Critically Endangered but is facing a very high risk of total destruction in the near future. This will be determined on the basis of the best available information, by it meeting any one or more of the following criteria (A, B or C): A) The estimated geographic range, and/or total area occupied, and/or number of discrete occurrences since European settlement have been reduced by at least 70% and either or both of the following apply (i or ii) i. Geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is likely in the short term (within approximately 10 years). ii. Modification throughout its range is continuing such that in the short term future (within approximately 10 years) the community is unlikely to be capable of being substantially restored or rehabilitated. B) Current distribution is limited, and one or more of the following apply (i, ii or iii): i. Geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the short term future (within approximately 10 years). ii. There are very few occurrences, each of which is small and/or isolated and extremely vulnerable to known threatening processes. iii. There may be many occurrences but total area is very small and each occurrence is small and/or isolated and extremely vulnerable to known threatening processes. C) The ecological community exists only as highly modified occurrences which may be capable of being rehabilitated if such work begins in the short term future (within approximately 10 years).

Category	Definition
Vulnerable (VU)	An ecological community will be listed as Vulnerable when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing a high risk of total destruction in the medium to long term future. This will be determined on the basis of the best available information, by it meeting any one or more of the following criteria (A, B or C): A) The ecological community exists largely as modified occurrences which are likely to be capable of being substantially restored or rehabilitated. B) The ecological community can be modified or destroyed and would be vulnerable to threatening processes, is restricted in area and/or range and/or is only found at a few locations. C) The ecological community may still be widespread but is believed likely to move into a category of higher threat in the medium to long-term future because of existing or impending threatening processes.
Data Deficient (DD)	An ecological community which has not been adequately evaluated with respect to status or where there is currently insufficient information to assign it to a particular category. (An ecological community with poorly known distribution or biology that is suspected to belong to any of the above categories. These ecological communities have a high priority for survey and/or research.)
Lower Risk (LR)	An ecological community that has been adequately surveyed and does not qualify for any of the above categories of threat and appears unlikely to be under threat of significant modification or destruction in the short to medium term future.

1.3.1.2 Priority Ecological Communities

Possible TECs that do not meet survey criteria or have not been adequately defined are added to the DEC s Priority Ecological Community (PEC) List under Priorities 1, 2 and 3. These three categories are ranked in order of priority for survey and/or definition of the community, and evaluation of conservation status, so that consideration can be given to their declaration as TECs. Ecological communities that are adequately known and are rare, but not threatened or meet criteria for Near Threatened (P1, 2 or 3), or that have been recently removed from the threatened list, are placed in Priority 4. These ecological communities require regular monitoring. Conservation dependent ecological communities are placed in Priority 5.

1.3.2 Conservation Significant Flora

Commonwealth Legislation: species of significant flora are protected under both state and Commonwealth Acts. Any activities that are deemed to have a significant impact on species that are recognised by the EPBC Act and the *Wildlife Conservation Act 1950* can trigger referral to DSEWPC and/or the EPA. Descriptions of Conservation Categories delineated under the EPBC *Act* are detailed in Appendix 1.

State Legislation: In addition to the *EPBC Act, s*ignificant flora in Western Australia is protected by the *Wildlife Conservation Act 1950.* This *Act,* which is administered by the DEC, protects declared rare flora (DRF) species. The DEC also maintains a list of Priority listed flora species. Conservation codes for flora species are assigned by the DEC to define the level of conservation significance.

Priority Flora are not currently protected under the *Wildlife Conservation Act 1950*. Priority Flora may be rare or threatened, but cannot be considered for declaration as rare flora until adequate surveys have been undertaken of known sites and the degree of threat to these populations clarified. Special consideration is often given to sites that contain Priority Flora, despite them not having formal legislated protection. A description of the DEC's Conservation Codes that relate to flora species is provided in Appendix 1.

1.3.3 Threatened Fauna

1.3.3.1 Commonwealth Legislation

The *Environment Protection and Biodiversity Act 1999* (EPBC Act) protects matters of national environmental significance, including threatened and migratory species protected under international agreements such as the Japan–Australia Migratory Bird Agreement (JAMBA), the China–Australia Migratory Bird Agreement (CAMBA), the Republic of Korea–Australia Migratory Bird Agreement (ROKAMBA) and the Convention on the Conservation of Migratory Species of Wild Animals (the Bonn Convention). The EPBC Act states the proponent must not take an action that is likely to have a significant impact on any matters of national environmental significance without approval.

1.3.3.2 State Legislation

There are four levels of conservation significance provided for fauna under the *Wildlife Conservation Act 1950*. Scheduled species are prioritised and listed as:

- Schedule 1 (S1): Fauna that is rare or likely to become extinct (also known as 'Threatened Species')
- Schedule 2 (S2): Fauna presumed to be extinct
- Schedule 3 (S3): Migratory birds protected under an international agreement
- Schedule 4 (S4): Other specially protected fauna.

The DEC has also produced a supplementary list of 'Priority' fauna, including species that are not considered 'Threatened' or scheduled under the *Wildlife Conservation Act 1950*, but for which the DEC considers require attention (DEC 2010). These include:

- Priority 1 (P1): Taxa with few, poorly known populations on threatened lands
- Priority 2 (P2): Taxa with few, poorly known populations on conservation lands

- Priority 3 (P3): Taxa with several, poorly known populations, some on conservation lands
- Priority 4 (P4): Taxa in need of monitoring
- Priority 5 (P5): Taxa that are conservation dependent (i.e. their conservation status is dependent on ongoing active management).

The DEC also classifies species into one of five categories developed by the International Union for Conservation of Nature (IUCN): extinct (EX), extinct in the wild (EW), critically endangered (CR), endangered (EN) or vulnerable (VU). These categories are determined by the total distribution of the species within Australia (and internationally where migratory species are concerned), not just within Western Australia.

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2.0 EXISTING ENVIRONMENT

2.1 Climate and Rainfall

The Gascoyne region experiences a dry warm Mediterranean climate characterised by cool, wet winters and hot, dry summers. More specifically, Exmouth frequently experiences seasonal extremes in weather from hot summer days when north-easterly winds arrive from the interior of Western Australia to cold, wet, windy winter days as cold fronts from the Southern Ocean move through the region. Mean maximum temperatures of 38 °C have been recorded at Learmonth in January while the mean minimum temperature is 11.3 °C during July (Bureau of Meteorology 2011).

The long-term average rainfall for Exmouth is approximately 300 mm per annum, which generally falls during either from January through to March or from May to July. Rainfall in summer is associated with thunderstorms and tropical lows, which can produce heavy localised falls over short periods of time. Most rain which occurs from May to July is brought to the region by tropical cloud bands originating in the north-west of the state (Bureau of Meteorology 2011).

Tropical cyclones causing strong winds, high seas and heavy rain affect the North West Cape about once every two years on average. Cyclones are most common in February and March (Bureau of Meteorology 2011).

2.2 Topography and Landform

The subject land is located on the North West Cape which is a northerly trending peninsula approximately 80 km long and 20 km wide. It has a rugged topography, reaching a maximum elevation of 314 m. The peninsula is bordered on the west by the Indian Ocean and to the east by the shallow Exmouth Gulf (Taylor Burrell 2003).

The sandy shore comprises a coastal barrier of beach, beachridge and dune between the alluvial plain and the shore platform. The dune extends as a single low dune ridge generally 8-12m high. Along parts of the shore where the dune is less developed, alluvial plain materials are exposed at the shore with dune sands forming only a thin veneer.

2.3 Geomorphology and Soils

Cape Range is situated within the Exmouth Sub-basin of the Carnarvon Basin. The rocks immediately underlying, and forming the core of the range are a sequence of carbonate rocks of Paleocene-Miocene age about 500m thick. Several different rocks units reflecting different age sedimentation are recognised within the Cape Range group, namely the Pilgramunna Formation, Trealla Limestone, Tulki Limestone and Mandu Limestone (Taylor Burrell 2003).

2.4 Watercourse and Wetlands

The study area is located adjacent to the Indian Ocean and the Exmouth Gulf. There are no wetlands located in the study area. One major ephemeral creek line dissects Lot 220 in the northern extent of the study area. Surface water from Cape Range and the surrounding plain are transported along this system and drain into the Exmouth Gulf (Figure 2).

2.5 Conservation Areas

The Cape Range National Park is located approximately seven kilometers to the west of the study area. The area is approximately 50,581 hectares and is managed by the Department of Environment and Conservation.

2.6 Environmentally Sensitive Areas

Environmentally Sensitive Areas (ESAs) are subject to definition under Section 51B of the *Environmental Protection Act 1986* and may include areas such as those requiring special management attention to protect important scenic values, fish and wildlife resources, historical and cultural values, and other natural systems or processes including Conservation Category wetlands and Threatened Flora.

A search of the DEC's Native Vegetation Viewer indicated that the study area is contained within an ESA associated with the Cape Range Province and surrounding marine and coastal environment.

2.7 Biological Context of the Study Area

2.7.1 Bioregional Context

Western Australia supports 53 biogeographical subregions (Thackway and Cresswell, 1995). The study area occurs in the Carnarvon 1 (CAR1 – Cape Range) subregion of the Carnarvon Bioregion. The Cape Range subregion is composed of rugged tertiary limestone ranges and extensive areas of red aeolian dunefield, quaternary coastal beach dunes and mud flats. The vegetation consists typically of *Acacia* shrublands (*Acacia stuartii* or *A. bivenosa*) over *Triodia* on limestone and red dunefileds, and *Triodia* hummock grasslands with sparse *Eucalyptus* trees and shrubs on the Cape Range (Kendrick and Mau 2002).

2.7.2 Beard's Vegetation Mapping

The study area is located within the Carnarvon Botanical District of the Eremaean Botanical Province (Beard 1990). According to vegetation mapping by Beard (1990) the vegetation of the study area is representative of the Cape Range vegetation association (663); hummock grasslands, shrub steppe; waterwood over soft spinifex.

