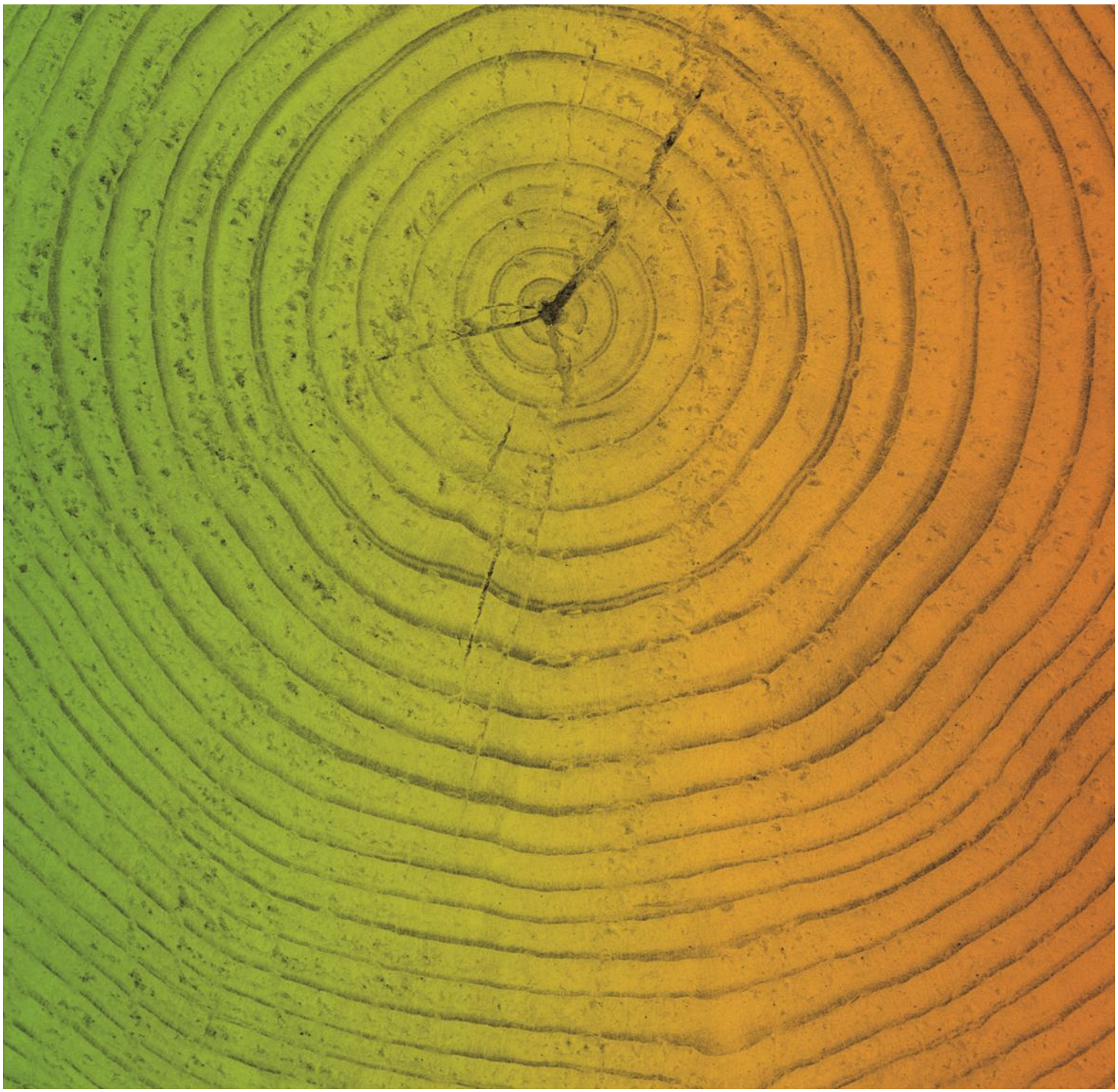
Department of Transport
03-Feb-2016

Ecological Assessments

Woodman Point Recreational Precinct



Ecological Assessments

Woodman Point Recreational Precinct

Client: Department of Transport

ABN: 27 285 643 255

Prepared by

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Quality Information

Document Ecological Assessments

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Prepared by F de Wit

Reviewed by L Kirchner

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			Name/Position	Signature
A	11-Mar-2015	Draft Report for Client Review	Linda Kirchner Associate Director - Environment	
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Table of Contents

List of Tables

List of Figures

Executive Summary

The Department of Transport required environmental investigations for a defined project area at the existing Woodman Point boating precinct. AECOM was commissioned to conduct ecological investigations to inform an assessment against the ten clearing principles and to determine a potential offsets strategy.

Ecological investigations included a level 1 flora and vegetation assessment and level 1 fauna assessment. Both investigations included a targeted survey component to address potential conservation significant flora, fauna and vegetation that may occur in the project area. Field surveys were conducted concurrently by a senior botanist and zoologist on 3 September 2015.

The flora and vegetation assessment confirmed the presence of a State-listed Threatened Ecological Community (TEC). This TEC is defined by the Gibson *et al.* (1994) FCT30a *Callitris preissii/Melaleuca lanceolata* forests and woodlands. The TEC was confirmed as present in the project area using statistical analysis of the Gibson (1994) dataset. Further confirmation from Val English from Department of Parks and Wildlife confirmed that the TEC is present and extends 10.51 ha within the project area. Of this, 3.33 ha of vegetation is in Good condition, with the remainder mapped as Degraded, Completely Degraded or Cleared.

No other conservation significant vegetation was recorded. No Threatened or Priority flora species were recorded despite the desktop assessment showing two species that are likely to occur. The entire project area was traversed on foot to conduct targeted searches. This was considered suitable effort to determine that the species identified in the desktop assessment do not occur.

The native vegetation within the project area was mostly degraded and has low biodiversity values. Historical clearing, tracks dissecting the area, and current human activities are causing widespread wind erosion and weed invasion. The high diversity of weed species including four that are considered a high risk and two Declared Pests have displaced native vegetation.

The fauna assessment identified potential Quenda diggings within the project area. The Quenda is a Priority 5 mammal and was sighted outside the project area. A flock of 14 Carnaby's Black Cockatoos were sighted flying away from the Woodman Point Regional Park. Some very low quality foraging habitat was recorded within the project area and is considered to have limited value to the species due to low diversity of suitable foraging species. The project area is not expected to support Carnaby's Black Cockatoo though it can be expected to fly over the area in transit to and from the Woodman Point Regional Park.

An assessment against the ten clearing principles was conducted and showed that the project may be at variance to principle b and likely to be at variance to principle d and h.

The vegetated area lies within a state-listed Threatened Ecological community and potentially requires a state offset. The Offset Calculator was used to determine a suitable offset if so required. Placing the vegetated area to the north of the masterplan development area into a reserve and undertaking fencing, weed control and feral animal control should be sufficient to meet any offset requirement. Consideration could be given to using endemic species in site landscaping as this could also be used as an additional offset.

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1.0 Introduction

1.1 Project background

Department of Transport (DoT) have commenced detailed site investigations for the Woodman Point Recreational Boating Precinct (WPRBP). The development of the WPRBP will support the growth and future demand for boat launching, storage and a range of complimentary maritime service business in the area. The site currently consists of eight public boat ramps with finger jetties, a floating universal access pontoon, and parking facilities for 216 car and boat trailer bays. The proposed development will increase the capacity to approximately 482 car and boat trailer bays, showrooms, wholesale and retail, boat building and services, and boat stackers with the potential for 240 boats. This will make Woodman Point the largest recreational boating facility in WA.

The next phase of development is to use vacant land within the WPRBP to create light industrial leasehold land parcels suitable for commercial developments servicing recreational boat users.

1.2 Project location

The WPRBP is a 32 ha site located in the City of Cockburn (the project area). The project area is bound by Cockburn Road (east), O'Kane Court (north) and Jervoise Bay Cove (west) (Figure 1).

1.3 Objective

The objective of the ecological investigations is to provide DoT with a detailed understanding of the flora, vegetation, and fauna values which may be impacted by the proposed development. This will inform the environmental assessment included in this report and identify potential environmental approvals that may be required for the project.

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DATUM GDA 1994, PROJECTION MGA ZONE XX

0 105 210 420
metres

1:12,000 (when printed at A4)

LEGEND

Project Area

Data sources:

Base Data: (c) 2015 Landgate Imagery
(c) 2015 ESRI Imagery

Woodman Point Boating Precinct
Project Location

PROJECT ID	60340056
CREATED BY	DF
LAST MODIFIED	DF - 08 SEP 2015>
VERSION:	1

Map
1

Filename: G60340056_Map1_ProjectLocation_20150908_V1_A4

A4 size

2.0 Methodology

2.1 Desktop assessment

The desktop assessment involved gathering background information for the local area. Desktop database searches were requested from the following government databases (including a 5km buffer from project area boundary):

- Department of Parks and Wildlife (DPaW) Threatened and Priority Flora List
- WA Herbarium (WAH) records
- DPaW Threatened and Priority Ecological Communities database
- *Environment Protection and Biodiversity Conservation Act* (EPBC Act) Protected Matters database.

All flora of conservation significance identified in the desktop assessment were assessed for their likelihood of occurrence within the project area (Table 1). The definitions of Threatened and Priority species and ecological community categories are explained in Appendix A.

Available literature was consulted to identify broad vegetation types and describe the existing environment. References included Worley Parson (2014) (which collates information from Biota, GHD and Worley Parsons) Approvals Strategy, Beard (1981) vegetation mapping, the Biodiversity Audit of Western Australia (CALM 2002), and Heddle et al. (1980) vegetation mapping.

Table 1 Categories of likelihood of occurrence for flora species of conservation significance identified in the desktop assessment

Category	Likelihood of occurrence assessment
Likely	Habitat is present in the project area and it has been recorded in close proximity to the project area
May	Habitat may be present in the project area and/or it has been previously recorded in close proximity to the project area
Unlikely	No suitable habitat is present and there have been no recorded locations in close proximity to the project area

2.2 Flora and vegetation

A Level 1 flora and vegetation assessment was conducted within the project area using methods stipulated in EPA (2004) Guidance Statement 51 and as stipulated in the DoT RFQ DOT400312-610 Provision of Consultancy Services for Detailed Site Investigation and Approvals. Floristic data was collected at sample point locations using a combination of 10x10m non-permanent quadrats and relevés to document the floristics, community composition, condition, and other identifying features of the project area. Sample point locations were selected to ensure accurate representation of native vegetation within the project area. Changes in floristic composition and structure were recorded and mapped as the project area was traversed.

Any species unable to be identified in the field were collected for identification in AECOM's in-house herbarium and the specimens and taxonomic references and keys at the Western Australian herbarium. Naming of species followed the convention of the Western Australian Herbarium.

Where buffers of Threatened Ecological Communities (TECs) and Priority Ecological Communities (PECs) overlap the project area, quadrat data was used to conduct FCT analysis (discussed in Section 2.3.4).

2.2.1 Reporting

Quantitative flora data were used to define the vegetation communities. Vegetation communities were described and mapped based on changes in dominant species composition and landform. Where marked changes in species composition and floristic structure were observed, species within the vegetation community were recorded in order to characterise vegetation communities.

Vegetation community descriptions were based on the National Vegetation Information System (NVIS) framework (Executive Steering Committee for Australian Vegetation Information 2003). The NVIS framework is a comprehensive data system that allows for the comparison of Australia's native vegetation at an Australia-wide scale. The system is based on describing strata levels using the three dominant species in that stratum. The naming convention is based on the first letters of the dominant species from each stratum.

There are limitations in using the NVIS system for assigning vegetation descriptions for heavily degraded communities. These are often limited to native trees over weeds and/or planted species. These are coded according to the dominant tree species, e.g. *Corymbia calophylla* over weeds is coded Cc.

Vegetation condition was determined using the Keighery (1994) condition scale (Table 2). The scale is based on disturbance (e.g. grazing, erosion), degree of alteration to community and habitat structure and site ecology.

Table 2 Bushland condition ratings (Keighery 1994)

Descriptor	Explanation
Pristine	Pristine or nearly so, no obvious signs of disturbance.
Excellent	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species.
Very Good	Vegetation structure altered obvious signs of disturbance. For example, disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.
Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. For example, disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds at high density, partial clearing, dieback and grazing.
Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example, disturbance of vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.
Completely Degraded	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as "parkland cleared" with the flora comprising weed or crop species with isolated native trees or shrubs.

2.2.2 Floristic community analysis

Floristic Community Types (FCTs) of the Swan Coastal Plain (SCP) were inferred using floristic data from the mapped vegetation communities. FCTs were developed by Gibson *et al.* (1994) following a survey of 509 remnant bushland quadrats on the southern Swan Coastal Plain.

Gibson's FCTs provide the basis for most of the listed Priority and Threatened Ecological Communities on the SCP. The dataset used for analysis is the Gibson and Bush Forever combined data available from NatureMap (online). Two sites were recorded in the vicinity of Woodman Point that represent the FCT30a TEC. These sites (WOODP-01 and WOODP-02) were used to conduct a Bray-Curtis dissimilarity matrix. This was transformed into a similarity matrix.

The Bray-Curtis formula:

$$BC_{ij} = 1 - \frac{2C_{ij}}{S_i + S_j}$$

C_{ij} = sum of the lesser values for only those species in common between both sites.

S_i and S_j are the total number of specimens counted at both sites.

2.3 Fauna

The assessment was undertaken in accordance with Level 1 Surveys as per the EPA Guidance Statement 56, *Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia* (EPA 2003) and as stipulated in the RFQ DOT400312-610 Provision of Consultancy Services for Detailed Site Investigation and Approvals – Woodman Point Recreational Boating Precinct.

The fauna survey was conducted in conjunction with the flora and vegetation survey. Conducting the two assessments concurrently enabled interpretation of the habitat value of each of the vegetation units described and mapped, and determination of each of these as suitable for significant fauna. Where habitat for conservation significant species was located, site details were recorded using Apple iPads with parameters including:

- GPS location
- species observed
- habitats present
- scats
- tracks
- linkage values.

In addition to recording all observed fauna and birds identified from distinctive calls, details of indirect evidence such as scats, tracks and diggings was documented. In particular, attention was given to conservation significant species identified in the desktop assessment as having the potential to occur in the area.

Opportunistic observations of fauna were recorded whilst traversing the project area. Furthermore, at each habitat, micro habitat searches were conducted. This included raking soil and leaf litter, inspecting dead logs and timber, inspecting burrows, lifting rocks and inspecting loose bark on of trees.

The taxonomy and nomenclature of vertebrate species for mammals, reptiles and amphibians is in accordance with the Western Australian Museum's Checklist of Vertebrates of Western Australia (WA Museum, 2014) and for bird species the Bird's Australia Checklist of Australian Birds based on Christidis and Boles (2008).

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3.0 Limitations

There were no significant limitations associated with the ecological investigations undertaken for the project. The limitations considered are outlined in Table 3.

Table 3 Limitations of the assessment

Limitation	Constraint	Impact to survey
Competency/experience of consultant conducting survey	Nil	The survey was conducted by an experienced botanist (more than seven years' experience) who has experience working on the Swan Coastal Plain.
Scope (i.e. what life forms were sampled)	Nil	The level 1 flora and vegetation assessment considered all dominant flora species and those unknown to the field team. This ensured that all potential conservation significant flora species were captured. The level 1 fauna assessment considered all secondary evidence and chance sightings of fauna.
Proportion of flora/fauna identified, recorded and/or collected (based on sampling, timing and intensity)	Nil	The flora and vegetation assessment was conducted during spring, 2015 using relevés as sample point locations and two quadrats within the Threatened Ecological Community buffer. The survey was conducted over one day. The fauna survey was conducted between daylight hours of 0900 and 1500 hrs to record opportunistic sightings and secondary evidence of fauna activity.
Sources of information	Nil	The desktop assessment sources and publicly available material used to inform the survey are predominantly from government databases or published by a government department.
Completion (is further work needed)	Nil	A level 1 flora and vegetation assessment, TEC boundary delineation, targeted flora searches, and a level 1 fauna assessment targeting conservation significant species for Threatened, Migratory and Priority species was undertaken. This is considered suitable for meeting the objective of the assessment.
Timing, weather, season, cycle	Nil	The field surveys were conducted in Spring, 2015. This is considered the ideal survey time on the Swan Coastal Plain. The field survey recorded annual species (mostly weeds) and orchids (native) in the project area. It can therefore be assumed that rainfall was not a limiting factor for the survey. Fauna surveys were conducted during daylight hours between 0900 and 1500.
Disturbances (e.g. fire flood, accidental human intervention) which affected results of the survey	Nil	Disturbance was observed at several locations, this can be viewed on the vegetation condition map (Figure 5). Historical clearing has left large areas bare and subject to erosion. Weed dispersal and presence of Declared Pests were also observed.
Intensity (was the intensity adequate)	Nil	A total of six relevés were surveyed to record the floristics of the project area. Opportunistic observations were made where appropriate to develop a comprehensive assessment of the flora and vegetation values of the site. The entire project area was traversed on foot by a zoologist and botanist.

Limitation	Constraint	Impact to survey
Completeness (was relevant area fully surveyed)	Nil	The entire project area was traversed on foot by a botanist and zoologist.
Resources (degree of expertise available in plant/animal identification)	Nil	The plant identifications were conducted by Senior Botanists Floora de Wit who has over seven years' experience as a botanist undertaking plant identifications, data management, technical reporting and field surveys. The zoologist, Matthew Cann, has over four years' experience conducting level 1 fauna assessments on the Swan Coastal Plain.
Remoteness and/or access problems	Nil	The entire project area was easily accessible by foot.
Availability of contextual information on the region	Nil	The Biodiversity Audit for Western Australia, Gibson *et al.* (1994) and Heddle *et al.* (1980) was used to determine the local and regional significance of vegetation identified in the project area.

