



Gascoyne Gateway

**GASCOYNE GATEWAY LTD**

# **Environmental Supporting Document**

## **Single Jetty Deep-water Port & Renewables Hub**



Document No Rev 1: 4023-006

22nd May 2021

Unit 38-39  
145 Stirling Hwy  
Nedlands, WA

Gascoyne Gateway LTD

© Copyright 2020 Gascoyne Gateway Ltd ABN 72 638 151 747. No part of this document or the information it contains may be reproduced or transmitted in any form or by any means electronic or mechanical, including photocopying, recording, or by any information storage and retrieval system, without permission in writing from Gascoyne Gateway LTD.

[gascoynegateway.com.au](http://gascoynegateway.com.au)



## Executive Summary

Gascoyne Gateway Ltd (the proponent) is proposing to privately fund, build and operate a new Single Jetty Deep-water Port & Renewables Hub (the proposal) located 10 kilometres south of Exmouth township.

The proposal will provide the Exmouth Gulf's existing marine traffic with a better place to berth, and provide reliable, year-round berthing for tourist vessels, Defence and border security.

As Australia's first regenerative 'green' port, the proponent is committed to environmental management that regenerates and protects the area. The proposal has many innovative features that suggests it can aim to be a world leader in regenerative development. This 21<sup>st</sup>-century type of development goes further than minimising impacts on the local and global environment – it seeks to repair and regenerate past impacts. Thus, it is part of a transformation that can be welcomed on various levels. The proposal can demonstrate these regenerative qualities in relation to energy and water production and usage, waste management, and biodiversity conservation. This Australian-first holistic approach to regenerative development can also enable social and economic regeneration.

The Exmouth township was originally established as a US naval base, and supported submarines, and air force planes were based there during World War II. Apart from a prawn fishery that began in the 1960's and continues today, the town's population has been sustained through a constant Defence presence – mostly from the Naval Communications Station Harold E Holt, Navy Pier, RAAF Learmonth, and to a lesser degree through space and weather monitoring facilities. The local community, therefore has a positive view of Defence activities. These activities will continue well into the foreseeable future, given the strategic geographic position of Exmouth and the national defence imperative for sovereign capabilities. In turn, there is a recognised strategic benefit and need for maintaining a Defence position and presence on the North West Cape (Coyne, 2020).

During the past two decades, there has been a gradual increase in domestic and international tourism, including visits from cruise liners. The community has welcomed the economic activity, albeit that it is extremely seasonal and does not support year-long business continuity. Likewise, the tourism appeal of the location versus the threats of impacts on the natural resources and the environment, needs to be holistically managed by all stakeholders into the future.

For nearly 20 years, the local government, region and community have wanted to broaden the regional economy and see a move away from an almost singular reliance on tourism.

The Shire of Exmouth has outlined a clear community vision in its *Strategic Community Plan 2030*: 'to be a prosperous and sustainable community living in harmony with our natural environment.' Its Strategic Community Plan states:

*"A range of potential economic and environmental challenges have been identified; a lack of investment in renewable energy; reduced roll out of optimum broadband infrastructure; financial viability of research centres in Exmouth; sufficient and reliable water supplies, accessibility and transport.*

*The consideration of a deep-water wharf would also attract additional investment in existing and new industry in Exmouth. The growth in investment expected in the medium term has the potential to underpin future economic growth in the region, providing employment, supply chain opportunities, training and economic engagement opportunities during both construction and operational phases. Expansion of Exmouth's existing harbour would assist recreational and commercial services, the burgeoning cruise ship*



*industry through improved suitable berthing facilities, recreational use, tourism, fisheries and mining activity within the precinct.”*

As demonstrated above, permanent Exmouth residents want a stronger, more diverse local economy that can provide year-round employment opportunities. It is considered that the economic ramifications of the Covid-19 pandemic illustrated the region’s emphasis on tourism and the ensuing vulnerability to influences on tourism that could bring on significant economic shocks. This was evident in Exmouth as the townsite has not significantly diversified its employment and industry sectors prior to the pandemic, lessening the town’s ability to recover from subsequent economic shock(s).

The proposal will contribute to more diverse economic activity and support the Exmouth community’s move towards a more sustainable long-term future. The proposal will create more than 70 full-time jobs at the facility, another 130 in Exmouth that are directly associated with the facility, and a further 600 in the wider Gascoyne region – helping to diversify the local economy to reduce the current over-reliance on tourism.

Moreover, the enabling capacity of the proposal will see community benefits well beyond economic diversity.

These social benefits include and are not restricted to:

- access to potable water for the town supply, relieving the environmental pressure on the dwindling quantities of subterranean water sources
- 100 per cent renewable energy delivered to the town from the proposal
- provision of long-term local employment with 70 full-time positions within or directly attributable to the proposal
- significant reduction in cost-of-living pressures – through fuel prices and power costs; and
- regenerative outcomes for the marine and terrestrial environments as a direct result of the proposal’s design or funded initiatives.

Activities around commercial shipping in the Exmouth Gulf and coastal waters are presently undertaken without regulation or oversight. The presence of a functioning port facility would enable management and risk mitigation of seabed damage from anchoring and megafauna contact and incident response capability.

Early surveys of the planned area for the construction of the marine infrastructure show very low levels of marine life, corals or seagrasses. Gascoyne Gateway has chosen this location as it has an optimal natural seabed depth that substantially minimises any dredging requirement. Of the small amount of dredging anticipated, all material will be brought ashore or used to construct the jetty and strategies will be put in place to reduce the risk of sand or silt escaping into the Gulf.

Exmouth Gulf is perceived to be a pristine environment. However, environmental pressure from a number of sources is causing stress in the Gulf, such as:

- random and numerous vessel movements/anchoring activity by all size vessels;
- limited response capability for any marine incident (fuel spill, marine accident);
- diesel offloading at Navy Pier within the World Heritage Marine Park;
- mass tourism impacting natural reefs, dunes etc.;
- water pressures on subterranean karst systems; and



The proponent plans to significantly mitigate the current risk to the Ningaloo Marine Park by proposing the translocating of fuel import activities from the Navy Pier at Point Murat to the proposed facility. The proposed facility location is in coastal waters and approximately 35 kilometres outside of the marine park. This may indirectly improve tourist access to the Navy Pier, which is recognised as a ‘top 10’ dive site in the world.

By virtue of having the proponent operating a fully functional marine facility, currently proposed under the Port Authorities Act (under the Mid West Ports Authority), the proponent will have the capability to mitigate significant present risk to the environment and flora and fauna. The port operators can regulate navigable waters which in turn can ensure that vessels follow specific routes and speeds to reduce the current risk. Further, vessels that presently traverse within the Gulf without oversight, would naturally opt to use the facility’s jetty wharves and therefore not need to utilise access to random anchorages (which are currently damaging benthic habitat).

As a regenerative development, the proponent will power its facility through renewable sources. Renewable energy generation will augment the town supplies and ultimately see Exmouth realise its ambition to become the first regional town in Western Australia to run completely on renewables (Australian Government, 2020). The proponent plans to use the renewable energy to power a desalination plant to provide potable water for users of the port and potentially the local community.

To realise the Shire’s ambitious strategic vision (to grow Exmouth from 2500 to 5000 residents so it can provide adequate health, education and community facilities), doing nothing is not an option.

This proposal will overwhelmingly benefit the local community, and provide real, measurable, science-based benefits to the marine and terrestrial environment.

The proponent is proud to be working to ensure this project delivers significant positive outcomes for the environment and deliver a proposed project that is world-leading in regenerative development.





**Disclaimer**

*This report has been prepared on behalf of and for the exclusive use of Gascoyne Gateway Ltd. Gascoyne Gateway LTD accepts no liability or responsibility whatsoever for it in respect of any use of or reliance upon this report by any third party. Copying this report without the permission of Gascoyne Gateway Ltd is not permitted.*

*The information contained in these documents is protected by the Global Data Protection Regulation (GDPR). Gascoyne Gateway Ltd complies with the provisions of the Regulation and the information is disclosed on the condition that the Recipient also complies with the provisions of the (GDPR).*

---

**PROJECT 4023 - Environmental Supporting Document - Single Jetty Deep-water Port & Renewables Hub**

---

Rev	Description	Originator	Reviewer	Approver	Revision Date	Approval Date
Rev A	Issued for Internal Review	<b><i>P Mellor</i></b>	<b><i>D Jackson</i></b>	<b><i>M Edwards</i></b>	11 September 2020	NA
		P Mellor	D Jackson	M Edwards		
Rev 0	Issued for Use	<b><i>P Mellor</i></b>	<b><i>D Jackson</i></b>	<b><i>M Edwards</i></b>	27th March 2021	27th March 2021
		P Mellor	D Jackson	M Edwards		
Rev 1	Reissued for Use	<b><i>P Mellor</i></b>	<b><i>D Jackson</i></b>	<b><i>M Edwards</i></b>	22nd May 2021	22nd May 2021
		P Mellor	D Jackson	M Edwards		

---



**Table of Contents**

**1. Introduction ..... 10**

1.1 Proposal background ..... 10

1.2 Document and purpose ..... 10

1.3 The EPA cumulative impact process ..... 10

1.4 Proponent details..... 11

**2. Proposal Description ..... 13**

2.1 Proposal description ..... 13

2.1.1 Footprints ..... 14

2.1.2 Primary footprints ..... 19

2.1.3 Phases..... 19

2.1.4 Marine infrastructure ..... 19

2.1.5 Terrestrial infrastructure ..... 20

2.1.6 Construction and temporary works ..... 25

2.2 Proposal justification ..... 26

2.3 Planning and environmental approval pathway..... 28

2.3.1 Section 38 ..... 28

2.3.2 Section 48a ..... 29

2.4 Legislative Framework ..... 29

2.4.1 Environmental Protection Act, 1986 Part IV ..... 29

2.4.2 Environmental Protection and Biodiversity Conservation Act 1999 ..... 29

2.4.3 Environmental Protection Act, 1986 Part V ..... 29

**3. Land use and tenure ..... 31**

3.1 Land Tenure within the Development Envelope ..... 31

3.1.1 Ingram Street industrial area ..... 31

3.1.2 Road train assembly area ..... 32

3.1.3 Qualing Scarp landfill site ..... 32

3.1.4 Exmouth Aerodrome ..... 32

3.1.5 Exmouth Water Reserve..... 32

3.1.6 Cape Wilderness Estate ..... 32

3.2 Conservation Estate ..... 32

3.3 Mining Tenements ..... 35

3.4 Surrounding land tenure..... 36

3.5 Native title..... 38

3.6 Statutory planning ..... 39

3.7 Workforce ..... 39

**4. Environmental investigations ..... 40**

4.1 Benthic communities and habitat survey ..... 40

4.1.1 Targeted benthic habitat survey ..... 40

4.2 Coastal processes..... 44

4.2.1 Site characteristics..... 47

4.2.2 Shoreline movement assessment ..... 48



4.3	Marine environmental quality .....	54
4.4	Marine fauna.....	58
4.5	Flora and vegetation survey.....	60
4.5.1	Environmentally sensitive areas.....	62
4.6	Terrestrial fauna survey .....	63
4.7	Subterranean fauna .....	64
4.7.1	Preferred habitats of Subterranean fauna .....	65
4.8	Migratory shorebird survey .....	67
4.9	Social surroundings investigations.....	68
4.9.1	Stakeholder analysis.....	68
4.9.2	Community consultation .....	69
4.9.3	Aboriginal heritage .....	69
4.9.4	Noise.....	69
4.9.5	Landscape.....	70
4.9.6	Commercial and recreational fishing .....	70
4.10	Matters of National Environmental Significance .....	73
4.10.1	Controlling provisions.....	73
4.10.2	Agreements, Policy and guidelines .....	73
4.10.3	Summary of Existing Environmental Values that relate to MNES.....	73
4.10.4	World Heritage Properties .....	73
4.10.5	National Heritage Places .....	74
4.10.6	Listed Threatened Species, Communities, and Migratory Species .....	74
<b>5.</b>	<b>Assessment of preliminary key environmental factors.....</b>	<b>78</b>
5.1	Environmental Principles .....	78
5.2	Identification of Key Environmental Factors .....	79
5.3	Benthic communities and habitat.....	80
5.3.1	EPA objective.....	80
5.3.2	Potential environmental impacts .....	80
5.4	Coastal processes.....	81
5.4.1	EPA objective.....	81
5.4.2	Potential environmental impacts .....	81
5.5	Marine environmental quality.....	84
5.5.1	EPA objective.....	84
5.5.2	Potential environmental impacts .....	84
5.6	Marine fauna.....	86
5.6.1	EPA objective.....	86
5.6.2	Potential environmental impacts .....	87
5.7	Flora and vegetation .....	89
5.7.1	EPA objective.....	89
5.7.2	Potential environmental impacts .....	89
5.8	Terrestrial fauna.....	91
5.8.1	EPA objective.....	91
5.8.2	Potential environmental impacts .....	91



5.9	Social surroundings .....	93
5.9.1	EPA objective .....	93
5.9.2	Potential environmental impacts .....	93
5.10	Other environmental factors .....	95
<b>6.</b>	<b>Benefits of the proposal .....</b>	<b>96</b>
6.1	Environmental benefits.....	96
6.2	Other benefits of the proposal .....	96
6.2.1	Employment and industrial development.....	96
6.2.2	Tourism.....	96
6.2.3	Science and Innovation .....	97
<b>7.</b>	<b>Conclusions .....</b>	<b>99</b>
<b>8.</b>	<b>References .....</b>	<b>100</b>
<b>9.</b>	<b>Acronym list .....</b>	<b>104</b>

## Appendices

**Appendix A. Environmentally Sensitive & Schedule 1 Areas of Western Australia**

**Appendix B. EPBC Search Tool**

**Appendix C. Community Reference Groups**

**Appendix D. Community Engagement Summary**

**Appendix E. Landscape Units**

**Appendix F. Overview of studies relevant to MNES as presented in Subsea 7 (2019)**

**Appendix G. Identification of Key Environmental Factors**

## List of tables

Table 2-1: Summary of the proposal’s key characteristics .....	14
Table 2-2: Typical dosing rates of water treatment chemicals .....	23
Table 2-3: Typical discharge characteristics of the desalination plant.....	24
Table 3-1: Legal description of land – east of Minilya-Exmouth Road .....	31
Table 3-2: Legal description of land – west of Minilya-Exmouth Road .....	31
Table 3-3: Extent of notable land tenure and interests within the surrounds.....	36
Table 4-1: Relative area of each biological habitat in the study area .....	44
Table 4-2: Marina fauna studies to date .....	59
Table 4-3: Key stakeholders consulted to date in the development of the proposal .....	68
Table 4-4: Listed species and known studies .....	75

## List of figures

Figure 1-1: Artist impression of the Single Jetty Deep-water Port & Renewables Hub .....	10
Figure 1-2: Location map .....	12



Figure 2-1: Proposed Development Envelope.....	16
Figure 2-2: Proposal Development Footprint.....	17
Figure 2-3: Marine design – Single Jetty Deep-water Port & Renewables Hub .....	18
Figure 2-4: Proposed Timeline .....	19
Figure 2-5: Proposed tug facility.....	20
Figure 2-6: Schematic of proposed desalination plant.....	23
Figure 2-7: Proposed regenerative activities and the need for the project.....	28
Figure 2-8: Current environmental approvals strategy and specialist studies underway or planned (subject to change based on ESD) .....	30
Figure 3-1: Surrounding land use.....	33
Figure 3-2: Conservation estates in relation to the proposed development.....	34
Figure 3-3: Surrounding Areas of Interest .....	35
Figure 3-4: Mining Tenements extracted from national map (Australian Government, 2021) .....	36
Figure 3-5: Notable land and waters tenure .....	38
Figure 4-1: Validation surveys, showing benthic validation types, of Lyne et al. (2006) habitat map.....	41
Figure 4-2: Exmouth Gulf habitat map developed by DPIRD/MG Kailis in 2018 .....	42
Figure 4-3: Seasonal survey routes.....	43
Figure 4-4: Habitat classification map for the study area, showing relationship between primary biota types and geomorphic regions. Depth contours in metres .....	43
Figure 4-5: Location of Learmonth Jetty in relation to the Single Jetty Deep-water Port & Renewables Hub.....	45
Figure 4-6: Original Learmonth Jetty and abutment.....	46
Figure 4-7: Photograph looking seaward from the base of the Learmonth Jetty abutment.....	47
Figure 4-8: Photographs looking landward from the end of the Learmonth Jetty abutment .....	47
Figure 4-9: Historical shoreline positions adjacent to Learmonth Jetty.....	49
Figure 4-10: Historical shoreline positions adjacent to Single Jetty Deep-water Port & Renewables Hub ....	50
Figure 4-11: Shoreline movement at the Learmonth location.....	51
Figure 4-12: Shoreline movement plan for Single Jetty Deep-water Port & Renewables Hub location.....	53
Figure 4-13: Conceptual diagram of Exmouth Gulf ecosystem (refer to text for key) (Oceanica, 2006b).....	54
Figure 4-14: Learmonth Land System (1. Stony footslopes 2. Outwash plains 3. Sandy plains 4. Coastal dunes 5. Saline plains 6. Drainage lines 7. Beaches and foredunes) (modified from Payne et al., 1987) .....	60
Figure 4-15: Distribution of the landscape units .....	61
Figure 4-16: Groundwater bores surrounding the project.....	66
Figure 4-17: Osprey nesting platform near the project site.....	68
Figure 4-18: Minilya-Exmouth Road surrounding environs (looking north (left) and south (right) from the site) .....	70
Figure 4-19: Current rubbish tip adjacent to the proposed land .....	70
Figure 4-20: Current commercial prawn fishery and current aquaculture use in Exmouth Gulf.....	72
Figure 5-1: Beach transects undertaken as part of baseline studies .....	83
Figure 5-2: Baseline water quality monitoring sites.....	85
Figure 6-1: Expected job creation.....	96
Figure 6-2: Buy Local Infographic .....	97

## 1. Introduction

---

### 1.1 Proposal background

Gascoyne Gateway Ltd ('the proponent') is seeking to develop the Single Jetty Deep-water Port & Renewables Hub ('the proposal'). The proposal is to construct and operate a single jetty and shore-based activities at a site about 10 km south of the Exmouth townsite in Western Australia (Figure 1-2).