2.7.3 Vegetation Extent

Approximately 29, 016 hectares (95.65% of the pre European extent) of the Cape Range vegetation unit currently remains. The benchmark of 15% representation in conservation reserves (ANZECC, MCFFA 1997) has been met for Beard vegetation association 663, with approximately 22.5% of this vegetation type within the Carnarvon bioregion in conservation reserves (Shepherd et al 2002).

2.7.4 Threatened or Priority flora

A search of the EPBC *Act* Protected Matters Search Tool (DSEWPC, 2011a) based on a five kilometer radial buffer from the eastern boundary of the study area did not identify any federally protected flora species or species habitat potentially occurring in the area (Appendix 2).

Prior to conducting the field survey, a search of the DEC NatureMap database (2011b) was undertaken to identify significant flora that could potentially occur in the study area. This investigation used a search buffer of twenty kilometers from a central point of the study area and encompassed a review of the following databases:

- the Department's *'Declared Rare and Priority Flora List'*, which contains species that are Declared Rare (Conservation Code R or X for those presumed to be extinct), poorly known (Conservation Codes 1, 2 or 3), or require monitoring (Conservation Code 4)
- the 'Western Australian Herbarium Specimen' database
- the DEC's Threaten Flora database.

The search indicated that 13 Priority Flora species may potentially occur in the Project area. A review of the location records of the Priority Flora species generated from this search indicate that none of these species have been previously recorded within or in close proximity to the study area.

Table 2: Conservation Significant Flora Species Recorded in the Vicinity of the Study Area

Species	Conservation Category Code
Abutilon sp. Cape Range (A.S. George 1312)	P2
Acacia alexandri	P3

Species	Conservation Category Code
Acacia startii	P3
Acanthocarpus rupestris	P2
Brachychiton obtusilobus	P4
Corchorus congener	P3
Eremophila forrestii subsp. *capensis*	P3
Eremophila occidens	P2
Grevillea calcicola	P3
Harnieria kempeana subsp. *rhadinophylla*	P2
Stackhousia umbellata	P3
Tinospora esiangkara	P2
Verticordia serotina	P2

2.7.5 Threatened and Priority Fauna Species

A desktop search was undertaken by RPS in November 2011 within a 10 km radius of the site, including the DEC database, Naturemap and the EPBC matters of national environmental significance database. Species that potentially occur in the area and that are identified in the DEC searches as protected under the *Wildlife Conservation Act 1950* and those identified in the matters of national environmental significance search that are protected under the EPBC Act are listed in Table 1. These species and the likelihood of their occurrence on site are discussed in more detail in Section 4.2.

Table 3: Conservation Significant Fauna Species Potentially Occurring within the Survey Area

Species	Common Name	Conservation Status (State)	Conservation Status (EPBC)
Birds			
Apus pacificus	Fork-tailed Swift		Migratory
Ardea alba	Great Egret		Migratory
Ardea ibis	Cattle Egret		Migratory
Charadrius veredus	Oriental Plover, Oriental Dotterel		Migratory
Glareola maldivarum	Oriental Pratincole		Migratory
Haliaeetus leucogaster	White-bellied Sea Eagle		Migratory
Hirundo rustica	Barn Swallow		Migratory
Macronectes giganteus	Southern Giant Petrel		Endangered
Merops ornatus	Rainbow Bee-eater		Migratory
Mammals			
Dasycercus cristicauda	Mulgara		Vulnerable
Petrogale lateralis subs. Lateralis	Black-footed Rock Wallaby	T	Vulnerable
Reptiles			
Diplodactylus sp 'Cape Range	Cape Range Diplodactylus	P2	

3.0 FLORA AND VEGETATION SURVEY METHODOLOGY

3.1 Desktop Assessment

A desktop assessment was carried out prior to the field survey in order to consider all biological constraints in or adjoining the Survey area. The desktop assessment included:

- a review of existing reports conducted by other environmental consultants in the Exmouth region
- a review of the potential for Threatened Rare and Threatened Flora to be present within the study area. This included a review of Threatened Flora species listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), the *Western Australian Wildlife Conservation Act 1950* (WC Act) (Rare Flora Notice 2008) and Priority Flora listed by the DEC
- a review of EPBC Act listed Threatened Ecological Communities (TECs); the DEC's Threatened Ecological Communities (TEC) and Priority Ecological Communities (PEC) databases to determine the potential for TECs or PECs to be present within the study area
- a review of Conservation Estates and Reserves including Environmentally Sensitive Areas (ESAs) occurring within the Project area.

3.2 Field Assessment Methodology

Baden Sadlo, a senior botanist from RPS, conducted a Level 1 flora and vegetation survey on 7–8 December 2011. The survey was undertaken to provide a description of the dominant vegetation types present, vegetation condition and flora species present at the time of the survey within the areas proposed to be developed. Additionally, the survey was also conducted to determine whether any of the conservation significant species identified from the desktop review for the area actually occur or are likely to occur in the study area. This was based on a combination of sampling using relevès as well as intensively traversing the site. This method complies with RPS' interpretation of the EPA's guidelines for flora surveys as outlined in Guidance Statement No. 51 *Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia* (EPA 2004a) and *Terrestrial Biological Surveys as an Element of Biodiversity Protection,* Position Statement No. 3 (EPA 2002).

Twelve relevè sites were selected within representative vegetation types in the study area. Locations were selected to ensure that an adequate representation of the major vegetation types and flora present was sampled. This was done using recent colour aerial photography and by ground-truthing on foot. Relevès are often used in flora and vegetation surveys to ascertain vegetation types and boundaries by recording the

dominant plant species present including height and percentage. A targeted search by foot of the entire study area for any Threatened Rare Flora or Priority listed species was also undertaken.

3.2.1 Flora Identification

Species that were well known to the survey botanist were identified in the field, while species that were unknown were collected and assigned a unique number to facilitate tracking. All plant species collected during the field program were dried and fumigated in accordance with the requirements of the Western Australian Herbarium. Plant species were identified by the use of local and regional flora keys and by comparison with the named species held at the Western Australian Herbarium. Plant taxonomists who are considered to be an authority on a particular plant group were consulted, when necessary.

The conservation status of all recorded flora was compared against the current lists available on *FloraBase* (DEC 2011a).

3.2.2 Limitations

Complete flora and vegetation surveys can require multiple surveys, at different times of year, and over a period of a number of years, to enable observation of all species present. Some flora species, such as annuals, are only available for collection at certain times of the year, and others are only identifiable at certain times (such as when they are flowering). Additionally, climatic and stochastic events (such as fire) may affect the presence of plant species. Species that have a very low abundance in the area are more difficult to locate, due to above factors.

Flora composition changes over time, with flora species having specific growing periods, especially annuals and ephemerals (some plants lasting for a markedly brief time, some only a day or two). Therefore the results of future botanical surveys in this location may differ from the results of this survey. As the survey was conducted only once rather than several times over the course of a year some annual, ephemeral condition-specific species may be present that were not recorded in the survey. Species that were insufficiently mature or dead were identified in the field to genus or family level only (where possible).

The survey area covers approximately 27.8 hectares. The small scale of this survey meant that sampling was conducted using relevès and targeted searches by intensively traversing the site. The majority of species would have been identified using these techniques; however, it is possible that species with a low abundance in the study area were not observed.

The flora surveys were also restricted to predominantly flowering, vascular plants. Fungi and nonvascular plants (e.g. alga, mosses and liverworts) were not systematically searched for, as the information available on these plants is generally limited.

4.0 FAUNA SURVEY METHODOLOGY

4.1 Fauna Database Searches and Literature Review

Prior to the commencement of the field survey, a number of database searches were conducted to determine a list of terrestrial fauna species (mammals, birds, reptiles and amphibians) that potentially occur within the survey area.

The databases searched and the corresponding search areas are provided in Table 3.

Table 4: Fauna Databases Searched and Corresponding Search Areas

Database Name	Governing Organisation	Search Area Defined
NatureMap Database	DEC	Circle search within a 10 km radius of 114°05'12'E and 22°07'17'S.
Threatened and Priority Fauna Database	DEC	Exmouth region.
Protected Matters Search Tool	DSEWPC	Circle search within a 5 km radius of 114°05'12'E and 22°07'17'S.
Species Profile and Threats (SPRAT) Database	DSEWPC	Search conducted by species, not area.

A number of species present on regional species lists rely on specific habitat requirements. Whilst these habitats were present within the broader region, they were not present within the survey area and it is therefore unlikely that these species are present within the survey area. As such, these species were excluded from discussion. The general patterns of distribution of species known to potentially occur within the study area were further augmented with information derived from the following texts:

- Mammals
  - Menkhorst and Knight (2004)
- Birds
  - Pizzey and Knight (1997)
- Reptiles
  - Storr et al. (1981;1983; 1986; 1990).

4.1.1 Fauna Habitat Assessment

Important landform and vegetation features with value as fauna habitat were identified from the literature review, aerial photography and ground-truthing (vegetation survey). These include:

- ephemeral drainage lines

- coastal dunes
- man made infrastructure
- stockpiles of cleared material
- native vegetation.

4.2 Field Assessment Methodology

An opportunistic fauna survey was undertaken by an ecologist on 7-8 December 2011.

The Level 1 fauna assessment was conducted in accordance with EPA Guidance Statement No. 56 Assessment of Environmental Factors for Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia. The assessment included a desktop investigation and opportunistic fauna field survey and a habitat assessment, undertaken in conjunction with the vegetation and flora survey. The field assessment involved visual and aural surveys for any fauna species utilising the study area in addition to searches of the study area for any fauna signs, such as tracks, scats, bones, diggings and feeding signs. Species – specific search strategies were used to identify any protected species in the area or evidence that they utilize the study area. The fauna assessment did not involve any fauna trapping.

4.2.1 Limitations

The fauna assessment undertaken was a reconnaissance survey only and thus only sampled those species that can be easily seen, heard or have distinctive signs, such as tracks, scats, diggings etc. Some cryptic and nocturnal species would not have been identified during a reconnaissance survey. Extensive detailed fauna surveys, involving trapping surveys, are required to obtain a more comprehensive list of fauna species that may utilise the site.