4.0 Existing environment

4.1 Climate

The Swan Coastal Plain has a warm Mediterranean climate (Mitchell *et al.* 2002), characterised by hot dry summers and cool to mild wet winters. The closest meteorological recording station to the project area with comprehensive data is Fremantle Weather Station (station 9192) located 10km north from the project area.

The rainfall figure in Figure 2 shows 2014 September to 2015 August compared to mean rainfall calculated from data obtained between 1983 and 2015. Rainfall data shows a reduction in rainfall in 2015 months of May and July. June and August 2015 data was incomplete on the BOM website (BOM, 2015) therefore no accurate predictions can be made for those months.

The field survey recorded annual species (mostly weeds) and orchids (native) in the project area. It can therefore be assumed that rainfall was not a limiting factor for the survey.

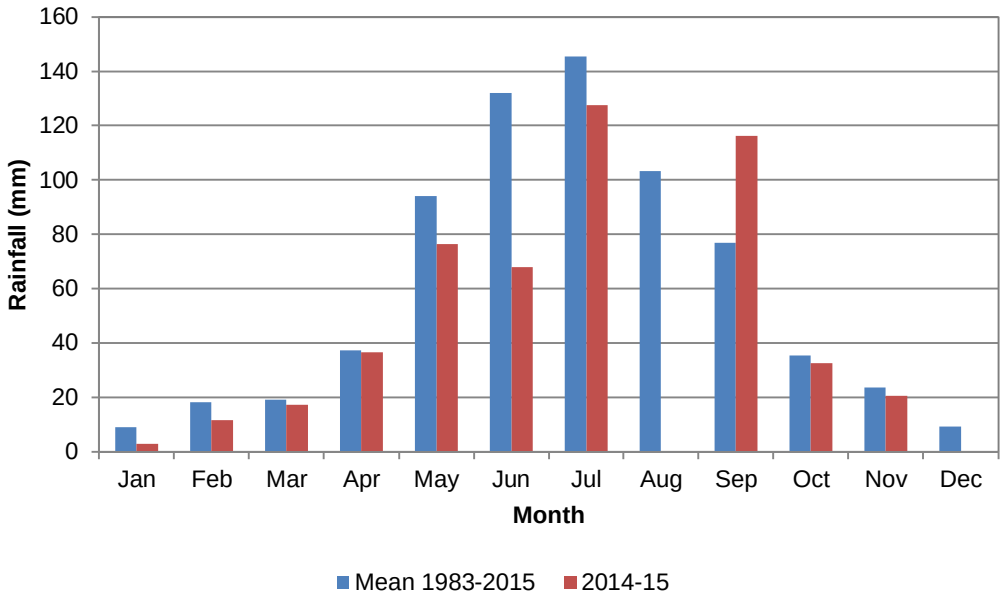

Figure 2 Rainfall of the project area (station 9192 BOM 2015). Rainfall data for 2014-2015 June and August were incomplete or not available at the time of reporting.

4.2 IBRA region

There are 89 recognised Interim Biogeographic Regionalisation for Australia (IBRA) regions across Australia that have been defined based on climate, geology, landforms and characteristic vegetation and fauna (CALM 2002). The project area lies within the Swan Coastal Plain IBRA region and, on a finer scale, within the Perth subregion (Mitchell *et al.* 2002).

The Perth subregion consists of alluvial river flats, colluvial and aeolian sands, and coastal limestone (Mitchell *et al.* 2002). Vegetation of the subregion comprises heath and/or Tuart (*Eucalyptus gomphocephala*) woodlands on limestone, Jarrah (*Eucalyptus marginata*) and *Banksia* woodlands on Quaternary marine dunes and Marri (*Corymbia calophylla*) on colluvial and alluvial sands. The subregion includes a complex chain of seasonal wetlands.

4.3 Pre-European vegetation

Beard (1981) undertook mapping of the Swan region and defined two broad vegetation types within the project area (Table 4). Of these, association 3048 is the most restricted on the Swan Coastal Plain (27.32% remaining).

Heddle *et al*. (1980) completed more detailed mapping of the Perth region, mapping four vegetation complexes within the project area (Table 5). Of these, the Serpentine River complex is the most regionally restricted (10.82% remaining).

Table 4 Beard (1981) pre-European vegetation within the project area

Association	Description	Percent remaining on SCP	Percent remaining in the State
998	Medium woodland; Tuart	38.52	38.41
3048	Shrublands; scrub-heath on the Swan Coastal Plain	31.62	27.32

Table 5 Heddle *et al*. (1980) pre-European vegetation within the project area

Association	Description	Percent remaining on SCP
Cottesloe complex – central and south	Mosaic of woodland of *Eucalyptus gomphocephala* and open forest of *E. gomphocephala – E. marginata – E. calophylla*; closed heath on the Limestone outcrops.	35.22
Quindalup complex	Coastal dune complex consisting mainly of two alliances – the strand and foredune alliance and the mobile and stable dune alliance. Local variations include the low closed forest of *Melaleuca lanceolata – Callitris preissii* and the closed scrub of *Acacia rostellifera*".	55.38

4.4 Protected Land

DPaW Managed Land

There is a Conservation Park and Nature Reserve adjacent to the project area north of Okane Court and west of Jervoise Bay Cove.

Bush Forever

Bush Forever Site 341 incorporates all the native vegetation between Cockburn Road and Indian Ocean, extending over 91.7ha, including the project area. The Site contains the state-listed TEC *Callitris preissii* (or *Melaleuca lanceolata*) forests and woodlands, classified as Vulnerable by DPaW. Furthermore, the Site includes populations of *Dodonaea hackettiana* (Priority 4) species and is entered in the Register of the National Estate as a location for JAMBA/CAMBA species subject to protection under the EPBC Act.

The Bush Forever site is wholly encompassed in Woodman Point Regional Park. Regional parks and Bush Forever sites have no specific legal status or protection, but are protected wherever possible.

4.5 Conservation significant matters

4.5.1 Threatened Ecological Community

There is one State-listed Threatened Ecological Community (TEC) known to occur in the vicinity of the project area. The field survey confirmed the presence of this TEC within the project area in the northeast corner. State-listed TECs are not currently protected under any legislation however an informal, non-statutory process is in place.

The area is defined as the TEC SCP30a *Callitris preissii* (and/or *Melaleuca lanceolata*) forests and woodlands, Swan Coastal Plain' classified as Vulnerable listed by the Minister for Environment. This is described in DPaW (2014)

> "A woodland and forest community located on calcareous sandy soils of the Quindalup Dunes between Trigg and Point Peron and on the Swan River in Peppermint Grove. The community is also present on Garden Island and Rottnest Island. Typical and common native taxa in the community are: *Callitris preissii, Melaleuca lanceolata, Spyridium globulosum, Acanthocarpus preissii, Rhagodia baccata, Austrostipa flavescens* and *Trachymene pilosa* (Gibson *et al.* 1994). The introduced herbs *Galium murale* (small bedstraw), *Asparagus asparagoides* (bridal creeper) and *Trachyandra divaricata* (dune onion weed) are common in the community."

The boundary for this TEC extends over the entire project area. The presence of this TEC was confirmed during field surveys and following liaison with DPaW (see Section 5.1.2).

4.5.2 Conservation significant flora

The desktop assessment identified 22 species of conservation significance (Threatened or Priority) that may occur within the project area (Table 6). These included:

- 3 Threatened species listed under the EPBC Act and *Wildlife Conservation Act 1950* (WC Act)
- 19 Priority species.

Of these:

- 2 are considered likely to occur due to suitable habitat present within the project area and known populations occurring within 5km
- 4 may occur due to suitable habitat present within the project area and known populations occurring more than 5km
- 16 are unlikely to occur due to no suitable habitat present within the project area and there are no known locations within 5km.

Previous studies did not record any flora of conservation significance (Worley Parsons, 2013). No conservation significant species were recorded during the 2015 field survey despite traversing the entire project area to conduct targeted searches.

Table 6 Conservation significant flora species identified in the desktop assessment

Taxon	Cons. status
Likely to occur	
Grevillea olivacea	P4
Dodonaea hackettiana	P4
May occur	
Austrostipa mundula	P2
Hibbertia spicata subsp. *leptotheca*	P3
Lepidium puberulum	P4
Pimelea calcicola	P3

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DATUM GDA 1994, PROJECTION MGA ZONE XX

0 35 70 140
metres

1:4,058 (when printed at A4)

LEGEND

Project Area

DPaW

- T
- 1
- 2
- 3
- 4

WA Herbarium

- T
- 1
- 2
- 3
- 4

TECs / PECs

- Critically Endangered
- Endangered
- Vulnerable
- Priority 3

Data sources:

Base Data: (c) 2015 Landgate Imagery

Woodman Point Boating Precinct Flora Desktop Results

PROJECT ID	60340056
CREATED BY	DF
LAST MODIFIED	DF - 08 SEP 2015
VERSION:	1

Map
3

A4 size

4.5.3 Conservation significant fauna

Search results from the Desktop Assessment resulted in a total of 64 species returned in the searches with potential to occur within the project area. Of these, 49 were birds, six reptiles, six mammals and 3 fish. Migratory mammals, reptiles and fish that have never been recorded within 5 km of the project area were omitted from further analysis as these are extremely unlikely to occur. A full list of species that include those omitted can be found in the EPBC Protected Matters report (Appendix D).

Based on the Desktop Assessment analysis, the following likelihoods of occurrence have been applied:

- likely to occur
    - six birds
    - one mammal
- may occur
    - 13 birds
    - two reptiles
    - one fish
- unlikely to occur
    - 30 birds
    - four reptiles
    - five mammals
    - two fish.

Those species that are likely to occur or may occur in the project area are listed in Table 7. For a full list of species and their analysis refer to Appendix E.

Table 7 Conservation significant species that are likely to or may occur in the project area

Species	Conservation status (Commonwealth ; State)	Likelihood
Birds		
Common Sandpiper *Actitis hypoleucos*	Migratory & Marine (Bonn, CAMBA, JAMBA, ROKAMBA) ; Schedule 3	A total of 16 records within 5 km of the project area. Last recorded in 2002. **May occur.**
Great Egret *Ardea alba/modesta*	Migratory & Marine (CAMBA, JAMBA) ; Schedule 3	A total of 6 records within 5 km of the project area. Last recorded in 2006. **May occur**.
Ruddy Turnstone *Arenaria interpres*	Migratory & Marine (Bonn, CAMBA, JAMBA, ROKAMBA) ; Schedule 3	A total of 90 records within 5 km of the project area. Last recorded in 2013. **Likely to occur**.
Sanderling *Calidris alba*	Migratory & Marine (Bonn, CAMBA, JAMBA, ROKAMBA) ; Schedule 3	A total of 25 records within 5 km of the project area. Last recorded in 2008. **May occur**.
Red Knot *Calidris canutus*	Marine, Migratory (EPBC),CAMBA, JAMBA, ROKAMBA ; Schedule 3	A total of 3 records within 5 km of the project area. Last recorded in 2011. **May occur**.
Red-necked Stint *Calidris ruficollis*	Migratory & Marine (Bonn, CAMBA, JAMBA, ROKAMBA) ; Schedule 3	A total of 42 records within 5 km of the project area. Last recorded in 2012. **Likely to occur**.
Great Knot *Calidris tenuirostris*	Migratory & Marine (Bonn, CAMBA, JAMBA, ROKAMBA); Schedule 1	A total of 31 records within 5 km of the project area. Last recorded in 2012. **Likely to occur**.
Carnaby's Cockatoo *Calyptorhynchus latirostris*	Endangered ; Schedule 1	A total of 40 records within 5 km of the project area. Last recorded in 2013. **Likely to occur**.
Greater Sand Plover *Charadrius leschenaultii*	Migratory & Marine (Bonn) ; Schedule 3	A total of 8 records within 5 km of the project area. Last recorded in 2008. **May occur**.
Eastern Reef Egret *Egretta sacra*	Migratory & Marine (CAMBA) ; Schedule 3	A total of 5 records within 5 km of the project area. Last recorded in 2012. **May occur**.
Peregrine Falcon *Falco peregrinus*	Schedule 4	A total of 3 records within 5 km of the project area. Last recorded in 2005. **May occur**.
Bar-tailed Godwit *Limosa lapponica*	Migratory & Marine (Bonn, CAMBA, JAMBA, ROKAMBA) ; Schedule 3	A total of 5 records within 5 km of the project area. Last recorded in 2010. **May occur**.
Rainbow Bee-eater *Merops ornatus*	Migratory & Marine (JAMBA) ; Schedule 3	A total of 14 records within 5 km of the project area. Last recorded in 2013. **Likely to occur**.
Whimbrel *Numenius phaeopus*	Marine, Migratory (EPBC), Bonn, CAMBA, JAMBA, ROKAMBA ; Schedule 3	A total of 4 records within 5 km of the project area. Last recorded in 2011. **May occur**.

Species	Conservation status (Commonwealth ; State)	Likelihood
Grey Plover *Pluvialis squatarola*	Migratory & Marine (Bonn, CAMBA, JAMBA, ROKAMBA) ; Schedule 3	A total of 92 records within 5 km of the project area. Last recorded in 2013. **Likely to occur**.
Arctic Skua *Stercorarius parasiticus*	Migratory & Marine (CAMBA, JAMBA, ROKAMBA) ; Schedule 3	A total of 26 records within 5 km of the project area. Last recorded in 2012. **May occur**.
Pomarine Skua *Stercorarius pomarinus*	Migratory & Marine (CAMBA, JAMBA) ; Schedule 3	A total of 4 records within 5 km of the project area. Last recorded in 2012. **May occur**.
Grey-tailed Tattler *Tringa brevipes*	Migratory & Marine (CAMBA, JAMBA, ROKAMBA, Bonn) ; Priority 4	A total of 25 records within 5 km of the project area. Last recorded in 2011. **May occur**.
Common Greenshank *Tringa nebularia*	Migratory & Marine (Bonn, CAMBA, JAMBA, ROKAMBA) ; Schedule 3	A total of 18 records within 5 km of the project area. Last recorded in 2009. **May occur**.
Mammals		
Quenda *Isoodon obesulus* subsp. *fusciventer*	Priority 5	A total of 41 records within 5 km of the project area. Last recorded in 2012. **Likely to occur**.
Reptiles		
Loggerhead Turtle *Caretta caretta*	Endangered, Marine and Migratory (Bonn). Schedule 1	A total of 7 records within 5 km of the project area. Last recorded in 2000. **May occur**.
Perth Slider, Lined Skink *Lerista lineata*	P3	A total of 44 records within 5 km of the project area. Last recorded in 2005. **May occur**.
Sharks		
Grey Nurse Shark *Carcharias Taurus*	Vulnerable ; Schedule 1	No records within 5 km of the project area. **May occur**.

5.0 Results

5.1 Vegetation

5.1.1 Communities

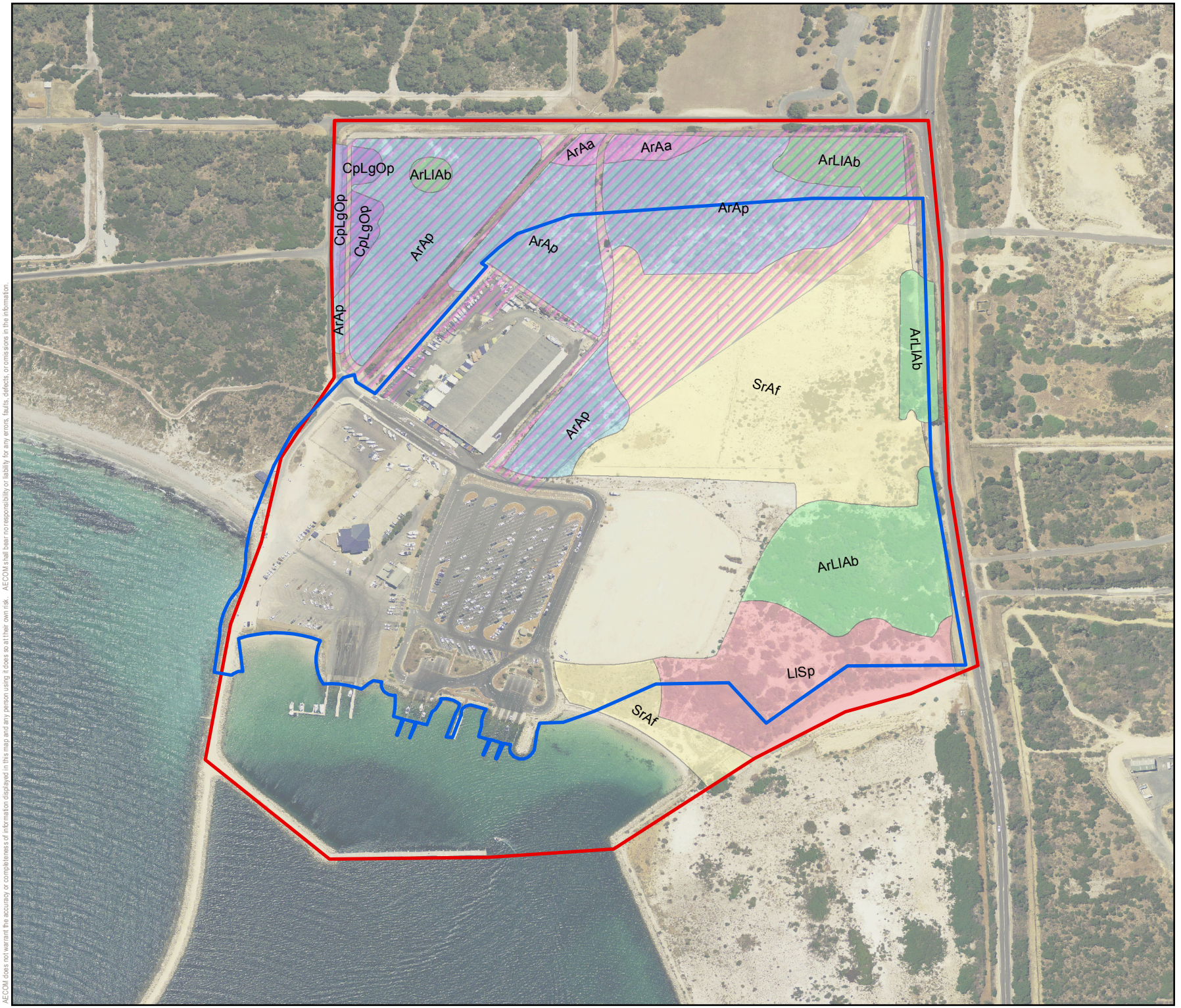
Six vegetation communities were recorded and mapped within the project area (Figure 4). The majority of the project area was dominated by *Acacia rostellifera* (Summer-scented Wattle). This species formed shrub thickets to woodlands as mapped in Figure 4. Furthermore, communities all had a ground layer of weedy herbs, further discussed in Section 0.