The proposal would be implemented within a development envelope approximately 3.8 km<sup>2</sup> in size. An artist impression of the infrastructure is shown in Figure 1-1.



Figure 1-1: Artist impression of the Single Jetty Deep-water Port & Renewables Hub

### 1.2 Document and purpose

This document supports referral of the proposal under section 38 of the EP Act. It provides information on the proposal's characteristics, existing environment, potential environmental impacts and proposed environmental management commitments.

The document has been prepared in accordance with Part IV Division 1 of the EP Act and the *Environmental Impact Assessment (Part IV Divisions 1 and 2) Administrative Procedures 2016*.

### 1.3 The EPA cumulative impact process

In August 2020, the Minister for Environment made a request to the Environmental Protection Authority (EPA) to provide strategic advice on the potential cumulative impacts of proposed activities and developments on the environmental, social and cultural values of Exmouth Gulf.

The EPA has initiated the study which involved calling for community and industry input on current and proposed pressures facing the Exmouth Gulf and any impacts of those on the area's environmental, social and cultural values. The EPA is expected to provide its findings to the Minister of Environment by July 2021 in relation to its cumulative impact assessment.





The EPA was particularly interested in receiving views and information in the following areas (EPA, 2020a):

- |                                                                                                                                      |
|--------------------------------------------------------------------------------------------------------------------------------------|
| ■ What are the values (environmental, social and cultural) you associate, or identify with, in and around Exmouth Gulf?              |
| ■ What activities do you engage with, in and around Exmouth Gulf?                                                                    |
| ■ What environmental pressures do you observe in and around Exmouth Gulf?                                                            |
| ■ What environmental pressures in and around Exmouth Gulf affect you/your sector or business?                                        |
| ■ Are there other activities that are proposed (or likely to be proposed) that you are aware of, which will impact the Exmouth Gulf? |

The proposal is in its early design phase and community reference groups have been established to help determine the final design. The proponent has made a separate submission as a stakeholder. Its schedule includes a milestone to review, incorporate and adapt to the findings of this study.

#### **1.4 Proponent details**

The proposal will be implemented by *Gascoyne Gateway Ltd*, a dedicated company owned by Australians.

The contact person for the proponent is:

Daniel Jackson  
Chief Operating Officer  
Gascoyne Gateway Limited

ABN: 72 638 151 747

Physical Address: Units 38-39 / 145 Stirling Highway  
Nedlands, WA 6009

T: +61 (08) 9386 2194

E: [d.jackson@gascoynegateway.com.au](mailto:d.jackson@gascoynegateway.com.au)

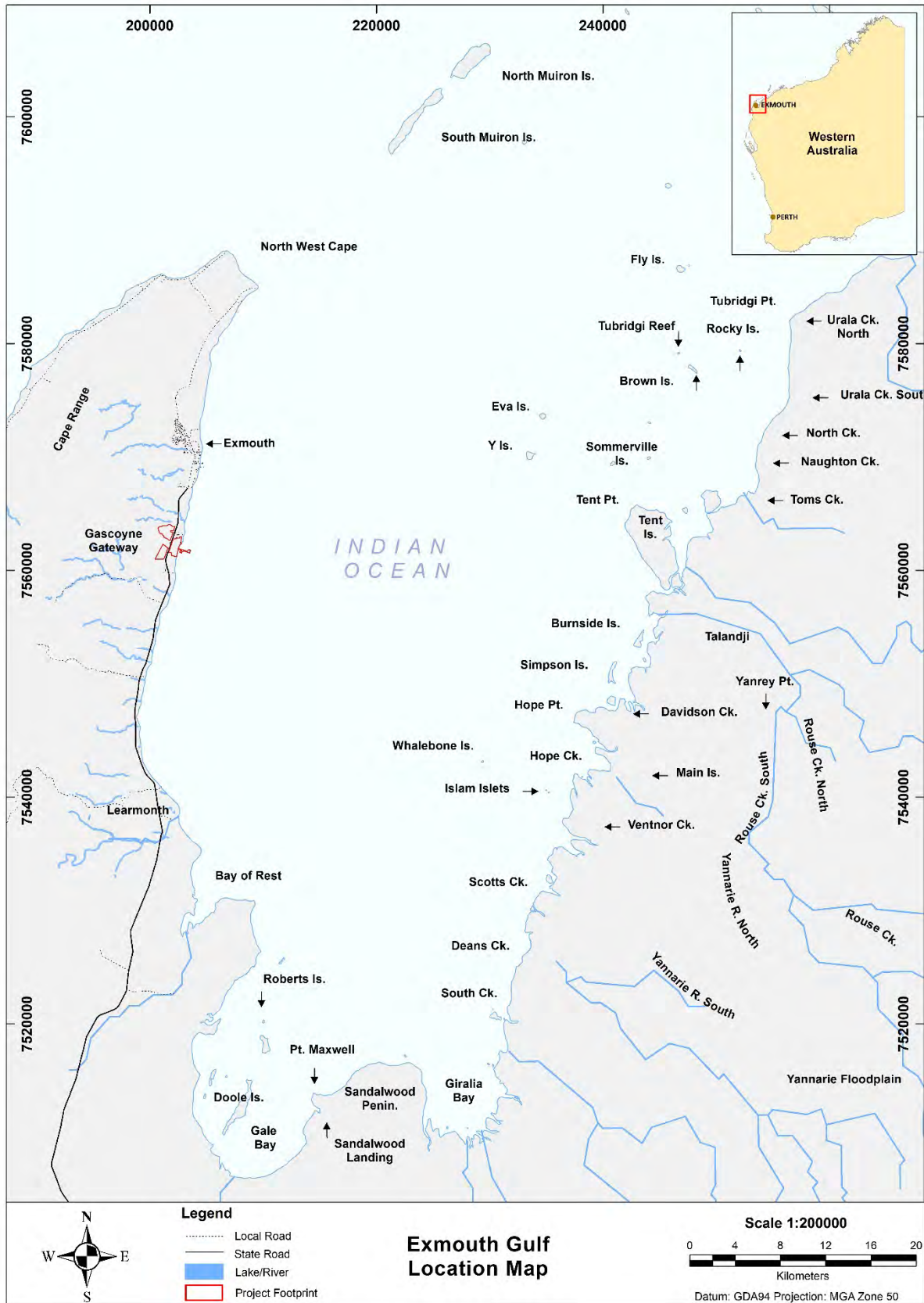


Figure 1-2: Location map



## 2. Proposal Description

### 2.1 Proposal description

Gascoyne Gateway Ltd is proposing to privately fund, build and operate a new single jetty deep-water port and renewables hub in Exmouth. The port will provide reliable, year-round berthing for a broad range of ships, including cruise ships, Defence and border security.

At overview level, the proposal’s key attributes are summarised as follows:

- Single access jetty
- Several berths based on bathymetry at the offshore jetty abutment
- Small dredging volume with all material brought ashore or used in construction
- A jetty on piles across the nearshore/dune intersect to allow longshore coastal processes
- Onshore strategic port land
- Renewables precinct
- Desalination infrastructure
- Fuel storage

Proposal title	Single Jetty Deep-water Port & Renewables Hub
<b>Proponent</b>	<b>Gascoyne Gateway Ltd</b>
<b>Short description</b>	<ul style="list-style-type: none"> <li>■ The Company plans to build, own and operate a multi-purpose marine facility in Exmouth. The project has primarily been designed with cruise liners and associated eco-tourism activity in mind to meet immediate State tourism outcomes. To ensure the project’s long-term financial viability, other marine trade sectors are intrinsic to the business model. Thus the project will be a ‘multi-purpose’ facility to capture diverse revenue streams. The project will not be utilised for livestock or iron ore.</li> <li>■ The site selected is next to the existing light industrial area at Mowbowra Creek that lies 10 kilometres south of the Exmouth township. This ‘greenfields’ project will have a port precinct footprint of approximately 259.62 ha landside and 62.76 ha marine side – this is necessary for the variety of activities to be undertaken at the multi-purpose facility. The envelope is described in further detail in Table 2-1.</li> <li>■ Design is based around a combination rock groin (breakwater) and pylon steel construction to a ‘T’ section berth-face to support the anticipated vessels. This berth face will require about 12.0 metres of depth (at Chart Datum) to meet design vessel draughts. This will be achieved by both natural depth and some dredging of sand and seabed limestone at the berth pocket.</li> </ul>

Table 2-1 illustrates the proposal’s key characteristics.



### 2.1.1 Footprints

The development envelope/footprint is shown in Figure 2-1, Figure 2-2 and Figure 2-3<sup>1</sup>.

The development envelope (Figure 2-1) extends to the road, the high tide and includes habitat open space and refuge on the terrestrial footprint. On the marine side, it includes a 25 m buffer on the marine infrastructure. It includes setbacks from the highway, the foredune and illustrates the terrestrial open space and drainage easements.

The development footprint (Figure 2-2) includes the planned primary footprint. On the marine side, it includes the primary footprint only, including the dredge footprint.

Table 2-1: Summary of the proposal's key characteristics

Element	Proposal extent	Location
<b>Marine components</b>		
Basin dimensions	360 m x 1100 m Nom.	Figure 2-3
Dredging area and volume	Area = 0.50 km <sup>2</sup> (50.1 ha) Volume = 1,128,251 m <sup>3</sup>	Figure 2-3
Basin depth	-4 to -12m LAT	Figure 2-3
Number of berths	Five	Figure 2-3
Offshore infrastructure	Small laydown area to support the operation at the seaward side, 200 m x 230 m	Figure 2-3
Total marine disturbance	<ul style="list-style-type: none"> <li>■ Development Envelope – 85 ha (which includes a 25m buffer on marine infrastructure footprint)</li> <li>■ Marine infrastructure footprint = 62.76 ha which includes               <ul style="list-style-type: none"> <li>■ 12.63 ha marine infrastructure</li> <li>■ 50.13 ha dredge footprint</li> </ul> </li> </ul>	Figure 2-3
Desalination Plant	Capacity of 2 ML/day potable water. <ul style="list-style-type: none"> <li>■ Intake 6 ML/day of seawater</li> <li>■ 4 ML/day of seawater concentrate (brine) to be discharged back to the ocean at approximately 70ppt.</li> </ul>	Brine discharge pipeline within the marine development envelope (Figure 2-2) and will be confirmed following modelling to determine which side has the smallest mixing zone.
<b>Terrestrial components</b>		
Terrestrial components include: <ul style="list-style-type: none"> <li>■ Operational areas</li> </ul>	<ul style="list-style-type: none"> <li>■ Development Envelope - 334.12 ha landside which includes:</li> </ul>	Figure 2-2

<sup>1</sup> Development footprint = area where infrastructure is located; Development envelope = area subject to impacts from the proposal.



<ul style="list-style-type: none"> <li>■ Fuel storage</li> <li>■ Water storage</li> <li>■ Renewables precinct</li> <li>■ Desalination</li> </ul>	<ul style="list-style-type: none"> <li>■ Open space buffers of 74.5 ha</li> <li>■ Development footprint - Leaving permanent clearing of no more than 259 ha, broken up as               <ul style="list-style-type: none"> <li>■ 171.43 ha as renewables</li> <li>■ 28.57 ha for fuel storage</li> <li>■ 59.62 ha as strategic port land</li> </ul> </li> </ul>	
<ul style="list-style-type: none"> <li>■ Renewables precinct</li> </ul>	<ul style="list-style-type: none"> <li>■ Solar and wind components to be confirmed during the study               <ul style="list-style-type: none"> <li>■ Wind Turbines and associated electrical infrastructure                   <ul style="list-style-type: none"> <li>□ Up to 12 wind turbines generating up to 3.5 MW, with each turbine being up to 250 m tall from the ground to the top rotation limit of the highest blade tip.</li> </ul> </li> <li>■ PV Solar Panels and associated electrical infrastructure                   <ul style="list-style-type: none"> <li>□ The Solar PV will be deployed in modules. The panels will be mounted on low impact steel frames and there will be inverters installed amongst the solar panels.</li> </ul> </li> <li>■ Battery – 264 MWh battery system</li> </ul> </li> </ul>	<p>Figure 2-6</p>

<b>Terrestrial and marine components combined</b>		
Development footprint	No more than 322 ha	Figure 2-1 and Figure 2-2
Development envelope	No more than 419 ha	