This survey was carried out during only one season, and in one year. Complete faunal surveys often require multiple surveys, at different times of year, and over a period of a number of years, to enable full survey of all species present

5.0 FLORA AND VEGETATION SURVEY RESULTS

5.1 Vegetation

5.1.1 Vegetation Condition

The vegetation condition of the site was assessed using the vegetation condition rating scale developed by Keighery (1994) that recognises the intactness of vegetation, which is defined by the following:

- completeness of structural levels
- extent of weed invasion
- historical disturbance from tracks and other clearing or dumping
- the potential for natural or assisted regeneration.

The scale consists of six rating levels as outlined below in Table 4.

Table 5: Vegetation Condition Rating Scale (Keighery 1994)

Vegetation Condition Rating	Vegetation Condition	Description
1	Pristine or Nearly So.	No obvious signs of disturbance.
2	Excellent	Vegetation structure intact, disturbance affecting individual species, and weeds are non-aggressive species.
3	Very Good	Vegetation structure altered, obvious signs of disturbance.
4	Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances retains basic vegetation structure or ability to regenerate it.
5	Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not in a state approaching good condition without intensive management.
6	Completely Degraded	The structure of the vegetation is no longer intact and the area is completely or almost without native species.

A significant proportion of Lots 1, 101, 112 and 220 have been historically cleared of native vegetation during the construction of facilities associated with the prawn processing factory previously established on the site by Kailis. The condition of the vegetation in the study area ranged from Good to Completely Degraded however a majority of the vegetation on the site was considered Degraded to Completely Degraded (Figure 3). Basic vegetation structure in the study area was observed to be severely impacted by earthworks, weed incursions and clearing activities and either incomplete or absent of native species.

Some areas of remnant vegetation, rated as Good to Good to Degraded, persisted in small isolated pockets in the study area and were associated with fore dune habitat and an ephemeral creek line located in the northern extent of the site. A small number of

grazing stock (sheep) was observed in the study area during the field survey. A majority of the site has been invaded by **Cenchrus ciliaris* (Buffel Grass). This species is a common pastoral weed in Northern Western Australia and appears to reduce native species abundance and diversity by aggressively competing with available plant resources (space, sunlight and water).

5.1.2 Vegetation Types

Six distinct vegetation types were recorded during the flora and vegetation survey. The vegetation types were described using Specht's (1970) Structural Formations in Australia. The vegetation types are described below Table 5 and mapped on Figure 4.

A large proportion of the study area was characterised by cleared areas either absent of vegetation or dominated by pastoral weeds (**Cenchrus ciliaris*) with introduced tree species (planted). These areas are not considered vegetation types but for the purpose of this report have been mapped as:

- C* Cleared areas with pastoral weeds and/or planted species
- C Cleared areas.

Table 6: Vegetation Types Recorded in the Study Area

Vegetation Type	Vegetation Description	Site Photo	Relevè
V1	Tall Open Shrubland of *Acacia bivenosa* and *Acacia tetragonophylla* over Low Open Shrubland of *Acacia synchronicia*, *Acanthocarpus verticillatus* and *Jasminum didymium* subsp. *lineare* over a Very Open Herbfield of *Cassytha aurea* var. *aurea* and *Cucumis maderaspatanus* over Tussock Grassland of **Cenchrus ciliaris* with Very Open Tussock Grassland of *Triodia epactia* on upland banks		R4
V2	Tall Open Shrubland of *Acacia synchronicia* over Low Shrubland of *Scaevola spinescens*, *Acacia tetragonophylla*, *Stylobasium spathulatum* and *Maireana polypterygia* over Tussock Grassland of **Cenchrus ciliaris* and *Triodia epactia*		R11/R12
V3	Low Open Shrubland of *Acacia coriacea* subsp. *coriacea*, *Acacia xiphophylla* and *Santalum lanceolatum* over a Very Open Herbfield of *Cassytha aurea* var. *aurea* over Tussock Grassland of **Cenchrus ciliaris* and *Triodia pungens*		R9/R10

Vegetation Type	Vegetation Description	Site Photo	Relevè
V4	Low Open Shrubland of mixed *Chenopodiaceae* spp. and *Pittosporum angustifolium* over Very Open Tussock Grassland of **Cenchrus ciliaris*		R8
V5	Low Open Shrubland of *Acacia synchronicia* and/or *Maireana polypterygia* over Tussock Grassland of **Cenchrus ciliaris* and *Triodia pungens*		R1/R2/R3/R5
V6	Tall Open Shrubland of *Acacia synchronicia* over Low Open Shrubland of *Acacia bivenosa* and *Acacia tetragonophylla* over Tussock Grassland of *Triodia epactia*		R7

5.1.3 Conservation Significance of the Vegetation

There are no TECs protected under the EPBC Act or TECs and PECs listed by the DEC (2011c/d) occurring on or in close proximity to the study area.

A search of the EPBC *Act* Protected Matters Search Tool (DSEWPC, 2011a) based on a five kilometer radial buffer from the eastern boundary of the study area did not identify any federally listed Threatened Ecological Communities in or in close proximity to the study area.

There are two TEC communities known to occur on the Cape Range Peninsula; Cameron's Cave Troglobitic Community and the Cape Range Remipede Community. None of these TECs occur in the study area.

5.2 Flora

5.2.1 Field Survey Results

A total of 67 plant taxa (including subspecies and varieties) representing 52 genera and 26 plant families were recorded in the study area. This total is comprised of 64 native species and 3 introduced (exotic) species. The vegetation of the study area is considered to be of low diversity.

All specimens, when considered necessary, were compared to all conservation significant species identified from the desktop TRF and Priority flora searches and contained within the morphological types held by the Western Australian Herbarium. A complete list of flora species recorded from the study area has been provided in Appendix 3.

5.2.2 Conservation Significant Flora

No Threatened Rare species listed by the DEC (2011a) or species of national conservation significance listed under the EPBC Act (DSEWPC 2011b) were recorded from the study area during the 2011 survey.

Two Priority flora species were recorded during in the study area; *Corchorus congener* (P3) (two plants) and *Gymnanthera cunninghamii* (P3) (one plant). The locations of these species have been plotted on Figure 2.

There are 16 collection records of *Corchorus congener* (P3) retained at the Western Australian Herbarium. The records indicate that this species is wide spread in the Cape Range area but also has been recorded on several off-shore islands (Barrow Island). The largest population referenced in the collection records is 1000+ plants and was recorded in the Cape Range National Park.

According to FloraBase (DEC 2011a) *Gymnanthera cunninghamii* (P3) has been recorded over an extensive range but not previously in the Cape Range area. There are fourteen records of this species retained in the collections housed at the Western Australian Herbarium. The largest documented population of *Gymnanthera cunninghamii* (P3) in the collection records is 100 plants.

5.2.3 Range Extensions

Three native taxa, *Acacia ramulosa* var. *linophylla*, *Lepidium phlebopetalum* and *Gymnanthera cunninghamii* (P3) were recorded in the study area exhibiting an extension to their known range. According to floristic records available on FloraBase (2011a) none of these species have been previously recorded in the Cape Range area.

Habitat for these species is not considered to be limited to the study area and is common in adjacent areas.

5.2.4 Introduced Flora

A total of three introduced species (weeds) were recorded during the flora survey; **Cenchrus ciliaris*, **Cynodon dactylon* and **Aerva javonica*. None of these species are listed as Declared Plant species pursuant to section 37 of the *Agricultural and Related Resources Protection Act 1976* (WA).

6.0 FAUNA SURVEY RESULTS

6.1 Vertebrate Fauna Habitats

Important landform and vegetation features with value as fauna habitat within the site include and are detailed further below:

- ephemeral drainage lines
- coastal dunes
- man made infrastructure
- stockpiles of cleared material
- native vegetation.

An abundance of leaf litter and fallen branches across the site also provides potential cover for small vertebrate species. Vegetation type V6 which is discussed in Table 5 provided important habitat and shelter to a number of reptile species. A number of burrows were identified within this substrate and under shrubs, likely constructed by a small mammal or reptile species.

A few burrows were also identified within the drainage lines on site, Mike Bamford has confirmed that these burrows are likely rainbow bee eater burrows.

Plate 1: Rainbow Bee Eater Nest

Large trees and shrubs were noted for their utilisation by bird species on site; in particular, being fed on or used as a perch for feeding honeyeater species, wrens, finches and rainbow bee eaters (Plate 2). Of the vegetation types provided in Table 5, V3 and V5 were observed being most utilised by bird species. Trees with structural complexity also provide essential roosting habitat for many bird species.

Plate 2: Perching Rainbow Bee Eater

Many areas on site had been cleared and provided little habitat for fauna species. However, stockpiles of cleared material are likely to provide habitat and shelter for reptile species and a number of bird species such as wrens which were observed utilising these stockpiles (Plate 3).

Plate 3: Stockpile of Cleared Material

Man made structures on site such as buildings and light poles were also utillised by species on site. Ospreys were also observed perching and nesting on light poles adjacent to the site (Plates 4 and 5).

Plate 4: Perching Osprey

Plate 5: Osprey Nest

6.2 Vertebrate Fauna

A list of potentially and actually occurring species within and surrounding the site is provided in Appendix 4. This information has been collected from the DEC Threatened Species database for the Exmouth region, DEC NatureMap, EPBC Protected Matters Search Tool database and the opportunistic field survey. The results from each of the database searches are included in Appendix 2.

A total of 135 known or previously recorded species potentially occur within the survey area. A description of each of the vertebrate groups in the region is given in the following section.

6.2.1 Birds

A total of 83 bird species have been historically recorded within or in close proximity to the survey area. Of these, there are nine species of conservation significance. These are discussed below.

6.2.1.1 Fork-tailed Swift (Apus pacificus)

The fork-tailed swift is listed as Migratory under the EPBC Act and is included in the JAMBA and the CAMBA. The fork-tailed swift breeds in Siberia and the Himalayas and migrates to Australia in October, before returning to the breeding grounds by May or June. Movements within Australia are in response to weather patterns, with this species often following thunderstorms. The species occurs year-around in the tropics, migrating southward in early spring. The birds then return north in autumn. When present, the fork-tailed swift is common and prominent in both natural and developed environments.

It is unlikely this species occurs within the survey area, except as a mobile species overflying the site, and as such is highly unlikely to be impacted by development.