The surveyed vegetation communities are described in detail in Table 8. Species richness was low in all vegetation communities. This can be seen in Appendix B showing a community by species matrix.

Table 8 Vegetation communities

AECOM Vegetation	Photograph
ArAa Proteaceae and *Acacia rostellifera* thickets *Acacia rostellifera, Hakea prostrata* and *Banksia sessilis* var. *cygnorum* tall shrubland over *Asparagus asparagoides*, Trachyandra divaricata** and *Euphorbia terracina** low open herbland. This community was very degraded with high levels of bare ground and weedy herbs. The Proteaceous shrubs and *Acacia* created thickets in parts that were inaccessible. Area: 0.29 ha	
ArAp *Acacia rostellifera* thicket *Acacia rostellifera, Melaleuca systena* and *Santalum acuminatum* mid to tall closed shrubland over *Acanthocarpus preissii, Hardenbergia comptoniana* and *Cyathochaeta avenacea* mid mixed open herbs and sedge land. The community is further characterised by sparse weed understorey including *Arctotheca calendula*, Asparagus asparagoides*, Brassica tournefortii** and *Euphorbia paralias*.* Area: 5.96 ha	

AECOM Vegetation	Photograph
LlSp Degraded foredunes *Leptospermum laevigatum** and *Acacia rostellifera* mid open to sparse shrubland over *Spinifex longifolius, Juncus pallidus* and *Ficinia nodosa* mid open sedgeland. Fore dunes where lack of vegetation establishment has led to prominent wind erosion and weed dispersal. Area: 2.32	
ArLlAb *Acacia rostellifera* woodlands *Acacia rostellifera* mid woodlands over *Leptospermum laevigatum** and *Spyridium globulosum* tall sparse shrubland over *Avena barbata*, Asparagus asparagoides** and *Clematis linearifolia* mid mixed herb and grassland. Very low species richness (four native species). This community is very degraded with weeds displacing native vegetation. Area: 2.99 ha	
CpLgOp *Callitris preissii* woodland TEC *Callitris preissii, Acacia rostellifera* and *Melaleuca lanceolata* low open forest over *Lepidosperma gladiatum* (dense to sparse), *Melaleuca parviceps* and *Asparagus asparagoides** mid mixed sedge and shrubland over *Oxalis pes-caprae*, Austrostipa* sp. and *Euphorbia terracina** mid mixed herb and grassland. This community represents the State-listed TEC that is known to occur in the vicinity (as discussed in Section 4.5.1). Area: 0.40 ha	
SrAf Limited regrowth of *Scaevola repens* var. *repens, Austrostipa flavescens*, *Leptospermum laevigatum**, and *Trachyandra divaricata**. This large area in the centre of the project area has undergone historic clearing. Since then, erosion and weed dispersal have prevented significant regrowth. Area: 6.82 ha	



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N

DATUM GDA 1994, PROJECTION MGA ZONE XX

0 40 80 160
metres

1:5,000 (when printed at A4)

LEGEND

- Clearence Footprint
- Project Area
- TEC Boundary

Community

- ArAa
- ArAp
- ArLIAb
- CpLgOp
- LISp
- SrAf

Data sources:

Base Data: (c) 2015 Landgate Imagery

Woodman Point Boating Precinct Vegetation Communities

PROJECT ID	60340056
CREATED BY	DF
LAST MODIFIED	DF - 06 OCT 2015
VERSION:	2

Map 4

A4 size

Filename: G60340056_Map4_VegetationCommunities_20151007_V3_A4

5.1.2 Threatened Ecological Community

The field survey identified this TEC at one location in the northwest corner of the project area. This community was represented by two relevés, and described as CpLgOp – *Callitris preissii* woodland TEC (see Section 5.1.1). Floristic data from these sites were compared to the Gibson dataset (sites WOODP-1 and WOODP-2) which represent the TEC at this location. The similarity index showed a high similarity between the sites (Table 9).

Table 9 Similarity matrix

Matrix	AECOM 01	AECOM 02
WOODP-1	67%	73%
WOODP-2	64%	69%

Frequent fires and clearing of land resulting in direct loss and weed invasion/edge effects are major threats to this community. Occurrences that are in the best condition and provide representation of the community include Garden Island and Woodman Point (DPaW, 2014). The recovery plan for this community aims to maintain and improve the overall condition of the community in the known locations and reduce the level of threat (DPaW 2014).

Condition mapping and accurate boundary mapping were completed for occurrences of this community at Woodman Point in 2006 by DPaW. Val English was contacted to confirm the mapped boundary of this TEC (see inset below). Following this, DPaW provided the boundaries of the TEC within the project area and advised that *Callitris preissii* may be missing from disturbed communities at this location.

The DPaW TEC boundary incorporated considerably more area than what was mapped by AECOM (Vegetation Community CpLgOp) as a result of the 2015 field surveys (Figure 4). According to DPaW mapping, the TEC incorporates five AECOM communities extending over 10.51ha, including:

- ArLlAb – *Acacia rostellifera* woodland
- ArAp – *Acacia rostellifera* thickets
- ArAa – Proteaceae and *Acacia rostellifera* thickets
- CpLgOp – *Callitris preissii* woodland TEC
- SrAf – limited regrowth on disturbed land

Although it was suggested that *Callitris preissii* may be absent from the community after disturbance, it would then seem reasonable to query whether that community still represents the TEC if the key indicator species is lacking.

Applying the precautionary principle, it is reasonable to suggest that all native vegetation within the DPaW mapped boundary may represent the TEC. The condition of the DPaW mapped TEC within the project footprint varies from Good to Degraded (Table 10).

Table 10 Condition of the TEC within the project area

Condition category	Area	% of total area
Good	3.33	32
Degraded	3.67	35
Completely degraded	1.92	18
Cleared	1.59	15
TOTAL	**10.51**	**100**

RE: Woodman Point TEC

English, Val <Val.English@DPaW.wa.gov.au>

You forwarded this message on 10/09/2015 1:12 PM.

Sent: Thu 10/09/2015 1:07 PM
To: De Wit, Floora
Cc: Communities Data

Hi Floora

Am just picking up emails for a few hours before heading out again. I have forwarded your email to communities.data@dpaw.wa.gov.au and asked them to provide a boundary of the TEC as mapped by us.

You will need to consider that the boundary may be approximate, and the Callitris can sometimes not be evident following disturbance.

cheers
Val

Plate 1 Threatened Ecological Community photographs within the project area

5.1.3 Condition

The condition of the vegetation within the project area varied from Completely Degraded to Good (Figure 5). Historical disturbance and weed invasion were the most prominent eroding factors causing the decline in condition. Observed disturbance included:

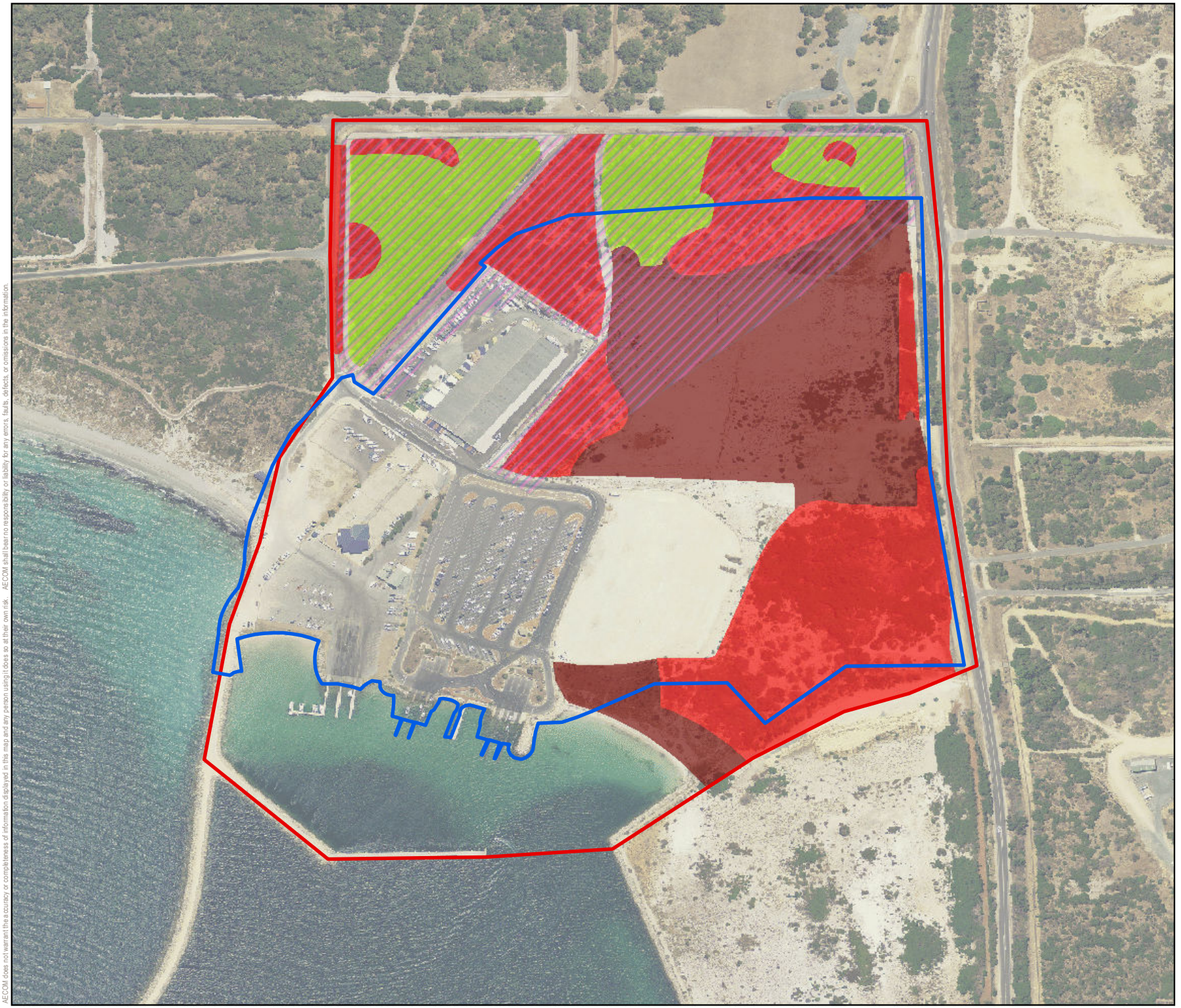
- weeds
- edge effects
- erosion on unstable surfaces and windy conditions
- Declared Pest invasion.

Previous studies found vegetation condition as ranging from Good to Completely Degraded (Worley Parsons, 2014). This was confirmed during the 2013 survey.

Table 11 Vegetation condition within the project area

Condition	Extent (ha)	Percent (%)
Excellent	0	0
Very good	0	0
Good	3.33	18
Degraded	8.22	44
Completely Degraded	6.98	38
Total	**18.53**	**100**

Plate 2 Degraded areas a) invasion of weeds and wind erosion b) tree death, weed invasion and displacement of native vegetation



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DATUM GDA 1994, PROJECTION MGA ZONE XX

0 40 80 160
metres

1:5,000 (when printed at A4)

LEGEND

- Clearence Footprint
- Project Area
- TEC Boundary

Condition

- Very Good
- Good
- Degraded
- Completely Degraded

Data sources:

Base Data: (c) 2015 Landgate Imagery

Woodman Point Boating Precinct Vegetation Condition

PROJECT ID	60340056
CREATED BY	DF
LAST MODIFIED	DF - 08 SEP 2015
VERSION:	1

Map 5

A4 size

Filename: G60340056_Map5_VegetationCondition_20151007_V3_A4

5.2 Flora

5.2.1 Species richness

A total of 34 native flora species were recorded representing 32 genera and 20 families. The species list of the project area is provided in Appendix C.

Several orchids were recorded during the survey however none are considered Threatened or Priority. This indicates that surveys were conducted at the appropriate time of year for orchid identification.

Plate 3 Orchids a) *Pyrorchis* sp. or *Drakea* sp. b) Pink Fairy Orchid (*Caladenia latifolia*)

5.2.2 Introduced species

A total of 19 introduced species were recorded. Of these, one is listed as a Weed of National Significance (WoNS) (Bridal Creeper) and two are listed as Declared Pests (Bridal Creeper and Arum Lily) under the Biosecurity and Agriculture Management Act 2007 (BAM Act). Details of all weeds recorded are shown in Table 12. This includes their family, common name, scientific name, and various weed ratings. The ratings include:

- WoNS: federal list of 32 species. All land owners and managers at all levels are responsible for managing WoNS
- Environment Weed Strategy of WA (EWSWA) rating (DEC, 1999). Weeds that pose a significant threat based on invasiveness, distribution and environmental impacts
    - High – have all three of the characteristics
    - Moderate – have two of the characteristics
    - Mild – have one of the characteristics
    - Low – not deemed to have any of the characteristics.
- BAM Act: explained in Appendix D
- Swan NRM Region Environmental Weed Census (DEC, 2008): rating weeds in the Perth region based on risk of each species in regards to environmental assets in the region. Ratings included:
    - Very High
    - High
    - Further Assessment Required (FAR)/ High
    - Moderate/ High
    - Moderate
    - Low/ Moderate
    - Low
    - Further Assessment required (FAR).

Weeds highlighted in Table 12 below represent the highest risk species within the project area based on the weed ratings and BAM Act classification. There are four species that have a High EWSWA rating and Very High Swan NRM weed census rating.

Plate 4 **Weeds a) Black Berry Nightshade b) Bridal Creeper and c) Arum Lily**

Table 12 **Details of weeds recorded in the project area including the BAM Act classification and Environmental Weed Strategy of Western Australia (EWSWA) rating**

Taxon	Family	Common Name	BAM Act[1]	EWSWA Rating	SWAN[3]
*Arctotheca calendula**	Asteraceae	Cape Weed	C1	Mod	H
*Asparagus asparagoides**	Asparagaceae	Bridal Creeper	C3 / WONS	High	VH
*Avena barbata**	Poaceae	Bearded Oat	C1		VH
*Brassica tournefortii**	Brassicaceae	Mediterranean Turnip	C1	High	H
*Cortaderia selloana**	Poaceae	Pampas Grass	C1	High	VH
*Cuscuta epithymum**	Convolvulaceae	Lesser Dodder	C1		M
*Euphorbia paralias**	Euphorbiaceae	Sea Spurge	C1	Mod	M
*Euphorbia terracina**	Euphorbiaceae	Geraldton Carnation Weed	C1	High	VH
*Freesia alba x leightlinii**	Iridaceae	Freesia	C1	High	VH
*Fumaria capreolata**	Papaveraceae	Whiteflower Fumitory	C1	Mild	M/H
*Lagurus ovatus**	Poaceae	Hare's Tail Grass	C1	High	H
*Leptospermum laevigatum**	Myrtaceae	Coast Teatree	C1	High	VH
*Lysimachia arvensis**	Primulaceae	Pimpernel	C1		FAR
*Oxalis pes-caprae**	Oxalidaceae	Soursob	C1		H
*Pelargonium capitatum**	Geraniaceae	Rose Pelargonium	C1	High	M/H
*Solanum nigrum**	Solanaceae	Black Berry Nightshade	C1		M
*Sonchus oleraceus**	Asteraceae	Common Sowthistle	C1		FAR
*Trachyandra divaricata**	Asphodelaceae		C1	Mild	FAR
*Zantedeschia aethiopica**	Araceae	Arum Lily	C3	High	VH

1. C1 = Permitted, C3 = Prohibited

5.3 Fauna

5.3.1 Threatened, Migratory and Priority fauna species

GHD (2012) survey defined the project area as degraded and modified native vegetation not considered significant habitat for native fauna. There was evidence of some minor fauna activity during field surveys and this included (Worley Parsons 2014):

- Fairy Wren (*Malurus* sp.)
- Willie Wagtail (*Rhipidura leucophrys*)
- Silver Gull (*Chroicocephalus novaehollandiae*)
- European Rabbit (*Oryctolagus cuniculus**)
- Southern Brown Bandicoot/Quenda (*Isoodon obesulus fusciventer*).

Two conservation significant species were recorded during the field survey. The Quenda (Priority 5) was recorded outside of the project area (Direct Sighting) and potential diggings were recorded inside the project area. A Flock of 14 Carnaby's Black Cockatoo (Endangered EPC Act, Schedule 1 WC act) were recorded flying over the project area but not observed landing within it. Details are provided in Table 13 and displayed in Figure 6.