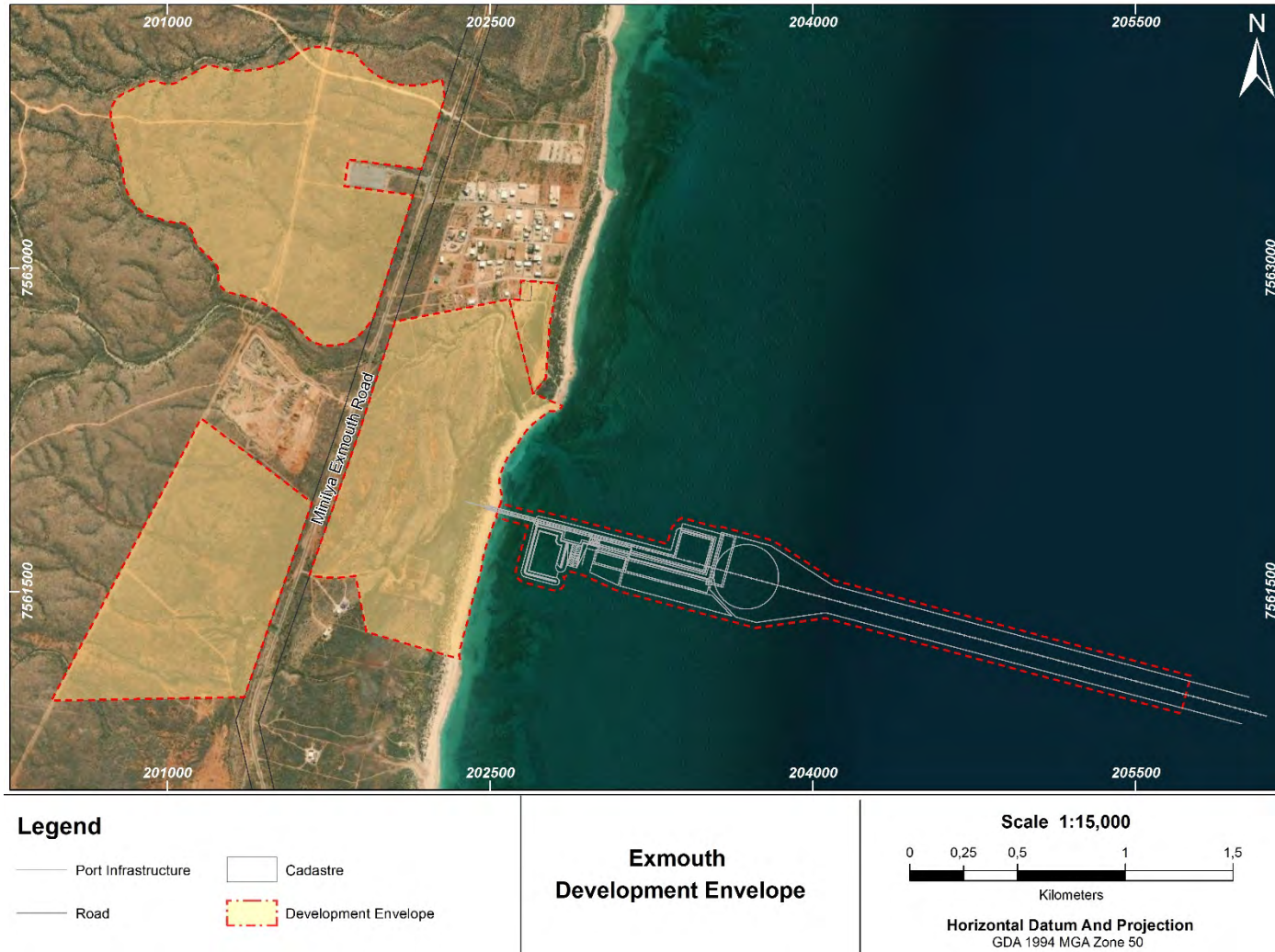


Figure 2-1: Proposed Development Envelope



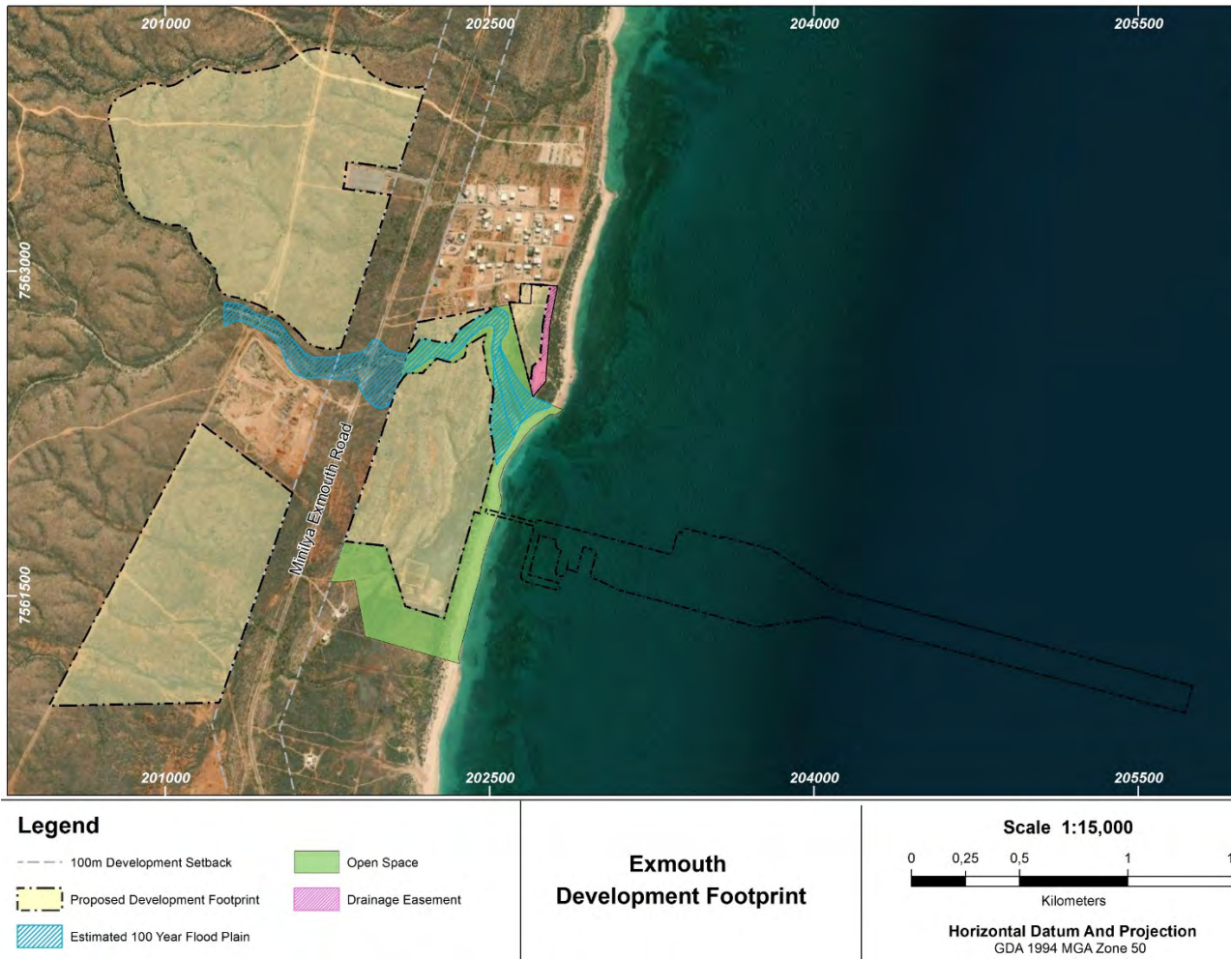


Figure 2-2: Proposal Development Footprint



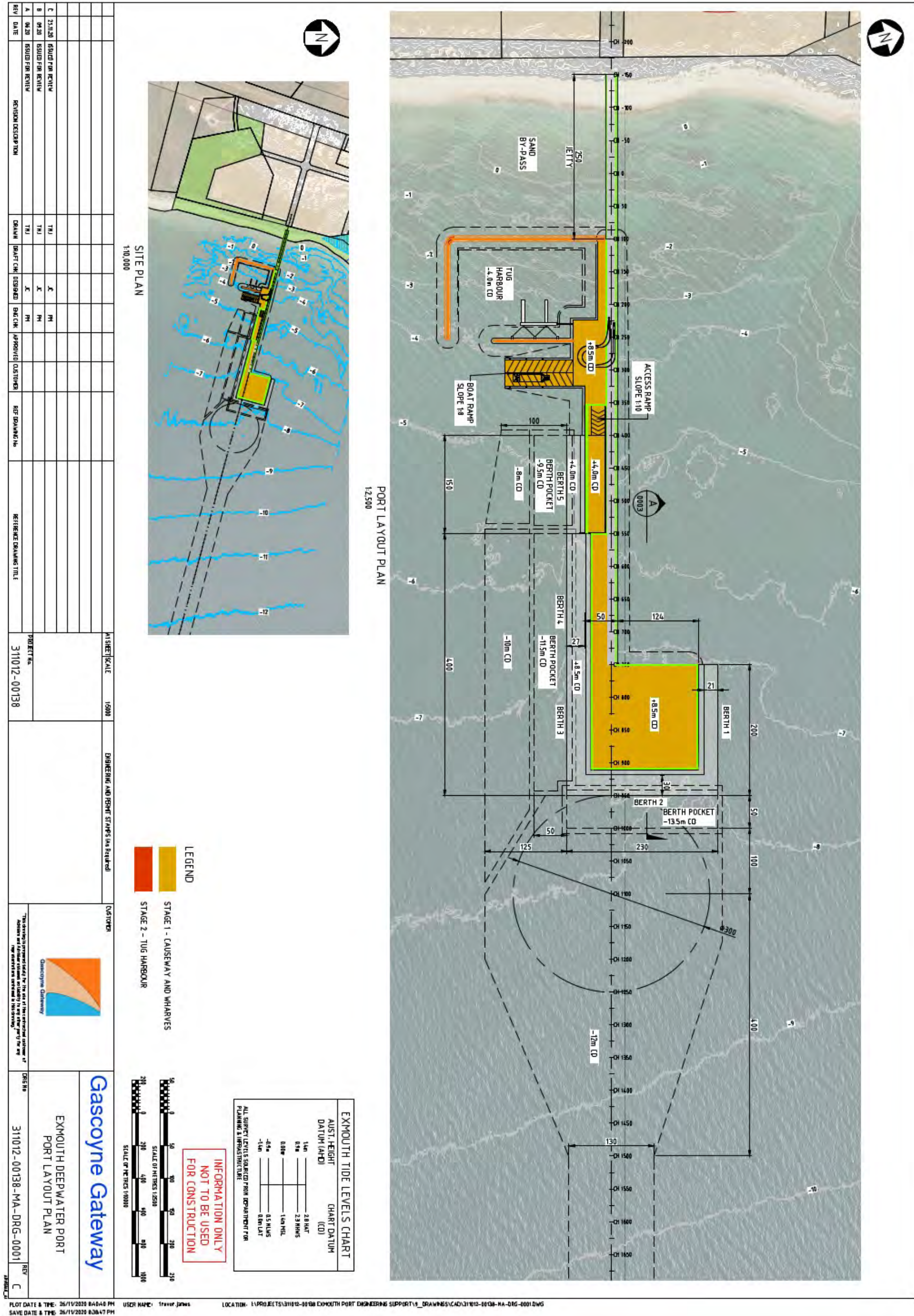


Figure 2-3: Marine design – Single Jetty Deep-water Port & Renewables Hub





### 2.1.2 Primary footprints

The primary development footprints have been analysed to compare and contrast existing facilities in the Exmouth Gulf (note that these have had no long-term effects on the ecosystem and add character and social values that resonate with the community i.e. Exmouth Navy Pier). These are presented statistically in Table 2-2.

Table 2-2: Comparison of primary footprints

Place	Area (ha)	Percent of gulf
Exmouth Gulf total area	544,766	
Gascoyne Gateway terrestrial	259	
Gascoyne Gateway marine infrastructure footprint	12.63	0.002%
Gascoyne Gateway dredge footprint	50.13	0.009%
Gascoyne Gateway combined (including terrestrial)	322	
Existing Boat Harbour (terrestrial)	83	
Existing Boat Harbour (marine) infrastructure	19	0.004%
Point Murat 2	0.3	0.000%

### 2.1.3 Phases

Gascoyne Gateway Ltd, has prepared this referral for the ultimate extent, which future proofs the project. Logical phases includes the marine facility in two phases (the second phase to include the tug facility – Section 2.1.4.1) and similar three phases for the landside (the initial operational areas, tied to the marine facility, the renewables precinct as phase 2 and the fuel farm in phase 3).

Exact scheduling of the phases will occur during definitive engineering and feed into the final environmental referral document. The overall project schedule for Phase 1 delivery is illustrated in Figure 2-4.



Figure 2-4: Proposed Timeline

### 2.1.4 Marine infrastructure

#### 2.1.4.1 Tug facilities

The proposal includes a battle axe tug boat facility to house both future tug boats and super yachts. An additional 36,045 m<sup>3</sup> of dredging would be required in this basin to get to an LAT of –4 m. This includes a turning circle and a roll-on/roll-off ramp, as shown in Figure 2-5 (this area is included in the footprints presented in the key characteristics Table - Table 2-1).

Australia currently hosts 70 to 80 super yacht vessels a year, of which the tug haven provides for their visitation. Australia’s market represents about 1% of the world’s superyachts. Super Yacht Australia is expecting a 300% rise in future visitation and this facility will position the project as a key enabler for capturing this tourism (AIMEX & Superyacht Australia, 2016).

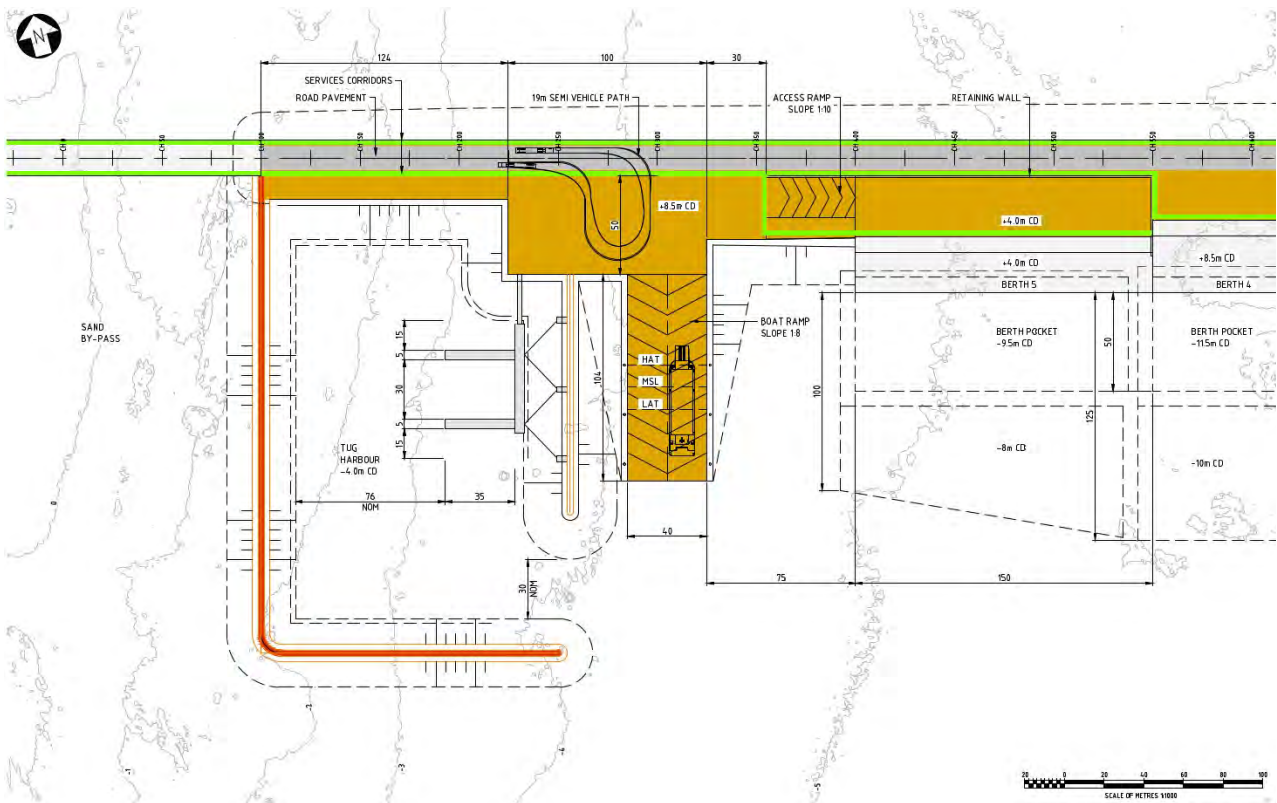


Figure 2-5: Proposed tug facility

### 2.1.5 Terrestrial infrastructure

Indicative layouts are presented in Figure 2-6 for the onshore facilities, individual components are detailed in the following sections.



Figure 2-6: Figure 2-2 broken down to show indicative layouts



### 2.1.5.1 Desalination

The project proposes to incorporate a small modular seawater desalination plant with a nominal design capacity of 2 ML/day. This is based on producing 0.6 GL/year with a plant availability of 95%. The plant will have RO desalination technology – the standard technology for all large desalination plants constructed in Australia over the past 20 years or that are under construction. The project will include best practices derived from the most-recent desalination projects around Australia.

The plant will consist of two main processes:

- a pre-treatment plant to remove suspended solids from the seawater
- an RO desalination plant to remove salt from the seawater.

Both the pre-treatment and RO plants will be configured as multiple trains (modules) to provide operational flexibility while at the same time maintaining peak production. The desalination plant will be located entirely within the cleared footprint and is expected to take up to 1,200 m<sup>2</sup>.

A typical schematic diagram of the proposed plant is provided in Figure 2-7 (Maunsell, 2007). Although this schematic represents the layout for a typical 1 ML/day temporary desalination plant, which is of less capacity than the proposed plant, the drawing provides a useful description of the overall layout.

The desalination plant will have a nominal product water capacity of 2 ML/day. This will require approximately 6 ML/day of seawater to be brought into the desalination plant and approximately 4 ML/day of seawater concentrate (brine) to be discharged back to the ocean at approximately 70ppt. This is considered a small plant and any mixing impacts will be considered in the EIA. In comparison globally there are more than 15,000 plants, outputting more than 95Mm<sup>3</sup>/day of brine, of which Australia is considered a large producer (Jones. E et al., 2019). Brine of 4ML represents a small 0.004% of this number and is expected to reach background levels within a mixing zone of 40m.

#### 2.1.5.1.1 Beach wells

We propose beach wells that source water from coastal sediments as an alternative to sourcing water from the nearshore environment. No marine works are required for beach well installation. The beach wells are saline water part of the ocean system and wont effect any surrounding aquifer.