6.2.1.2 Great Egret (Ardea alba) and Cattle Egret (Ardea ibis)

Both of these Australian waterbird species are listed as Migratory under the EPBC Act. Both egrets are also listed under the JAMBA and the CAMBA. They are widespread in southern and eastern Asia and Australasia and are highly mobile, rendering them less susceptible to population fragmentation. In Western Australia breeding colonies nest predominantly in *Melaleuca* swamps in November and December although breeding is dependent to some extent on rainfall (DSEWPC 2011b).

As waterbird species, the egrets are unlikely to inhabit the site for most of the year, though they may interact with it in a transitory capacity during the wetter months due to the drainage lines present on site. Consequently, due to their unlikely or infequent se of the site, this species is considered unlikely to be impacted by development.

6.2.1.3 Oriental Plover (Charadrius veredus)

This species is listed as Migratory under the EPBC Act and under the JAMBA and ROKAMBA. It is a non-breeding visitor to Australia where it occurs in both coastal and inland areas, however it is mostly recorded along the north-western coast. When inland, the oriental plover generally inhabits flat, open, semi-arid or arid grasslands where areas of bare ground are prevalent (DSEWPC 2011b).

The oriental plover may occur within the survey area, but it is most likely to be present on the adjacent shoreline in a transitory capacity and is unlikely to be adversely impacted by development of the survey area, which covers only a small area of the extensive distribution of the species.

6.2.1.4 Oriental Pratincole (Glareola maldivarum)

This species is listed as Marine and Migratory under the EPBC Act, and occurs under the CAMBA, JAMBA and ROKAMBA. It is a medium-sized shorebird that occurs in small to very large flocks of thousands to millions of individuals. The oriental pratincole is widespread in the northern extent of Australia, particularly along the coastlines of Western Australia s Pilbara and Kimberley regions. The breeding season is spent in southern, south-eastern and eastern Asia, with the non-breeding season spent largely in Australia. During this time, the oriental pratincole preferably inhabits beaches, mudflats, islands, open plains, floodplains or short grassland, often with extensive areas of bare ground (DSEWPC 2011b).

This species may over fly the site, but it is most likely to be present on the adjacent shoreline in a transitory capacity and is unlikely to be adversely impacted by development of the survey area.

6.2.1.5 White-bellied Sea Eagle (Haliaeetus leucogaster)

Listed as Marine and Migratory under the EPBC Act and also listed under Appendix II of the CITES and under the China-Australia Migratory Bird Agreement (CAMBA), the white-bellied sea eagle is not globally threatened, but has been subject to population decline within Australia and South East Asia. In Australia, it is distributed along the coastline, and is restricted to a narrow band of coastline in south-western Australia. The population residing within Australia is estimated at 500 mating pairs. The sea eagle is found in coastal habitats and tends to occupy dunes, tidal flats, woodlands, forests and grasslands (generally in areas associated with large bodies of water). When not migrating, the home range of the sea eagle can be up to 100 square km, although breeding adult birds are generally sedentary (breeding season runs from June to January). The nests of these birds are large and conspicuous, generally constructed in large trees, cliffs, rocky outcrops, mangroves, caves or on artificial structures (DSEWPC 2011b).

This species was not identified on site, however the proximity to the coast and structures such as light poles and trees may provide suitable habitat for this species. However, although likely to occur in vicinity of the site, development of the site is not considered likely to impact this species.

6.2.1.6 Barn Swallow (Hirundo rustica)

Listed as Marine and Migratory under the EPBC Act, the barn swallow is also recognised under the CAMBA, JAMBA AND ROKAMBA agreements. It occurs in open land, such as agricultural pasture and plains, roosting or nesting in dead trees, banks, cliff cavities and rock shelves. It is a regular non-breeding summer migrant to northern Australia, where its range extends from the Kimberley region to north-eastern and south-eastern Queensland (Pizzey and Knight 1997).

There is minimal habitat suitable for this species within the site, and it is therefore unlikely to be impacted by the proposed development.

6.2.1.7 Rainbow Bee-eater (Merops ornatus)

The rainbow bee-eater is listed as Migratory under the EPBC Act and under the JAMBA. The population size of this species within Australia is not known, but it is assumed to be quite large. It is known to occur across the majority of the mainland. It migrates between Australia, Eastern Indonesia and Japan, and has formed a colony on Rottnest Island. The bee-eater tends to occupy open forests and woodlands, including cleared or semi-cleared areas and farmland, and prefers timbered landscapes. Their nests consist of an enlarged chamber at the end of a long burrow that is excavated by both the female and male bird from flat or sloping ground, cliff faces or mounds of gravel. They generally remain unlined (DSEWPC 2011b).

Over ten individuals were seen on site at one time and it is considered likely that more were present. Expert identification was also sort from Mike Bamford on a number of burrows that occurred along the drainage lines on site. Mike confirmed that at least one of these burrows had been created by rainbow bee eaters. Therefore, it is considered highly likely that the rainbow bee eater utilises the site for feeding and breeding and may be impacted by the proposed development.

Nesting areas are often reused and banding indicates that some birds return to the nest each year. However, pairs usually excavate a new burrow for each breeding season (DSEWPC 2011b). Therefore, as most pairs excavate new burrows each season and given the mobile nature of the species and the presence of similar suitable habitat nearby and in the greater region this impact is not considered great.

The following bird species were recorded during the field survey and are likely to occur frequently within the survey area and surrounds:

- Magpie-lark (*Grallina cyanoleuca*)
- Black-faced Cuckoo-shrike (*Coracina novaehollandiae*)
- Zebra Finch (*Taeniopygia guttata*)
- Welcome Swallow (*Hirundo neoxena*)
- Rainbow Bee Eater (*Merops ornatus*)
- Variegated Fairy-wren (*Malurus lamberti*)

- Little Button Quail (*Turnix velox)*
- Crested Pigeon (*Ocyphaps lophotes)*
- Yellow Throated Miner (*Manorina flacigula)*
- Singing Honeyeater (*Lichenostomus virescens)*
- White Plumed Honeyeater (*Lichenostomus penicillatus)*
- Osprey (*Pandion haliaetus)*
- Little Corella (*Cacatua sanguinea)* (fly over)
- Galah (*Eolophus roseicapilla)* (fly over)
- Red Capped Plover (*Charadrius ruficapillus)* (adjacent)
- Sooty Oystercatcher (*Haematopus fuliginosus)* (adjacent)

The aerial nature of the majority of the avifauna listed in Appendix 2 identifies these species as having an extremely broad range in comparison to other fauna species. Also, given that the size of the area proposed for development is relatively small, it is highly unlikely these species will be adversely affected by development.

6.2.2 Mammals

A total of 17 mammal species potentially occur within the survey area, and of these, four species are introduced. This list also includes 2 species of conservation significance, which are discussed below.

6.2.2.1 Black-flanked Rock Wallaby (Petrogale lateralis lateralis)

The Black-flanked Rock Wallaby is listed as Vulnerable under the EPBC Act and Threatened under the WC Act. Threatening processes to this species includes predation by foxes and feral cats and degradation of habitat due to grazing by sheep, goats and rabbits.

The habitat of this species varies between colonies, however always involves proximity to some form of cliff, rock pile, escarpment or talus for refuge in areas of hummock grassland. They feed on grasses, herbs leaves and fruits and do not require close proximity to water as they conserve water through sheltering from warm temperatures in caves or rock overhangs. Consequently there is not considered suitable habitat on site for the Black-flanked Rock Wallaby and no signs of this species were seen during the site survey. Therefore, the proposed development is not considered likely to impact this species.

6.2.2.2 Mulgara (Dasycercus cristicauda)

The Crest-tailed Mulgara is listed as Vulnerable under the EPBC Act and Schedule 1 under the WC Act. This species can tolerate moderate local reduction in land cover, however a more severe reduction will lead to population decline. The main threat to this species is predation from introduced species and habitat reduction through agriculture and mining.

Mulgara predominantly occur in hummock grasslands and shrublands on sandy soils, burrowing in flat areas between sand dunes or on the low side of sand dunes. They are predominantly nocturnal, emerging from their burrows at night to feed on insects and small reptiles.

Although the site contains suitable vegetation types and sandy dunes, the degraded nature of the majority of the site makes it unlikely for this species to occur on the site. No individuals were identified on site and due to the amount of similar habitat available nearby, the proposed development is not considered likely to have an impact on available habitat to the Mulgara.

During the field survey, a red kangaroo, a number of sheep and rabbits were recorded within the site, however no species of ecological significance were identified as occurring on site.

6.2.3 Reptiles

Thirty one reptile species are recorded as potentially occurring within the site. Of these, the Cape Range Diplodactylus (*Diptodactylus sp 'Cape Range'*) and *Lerista allochira* are of conservation significance (Appendix 2), other species of significance are not discussed in this report due to the lack of required habitat within the site (all are marine species such as turtles and sea snakes).

The *L. allochira* has been recorded in habitats consisting of dissected limestone gorges and plateaus, preferring sparsely vegetated areas (IUCN 2012). There is very little information available on the preferred habitat of the Cape Range Diplodactylus, however similar species inhabit hard rocky limestone substrates. Consequently, these species are not considered likely to occur on the site.

Reptile species recorded whilst conducting the opportunistic fauna survey included Bungarra (*Varanus gouldii*) and the Long-nosed Dragon (*Amphibolurus longirostris*).

6.2.4 Amphibians

Four species of amphibian have been identified as potentially occurring on the site. Of these four species, none are of federal or state conservation significance.

No amphibian species were recorded whilst conducting the opportunistic fauna survey, although no formal trapping was carried out.

7.0 RECOMMENDATIONS AND CONCLUSIONS

Site investigations have identified that the majority of the site is Degraded to Completely Degraded. Surrounding areas contain vegetation in a better condition, in particular the Cape Range National Park (50,800 hectares). Therefore, as the vegetation and habitat types present on the site are better represented and protected elsewhere, further development of the site is not considered likely to have a major impact on matters of environmental significance. However, to reduce any potential impacts the following may be considered:

The following recommendations and general management guidelines are provided, in order to minimise adverse impacts to matters of environmental significance as a result of development:

- Staged Clearing - At the clearing stage of development, care should be taken to ensure that any fauna utilising the site is given every opportunity to relocate. To achieve this, clearing should be undertaken in a staged manner in the direction of vegetation to be retained and cleared vegetation should be left overnight in-situ to allow individuals further opportunity to disperse.