Table 13 Conservation significant fauna recorded within the project area during the September survey

Species	Evidence	Location (Lat; Long)	Photo
Carnaby's Black Cockatoo	Direct Sighting, overhead	-32.137246; 115.763839	
Quenda	Potential conical shaped diggings	-32.134814; 115.762559	
	Direct Sighting	-32.137245; 115.763851	No photo taken

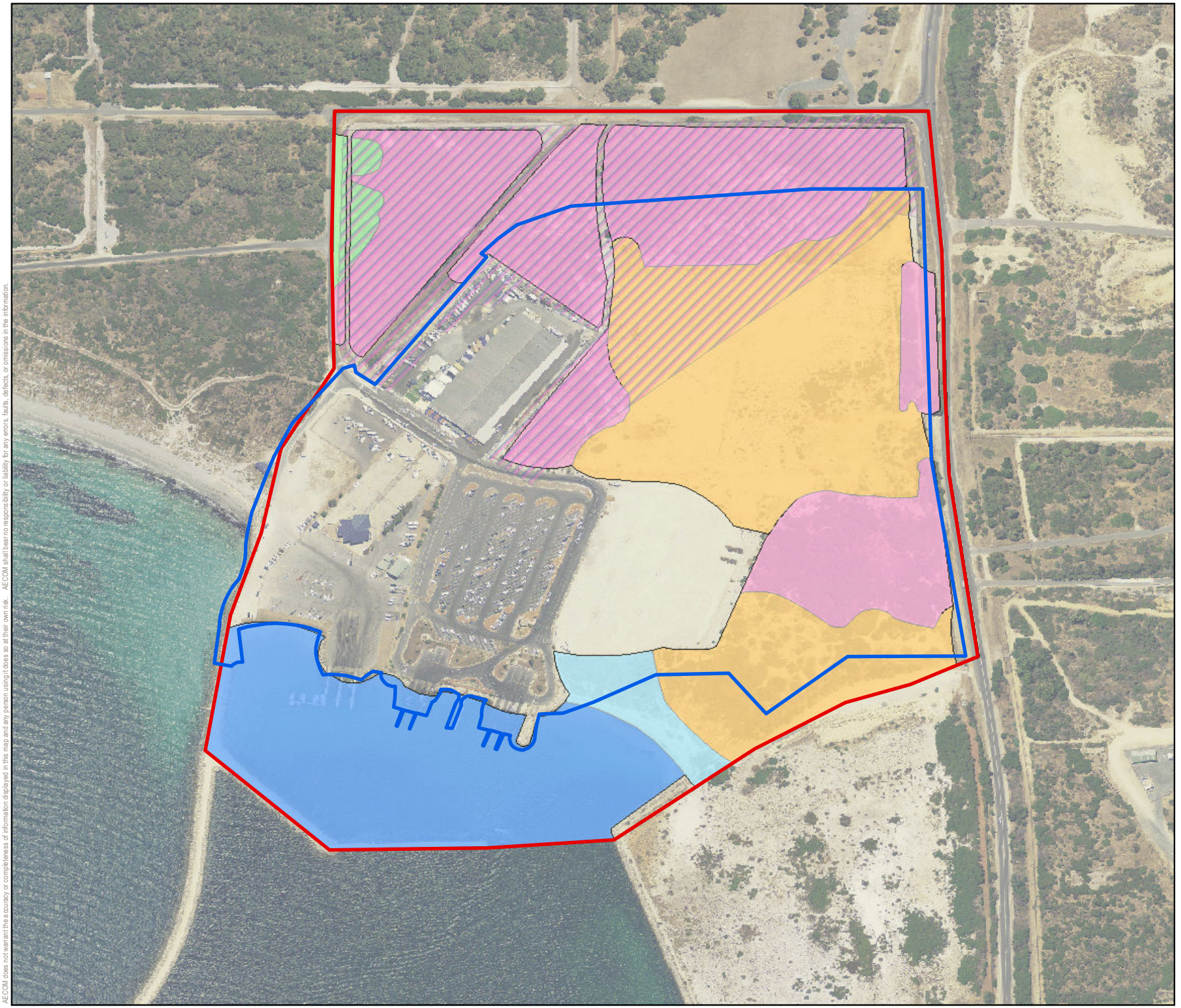
5.3.2 Inventory of fauna species

A total of 23 fauna species were recorded in the project area. This included three introduced species, one EPBC listed Endangered species, and one Priority 5 species. The Carnaby's Black Cockatoo is listed as Threatened under the EPBC Act. One flock of 14 Carnaby's Black Cockatoos was observed flying over the site.

Three introduced species were recorded within the project area during the field survey and all (if feral) are on the Declared Species list (Department of Agriculture and Food, 2013). Dogs and Cats were recorded on sandy tracks within the project area and Rabbits were the most abundant introduced animal with diggings observed throughout the project area in most habitats.

Table 14 Inventory of fauna species recorded in the project area in September 2015

Species	Vernacular	Conservation Status
Acanthiza inornata	Western Thornbill	Native
Cacatua roseicapilla	Galah	Native
Calyptorhynchus latirostris	Carnaby's Black Cockatoo	Endangered
Canis lupus familiaris	Dog	Introduced (Feral dogs are considered Declared Pests s22)
Corvus coronoides	Australian Raven	Native
Cracticus tibicen	Australian Magpie	Native
Cryptoblepharus buchananii	-	Native
Falco cenchroides	Australian Kestrel	Native
Felis catus	Cat	Introduced (Declared Pest s22)
Gerygone fusca	Western Gerygone	Native
Hirundo neoxena	Welcome Swallow	Native
Isoodon obesulus fusciventer	Southern Brown Bandicoot, Quenda	Priority 5
Lichmera indistincta	Brown Honeyeater	Native
Malurus splendens	Splendid Fairy-wren	Native
Menetia greyii	-	Native
Oryctolagus cuniculus	Rabbit	Introduced (Declared Pest s22)
Pachycephala rufiventris	Rufous Whistler	Native
Phalacrocorax varius	Pied Cormorant	Native
Platycercus zonarius	Australian Ringneck (Ring-necked Parrot)	Native
Rhipidura fuliginosa	Grey Fantail	Native
Rhipidura leucophrys	Willie Wagtail	Native
Sterna bergii	Crested Tern	Native
Tiliqua rugosa	Bobtail	Native



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DATUM GDA 1994, PROJECTION MGA ZONE XX

0 40 80 160
metres

1:5,000 (when printed at A4)

LEGEND

- Clearence Footprint
- Project Area
- TEC Boundary

Fauna

- Acacia Woodlands and Shrublands
- Beach/Dune Habitat
- Formerly Cleared Shrubland
- Marine
- Rottnest Island Pine over Sedges
- Cleared

Data sources:

Base Data: (c) 2015 Landgate Imagery

Woodman Point Boating Precinct Fauna

PROJECT ID	60340056
CREATED BY	DF
LAST MODIFIED	DF - 06 OCT 2015
VERSION:	3

Map
6

A4 size

Filename: G60340056_Map6_Fauna_20151006_V3_A4

5.3.3 Habitat

A total of five fauna habitats have been defined (Table 15) and mapped (Figure 6) for the Project area based on the results of the field assessment.

Table 15 Fauna Habitats of the Project area

Habitat and description	Photo
Acacia Woodlands and Shrublands Acacia thickets and some mixed shrubs on undulating to flat sandy terrain. Limited suitable habitat for Black Cockatoos. Extends over 9.24 ha, 24% of total area	
Rottnest Island Pine over Sedges Mixed Pine, Acacia and Melaleuca trees over scattered shrubs over sedges and weedy herbs. Potential suitable habitat for Black Cockatoos. Extends over 0.4 ha, 1% of total area	
Formerly cleared Shrubland Large area of degraded low shrubs and grasses. Extends over 9.04 ha, 23% of total area	

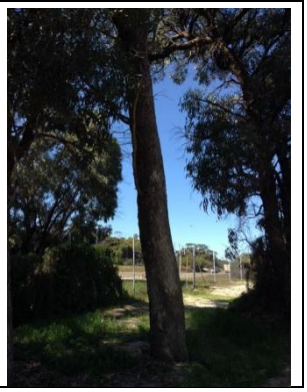
Habitat and description	Photo
Beach/dune habitat Sedges on sand and beach. Extends over 0.76 ha, 2% of total area	
Marine Open ocean water. Extends over 5.67 ha, 15% of total area	

5.3.3.1 Black Cockatoo habitat

Within the project area, three trees within the project area are considered potential breeding habitat trees in accordance with the Commonwealth guidelines (Australian Government, 2012) (Table 16, Figure 6). No trees had hollows for use by Black Cockatoo species.

A total of 9.64 ha of vegetation within the project area may provide some foraging value to Carnaby's Black Cockatoo, mapped in Figure 6. These areas did not have a high diversity of foraging species for Carnaby's Black Cockatoo. Suitable foraging species that were present were observed in low numbers.

Table 16 Black Cockatoo potential breeding habitat trees within the project area

Species	Location	Hollows present	Photo
Tuart (*Eucalyptus gomphocephala*)	-32.133884; 115.764602	No	
	-32.134617; 115.766557	No	
	-32.136292; 115.767516	No	

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6.0 Clearing Principles

An assessment against the ten Clearing Principles was undertaken (Table 17). These principles must be addressed when applying for a Native Vegetation clearing Permit.

Table 17 Assessment against the Ten Clearing Principles

Principle	Principle Description	Assessment	Outcome
A	Native vegetation should not be cleared if it comprises a high level of biological diversity	Vegetation condition of the project area ranged between Good and Completely Degraded, with the majority of the vegetation considered to be Degraded (44%). The low condition rating was attributed to the presence of weeds, historical clearing, and erosion of sandy surfaces due to low vegetation recruitment in bare areas. A total of 53 flora species were recorded, including 34 native species and 19 weeds. The ground cover vegetation stratum was observed to be predominantly weeds. Six vegetation communities were mapped in the project area. Of these, three were dominated by *Acacia rostellifera* which formed thickets and woodlands over weeds. Two communities represent degraded habitats that are characterised by sparse vegetation cover including weeds, a high area of bare ground (and therefore erosion), and limited native species. The project footprint extends over 12.49 ha, of this, 6.5 ha (52%) is Completely Degraded, 5.64 ha (45%) is Degraded and 0.35 ha (3%) is in Good condition. One community, dominated by *Callitris preissii* woodlands, represents the State-listed Threatened Ecological Community SCP30a *Callitris preissii* (and/or *Melaleuca lanceolata*) forests and woodlands. The desktop assessment and available mapping of this TEC by DPaW confirmed the presence of this TEC in the project area. There is some discrepancy between the DPaW mapped boundary and the community boundary recorded during the field survey. The DPaW mapped boundary extends 10.51 ha within the project area, of which 5.07 ha is within the clearing footprint. The DPaW mapped boundary of the TEC within the clearing footprint is mapped as Degraded. The area has limited value and, due to degrading processes, is void of all key indicator species. It could therefore be argued that these areas do not represent the TEC any longer. Given the low species diversity and poor quality of the native vegetation, the proposed clearing is not likely to be at variance with this Principle.	Proposal is not likely to be at variance with this Principle.

Principle	Principle Description	Assessment	Outcome
B	Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia	A total of 23 Threatened, Priority or Migratory fauna species were identified from database searches as potentially occurring within the project area. Of these, seven species are considered likely to occur: - Red-necked Stint (Migratory EPBC Act and Schedule 3 WC Act) - Great Knot (Migratory EPBC Act and Schedule 1 WC Act) - Carnaby's Cockatoo (Endangered EPBC Act and Schedule 1 WC Act) - Rainbow Bee-eater (Migratory EPBC Act and Schedule 3 WC Act) - Grey Plover (Migratory EPBC Act and Schedule 3 WC Act) - Quenda (Priority 5) One Threatened fauna species, the Carnaby's Cockatoo was recorded within the project area. This record consisted of a sighting of a flock of approximately 14 individuals. Three potential breeding habitat trees were recorded within the project area. None of these are proposed to be cleared. Secondary evidence of the Priority 5 Quenda species was recorded in the project area, with a direct sighting recorded outside but in the vicinity of the project area. Taking into account the number of Quenda records in close proximity, it is likely that this species frequents the area. The area proposed to be cleared consists of mostly Degraded vegetation which has limited value for fauna species. Furthermore, similar vegetation in Good to Very Good condition can be found outside the project area within Woodman Point nature reserve. In view of this, the proposed clearing for this project may be at variance with this Principle.	Proposal may be at variance with this Principle.
C	Native vegetation should not be cleared if it includes, or is necessary for the continued existence of rare flora	The desktop assessment identified 6 Threatened and Priority flora species as potentially occurring in the project area. No Threatened or Priority flora species were recorded during the flora and vegetation survey. No previous DPaW records exist within the project area. A species that is observed as absent (non-detection of species) does not necessarily imply that the species is genuinely absent as often they can be present in an area but go undetected due to random chance (MacKenzie, 2005) or being cryptic in nature such as native orchids. However, the lack of historical known records of Threatened or Priority flora in the project area increases the confidence of the field survey results, that is, no conservation significant flora was recorded. The clearing of native vegetation within the proposed footprint is not likely to be at variance with this Principle.	Proposal is not likely to be at variance with this Principle.

Principle	Principle Description	Assessment	Outcome
D	Native vegetation should not be cleared if it comprises whole or a part of, or is necessary for the maintenance of a Threatened Ecological Community	The flora and vegetation assessment recorded the presence of one State-listed Threatened Ecological Community (TEC) in the northwest corner of the project area. The TEC is described as SCP30a *Callitris preissii* (and/or *Melaleuca lanceolata*) forests and woodlands, Swan Coastal Plain' classified as Vulnerable listed by the Minister for Environment. Statistical analysis from the representative community CpLgOp was conducted and liaison with Val English from DPaW confirmed the presence of this TEC. Val English then provided AECOM with the accurate boundary mapping that was undertaken by DPaW previously in the area. DPaW mapping shows this community extending 10.51 ha within the project area. Of this, 5.07 ha is within the project footprint. This boundary extends beyond the community which the biological assessment identified as correlating to the TEC. In this case the precautionary principle has been applied and the DPaW spatial boundary has been accepted as correct. Within the clearing footprint the TEC community is considered 82% Completely Degraded and Degraded with 7% (0.34 ha) of the area considered in Good condition. The area considered in Good condition was not mapped during the biological assessment as representing this TEC. It is therefore likely a poor representation of the TEC. DoT has committed to protect the native vegetation in the northwest corner of the project area. This includes the TEC community as mapped during the biological assessment as community CpLgOp. This community best represents the TEC and is mapped as Good condition. This will ensure the conservation of the community that continues to accurately represent the TEC functions and values. The clearing of native vegetation within the proposed footprint may be at variance with this Principle as 5.07 ha of the DPaW mapped TEC occurs within the clearing footprint, of which 0.34 ha is considered in Good condition.	The proposal may be at variance with this Principle.
E	Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared	*The National Objectives and Targets for Biodiversity Conservation 2001-2005* (Commonwealth of Australia, 2001) recognises that the retention of 30% or more of the pre-clearing extent of each ecological community is necessary if Australia's biodiversity is to be protected. This level is in keeping with the EPA Position Statement No. 2 on *Environmental Protection of Native Vegetation in Western Australia* (EPA, 2000). Beard (1981) mapped the vegetation in the project area as vegetation association 998 and 3048. According to Government of Western Australia (2014) these vegetation associations remains 38.4% and 27.3% respectively. Vegetation association 3048 could be considered extensively cleared. The proposed clearing footprint does not incorporate vegetation association 3048, which is restricted to the west side of the project area. In view of this, the proposal is unlikely to be at variance with this Principle.	The proposal is unlikely to be at variance with this Principle.

Principle	Principle Description	Assessment	Outcome
F	Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland	The project area is not bisected by any surface water features. There are no wetlands or watercourses within or in close proximity to the project area. The proposed clearing footprint will not impact on any surface water features, therefore it is not likely to be at variance with this Principle.	The proposal is unlikely to be at variance with this Principle.
G	Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation	The national Acid Sulphate Soil database indicates an Extremely Low Probability of Occurrence, with a 1-5% chance in small localised areas. This indicates that potential shallow excavation and construction has a low risk of exposing Acid Sulphate Soils. The project footprint is approximately 25.12 ha, of which 12.49 ha is comprised of vegetation in various states of condition. The condition mapping shows that 6.5 ha (52%) is Completely Degraded, 5.64 ha (45%) is Degraded, and 0.35 (3%) is in Good condition. The proposal is unlikely to be at variance with this Principle.	The proposal is unlikely to be at variance with this Principle.
H	Native vegetation should not be cleared if it is likely to have an impact on the environmental values of any adjacent or nearby conservation area	The Woodman Point Regional Park is adjacent to the Woodman Point project area. The entire survey area is within an Environmentally Sensitive Area which is in association with the TEC present within and outside the project area. Furthermore, the project area is located within a Bush Forever Site (341). Bush Forever Site 341 encompasses the Woodman Point Regional Park, this includes the existing Boat Harbour and facilities, Woodman Point Recreation Camp, and several other small buildings. The proposal will require clearing of 12.49 ha of vegetation within the Bush Forever Site. However, due to the degraded condition of vegetation within the project footprint, and the site encompassing a much larger area, the overall impact on Bush Forever is unlikely to be significant. A buffer of native vegetation will remain within the project area between the project footprint and the adjacent native vegetation. This may reduce indirect impacts on environmental values of adjacent conservation areas. The clearing of native vegetation is likely to be at variance with this Principle.	The proposal is likely to be at variance with this Principle.

Principle	Principle Description	Assessment	Outcome
I	Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or ground water	The Preliminary Site Inspection showed that organotins and other potential contamination was below acceptable limits. One higher concentration of organotins was reported adjacent to the harbour likely to be associated with dredging spoil that was used during construction of the harbour facility. This proposal does not include any construction at this location and is therefore unlikely to be an issue. There is a low risk of salinity or exposure to ASS. The lack of water features present within the project area ensures that there will be no risk to surface water in the vicinity. The area to be cleared is relatively low, with the majority of clearing occurring in Completely Degraded to Degraded vegetation (97%). The current erosion and sedimentation processes are therefore unlikely to be significantly altered as a result of the proposal. Clearing of such a relatively small area of native vegetation will not raise the water table. No Public Drinking Water Source Areas exist in the area. The proposal will therefore not cause any deterioration in the quality of groundwater. The clearing of native vegetation is not likely to be at variance with this Principle.	The proposal is unlikely to be at variance with this Principle.
J	Native vegetation should not be cleared if the clearing of the vegetation is likely to cause or exacerbate the incidence or intensity of flooding	DER (2014) states that this should only be considered for large clearing proposals. The amount of native vegetation proposed to be cleared is not expected to cause any exacerbated incidence or intensity of flooding. The construction of boat harbour facilities are designed with appropriate drainage measures to ensure flooding does not occur. The clearing of native vegetation is not likely to be at variance with this Principle.	The proposal is unlikely to be at variance with this Principle.