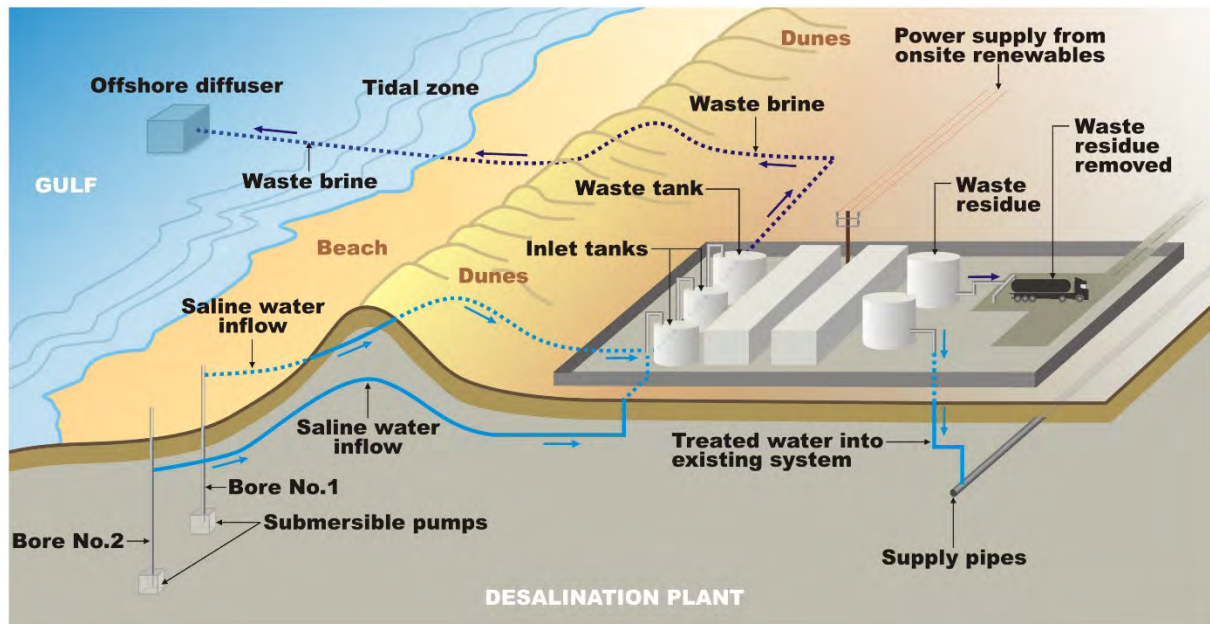


Figure 2-7: Schematic of proposed desalination plant

### 2.1.5.1.2 Chemicals used in the RO desalination process

Several chemicals are required for the efficient and effective operation of the desalination plant. These may include the chemicals listed in Table 2-3, which also shows the potential maximum dosing rates and frequencies. The chemicals listed in Table 2-3 are in common use at all the seawater desalination plants currently operating in Australia, including the Tugun plant on the Gold Coast, the Sydney plant at Kurnell and the Perth plant at Kwinana. We will determine the actual chemical requirements and dosing regimes from jar testing or pilot studies and refine these during plant design.

Chemicals added during the process have several pathways: they will either flow through the treated water pipeline, enter the brine discharge (Table 2-3) or be disposed of with solid wastes. The possible impacts of these chemicals, which may be present in the brine discharge, are described in the impact assessment.

There will be no flushing of chemicals through the seawater intake.

Table 2-3: Typical dosing rates of water treatment chemicals

Chemical	Dosing frequency – potential maximum	Dosing rate – potential maximum
Sulphuric acid	Continuous	10 mg/L
Ferric sulphate/chloride	Continuous	5 mg/L
Polyelectrolyte	Continuous	1 mg/L
Antiscalant	Continuous	1.5 mg/L
Sodium hypochlorite	Intermittent (0.5h per week)	5 mg/L
Sodium metabisulphite	Intermittent (0.5h per week)	12 mg/L

### 2.1.5.1.3 Overview of discharge



The desalination plant will have a nominal product water capacity of 2 ML/day. This will require about 6 ML/day of seawater to be brought into the desalination plant and about 4 ML/day of seawater concentrate (brine) to be discharged back to the ocean. During certain times, governed by demand from the Exmouth community and operations, production rates will be lower, which will result in lower seawater inflow and brine discharge rates.

The nominal annual production from the desalination plant is 0.7 GL. This translates to an annual seawater intake of 2.8 GL and an annual brine discharge of 2.1 GL.

The typical discharge characteristics of the desalination plant are shown in Table 2-4.

Table 2-4: Typical discharge characteristics of the desalination plant

Parameter	Discharge characteristic
Salinity (parts per thousand, ppt)	Up to 70 ppt
pH	6–8
Temperature (°C)	Increase of less than 2 °C above ambient
Selected chemical species, subject to final plant design	Diluted concentrations of chemical species

Brine will be pumped from the plant and discharged to the ocean via the brine discharge pipeline within the marine development envelope. We will determine the layout of the brine discharge during detailed design, ensuring it fits within the development envelope.

#### 2.1.5.2 Fuel storage

The strategic port land will include a 30 ML fuel facility made up of Diesel and Jet A1 fuel.

The overall details are as follows:

- Diesel storage tanks: two above-ground, vertical diesel storage tanks. These will be located on impermeable graded floors with a closed drainage system and sump and surrounded by impermeable bund capable of containing 110% volume of the largest diesel storage tank. Tank control instrumentation will include tank level gauges, high-level alarm sensors (with annunciator system), temperature transmitters and valve position indicators. Tanks will be fitted with fail safe valves on tank draw offs.
- Loading gantry consisting of fuel compatible concrete floor with roll-over bund, self-draining floor into a local sump/holding tank, roofed truck loading bay, tanker bottom fill with overfill and earth protection, vapour recovery system, and operation instrumentation including emergency shutdown systems.
- Surface water management system consisting of drainage system to contain and treat potentially contaminated storm water, oily water separator and surface water infiltration areas.
- Firefighting system anticipated to consist of two firefighting water tanks, pumps to supply fire water at pressure and firefighting foam including foam pourers.

#### 2.1.5.3 Water storage

Limited temporary water storage facilities will be installed on site within the disturbance footprint. No ground water abstraction is proposed apart from the beach saline wells (Section 2.1.5.1.1).



#### 2.1.5.4 Renewables

The renewables onshore facility is a key aspect of the proposal and the vision to become Australia's first green port through regenerative development principles including a solar farm and battery storage to power the jetty; and potable water production (desalination) and other regenerative initiatives currently being investigated.

Currently Exmouth has a 9MW Power Station -Horizon Power's only CNG (compressed natural gas) / LPG power station, powered by CaterpillarG3516 TA. This is owned by Ferngate Capital and David Bradley since 2006, and operated by TW Power Services.

Horizon Power engaged with the Exmouth community in late 2020 and proponent representatives were in attendance. Horizon Power reported that the community is interested in the town being a leader in renewable energy, deploying increased and visible renewable generation with solar, wind, batteries or other technology to highlight Exmouth as a regional leader in the renewable energy transition (Australian Government, 2020).

There is currently no significant renewable energy generation in Exmouth. Horizon Power is conducting an options analysis and cost benefit modelling process involving demand and energy forecasting and long-term system planning studies (Horizon Power, 2020). Following this process, Horizon Power are anticipated to present findings to the Exmouth community for comment mid-2021.

The proponent has identified two areas for power generation to support 24/7 operations and provide energy to the grid. The first is a dedicated power development zone to the west of the port landside facilities (77.62ha - Figure 2-2). A second area to the north-west of the site has been earmarked as a multi-use area with power generation as an identified activity (93.81ha - Figure 2-2).

Renewable energy could be sourced from solar and wind sources supplemented with battery storage, or alternatively sourced from hydrogen. For the purposes of this referral, the Proposal includes all land that could be used for construction and operation of renewable facilities and associated infrastructure.

The technology behind wind and solar is well-established. Battery technology is established and whilst the technology is improving and the costs are reducing it is possible to purchase battery systems of sufficient size to run the port. Hydrogen is not a mature technology but appears to be developing to a stage where it could be a commercially available economical alternative to battery storage before the commencement of operations.

Gascoyne Gateway Ltd current energy consumption calculations are for 17 MW as follows:

- Port facility use Main port site to power lighting, desalination, cool rooms etc. 5 MW
- Fuel facility Lighting, pumps etc. 2MW
- Supply to community (subject to access agreements) 10MW

#### 2.1.6 Construction and temporary works

We expect the construction and commissioning of the entire project to take up to two years using conventional construction techniques and to include the following elements:

- earthworks
- marine works
- concrete works
- steel works



- piping
- building works
- mechanical and electrical installation.

We will undertake all environmental management using standard environmental management practices and ensure project management plans comply with relevant legislation and EPA objectives discussed throughout this document

#### **2.1.6.1 Existing adjacent industrial estate**

The existing industrial estate was originally approved by the EPA in 2000 (EPA, 2000), Uses assessed by the Department included:

- a gas-fired power station;
- heavy transport depot;
- concrete batching plant;
- off-shore facilities for the hydrocarbon industry (pipes etc.);
- fish processing and handling;
- warehousing; and
- limestone related industries.

The proponent believes the industrial land is well suited to support the proposed development and provide complementary activities and support services.

## **2.2 Proposed Use**

The sectors considered within this proposal include:

- |           |                      |
|-----------|----------------------|
| ■ Tourism | ■ Ancillary services |
| ■ Defence | ■ Power              |
| ■ Fuel    | ■ Water              |

There is no proposal for live cattle or bulk minerals export. Any mineral export is limited to high value, low tonnage commodities. This approach will limit many noise, dust and odour issues commonly associated with marine facilities.

## **2.3 Proposal justification**

The proposal has many innovative features that suggest it may lead the world in demonstrating Regenerative Development. This is a 21<sup>st</sup>-century type of development that not only minimises impacts on the local and global environment but also mitigates current risk while repairing and regenerating past impacts. The Single Jetty Deep-water Port & Renewables Hub can demonstrate these regenerative qualities on energy, water, waste and biodiversity. It can also enable social and economic regeneration and thus be an Australian-first holistic approach to regenerative development. There is a compelling case for the construction and operation of a multi-use marine facility supporting Exmouth, Western Australia. This facility would provide essential capability for a variety of seaborne operations, particularly for cruise liners, where Exmouth is a key element in supporting a viable tourism market for Western Australia.

There is no single-use purpose that could financially support the construction and operation of a marine facility of this nature, whereas the multi-use model supports ongoing financial viability for the next 50–100 years. It also has a suitable business model to attract private investment.

Gascoyne Gateway Ltd was formed to plan and invest, then build, own and operate the project, working with the community, local and state governments and industry stakeholders. The project aligns naturally



with the Western Australian Government's declared priorities, including 'Regional Prosperity' and a 'Strong Economy'. With an anticipated long-term revenue base of \$40 to 60 million per year and the creation of 70 full time jobs, the project will support the Exmouth Shire and Gascoyne Development Commission's desire to see Exmouth flourish.

Sensitive to the delicate Australian coastline, Gascoyne Gateway is planned to be the first 'Green Port' in Australia designed, built and operated as a 'carbon neutral' endeavour utilising planned renewable energy sources as part of the design.

Importantly, the planned site of the facility sits outside any World Heritage Park and is adjacent to a zoned industrial area and well outside the Ningaloo Marine Park, in coastal waters.

The Company has made a substantial investment and holds suitable land as part of its planned use at the location. This project has significant potential to positively impact the community of Exmouth, the Gascoyne region and the state's economy.

Design is based around an approximately 900-metre combination rock groin (breakwater) and pylon steel construction to a 'T' section berth face to support the anticipated vessels. This berth face will require about 12.0 metres of depth (at Chart Datum) to meet design vessel draughts. This will be achieved by both natural depth and some dredging of sand and seabed limestone at the berth pocket.

By virtue of having the proponent operating a fully functional marine facility, currently proposed under the Port Authorities Act (under the Mid West Ports Authority), the proponent will have the capability to mitigate significant present risk to the environment. There are also many additional benefits of having a regulated waterway under the Port Authority Act, including designated anchorages, oil spill management and response, marine pests management and fauna strikes. The estimated benthic impact caused by anchoring scour from 298 commercial vessels in the Exmouth Gulf for the 2016-2020 period is 299,439m<sup>2</sup> (Mellor et al., 2020).

The subject site has a number of clear strategic advantages as summarised below:

- The proponent has entered into negotiations with Traditional Owners and the State Government to secure suitable land. Initial indications are positive that the proponent will be able to negotiate land tenure arrangements to facilitate the proposal. In addition, the proponent has secured some freehold land to provide an initial baseline capability for Facility construction and operations;
- The subject site has coastal access and a seabed profile that will provide suitable area for construction of the facility, and access to a suitable water depth to suit design vessels. The subject site also benefits from a low tidal range and low current speeds. Point Murat as an example has good depth but is also restricted in operations by fast currents of 4-6 knots during Spring tides. Further to the South of the subject site, available depth is quickly negated by the requirement for significant additional construction and/or dredging costs to achieve the same result;
- Distance from the Exmouth townsite ensures that Port activities are located near existing and planned industrial areas whilst not impacting existing or planned residential areas. The adjacent Ingram Street Industrial Area allows access to local specialist contractors and services for the repair and maintenance of port functions into the future and will contribute to the increasing use and viability of the industrial base;
- The subject site is within close proximity to existing limestone extraction areas as a supply of construction limestone;
- The Exmouth-Minilya Road is an important road that will provide access to the proposal; The subject site is capable of connecting to water and power services. The proponent also proposes to provide renewable energy generation and desalination plant to provide water; and





- Access to the local population workforce – with approximately 70 full time jobs anticipated.

The proponent has undertaken a review of threatening processes occurring in the region to identify the project’s benefits for the local environment – see Figure 2-8. The opportunities to restore past cumulative impacts provide a strategic opportunity for the community.

The various aspects (identified in Figure 2-8) of the Single Jetty Deep-water Port & Renewables Hub concept individually, may be considered individually as best practice, but together provide something more. They actually give insight into how a development can be *regenerative*. This is a new level in environmentally-sensitive development. A paper by Professor Peter Newman AO from the Curtin University Sustainability Policy Institute captures the project’s aspirations to be a globally significant development (Newman, 2020).

	Initiative	Desired outcomes	
1	Design	'At risk' species studies	'At risk' species identified and regenerative habitat options funded.
		Port buffer zones	Design 'buffers' to reduce noise and fauna/flora protection zones.
2	Construction	Carbon offset construction	Reduction of greenhouse gases by using less cement or carbon offset cement during construction.
		Optimal seabed depth - minimal dredging	All material will be brought ashore or used to construct the jetty - removing the risk of sand or silt escaping into the Gulf.
3-12	Operations	Desalinated water production	Desalination plant to produce potable water for the local community, reducing the load on local aquifers and helping them replenish over time.
		World Heritage risk mitigation	Point Murat fuelling could be transferred away from the Ningaloo World Heritage Marine Park. 'Recommended' courses and speeds for larger vessels on charts and regulated through Port Authorities Act and the provision of pilotage.
		Seagrass community replenishment	Determine long-term damage done to seabed grass fields throughout the Gulf through survey and co-fund an annual grass seeding program to increase carbon storage capacity.
		Renewable energy	Provide Exmouth with access to renewable energy. The port would run on renewable energy generated through a proposed solar plant and storage grid, as well as a waste-to-energy plant.
		Community values	Contribution to priority environmental projects in Exmouth. Provision of potable water to the community. Assistance in modernising waste recycling/composting/mulch.
		Conservation and scientific agency partnerships	Co-contribute to research organisations for the protection and enhancement of the natural environment.
		Research reef	Installation of a marine structure that encourages corals to grow, increasing their natural habitat and providing research opportunities.
		Heritage significance	Identify areas of significance and undertake partnership with Traditional Owners to protect, promote and educate through eco-tourism opportunities.

Figure 2-8: Proposed regenerative activities and the need for the project

## 2.4 Planning and environmental approval pathway

### 2.4.1 Section 38

Gascoyne Gateway Ltd is currently going through Stage 1 of the Environmental Impact Assessment process, as illustrated in Figure 2-9. We have started to collect some long-lead-item baseline datasets to support the overall EIA and this referral.





## 2.4.2 Section 48a

As part of the project, a Scheme Amendment request to the Shire of Exmouth Local Planning Scheme No. 4 (LPS 4) will be prepared and submitted to the local government. The Shire will consider the Scheme Amendment request and prepare a Council Agenda item for a resolution of Council to initiate the Scheme Amendment.

Pursuant to section 81 of the *Planning and Development Act 2005* (PD Act), the local government will refer the proposed Scheme Amendment to the EPA. Sufficient written information about the Scheme Amendment will be provided to enable the EPA to comply with section 48A of the EP Act in relation to the Scheme Amendment.

## 2.5 Legislative Framework

The following sections describe the range of applicable legislation that the Proposal will be regulated under.

### 2.5.1 Environmental Protection Act, 1986 Part IV

This document supports the proposal's referral to the Western Australian Environmental Protection Authority (EPA) under Part IV of the EP Act. Preliminary scoping discussions have commenced between Gascoyne Gateway Ltd and the EPA to determine the appropriate assessment level to be applied to the Proposal and identify essential information requirements.

