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# BOOLATHANA PROJECT RED FLAG MULTI-CRITERIA ASSESSMENT

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REPORT PREPARED FOR GASCOYNE GREEN ENERGY (OPERATIONS) PTY LTD  
BY PRESTON CONSULTING PTY LTD

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## DOCUMENT CONTROL

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# 1 INTRODUCTION

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Gascoyne Green Energy (Operations) Pty Ltd (GGE) wishes to develop the Gascoyne Green Energy Boolathana Project (the Project). The Project will be a renewable energy hub, built in stages on Boolathana Station, located 15 km north of Carnarvon (Figure 1).

Stage 1 will comprise of upstream wind turbines and infill solar arrays which will be used to power downstream processing facilities to produce commodities such as green hydrogen (Figure 2).

Due to the size of Boolathana, the proposed hub's capacity can be scaled up to correspond with environmental, social and engineering investigations and approval processes. The Project will also be appropriately scaled to match the receival capacity of GGE's intended offtake partners.

At full capacity the Project may produce more than 10 GW of renewable energy.

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# 2 SCOPE AND PURPOSE

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GGE has requested that Preston Consulting conduct a Red Flag Multi-Criteria Assessment (MCA) for the Project. The Red Flag MCA is based on a desktop review of environmental and cadastral information for the Project, and the Project characteristics defined in Section 3.

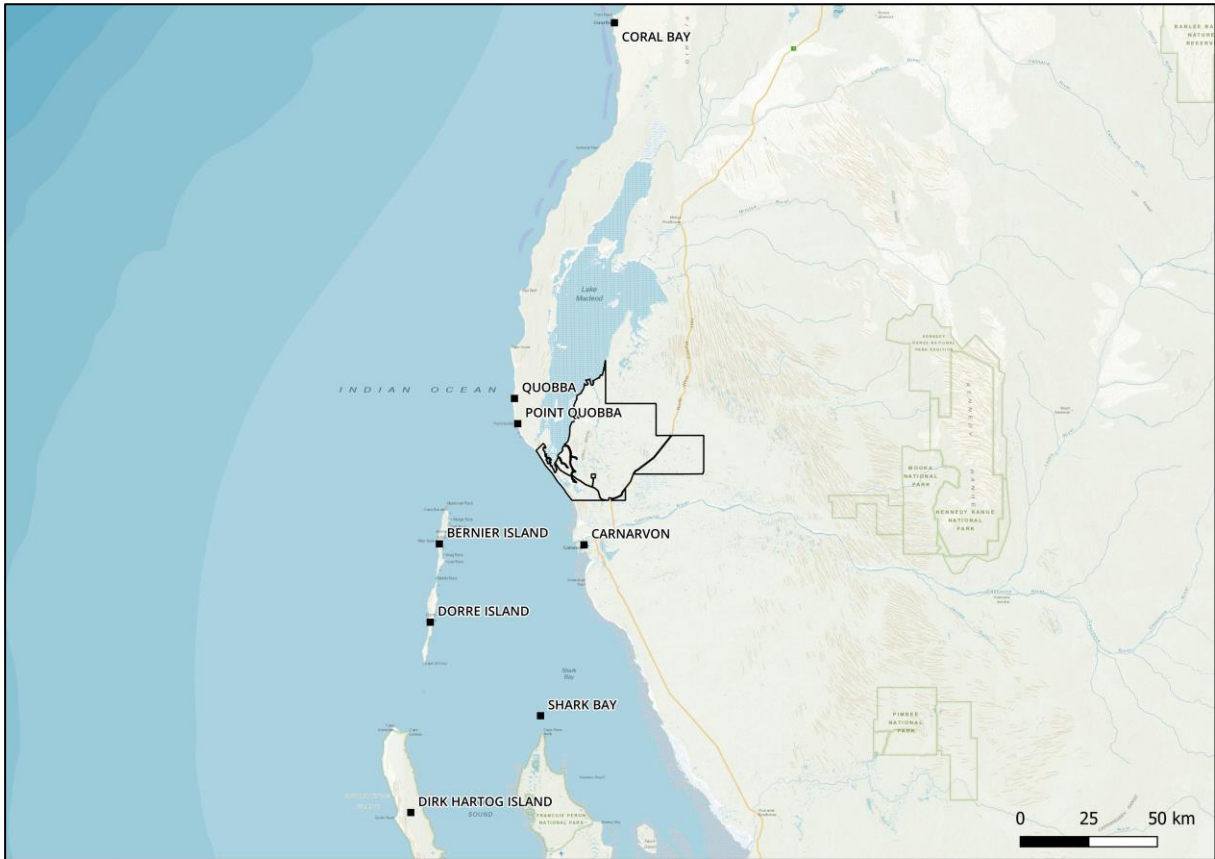
GGE's purpose for obtaining the Red Flag MCA is to include the results within an investor / stakeholder presentation which will be circulated to the market.

The Red Flag MCA is based on:

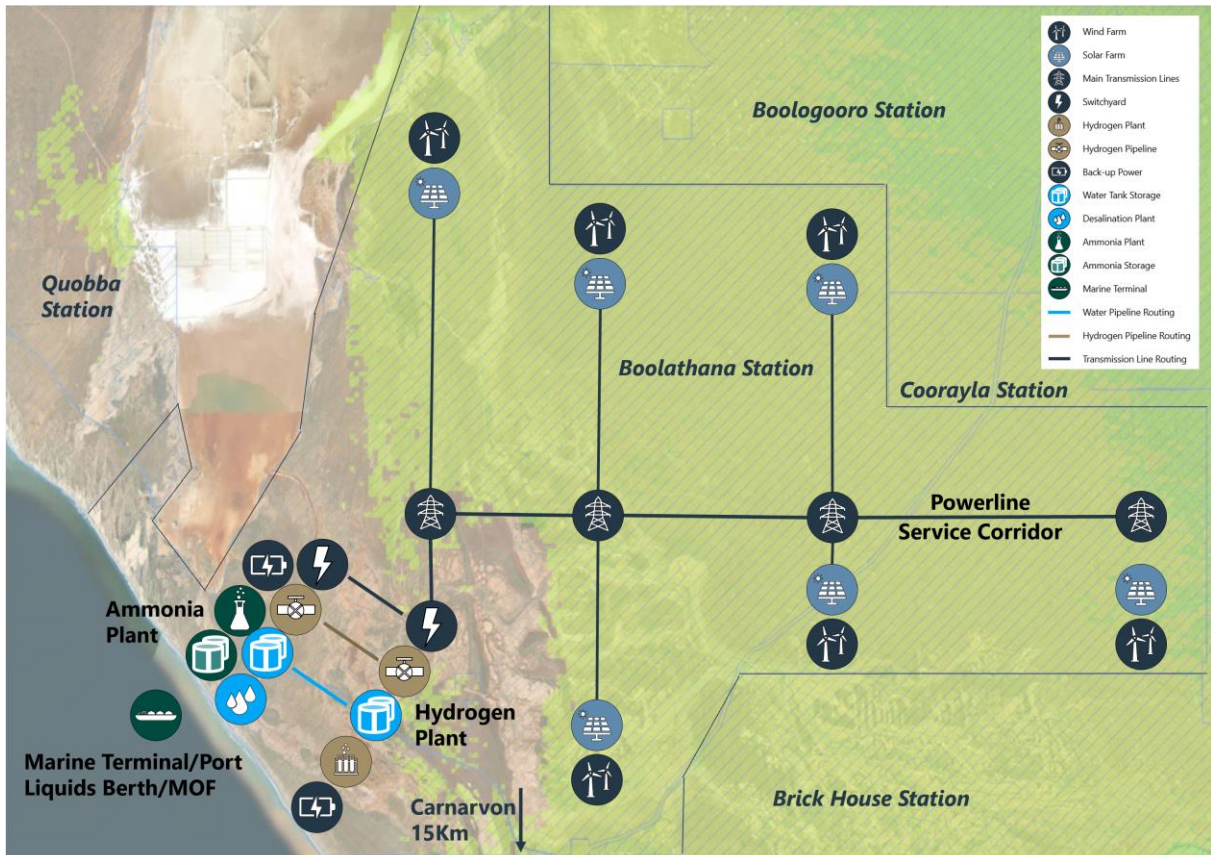
- The Project description provided in Section 3;
- Current legislation, noting that the assessments may need to be revised if legislation changes;
- Study gaps and the study effort required to inform an environmental impact assessment (EIA);
- Likely management requirements and potential restrictions; and
- Current regulator and consultant timeframes, noting resources within Government and private industry are limited at the time of this assessment.

The scope of this assessment does not include health and safety approvals, tenure or land access (including Native Title).





**Figure 1: Regional Project location**



**Figure 2: Boolathana Project – key components**





### 3 PROJECT DESCRIPTION

The Project, as assessed in this Red Flag MCA, will comprise the following:

- Generation of renewable energy via a combination of solar panels and wind turbines with connecting transmission infrastructure;
- Approximately 7,285 ha of vegetation clearing;
- Hydrogen and ammonia production, storage and transport facilities will be developed;
- Export facilities including a single point / buoy mooring system between 5 – 10 km offshore and a connecting ammonia pipeline;
- Desalination plant with seawater intake and brine discharge pipes; and
- Onshore loading of modules and other materials.

### 4 REVIEW OF ENVIRONMENTAL VALUES

Preston Consulting prepared a list of key environmental values that could be relevant, based on the location, scale, and characteristics of the Project, listed in Table 1. Only key values were included in Table 1, those that have the potential to require detailed surveys, studies, and assessments during the EIA phase.

Each of these key environmental values were then investigated using online databases and GIS software to identify whether they intersected with the Project or were located nearby. No searches of the specific items logged as priority areas on the DBCA database have been undertaken at this time. Table 1 summarises the outcomes of this investigation, with relevant figures provided.

Table 1: Key environmental values that may be present

EPA Key Environmental Factor	Key item	Known presence or likelihood	Figure Reference
Benthic Communities and Habitat (BCH)	Marine reserves or conservation areas	No	N/A
	Coral	Unable to be determined without field surveys however may occur	N/A
	Seagrass	Unable to be determined without field surveys however may occur	N/A
	Mangroves	No	N/A
	Mangrove Management Areas	No	N/A
	Sandy beaches	Yes - extensive	N/A
Marine Fauna	Biologically important areas	Humpback Whale – migration only	Section 4.1
	Migratory pathways	As above	As above
	Threatened Marine Fauna	Yes, several likely to occur	N/A
	Migratory Marine Fauna	Yes, several likely to occur	N/A
	Fish Habitat Protection Area	Yes	Section 4.2.1
	Commercial fishery boundaries	Yes, Shark Bay Prawn and Scallop Managed Fisheries	Section 4.2.2



<b>EPA Key Environmental Factor</b>	<b>Key item</b>	<b>Known presence or likelihood</b>	<b>Figure Reference</b>
	Recreational fishing areas	Carnarvon / Shark Bay Recreational Fishing Area	Section 4.2.3
Flora and Vegetation	National Parks and other conservation estate	No	N/A
	Nominated offset sites	No	N/A
	Bush Forever sites	No	N/A
	Proposed conservation areas	No – However, Lake MacLeod is adjacent	Section 4.3.1
	Environmentally Sensitive Areas	No, but Lake MacLeod is adjacent	Section 4.3.2
	Threatened Flora	No, but potential habitat could occur	N/A
	Priority Flora	Yes, some known and others likely to be recorded during field surveys	Section 4.4.1
	Range Extensions Flora	Unable to be determined without field surveys, however likely to occur	N/A
	New or unidentified flora species	Unable to be determined without field surveys, however likely to occur	N/A
	Threatened Ecological Communities	No	N/A
	Priority Ecological Communities	Yes	Section 4.4.2
	Locally significant vegetation	Unable to be determined without field surveys, however likely to occur	N/A
	Groundwater dependant vegetation	Unable to be determined without field surveys, however likely to occur	N/A
Terrestrial Fauna	Threatened Fauna	Yes	Section 4.5.1
	Migratory Fauna	Yes	Section 4.5.3
	Priority Fauna	Yes	Section 4.5.2
	Short-range endemic fauna	Unable to be determined without field surveys, however likely to occur	N/A
	Locally significant fauna	Unable to be determined without field surveys, however likely to occur	N/A
Subterranean Fauna	Presence of restricted species	Unable to be determined without field surveys, however likely to occur	N/A
Inland Waters	Protected wetlands or waterways	No – but Lake MacLeod is adjacent and listed as an important wetland	Section 4.3.3
	Significant drainage lines	Yes	N/A
	Minor creeklines	Yes	N/A
	Public Drinking Water Source Areas	No	N/A
Terrestrial Environmental Quality	Contaminated sites	No	N/A
	Acid sulphate soils	Yes – Low to moderate risk	Section 4.6
Social Surroundings	Registered Aboriginal Heritage sites or places	Yes - Three lodged heritage sites	Section 4.7

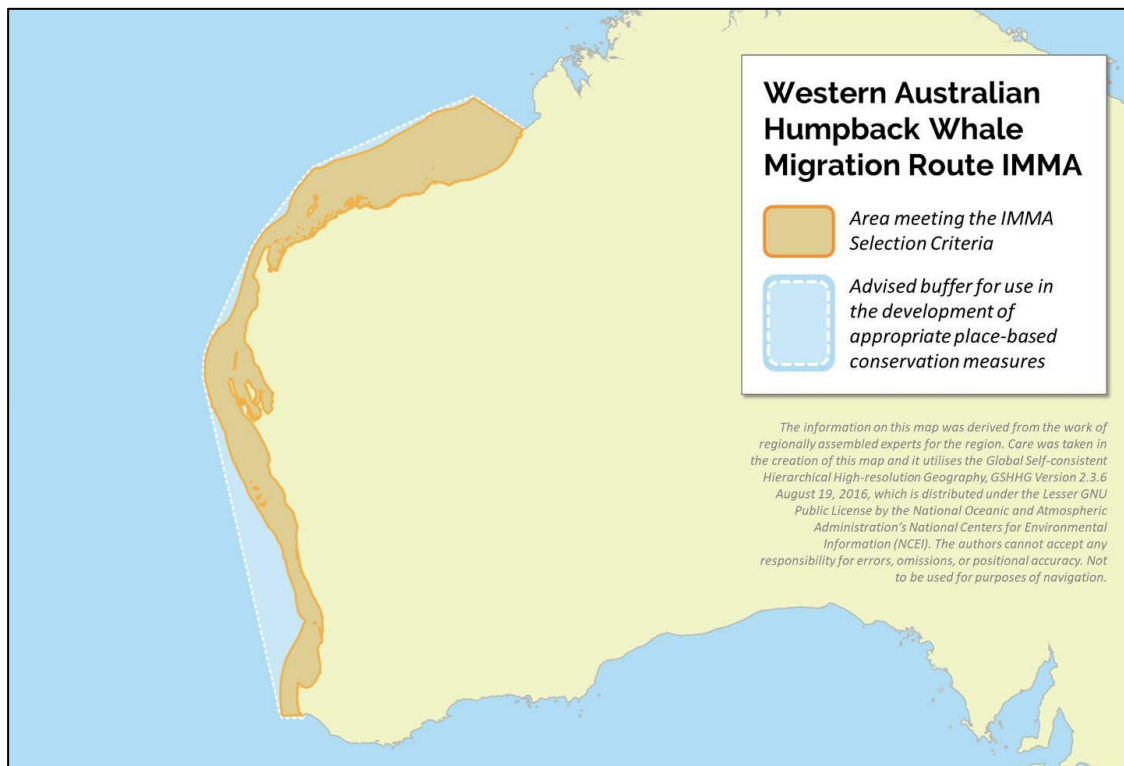


EPA Key Environmental Factor	Key item	Known presence or likelihood	Figure Reference
	European heritage sites	No	N/A
	Areas used for cultural purposes or of cultural value	Unable to be determined without field surveys, however likely to occur	N/A
	Towns / settlements	No	N/A
	Camping or other recreational areas	No known areas	N/A

## 4.1 BIOLOGICALLY IMPORTANT AREAS

The annual migration route for the Humpback Whale (*Megaptera novaeangliae*) extends the length of the western WA coastline to approximately 90 km offshore (Figure 3) and has been identified as a Biologically Important Area (BIA) due to its use as a migration and resting area. The section of the BIA offshore from Carnarvon (Figure 4) will often house aggregates of nursing whales with their calves during their southern migration.

BIAs are areas that a selection of species use to display important behaviours, such as breeding, foraging, resting, or in the case of the Humpback Whale, migration.