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7.0 Offsets Strategy

7.1 State Policy and Guidance

The State and Federal Government policies are similar in the respect that an offset is required for residual impacts after the process of avoidance, mitigation and management has been undertaken. The Western Australian Government's *Environmental Offsets Policy September 2011* (Government of Western Australia, 2011) and WA Offsets Guidelines (Government of Western Australia, 2014) seeks to protect and conserve environmental and biodiversity values for present and future generations.

Environmental offsets will only be applied where the residual impacts of a project are determined to be significant, after avoidance, minimisation and rehabilitation have been pursued. The project footprint is approximately 25.12 ha, of which 12.49 ha is comprised of vegetation in various states of condition. The condition mapping shows that 6.5 ha (52%) is Completely Degraded, 5.64 ha (45%) is Degraded, and 0.35 (3%) is in Good condition.

Bush Forever Site 341 encompasses the Woodman Point Regional Park, which includes the existing Boat Harbour and facilities, Woodman Point Recreation Camp, and several other small buildings. The proposal will require clearing of 12.49 ha of vegetation within the Bush Forever Site. However, due to the degraded condition of vegetation within the project footprint, and the site encompassing a much larger area, the overall impact on Bush Forever is unlikely to be significant.

A buffer of native vegetation will remain within the project area between the project footprint and the adjacent native vegetation. This is likely to reduce indirect impacts on environmental values of adjacent conservation areas.

A total of 5.1 ha of DPaW mapped TEC occurs within the proposed footprint. Areas that are within the proposed footprint that have been mapped as a TEC represents Degraded vegetation, some of which has been cleared recently and is considered Completely Degraded. Furthermore, key indicator species such as *Callitris preissii* and *Melaleuca lanceolata* were not recorded in the proposed clearing footprint. It can therefore be suggested that the TEC within the footprint is not an accurate representation of this TEC at this location.

Clearing of vegetation that is degraded or completely degraded, apart from 0.35 ha of vegetation in good condition, could not be considered a significant residual impact. The site, however, is in a Bush Forever Site and the clearing is at variance to Clearing Principle h. According to the Guideline (2014) this indicates an offset is required. It is considered that an offset for the good or better condition vegetation may be recommended.

There are generally three types of environmental offsets – land acquisition, on ground management and research.

Given the small size of the area in good condition (0.35 ha) an offset could be formulated relating to on ground management. This could include:

- Landscaping within the project site consisting of a high proportion of species local to the site.
- Providing good quality fencing along the existing Nature Reserve boundary with silt fencing used during construction to prevent impacts.
- Placing the northern part of the project area into reserve, particularly as this area is significantly larger than the area of good condition to be cleared.
- Undertaking weed control or feral animal management within the nature reserve.

7.1.1 Offset Calculator

The Offset guideline calculator was used to establish whether the above approach would meet the requirements of the offsets policy.

In choosing the areas of TEC to be offset only areas of good or better condition vegetation have been input into the calculator as degraded and completely degraded vegetation does not adequately represent the TEC. The area of impact of good or better condition vegetation is 0.35 ha. The area of equivalent condition, type and quality vegetation selected for the offset has an area of 2.99ha. It has been assumed that good category of vegetation corresponds to 5/10 in the spreadsheet scale and that fencing, weed control and feral animal control can improve the condition to 6/10. It has also been assumed that there is a 30% risk of loss without management actions and a 10% risk of loss even if the management actions are undertaken (Figure 7).

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Offsets Assessment Guide

For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*
2 October 2012

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	TEC
EPBC Act status	Vulnerable
Annual probability of extinction Based on IUCN category definitions	**0.2%**

Key to Cell Colours
User input required
Drop-down list
Calculated output
Not applicable to attribute

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community	Yes		**Area**	0.35	Hectares	
			Quality	**5**	Scale 0-10	
			Total quantum of impact	0.18	Adjusted hectares	
Threatened species habitat						
Area of habitat	No		**Area**			
			Quality			
			Total quantum of impact	0.00		
Protected matter attributes	**Attribute relevant to case?**	**Description**	**Quantum of impact**		**Units**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No					
Condition of habitat Change in habitat condition, but no change in extent	No					
Threatened species						
Birth rate e.g. Change in nest success	No					
Mortality rate e.g Change in number of road kills per year	No					
Number of individuals e.g. Individual plants/animals	No					

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																				
Area of community	Yes	0.18	Adjusted hectares	2.99	**Risk-related time horizon (max. 20 years)**	20	**Start area (hectares)**	2.99	**Risk of loss (%) without offset**	30%	**Risk of loss (%) with offset**	10%	0.60	80%	0.48	0.46	157.60%	Yes		
									Future area without offset (adjusted hectares)	2.1	**Future area with offset (adjusted hectares)**	2.7				0.28				
					Time until ecological benefit	1	**Start quality (scale of 0-10)**	**5**	**Future quality without offset (scale of 0-10)**	**5**	**Future quality with offset (scale of 0-10)**	**6**	1.00		0.00	0.00				
Threatened species habitat																				
Area of habitat	No				**Time over which loss is averted (max. 20 years)**		**Start area (hectares)**		**Risk of loss (%) without offset**		**Risk of loss (%) with offset**									
									Future area without offset (adjusted hectares)	0.0	**Future area with offset (adjusted hectares)**	0.0								
					Time until ecological benefit		**Start quality (scale of 0-10)**		**Future quality without offset (scale of 0-10)**		**Future quality with offset (scale of 0-10)**									
Protected matter attributes	**Attribute relevant to case?**	**Total quantum of impact**	**Units**	**Proposed offset**	**Time horizon (years)**		**Start value**		**Future value without offset**		**Future value with offset**		**Raw gain**	**Confidence in result (%)**	**Adjusted gain**	**Net present value**	**% of impact offset**	**Minimum (90%) direct offset requirement met?**	**Cost ($ total)**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No																			
Condition of habitat Change in habitat condition, but no change in extent	No																			
Threatened species																				
Birth rate e.g. Change in nest success	No																			
Mortality rate e.g Change in number of road kills per year	No																			
Number of individuals e.g. Individual plants/animals	No																			

Summary

Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost ($)		
					Direct offset ($)	Other compensatory measures ($)	Total ($)
Birth rate	0				$0.00		$0.00
Mortality rate	0				$0.00		$0.00
Number of individuals	0				$0.00		$0.00
Number of features	0				$0.00		$0.00
Condition of habitat	0				$0.00		$0.00
Area of habitat	0				$0.00		$0.00
Area of community	0.175	0.28	157.60%	**Yes**	$0.00	N/A	$0.00
					$0.00	**$0.00**	**$0.00**

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8.0 Discussion

The Department of Transport required a level 1 flora and vegetation assessment, level 1 fauna assessment, and targeted searches for conservation significant species within a defined project area at Woodman Point. The field surveys were conducted by a qualified botanist and zoologist on 3 September 2015. The entire project area was traversed on foot and all relevant ecological values were recorded.

8.1 Flora and vegetation

A State-listed Threatened Ecological Community (TEC) was identified as occurring in the local area of Woodman Point. The presence of this TEC was confirmed during the field surveys. The community is easily distinguishable in the area from the presence of *Callitris preissii/Melaleuca lanceolata* forest. Two relevés were completed within the assumed TEC and data was compared to Gibson and Bush Forever datasets to assess their similarities. The high similarity results (64% to 73%) confirm that the TEC is present within the project area. According to DPaW mapping the TEC extends 10.51ha within the project area. Of this, only 3.33 ha is in Good or better condition. Within the clearing footprint the TEC community is considered 82% Completely Degraded and Degraded with 7% (0.34 ha) of the area considered in Good condition.

No Threatened or Priority flora species were recorded in the project area despite conducting targeted searches throughout the native vegetation. None were found previously by Worley Parsons (2013) therefore it is considered unlikely that they occur.

Biodiversity of the project area is low. Only 33 native flora species were recorded. Furthermore, 19 weeds were recorded. Weeds were observed in dense thickets, displacing native vegetation and causing degradation of the ecosystem.

The condition of the vegetation is degraded. Historical clearing has resulted in large bare areas. Wind erosion has further exacerbated this and led to increased edge effects in blocks of native vegetation. Numerous pathways also dissect the native vegetation.

Two Declared Pests, classified as C3 Prohibited under the BAM Act, were recorded at numerous locations within the project area. Furthermore, four species are considered a High risk to environmental assets and are rated as High and Very High under the Environmental Weed Strategy and Swan NRM weed census respectively. Appropriate management will be required to ensure that these weeds do not exacerbate following further development on this site.

8.2 Fauna

The desktop assessment identified seven species of conservation significance that are likely to occur in the area. This includes six birds and one mammal. Of these, two were recorded during the survey, including the Quenda and the Carnaby's Black Cockatoo.

The Carnaby's Black Cockatoo is listed as Threatened under the EPBC Act. A flock was observed flying over but did not stop to utilise the area as foraging habitat.

The Quenda or Southern Brown Bandicoot is a Priority 5 species. This classification is given to fauna that is considered by DPaW as not threatened but is under a specific conservation program. It is found in woodland, heath and shrub communities on the Swan Coastal Plain and prefers a combination of sandy soils and dense heathy vegetation (Van Dyck & Strahan 2008). Key threatening processes for the Quenda include habitat loss and degradation, road trauma and predation by introduced carnivores.

The Rainbow Bee-eater was not recorded during the survey however the species may possibly utilise sandy areas within the project area for breeding. The habitats in the project area provide some potential breeding habitat for this species given the sandy substrate present. The Rainbow Bee-eater is a common and widespread species, however it is protected under the international agreement JAMBA and thus, consideration should be given to mitigating potential impacts on the species.

The Ruddy Turnstone, Red-necked Stint, Great Knot and Grey Plover birds were not recorded during the survey but are likely to utilise the habitat within the project area. These species have been recorded recently in close proximity to the project area. These species are all protected under international agreements.

8.3 Ten clearing principles

An assessment against the ten clearing principles was completed using information from available literature, the Flora and Vegetation Assessment, and the Fauna Assessment. The results showed that the proposal 'may be at variance' to Principle b and is 'likely to be at variance' to Principle d and h.

Principle b refers to the potential for the proposal to clear native vegetation if it comprises part of habitat for fauna indigenous to Western Australia. The Carnaby's Black Cockatoo was observed flying over the project area, and a Priority 5 Quenda was recorded. Due to the degraded condition of the vegetation within the proposed footprint, it is unlikely to have a significant impact on available habitat for this species, however should still be considered.

The project is likely to be at variance to Principle d due to the presence of a TEC within the project area and proposed footprint. There is some variability here as the TEC boundary mapped during the Flora and Vegetation Assessment occupied a very small area in the northeast of the project area, outside the project footprint. However, DPaW have provided boundary mapping for this TEC which shows the TEC to occur within the proposed footprint. The primary cause of discrepancy is the lack of indicator species present within the DPaW mapped TEC boundary, and the low value of the native vegetation due to the degraded condition.

The project is likely to be at variance with Principle h as the project area is located within a Bush Forever Site and an Environmentally Sensitive Area.

8.4 Offsets

Part of the site vegetation has been mapped as falling with-in a DPaW state-listed TEC and may require offsetting. The area of this vegetation that is of good or better condition has been used to determine the size and type of offset that may be required. Calculations using the offset guide in Figure 8 indicate that preserving the area of vegetation, contiguous with the nature reserve, to the north of the project area and undertaking management actions to improve the vegetation condition meets the offset requirements as per the offset guide.

Management actions include:

- Managing the area as a reserve and preventing further development
- Fencing to reduce access and damage
- Weed control to improve vegetation condition
- Feral animal control
- Considering the use of endemic species in landscaping of the masterplan area.

8.5 Bush Forever Impact statement

Consistent with the requirements of State Planning Policy 2.8 *Bushland Policy for the Perth Metropolitan Region* the following conclusions can be made:

9.0 Conclusion

The flora, vegetation and fauna assessments were successfully completed within the Woodman Point project area with no significant limitations affecting the survey. A summary of the results is provided below:

- The flora desktop assessment identified 22 species as potentially occurring within the project area.
- Targeted flora searches were conducted during which no Threatened or Priority flora were recorded
- One Threatened Ecological Community is known to occur in the area. This State-listed TEC is known as FCT30a *Callitris preissii/Melaleuca lanceolata* forests and woodlands and extends over 10.51 ha within the project area and incorporates Cleared, Completely Degraded, Degraded and Good condition vegetation.
- Biodiversity and condition of vegetation within the project area was considered low and degraded due to weed invasion, historic clearing and wind erosion causing soil instability.
- Two C3 prohibited Declared Pests were recorded within the project area and an additional four species are considered a high environmental risk.
- The fauna desktop assessment identified seven species (six birds, one mammal) of conservation significance that were likely to occur in the project area.
- Potential diggings of a Quenda (Priority 5) were recorded in the project area. A sighting of a Quenda outside the project area (in the vicinity) further confirms the likelihood of their presence in the project area.
- A flock of 14 Carnaby Black Cockatoos (listed as Endangered under the EPBC Act) were recorded flying over the project area. They did not land in the project area.

An assessment against the ten clearing principles was conducted and showed that the project may be at variance to principle b and likely to be at variance to principle d and h.

Offsets can be managed by placing the vegetated area to the north of the master plan development area into a reserve and undertaking appropriate management actions.

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Appendix A

Conservation Categories

Appendix A – Conservation Categories

1.1 Western Australia

Plants and animals that are considered threatened and need to be specially protected because they are under identifiable threat of extinction are listed under the *Wildlife Conservation Act* (WC Act). These categories are defined in Table 1. Any species identified as Threatened under the WC Act is assigned a threat category using the International Union for Conservation of Nature (IUCN) Red List categories and criteria.

Species that have not yet been adequately surveyed to warrant being listed under Schedule 1 or 2 are added to the Priority Flora or Fauna Lists under Priority 1, 2 or 3. Species that are adequately known, are rare but not threatened, or meet criteria for Near Threatened, or that have been recently removed from the threatened list for other than taxonomic reasons, are placed in Priority 4 and require regular monitoring. Conservation Dependent species and ecological communities are placed in Priority 5. Categories and definitions of Priority Flora and Fauna species are provided in Table 2.

Table 1 Conservation codes for WA flora and fauna listed under the *Wildlife Conservation Act 1950*

Conservation Code	Category
T	Threatened species – specially protected under the WC Act, listed under Schedule 1 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora (which may also be referred to as Declared Rare Flora). Species* 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. Threatened Fauna and Flora are further recognised by the Department according to their level of threat using IUCN Red List criteria. Critically Endangered: considered to be facing an extremely high risk of extinction in the wild. Endangered: considered to be facing a very high risk of extinction in the wild. Vulnerable: considered to be facing a high risk of extinction in the wild.
X	Presumed extinct species – specially protected under the WC Act, listed under Schedule 2 of the Wildlife Conservation (Specially Protected Fauna) Notice for Presumed Extinct Fauna and Wildlife Conservation (Rare Flora) Notice for Presumed Extinct Flora (which may also be referred to as Declared Rare Flora). Species which have been adequately searched for and there is no reasonable doubt that the last individual has died, and have been gazetted as such.
IA	Migratory birds protected under international agreement – specially protected under the WC Act, listed under Schedule 3 of the Wildlife Conservation (Specially Protected Fauna) Notice. Birds that are subject to an agreement between governments of Australia and Japan, China and The Republic of Korea relating to the protection of migratory birds and birds in danger of extinction.
S	Other specially protected fauna – specially protected under the WC Act, listed under Schedule 4 of the Wildlife Conservation Policy (Specially Protected Fauna) Notice.

Table 2 Conservation codes for WA flora and fauna

P1	Priority One – Poorly Known Species Species 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. Species 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 Species Species 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. Species 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 Species Species 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. Species 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.
P4	Priority Four – Rare, Near Threatened and other species in need of monitoring a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These species are usually represented on conservation lands. b) Near Threatened. Species that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable. c) (c) Species 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 species Species that are not threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years.

1.2 Commonwealth

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is Australia's central piece of environmental legislation which provides for the listing of nationally Threatened native species and ecological communities, native migratory species and marine species.

Threatened fauna and flora may be listed in any one of seven categories as defined in Section 179 of the EPBC Act. These categories are defined in Table 3.

Ecological communities that become threatened and are at risk of extinction are protected under the EPBC Act and are categorised as Critically Endangered, Endangered, or Vulnerable. These are described in Table 4.

Table 3 Categories of Species Listed under Schedule 179 of the *Environment, Protection and Biodiversity Conservation* Act 1999 [Commonwealth]

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

Table 4 Categories of Threatened Ecological Communities listed under the *Environment Protection and Biodiversity Conservation Act 1999*

Conservation Code	Category
CE	Critically Endangered If, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future (indicative timeframe being the next 10 years).
E	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 (indicative timeframe being the next 20 years).
V	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 (indicative timeframe being the next 50 years).

Appendix B

Flora Desktop Results

Appendix B Flora Desktop Results

The desktop results include database searches and a review of each species' habitat to determine their likelihood of occurrence. The summary of the results are provided in Table 1 below. The sources include database searches from the Western Australian Herbarium (WAHerb), Department of Parks and Wildlife (DPaW) records, and the Threatened and Priority Flora Database (TPFL).