The following environmental factors will be assessed:

- Benthic communities and habitat (Section 5.3);
- Coastal processes (Section 5.4)
- Marine environmental quality (Section 5.5)
- Marine fauna (Section 5.6)
- Flora and vegetation (Section 5.7)
- Terrestrial fauna (Section 5.8);
- Social surroundings (Section 5.9); and
- Other factors (Section 5.10).

### 2.5.2 Environmental Protection and Biodiversity Conservation Act 1999

Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) if it impacts on Matters of National Environmental Significance (MNES). Gascoyne Gateway Ltd has referred simultaneously this Proposal to the Commonwealth Department of Agriculture, Water and the Environment (DAWE) under the EPBC Act, for matters of national environmental significance (Section 4.10).

### 2.5.3 Environmental Protection Act, 1986 Part V

A works approval and operating licence for the Proposal may be required under the EP Act Part V. The following items will be assessed, and management provisions assigned:

- Noise emissions;
- Air emissions;
- Wastewater disposal; and
- Solid waste disposal.



Figure 2-9: Current environmental approvals strategy and specialist studies underway or planned (subject to change based on ESD)





### 3. Land use and tenure

#### 3.1 Land Tenure within the Development Envelope

The proposal is located entirely in the Shire of Exmouth. The main development envelope is situated on unallocated crown land, with the allocations as identified in Table 3-1 and Table 3-2 and shown in Figure 2-2. Parts of the development envelope has been used for gravel and other requirements. It is not apparent that any particular activities have been undertaken in recent time.

Table 3-1: Legal description of land – east of Minilya-Exmouth Road

Lot on plan/diagram	Volume/ folio	Reserve no.	Lot size (hectare)	Registered proprietor
13 (Lot 150) Hunt Street, P50918	2650/672	–	0.4482	Whitegold Corporation Pty Ltd
1 (Lot 149) Hunt Street, P50918	2650/671	–	6.2298	Whitegold Corporation Pty Ltd
Vacant crown land	–	–	304.3825	State of Western Australia
Vacant crown land	–	–	2.1849	State of Western Australia
Lot 81 on Deposited Plan 180895	LR3010/285	R33047	8.3984	DPLH, vested to Shire of Exmouth
Lot 56 on Deposited Plan 210437	LR3151/4	R36475	2.151	DPLH, vested to Shire of Exmouth
Lot 118 on Deposited Plan 184984	LR3150/223	R37664	23.4315	DPLH, vested to Shire of Exmouth

Table 3-2: Legal description of land – west of Minilya-Exmouth Road

Lot on Plan/diagram	Volume/ folio	Reserve no.	Land ID number	Lot size (hectare)
Vacant Crown Land (North)	-	-	3100207	133.3702 ha (approx.) of 637.4012 ha
Lot 560 on Deposited Plan 68726	LR3016/991	R51512	-	67.5916 ha (approx.) of 87.2673 ha
Lot 550 on Deposited Plan 72929	LR3022/878	R34055	-	9.3929 ha (approx.) of 3141.0427 ha
Vacant Crown Land (South)	-	-	3950264	10.5668 ha

The following areas of interest have been identified, refer Figure 3-3.

##### 3.1.1 Ingram Street industrial area

The Ingram Street industrial area was previously known as Lot 51, Lyndon Location 221 and historically was the subject of investigations into its use for strategic industry. To its north is Lot 50 which has operated for the Exmouth Limestone activities, and was touted for a barge loading facility.

The Ingram Street industrial area is subject to a subdivision guide plan that was prepared in 2003. Around 2005 the roads and lots were constructed. The industrial area has been developed for composite development for general and light industrial uses in accordance with the 'Lot 51 subdivision guide plan' and



nominated building envelopes for industry and residential, landscaped buffers, public open space, a drainage easement on Lot 149 Hunt Street, and strategic firebreaks. Several properties contain caretaker's dwellings predominately within the two internal street blocks bounded by Ingram Street, Tuckey Street, Hunt Street and Thresher Street.

### **3.1.2 Road train assembly area**

Around 2010, the road train assembly area (RTAA) was constructed on Crown Lot 567 on the western side of Minilya-Exmouth Road. It is understood this parking area allows for restricted access vehicles (RAV) to stop and the drivers can reconfigure the vehicles according to the permitted requirements, such as reconfiguring to shorter trucks for access through to Exmouth.

### **3.1.3 Qualing Scarp landfill site**

The landfill site is located on the western side of Minilya-Exmouth Road. This facility would separate the proposed development envelope (north and south) areas.

### **3.1.4 Exmouth Aerodrome**

To the south-west is Exmouth Aerodrome. The aerodrome has been operated by the Shire since 1974, predominately providing for general aviation aircraft, micro-lights and helicopter maintenance. The Shire has prepared a draft masterplan for the aerodrome to identify further development opportunities.

The unsealed gravel runway is subject to closure due to rain, and is unfenced. There is no fuel available at the aerodrome.

### **3.1.5 Exmouth Water Reserve**

To the west is the Exmouth Water Reserve water source protection area. The Development Envelope does not intersect with the Exmouth Water Reserve. This is classed as a Priority 1 public drinking water source area (PDWSA) to offer the highest level of protection, allowing for no degradation to be caused by the development of incompatible land use activities (*Exmouth Water Reserve Water Source Protection Plan, 2000*).

### **3.1.6 Cape Wilderness Estate**

To the south is the Cape Wilderness Estate. The estate is comprised of rural residential type lots ranging from 3.5 to 13.8 hectares in size. The lots are for limited uses including single houses, holiday homes and bed and breakfast. Further subdivision of the lots is not permitted. The lots are required to have 4,000 square metre building envelopes to be setback a minimum 20 metres from any lot boundary.

## **3.2 Conservation Estate**

Conservation estates in the region include (Figure 3-2):

- Cape Range National Park;
- Ningaloo Coast;
- Ningaloo Marine Park.



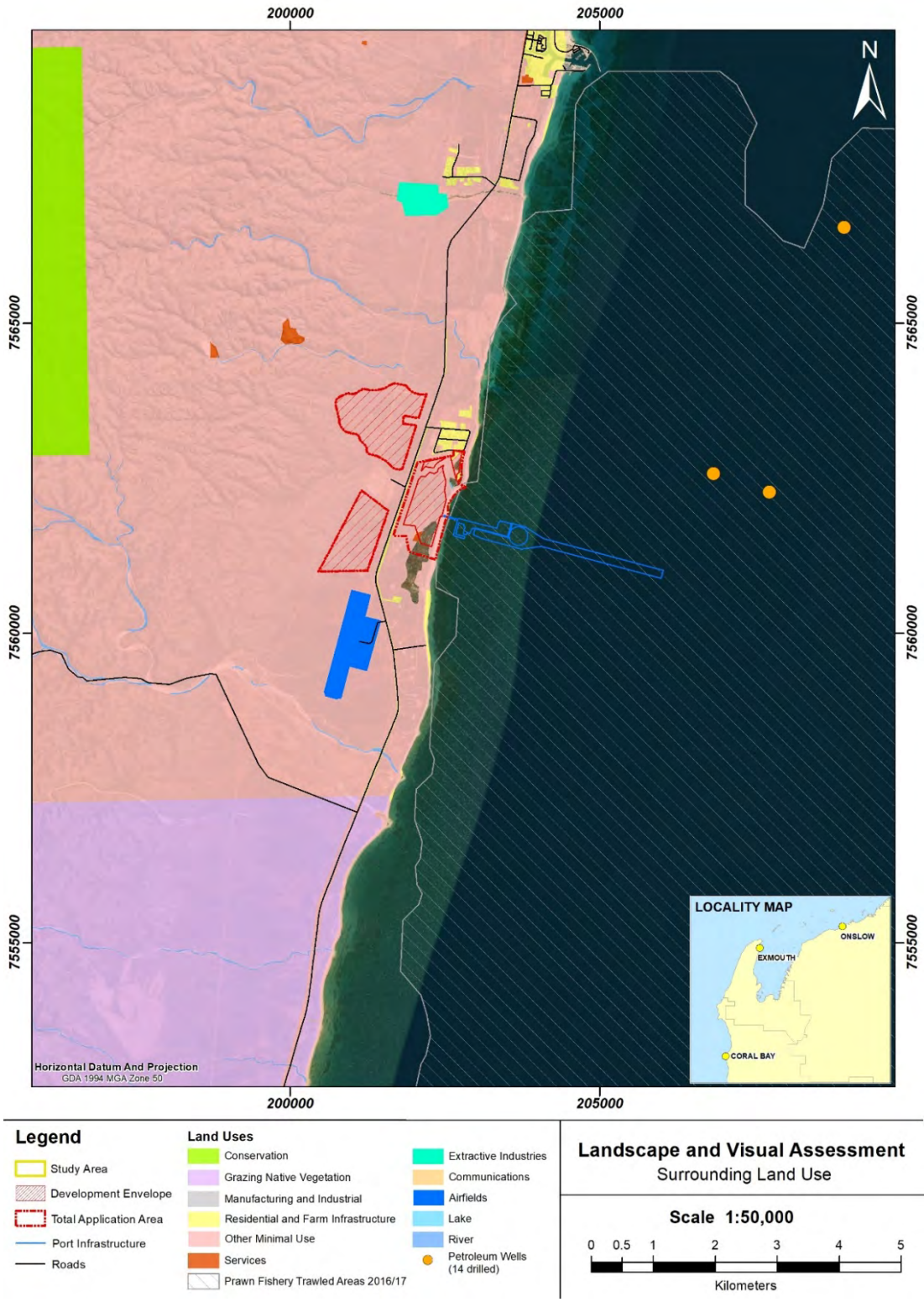
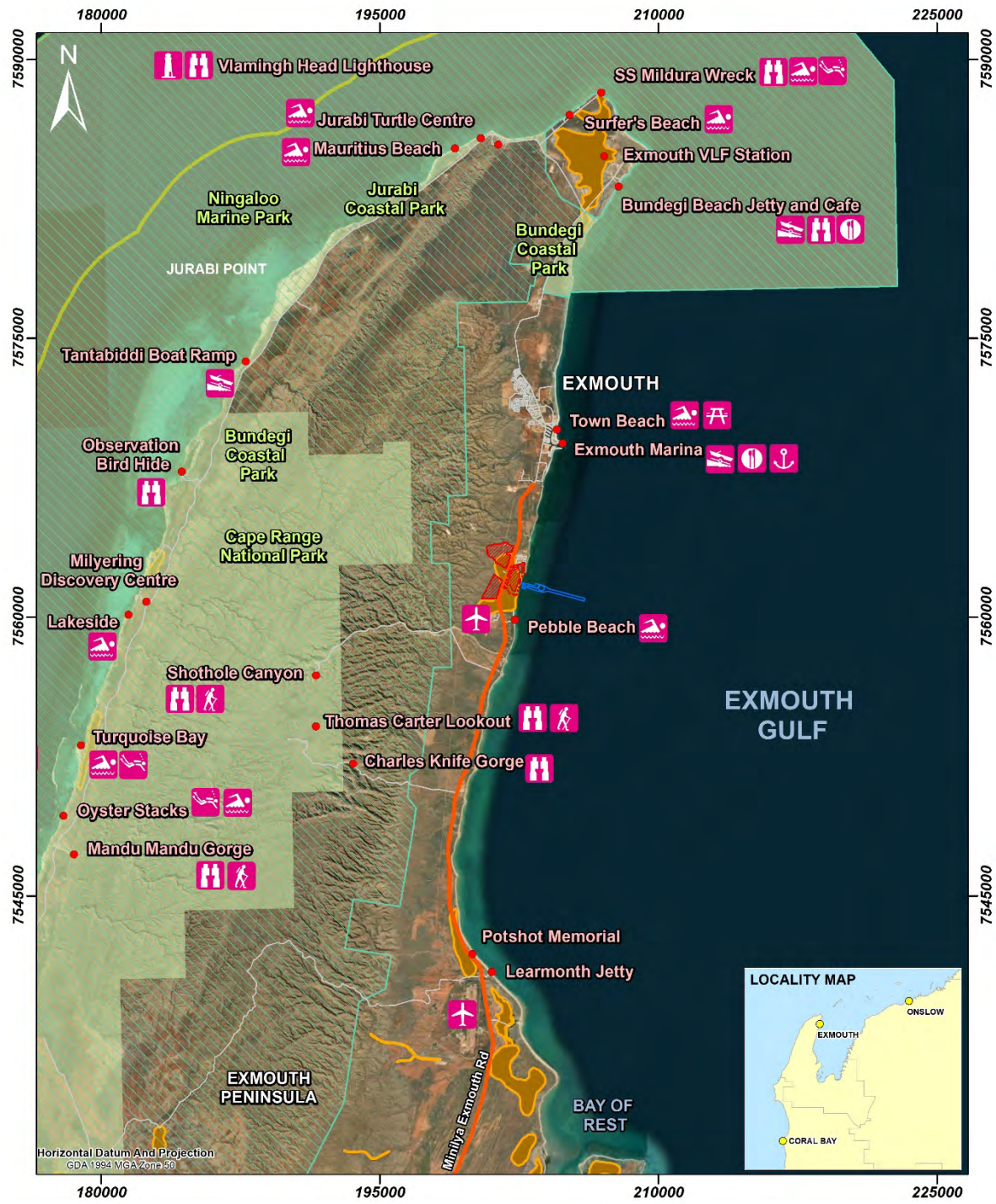


Figure 3-1: Surrounding land use





**Legend**

- Development Envelope
- Total Application Area
- Port Infrastructure
- Major Roads
- Roads

**Sensitive Receptors and Valued Places**

- Places of Interest
- National Heritage Area
- World Heritage Area
- Commonwealth Marine Reserve
- Cape Range Subterranean Waterways

**Landscape and Visual Assessment**  
Sensitive Receptors and Valued Areas

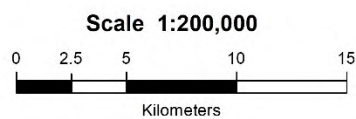


Figure 3-2: Conservation estates in relation to the proposed development



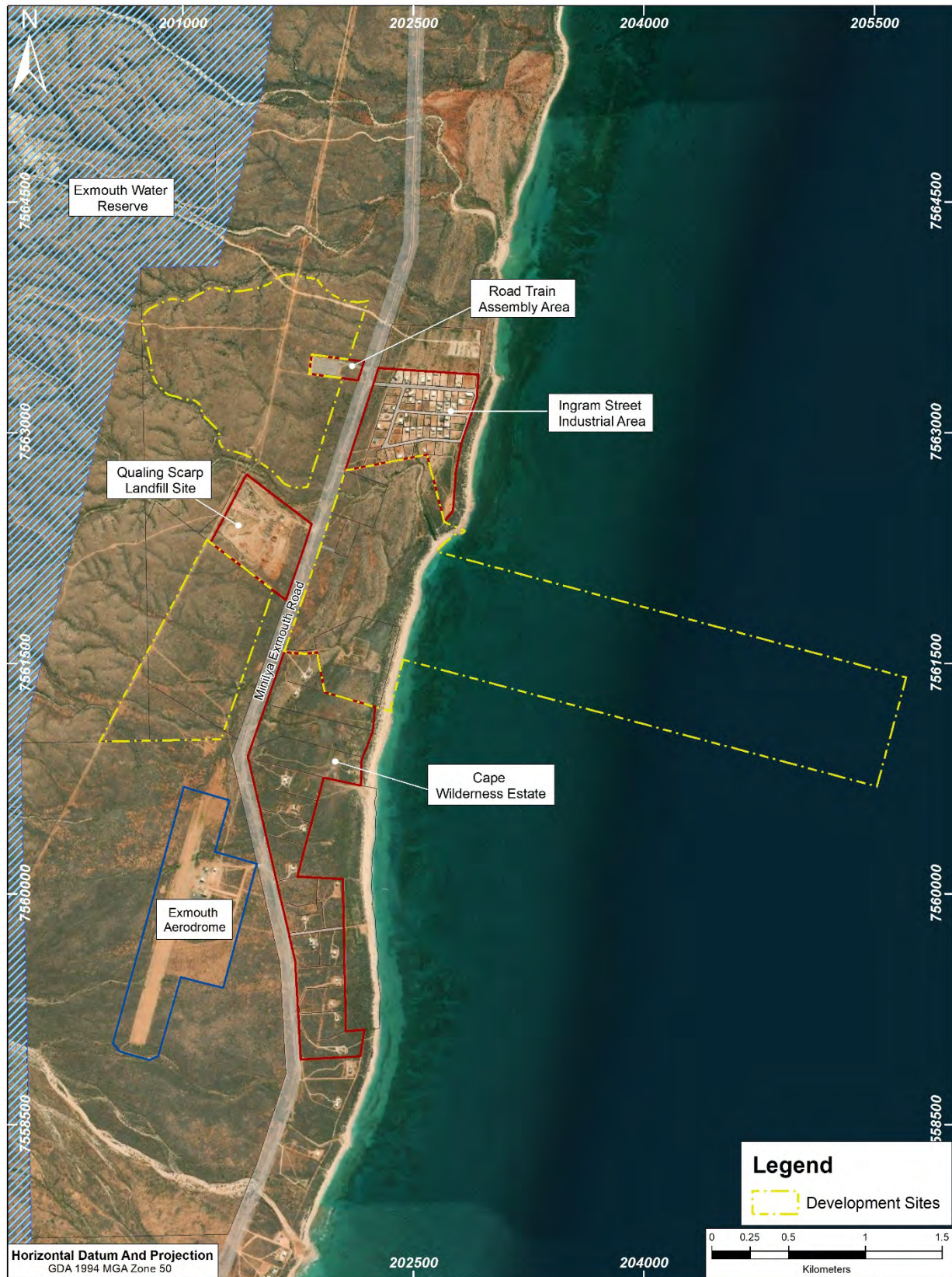


Figure 3-3: Surrounding Areas of Interest

### 3.3 Mining Tenements

The development envelope overlaps two active temporary mining tenements (unsurveyed):



- East side of Minilya-Exmouth Road: TR 70/2614, Ministerial, granted 25 July 1962; and
- West side of Minilya-Exmouth Road: TR 70/5980, Ministerial, granted 22 April 1975.