- The ephemeral creek line has been identified as a potential breeding site for rainbow bee eaters and should preferably be retained and managed within any future development. Rainbow bee eaters are common through out the area, with similar habitat in surrounding areas. This combined with their mobile nature and the fact that they most often choose to excavate new burrow each season means that the proposed development is not likely to impact this species.

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8.0 REFERENCES

ANZECC, MCFFA (1997), Nationally Agreed Criteria for the Establishment of a Comprehensive, Adequate and Representative Rerserve System for Forests in Australia, Commonwealth of Australia

Beard, J.S. (1990). *Plant Life of Western Australia*. Kangaroo Press Pty Ltd, Kenthurst NSW.

Bureau of Meteorology (BoM). (2011) Climate Statistics for Australian Stations.

Department of Agriculture and Food, (2011). Declared Plants List. Publicly available list prepared by the Department of Agriculture and Food (Western Australia) www.agric.wa.gov.au

Department of Environment and Conservation, (2011a), Florabase, Western Australian Herbarium http://florabase.calm.wa.gov.au

Department of Environment and Conservation. (2011b). Native Vegetation Map Viewer www.map.dec.wa.gov.au

Department of Environment and Conservation, (2011c), List of Threatened Ecological Communities (endorsed by the Minister – August 2010)

Department of Environment and Conservation, (2011d), List of Priority Ecological Communities (endorsed by the Minister – October 2011)

Department of Sustainability, Environment, Water, Population and Communities (2011a), Environment Protection and Biodiversity Act 1999 Protected Matters Search Tool.

Department of Sustainability, Environment, Water, Population and Communities (2011b). Species Profile and Threats Database. http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl. Accessed online April 2011.

English, V. and Blyth, J. (1997). Identifying *and Conserving Threatened Ecological Communities (TECs) in the South West Botanical Province*. ANCA National Reserves System Cooperative Program: Project Number N702. Department of Conservation and Land Management, Wanneroo.

Environmental Protection Authority (EPA). (2002). *Position Statement 3 - Terrestrial Biological Surveys as an Element of Biodiversity Protection*. March 2002.

Environmental Protection Authority (EPA). (2004a). *Guidance Statement 51. Guidance for the Assessment of Environmental Factors (in accordance with the Environmental Protection Act 1986) Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia*. June 2004.

Environmental Protection Authority (EPA). (2004b). *Guidance Statement 56 – Guidance for the Assessment of Environmental Factors (in accordance with the Environmental Protection Act 1986) Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia.* June 2004.

International Union for Conservation of Nature and Natural Resources (2012) Red List – *Lerista allochira.* http://www.iucnredlist.org/apps/redlist/details/178677/0. Accessed 16 February 2012

Keighery, B. (1994). Bushland Plant Survey: A Guide to Plant Community Survey for the Community. Wildflower Society of WA (Inc.), Nedlands.

Kendrick, P. and Mau, M. (2002). Carnarvon 1 (CAR1- Cape Range Subregion). In: *The Biodiversity Audit of Western Australia.* Department of Conservation and Land Management, Perth. Available at http:/www.naturebase.net/science/bio audit/index.html

Menkhorst, P. and Knight, F. (2004). A Field Guide to the Mammals of Australia. Oxford University Press, Melbourne, Australia.

Pizzey, G. and Knight, F. (1997). *Field Guide to the Birds of Australia.* Angus and Robertson, Sydney NSW.

Shepherd, D.P., Beeston, G.R. and A.J.M. Hopkins (2002). *Native Vegetation in Western Australia – Extent, Type and Status.* Resource Management Technical Report 249. Department of Agriculture, Perth

Specht, R.L. (1970). *Vegetation in the Australian Environment.* GW Leeper Ed. Fourth edition. CSIRO, Melbourne

Taylor Burrell Town Planning and Design (2003) Exmouth Marina Village Outline Development Plan, LandCorp

Storr, G.M., Smith, L.A. and Johnstone, R.E. (1981). Lizards of Western Australia Part I Skinks. WA Museum, Perth.

Storr, G.M., Smith, L.A. and Johnstone, R.E. (1983). Lizards of Western Australia Part II Dragons and Monitors. WA Museum, Perth.

Storr, G.M., Smith, L.A. and Johnstone, R.E. (1986). Snakes of Western Australia. WA Museum, Perth.

Storr, G.M., Smith, L.A. and Johnstone, R.E. (1990). Lizards of Western Australia Part III Geckos and Pygopods. WA Museum, Perth.

Thackway, R. and Cresswell, I.D. (Eds) (1995). *An Interim Biogeographical Regionalisation of Australia.* Australian Nature Conservation Agency (now DSEWPC), Canberra.

Tille, P. (2006). Resource Management Technical Report 313: Soil-landscapes of Western Australia s Rangelands and Arid Interior. Department of Agriculture. South Perth, Western Australia.

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FIGURES

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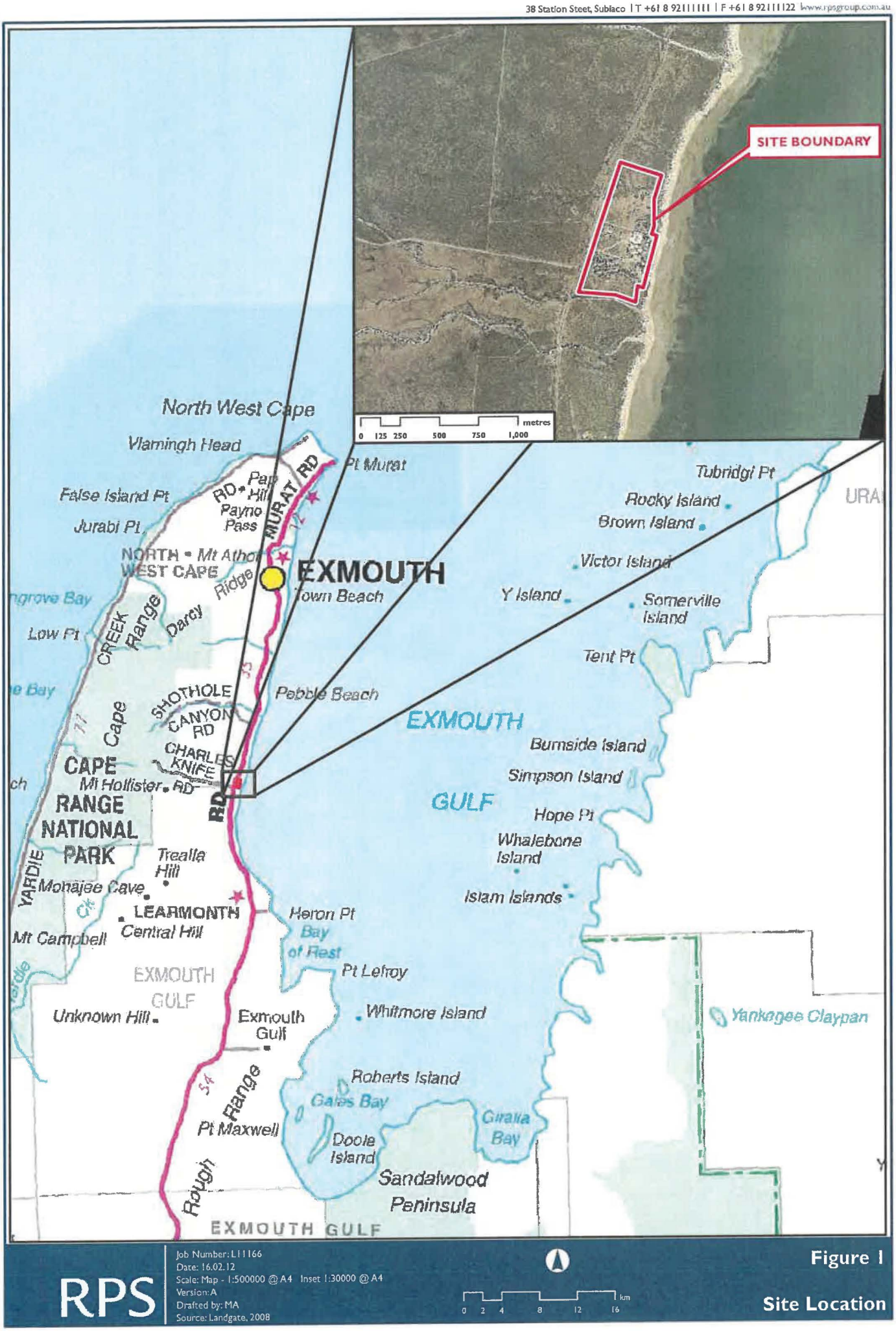

RPS

Job Number: L11166
Date: 16.02.12
Scale: Map - 1:500000 @ A4 Inset 1:30000 @ A4
Version: A
Drafted by: MA
Source: Landgate, 2008

Figure 1

Site Location

RPS

Job Number: L11166
Date: 17.02.12
Scale: 1:2,500 @ A3
Revision: A
Drafted by: MA
Source: Cadastre - Landgate, 2011 Orthophoto - Landgate, 2007

0 12.5 25 50 75 100 metres

Figure 2

Environmental Constraints

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Job Number: LJ1166
Date: 20.02.12
Scale: 1: 2,500 @ A3
Revision: A
Drafted by: MA
Source: Cadastre - Landgate, 2011 Orthophoto - Landgate, 2007