Table 1 Priority flora species identified in the desktop assessment

Species	Cons Status	Source	Habitat	Likelihood of Occurrence
Dodonaea hackettiana	P4	TPFL, WAHerb, DPaW	Sand. Outcropping limestone Plain. Reserve. Lake upland. Beeliar Regional Park. Grey dry sand. Recorded in 1980, 1981, 1987 and 2005 with records <5km.	Likely
Grevillea olivacea	P4	WAHerb	Recorded in 1993 <5km away coastal.	Likely
Austrostipa mundula	P2	WAHerb	In sand over limestone. Recorded in 1967 approx. 5.5km away.	May
Hibbertia spicata subsp. *leptotheca*	P3	WAHerb	Recorded more than 5km away, coastal in land currently cleared.	May
Lepidium puberulum	P4	WAHerb	Fl. white-green, Jul to Aug or Oct to Nov. Sandy soils. Recorded in 2002 and 2006. Records are >5km in the ocean.	May
Pimelea calcicola	P3	WAHerb, DPaW	Sand. Coastal limestone ridges. Low rises. Grey sand, calcareous/limestone. Low heath. Recorded in 1983, 1997, 1999 approx. 5km and further north close to the coast.	May
Acacia lasiocarpa var. *bracteolata* long peduncle variant (G.J. Keighery 5026)	P1	WAHerb, DPaW	Grey or black sand over clay. Swampy areas, winter wet lowlands. Recorded in 1957 approx. 7km away.	Unlikely
Byblis gigantea	P3	DPaW	Fl. pink-purple/white, Sep to Dec or Jan. Sandy-peat swamps. Seasonally wet areas.	Unlikely
Caladenia huegelii	WA: CR EPBC: EN	TPFL, WAHerb	Grey or brown sand, clay loam. Recorded in 2014 more than 5km inland.	Unlikely
Chorizema varium	WA: EN EPBC: EN	DPaW	Sand. Coastal limestone hills & outcrops. No location data.	Unlikely
Cyathochaeta teretifolia	P3	WAHerb	Recorded in 1995 more than 5km inland.	Unlikely
Dampiera triloba	P3	WAHerb	Recorded in 1999 and 2010 more than 5km inland.	Unlikely

Species	Cons Status	Source	Habitat	Likelihood of Occurrence
Diuris micrantha	WA: VU EPBC VU	WAHerb, DPaW	Winter-wet swamps, in shallow water. Swamp. Black peaty soil. Miscellaneous rushes. Confined to one small swampy flat south of Perth. It has been found nowhere else. Recorded in 1985 more than 5km inland.	Unlikely
Jacksonia gracillima	P3	WAHerb	Recorded in 1994 more than 5km inland.	Unlikely
Jacksonia sericea	P4	WAHerb	Loam or sand on granite, peaty sand. Swampy depressions, hillslopes. Recorded in 1902 more htan 5km away in land currently cleared.	Unlikely
Microtis quadrata	P4	WAHerb, DPaW	No habitat information on Florabase. Recorded in 1960 more than 5km inland.	Unlikely
Phlebocarya pilosissima subsp. *pilosissima*	P3	WAHerb	White or grey sand, lateritic gravel. Recorded in 1978 more than 5km inland.	Unlikely
Platychorda rivalis	P1	DPaW	Edges of swamps, valleys. No location data, none found coastal.	Unlikely
Stylidium ireneae	P4	DPaW	Sandy loam. Valleys near creek lines, woodland, often with *Agonis*.	Unlikely
Stylidium longitubum	P3	WAHerb, DPaW	Recorded in 1973 approx. 5km inland. Associated with freshwater not coastal.	Unlikely
Stylidium paludicola	P3	WAHerb, DPaW	Recorded in 1974 approx. 4.5km inland. Associated with freshwater not coastal.	Unlikely
Thelymitra variegata	P3	WAHerb	Sandy clay, sand, laterite. Occurs sporadically along coastal plain from eneabba to east of Esperance. Found in open sandy clearings amongst scattered shrubs. Recorded in 1959 associated with freshwater approx. 4.5km inland.	Unlikely

Appendix C

Species by Community Matrix

Appendix C: Species by Community Matrix, Woodman Point, 2015

Species not recorded in a quadrat were recorded opportunistically

Family	Taxon * denotes weed species	CpLgOp	ArAp	ArAa	ArLlAb	LlSp
?Goodeniaceae						
	?					1
Araceae						
	*Zantedeschia aethiopica**					
Asparagaceae						
	Acanthocarpus preissii	x	x	x	x	
	*Asparagus asparagoides**			x		
	Lomandra sonderi	x	x	x	x	
Asphodelaceae						
	*Trachyandra divaricata**			x	x	x
Asteraceae						
	*Arctotheca calendula**					x
	*Sonchus oleraceus**	x	x	x	x	x
Brassicaceae						
	*Brassica tournefortii**		x			
Chenopodiaceae						
	Rhagodia baccata			x		
Convolvulaceae						
	*Cuscuta epithymum**					
Cupressaceae						
	Callitris preissii	x			x	
Cyperaceae						
	Cyathochaeta avenacea				x	x
	Ficinia nodosa	x				
	Lepidosperma gladiatum	x	x	x	x	x
Ericaceae						
	Leucopogon propinquus					
Euphorbiaceae						
	*Euphorbia paralias**	x		x	x	x
	*Euphorbia terracina**	x	x	x	x	x
Fabaceae						
	Acacia ligustrina					
	Acacia rostellifera	x	x	x	x	x
	Acacia saligna				x	x
	Hardenbergia comptoniana	x	x	x	x	x
Geraniaceae						
	*Pelargonium capitatum**			x	x	x
Goodeniaceae						
	Scaevola crassifolia					x
	Scaevola repens var. *repens*					x
Haemodoraceae			x			
	Conostylis candicans		x			
Hemerocallidaceae						
	Dianella revoluta					
Iridaceae						
	*Freesia alba x leightlinii**					
Juncaceae						x
	Juncus pallidus					x
Lamiaceae						
	Hemiandra pungens				x	
Lauraceae			x	x		
	Cassytha ?racemosa		x	x		
Myrtaceae						
	Eucalyptus gomphocephala			x		
	*Leptospermum laevigatum**				x	x
	Melaleuca lanceolata	x				
	Melaleuca parviceps	x				
	Melaleuca systena		x	x		x
Orchidaceae						
	Caladenia latifolia	x				
	Orchid 1	x				

Oxalidaceae					
*Oxalis pes-caprae**	x	x		x	
Papaveraceae					
*Fumaria capreolata**	x			x	
Phyllanthaceae					
Phyllanthus calycinus	x				
Poaceae					
Ammophila arenaria subsp. *arenaria*					
Austrostipa sp.				x	
Austrostipa flavescens	x				
*Avena barbata**					x
*Cortaderia selloana**	x		x	x	x
*Lagurus ovatus**					x
Spinifex longifolius	x	x	x	x	5
Primulaceae					
*Lysimachia arvensis**	x	x	x		
Proteaceae					
Hakea prostrata					
Ranunculaceae					
Clematis linearifolia	x			x	
Rhamnaceae					
Spyridium globulosum	x	x	x	x	
Santalaceae					
Santalum acuminatum		x			
Solanaceae					
*Solanum nigrum**				x	

Appendix D

Declared Pests

Appendix D Declared Pests

1.1 The BAM Act

Biosecurity is the management of the risk of animal and plant pests and diseases entering, emerging, establishing or spreading in WA to protect the economy, environment and community. Biosecurity is managed under the *Biosecurity and Agriculture Management Act 2007* (BAM Act) which came into effect 1 May 2013. Exotic animals and plants can become an invasive species if they can establish in new areas where local conditions are favourable for their growth. They usually invade as a result of human activities both accidental and deliberate. These invasive species can often have a damaging impact on the natural environment and agriculture, and therefore requires careful management. The Department of Agriculture and Food, Western Australia (DAFWA) has developed an Invasive Species Program which provides the strategic and operational management of serious weeds and pest animals.

The Minister for Agriculture and Food can declare invasive exotic plants and animals as pests under the BAM Act. These species are listed on the Western Australian Organism List (WAOL) and classified in four categories:

- declared pests
- permitted
- prohibited
- permitted requiring a permit.

The Minister can declare an organism as a declared pest if there are reasonable grounds for believing that the organism:

a) has or may have an adverse effect on
    a. another organism in the area
    b. human beings in the area
    c. the environment or part of the environment in an area
    d. agricultural activities, fishing or pearling activities, or related commercial activities carried on or intended to be carried on in the area.

b) May have an adverse effect on any of those things if it were present in the area, or if it were present in the area in greater numbers or to a greater extent.

Under the BAM Act declared pests are placed in one of three categories, as explained in Table 1. Many of the declared pest plant species are also on the list of Weeds of National Significance. This list was compiled to prioritise future management and allocation of resources for weed control. Species were selected based on their invasiveness and impact characteristics, potential and current area of spread and their environmental, industrial or socioeconomic impacts.

Under the BAM Act, local government authorities can prescribe any plant, other than a declared plant, to be a pest plant. Local law can be used to assist in pest plant management by enforcing that the owner or occupier of the land can be held financially responsible for the management of any pest plant.

Department of Parks and Wildlife (DPaW) recognise weeds as one of the most significant threats to biodiversity as they outcompete native species for resources, reduce natural diversity by smothering native plants, displace and replace native plants, and alter fire regimes. DPaW have prioritised their focus on infestations of species considered to be high impact, rapidly invasive and still at a population size that can feasibly be eradicated or contained to a manageable size. DPaW's rankings are provided to help landholders, community groups and private enterprises manage weeds that may impact on the natural environment. Weed species are listed according to the region they occur in and are ranked as very high, high, medium, low, negligible, or further assessment required. Furthermore, an example of management actions that may be appropriate for a species of that ranking is provided (DPaW, 2013).

Table 1 Declared Pest categories under the BAM Act

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

Appendix E

EPBC Protected Matters Database Search Results

Australian Government

Department of the Environment

EPBC Act Protected Matters Report

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

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

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

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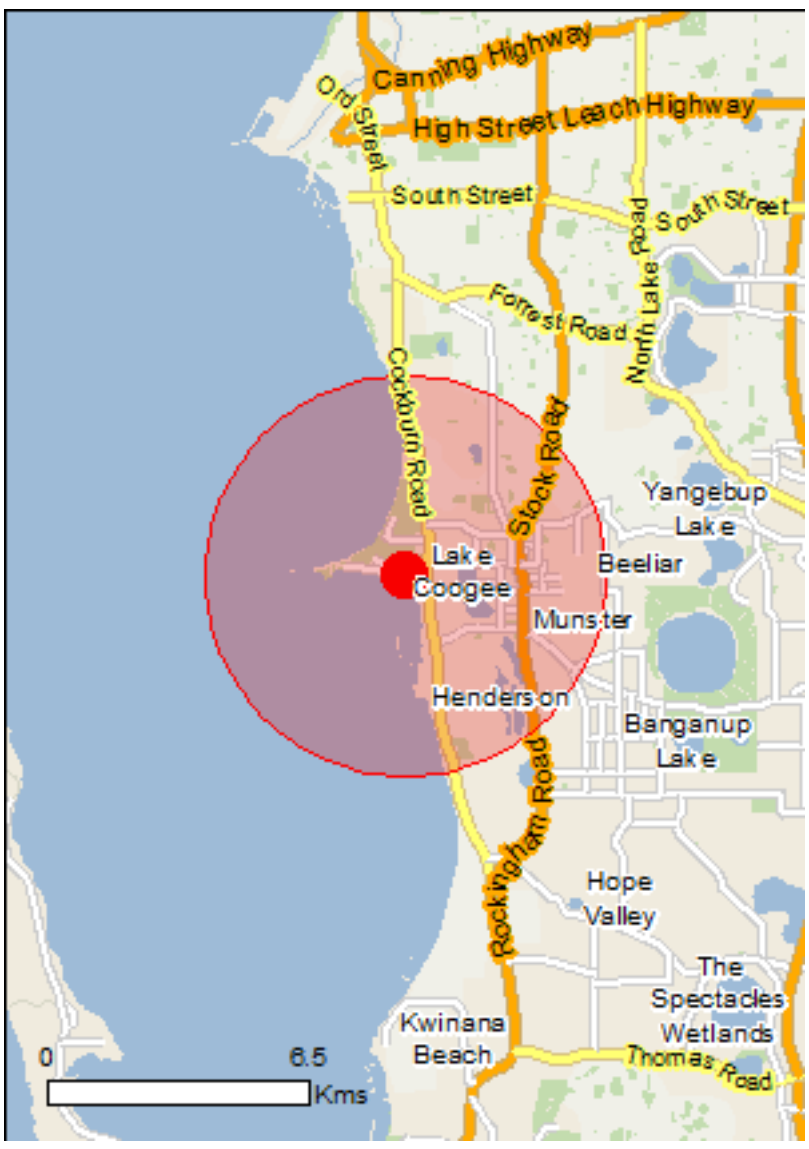
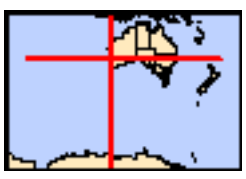


This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

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.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	1
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	42
Listed Migratory Species:	52

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Land:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	79
Whales and Other Cetaceans:	13
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

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

State and Territory Reserves:	4
Regional Forest Agreements:	None
Invasive Species:	42
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar)	[Resource Information]
Name	Proximity
Forrestdale & thomsons lakes	Within 10km of Ramsar

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Anous tenuirostris melanops		
Australian Lesser Noddy [26000]	Vulnerable	Species or species habitat may occur within area
Botaurus poiciloptilus		
Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calyptorhynchus banksii naso		
Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat may occur within area
Calyptorhynchus latirostris		
Carnaby's Black-Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Species or species habitat likely to occur within area
Diomedea epomophora epomophora		
Southern Royal Albatross [25996]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora sanfordi		
Northern Royal Albatross [82331]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans amsterdamensis		
Amsterdam Albatross [82330]	Endangered	Species or species habitat may occur within area
Diomedea exulans exulans		
Tristan Albatross [82337]	Endangered	Species or species habitat may occur within area
Diomedea exulans (sensu lato)		
Wandering Albatross [1073]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Halobaena caerulea		
Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
Leipoa ocellata		
Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Macronectes giganteus Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Species or species habitat may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Thalassarche cauta cauta Shy Albatross, Tasmanian Shy Albatross [82345]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche cauta steadi White-capped Albatross [82344]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris impavida Campbell Albatross [82449]	Vulnerable	Species or species habitat may occur within area
Mammals		
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat likely to occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Breeding known to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Congregation or aggregation known to occur within area
Neophoca cinerea Australian Sea-lion [22]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Pseudocheirus occidentalis Western Ringtail Possum, Ngwayir [25911]	Vulnerable	Species or species habitat likely to occur within area
Setonix brachyurus Quokka [229]	Vulnerable	Species or species habitat may occur within area
Plants		
Caladenia huegelii King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid [7309]	Endangered	Species or species habitat may occur within area

Name	Status	Type of Presence
[Centrolepis caespitosa](#) [6393]	Endangered	Species or species habitat likely to occur within area
[Diuris micrantha](#) Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat known to occur within area
[Diuris purdiei](#) Purdie's Donkey-orchid [12950]	Endangered	Species or species habitat may occur within area
[Drakaea elastica](#) Glossy-leafed Hammer-orchid, Praying Virgin [16753]	Endangered	Species or species habitat likely to occur within area
[Drakaea micrantha](#) Dwarf Hammer-orchid [56755]	Vulnerable	Species or species habitat may occur within area
Reptiles		
[Caretta caretta](#) Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
[Chelonia mydas](#) Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
[Dermochelys coriacea](#) Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
[Natator depressus](#) Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Sharks		
[Carcharias taurus (west coast population)](#) Grey Nurse Shark (west coast population) [68752]	Vulnerable	Species or species habitat known to occur within area
[Carcharodon carcharias](#) Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
[Rhincodon typus](#) Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species [Resource Information]

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

Name	Threatened	Type of Presence
Migratory Marine Birds		
[Apus pacificus](#) Fork-tailed Swift [678]		Species or species habitat likely to occur within area
[Diomedea amsterdamensis](#) Amsterdam Albatross [64405]	Endangered*	Species or species habitat may occur within area
[Diomedea dabbenena](#) Tristan Albatross [66471]	Endangered*	Species or species habitat may occur within area
[Diomedea epomophora (sensu stricto)](#) Southern Royal Albatross [1072]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area

Name	Threatened	Type of Presence
Diomedea exulans (sensu lato)		
Wandering Albatross [1073]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi		
Northern Royal Albatross [64456]	Endangered*	Foraging, feeding or related behaviour likely to occur within area
Macronectes giganteus		
Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli		
Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Puffinus carneipes		
Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Species or species habitat likely to occur within area
Sterna anaethetus		
Bridled Tern [814]		Foraging, feeding or related behaviour likely to occur within area
Sterna caspia		
Caspian Tern [59467]		Foraging, feeding or related behaviour known to occur within area
Sterna dougallii		
Roseate Tern [817]		Foraging, feeding or related behaviour likely to occur within area
Thalassarche carteri		
Indian Yellow-nosed Albatross [64464]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Thalassarche cauta (sensu stricto)		
Shy Albatross, Tasmanian Shy Albatross [64697]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida		
Campbell Albatross [64459]	Vulnerable*	Species or species habitat may occur within area
Thalassarche melanophris		
Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi		
White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to 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 likely to occur within area
Caperea marginata		
Pygmy Right Whale [39]		Species or species habitat may occur within area
Carcharodon carcharias		
Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Caretta caretta		
Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area

Name	Threatened	Type of Presence
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Breeding known to occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat may occur within area
Manta birostris Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Congregation or aggregation known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known 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
Migratory Terrestrial Species		
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Ardea alba Great Egret, White Egret [59541]		Breeding known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Arenaria interpres Ruddy Turnstone [872]		Species or species habitat known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris alba Sanderling [875]		Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]		Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris ruficollis Red-necked Stint [860]		Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]		Species or species habitat known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]		Species or species habitat known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]		Species or species habitat known to occur within area
Heteroscelus brevipes Grey-tailed Tattler [59311]		Species or species habitat known to occur within area
Limicola falcinellus Broad-billed Sandpiper [842]		Species or species habitat known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Numenius phaeopus Whimbrel [849]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Pluvialis squatarola Grey Plover [865]		Species or species habitat known to occur within area
Xenus cinereus Terek Sandpiper [59300]		Species or species habitat known to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