Figure 3-4: Mining Tenements extracted from national map (Australian Government, 2021)

### 3.4 Surrounding land tenure

The project’s surrounding area has a combination of land tenure. Within the Development Envelope, most of the tenure is overlapping and is predominantly:

- Vacant Crown land;
- Crown Reserves, vested in a number of management entities including the Shire of Exmouth, Main Roads WA and the Water Corporation;
- land that is subject to Native Title; and
- Exmouth Gulf Prawn Managed Fishery.

In the broader surrounding area is a range of Crown land and freehold land. Table 3-3 provides a further breakdown of the extents of the above interests. Figure 3-5 illustrates the range of land tenure.

Table 3-3: Extent of notable land tenure and interests within the surrounds

TENURE	SOURCE	AREA (K M <sup>2</sup> )
Pastoral lease	Landgate 2015	15.84
Mining tenements	DMIRS 2018c	157.04
Conservation Estate – DBCA	DBCA 2018	31.18





Conservation Estate – Commonwealth Marine Reserve	DoEE 2018a	-
Ningaloo Coast World Heritage Site	DoEE 2018b	26.71
Native title claim area	NTTT 2018	338.03
Pearling leases	DPIRD 2018a	1.35
Exmouth Gulf Prawn Managed Fishery	DPIRD 2018b	265.94
The project (project envelope marine area)		0.63
<b>The project (project envelope terrestrial)</b>		<b>3.13</b>

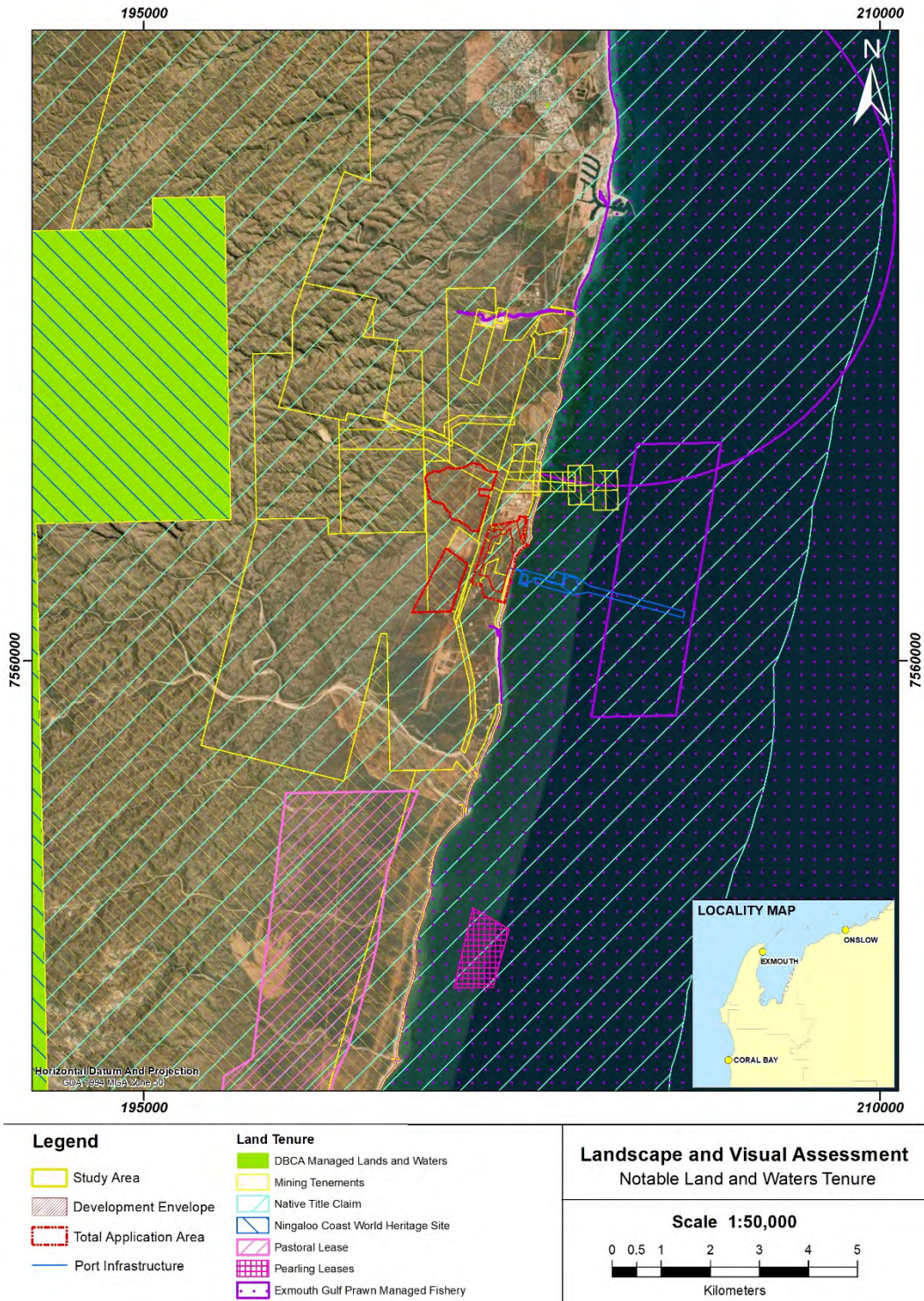


Figure 3-5: Notable land and waters tenure

### 3.5 Native title

The proposal lies entirely within a native title claim.

Notwithstanding the exclusive native title, we believe it is important to formally state our recognition of the Native Title Claimants as the traditional owners of the development envelope within which the proposal is located. In addition, we recognise the Native Title Claimants as the descendants of original inhabitants of



the Australian sub-continent, possessing a unique culture that is unmatched in antiquity to anything else in the world. We therefore acknowledge and respect the claimants' traditional culture, customs and lore across the development envelope. We consider the claimants to be the primary land owners of the development envelope, regardless of other land tenure, and will never undertake any significant activity on their land to which they do not agree. This commitment is made despite any other rights that may be accorded by non-Aboriginal law.

In keeping with this philosophy, we engaged with the Native Title Claimants early in the proposal development process in 2020 and will continue this dialogue as part of the more substantial relationship that is being created. We are continuing to negotiate an Indigenous Land Use Agreement to formally govern ongoing obligations such as land access, tenure acquisition, heritage surveys, environmental management, consultation, the claimants' role in the project, employment and business development, and ongoing communication processes between ourselves and the traditional owners.

### **3.6 Statutory planning**

An amendment to the Local Planning Scheme will be required and this has been the subject of preliminary consultation with the Department of Planning, Lands and Heritage (DPLH) and the Shire of Exmouth. Both DPLH and the Shire have contributed towards the approach to be applied through the scheme amendment.

Going forwards, other processes may be undertaken including:

- Structure planning for the land zoned 'industrial development' on the western side of Minilya-Exmouth Road;
- WAPC approval for leases or licences to use or occupy land for any term exceeding 20 years, pursuant to s136 of the PD Act;
- Subdivision application(s) to subdivide/amalgamate lot(s);
- Crown land subdivision processes may be followed to subdivide/amalgamate Crown lot(s); and
- Development Applications may be submitted for particular works and development, in accordance with the LPS 4.

### **3.7 Workforce**

The proponent anticipates that the proposal will create 70 ongoing jobs directly on-site, as well as more than 130 ongoing jobs in Exmouth through their commitment to buying from local businesses whenever possible.

The proponent will prepare a workforce and accommodation plan that will target the hiring of local workers, and promote living locally in the Exmouth region.

The proponent is also committed to working with Aboriginal communities in the region to promote the rollout of marine/port knowledge and projects. Opportunities will be explored to assist and train Aboriginal representatives to work on the proposal, both during construction and operations.



## 4. Environmental investigations

---

### 4.1 Benthic communities and habitat survey

Two habitat maps are available to describe the extent of broad habitats over the entirety of the Exmouth Gulf. The first is a habitat map produced by the North West Shelf Joint Environmental Management Study (NWSJEMS), which describes six biophysical habitats: coral reef communities, mudflats, sand, mixed assemblage (sand, limestone pavement, macroalgae, seagrass, occasional bommies), filter feeder communities and low-relief subtidal reef (Lyne et al., 2006) (Figure 4-1). Based on Lyne et al. (2006), the biophysical habitats in the Exmouth Gulf are predominantly sand (- 50%) and mixed assemblage (- 30%) with the remaining categories cumulatively accounting for - 20% (Figure 4-1). This map was validated in 2018 by DPIRD, in collaboration with MG Kailis (Figure 4-2), with the validation results showing a strong positive relationship with the Lyne et al. (2006) map for coral reefs, sand and mixed assemblage, but filter feeder communities are likely over represented.

The second habitat map available for the Exmouth Gulf was developed using data from the 129 validation survey sites conducted by DPIRD in 2018 to create a new interpolated predictive habitat map. This map identified four major habitat types with mixed assemblage (macroalgae, seagrass, anemones, ascidians, bryozoans, soft coral) accounting for - 48% of Exmouth Gulf, sand (- 44%), filter feeder communities (7.5%) and coral reef communities (0.5%) (Figure 4-2). The definition of the habitat types is comparable with the Lyne et al. (2006) map of habitat types. However, given the increased number of training sites used, it is likely the 2018 map provides a more accurate estimate of the spatial distribution of benthic habitats within the Exmouth Gulf.

#### 4.1.1 Targeted benthic habitat survey

Video observations for the region were collected over two seasonal surveys, as shown in Figure 4-3. The available data allowed association of geomorphic regions with biological habitats.

Coral benthic primary producers were found to be strongly associated with the inshore high-profile reef and rock veneer areas. Seagrasses were not particularly abundant or dominant at any time, and were typically found interspersed with corals and macroalgae in water depths less than 5 metres. Macroalgal benthic primary producers were often dominant, and were also typically in shallow water, most likely attached to high profile reef or rock veneer.

Other biota included turfing algae (various locations) and filter feeders (sponges, ascidians and crinoids) which were strongly associated with deeper water. No video information was available beyond about 10-metre depth, although it is highly likely that these would be dominated by filter feeders or bare sediment areas.

From these associations, a habitat classification map was created (Figure 4-4). See Table 4-1 for the relative abundance of each habitat (in hectares).



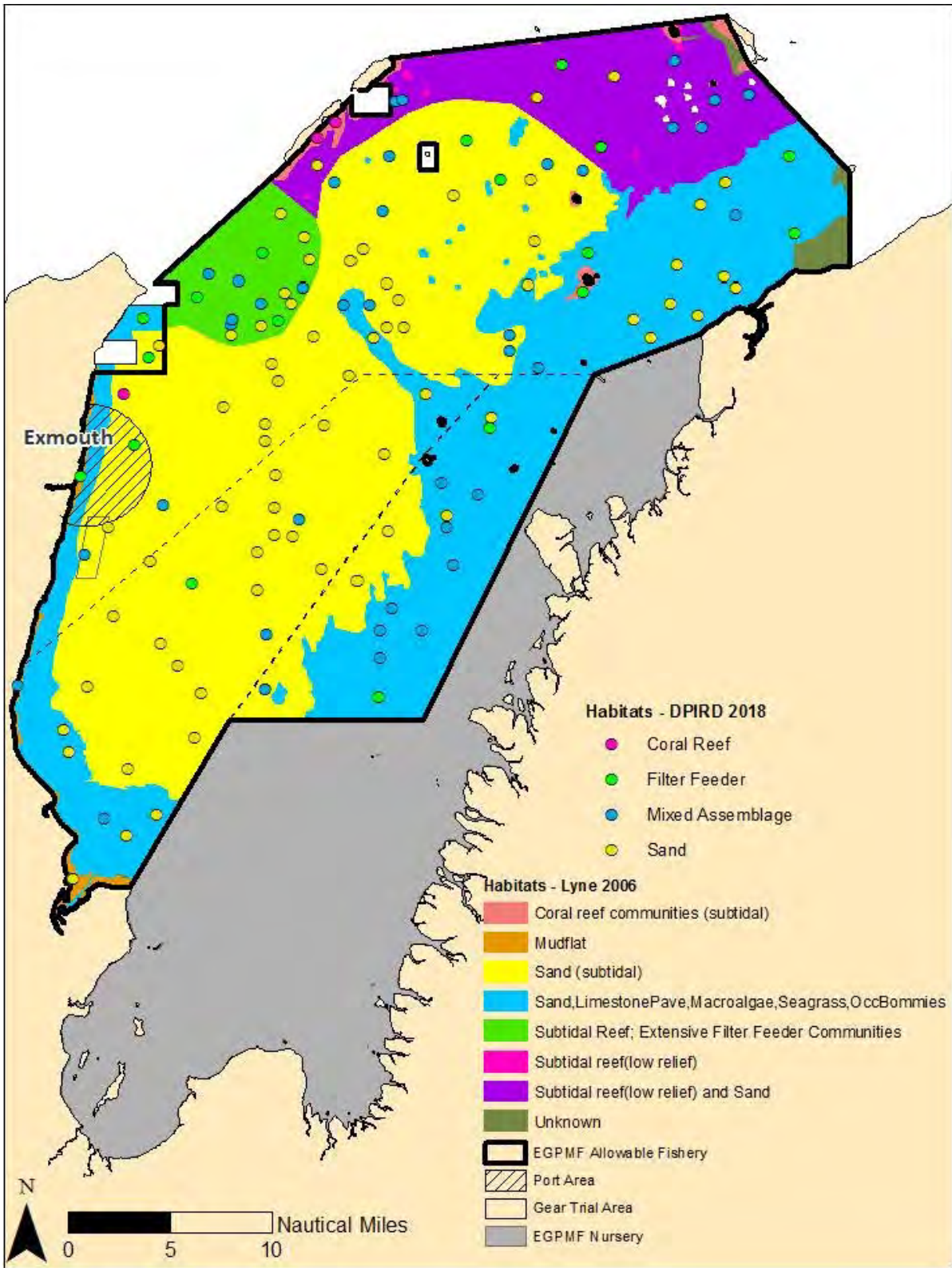


Figure 4-1: Validation surveys, showing benthic validation types, of Lyne et al. (2006) habitat map