Figure 3

Vegetation Condition

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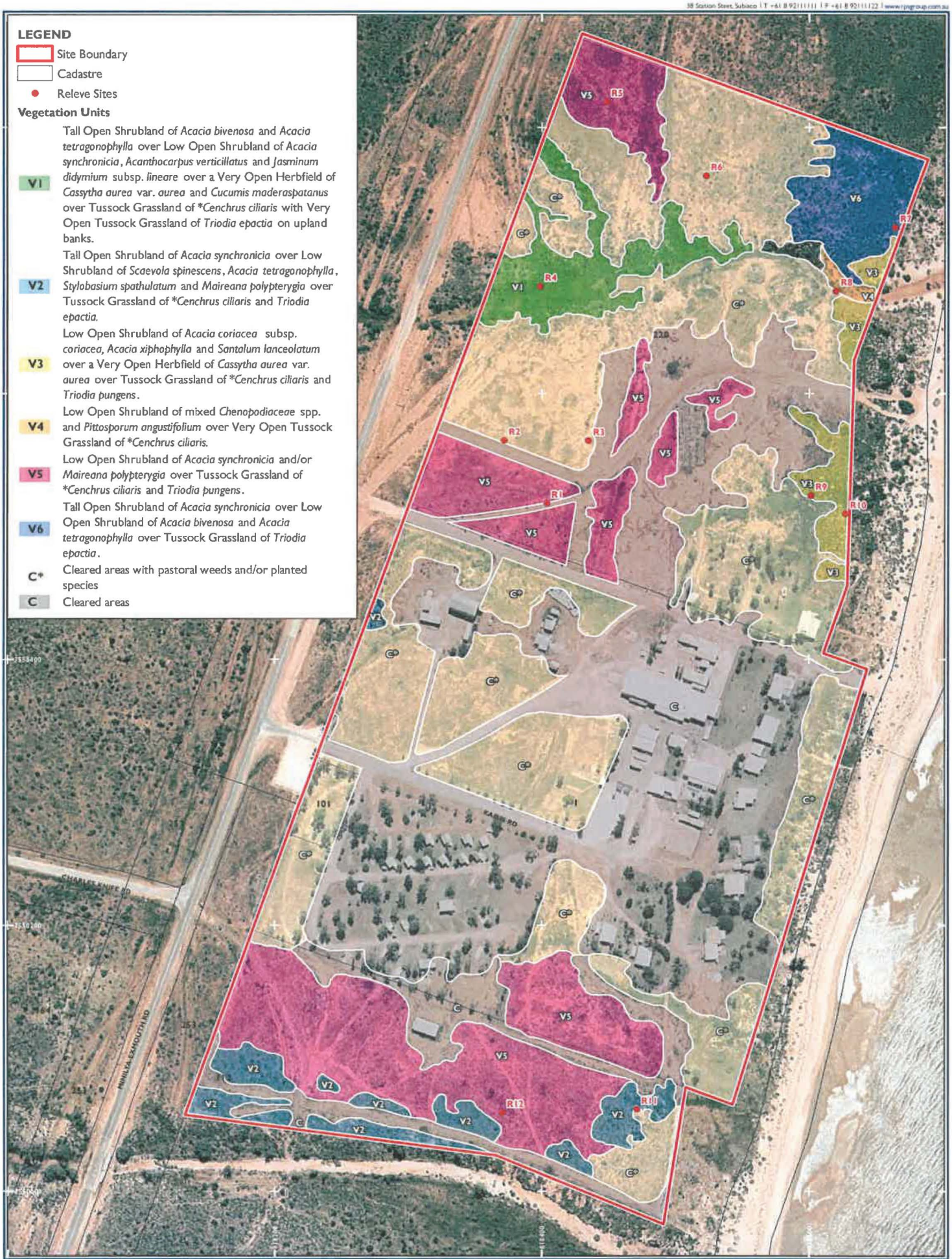

RPS

Job Number: L11166
Date: 21.02.12
Scale: 1: 2,500 @ A3
Revision: A
Drafted by: MA
Source: Cadastre - Landgate, 2011 Orthophoto - Landgate, 2007

0 12.5 25 50 75 100 metres

Figure 4

Vegetation Type

RPS

APPENDIX I

Flora Conservation Codes

APPENDIX 1: Flora Conservation Codes

Conservation Categories and Definitions for EPBC Act Listed Flora Species

Conservation Category	Definition
Extinct	Taxa not definitely located in the wild during the past 50 years
Extinct in the Wild	Taxa known to survive only in captivity
Critically Endangered	Taxa facing an extremely high risk of extinction in the wild in the immediate future
Endangered	Taxa facing a very high risk of extinction in the wild in the near future
Vulnerable	Taxa facing a high risk of extinction in the wild in the medium-term
Near Threatened	Taxa that risk becoming Vulnerable in the wild
Conservation Dependent	Taxa whose survival depends upon ongoing conservation measures. Without these measures, a conservation dependent taxon would be classified as Vulnerable or more severely threatened.
Data Deficient (Insufficiently Known)	Taxa suspected of being Rare, Vulnerable or Endangered, but whose true status cannot be determined without more information.
Least Concern	Taxa that are not considered Threatened

Conservation Codes and Descriptions for DEC Threatened Rare and Priority Flora Species

Conservation Code	Description
T: (Declared Rare Flora – Extant)	Taxa which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such.
P1: Priority One – Poorly Known Taxa	Taxa that are known from one or a few collections or sight records (generally less than five), all on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, shire, Westrail and Main Roads WA road, gravel and soil reserves, and active mineral leases and under threat of habitat destruction or degradation. Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes
P2: Priority Two – Poorly Known Taxa	Taxa that are known from one or a few collections or sight records, some of which are on lands not under imminent threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, state forest, vacant Crown land, water reserves, etc. Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes
P3: Priority Three – Poorly Known Taxa	Taxa that are known from collections or sight records from several localities not under imminent threat, or from few but widespread localities with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Taxa may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and known threatening processes exist that could affect them.

Conservation Code	Description
P4: Priority Four – Rare, Near Threatened and other taxa in need of monitoring	1. **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. 2. **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. 3. **Taxa that have been** removed from the list of threatened species during the past five years for reasons other than taxonomy
P5: Priority Five: Conservation Dependent Taxa	Taxa that are not threatened but are subject to a specific conservation program, the cessation of which would result in the taxon becoming threatened within five years

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APPENDIX 2

Database Searches

NatureMap Species Report

Created By Guest user on 10/10/2011

Conservation Status Conservation Taxon (T, X, IA, S, P1-P5)
Current Names Only Yes
Method 'By Circle'
Centre 114°05' 09" E,22°07' 23" S
Buffer 20km
Group By Kingdom

Kingdom	Species	Records
Animalia	26	88
Plantae	13	72
TOTAL	**39**	**160**

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Animalia					
1.	24610	*Ardeotis australis (Australian Bustard)*		P4	
2.	33905	*Bamazomus subsolanus (Eastern Cape Range Bamazomus)*		T	Y
3.	33906	*Bamazomus vespertinus (Western Cape Range Bamazomus)*		T	
4.	34031	*Carcharodon carcharias (Great White Shark)*		T	
5.	33909	*Draculoides julianneae (Western Cape Range Draculoides)*		T	Y
6.	33915	*Draculoides vinei (Cape Range Draculoides)*		P4	
7.	24084	*Dugong dugon (Dugong)*		S	
8.	24043	*Eubalaena australis (Southern Right Whale)*		T	
9.	25624	*Falco peregrinus (Peregrine Falcon)*		S	
10.	24218	*Leporillus apicalis (Lesser Stick-nest Rat)*		X	
11.	25120	*Lerista allochira*		P3	
12.	24051	*Megaptera novaeangliae (Humpback Whale)*		T	
13.	24222	*Mesembriomys macrurus (Golden-backed Tree-rat)*		P4	
14.	34025	*Milyeringa veritas (Blind Gudgeon)*		T	
15.	33985	*Nocticola flabella (Cape Range Blind Cockroach)*		P2	Y
16.	34038	*Ophisternon candidum (Blind Cave Eel)*		T	
17.	24142	*Petrogale lateralis subsp. lateralis (Black-footed Rock-wallaby)*		T	
18.	24098	*Phascogale calura (Red-tailed Phascogale)*		T	
19.	24236	*Pseudomys fieldi (Shark Bay Mouse)*		T	
20.	24115	*Sminthopsis longicaudata (Long-tailed Dunnart)*		P4	
21.	33964	*Stygiocaris stylifera (Spear-beaked Cave Shrimp)*		P4	
22.	33968	*Stygiochiropus peculiaris (Camerons Cave Millipede)*		T	Y
23.	33969	*Stygiochiropus sympatricus*		T	Y
24.	34007	*Thalassarche chlororhynchos (Atlantic Yellow-nosed Albatross)*		T	
25.	25441	*Uperoleia marmorata (Marbled Toadlet)*		P1	Y
26.	24249	*Zyzomys pedunculatus (Central Rock-rat)*		T	Y
Plantae					
27.	14115	*Abutilon sp. Cape Range (A.S. George 1312)*		P2	
28.	13074	*Acacia alexandri*		P3	
29.	13076	*Acacia startii*		P3	
30.	1210	*Acanthocarpus rupestris*		P2	
31.	12714	*Brachychiton obtusilobus*		P4	
32.	18411	*Corchorus congener*		P3	
33.	29715	*Eremophila forrestii subsp. capensis*		P3	
34.	15032	*Eremophila occidens*		P2	
35.	1972	*Grevillea calcicola*		P3	
36.	17327	*Hamieria kempeana subsp. rhadinophylla*		P2	
37.	4736	*Stackhousia umbellata*		P3	
38.	17345	*Tinospora esiangkara*		P2	
39.	12457	*Verticordia serotina*		P2	

Conservation Codes
T - Rare or likely to become extinct
X - Presumed extinct

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

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 Sustainability, Environment, Water, Population and Communities

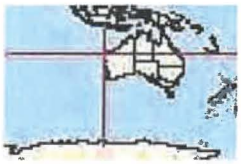
EPBC Act Protected Matters Report: Coordinates

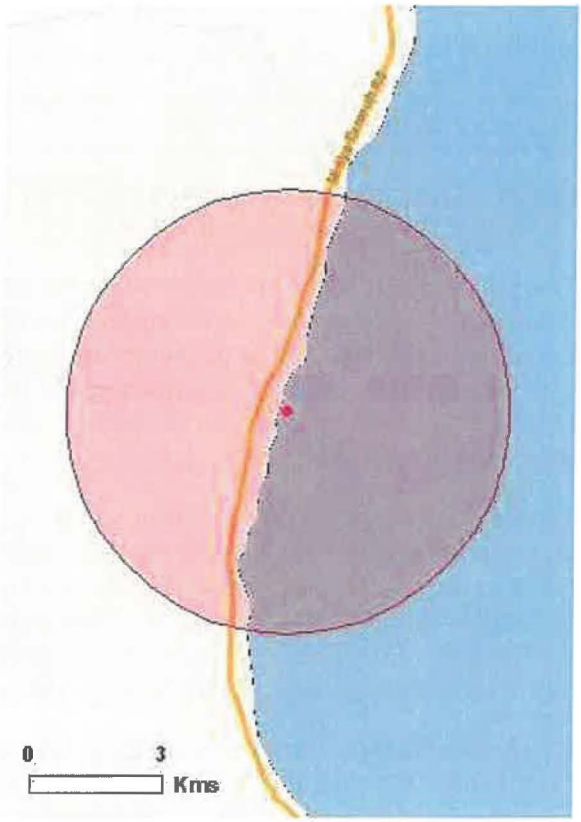
This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

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 about the EPBC Act including significance guidelines, forms and application process details can be found at http://www.environment.gov.au/epbc/assessmentsapprovals/index.html

Report created: 24/05/11 19:10:59





This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

Coordinates
Buffer: 5.0Km

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 - see http://www.environment.gov.au/epbc/assessmentsapprovals/guidelines/index.html.