**Figure 3: Western Australian Humpback Whale Migration Route (Marine Mammal Protected Areas Task Force, 2020)**



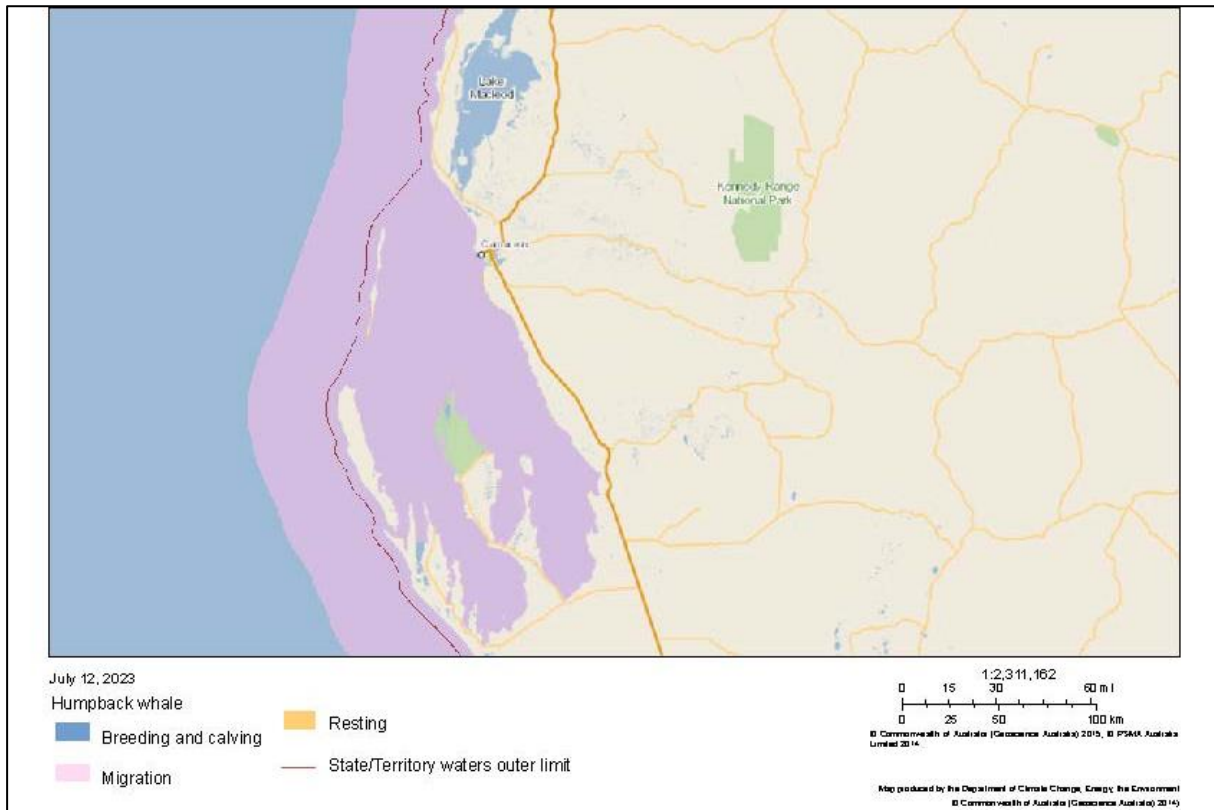


Figure 4: Biologically Important Areas - Humpback Whale Migration

## 4.2 OFFSHORE IMPACTS

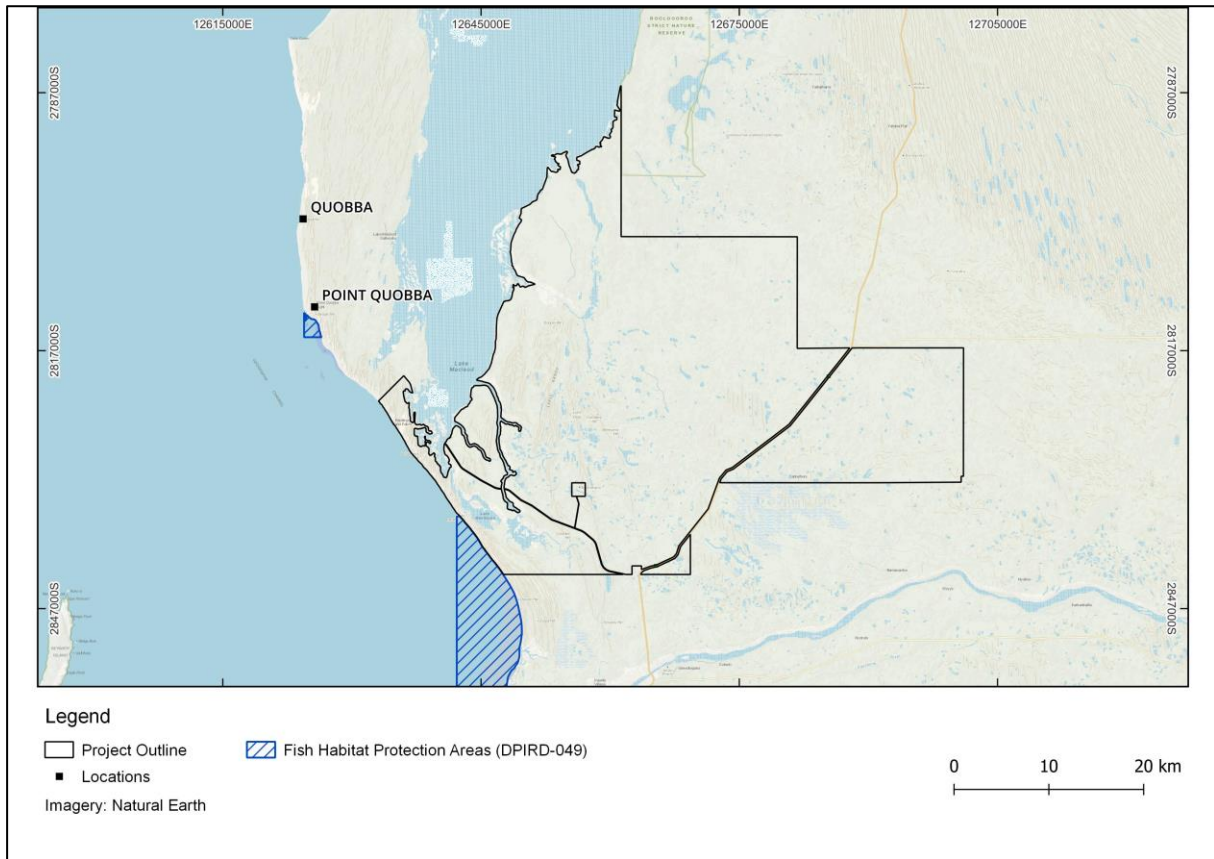
### 4.2.1 FISH HABITAT PROTECTION AREAS

Fish Habitat Protection Areas (FHPA) are established under Section 115 of the *Fish Resources Management Act 1994* and are established for one or more of the following purposes:

1. The conservation and protection of fish, fish breeding areas, fish fossils or the aquatic ecosystem;
2. The culture and propagation of fish and experimental purposes related to that culture and propagation; or
3. The management of fish and activities relating to the appreciation or observation of fish.

WA has six FHPA's, one of which is the Miaboolya Beach FHPA located in the Gascoyne River delta, 16 km north of Carnarvon (Figure 5). Miaboolya Beach is utilised as a nursery for the more than 130 species that inhabit it, and the area holds significant cultural value for the Aboriginal people of the area.





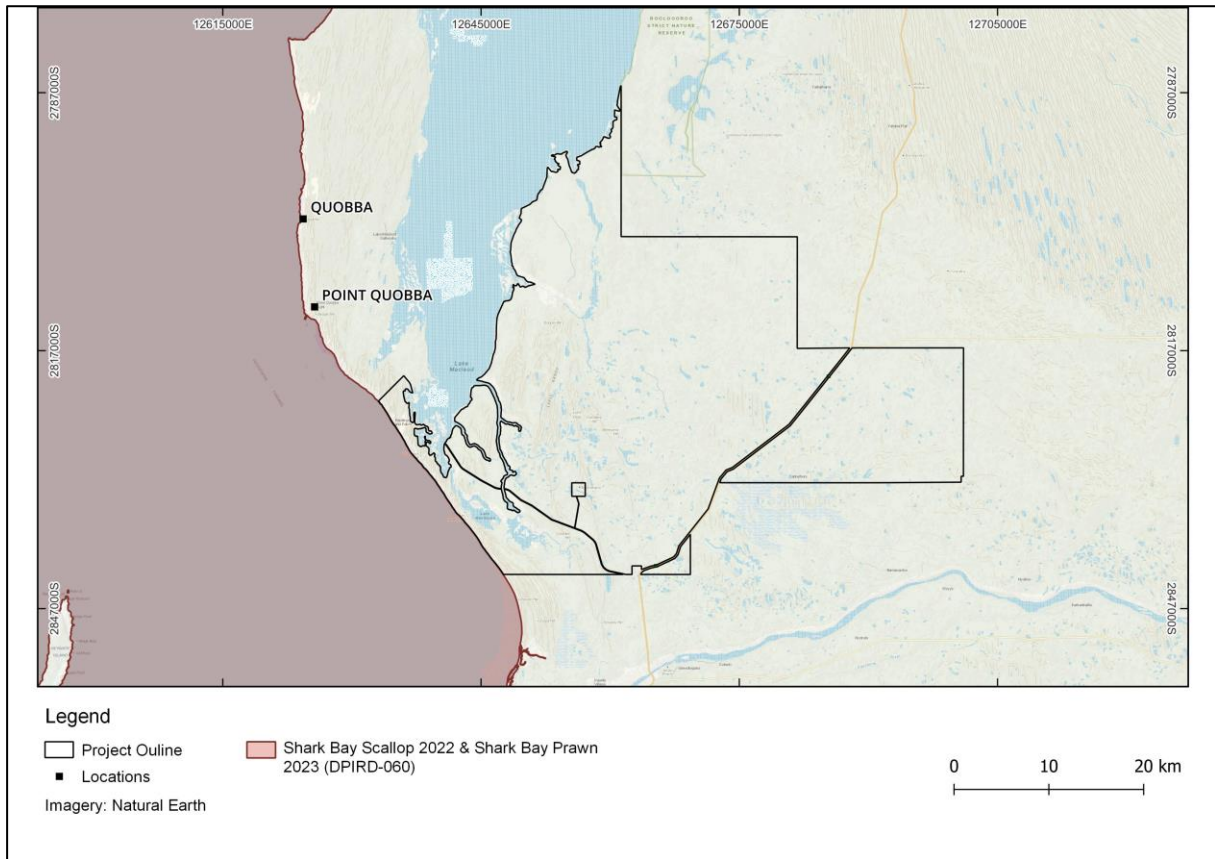
**Figure 5: Fish Habitat Protection Areas**

### 4.2.2 COMMERCIAL FISHERY

Commercial Fishery boundaries are detailed as part of the ‘Status Reports of the Fisheries and Aquatic Resources’ and span across a vast area of ocean along the Australian coastline (Newman, Wise, Santoro, & Gaughan, 2023). The Australian commercial fishery industry contributes approximately one billion dollars to WA’s economy annually and directly employs more than 5,000 people.

The Shark Bay Scallop Managed Fishery is the largest commercial fishery in WA encompassing over 4 million hectares of ocean and solely targets the western saucer scallop (*Amusium balloti*). Within the same boundaries is the Shark Bay Prawn Managed Fishery, which is the largest prawn fishery in WA and predominately targets the western king prawn (*Melicertus latisulcatus*) and the brown tiger prawn (*Penaeus esculentus*) (Figure 6 - Figure 8).





**Figure 6: Commercial Fishery Boundaries**



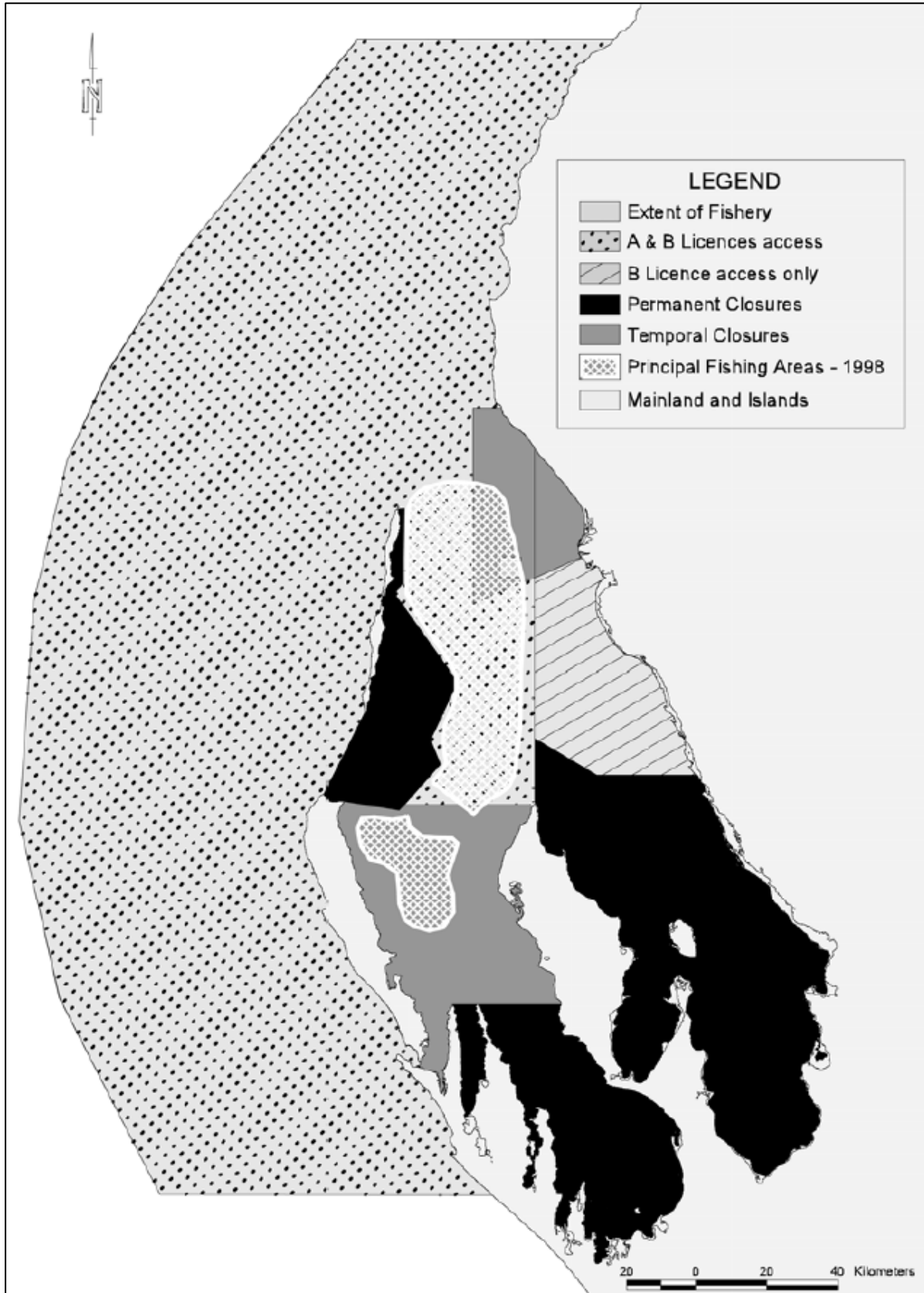


Figure 7: Shark Bay Scallop Fishery Extent (Kangas et al., 2006a)