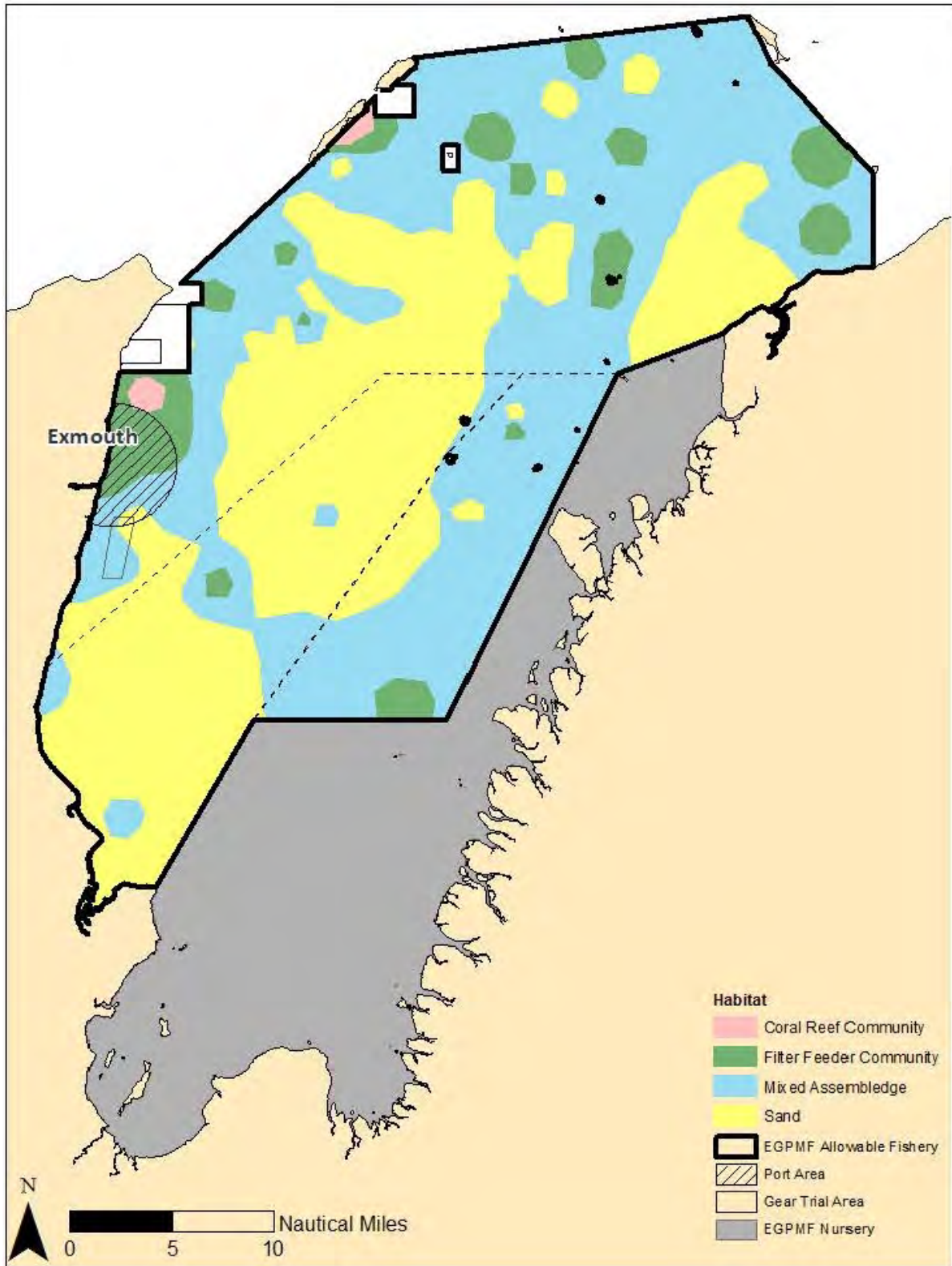


Figure 4-2: Exmouth Gulf habitat map developed by DPIRD/MG Kailis in 2018



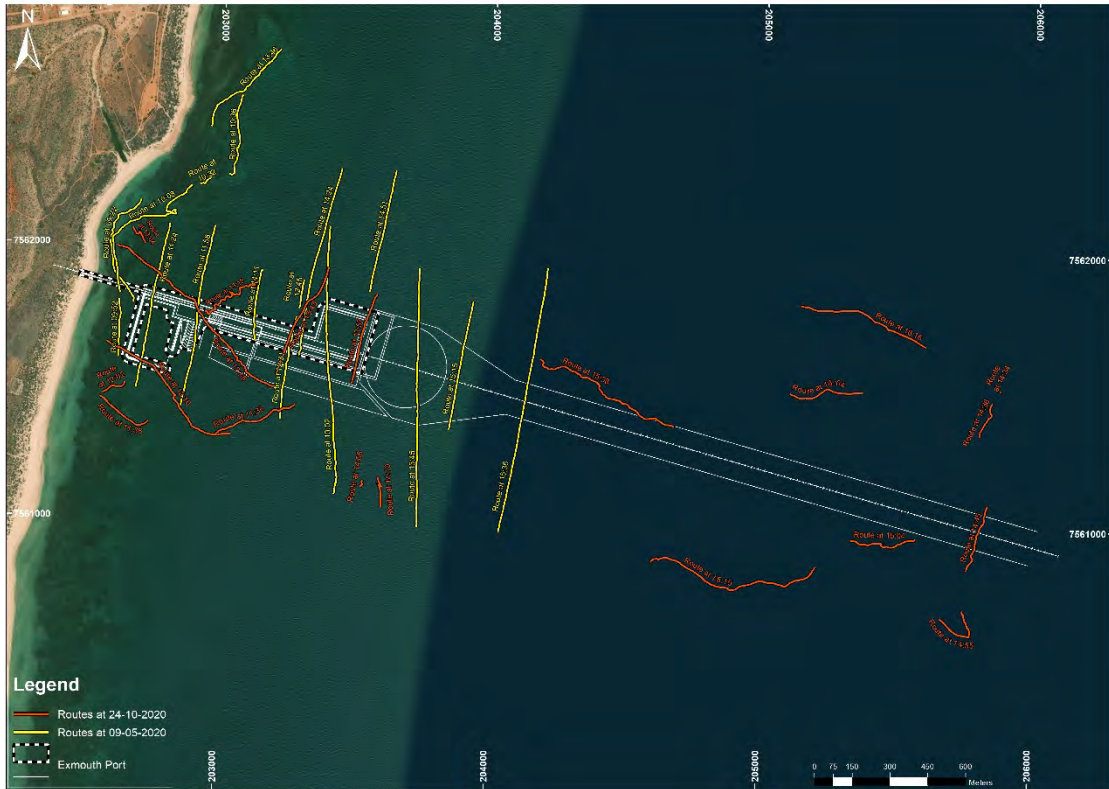


Figure 4-3: Seasonal survey routes

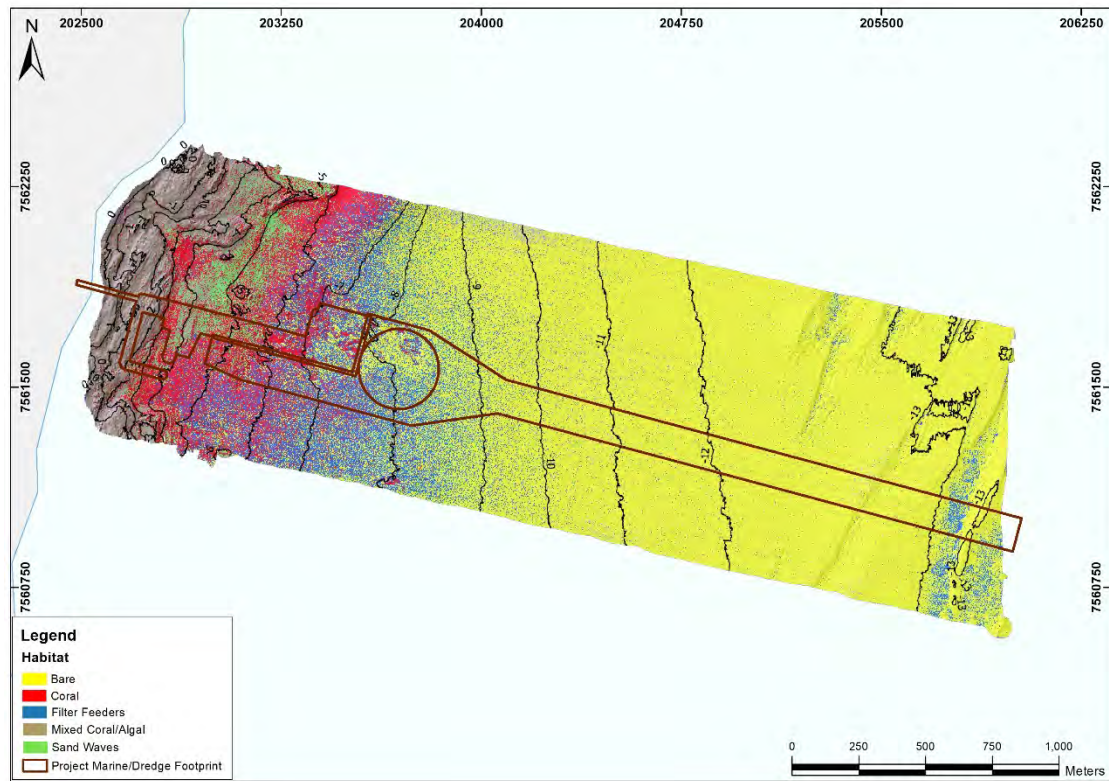


Figure 4-4: Habitat classification map for the study area, showing relationship between primary biota types and geomorphic regions. Depth contours in metres



Table 4-1: Relative area of each biological habitat in the study area

Habitat	Area (m <sup>2</sup> )	Area(ha)
Bare	524,293	52.43
Coral	85,571	8.56
Filter feeders	149,661	14.97
Mixed coral/algal	18,341	1.83
Seagrass	17,925	1.79

#### 4.1.1.1 Benthic habitat summary

The inshore study area is geomorphologically complex, containing a series of shore-parallel limestone ridges (common in NW Australia) which provide complex rocky reef habitat for many biota. A small, sediment floored drowned river valley (or paleochannel) also occurs, which adds to the topographic complexity of the area.

The area does not contain any complex sand wave systems, indicating sediment starvation or a general lack of large quantities of river-derived sediment. The deep-water isolated dune systems may comprise relatively small amounts of bare sand and could reflect past cyclone activity.

Mound structures are very common and are highly likely to be either coral bommies or cyclone rubble that has been colonised by corals and other organisms.

Macroalgae communities are very common throughout the shallow water inshore reef area.

Seagrasses in the area were not well mapped yet appear to be mostly limited to the inshore reef and sediment areas.

The deeper water area filter feeder communities dominate this area.

## 4.2 Coastal processes

A key element of the Single Jetty Deep-water Port & Renewables Hub is the marine facilities which intersect the marine/terrestrial interface.

The Single Jetty Deep-water Port & Renewables Hub requires the construction of an approximately 1 km perpendicular structure over the nearshore area.

Additionally, the extent of shoreline change observed adjacent to an abutment structure associated with the Learmonth Jetty has also been reviewed to show the potential shoreline changes that could occur due to the construction of the marine facilities.

The Learmonth Jetty and abutment were first constructed in 1955 for use by the area's oil drilling operations. The design drawing of the original Learmonth Jetty is included in Figure 4-6 and shows a total abutment length of approximately 80 m. For this assessment, it is assumed that the shoreline changes that have occurred due to the construction of the abutment will be similar to those that arise as a result of the Single Jetty Deep-water Port & Renewables Hub. This assumption is based on the fact that the exposure, aspect and nearshore bathymetry are similar at both sites, as shown in Figure 4-5.





Figure 4-5: Location of Learmonth Jetty in relation to the Single Jetty Deep-water Port & Renewables Hub

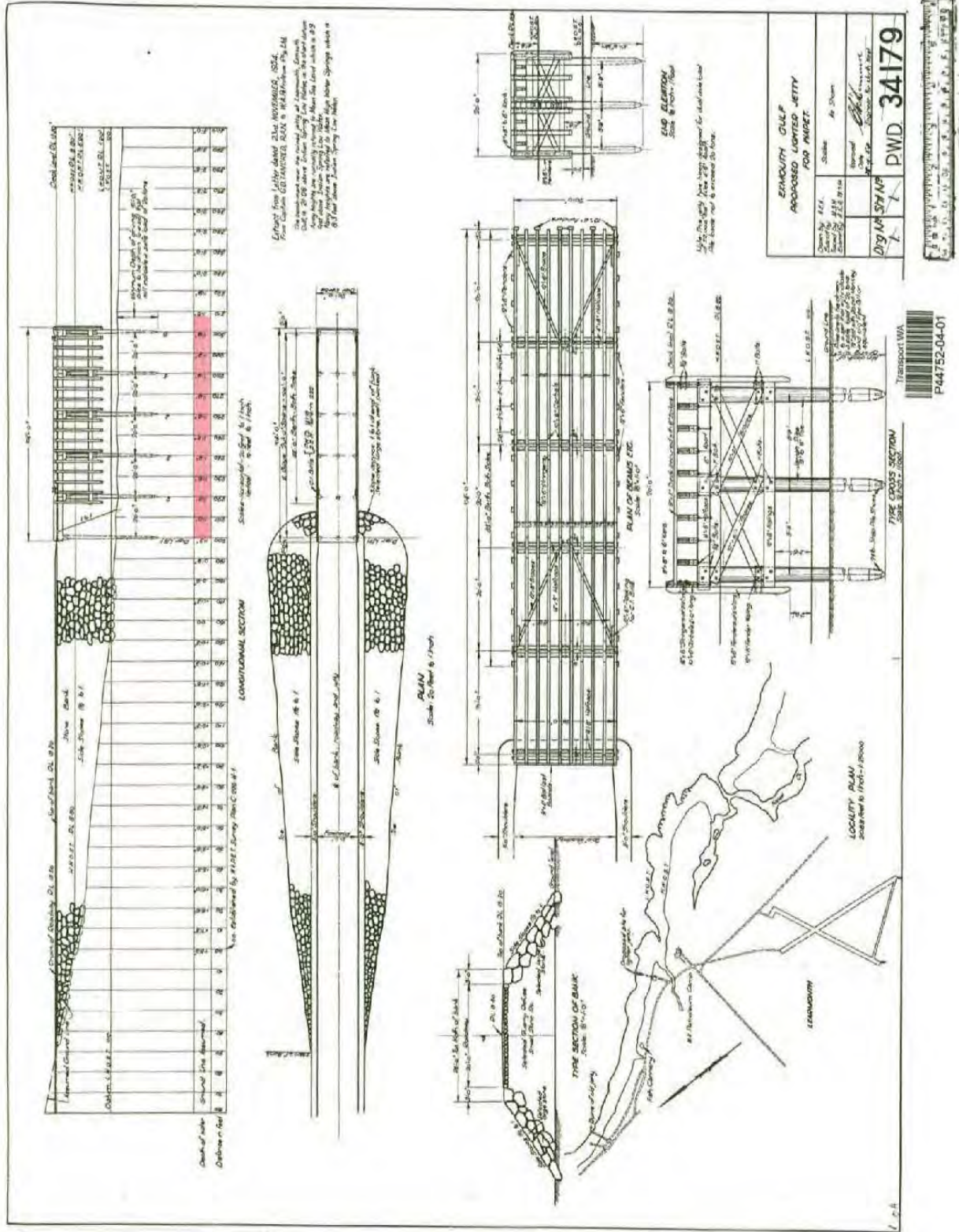


Figure 4-6: Original Learmonth Jetty and abutment





#### 4.2.1 Site characteristics

Beaches adjacent to the Learmonth Jetty and the Single Jetty Deep-water Port & Renewables Hub are characterised by southerly sediment transport (Short, 2005). This southerly sediment transport is mostly due to the increased exposure. It fetches to the north when compared with the relatively protected waters of the Exmouth Gulf to the south of the sites. Short (2005) notes that the beaches are very low in energy and often calm, with sand flats extending around 100 m offshore and patchy fringing reef beyond. This is consistent with the results of the benthic habitat mapping completed by Gascoyne Gateway Ltd near the Single Jetty Deep-water Port & Renewables Hub, as presented in Figure 4-4.

Gascoyne Gateway Ltd also collected sediment samples at locations along the shoreline. Particle size distribution analysis of these samples indicates the coastline is predominantly comprised of medium-grained sands with median grain sizes ( $d_{50}$ ) ranging from 0.15 to 0.5 mm. The mostly sandy nature of these beach materials, coupled with their medium size, means that longshore sediment transport processes would be expected along these shorelines, albeit the sediment transport quantities would be expected to be small given the site's calm nature.

Evidence of net longshore sediment transport is observed at the Learmonth Jetty abutment. Photographs of the jetty abutment and the beaches north and south are presented in Figure 4-7 and Figure 4-8. These images clearly show the presence of a wide sandy beach on the northern side of the abutment, with a much narrower beach present on the structure's southern side. This is indicative of southerly sediment transport.



Figure 4-7: Photograph looking seaward from the base of the Learmonth Jetty abutment



Figure 4-8: Photographs looking landward from the end of the Learmonth Jetty abutment



## 4.2.2 Shoreline movement assessment

### 4.2.2.1 Shoreline adjacent to Learmonth Jetty

Historical aerial imagery was obtained to help understand the impacts of the Learmonth Jetty abutment's construction on the shoreline. To provide meaningful results, the historical imagery was required to pre-date the abutment's development so that changes to the coastline as a result of the construction could be measured.

Aerial imagery was available from 1949, with additional imagery available through the 1960s and 1970s to indicate the changes in the period after the construction. Images from 2001 and 2013 were also included in the assessment to show the longer-term shoreline changes that have occurred.