World Heritage Properties:	None
National Heritage Places:	1
Wetlands of International Significance (Ramsar Wetlands):	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Areas:	None
Threatened Ecological Communitites:	None
Threatened Species:	13
Migratory Species:	25

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 and the heritage values of a place on the Register of the National Estate. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage/index.html

Please note that the current dataset on Commonwealth land is not complete. Further information on Commonwealth land would need to be obtained from relevant sources including Commonwealth agencies, local agencies, and land tenure maps.

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. Information on EPBC Act permit requirements and application forms can be found at http://www.environment.gov.au/epbc/permits/index.html.

Commonwealth Lands:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	52
Whales and Other Cetaceans:	13

Critical Habitats:	None
Commonwealth Reserves:	None

Report Summary for Extra Information

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

Place on the RNE:	3
State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	6
Nationally Important Wetlands:	None

Details

Matters of National Environmental Significance

National Heritage Places		[Resource Information]
Name	Status	
Natural		
The Ningaloo Coast WA	Listed place	
Threatened Species		[Resource Information]
Name	Status	Type of Presence
BIRDS		
Macronectes giganteus		
Southern Giant-Petrel [1060]	Endangered	Species or species habitat may occur within area
MAMMALS		
Balaenoptera musculus		
Blue Whale [36]	Endangered	Species or species habitat may occur within area
Dasycercus cristicauda		
Mulgara [328]	Vulnerable	Species or species habitat likely to occur within area
Eubalaena australis		
Southern Right Whale [40]	Endangered	Species or species habitat may occur within area
Megaptera novaeangliae		
Humpback Whale [38]	Vulnerable	Congregation or aggregation known to occur within area
Petrogale lateralis lateralis		
Black-flanked Rock-wallaby [66647]	Vulnerable	Species or species habitat likely to occur within area
REPTILES		
Caretta caretta		
Loggerhead Turtle [1763]	Endangered	Species or species habitat likely to occur within area
Chelonia mydas		
Green Turtle [1765]	Vulnerable	Species or species habitat likely to occur within area
Dermochelys coriacea		

Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area
Eretmochelys imbricata		
Hawksbill Turtle [1766]	Vulnerable	Species or species habitat likely to occur within area
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Species or species habitat likely to occur within area
SHARKS		
Pristis clavata		
Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat may occur within area
Rhincodon typus		
Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Migratory Species		**[Resource Information]**
Name	Status	Type of Presence
Migratory Marine Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat may occur within area
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat may occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area
Macronectes giganteus		
Southern Giant-Petrel [1060]	Endangered	Species or species habitat may occur within area
Migratory Marine Species		
Balaenoptera edeni		
Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus		
Blue Whale [36]	Endangered	Species or species habitat may occur within area
Caretta caretta		
Loggerhead Turtle [1763]	Endangered	Species or species habitat likely to occur within area
Chelonia mydas		
Green Turtle [1765]	Vulnerable	Species or species habitat likely to occur within area
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area
Dugong dugon		
Dugong [28]		Species or species habitat likely to occur within area
Eretmochelys imbricata		
Hawksbill Turtle [1766]	Vulnerable	Species or species habitat likely to occur within area
Eubalaena australis		
Southern Right Whale [40]	Endangered	Species or species habitat may occur within area
Megaptera novaeangliae		
Humpback Whale [38]	Vulnerable	Congregation or aggregation known to occur within area
Natator depressus		

Flatback Turtle [59257]	Vulnerable	Species or species habitat likely to occur within area
Orcinus orca		
Killer Whale, Orca [46]		Species or species habitat may 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 may occur within area
Tursiops aduncus (Arafura/Timor Sea populations)		
Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Haliaeetus leucogaster		
White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Hirundo rustica		
Barn Swallow [662]		Species or species habitat may occur within area
Merops ornatus		
Rainbow Bee-eater [670]		Species or species habitat may occur within area
Migratory Wetlands Species		
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat may occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area
Charadrius veredus		
Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Glareola maldivarum		
Oriental Pratincole [840]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat may occur within area
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat may occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area
Charadrius veredus		
Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Glareola maldivarum		
Oriental Pratincole [840]		Species or species habitat may occur within area
Haliaeetus leucogaster		
White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area

Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area
Macronectes giganteus 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
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 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
Solenostomus paegnius		
Rough-snout Ghost Pipefish [68425]		Species or species habitat may occur within area
Syngnathoides biaculeatus		
Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Trachyrhamphus bicoarctatus		
Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
Trachyrhamphus longirostris		
Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281]		Species or species habitat may occur within area
Mammals		
Dugong dugon		
Dugong [28]		Species or species habitat likely to occur within area
Reptiles		
Aipysurus apraefrontalis		
Short-nosed Seasnake [1115]		Species or species habitat known to occur within area
Aipysurus duboisii		
Dubois' Seasnake [1116]		Species or species habitat may occur within area
Aipysurus eydouxii		
Spine-tailed Seasnake [1117]		Species or species habitat may occur within area
Aipysurus laevis		
Olive Seasnake [1120]		Species or species habitat may occur within area
Astrotia stokesii		
Stokes' Seasnake [1122]		Species or species habitat may occur within area
Caretta caretta		
Loggerhead Turtle [1763]	Endangered	Species or species habitat likely to occur within area
Chelonia mydas		
Green Turtle [1765]	Vulnerable	Species or species habitat likely to occur within area
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat 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	Species or species habitat likely to occur within area
Hydrophis elegans		
Elegant Seasnake [1104]		Species or species habitat may occur within area
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Species or species habitat likely 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 may occur within area
Delphinus delphis		
Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Eubalaena australis		
Southern Right Whale [40]	Endangered	Species or species habitat may occur within area
Grampus griseus		
Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Megaptera novaeangliae		
Humpback Whale [38]	Vulnerable	Congregation or aggregation known to occur within area
Orcinus orca		
Killer Whale, Orca [46]		Species or species habitat may occur within area
Sousa chinensis		
Indo-Pacific Humpback Dolphin [50]		Species or species habitat may 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)		Species or species habitat likely to occur within area

[78900]
Tursiops truncatus s. str.
Bottlenose Dolphin [68417] Species or species habitat may occur within area

Extra Information

Places on the RNE [Resource Information]

Note that not all Indigenous sites may be listed.

Name	Status
Natural	
Cape Range Geological Site WA	Registered
Cape Range National Park and Surrounds WA	Registered
Cape Range and Adjacent Coastal Plain WA	Registered

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
Mammals		
Capra hircus Goat [2]		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
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat likely to occur within area
Prosopis spp. Mesquite, Algaroba [68407]		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 Heritage and Register of National Estate properties, Wetlands of International 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.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

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

-22.12391 114.08999

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:

-Department of Environment, Climate Change and Water, New South Wales
-Department of Sustainability and Environment, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment and Natural Resources, South Australia
-Parks and Wildlife Service NT, NT Dept of Natural Resources, Environment and the Arts
-Environmental and Resource Management, Queensland
-Department of Environment and Conservation, Western Australia
-Department of the Environment, Climate Change, Energy and Water
-Birds Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum

-SA 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, Atherton and Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
-State Forests of NSW
-Other groups and individuals

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

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

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APPENDIX 3

Flora Species List Inventory

APPENDIX 3: Flora Species List Inventory

Family	Species
Acanthaceae	*Dicladanthera forrestii*
Amaranthaceae	**Aerva javonica*
Amaranthaceae	*Ptilotus divaricatus* var. *divaricatus*
Amaranthaceae	*Ptilotus obovatus*
Apocynaceae	*Gymnanthera cunninghamii* (P3)
Apocynaceae	*Sarcostemma viminale* subsp. *australe*
Asparagaceae	*Acanthocarpus verticillatus*
Asteraceae	*Pterocaulon sphaeranthoides*
Asteraceae	*Streptoglossa decurrens*
Asteraceae	*Streptoglossa liatroides*
Brassicaceae	*Lepidium pedicellosum*
Brassicaceae	*Lepidium phlebopetalum*
Capparaceae	*Capparis lasiantha*
Chenopodiaceae	*Atriplex semilunaris*
Chenopodiaceae	*Enchylaena tomentosa*
Chenopodiaceae	*Maireana polypterygia*
Chenopodiaceae	*Maireana tomentosa* subsp. *tomentosa*
Chenopodiaceae	*Neobassia astrocarpa*
Chenopodiaceae	*Rhagodia eremaea*
Chenopodiaceae	*Salsola tragus* subsp. *tragus*
Chenopodiaceae	*Sclerolaena gardneri*
Chenopodiaceae	*Tecticornia* sp.
Convolvulaceae	*Ipomoea pes-caprae* subsp. *brasiliensis*
Cucurbitaceae	*Cucumis maderaspatanus*
Euphorbiaceae	*Adriana tomentosa* var. *tomentosa*
Euphorbiaceae	*Euphorbia tannensis* subsp. *eremophila*
Fabaceae	*Acacia ampliceps*
Fabaceae	*Acacia bivenosa*
Fabaceae	*Acacia coriacea* subsp. *coriacea*
Fabaceae	*Acacia pyrifolia*
Fabaceae	*Acacia ramulosa* var. *linophylla*
Fabaceae	*Acacia synchronicia*
Fabaceae	*Acacia tetragonophylla*
Fabaceae	*Acacia xiphophylla*
Fabaceae	*Indigofera monophylla*
Fabaceae	*Rhynchosia minima*