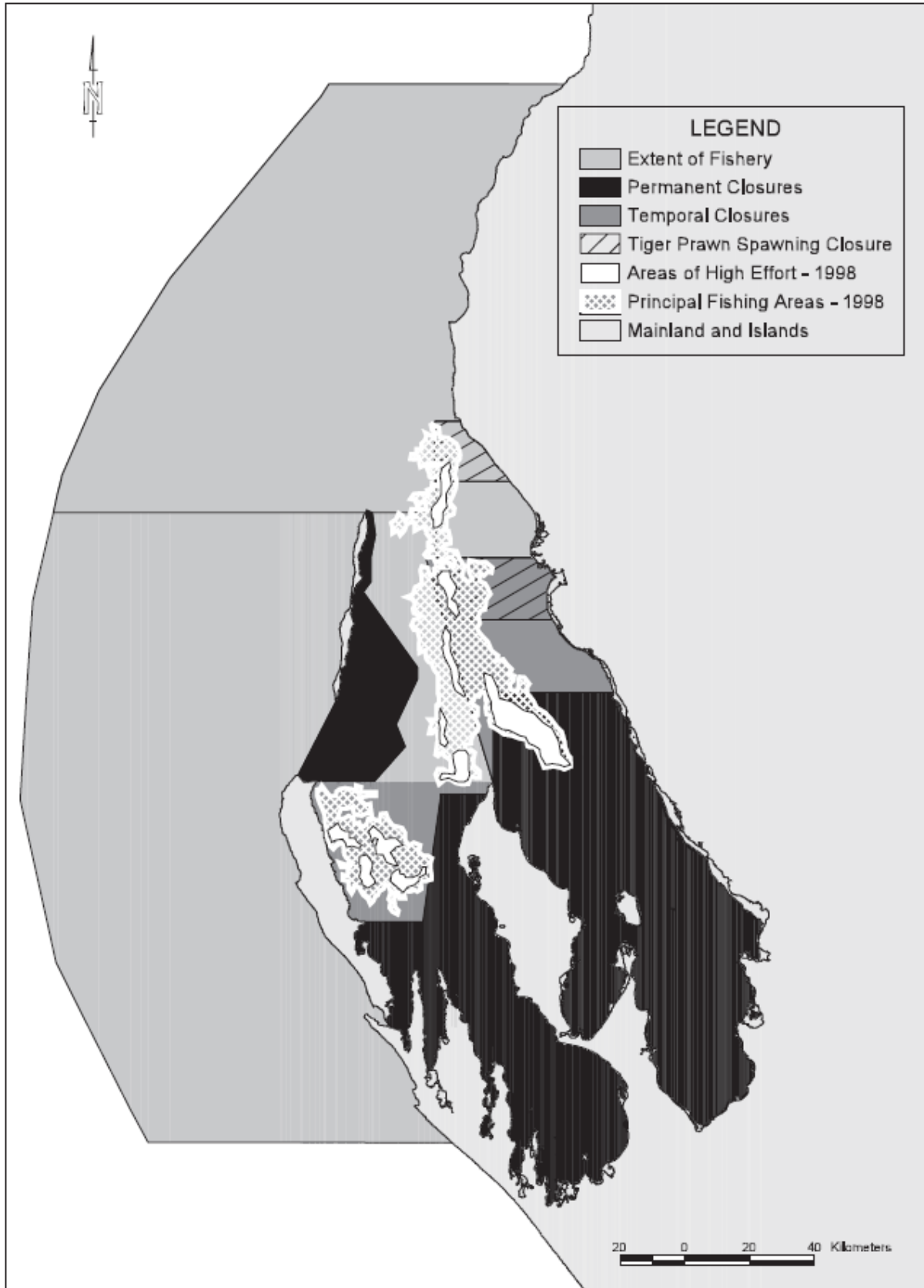


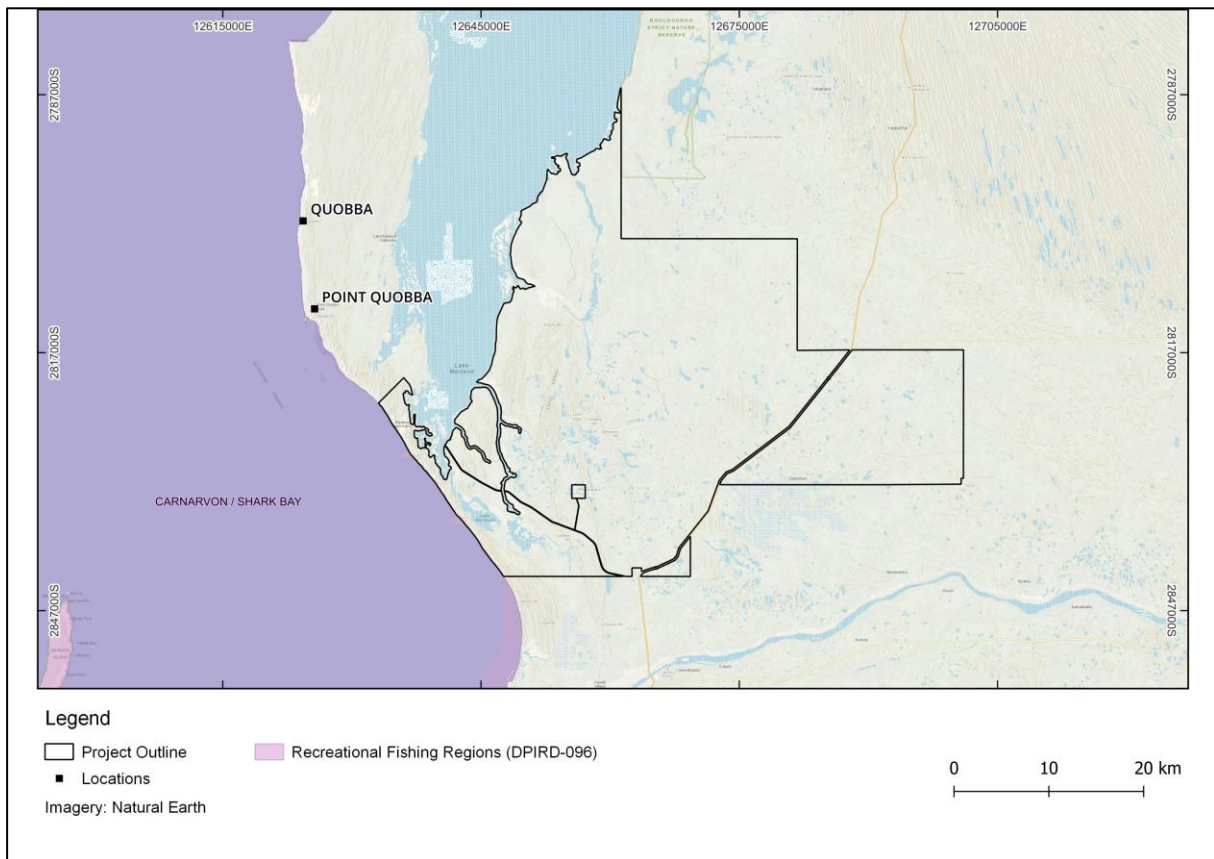
Figure 8: Shark Bay Prawn Fishery Extent (Kangas et al., 2006b)





### 4.2.3 RECREATIONAL FISHING AREAS

In contrast to commercial fishing, where fishing is conducted purely for profit, recreational fishing is used as a leisure activity and provides important economic and social benefits to the people of Australia. The Carnarvon/Shark Bay Fishing Region (Figure 9) is contained within the Gascoyne Coast marine bioregion and spans from just south of Exmouth to just south of Tamala. It spans approximately 20 million hectares of ocean and contains 28 launching locations and eight major boat ramps (Figure 10 & Figure 11).



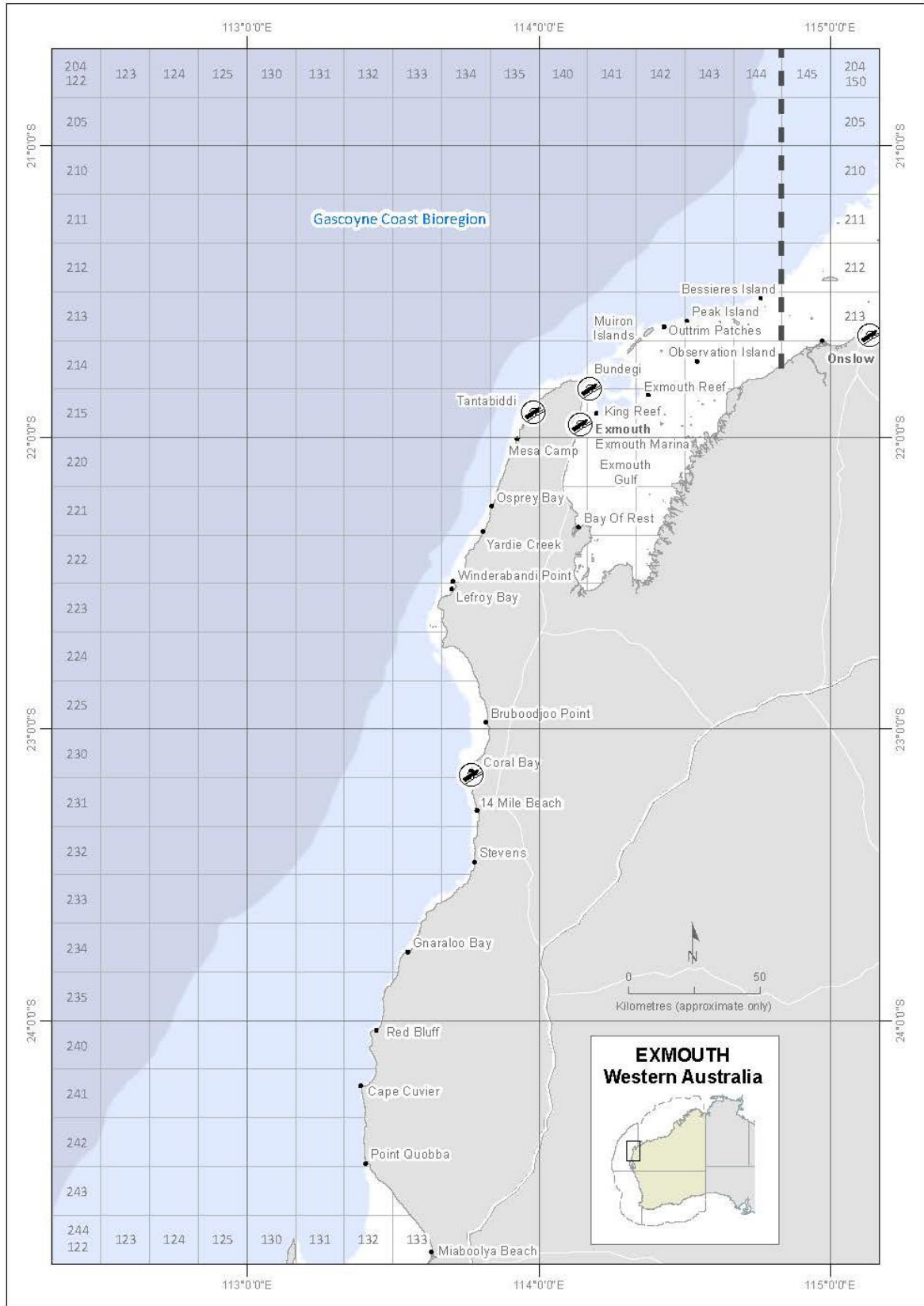
**Figure 9: Recreational Fishing Areas**



**Exmouth**





Major boat ramps  
Launching and fishing locations'

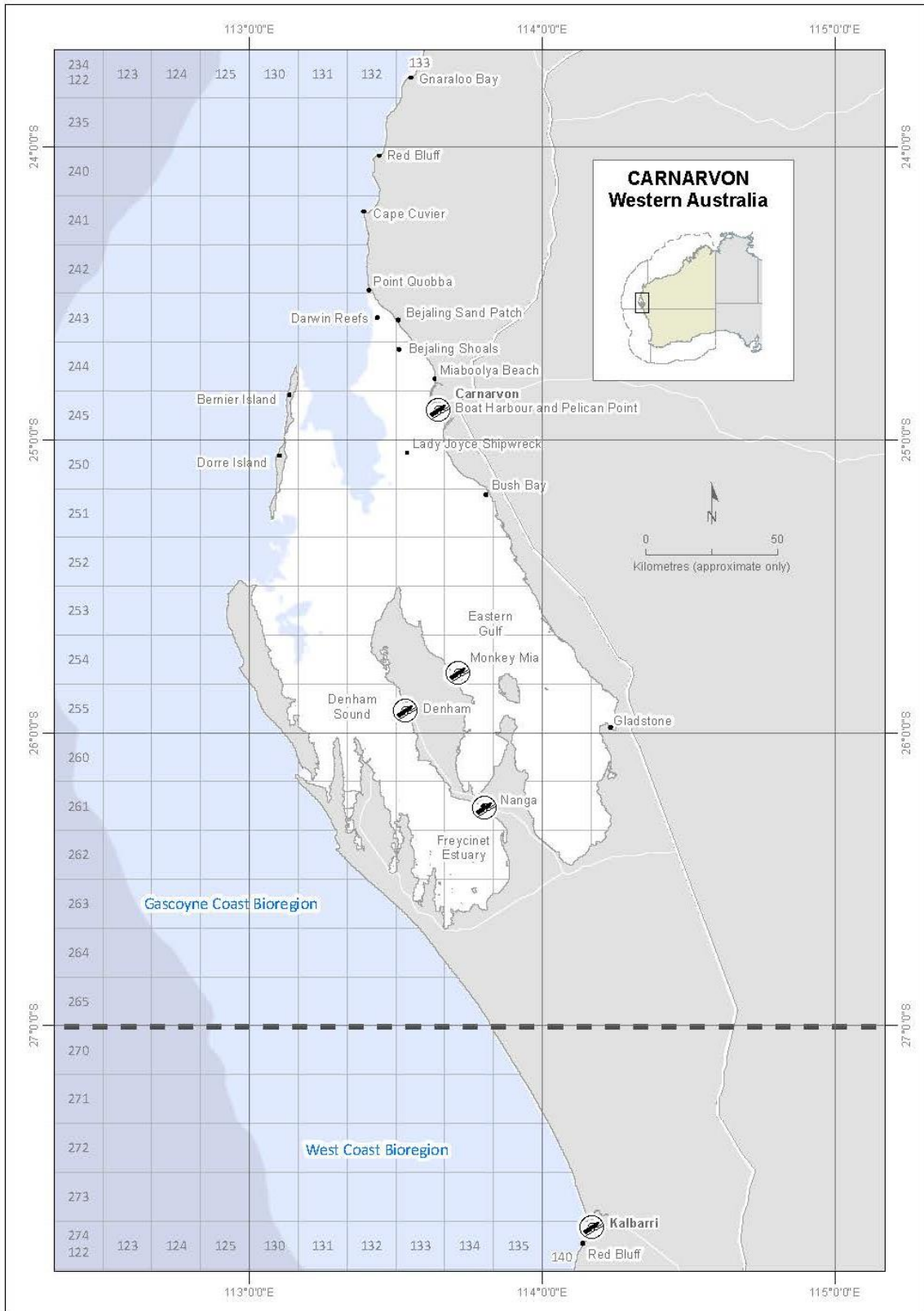


**Figure 10: Exmouth Recreational Fishing Locations**



**Carnarvon**

 Major boat ramps  
 Launching and fishing locations'



**Figure 11: Carnarvon Recreational Fishing Locations**



## 4.3 LAKE MACLEOD

Lake MacLeod is a significant inland wetland system approximately 120 km long and 40 km at its widest, spanning around 220,000 hectares (ha). The lake is the western-most salt lake in Australia and holds the largest inland mangrove communities in WA, and is one of the largest in the world. Additionally, the number of water birds counted at the lake regularly exceeded 20,000 individuals and it provides one of the most important non-tidal migration rest areas for more than 35 species of shorebirds. Its shallow waters house a high abundance of macroinvertebrates that are utilised as food for these species and the lake provides a unique combination of habitats including mangroves, mudflats, and saltmarshes - all of which are scarce in an arid environment.

Dampier Salt Limited (DSL), a company majority owned by Rio Tinto, operates the Lake MacLeod Gypsum Project (Mineral Lease 245SA) on 764 ha of land within Lake MacLeod. DSL chaired the consultation for the nomination of the lake to be considered for Ramsar status in 2006 and were supportive of a Ramsar Listing.

### 4.3.1 PROPOSED CONSERVATION AREAS

Environmental Protection Authority (EPA) Redbook Recommended Conservation Reserves are areas recommended for conservation by the EPA and listed in the Red Book Status Report on the Implementation of Conservation Reserves for WA (EPA, 1993). Lake MacLeod (Figure 12) falls within the Central West Coast area (System Nine) of the Redbook classification system. Due to the presence of DSL's Mineral Lease 245SA (as mentioned previously) within the proposed conservation area, the area cannot be classified as a listed conservation reserve. However, the EPA will be consulted to formulate provisions to protect the environment should the lease be renegotiated.

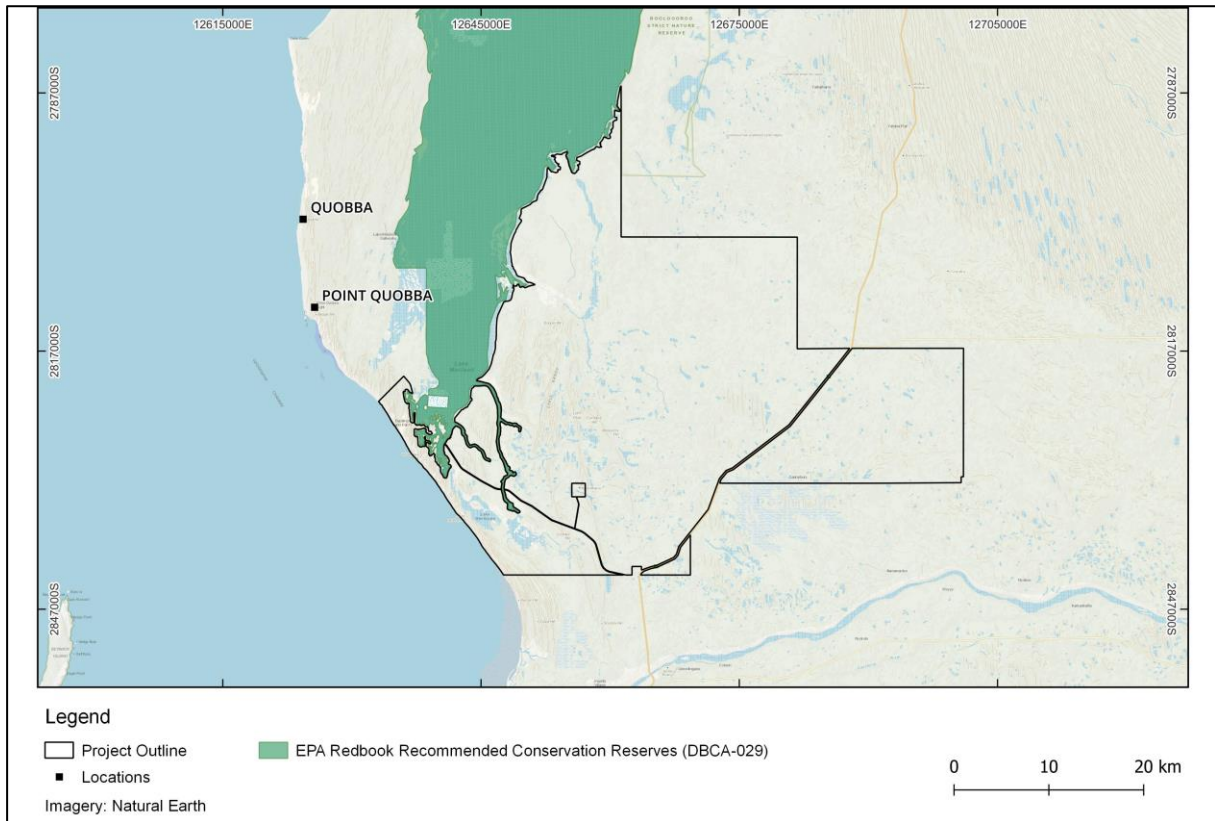
### 4.3.2 ENVIRONMENTALLY SENSITIVE AREAS

Environmentally Sensitive Areas (ESAs) are declared by the Minister for Environment under Section 51B of the *Environmental Protection Act 1986* and can be classified in two ways; as a specified area of the State; or class of areas of the State. ESAs are areas of native vegetation where the exemptions for clearing under the Environmental Protection Regulations 2004 do not apply. Classification as an ESA provides important protection for the area and helps prevent degradation of important environmental values within Lake Macleod (Figure 13) such as the presence of migratory species and a large ecologically important mangrove community.