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

Name
Commonwealth Land -

Listed Marine Species [Resource Information]

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

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Anous tenuirostris melanops Australian Lesser Noddy [26000]	Vulnerable	Species or species

Name	Threatened	Type of Presence
		habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Breeding known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Arenaria interpres Ruddy Turnstone [872]		Species or species habitat known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris alba Sanderling [875]		Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]		Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris ruficollis Red-necked Stint [860]		Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]		Species or species habitat known to occur within area
Catharacta skua Great Skua [59472]		Species or species habitat may occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]		Species or species habitat known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]		Species or species habitat known to occur within area
Charadrius ruficapillus Red-capped Plover [881]		Species or species habitat known to occur within area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered*	Species or species habitat may occur within area
Diomedea dabbenena Tristan Albatross [66471]	Endangered*	Species or species habitat may occur within area
Diomedea epomophora (sensu stricto) Southern Royal Albatross [1072]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans (sensu lato) Wandering Albatross [1073]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area

Name	Threatened	Type of Presence
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered*	Foraging, feeding or related behaviour likely to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
Heteroscelus brevipes Grey-tailed Tattler [59311]		Species or species habitat known to occur within area
Larus pacificus Pacific Gull [811]		Foraging, feeding or related behaviour may occur within area
Limicola falcinellus Broad-billed Sandpiper [842]		Species or species habitat known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Macronectes giganteus Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Numenius phaeopus Whimbrel [849]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Pluvialis squatarola Grey Plover [865]		Species or species habitat known to occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Species or species habitat may occur within area
Puffinus assimilis Little Shearwater [59363]		Foraging, feeding or related behaviour known to occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Species or species habitat likely to occur within area
Recurvirostra novaehollandiae Red-necked Avocet [871]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area

Name	Threatened	Type of Presence
Sterna anaethetus		
Bridled Tern [814]		Foraging, feeding or related behaviour likely to occur within area
Sterna caspia		
Caspian Tern [59467]		Foraging, feeding or related behaviour known to occur within area
Sterna dougallii		
Roseate Tern [817]		Foraging, feeding or related behaviour likely to occur within area
Thalassarche carteri		
Indian Yellow-nosed Albatross [64464]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Thalassarche cauta (sensu stricto)		
Shy Albatross, Tasmanian Shy Albatross [64697]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida		
Campbell Albatross [64459]	Vulnerable*	Species or species habitat may occur within area
Thalassarche melanophris		
Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi		
White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thinornis rubricollis		
Hooded Plover [59510]		Species or species habitat known to occur within area
Xenus cinereus		
Terek Sandpiper [59300]		Species or species habitat known to occur within area
Fish		
Acentronura australe		
Southern Pygmy Pipehorse [66185]		Species or species habitat may occur within area
Campichthys galei		
Gale's Pipefish [66191]		Species or species habitat may occur within area
Heraldia nocturna		
Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		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 breviceps		
Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area
Hippocampus subelongatus		
West Australian Seahorse [66722]		Species or species habitat may occur within area
Histiogamphelus cristatus		
Rhino Pipefish, Macleay's Crested Pipefish, Ring-back Pipefish [66243]		Species or species habitat may occur within area
Lissocampus caudalis		
Australian Smooth Pipefish, Smooth Pipefish [66249]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Lissocampus fatiloquus Prophet's Pipefish [66250]		Species or species habitat may occur within area
Lissocampus runa Javelin Pipefish [66251]		Species or species habitat may occur within area
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area
Mitotichthys meraculus Western Crested Pipefish [66259]		Species or species habitat may occur within area
Nannocampus subosseus Bonyhead Pipefish, Bony-headed Pipefish [66264]		Species or species habitat may occur within area
Phycodurus eques Leafy Seadragon [66267]		Species or species habitat may occur within area
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area
Pugnaso curtirostris Pugnose Pipefish, Pug-nosed Pipefish [66269]		Species or species habitat may occur within area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
Stigmatopora argus Spotted Pipefish, Gulf Pipefish [66276]		Species or species habitat may occur within area
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area
Stigmatopora olivacea a pipefish [74966]		Species or species habitat may occur within area
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area
Vanacampus phillipi Port Phillip Pipefish [66284]		Species or species habitat may occur within area
Vanacampus poecilolaemus Longsnout Pipefish, Australian Long-snout Pipefish, Long-snouted Pipefish [66285]		Species or species habitat may occur within area
Mammals		
Arctocephalus forsteri Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within area
Neophoca cinerea Australian Sea-lion [22]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area

Name	Threatened	Type of Presence
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Disteira kingii Spectacled Seasnake [1123]		Species or species habitat may occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area

Whales and other Cetaceans		[Resource Information]
Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Caperea marginata Pygmy Right Whale [39]		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	Breeding known to occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		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
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

Name	Status	Type of Presence
[Tursiops truncatus s. str.](#) Bottlenose Dolphin [68417]		Species or species habitat may occur within area

Extra Information

State and Territory Reserves [Resource Information]

Name	State
Unnamed WA39584	WA
Unnamed WA39752	WA
Unnamed WA42469	WA
Unnamed WA49220	WA

Invasive Species [Resource Information]

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

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		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
Funambulus pennantii Northern Palm Squirrel, Five-striped Palm Squirrel [129]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus aethiopicus Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425]		Species or species habitat likely to occur within area
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Asparagus plumosus Climbing Asparagus-fern [48993]		Species or species habitat likely to occur within area
Brachiaria mutica Para Grass [5879]		Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur

Name	Status	Type of Presence within area
Genista linifolia Flax-leaved Broom, Mediterranean Broom, Flax Broom [2800]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Olea europaea Olive, Common Olive [9160]		Species or species habitat may occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Protasparagus densiflorus Asparagus Fern, Plume Asparagus [5015]		Species or species habitat likely to occur within area
Protasparagus plumosus Climbing Asparagus-fern, Ferny Asparagus [11747]		Species or species habitat likely to occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Tamarix aphylla Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018]		Species or species habitat likely to occur within area
Reptiles		
Hemidactylus frenatus Asian House Gecko [1708]		Species or species habitat likely to occur within area

Caveat

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

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

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

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

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

-32.13578 115.76296

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
-Geoscience Australia
-CSIRO
-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 F

Fauna Desktop

Appendix F Desktop Fauna

Ten Albatross were excluded from analysis based on scarcity of records and lack of reliance on habitat within the Project Area. Details of the desktop assessment based on database searches and literature are provided in Table 1.

Table 1 Desktop fauna results

Taxon	Cons. Status	Description and Habitat	Likelihood of Occurrence
Birds			
Common Sandpiper *Actitis hypoleucos*	Migratory & Marine (Bonn, CAMBA, JAMBA, ROKAMBA) ; Schedule 3	The Common Sandpiper is widespread throughout Australia, with few important sites on the continent. They visit Australia during the non-breeding season. Preferred habitat is coastal wetlands with muddy margins or rocky shores (DotE, 2015).	A total of 16 records within 5 km of the Project Area. Last recorded in 2002. **May occur.**
Australian Lesser Noddy *Anous tenuirostris melanops*	Vulnerable ; Schedule 1	The Australian Lesser Noddy is a small Noddy, standing at approximately 34 cm and a wingspan of 60 cm (Pizzey & Knight, 2007). This species breeds on the Abrolhos Islands and is sedentary however sometimes beach washed south to Cape Naturaliste (Pizzey & Knight, 2007, Johnstone & Storr, 1998). Individuals recorded on the mainland have typically been dying or dead after washing up from large storms (Johnstone & Storr, 1998).	No records within 5 km of the Project Area. **Unlikely to occur**.
Great Egret *Ardea alba/modesta*	Migratory & Marine (CAMBA, JAMBA) ; Schedule 3	The Great Egret occupies a wide variety of wet habitats including freshwater wetlands, dams, flooded pastures, estuarine mudflats, mangroves and reefs (Morcombe, 2003). The species is also known to visit shallows of rivers, sewage ponds and irrigation areas (Pizzey & Knight, 2007).	A total of 6 records within 5 km of the Project Area. Last recorded in 2006. **May occur**.
Cattle Egret *Ardea ibis*	Migratory & Marine (JAMBA) ; Schedule 3	The Cattle Egret is a small egret weighing only 390g and standing 70cm tall. The heaviest distribution of this species in WA is in the north east, and into the Northern Territory. In the non-breeding season, it can be found throughout most of Australia (DotE, 2015).	No records within 5 km of the Project Area. **Unlikely to occur**.

Taxon	Cons. Status	Description and Habitat	Likelihood of Occurrence
Ruddy Turnstone *Arenaria interpres*	Migratory & Marine (Bonn, CAMBA, JAMBA, ROKAMBA) ; Schedule 3	The Ruddy Turnstone is a stocky, medium build wader with a short wedge shaped bill, orange-red legs and black or dark-brown chest. It is widespread throughout Australia during its non-breeding season. It prefers rocky shores or beaches with rotting seaweed. It breeds in the Northern Hemisphere, but there are several Australian site of international importance in the north of Western Australia and is widespread across the continent during the non-breeding season (DotE, 2015).	A total of 90 records within 5 km of the Project Area. Last recorded in 2013. **Likely to occur**.
Fork-tailed Swift *Apus pacificus*	Migratory & Marine (CAMBA, JAMBA ROKAMBA) ; Schedule 3	The Fork-tailed Swift is almost exclusively aerial, and a non-breeding visitor to Australia (DotE, 2015). They are rarely seen roosting on land.	No records within 5 km of the Project Area. **Unlikely to occur**.
Australasian Bittern *Botaurus poiciloptilus*	Endangered ; Schedule 1	The Australasian Bittern is a large thick-necked bird, growing to a length of 66 to 76 cm. upper parts are brown and black and mottled to aid in camouflage. In Western Australia the species was formerly widespread in the south-west however is now thought to only occur on the western coastal plain, southern coastal region and inland to some wetlands in the Jarrah forests (DotE, 2015).	No records within 5 km of the Project Area. **Unlikely to occur**.
Sharp-tailed Sandpiper *Calidris acuminata*	Migratory & Marine (Bonn, CAMBA, JAMBA, ROKAMBA) ; Schedule 3	The Sharp-tailed Sandpiper is a small to medium sized wader with a length of 17 to 22 cm and weighing 65g. They are widespread in Western Australia from the Pilbara region to the south-west.	No records within 5 km of the Project Area. **Unlikely to occur**.
Sanderling *Calidris alba*	Migratory & Marine (Bonn, CAMBA, JAMBA, ROKAMBA) ; Schedule 3	A small pale wader, reaching 20cm long that breeds in the Northern Hemisphere. This species is almost always found on the coast where they forage in the wave-wash zone and in rotting seaweed (DotE, 2015). This species occurs from the coast near Eyre to Derby, however is more common on the southern and south-west coasts (DotE, 2015).	A total of 25 records within 5 km of the Project Area. Last recorded in 2008. **May occur**.
Red Knot *Calidris canutus*	Marine, Migratory (EPBC), CAMBA, JAMBA, ROKAMBA ; Schedule 3	The Red Knot is a widely distributed marine and migratory species. It is common In the north-west of Western Australia with populations in the tens of thousands recorded at 80-mile Beach, not far from the study area (Bamford et al. 2008). The species mainly inhabits intertidal mudflats, sand flats, in estuaries, bays and lagoons. They are occasionally seen on inland salt lakes and wetlands but hardly every use freshwater swamps.	A total of 3 records within 5 km of the Project Area. Last recorded in 2011. **May occur**.

Taxon	Cons. Status	Description and Habitat	Likelihood of Occurrence
Curlew Sandpiper *Calidris ferruginea*	Migratory & Marine (Bonn, CAMBA, JAMBA, ROKAMBA) ; **Schedule 1**	The Curlew Sandpiper is a small, slim bird weighing 57 g. In Australia, Curlew Sandpipers occur around the coasts and are also quite widespread inland, though in smaller numbers. In Western Australia, they are widespread around coastal and sub coastal plains from Cape Arid to the south-west Kimberley.	A total of 3 records within 5 km of the Project Area. Last recorded in 2001. **Unlikely to occur**.
Red-necked Stint *Calidris ruficollis*	Migratory & Marine (Bonn, CAMBA, JAMBA, ROKAMBA) ; Schedule 3	The Red-necked Stint is the smallest wader in Australia and is distributed along most of the Australian coastline, with the greatest densities in Victoria and Tasmania. The nearest internationally important site for the species is the Alfred Cove Nature Reserve on the Swan River (DotE, 2015).	A total of 42 records within 5 km of the Project Area. Last recorded in 2012. **Likely to occur**.
Great Knot *Calidris tenuirostris*	Migratory & Marine (Bonn, CAMBA, JAMBA, ROKAMBA); Schedule 1	The Great Knot has been recorded around the Australian coast. The greatest concentrations are in the north of the continent. In WA, this species is much less common in the south west but has large populations in the north of the state (DotE, 2015).	A total of 31 records within 5 km of the Project Area. Last recorded in 2012. **Likely to occur**.
Forest Red-tailed Black-Cockatoo, *Calyptorhynchus banksii naso*	Vulnerable ; Schedule 1	Requires tree hollows to nest and breed, occurs in forests of Karri (*E. diversicolor*), Jarrah (*E. marginata*) and Marri (*Corymbia calophylla*), with flocks moving out onto the Swan Coastal Plain in search of food from exotic trees such as White Cedar (Johnstone et al, 2010). Foraging habitat for the species consists of Jarrah and Marri woodlands and forest throughout its range. Has become more common in the Metropolitan area in the past few years.	No records within 5 km of the Project Area. **Unlikely to occur**.
Carnaby's Cockatoo *Calyptorhynchus latirostris*	Endangered ; Schedule 1	Carnaby's Cockatoo is a postnuptial nomad and typically moves west soon after breeding. The species nests in hollows of smooth-barked eucalypts, particularly Salmon Gum (*Eucalyptus salmonophloia)* and Wandoo (*E. Wandoo)* but is not limited to these eucalypts. Diet consists of an array of Proteaceous and Eucalypt species prevalent on the Swan Coastal Plain. Foraging habitat, including *banksia* woodlands, is considered to be habitat critical to the survival of the species (Johnstone *et al,* 2010).	A total of 40 records within 5 km of the Project Area. Last recorded in 2013. **Likely to occur**.
Greater Sand Plover *Charadrius leschenaultii*	Migratory & Marine (Bonn) ; Schedule 3	The Greater Sand Plover is a medium sized plover, weighing up to 100 g. This species has been recorded at beaches, tidal mudflats, reefs, dunes and is seldom observed far inland (Pizzey & Knight, 2007).	A total of 8 records within 5 km of the Project Area. Last recorded in 2008. **May occur**.

Taxon	Cons. Status	Description and Habitat	Likelihood of Occurrence
Lesser Sand Plover *Charadrius mongolus*	Migratory & Marine (Bonn, CAMBA, JAMBA, ROKAMBA) ; Schedule 1	The Lesser Sand Plover occurs in similar habitats to the Greater Sand Plover (DotE, 2015). This species typically feeds from the surface of wet sand or mud on open intertidal flats of sheltered bays, lagoons or estuaries (DotE, 2015).	A total of 1 record within 5 km of the Project Area. Last recorded in 2008. **Unlikely to occur**.
Hooded Plover *Charadrius rubricollis*	- ; Priority 4	A small, stocky plover standing at between 19 -23 cm tall, this species frequents broad sandy beaches with plentiful seaweed and jetsam, adjacent dune vegetation, weedy rocky shelves and reefs. In WA this species inhabits salt lakes (Pizzey & Knight, 2007).	A total of 2 records within 5 km of the Project Area. Last recorded in 1998. **Unlikely to occur**.
Wandering Albratross *Diomedea exulans*	Vulnerable ; Schedule 1	The Wandering Albatross breeds on Macquarie Island. It is a pelagic bird and feeds on the ocean (DotE, 2015). **Recorded in 1955**	A total of 1 record within 5 km of the Project Area. Last recorded in 1955. **Unlikely to occur**.
Eastern Reef Egret *Egretta sacra*	Migratory & Marine (CAMBA) ; Schedule 3	Occurs in two morphs, a dark and light morph, the Eastern Reef Heron inhabits islands, rocky shores, exposed coral reefs, beaches, tidal rivers and inlets (Pizzey & Knight, 2007).	A total of 5 records within 5 km of the Project Area. Last recorded in 2012. **May occur**.
Peregrine Falcon *Falco peregrinus*	Schedule 4	A well-known falcon, the Peregrine inhabits a vast array of environs in Australia. Usually uncommon and migratory (Pizzey & Knight, 2007). This species lays its eggs in recesses of cliff faces, tree hollows or large abandoned nests (Bamford, 2009a)	A total of 3 records within 5 km of the Project Area. Last recorded in 2005. **May occur**.
Blue Petrel *Halobaena caerulea*	Vulnerable ; Schedule 1	This species is a small Petrel with a wingspan of approximately 65cm. It has been recorded off the coast of the Perth area (DotE, 2015)	No records within 5 km of the Project Area. **Unlikely to occur**.
Malleefowl *Leipoa ocellata*	Vulnerable ; Schedule 1	Malleefowl habitat requirements are quite specific. The species requires unburnt mallee and woodland with low scrub and abundant litter to use in nesting mounds (Morcombe, 2003). The species does not occur within the Perth Metropolitan Area.	No records within 5 km of the Project Area. **Unlikely to occur**.