Family	Species
Fabaceae	*Senna artemisioides* subsp. *oligophylla* x ?
Goodeniaceae	*Goodenia microptera*
Goodeniaceae	*Scaevola spinescens*
Lauraceae	*Cassytha aurea* var. *aurea*
Loranthaceae	*Amyema preissii*
Malvaceae	*Abutilon cunninghamii*
Malvaceae	*Alyogyne cuneiformis*
Malvaceae	*Corchorus congener* (P3)
Malvaceae	*Hibiscus sturtii* var. ? *campylochlamys*
Malvaceae	*Melhania oblongifolia*
Malvaceae	*Sida fibulifera*
Myrtaceae	*Eucalyptus* sp. (cultivated)
Myrtaceae	*Eucalyptus xerothermica*
Oleaceae	*Jasminum didymum* subsp. *lineare*
Phyllanthaceae	*Notoleptopus decaisnei*
Pittosporaceae	*Pittosporum angustifolium*
Pittosporaceae	*Pittosporum phylliraeoides*
Poaceae	**Cenchrus ciliaris*
Poaceae	**Cynodon dactylon*
Poaceae	*Enneapogon caerulescens*
Poaceae	*Spinifex longifolius*
Poaceae	Triodia epactia
Poaceae	Triodia pungens
Santalaceae	*Exocarpos sparteus*
Santalaceae	*Santalum lanceolatum*
Sapindaceae	*Alectryon oleifolius* subsp. *oleifolius*
Sapindaceae	*Diplopeltis eriocarpa*
Scrophulariaceae	*Eremophila longifolia*
Scrophulariaceae	*Eremophila maculata* subsp. brevifolia
Solanaceae	*Solanum* sp.
Surianaceae	*Stylobasium spathulatum*

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APPENDIX 4

Fauna Species List and Information Sources

APPENDIX 4: Fauna Species List and Information Sources

A = recorded on site
B = DEC Threatened Fauna Database
C = EPBC Protected Matters Search Tool
D = DEC NatureMap Species Database
* = introduced species
^ = tentative identification

Species	Common Name	Conservation Status (State)	Conservation Status (EPBC)	Source (indicated by X)			
				A	B	C	D
birds							
Acanthagenys rufogularis	Spiny-cheeked honeyeater						X
Accipiter fasciatus	Brown goshawk						X
Aegotheles cristatus	Australian owlet-nightjar						X
Amytornis striatus	Striated grasswren						X
Anthus novaeseelandiae	Australian pipit						X
Aquila audax	Wedge-tailed eagle						X
Apus pacificus	Fork tailed swift		Migratory			X	
Ardea alba	Great egret		Migratory			X	
Ardea ibis	Cattle egret		Migratory			X	
Arenaria interpres	Ruddy turnstone						X
Artamus cinereus	Black-faced woodswallow						X
Artamus minor	Little woodswallow						X
Barnardius zonarius	Australian ringneck						X
Cacatua sanguinea	Little corella			X			X
Cacomantis pallidus	Pallid cuckoo						X
Calamanthus campestris	Rufous fieldwren						X
Calidris acuminata	Sharp-tailed sandpiper						X
Chalcites basalis	Horsfield's bronze cuckoo						X
Charadrius ruficapillus	Red-capped plover						X
Charadrius veredus	Oriental plover		Migratory			X	
Cheramoeca leucosterna	White-backed swallow						X
Chroicocephalus novaehollandiae	Silver gull			X			X
Cincloramphus cruralis	Brown songlark						X
Coracina novaehollandiae	Black-faced cuckoo-shrike			X			X
Corvus bennetti	Little crow						X
Corvus orru	Torresian crow						X
Corvus sp.	Crow						X
Cracticus nigrogularis	Pied butcherbird						X

Species	Common Name	Conservation Status (State)	Conservation Status (EPBC)	Source (indicated by X)			
				A	B	C	D
Cracticus torquatus	Grey butcherbird						X
Dicaeum hirundinaceum	Mistletoebird						X
Dromaius novaehollandiae	Emu						X
Egretta sacra	Pacific reef heron						X
Elanus axillaris	Australian black-shouldered kite						X
Emblema pictum	Painted finch						X
Eolophus roseicapillus	Galah			X			X
Epthianura tricolor	Crimson chat						X
Erodium botrys	Long storksbill						X
Erodium cygnorum	Blue heronsbill						x
Eremiornis carteri	Spinifex-bird						X
Falco berigora	Brown falcon						X
Falco cenchroides	Australian kestrel						X
Geopelia cuneata	Diamond dove						X
Glareola maldivarum	Oriental pratincole		Migratory			X	
Grallina cyanoleuca	Magpie-lark			X			X
Haematopus fuliginosus	Sooty oystercatcher						X
Haematopus longirostris	Pied oystercatcher						X
Haliaeetus leucogaster	White-bellied sea-eagle		Migratory			X	X
Haliastur indus	Brahminy kite						X
Haliastur sphenurus	Whistling kite						X
Hieraaetus morphnoides	Little eagle						X
Hirundo neoxena	Welcome swallow			X			X
Hirundo rustica	Barn swallow		Migratory			X	X
Hydroprogne caspia	Caspian tern						X
Lalage sueurii	White-winged triller						X
Lichenostomus keartlandi	Grey-headed honeyeater						X
Lichenostomus penicillatus	White-plumed honeyeater			X			X
Lichenostomus virescens	Singing honeyeater			X			X
Lichmera indistincta	Brown honeyeater						X
Limosa lapponica	Bar-tailed godwit						X
Mocronectes giganteus	Southern giant petrel		Endangered			X	
Malurus lamberti	Variegated fairy-wren			X			X
Malurus leucopterus	White-winged fairy-wren						X
Manorina flavigula	Yellow-throated miner			X			X
Melopsittacus undulatus	Budgerigar						X
Melanodryas cucullata							X
Merops ornatus	Rainbow bee-eater		Migratory	X		X	X

Species	Common Name	Conservation Status (State)	Conservation Status (EPBC)	Source (indicated by X)			
				A	B	C	D
Ocyphaps lophotes	Crested pigeon			X			X
Oreoica gutturalis	Crested bellbird						X
Pachycephala rufiventris	Rufous whistler						X
Pandion cristatus	Eastern osprey			X			X
Pardalotus striatus	Striated pardalote						X
Pelecanus conspicillatus	Australian pelican						X
Petrochelidon nigricans	Tree martin						X
Phalacrocorax varius	Pied cormorant						X
Psophodes occidentalis	Western wedgebill						X
Ptilonorhynchus guttatus							X
Rhipidura albiscapa	Grey fantail						X
Taeniopygia guttata	Zebra finch			X			X
Thalasseus bengalensis							X
Thalasseus bergii							X
Todiramphus pyrrhopygius	Red-backed kingfisher						X
Turnix velox	Little button-quail			X			X
Zosterops luteus	Yellow white-eye						X
Mammals							
Capra hircus	Goat					X	
Dasycercus cristicauda	Mulgara		Vulnerable			X	
Dasykaluta rosamondae	Little red kaluta						X
Felis catus	Cat					X	
Macropus rufus	Red kangaroo			X			
Ningaui timealeyi	Pilbara ningaui						X
Oryctolagus cuniculus	Rabbit			X		X	
Ovis aries	Sheep			X			
Petrogale lateralis subs. Lateralis	Black-footed rock wallaby	T	Vulnerable			X	X
Phascogale calura	Red-tailed phascogale						X
Pseudomys fieldi	Shark bay mouse						X
Pseudomys hermannsburgensis	Sandy inland mouse						X
Rattus rattus	Black rat						X
Sminthopsis macroura	Stripe-faced dunnart						X
Taphozous georgianus	Common sheathtail-bat						X
Vespadelus finlaysoni	Finlayson's cave bat						X
*Vulpes vulpes**	Red fox					X	

Species	Common Name	Conservation Status (State)	Conservation Status (EPBC)	Source (indicated by X)			
				A	B	C	D
Reptiles							
v	Pilbara death adder						X
Aipysurus apraefrontalis							X
Aipysurus duboisii							X
Amphibolurus longirostris				X			X
Carlia munda							X
Crenadactylus ocellatus subsp. horni							X
Ctenophorus femoralis	Dune dragon						X
Ctenophorus isolepis subsp. isolepis							X
Ctenotus pantherinus subsp. ocellifer							X
Ctenotus saxatilis	Rock ctenotus						X
Cyclodomorphus melanops subsp. melanops							X
Delma tealei							X
Delma tincta							X
Diplodactylus conspicillatus	Fat-tailed gecko						X
Diplodactylus sp 'Cape Range	Cape range diplodactylus	P2			X		X
Disteira stokesii							X
Furina ornata	Moon snake						X
Gehyra pilbara							X
Gehyra variegata							X
Heteronotia binoei	*Bynoe's gecko*						X
Lerista allochira		P3					X
Lerista clara							X
Menetia greyii	Common dwarf skink						X
Menetia surda							X
Morethia ruficauda subsp. exquisita							X
Pseudechis australis	Mulga snake						X
Pygopus nigriceps							X
Ramphotyphlops ammodytes							X
Strophurus strophurus							X
Suta fasciata	*Rosen's snake*						X
Varanus gouldii	Bungarra			X			
Amphibians							
Cyclorana maini	Sheep frog						X
Neobatrachus fulvus	Tawny trilling frog						X
Neobatrachus sutor	*Shoemaker frog*						X
Pseudophryne douglasi	*Gorge toadlet*						X