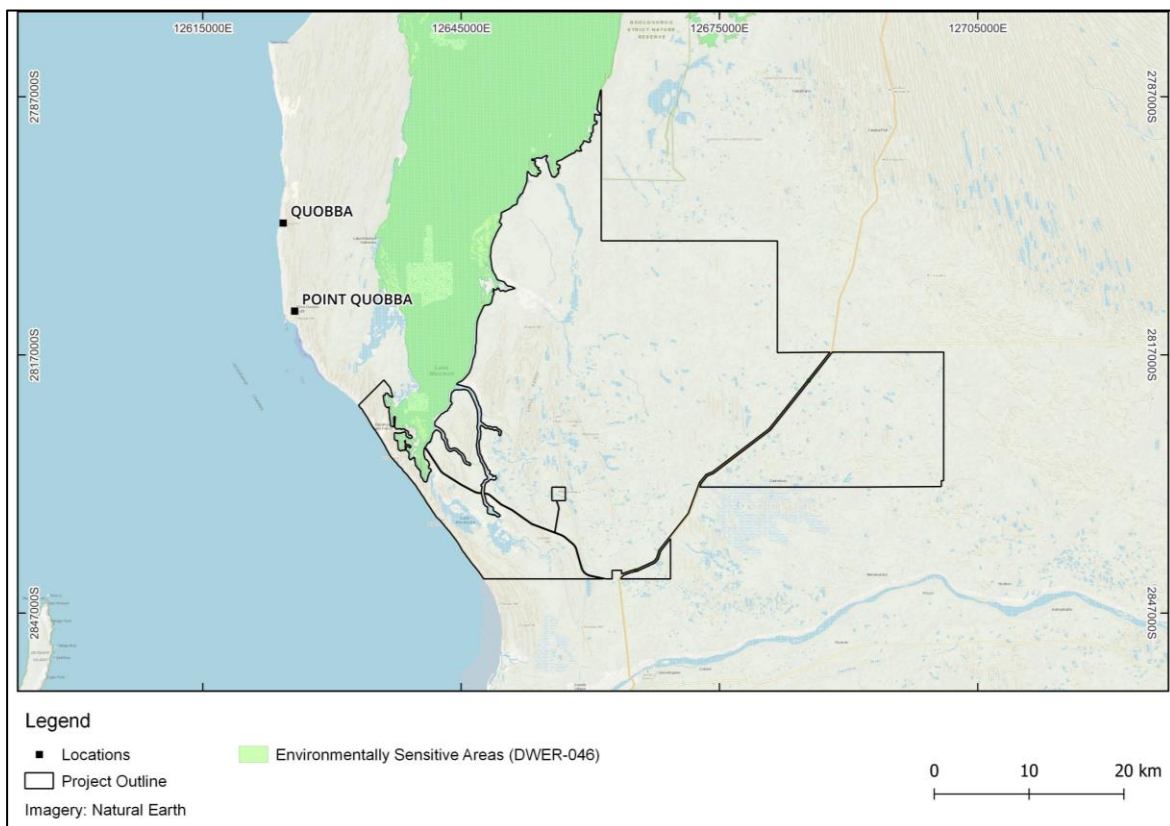
### 4.3.3 PROTECTED WETLANDS

The publication 'A Directory of Important Wetlands in Australia' Third Edition identifies important wetlands and provides a catalogue of unique ecosystems within those wetland systems (Environment Australia, 2001). The information within this document is provided by each State and Territory nature conservation agency and is collated by Environment Australia. Lake MacLeod (Figure 14) contains eight different wetland types and meets five of the six criteria for inclusion as an Important Wetland in Australia as listed by the ANZECC Wetlands Network in 1994. Classification as an Important Wetland in Australia aims to help prevent further loss of important habitat by providing a better understanding of Lake MacLeod's environmental values and location.



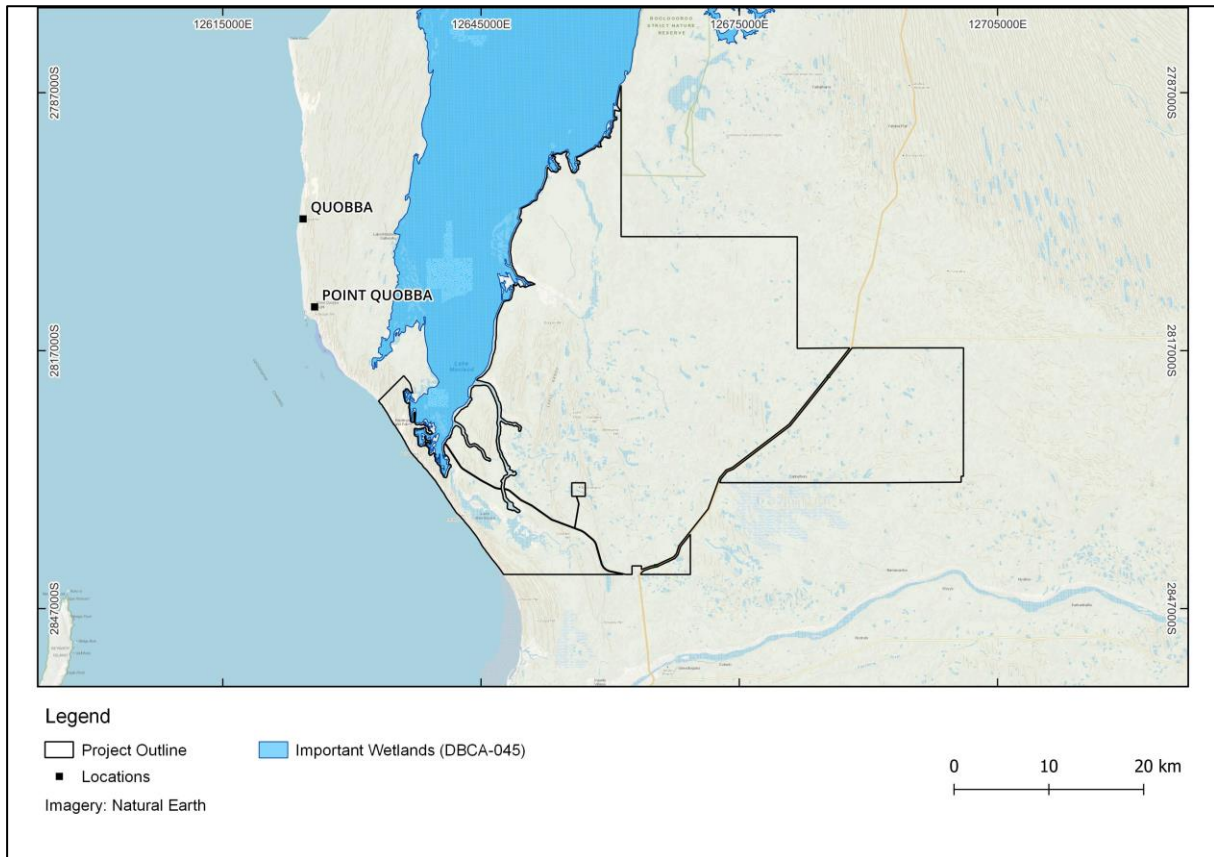


**Figure 12: Proposed Conservation Areas**



**Figure 13: Environmentally Sensitive Areas**





**Figure 14: Protected Wetlands or Waterways**

## 4.4 FLORA

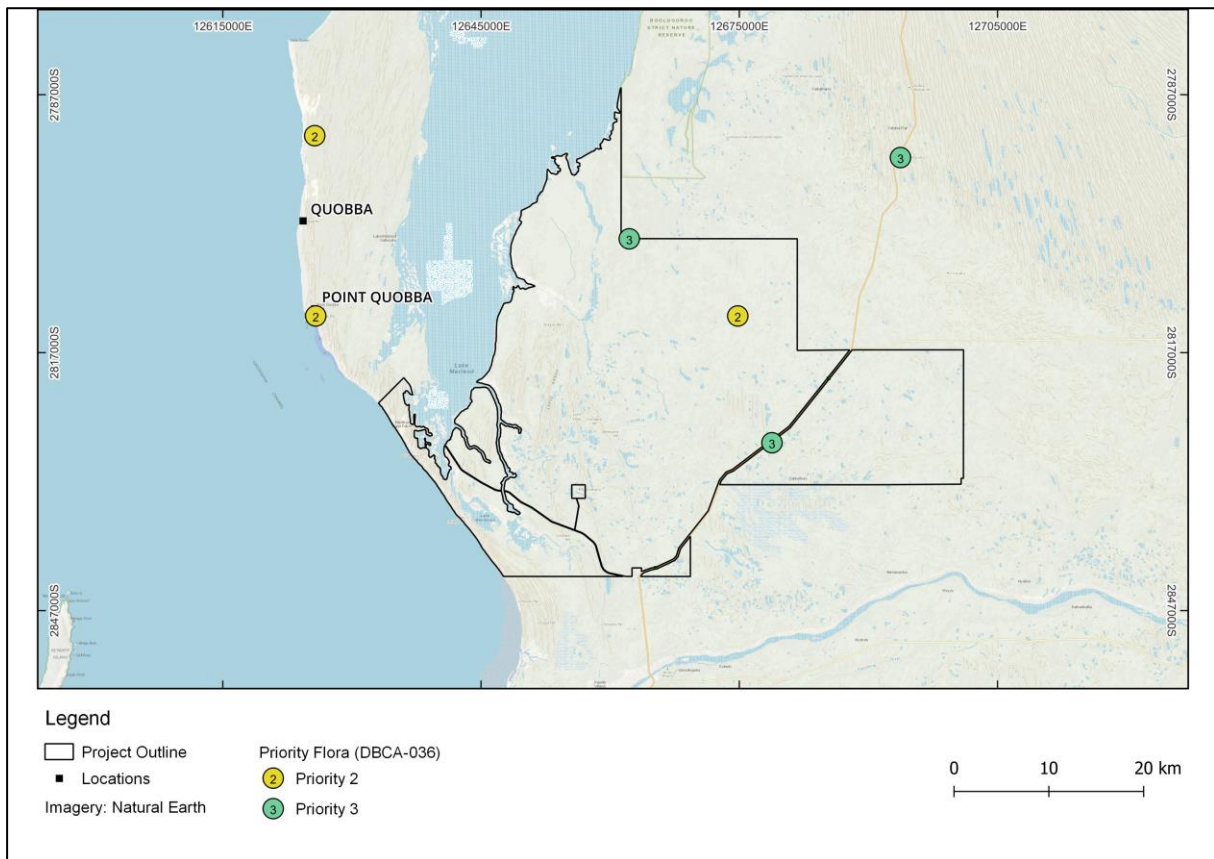
### 4.4.1 PRIORITY FLORA

Priority 1, 2 and 3 flora taxa are species that are possibly threatened but do not currently meet the threatened flora survey criteria or are otherwise poorly known. The Project area contains one known Priority 2 flora record and two known Priority 3 flora records (Figure 15).

The number of Priority Flora within the Project area is likely to be higher, as it has not been extensively surveyed. Obtaining further Priority Flora information will require detailed surveys to determine their presence, population extent and species classification.

Regardless of the results of the survey, Priority Flora (and other significant flora) are usually easy to avoid to a level that is acceptable when projects have a high level of flexibility (such as roads, wind farms, solar farms etc), and where there is extensive native vegetation remaining.





**Figure 15: Priority Flora**

#### 4.4.2 PRIORITY ECOLOGICAL COMMUNITIES

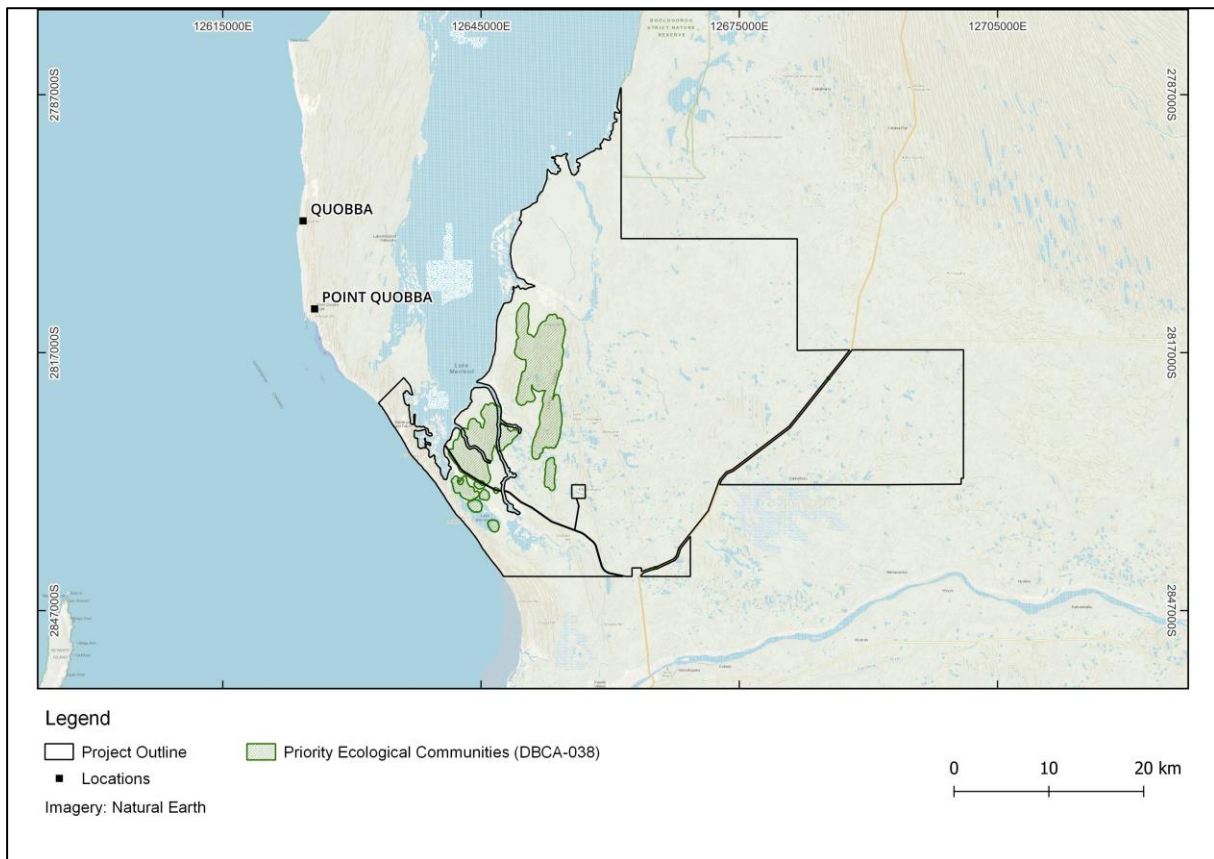
Priority Ecological Communities (PEC) are not regulated under the *Biodiversity and Conservation Act 2016* (BC Act) (unlike Threatened Ecological Communities (TEC)) and are maintained by the DBCA. A comprehensive list is available on DBCA’s website which can be accessed at [www.dbcwa.wa.gov.au/wildlife-and-ecosystems/threatened-ecological-communities](http://www.dbcwa.wa.gov.au/wildlife-and-ecosystems/threatened-ecological-communities).

TECs that do not meet the survey criteria or are not adequately defined are listed as a PEC. PECs often have insufficient information available regarding their distribution to inform the evaluation of their conservation status. PECs can be classified under five priority categories and are ranked in order of priority for survey and/or the definition of the PEC. The Project area contains up to ten areas of PECs of an unknown category level (Figure 16).

Field surveys are required to accurately map the actual boundaries of the PEC (i.e., the polygons shown in Figure 16 have a low level of accuracy) and confirm their PEC classification.

Disturbances to small proportions of PEC’s are common with large-scale projects, however the disturbance will often require offsets to be made acceptable, and the proponent will need to demonstrate why disturbance is necessary in those areas.





**Figure 16: Priority Ecological Communities**

## 4.5 FAUNA

### 4.5.1 THREATENED FAUNA

Threatened fauna are listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and / or under Section 19 or Section 26 of the BC Act, when they face a high risk of extinction in the wild and are divided into three categories: critically endangered, endangered or vulnerable. Once listed under the BC Act, ministerial authorisation is required to disturb or take threatened fauna.

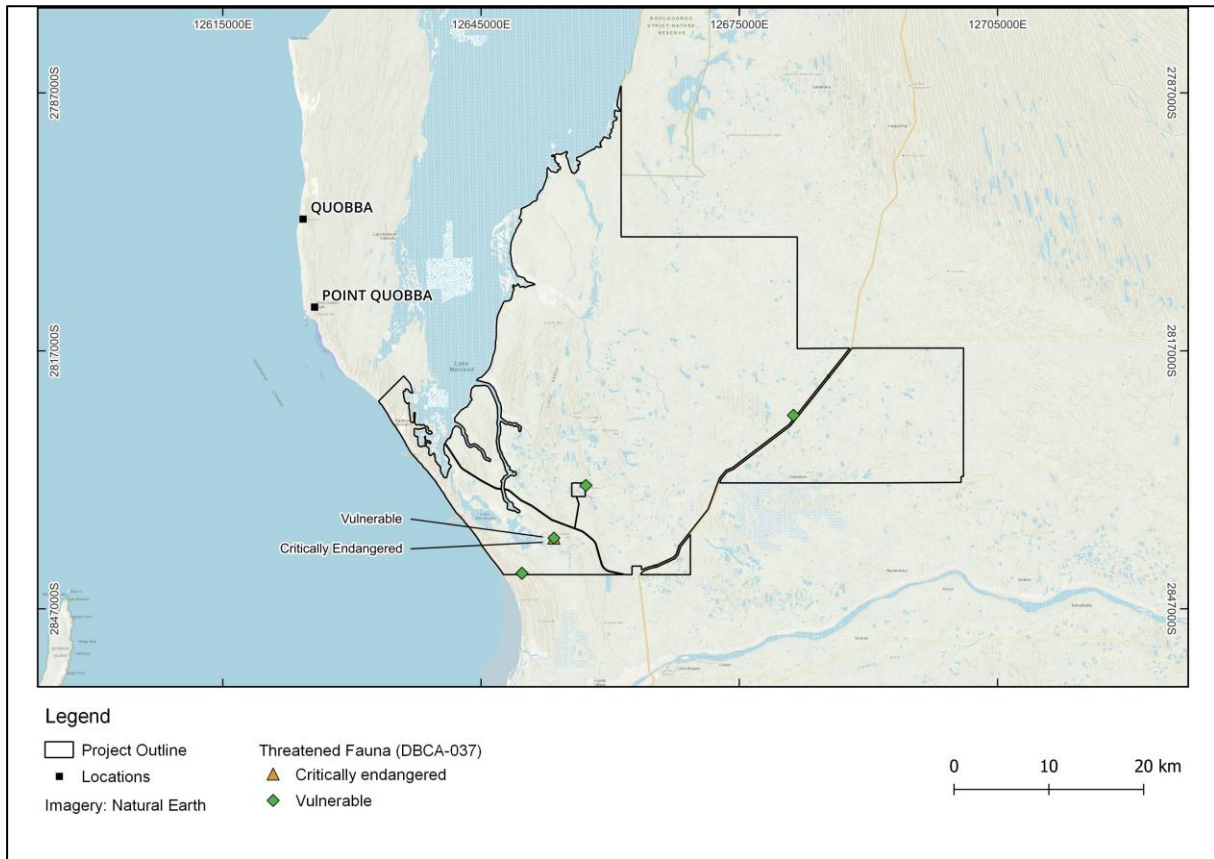
There is one record of a critically endangered species and five records of a vulnerable species within the Project area, all of which are categorised as unnamed bird species (Figure 17).