Taxon	Cons. Status	Description and Habitat	Likelihood of Occurrence
Broad-billed Sandpiper *Limicola falcinellus*	Marine, Migratory (EPBC), CAMBA, JAMBA, ROKAMBA, Bonn ; Schedule 3	Broad-billed Sandpiper occur around the coast and are widespread inland. In Western Australia they are common from Cape arid to the south-west Kimberley region.	No records within 5 km of the Project Area. **Unlikely to occur**.
Bar-tailed Godwit *Limosa lapponica*	Migratory & Marine (Bonn, CAMBA, JAMBA, ROKAMBA) ; Schedule 3	The Bar-tailed Godwit is a large wader weighing up to 450 g and in Western Australia is widespread around the coast from Eyre to Derby (DotE, 2015).	A total of 5 records within 5 km of the Project Area. Last recorded in 2010. **May occur**.
Southern Giant Petrel *Macronectes giganteus*	Endangered ; Priority 4	The Southern Giant-Petrel is known to occur in Antarctic to subtropical waters. It typically nests in areas of exposed vegetation (DotE, 2015). It is a marine species and is only known to nest on the Antarctic Continent, surrounding islands and South America, it may however overfly the area.	No records within 5 km of the Project Area. **Unlikely to occur**.
Northern Giant Petrel *Macronectes halli*	Vulnerable ; -	Similar in appearance to the South Giant-Petrel and hybrids of both species exist (Pizzey & Knight, 2007). The species typically frequents oceans, bays, seas, islands and mainland coastal areas (Pizzey & Knight, 2007).	No records within 5 km of the Project Area. **Unlikely to occur**.
Rainbow Bee-eater *Merops ornatus*	Migratory & Marine (JAMBA) ; Schedule 3	The Rainbow Bee-eater is a common species which occupies numerous habitats including open woodlands with sandy loamy soil, sand ridges, sandpits, riverbanks, road cuttings, beaches, dunes, cliffs, mangroves and rainforests. It is possible that this species will occupy open woodland areas within the survey area. The Rainbow Bee-eater avoids heavy forest that would hinder the pursuit of its insect prey (Morcombe, 2003).	A total of 14 records within 5 km of the Project Area. Last recorded in 2013. **Likely to occur**.
Eastern Curlew *Numenius madagascariensis*	Critically Endangered & Migratory, Marine (Bonn, CAMBA, JAMBA & ROKAMBA) ; Schedule 1	Within Australia, this bird has a primarily coastal distribution. It is found in all states and has a continuous distribution from Barrow Island through the Kimberley region and into the Northern Territory with more scattered records along the coastlines south (DotE, 2015).	A total of 1 record within 5 km of the Project Area. Last recorded in 2002. **Unlikely to occur**.
Whimbrel *Numenius phaeopus*	Marine, Migratory (EPBC), Bonn, CAMBA, JAMBA, ROKAMBA ; Schedule 3	The Whimbrel occurs all along the Australian coast and inhabits estuaries, mangroves, tidal flats, flooded paddocks, and bare grasslands (Pizzey & Knight 2007)	A total of 4 records within 5 km of the Project Area. Last recorded in 2011. **May occur**.

Taxon	Cons. Status	Description and Habitat	Likelihood of Occurrence
Wilson's Storm Petrel *Oceanites oceanicus*	Migratory & Marine (JAMBA) ; Schedule 3	One of the planet's most abundant and widespread birds, this species breeds on Antarctica and sub-Antarctic Islands, after which it migrates north appearing over shelf waters in south west Western Australia in late autumn (Pizzey & Knight, 2007).	A total of 1 record within 5 km of the Project Area. Last recorded in 2012. **Unlikely to occur**.
Blue-billed Duck *Oxyura australis*	- ; Priority 4	The Blue-billed Duck is endemic to south eastern and south western Australia. It prefers deep water in large permanent wetlands and swamps with aquatic vegetation. This species of duck is fully aquatic and rarely comes onto land (NSW Government, 2015) http://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10580	A total of 2 records within 5 km of the Project Area. Last recorded in 2002. **Unlikely to occur**.
Osprey *Pandion Haliaetus*	Migratory & Marine (Bonn) ; -	The Osprey is a medium sized raptor and is found along the coast from Albany north to the state border (DotE, 2015).	No records within 5 km of the Project Area. **Unlikely to occur**.
Pacific Golden Plover *Pluvialis fulva*	Migratory & Marine ; Schedule 3	The Pacific Golden Plover is a medium sized bird with long legs and seldom recorded in the south west of Western Australia (DSWEPaC, 2012).	A total of 13 records within 5 km of the Project Area. Last recorded in 2006. **Unlikely to occur**.
Grey Plover *Pluvialis squatarola*	Migratory & Marine (Bonn, CAMBA, JAMBA, ROKAMBA) ; Schedule 3	The Grey Plover is a medium sized plover, with the Australian population breeding in Siberia between May and August, with individuals reaching the south coast of Australia in October and November (DotE, 2015).	A total of 92 records within 5 km of the Project Area. Last recorded in 2013. **Likely to occur**.
Soft-plumaged Petrel *Pterodroma mollis*	Vulnerable ; -	The Soft-plumaged Petrel has a whitish forehead and blue-grey back and is often seen in small groups flying close to the water (DotE, 2015). The species typically frequents oceans, bays, seas, islands and mainland coastal areas (Pizzey & Knight, 2007).	No records within 5 km of the Project Area. **Unlikely to occur**.
Fleshy-footed Shearwater *Puffinus carneipes*	Migratory & Marine (JAMBA, ROKAMBA) ; Schedule 3	The Fleshy-footed Shearwater is a large robust shearwater that breeds on Lord Howe Island and in southern Western Australia on Islands in the Recerche Archipelago. It is a common visitor from the coast of Bunbury around to coastal South Australia (Pizzey & Knight, 2007).	No records within 5 km of the Project Area. **Unlikely to occur**.

Taxon	Cons. Status	Description and Habitat	Likelihood of Occurrence
Australian Painted Snipe *Rostratula australis*	Endangered ; Schedule 1	The Painted Snipe generally inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans (DOTE, 2015) This species is a very rare summer visitor to the south-west of Western Australia. Breeding habitat in Western Australia is not quite known however a nest located near Moora was located in a tussock beside a swamp (Johnstone & Storr, 1998).	No records within 5 km of the Project Area. **Unlikely to occur**.
Arctic Skua *Stercorarius parasiticus*	Migratory & Marine (CAMBA, JAMBA, ROKAMBA) ; Schedule 3	This species of sea-bird is found around Australia's coastline. It breeds throught the Arctic. It inhabits the ocean, offshore waters, entrances of harbours, bays (Pizzey & Knight, 2007)	A total of 26 records within 5 km of the Project Area. Last recorded in 2012. **May occur**.
Pomarine Skua *Stercorarius pomarinus*	Migratory & Marine (CAMBA, JAMBA) ; Schedule 3	This species of sea-bird breeds throughout the Arctic region and a little further south. It arrives in Australian waters in Oct-Nov and departs April-May, returning to breeding grounds. It inhabits the ocean, offshore waters, entrances of harbours, bays (Pizzey & Knight, 2007).	A total of 4 records within 5 km of the Project Area. Last recorded in 2012. **May occur**.
Bridled Tern *Sterna anaethetus*	Migratory & Marine (CAMBA, JAMBA) ; Schedule 3	The Bridled Tern is widespread and breeds on offshore islands off Western Australia, northern Australia and Queensland (DotE, 2015).	No records within 5 km of the Project Area. **Unlikely to occur**.
Caspian Tern *Sterna caspia*	Migratory & Marine (CAMBA, JAMBA) ; Schedule 3	The Caspian Tern is the largest tern in Australia. It breeds in Western Australia in the Recherche Archipelago and north to Dirk Hartog Island and also in the Pilbara. Its distribution is more widespread, occurring virtually all along the WA coast. Its preferred habitat is sheltered coastal areas, near coastal or inland wetlands (DotE, 2015).	No records within 5 km of the Project Area. **Unlikely to occur**.
Roseate Tern *Sterna dougallii*	Migratory & Marine (JAMBA) ; Schedule 3	The Roseate Tern is relatively small, the smallest of all "commic" terns (meaning similar to the Common Tern), with long white tail streamers and a long black bill, occasionally with red on the base (Pizzey & Knight, 2007; Morcombe, 2003). The flight is distinctive, with a direct and fast movement rather than buoyant flight observed in other comic terns. The Roseate Tern is common in seas around Northern Australia and breeds on islands off both the north-east and western coasts, possibly expanding southwards in Western Australia where it is now a casual visitor to the area (Morcombe, 2003).	A total of 1 record within 5 km of the Project Area. Last recorded in 2011. **Unlikely to occur**.

Taxon	Cons. Status	Description and Habitat	Likelihood of Occurrence
Common Tern *Sterna hirundo* subsp. *hirundo*	Migratory & Marine (CAMBA, JAMBA, ROKAMBA) ; Schedule 3	The Common Tern is a slender sea-tern, a non-breeding migrant to Australia. It is most common on the eastern coast of the continent. In WA, the species is rarely recorded south of 30° S (DotE, 2015).	A total of 1 record within 5 km of the Project Area. Last recorded in 1956. **Unlikely to occur**.
Australian Fairy Tern *Sternula nereis nereis*	Vulnerable ; Schedule 1	The Fairy tern is a small bird weighing approximately 70 g and is found along coasts of Victoria, Tasmania, South Australia and Western Australia. The Fairy Tern nests on sheltered sandy beaches, spits and banks (DotE, 2015).	No records within 5 km of the Project Area. **Unlikely to occur**.
Grey-tailed Tattler *Tringa brevipes*	Migratory & Marine (CAMBA, JAMBA, ROKAMBA, Bonn) ; Priority 4	The Grey-tailed Tattler is a medium sized wader with a primarily coastal northern coastal distribution and found in most coastal regions. In WA, it is found rarely on the south coast and between Augusta and Cervantes. It is more common and widespread from the Houtman Abrolhos and mainland adjacent to the Kimberley Region (DotE, 2015).	A total of 25 records within 5 km of the Project Area. Last recorded in 2011. **May occur**.
Common Greenshank *Tringa nebularia*	Migratory & Marine (Bonn, CAMBA, JAMBA, ROKAMBA) ; Schedule 3	The Common Greenshank is a largely built wader, weighing up to 190 g for both sexes. The species is found in inland wetlands and sheltered coastal habitats (DotE, 2015).	A total of 18 records within 5 km of the Project Area. Last recorded in 2009. **May occur**.
Marsh Sandpiper *Tringa stagnatilis*	Migratory & Marine (Bonn, CAMBA, JAMBA, ROKAMBA) ; Schedule 3	This species breeds from Austria to Mongolia and moves to Australia for summer and is found in mostly coastal areas (Pizzey & Knight, 2007). Scattered records exist in Western Australia and are found mainly near the coast (DotE, 2015). This species occupies wetlands of varying salinity including fresh, sewage ponds and estuaries (Pizzey & Knight, 2007).	A total of 1 record within 5 km of the Project Area. Last recorded in 2003. **Unlikely to occur**.
Masked Own (southern subsp.) *Tyto novae-hollandiae* subsp. *novaehollandiae*	- ; Priority 3	The Masked Owl occupies a variety of habitats including forests, open woodlands, farmlands with large trees, paperbark woodlands and caves. This species generally occurs in coastal mainland Australia and though widespread it is typically locally uncommon (Pizzey & Knight, 2007).	A total of 3 records within 5 km of the Project Area. Last recorded in 2005. **Unlikely to occur**.
Terek Sandpiper *Xenus cinereus*	Migratory & Marine (Bonn, CAMBA, JAMBA, ROKAMBA) ; Schedule 3	The Terek Sandpiper has a primarily coastal distribution with some records inland and is more common in northern and eastern Australia than southern Australia. It has been recorded between Bunbury and the mouth of the Moore River (DotE, 2015).	A total of 2 records within 5 km of the Project Area. Last recorded in 2000. **Unlikely to occur**.

Taxon	Cons. Status	Description and Habitat	Likelihood of Occurrence
Mammals			
Chuditch, Western Quoll *Dasyurus geoffroii*	Vulnerable; Schedule 1	Following European settlement the range of this species contracted dramatically, from much of the continent to a small area in the south west. It currently only occurs in areas dominated by sclerophyll forest or drier woodland, heath and mallee shrubland (Van Dyck & Strahan, 2008). The majority of records are found in the contiguous Jarrah forests of the south west of Western Australia (DotE, 2015). Recent records exist within the Gnangara pine forest and Walyunga National Park.	No records within 5 km of the Project Area. **Unlikely to occur**.
Quenda *Isoodon obesulus* subsp. *fusciventer*	Priority 5	The Quenda or Southern Brown Bandicoot exists only in a fragmented distribution to its former range in southern south western and eastern Australia. It is found in forest, woodland, heath and shrub communities in these regions. Preferred habitat usually consists of a combination of sandy soils and dense heathy vegetation (Van Dyck & Strahan, 2008).	A total of 41 records within 5 km of the Project Area. Last recorded in 2012. **Likely to occur**.
Australian Sea Lion *Neophoca cinerea*	Schedule 4	Recorded in 1971	Only 1 record within 5 km of the Project Area, in 1971. **Unlikely to occur**.
Southern Brush-tailed Phascogale, Wambenger *Phascogale tapoatafa* subsp. *tapoatafa*	-; Schedule 1	The Brush-tailed Phascogale is one of the most arboreal dasyurids and rarely feeds on the ground. The species is distinguished by a large black tail. The species formerly occupied all the dry sclerophyll forests and woodlands of temperate and tropical Australia. The species suffered a drastic reduction in habitat due to clearing of prime habitat for agriculture and now prefers open forest with sparse groundcover. It has been observed in habitats ranging from mallee to rainforest. Recorded in 1968 in the vicinity of the Project Area.	Only 1 record within 5 km of the Project Area, in 1968. **Unlikely to occur**.
Western Ringtail Possum *Pseudocheirus occidentalis*	Vulnerable; Schedule 1	This species is restricted to the south-west corner of Western Australia. Closer to the coast it is closely associated with Peppermint (*Agonis flexuosa*) forest and woodland and Tuart (*Eucalyptus gomphocephala*) with a peppermint mid-story. Further from the coast the species is found in Jarrah (*Eucalyptus marginata*), Wandoo (*Eucalyptus wandoo*) and Marri (*Corymbia calophylla*) forest (Van Dyck & Strahan, 2008).	No records within 5 km of the Project Area. **Unlikely to occur**.

Taxon	Cons. Status	Description and Habitat	Likelihood of Occurrence
Quokka *Setonix brachyurus*	Vulnerable ; Schedule 1	The Quokka is distributed from Jarrah forest south-east of Perth, extending south through southern Jarrah, Marri and Karri forests onward to the south coast. It is now thought to be absent from the Swan Coastal Plain. Habitat use varies and includes thickets of *Acacia, Melaleuca* and is sometimes found in conjunction with tea-tree (Van Dyck & Strahan, 2008).	No records within 5 km of the Project Area. **Unlikely to occur**.
Reptile			
Loggerhead Turtle *Caretta caretta*	Endangered, Marine and Migratory (Bonn). Schedule 1	The Loggerhead Turtle has been recorded nesting from Shark Bay to the North West Cape. The turtle has been recorded nearby the Project Area as recently as 2000.	A total of 7 records within 5 km of the Project Area. Last recorded in 2000. **May occur**.
Green Turtle *Chelonia mydas*	Vulnerable; Schedule 1	Green Turtles nest and migrate across northern Australia.	No records within 5 km of the Project Area. **Unlikely to occur**.
Leatherback Turtle *Dermochelys coriacea*	Endangered, Migratory Marine (Bonn)	The Leatherback Turtle has been recorded feeding in coastal waters of all australian States. No major nesting has been recorded in Australia though isolated nesting occurs in Queensland and the Northern Territory (DotE, 2015). Recorded in 2001 in the vicinity of the Project Area.	A total of 2 records within 5 km of the Project Area. Last recorded in 2001. **Unlikely to occur**.
Perth Slider, Lined Skink *Lerista lineata*	Priority 3	The Perth Lined Lerista is an underground dwelling skink, sheltering in leaf litter and upper layers of loose soil. It is typically found at the bases of shrubs, spoil heaps and stick ant nests (Bush *et al,* 2010). The species inhabits sandy soils supporting Eucalypt/*Banksia* woodland, coastal heath and low shrubland (Bush *et al,* 2010; Wilson and Swan, 2010).	A total of 44 records within 5 km of the Project Area. Last recorded in 2005. **May occur**.
Flatback Turtle *Natator Depressus*	Vulnerable;Schedule 1	The Flatback Turtle is found only in the tropical waters of northern Australia (DotE, 2015).	No records within 5 km of the Project Area. **Unlikely to occur**.
Black-striped Snake *Neelaps calonotos*	Priority 3	The Black-striped Snake is mostly confined to the Swan Coastal Plain between Mandurah and Lancelin. It takes shelter in upper layers of loose soil beneath leaf litter in Eucalyptus/Banksia woodlands, typically at the base of trees and shrubs (Bush *et al* 2010).	Recorded <1965. **Unlikely to occur**

Taxon	Cons. Status	Description and Habitat	Likelihood of Occurrence
Sharks			
Grey Nurse Shark *Carcharias Taurus*	Vulnerable ; Schedule 1	This shark occurs in two populations, on the east coast around southern Queensland to southern NSW and on south-west coast of WA. There are occasional sightings around the Perth Metropolitan Area (DotE, 2015).	No records within 5 km of the Project Area. **May occur.**
Great white Shark *Carcharodon carcharias*	Vulnerable ; Schedule 1	The Great White Shark has been recorded from central Queensland, around the south coast of Australia to the north-west of Western Australia. Areas where they are more commonly recorded are in and around waters off islands with Fur Seal and Sea Lion populations (DotE, 2015).	1 record from 2001 within 5 km of the Project Area. **Unlikely to occur**
Whale Shark *Rhincodon typus*	Vulnerable ; Schedule 4	Seen in waters from NSW, Queensland, NT and WA. More commonly found off waters in northern Western Australia	No records within 5 km of the Project Area. **Unlikely to occur**.