Data from the Protected Matters Search Tool (Appendix 1) identified a total of 31 EPBC Act-listed Threatened fauna species that may occur in the Project area or offshore. This includes two marine species/habitats that are considered likely to occur in the Project area; the conservation dependent Southern Bluefin Tuna (*Thunnus maccoyii*) and the endangered Southern Right Whale (*Eubalaena australis*).

Further information on the Threatened fauna present in the Project area will require detailed surveys to determine their extent and DBCA species classification.







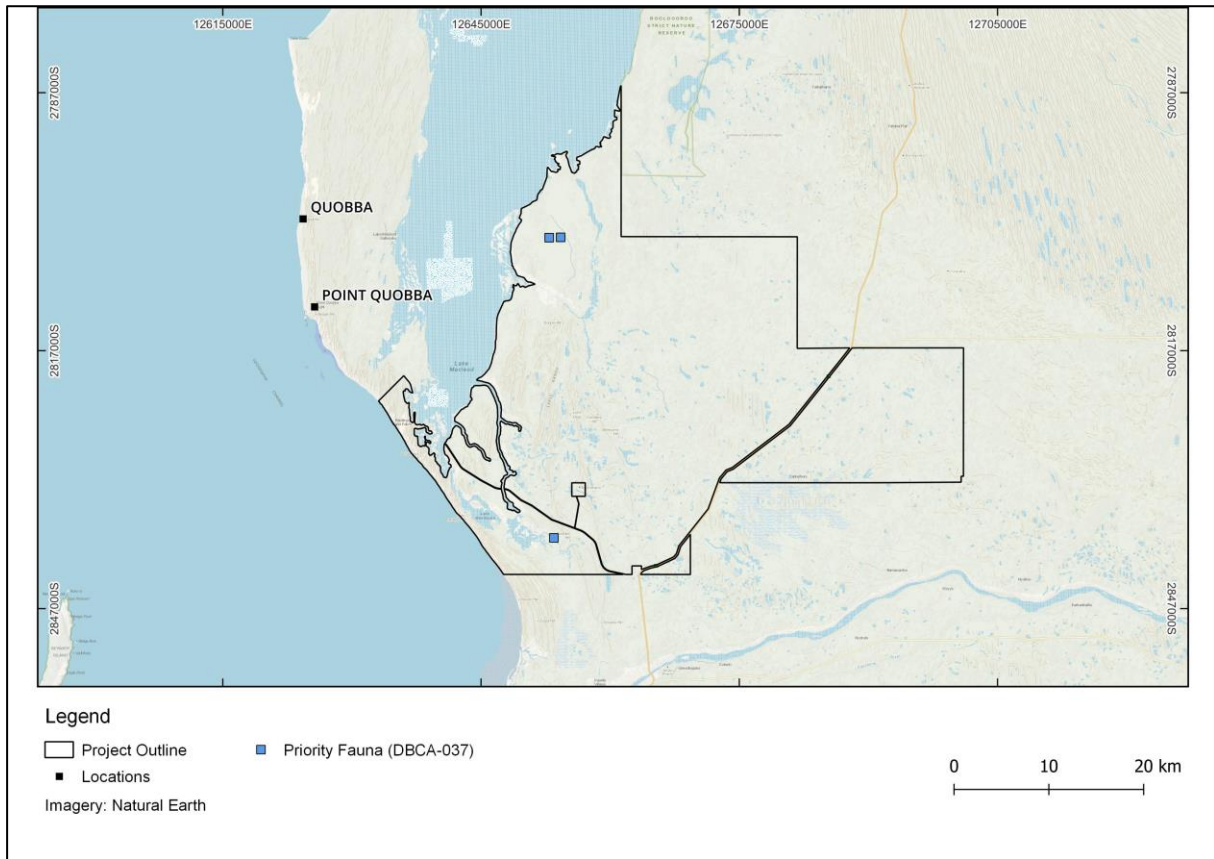
**Figure 17: DBCA Threatened Fauna**

### 4.5.2 PRIORITY FAUNA

Priority fauna are listed by the DBCA and categorised into Priority 1, 2 and 3. Priority Fauna are species that are possibly threatened and do not meet the survey criteria for threatened fauna or are otherwise poorly known. One record of a Priority 4 species and two records of Priority 3 species occur within the Project area, consisting of one bird and two invertebrate species respectively (Figure 18).

Further information on the Priority fauna present in the Project area will require detailed surveys to determine their extent and species classification.





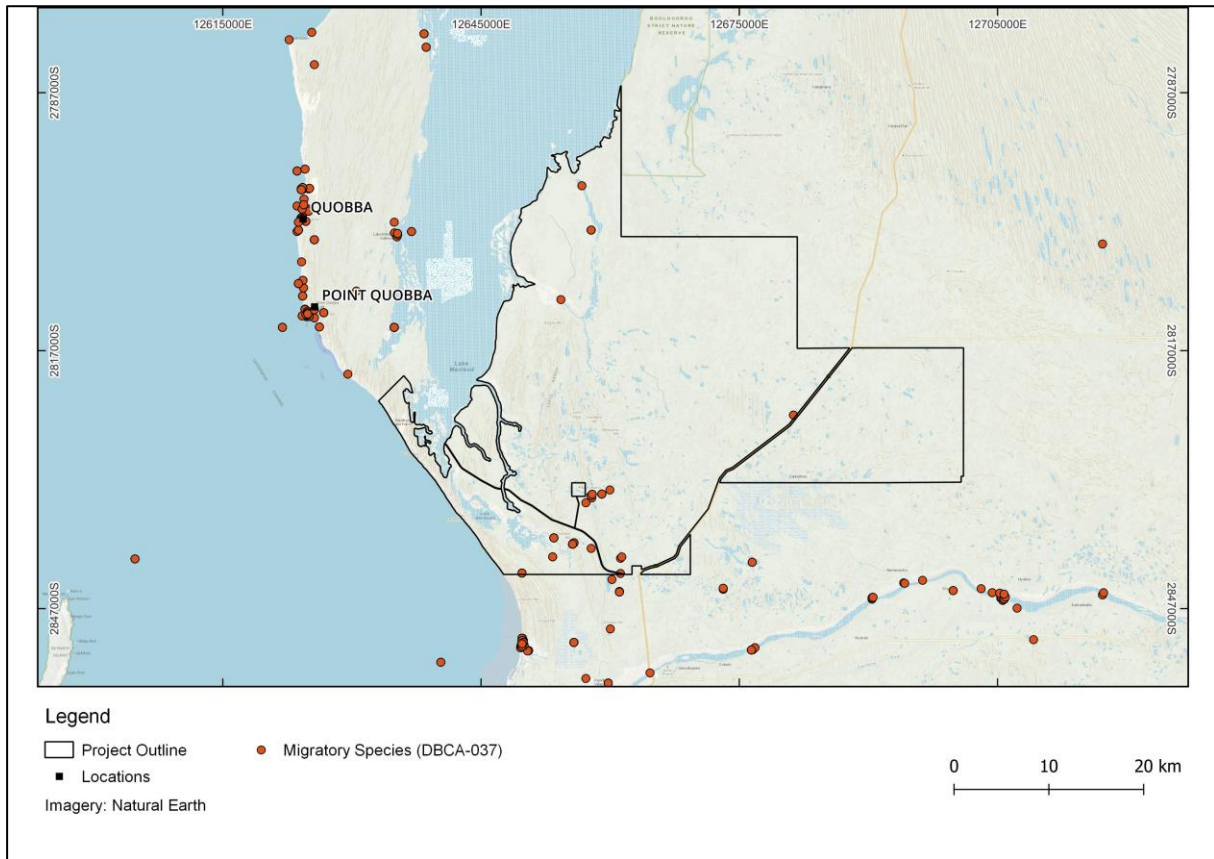
**Figure 18: Priority Fauna**

### 4.5.3 MIGRATORY FAUNA

Migratory fauna are listed under the EPBC Act and / or Section 13 of the BC Act and are a sub-classification within the specially protected species category. Migratory fauna are species that periodically or occasionally visit Australia or are subject to an international protection via a migratory species agreement. There are 78 migratory bird records present within the Project area and surrounds (Figure 19). As shown in Figure 19, these records collate to waterbodies, including the coastline, inland wetlands and watercourses. Data from the Protected Matters Search Tool (Appendix 1) identified a total of 44 EPBC Act-listed Migratory fauna species that may occur in the Project area or offshore.

DBCA does not display the specific Migratory fauna species name in their database without the proponent requesting a database search and paying a search fee, however Appendix 1 provides a reasonable prediction of the species that may occur. Further information on the Migratory fauna present in the Project area will require detailed surveys to determine their extent and species classification.





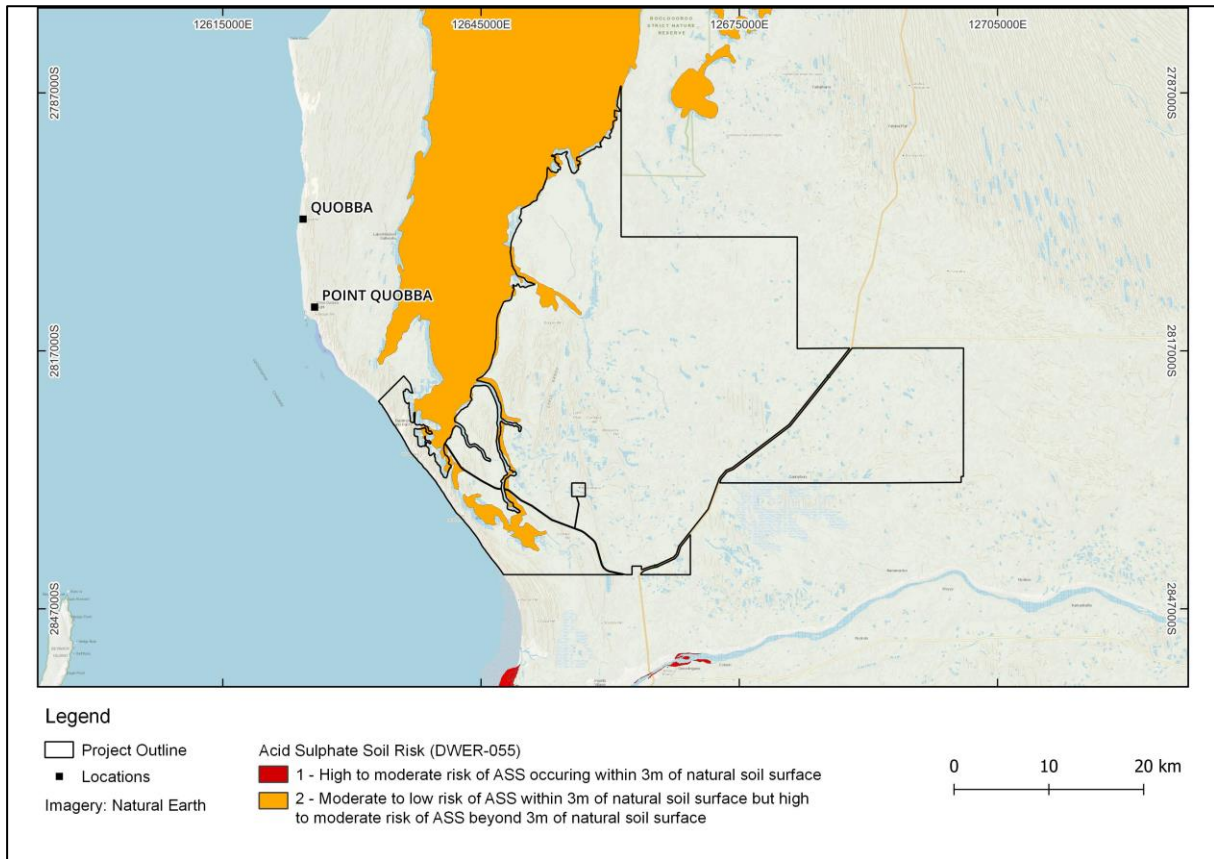
**Figure 19: Migratory Fauna**

## 4.6 ACID SULPHATE SOILS

Soils or sediments that contain iron sulphides (commonly pyrite) are described as Acid Sulphate Soils (ASS). Sulphides form naturally in soils that have consistent water-logged conditions (often in low lying areas). Once they are exposed to air, the oxidation reaction results in the production of sulfuric acid which can cause damaging flow-on effects. ASS that have not yet been exposed to air are referred to as potential acid sulphate soils (PASS). When PASS are waterlogged and in an undisturbed environment they are benign and do not produce acid.

The Project area has areas of moderate to low risk of ASS occurring within 3 m of the natural surface but a high to moderate risk of ASS occurring beyond 3 m (Figure 20). As the Project area has not been extensively surveyed, accuracies of the extent of ASS and PASS are undetermined, however will generally align with low-lying waterlogged areas. Detailed surveys are required to establish the extent of PASS and to prevent or manage their future disturbance.





**Figure 20: Acid Sulphate Soils**

## 4.7 ABORIGINAL HERITAGE

Aboriginal Heritage Sites and Places provide significant cultural value for the Aboriginal People of Australia and continue the important link between present and past culture.

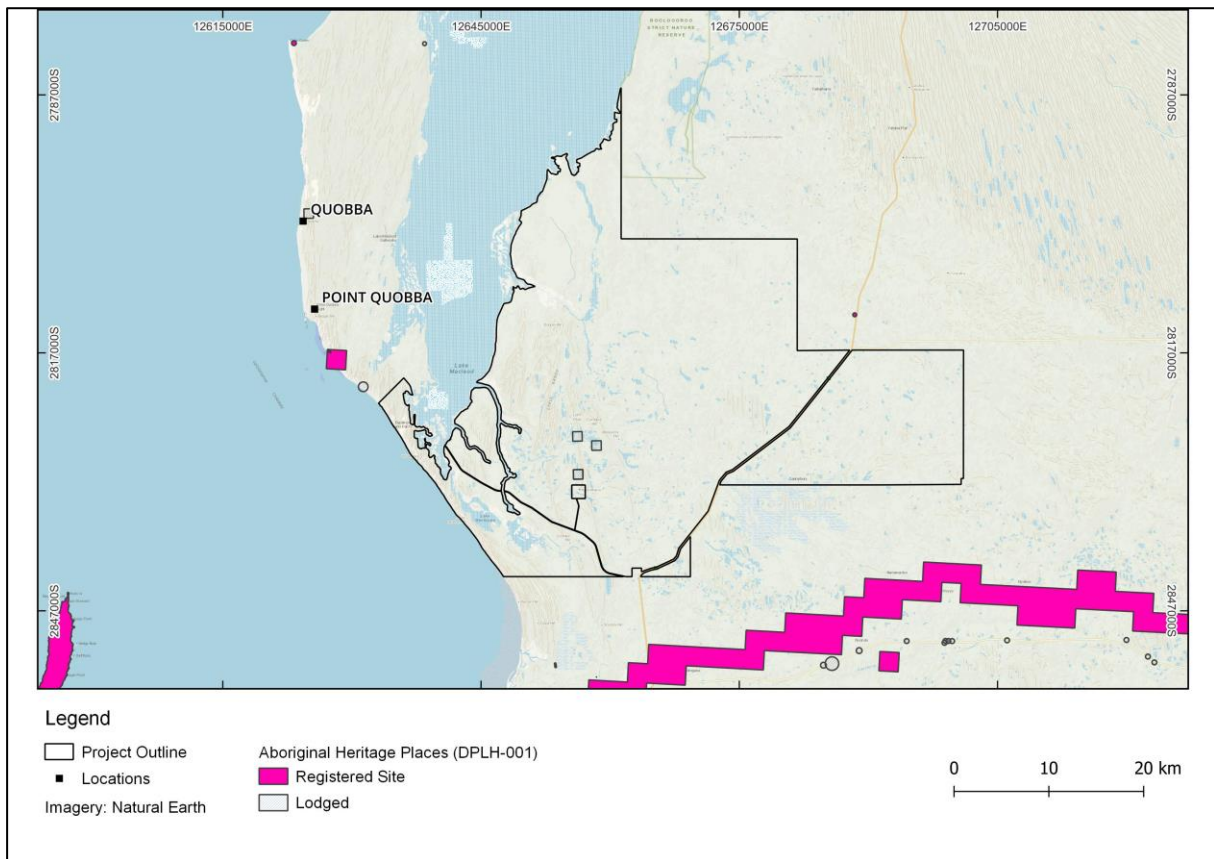
Three lodged Aboriginal Heritage Places are present within the Project area:

- The Boolathana West Claypan - 11047 (Artefacts / Scatter, Camp, Plant Resource);
- The Telegraph Claypan - 11050 (Artefacts / Scatter); and
- The Boolathana Homestead 1, Boolathana Homestead 2, and Boolathana Claypan – 11048, 11046, 11045 (Artefacts / Scatter, Burial, Camp, Water Source).

Lodged Aboriginal Heritage Places are areas that have been reported to the Registrar of Aboriginal Sites, but an assessment has not been completed to see if it meets the criteria under Section 5 of the *Aboriginal Heritage Act 1972* to be classed as a Registered Site.

Figure 21 does not display an exhaustive list of Aboriginal Heritage areas and is accurate up to 30 June 2023. Detailed surveys should be undertaken with Traditional Owners to determine the presence and extent of Aboriginal Heritage Places and Sites within the Project area.





**Figure 21: Registered Aboriginal Heritage Sites or Places**

## 5 HIGH LEVEL ENVIRONMENTAL IMPACT ASSESSMENT

Preston Consulting prepared a list of potential environmental impacts that could occur as a result of the implementation of the Project. Only key potential impacts were included in the list, those that have the potential to require detailed studies and assessments during the EIA phase.

Each of these potential impacts were then assessed against the key environmental values identified in Table 1 to identify whether they could potentially be impacted using a ‘no mitigation’ assumption. Where a potential impact was identified, it was then ranked from low to high potential impact. This information was then used to inform the Red Flag MCA (Section 6).

Appendix 2 summarises the outcomes of this impact assessment.

To inform this assessment, cumulative impacts within 100 km of the Project were reviewed and one significant proposal (a proposal referred under Part IV of the *Environmental Protection Act 1986 (WA)*) was located within this boundary (Figure 22). However, this is a small-scale urban expansion project that has been in development by the Shire of Carnarvon since 1994 and therefore did not affect the assessment. The only other notable project is the Lake MacLeod operation already described in Section 4.3.



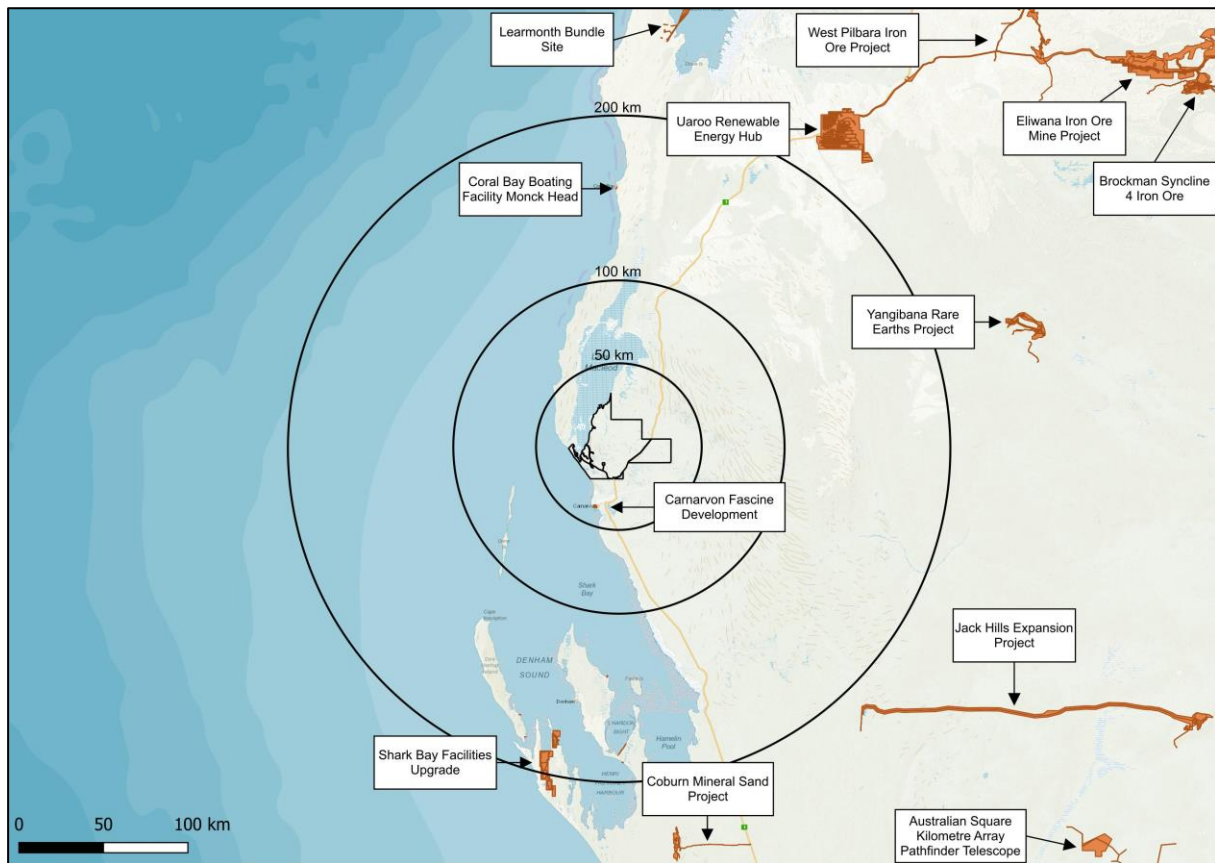


Figure 22: Nearby Significant Proposals

## 6 RED FLAG MULTI-CRITERIA ASSESSMENT

### 6.1 PROCESS

The potential impacts that were ranked as moderate or high were transferred into the Red Flag MCA for further assessment. A total of 166 different impacts were assessed. The Red Flag MCA assessed each impact against six categories, each weighted according to importance as specified by GGE:

1. **Approval Risk**, 30% weighting – the influence that each impact has in obtaining environmental approval for the Project;
2. **Management requirements**, 15% - the complexity and cost of management requirements to mitigate that impact;
3. **Public perception**, 10% - the level of public interest in that impact;
4. **Study requirements**, 15% - the complexity and cost of study requirements to inform the impact assessment and management planning for that impact;
5. **Schedule**, 10% - the time required to conduct studies and develop adequate management strategies to mitigate that impact; and
6. **Flexibility**, 20% - the number of available options that could be implemented to avoid or minimise that impact.

Each of the assessed impacts were then given a score from 0 – 10, based on set criteria for each category, detailed in Table 2. The scores were determined by Gavin Edwards, a specialised EIA consultant, with more than 18 years' experience in the EIA field. Impacts were assessed on the



basis that industry-standard avoidance and minimisation mitigation measures would be implemented, for example:

- Marine fauna exclusion zones would be implemented during piling, heavy marine construction or any marine activities where fauna could be injured;
- Lighting would be installed in such a manner that would minimise impacts to shorebirds and turtle hatchlings;
- Infrastructure would be located to avoid or minimise impacts to significant areas such as Registered Aboriginal Heritage, Threatened Flora, restricted Threatened Fauna habitats, significant creeklines, and other features that may be found during the detailed surveys; and
- Pollution risks and changes to hydrology within the Lake MacLeod catchment will be able to be minimised such that the risks to the lake and surrounding catchment are not significant.

Table 2: MCA scoring criteria

Score, description & general criteria	Approval risk	Management requirements	Public perception	Study requirements	Schedule	Flexibility
0 = Unacceptable. Unacceptable in every aspect, unable to be approved or designed such that it can be made acceptable	Impacts are expected to be too great to allow it to be approved	Extensive and highly restrictive management requirements / conditions to control impacts	Extremely negative public perception	Large number of extensive and specific studies required, including peer reviews	Requires 36+ months to investigate and develop proposed mitigation	No opportunity for alternative options
2 = Detrimental. Project impact is significant, no guaranteed approval but can potentially be made acceptable with significant effort	Unlikely to be approved unless significant supporting evidence and management options are available	Some highly restrictive management requirements / conditions to control impacts	Negative public perception	Multiple specific studies required, including peer reviews	Requires 24+ months to investigate and develop proposed mitigation	Minimal opportunity for alternative options
4 = Below Standard. Project impact is significant, but industry best-practice options are available that would make it acceptable	Will not be approved unless clear outcomes can be defined for several factors	Several detailed management plans required	Slightly negative public perception	Specific studies required	Requires 12+ months to investigate and develop proposed mitigation	Opportunity for alternative options at cost
6 = Acceptable. Meets expectations and all minimum requirements. Able to be approved with clear precedence	Approval possible with clear precedence	Low intensity management plans required	Neutral public perception	General studies required	No likely schedule impact	Opportunity for alternative options at low cost
8 = Very Good. Exceeds expectations; risk deemed acceptable	Approval likely with clear precedence	Minimal management required	Positive public perception	Desktop studies required	No schedule impact	Opportunity for alternative options at no cost
10 = Exceptional. Far exceeds expectations with no added risk	No approval risk	No management required	Extremely positive public perception	No studies required	No time requirements	Full flexibility - no restrictions



## 6.2 RESULTS

The Red Flag MCA is provided in Appendix 3. It assessed 166 different impacts and grouped them into categories that aligned with the MCA scores detailed in Table 3.

Table 3: MCA outcome range

Score range	Category	Description	No. of impacts in this category
0-2	Unacceptable	Unacceptable in every aspect, unable to be approved or designed such that it can be made acceptable	0
2-4	Detrimental	Project impact is significant, no guaranteed approval but can potentially be made acceptable with significant effort	0
4-6	Below standard	Project impact is significant, but industry best-practice options are available	53
6-8	Acceptable	Meets expectations and all minimum requirements. Able to be approved with clear precedence	114
8-10	Very Good	Exceeds expectations; risk deemed acceptable	0
10	Exceptional	Far exceeds expectations with no added risk	0

The scores ranged from 2.6 - 7.6, falling to three categories; Detrimental, Below Standard and Acceptable. Note that impacts classified as 'Low' in the High-level EIA in turn did not require further assessment in the Red Flag MCA. If assessed those scores would be expected to be in the 7.6 - 10 range.

### 6.2.1 IMPACTS IN THE 'UNACCEPTABLE' AND 'DETRIMENTAL' CATEGORIES

No impacts were assessed as being in these categories in the Red Flag MCA. This means that no single impact was so great that it could not be approved or ever be designed such that it can be made acceptable. As stated in Section 6.1, this outcome was based on an assumption that industry-standard avoidance and minimisation mitigation measures would be implemented.

### 6.2.2 IMPACTS IN THE 'BELOW STANDARD' CATEGORY

Fifty-three impacts were assessed as being in this category in the Red Flag MCA. These impacts were assessed as being significant, but standard industry best-practice mitigation measures are available that would likely make these impacts acceptable to EPA and the Department of Climate Change, Energy, the Environment and Water (DCCEEW). These impacts will require specific study effort and will also likely be key issues for the formal EIA process with the EPA and DCCEEW, and conditions would likely be applied to enforce the implementation of the required mitigation measures. Several worst-ranked impacts in this category are discussed in Section 7.

### 6.2.3 IMPACTS IN THE 'ACCEPTABLE' CATEGORY

A total of 114 impacts were assessed as being in this category in the Red Flag MCA. These impacts were assessed as being acceptable if industry standard mitigation measures are implemented. These impacts are able to be clearly quantified with clear precedence from other projects. Some conditions may be required to enforce the implementation of the required mitigation measures.





## 6.2.4 IMPACTS IN THE 'VERY GOOD' AND 'EXCEPTIONAL' CATEGORIES

No impacts were assessed as being in these categories in the Red Flag MCA. This is due to the impacts classified as 'Low' in the High-level EIA not being carried through to the assessment in the Red Flag MCA. It is likely that if those impacts were assessed those scores would be expected to be in this category.

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# 7 KEY FINDINGS

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## 7.1 VEGETATION CLEARING

The clearing of approximately 7,285 ha of vegetation featured in six of the 13 worst-ranked impacts:

- Areas used for cultural purposes or of cultural value – score of 4.0;
- General flora and vegetation – 4.4;
- General terrestrial fauna (habitat) – 4.4;
- Threatened and Priority Fauna – 4.4;
- Priority Ecological Communities – 4.4; and
- Migratory fauna – 4.4.

The scores for these impacts were due to the large amount of the vegetation clearing, and the broad area that would be affected. This amount of clearing has been assessed numerous times before by the EPA (for major mining projects, salt projects, and the Australian Renewable Energy Hub for example), however it was a key issue in those assessments.

Several factors will be key to obtaining approval for this amount of clearing:

- The area will need to be adequately surveyed for flora, vegetation, and fauna, to ensure that the regulators are able to assess the clearing using accurate information;
- The Project will need to be designed to avoid and minimise interactions with key environmental values found during those surveys, such as:
  - Avoiding areas of restricted fauna habitats such as creeklines, rocky outcrops, wetlands, salt pans etc. where practicable;
  - Relocating clearing to avoid Aboriginal Heritage sites, areas of significant cultural value, and significant flora records;
  - Reducing the proportion of clearing within PEC boundaries, locally significant vegetation or fauna habitat, or areas where traditional cultural activities take place; and
- Consultation with the Traditional Owners will be critical, as this will be an impact on their country. This may require several years of consultation, with numerous on-country meetings.



## 7.2 LIGHT EMISSION IMPACTS ON FAUNA

Light emissions during export operations were identified as being the equal worst ranked impact in the Red Flag MCA, in particular the subsequent impacts to marine turtles and migratory shorebirds. In addition:

- Light impacts during marine and coastal construction featured in two other impacts in the top 13; and
- Light, noise and human interaction impacts on terrestrial fauna also featured in two other impacts in the top 13.

For reference, the text in this section has been summarised from the *National Light Pollution Guidelines for Wildlife*, which can be accessed at [www.dccew.gov.au/environment/biodiversity/publications/national-light-pollution-guidelines-wildlife](http://www.dccew.gov.au/environment/biodiversity/publications/national-light-pollution-guidelines-wildlife).

Vision is a critical cue used by wildlife to orient themselves in their environment, find food, avoid predation and communicate. Artificial light is known to adversely affect many fauna species. It can change behaviour and/or physiology, reducing survivorship or reproductive output. It can also have the indirect effect of changing the availability of habitat or food resources. It can attract predators and invasive pests, both of which may pose a threat to listed species.

Behavioural changes in wildlife have been well described for some species. Adult marine turtles may avoid nesting on beaches that are brightly lit, and adult and hatchling turtles can be disoriented and unable to find the ocean in the presence of direct light or skyglow. Similarly, lights can disorient flying birds, particularly during migration, and cause them to divert from efficient migratory routes or collide with infrastructure. Birds may starve when artificial lighting disrupts foraging, and fledgling seabirds may not be able to take their first flight if their nesting habitat never becomes dark. Migratory shorebirds may use less preferable roosting sites to avoid lights and may be exposed to increased predation where lighting makes them visible at night.

In the absence of survey data, marine turtles and shorebirds have been assumed to be present regularly or on occasion within the area that could be impacted by light from the Project (estimated 20 km from the nearest light source). The habitats where these species could occur are remote and are unlikely to currently be significantly impacted by artificial light. The lighting of export and other coastal infrastructure such as stockyards, vessels, and desalination plant have the potential to impact the behaviour of these species.

If these species are shown to occur in proximity to the Project, then measures will need to be implemented to minimise lighting impacts. This could include:

- Avoiding areas of known high aggregations of marine turtles and shorebirds;
- Using lights only where necessary;
- Lighting design to minimise horizon glow and direct light emissions; and
- Locating infrastructure further inland if possible.

## 7.3 VESSEL STRIKE

Vessel strike impacts featured in the top four worst-ranked impacts. These rankings reflect that vessels (both construction and export) will need to traverse through areas known to be inhabited



by marine megafauna such as dugong, whales, dolphins, and turtles, including important migration pathways and a Biologically Important Area for Humpback Whale migration.

The reasons for the low score on these impacts was primarily due to two categories; public perception and flexibility, both which received a score of only two out of ten. Public perception was scored two because of the likely public attention and opposition to an export operation between the key ecological areas of Shark Bay and Ningaloo / Exmouth Gulf. Activists for both areas may have vocal opposition to additional vessels passing through key marine fauna movement areas, including Humpback Whale migration pathways. Flexibility was scored two due to the lack of other viable options – the vessels must pass through these areas to reach the open sea.

It should be noted however that large export vessels are generally slow-moving and marine fauna death or serious injury from vessel strike is rare with these vessels. Mitigation measures such as fauna spotters or reporting of marine fauna to other vessels can also reduce this risk further.

## 7.4 OTHER IMPACTS OF NOTE

Other impacts that were reflected in the top 20 included:

- Light and noise impacts on significant fauna species from Project construction and operation (i.e., inland infrastructure such as wind towers, processing plants etc.);
- Impacts to significant marine fauna species from ammonia or hydrocarbon spills into the marine environment; and
- Restriction of access to areas traditionally used for cultural purposes by the Traditional Owners, and a reduction in amenity for the Traditional Owners when utilising those areas.

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## 8 SUMMARY AND RECOMMENDATIONS

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The Red Flag MCA identified that no single Project impact was so great that it could not be approved or ever be designed such that it can be made acceptable. As stated in Section 6.1, this outcome was based on an assumption that industry-standard avoidance and minimisation mitigation measures would be implemented. There were however 53 impacts that fell below the 'Acceptable' category. Those impacts require a detailed EIA and the implementation of specific mitigation measures to ensure that they can be made acceptable.

The study phase, EIA and approval process for a project of this scale will be extensive. If GGE seeks to continue investigating the Project, it is recommended that a detailed approvals and study scoping assessment be completed. This assessment should:

- Detail the full list of environmental studies that will need to be completed to inform the EIA process;
- Provide estimated costs to complete the studies;
- Provide a list of potential consultants that could undertake each study;
- Provide study timeframes and linkages to approval processes;
- Detail the full list of environmental approvals that will be required to implement the Project;
- Provide a high-level schedule for the study and approvals phase, with linkages provided where relevant; and
- Provide estimated costs for the development of approval documentation, and the likely Government assessment fees for each approval process.



## 9 GLOSSARY

<b>Term</b>	<b>Meaning</b>
ANZECC	Australian and New Zealand Environment and Conservation Council
ASS	Acid Sulphate Soils
BC Act	<i>Biodiversity Conservation Act 2016</i>
BCH	Benthic Communities and Habitat
BIA	Biologically Important Area
DBCA	Department of Biodiversity, Conservation and Attractions
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DSL	Dampier Salt Limited
EIA	Environmental Impact Assessment
EPA	Environmental Protection Authority
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
ESA	Environmentally Sensitive Area
FHPA	Fish Habitat Protection Area
GGE	Gascoyne Green Energy (Operations) Pty Ltd
ha	Hectares
IMMA	Important Marine Mammal Area
km	Kilometre
m	Metre
MCA	Red Flag Multi-Criteria Assessment
PASS	Potential Acid Sulphate Soils
PEC	Priority Ecological Community
TEC	Threatened Ecological Community
The Project	Gascoyne Green Energy Boolathana Project
WA	Western Australia



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## 10 REFERENCES

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- Department of Climate Change, Energy, the Environment and Water. (2023). *Protected Matters Search Tool*. Retrieved August 10, 2023, from Department of Climate Change, Energy, the Environment and Water: <https://pmst.awe.gov.au/>
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- Environmental Protection Authority. (2023). *Statement of environmental principles, factors, objectives and aims of EIA*. Western Australia: EPA.
- EPA. (1993). *Red Book status report (1993) on the implementation of conservation reserves for Western Australia as recommended by the Environmental Protection Authority (1976-1984)*. Perth: Environmental Protection Authority .
- Kangas, M., McCrea, J., Fletcher, W., Sporer, E., & Weir, V. (2006b). *Shark Bay Prawn Fishery ESD Report Series No. 3*. Western Australia: Department of Fisheries.
- Kangas, M., Weir, V., Fletcher, W., & Sporer, E. (2006a). *Shark Bay Scallop Fishery ESD Report Series No. 2*. Western Australia: Department of Fisheries.
- Marine Mammal Protected Areas Task Force. (2020). *Western Australian Humpback Whale Migration Route IMMA*. Retrieved August 11, 2023, from Marine Mammal Protected Areas Task Force: <https://www.marinemammalhabitat.org/portfolio-item/western-australian-humpback-whale-migration-route/>
- Newman, S., Wise, B., Santoro, K., & Gaughan, D. (. (2023). *Status Reports of the Fisheries and Aquatic Resources of Western Australia 2021/22: The State of the Fisheries*. Western Australia: Department of Primary Industries and Regional Development.



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# **APPENDIX 1: PROTECTED MATTERS SEARCH TOOL RESULTS**

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# 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. Please see the caveat for interpretation of information provided here.

Report created: 10-Aug-2023

[Summary](#)

[Details](#)

[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)

# Summary

## Matters of National Environment 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](#).

<a href="#">World Heritage Properties:</a>	None
<a href="#">National Heritage Places:</a>	None
<a href="#">Wetlands of International Importance (Ramsar)</a>	None
<a href="#">Great Barrier Reef Marine Park:</a>	None
<a href="#">Commonwealth Marine Area:</a>	None
<a href="#">Listed Threatened Ecological Communities:</a>	None
<a href="#">Listed Threatened Species:</a>	31
<a href="#">Listed Migratory Species:</a>	44

## 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 <https://www.dcceew.gov.au/parks-heritage/heritage>

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

<a href="#">Commonwealth Lands:</a>	None
<a href="#">Commonwealth Heritage Places:</a>	None
<a href="#">Listed Marine Species:</a>	66
<a href="#">Whales and Other Cetaceans:</a>	10
<a href="#">Critical Habitats:</a>	None
<a href="#">Commonwealth Reserves Terrestrial:</a>	None
<a href="#">Australian Marine Parks:</a>	None
<a href="#">Habitat Critical to the Survival of Marine Turtles:</a>	None

## Extra Information

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

<a href="#">State and Territory Reserves:</a>	2
<a href="#">Regional Forest Agreements:</a>	None
<a href="#">Nationally Important Wetlands:</a>	1
<a href="#">EPBC Act Referrals:</a>	1
<a href="#">Key Ecological Features (Marine):</a>	None
<a href="#">Biologically Important Areas:</a>	2
<a href="#">Bioregional Assessments:</a>	None
<a href="#">Geological and Bioregional Assessments:</a>	None



# Details

## Matters of National Environmental Significance

### Listed Threatened Species

[\[ Resource Information \]](#)

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.  
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text
<b>BIRD</b>		
<a href="#">Aphelocephala leucopsis</a> Southern Whiteface [529]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Calidris canutus</a> Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
<a href="#">Charadrius leschenaultii</a> Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Erythrotriorchis radiatus</a> Red Goshawk [942]	Endangered	Species or species habitat may occur within area
<a href="#">Falco hypoleucos</a> Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Limosa lapponica menzbieri</a> Northern Siberian Bar-tailed Godwit, Russkoye Bar-tailed Godwit [86432]	Critically Endangered	Species or species habitat known to occur within area
<a href="#">Macronectes giganteus</a> Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
<a href="#">Pezoporus occidentalis</a> Night Parrot [59350]	Endangered	Species or species habitat may occur within area
<a href="#">Rostratula australis</a> Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
<a href="#">Sternula nereis nereis</a> Australian Fairy Tern [82950]	Vulnerable	Breeding known to occur within area
<a href="#">Thalassarche carteri</a> Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat may occur within area
<a href="#">Thalassarche cauta</a> Shy Albatross [89224]	Endangered	Species or species habitat may occur within area
<a href="#">Thalassarche impavida</a> Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
<a href="#">Thalassarche melanophris</a> Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
<a href="#">Thalassarche steadi</a> White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area
<b>FISH</b>		
<a href="#">Thunnus maccoyii</a> Southern Bluefin Tuna [69402]	Conservation Dependent	Species or species habitat likely to occur within area
<b>MAMMAL</b>		
<a href="#">Eubalaena australis</a> Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
<b>REPTILE</b>		

Scientific Name	Threatened Category	Presence Text
<a href="#">Aipysurus apraefrontalis</a> Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Aipysurus foliosquama</a> Leaf-scaled Seasnake [1118]	Critically Endangered	Species or species habitat known to occur within area
<a href="#">Caretta caretta</a> Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
<a href="#">Chelonia mydas</a> Green Turtle [1765]	Vulnerable	Breeding known to occur within area
<a href="#">Dermochelys coriacea</a> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
<a href="#">Egernia stokesii badia</a> Western Spiny-tailed Skink, Baudin Island Spiny-tailed Skink [64483]	Endangered	Species or species habitat may occur within area
<a href="#">Natator depressus</a> Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
<b>SHARK</b>		
<a href="#">Carcharias taurus (west coast population)</a> Grey Nurse Shark (west coast population) [68752]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Carcharodon carcharias</a> White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Pristis pristis</a> Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area
<a href="#">Rhincodon typus</a> Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Sphyrna lewini</a> Scalloped Hammerhead [85267]	Conservation Dependent	Species or species habitat likely to occur within area
<b>Listed Migratory Species</b> <span style="float: right;"><a href="#">[ Resource Information ]</a></span>		
Scientific Name	Threatened Category	Presence Text
<b>Migratory Marine Birds</b>		
<a href="#">Anous stolidus</a> Common Noddy [825]		Species or species habitat may occur within area
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat likely to occur within area
<a href="#">Ardenna carneipes</a> Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Species or species habitat likely to occur within area
<a href="#">Fregata ariel</a> Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
<a href="#">Hydroprogne caspia</a> Caspian Tern [808]		Foraging, feeding or related behaviour known to occur within area
<a href="#">Macronectes giganteus</a> Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
<a href="#">Phaethon lepturus</a> White-tailed Tropicbird [1014]		Species or species habitat may occur within area
<a href="#">Sternula albifrons</a> Little Tern [82849]		Species or species habitat may occur within area
<a href="#">Thalassarche carteri</a> Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Thalassarche cauta</a> Shy Albatross [89224]	Endangered	Species or species habitat may occur within area
<a href="#">Thalassarche impavida</a> Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
<a href="#">Thalassarche melanophris</a> Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
<a href="#">Thalassarche steadi</a> White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area
<b>Migratory Marine Species</b>		
<a href="#">Balaenoptera edeni</a> Bryde's Whale [35]		Species or species habitat may occur within area
<a href="#">Carcharhinus longimanus</a> Oceanic Whitetip Shark [84108]		Species or species habitat may occur within area
<a href="#">Carcharodon carcharias</a> White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Caretta caretta</a> Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
<a href="#">Chelonia mydas</a> Green Turtle [1765]	Vulnerable	Breeding known to occur within area
<a href="#">Dermochelys coriacea</a> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
<a href="#">Dugong dugon</a> Dugong [28]		Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Eubalaena australis as Balaena glacialis australis</a> Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
<a href="#">Lamna nasus</a> Porbeagle, Mackerel Shark [83288]		Species or species habitat may occur within area
<a href="#">Megaptera novaeangliae</a> Humpback Whale [38]		Congregation or aggregation known to occur within area
<a href="#">Mobula alfredi as Manta alfredi</a> Reef Manta Ray, Coastal Manta Ray [90033]		Species or species habitat known to occur within area
<a href="#">Mobula birostris as Manta birostris</a> Giant Manta Ray [90034]		Species or species habitat may occur within area
<a href="#">Natator depressus</a> Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
<a href="#">Orcinus orca</a> Killer Whale, Orca [46]		Species or species habitat may occur within area
<a href="#">Pristis pristis</a> Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area
<a href="#">Rhincodon typus</a> Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
<b>Migratory Terrestrial Species</b>		
<a href="#">Hirundo rustica</a> Barn Swallow [662]		Species or species habitat likely to occur within area
<a href="#">Motacilla cinerea</a> Grey Wagtail [642]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Motacilla flava</a> Yellow Wagtail [644]		Species or species habitat likely to occur within area
<b>Migratory Wetlands Species</b>		
<a href="#">Actitis hypoleucos</a> Common Sandpiper [59309]		Species or species habitat known to occur within area
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
<a href="#">Calidris canutus</a> Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
<a href="#">Calidris melanotos</a> Pectoral Sandpiper [858]		Species or species habitat known to occur within area
<a href="#">Charadrius leschenaultii</a> Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Charadrius veredus</a> Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
<a href="#">Limnodromus semipalmatus</a> Asian Dowitcher [843]		Species or species habitat may occur within area
<a href="#">Limosa lapponica</a> Bar-tailed Godwit [844]		Species or species habitat known to occur within area
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Pandion haliaetus</a> Osprey [952]		Species or species habitat known to occur within area
<a href="#">Tringa nebularia</a> Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

## Other Matters Protected by the EPBC Act

Listed Marine Species		[ <a href="#">Resource Information</a> ]
Scientific Name	Threatened Category	Presence Text
<b>Bird</b>		
<a href="#">Actitis hypoleucos</a> Common Sandpiper [59309]		Species or species habitat known to occur within area
<a href="#">Anous stolidus</a> Common Noddy [825]		Species or species habitat may occur within area
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area
<a href="#">Ardenna carneipes as Puffinus carneipes</a> Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Species or species habitat likely to occur within area
<a href="#">Bubulcus ibis as Ardea ibis</a> Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
<a href="#">Calidris canutus</a> Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area overfly marine area



Scientific Name	Threatened Category	Presence Text
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area overfly marine area
<a href="#">Calidris melanotos</a> Pectoral Sandpiper [858]		Species or species habitat known to occur within area overfly marine area
<a href="#">Chalcites osculans as Chrysococcyx osculans</a> Black-eared Cuckoo [83425]		Species or species habitat likely to occur within area overfly marine area
<a href="#">Charadrius leschenaultii</a> Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Charadrius veredus</a> Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area overfly marine area
<a href="#">Fregata ariel</a> Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
<a href="#">Haliaeetus leucogaster</a> White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
<a href="#">Hirundo rustica</a> Barn Swallow [662]		Species or species habitat likely to occur within area overfly marine area
<a href="#">Hydroprogne caspia as Sterna caspia</a> Caspian Tern [808]		Foraging, feeding or related behaviour known to occur within area
<a href="#">Larus pacificus</a> Pacific Gull [811]		Foraging, feeding or related behaviour known to occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Limnodromus semipalmatus</a> Asian Dowitcher [843]		Species or species habitat may occur within area overfly marine area
<a href="#">Limosa lapponica</a> Bar-tailed Godwit [844]		Species or species habitat known to occur within area
<a href="#">Macronectes giganteus</a> Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
<a href="#">Merops ornatus</a> Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area
<a href="#">Motacilla cinerea</a> Grey Wagtail [642]		Species or species habitat may occur within area overfly marine area
<a href="#">Motacilla flava</a> Yellow Wagtail [644]		Species or species habitat likely to occur within area overfly marine area
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
<a href="#">Pandion haliaetus</a> Osprey [952]		Species or species habitat known to occur within area
<a href="#">Phaethon lepturus</a> White-tailed Tropicbird [1014]		Species or species habitat may occur within area
<a href="#">Rostratula australis as Rostratula benghalensis (sensu lato)</a> Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
<a href="#">Sternula albifrons</a> as <a href="#">Sterna albifrons</a> Little Tern [82849]		Species or species habitat may occur within area
<a href="#">Thalassarche carteri</a> Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat may occur within area
<a href="#">Thalassarche cauta</a> Shy Albatross [89224]	Endangered	Species or species habitat may occur within area
<a href="#">Thalassarche impavida</a> Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
<a href="#">Thalassarche melanophris</a> Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
<a href="#">Thalassarche steadi</a> White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area
<a href="#">Tringa nebularia</a> Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area overfly marine area
<b>Fish</b>		
<a href="#">Campichthys galei</a> Gale's Pipefish [66191]		Species or species habitat may occur within area
<a href="#">Choeroichthys suillus</a> Pig-snouted Pipefish [66198]		Species or species habitat may occur within area
<a href="#">Festucalex scalaris</a> Ladder Pipefish [66216]		Species or species habitat may occur within area
<a href="#">Filicampus tigris</a> Tiger Pipefish [66217]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Halicampus brocki</a> Brock's Pipefish [66219]		Species or species habitat may occur within area
<a href="#">Haliichthys taeniophorus</a> Ribboned Pipehorse, Ribboned Seadragon [66226]		Species or species habitat may occur within area
<a href="#">Hippocampus angustus</a> Western Spiny Seahorse, Narrow-bellied Seahorse [66234]		Species or species habitat may occur within area
<a href="#">Hippocampus histrix</a> Spiny Seahorse, Thorny Seahorse [66236]		Species or species habitat may occur within area
<a href="#">Hippocampus planifrons</a> Flat-face Seahorse [66238]		Species or species habitat may occur within area
<a href="#">Hippocampus trimaculatus</a> Three-spot Seahorse, Low-crowned Seahorse, Flat-faced Seahorse [66720]		Species or species habitat may occur within area
<a href="#">Lissocampus fatiloquus</a> Prophet's Pipefish [66250]		Species or species habitat may occur within area
<a href="#">Nannocampus subosseus</a> Bonyhead Pipefish, Bony-headed Pipefish [66264]		Species or species habitat may occur within area
<a href="#">Solegnathus lettiensis</a> Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
<a href="#">Solenostomus cyanopterus</a> Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
<a href="#">Stigmatopora argus</a> Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Syngnathoides biaculeatus</a> Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
<a href="#">Trachyrhamphus bicoarctatus</a> Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
<b>Mammal</b>		
<a href="#">Dugong dugon</a> Dugong [28]		Species or species habitat known to occur within area
<b>Reptile</b>		
<a href="#">Aipysurus apraefrontalis</a> Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Aipysurus foliosquama</a> Leaf-scaled Seasnake [1118]	Critically Endangered	Species or species habitat known to occur within area
<a href="#">Aipysurus laevis</a> Olive Seasnake [1120]		Species or species habitat may occur within area
<a href="#">Aipysurus pooleorum</a> Shark Bay Seasnake [66061]		Species or species habitat may occur within area
<a href="#">Caretta caretta</a> Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
<a href="#">Chelonia mydas</a> Green Turtle [1765]	Vulnerable	Breeding known to occur within area
<a href="#">Dermochelys coriacea</a> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
<a href="#">Disteira kingii</a> Spectacled Seasnake [1123]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
<a href="#">Disteira major</a> Olive-headed Seasnake [1124]		Species or species habitat may occur within area
<a href="#">Emydocephalus annulatus</a> Turtle-headed Seasnake [1125]		Species or species habitat may occur within area
<a href="#">Ephalophis greyi</a> North-western Mangrove Seasnake [1127]		Species or species habitat may occur within area
<a href="#">Hydrophis elegans</a> Elegant Seasnake [1104]		Species or species habitat may occur within area
<a href="#">Natator depressus</a> Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
<a href="#">Pelamis platurus</a> Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area

## Whales and Other Cetaceans [ [Resource Information](#) ]

Current Scientific Name	Status	Type of Presence
<b>Mammal</b>		
<a href="#">Balaenoptera acutorostrata</a> Minke Whale [33]		Species or species habitat may occur within area
<a href="#">Balaenoptera edeni</a> Bryde's Whale [35]		Species or species habitat may occur within area
<a href="#">Delphinus delphis</a> Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
<a href="#">Eubalaena australis</a> Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
<a href="#">Grampus griseus</a> Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area

Current Scientific Name	Status	Type of Presence
<a href="#">Megaptera novaeangliae</a> Humpback Whale [38]		Congregation or aggregation known to occur within area
<a href="#">Orcinus orca</a> Killer Whale, Orca [46]		Species or species habitat may occur within area
<a href="#">Stenella attenuata</a> Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
<a href="#">Tursiops aduncus</a> Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
<a href="#">Tursiops truncatus s. str.</a> Bottlenose Dolphin [68417]		Species or species habitat may occur within area

## Extra Information

State and Territory Reserves			[ <a href="#">Resource Information</a> ]
Protected Area Name	Reserve Type	State	
Boologoroo	NRS Addition - Gazettal in Progress	WA	
Miaboolya Beach	Fish Habitat Protection Area	WA	

Nationally Important Wetlands		[ <a href="#">Resource Information</a> ]
Wetland Name	State	
<a href="#">Lake MacLeod</a>	WA	

EPBC Act Referrals				[ <a href="#">Resource Information</a> ]
Title of referral	Reference	Referral Outcome	Assessment Status	
Not controlled action				
<a href="#">Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia</a>	2015/7522	Not Controlled Action	Completed	

Biologically Important Areas		
Scientific Name	Behaviour	Presence
Seabirds		

Scientific Name	Behaviour	Presence
<a href="#">Sternula nereis</a> Fairy Tern [82949]	Breeding	Known to occur

## Whales

<a href="#">Megaptera novaeangliae</a> Humpback Whale [38]	Migration (north and south)	Known to occur
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# Caveat

## 1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

## 2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

## 3 DATA SOURCES

Threatened ecological communities

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

Threatened, migratory and marine species

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

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

## 4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

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

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

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

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

# Acknowledgements

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

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

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

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## **APPENDIX 2: ENVIRONMENTAL IMPACT TABLE**

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EPA Factors	Aspect	Impact	Relevant Factors	Value																																						
				General BCH	Corals	Seagrass	Sandy beaches	Biologically important areas	Migratory pathways	Fish Habitat Protection Area	Commercial fishery areas	Recreational fishing areas	General flora and vegetation	Proposed conservation areas	Environmentally Sensitive Areas	Threatened Flora	Priority Flora	Range Extensions Flora	New or unidentified flora species	Priority Ecological Communities	Locally significant vegetation	Groundwater dependant vegetation	General Terrestrial Fauna	Threatened Fauna	Migratory Fauna	Priority Fauna	Short-range endemic fauna	Locally significant fauna	Presence of restricted subterranean fauna species	Protected wetlands or waterways	Significant drainage lines	Minor creeklines	Registered or Other Aboriginal Heritage sites or places	Areas used for cultural purposes or of cultural value								
Sea	Construction of marine and coastal infrastructure	Direct Disturbance/smothering of BCH	BCH, MF, TF, SS	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow			
		Introduction of marine pests	BCH, MF, TF	Yellow	Yellow	Yellow	Green	Green	Green	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow			
		Increase in water turbidity	BCH, MEQ, MF	Yellow	Red	Red	Green	Green	Green	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow		
		Disturbance of ASS	BCH, MEQ	Yellow	Green	Green	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow		
		Alteration to fauna behaviour (e.g. from noise, lighting)	MF, TF, SS	Yellow	Yellow	Yellow	Yellow	Red	Red	Green	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow		
		Death or injury of marine fauna via collisions with vessels	MF	Yellow	Yellow	Yellow	Yellow	Red	Red	Green	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow		
	Export operations	Marine spills of ammonia or hydrocarbons	BCH, MEQ, MF, TF, SS	Yellow	Yellow	Yellow	Yellow	Red	Red	Red	Red	Red	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow		
		Increase in water turbidity (from vessel movements)	BCH, MEQ, MF	Yellow	Yellow	Yellow	Green	Green	Green	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow		
		Alteration to fauna behaviour (e.g. from noise, lighting)	MF, TF, SS	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Green	Green	Green	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	
		Death or injury of marine fauna via collisions with vessels	MF	Yellow	Yellow	Yellow	Yellow	Red	Red	Green	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	
	Seawater intake	Marine fauna entrapment	MF	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow		
Land	Terrestrial construction	Vegetation clearing resulting in the direct disturbance of flora, vegetation and fauna habitat, and areas of Aboriginal cultural value	FV, TF, SS	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow			
		Dust emissions cause reduction in vegetation / habitat health	FV, TF, SS	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	
		Introduction/spread of weeds	FV, TF, IW, SS	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
		Unintentional spills resulting in degradation of soils, drainage lines or vegetation / habitat	FV, TF, IW, SS	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
		Introduction or increase of feral fauna	FV, TF, SS	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	
		Alteration of fauna behaviour from noise, light and human interaction	TF, SS	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
		Contamination from the disturbance of ASS	FV, TF, TEQ, SS, IW	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
		Restriction of access	SS	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
		Reduction in amenity from noise, light and human presence	SS	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
	Project Operation	Unintentional spills resulting in degradation of soils, drainage lines or vegetation / habitat	FV, TF, IW, SS	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	
		Changes in surface water regimes due to the presence of infrastructure	FV, TF, IW, SS	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	
		Barriers prevent fauna from accessing feeding or roosting habitats	TF, SS	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
		Introduction or increase of feral fauna	FV, TF, SS	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
		Alteration of fauna behaviour from noise, light and human interaction	TF, SS	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
		Air emissions associated with the production of hydrogen and ammonia	AQ, SS	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
		Restriction of access	SS	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
	Groundwater abstraction	Reduction in health of Groundwater Dependent Vegetation (if present)	FV, TF, IW, SS	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	
		Reduction in aquifer habitat extent	SF	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	

No predicted impact
Low potential for significant impact
Moderate potential for significant impact
High potential for significant impact

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# **APPENDIX 3: RED FLAG MULTI-CRITERIA ASSESSMENT**

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EPA Factors	Aspect	Impact	Value	Approval Risk	Management Requirements	Public Perception	Study Requirements	Schedule	Flexibility	Total
Sea	Construction of marine and coastal infrastructure	Direct Disturbance/smothering of BCH	General BCH	8	8	6	6	6	8	7.3
			Corals	6	6	4	6	6	8	6.2
			Seagrass	8	6	6	6	6	8	7
			Sandy beaches	8	8	6	8	6	4	6.8
			Biologically important areas / migratory pathways	8	6	4	6	6	6	6.4
			Fish Habitat Protection Area	8	8	4	8	8	4	6.8
			Commercial fishery areas	8	8	6	4	6	4	6.2
			Recreational fishing areas	10	8	4	6	6	2	6.5
			Threatened / Migratory fauna	6	6	2	6	6	6	5.6
			Cultural values	8	6	6	4	4	8	6.5
		Introduction of marine pests	General BCH	8	6	6	8	8	6	7.1
			Corals	8	6	6	8	8	6	7.1
			Seagrass	8	6	6	8	8	6	7.1
			Fish Habitat Protection Area	8	6	4	8	8	6	6.9
			Commercial fishery areas	8	6	4	8	8	6	6.9
			Recreational fishing areas	8	6	4	8	8	6	6.9
			Threatened / Migratory fauna	8	6	6	8	8	6	7.1
		Increase in water turbidity	General BCH	8	8	6	8	6	8	7.6
			Corals	6	6	6	4	6	8	6.1
			Seagrass	6	6	6	4	6	8	6.1
			Fish Habitat Protection Area	8	8	4	8	8	6	7.2
			Commercial fishery areas	8	8	6	8	8	2	6.6
			Recreational fishing areas	8	8	4	8	8	2	6.4
		Disturbance of ASS	General BCH	8	6	6	6	8	8	7.2
		Alteration to fauna behaviour (e.g. from noise, lighting)	Biologically important areas / migratory pathways	6	4	2	4	4	4	4.4
			Threatened / Migratory fauna	6	4	2	4	4	4	4.4
			Cultural values	6	6	4	6	6	6	5.8
		Death or injury of marine fauna via collisions with vessels	Biologically important areas / migratory pathways	8	6	4	6	6	4	6
			Threatened / Migratory fauna	8	6	4	6	6	4	6
		Marine spills of ammonia or hydrocarbons	General BCH	6	4	4	4	6	6	5.2
Corals	6		4	4	6	6	6	5.5		
Seagrass	6		4	4	6	6	6	5.5		
Sandy beaches	6		4	4	4	6	6	5.2		
Biologically important areas / migratory pathways	6		4	2	6	6	2	4.5		
Fish Habitat Protection Area	4		6	4	6	6	6	5.2		

0-2	Unacceptable
2-4	Detrimental
4-6	Below standard
6-8	Acceptable
8-10	Very Good
10	Exceptional

Export operations	Commercial fishery areas	6	6	4	6	6	4	5.4		
	Recreational fishing areas	6	6	4	6	6	4	5.4		
	General Terrestrial Fauna (coastal species)	6	6	4	6	6	6	5.8		
	Threatened / Migratory fauna	6	4	2	6	6	2	4.5		
	Cultural values	6	6	4	4	6	6	5.5		
	Increase in water turbidity (from vessel movements)	General BCH	8	8	6	8	8	6	7.4	
		Corals	6	8	6	8	8	6	6.8	
		Seagrass	6	8	6	8	8	6	6.8	
		Fish Habitat Protection Area	8	8	6	8	8	6	7.4	
		Commercial fishery areas	8	8	6	8	8	2	6.6	
		Recreational fishing areas	8	8	6	8	8	4	7	
	Alteration to fauna behaviour (e.g. from noise, lighting)	Biologically important areas / migratory pathways	8	8	4	8	6	2	6.2	
		Threatened / Migratory fauna	4	4	4	4	4	4	4	
	Death or injury of marine fauna via collisions with vessels	Biologically important areas / migratory pathways	6	4	2	6	4	2	4.3	
		Threatened / Migratory fauna	6	4	2	6	4	2	4.3	
	Seawater intake	Marine fauna entrapment	Fish Habitat Protection Area	8	6	6	4	4	6	6.1
			Commercial fishery areas	8	6	6	4	6	6	6.3
			Recreational fishing areas	8	6	6	4	4	6	6.1
Vegetation clearing resulting in the direct disturbance of flora, vegetation and fauna habitat, and areas of Aboriginal cultural value	General flora and vegetation	4	4	4	4	4	6	4.4		
	Threatened / Priority Flora	8	6	4	4	4	8	6.3		
	Range extensions flora	8	6	6	6	6	8	7		
	New / unidentified flora	8	6	6	4	4	8	6.5		
	Priority Ecological Communities	4	4	4	4	4	6	4.4		
	Locally significant vegetation	6	6	6	6	6	8	6.4		
	Groundwater-dependant vegetation	6	6	6	6	4	8	6.2		
	General terrestrial fauna	4	4	4	4	4	6	4.4		
	Threatened / Priority fauna	4	4	4	4	4	6	4.4		
	Migratory fauna	4	4	4	4	4	6	4.4		
	Short-range endemic fauna	6	6	6	4	6	8	6.1		
	Locally significant fauna	6	6	6	6	6	8	6.4		
	Significant drainage lines	6	4	6	6	6	8	6.1		
	Registered or Other Aboriginal Heritage sites or places	6	4	4	4	4	8	5.4		
	Areas used for cultural purposes or of cultural value	4	4	4	4	4	4	4		
	General flora and vegetation	General flora and vegetation	6	6	4	4	6	6	5.5	
		Threatened / Priority Flora	6	6	4	4	6	8	5.9	

0-2	Unacceptable
2-4	Detrimental
4-6	Below standard
6-8	Acceptable
8-10	Very Good
10	Exceptional

Dust emissions cause reduction in vegetation / habitat health	New / unidentified flora	6	6	6	4	6	8	6.1
	Priority Ecological Communities	6	4	4	4	6	6	5.2
	General terrestrial fauna	8	6	6	4	6	6	6.3
	Threatened fauna	8	4	4	4	6	6	5.8
	Registered or Other Aboriginal Heritage sites or places	6	6	4	4	6	8	5.9
	Areas used for cultural purposes or of cultural value	6	4	4	4	6	6	5.2
Introduction/spread of weeds	General flora and vegetation	6	6	6	6	6	6	6
	Proposed conservation areas	8	6	4	6	6	6	6.4
	Environmentally Sensitive Areas	8	6	4	6	6	6	6.4
	Threatened / Priority Flora	8	6	6	6	6	8	7
	New / unidentified flora	8	6	6	6	6	8	7
	Priority Ecological Communities	6	4	6	6	6	6	5.7
	Locally significant vegetation	8	6	6	6	6	8	7
	Groundwater-dependant vegetation	8	6	6	6	6	8	7
	General terrestrial fauna	8	6	6	6	6	6	6.6
	Threatened / Priority fauna	6	4	4	6	6	6	5.5
	Migratory fauna	6	4	6	6	6	6	5.7
	Short-range endemic fauna	8	6	6	6	6	8	7
	Protected wetlands or waterways	8	6	4	6	6	6	6.4
	Significant drainage lines	8	6	6	6	6	6	6.6
	Registered or Other Aboriginal Heritage sites or places	6	6	4	6	6	6	5.8
Areas used for cultural purposes or of cultural value	6	6	4	6	6	6	5.8	
Unintentional spills resulting in degradation of soils, drainage lines or vegetation / habitat	General flora and vegetation	8	8	6	8	8	6	7.4
	General terrestrial fauna	8	8	6	8	8	6	7.4
	Significant drainage lines	8	8	6	8	8	6	7.4
	Registered or Other Aboriginal Heritage sites or places	8	8	6	8	6	6	7.2
	Areas used for cultural purposes or of cultural value	8	8	6	8	6	6	7.2
Introduction or increase of feral fauna	General terrestrial fauna	6	6	6	6	6	6	6
	Threatened / Priority fauna	6	4	4	6	6	6	5.5
	Migratory fauna	6	4	4	6	6	6	5.5
	Locally significant fauna	6	6	6	6	6	8	6.4
	Areas used for cultural purposes or of cultural value	6	6	4	6	6	6	5.8
Alteration of fauna behaviour from noise, light and human interaction	General terrestrial fauna	8	6	6	6	6	6	6.6
	Threatened fauna	6	4	4	6	6	6	5.5
	Priority fauna	6	6	6	6	6	6	6

Terrestrial construction

0-2	Unacceptable
2-4	Detrimental
4-6	Below standard
6-8	Acceptable
8-10	Very Good
10	Exceptional



Land

Land		Migratory fauna	6	4	4	4	4	4	4.6	
		Areas used for cultural purposes or of cultural value	6	4	4	6	6	6	5.5	
	Contamination from the disturbance of ASS	General flora and vegetation	8	6	6	6	6	6	6.6	
		Priority Ecological Communities	8	4	6	6	6	6	6.3	
		Locally significant vegetation	8	6	6	6	6	6	6.6	
		Groundwater-dependant vegetation	8	6	6	6	6	4	6.2	
		General terrestrial fauna	8	6	6	6	6	6	6.6	
		Significant drainage lines	8	6	6	6	6	4	6.2	
		Areas used for cultural purposes or of cultural value	8	6	6	6	6	6	6.6	
		Restriction of access	Registered or Other Aboriginal Heritage sites or places	6	6	4	4	4	8	5.7
	Areas used for cultural purposes or of cultural value		4	6	4	4	2	6	4.5	
	Reduction in amenity from noise, light and human presence	Registered or Other Aboriginal Heritage sites or places	6	6	6	6	4	8	6.2	
		Areas used for cultural purposes or of cultural value	4	6	4	4	2	6	4.5	
	Project Operation	Unintentional spills resulting in degradation of soils, drainage lines or vegetation / habitat	General flora and vegetation	8	6	4	6	8	6	6.6
			Priority Ecological Communities	6	4	4	4	6	8	5.6
			General terrestrial fauna	8	6	4	6	8	6	6.6
			Threatened fauna	6	6	4	6	8	6	6
			Migratory fauna	6	6	4	6	8	6	6
Significant drainage lines			8	6	4	4	6	6	6.1	
Registered or Other Aboriginal Heritage sites or places			6	4	4	6	8	8	6.1	
Areas used for cultural purposes or of cultural value			6	6	4	4	6	6	5.5	
Changes in surface water regimes due to the presence of infrastructure		General flora and vegetation	8	6	6	6	6	6	6.6	
		Proposed conservation areas	8	6	6	4	6	6	6.3	
		Environmentally Sensitive Areas	8	6	6	4	6	6	6.3	
		Threatened / Priority Flora	6	6	6	6	6	8	6.4	
		New / unidentified flora	8	6	6	6	6	8	7	
		Priority Ecological Communities	6	4	6	4	6	6	5.4	
	Groundwater-dependant vegetation	8	6	6	6	6	6	6.6		
	General terrestrial fauna	8	6	6	6	6	6	6.6		
	Threatened fauna	6	6	6	6	6	6	6		
	Migratory fauna	8	4	6	4	6	6	6		
Short-range endemic fauna	8	6	6	6	6	6	6.6			
Protected wetlands or waterways	8	6	6	4	6	6	6.3			
Significant drainage lines	8	4	6	4	6	6	6			
Registered or Other Aboriginal Heritage sites or places	6	6	6	6	6	6	6			

0-2	Unacceptable
2-4	Detrimental
4-6	Below standard
6-8	Acceptable
8-10	Very Good
10	Exceptional

		Areas used for cultural purposes or of cultural value	6	6	6	4	4	6	5.5	
		Barriers prevent fauna from accessing feeding or roosting habitats	General terrestrial fauna	8	6	6	8	6	6	6.9
			Threatened / Priority fauna	6	4	6	8	6	6	6
			Migratory fauna	6	6	6	8	6	6	6.3
			Short-range endemic fauna	6	6	6	8	6	8	6.7
			Areas used for cultural purposes or of cultural value	6	6	6	8	6	6	6.3
	Introduction or increase of feral fauna	General terrestrial fauna	8	6	6	6	8	6	6.8	
		Threatened fauna	6	6	6	6	8	6	6.2	
		Priority fauna	8	6	6	6	8	6	6.8	
		Migratory fauna	6	6	6	6	8	6	6.2	
		Locally significant fauna	8	6	6	6	8	6	6.8	
		Areas used for cultural purposes or of cultural value	8	6	6	6	6	6	6.6	
	Alteration of fauna behaviour from noise, light and human interaction	General terrestrial fauna	8	6	6	6	6	6	6.6	
		Threatened fauna	4	4	4	4	4	6	4.4	
		Priority fauna	8	6	6	6	6	6	6.6	
		Migratory fauna	4	4	4	4	4	6	4.4	
		Areas used for cultural purposes or of cultural value	8	6	4	6	6	6	6.4	
	Restriction of access	Registered or Other Aboriginal Heritage sites or places	6	8	4	4	4	8	6	
		Areas used for cultural purposes or of cultural value	4	8	4	4	2	6	4.8	
	Reduction in amenity from noise, light and human presence	Registered or Other Aboriginal Heritage sites or places	6	6	6	6	4	8	6.2	
		Areas used for cultural purposes or of cultural value	4	6	4	4	2	6	4.5	
	Groundwater abstraction	Reduction in health of Groundwater Dependent Vegetation (if present)	Locally significant vegetation	8	6	6	6	6	6	6.6
			Groundwater-dependant vegetation	8	4	6	4	4	8	6.2
			Significant drainage lines	8	6	6	6	6	6	6.6
Registered or Other Aboriginal Heritage sites or places			8	6	6	6	6	6	6.6	
Areas used for cultural purposes or of cultural value			8	6	6	6	6	6	6.6	
Reduction in aquifer habitat extent		Presence of restricted subterranean fauna species	6	6	6	4	6	8	6.1	

0-2	Unacceptable
2-4	Detrimental
4-6	Below standard
6-8	Acceptable
8-10	Very Good
10	Exceptional