Figure 4-9 presents extracts from each of the aerial images for the shoreline adjacent to the abutment. It is evident from these images that the abutment has impacted the coastline through the trapping of sediment on its northern side. However, it is also apparent that the vegetation line has advanced seaward on both sides of the abutment throughout the record. This is better demonstrated in Figure 4-11, which presents a shoreline movement plan for the area. This shoreline movement plan was prepared by mapping the position of the coastal vegetation line following the methodology outlined in DoT (2009).

This shoreline movement plan shows that while there has been some degree of fluctuation in the shoreline position, the shoreline adjacent to the abutment has experienced a net accretion trend. Notwithstanding, the extent of the accretion is much higher on the abutment's northern side than its southern side.

The average accretion on the abutment's northern side has varied between 70 to 100 m over the 800 m north of the structure between 1949 and 2013, while the accretion on the southern side has been about 20 m over a 700 m length of shoreline for the same period. This suggests that while the structure does provide an impediment to longshore transport of sediment, its construction on what appears to have been an accreting shoreline has resulted in no net erosion over the longer term. Nevertheless, it is essential to note that over interim periods in a couple of decades following the construction, erosion of the southern shoreline occurred. This erosion appeared to peak in around 1968 before the coastline began to rebound slowly over time. This rebound of the shoreline position presumably occurred as the rate of sediment feed around the abutment began to increase. The extent of this interim erosion may have been as much as 40 m in places.

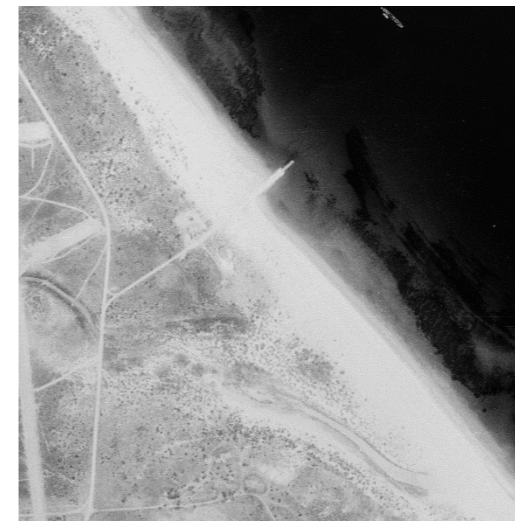




1949



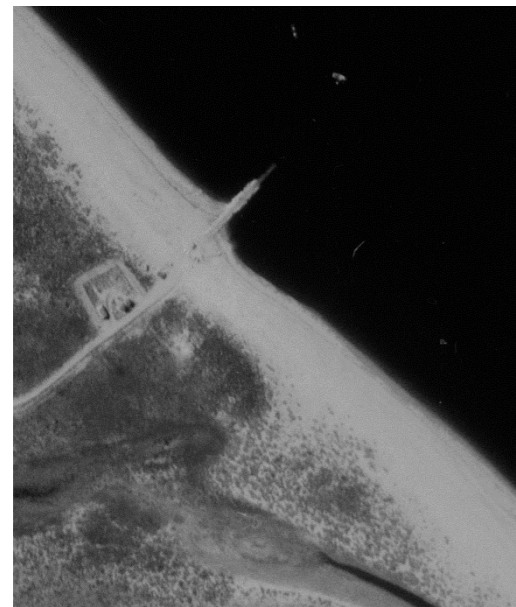
1961



1963



1968



1972



1976



2001



2013

Figure 4-9: Historical shoreline positions adjacent to Learmonth Jetty





1949



1961



1963



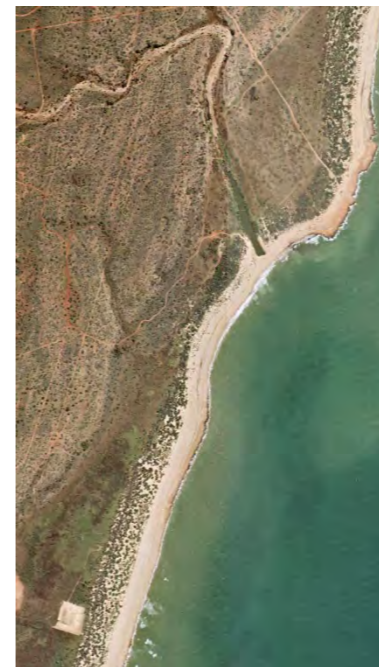
1968



1972



1976



2001



2013

Figure 4-10: Historical shoreline positions adjacent to Single Jetty Deep-water Port & Renewables Hub





Figure 4-11: Shoreline movement at the Learmonth location



#### **4.2.2.2 Proposed Single Jetty Deep-water Port & Renewables Hub**

A similar review of aerial photography was completed for the shoreline adjacent to the Single Jetty Deep-water Port & Renewables Hub location, with vegetation lines mapped from the imagery to indicate the historical shoreline movement. The shoreline movement information is presented in Figure 4-12.

Similar to the Learmonth Jetty site, the shoreline along this stretch of coast has experienced net accretion over the longer term. The rate of growth for the period between 1949 and 2013 varies from about 30 m at the Single Jetty Deep-water Port & Renewables Hub location to about 50 m in the area 1 km north. Nevertheless, it should be noted that at this northern location most of the apparent accretion appears to have occurred between 2001 and 2013 and may, therefore, be the result of ephemeral vegetation coverage due to a calm period before the 2013 photography was undertaken. Excluding the 2013 shoreline position, the average accretion on this shoreline was around 20 m for the period between 1949 and 2001.





Figure 4-12: Shoreline movement plan for Single Jetty Deep-water Port & Renewables Hub location



### 4.3 Marine environmental quality

This section gives an overview of the current marine environment condition of the Exmouth Gulf. This assessment has been based on a literature review, discussions with agencies and four months of field surveys.

It is important to recognise the values of the gulf's western and eastern sides have previously been identified as different.

The gulf's waters are generally turbid. Its eastern and southern shores are dominated by mangal and mudflat habitats of great importance for nature conservation and for sustaining local fisheries. A range of mangrove species and mangal assemblages are present in the gulf. Extensive seagrass beds may be found in its shallow waters; these provide feeding habitat for turtles and dugongs. The shores and nearshore habitats of the gulf's western side are quite different to those of the east.

The western shores have been given a different level of ecological protection recognising those differences (DoE, 2006).

Figure 4-13 is a conceptual diagram of the Exmouth Gulf ecosystem adopted from Oceanica (2006b). The key elements are discussed below.

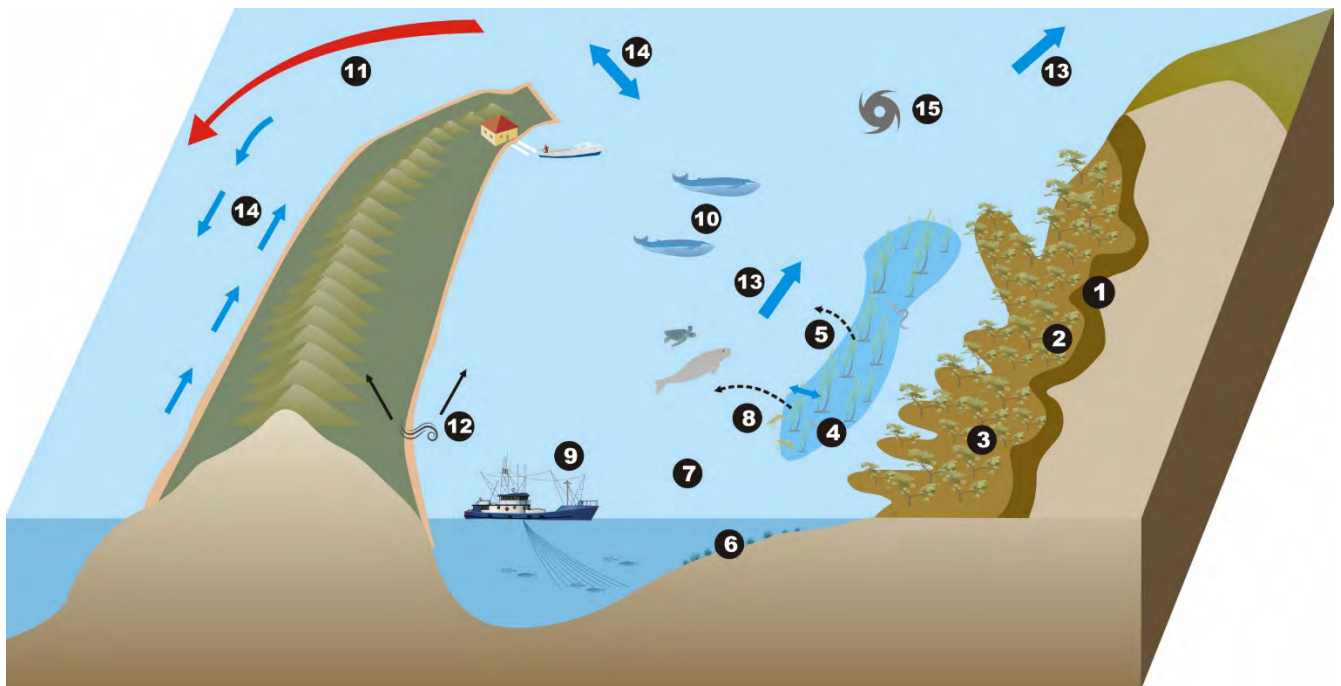


Figure 4-13: Conceptual diagram of Exmouth Gulf ecosystem (refer to text for key) (Oceanica, 2006b)

The numbers in the list below correspond to the numbers in Figure 4-13.

1. Salt flats

The east coast of the gulf is characterised by broad salt flats which extend from the hinterland to the coast. The flats range in width from 6 to 12 km and extend approximately 80 km along the coast from Sandalwood Peninsula in the south to Locker Point in the north (DC Blandford & Associates and Oceanica Consulting, 2005).

The salt flats are occasionally inundated by marine waters during storm surge events.



There is very little evidence of fluvial sediment deposition along the eastern edge of the salt flats as hinterland flows that reach the flats are rare (ARI of 1:2 years for flow to reach flats and significantly greater flows required for flows to cross the flats and flow into the gulf) (DC Blandford & Associates and Oceanica Consulting, 2005; Parsons Brinckerhoff, 2005).

## 2. Algal mats

Cyanobacterial algal mats are an important component of the ecosystem as they survive by fixing nitrogen from the air and contribute nutrients and organic material to the coastal zone in what is otherwise an arid and nutrient-poor region.

Algal mats form the inland margins of the intertidal zone, generally wet 1 to 3% of the time (i.e. on spring tides) (Biota, 2005; Paling et al., 1994).

Brunskill et al. (2001) hypothesised that higher concentrations of organic carbon and nitrogen in sediments along the east coast originate from mangrove litter, algal mats and the erosion of older Holocene sediments.

CALM (1994) also suggested that the mangroves and algal mats are the source of much of the nutrients which support the prawn fishery within the gulf.

Refer to (Paling, 1986) and Biota (2005) for a more detailed description of the algal mats of the east coast and their ecology.

## 3. Mangroves and mangrove creeks

The east coast is dominated by one of Western Australia's most extensive stands of arid zone mangroves (Biota, 2005).

The lack of hinterland flow is a typical characteristic of arid zone mangrove systems, which do not rely on hinterland flows for survival (Biota, 2005).

The mangroves line the open coast from Sandalwood Peninsula up to the Hope Point region. North of Hope Point, where the shoreline is more exposed to wave action, the mangroves occupy more sheltered areas.

Mangrove forests are highly productive ecosystems, and it has been estimated that about one third of the net primary production can be lost as plant litter and up to half of this litter is exported from mangrove creeks to adjacent coastal waters (Biota, 2005).

The export of organic matter and nutrients has an important effect on the nutrition or biomass of consumer communities in coastal waters.

Surveys of water quality in the mangrove creeks confirmed that nutrient concentrations were elevated within the creeks (Oceanica, 2006b).

The high evaporation rates and tidal range mean that salinity in the creeks is higher than offshore waters, with salinities in creeks generally above 40 (Oceanica, 2006b).

It is believed the east coast mangrove system is the primary ecological unit sustaining productivity within the gulf, albeit with significant retention of organic matter within the east coast system.

## 4. Benthic vegetation/dugongs/turtles





There are extensive shallow banks extending up to 5 km offshore of the coast south of Hope Point, while north of Hope Point shallow areas occur in more protected waters.

These banks are generally 0.5 to 2 m deep and support the majority of marine flora on the east coast of the gulf.

The flora comprises ephemeral seagrasses and macroalgae.

These banks are the primary feeding grounds for the Exmouth Gulf dugong population, which tend to be found in greatest numbers in the south-east corner of the gulf.

The banks are likely to be an important feeding ground for turtles.

The banks provide structured habitat which is a key component of the lifecycle of prawns, especially tiger prawns (Loneragan N.R. et al., 2003; Oceanica, 2005).

#### 5. Detritus

The banks produce significant quantities of Sargassum detritus (as well as lesser quantities of material from other less abundant species).

It is postulated that the supply of detrital material from the east coast to the remainder of the gulf may be an important contributor of nutrients to the ecosystem (McCook et al., 1995).

#### 6. Bathymetry

The gulf has two distinct bathymetric regions: the deeper waters (depths >10 m) in the western portion and the shallows of the eastern portion.

The bathymetry tends to regulate what flora and fauna are found in each region; for example, the deep region is too deep to support seagrasses while the shallow region is not frequented by whales.

#### 7. Water quality

Water in the gulf is naturally turbid due to continual resuspension by wind waves and tidal currents of fine sediments on the east coast.

Primary productivity (phytoplankton biomass) is low and is limited by the availability of nitrogen (Ayukai et al., 1998).

Water temperatures are tropical (18 to 30°C) and salinity in the main part of the gulf is not different to oceanic salinities (34 to 36), however salinities increase in the tidal creek areas (40 to 42).

#### 8. Prawns

The east coast mangrove creek and vegetated bank region is essential to the Exmouth Gulf tiger prawn population.

The mangrove creeks are spawning grounds for some species, while the seagrass and algal habitat on the nearshore banks is an essential nursery ground for the tiger prawns (Loneragan N.R. et al., 2003).

Prawns 'recruit' to the deeper waters from the east coast.



## 9. Trawling

The suitability of the gulf for prawns has led to the development of a major prawning industry.

The industry has recently adopted mandatory bycatch reduction devices (BRDs) and fish escapement devices (FEDs) which are known to be effective.

Refer to Oceanica (2005) for details of the prawning industry and the management controls in place.

## 10. Whales

The gulf is an important resting place for nursing humpback whales on their southward migration, with whales found in the gulf from September to November.

Large numbers of whales and their calves gather in the deeper waters of the gulf along the west coast and near Point Murat.

## 11. Leeuwin Current

The gulf is strongly affected by the Leeuwin Current, being in the region where the current forms and starts to head south down the Western Australian coast.

The fauna in the gulf are predominantly tropical (Hutchins. J.B et al., 1996).

## 12. Winds

The winds in the region are dominated by south-westerlies and south-easterlies, with the south-westerly winds generally the strongest.

This has the effect of driving water out of the gulf towards the north-east.

In winter months when southerly conditions are most persistent, localised cooling of nearshore waters along the Pilbara coast occurs.

## 13. Tides and currents

The circulation in the gulf is affected by both wind and tides.

The gulf bathymetry causes the tidal range to increase with distance into the gulf (maximum range is about 2.8 m at Exmouth and about 3.2 m at Hope Point) (Section 3.7).

Numerical modelling work suggests that tidal currents dominate the nearshore region of the east coast while winds tend to drive currents northwards, parallel to the east coast (Massel. S.R et al., 1997) the confluence of these two flows is the cause of large fronts observed parallel to the east coast.

Tides are semi-diurnal and horizontal tidal excursion is 5 km or less on any one tide, therefore detritus, nutrients, spawn and plankton originating from the east coast will generally stay near the east coast for several tidal cycles (coastal trapping; Wolanski et al., 1992).

There is no possibility of direct (i.e. in a single cycle) transfer by the tides of any material or nutrient from the east coast of the gulf to the North West Cape area and Ningaloo Reef, except under very unusual wind conditions (APASA, 2005).



There is only a localised area of the gulf which exchanges directly with the Ningaloo region. The exchange is entirely due to tides and the area extends about 10 to 15 km into the gulf from Point Murat. Beyond this, the water in the gulf tends to be driven by winds north-east towards the Onslow region (Oceanica, 2006a).

#### 14. Relationship between the eastern gulf and Ningaloo Reef

The eastern gulf waters and fauna are distinctly different to those of the Muiron Islands and Ningaloo (Hutchins. J.B et al., 1996).

The fauna are most similar to those found in other turbid tropical coasts such as the Pilbara and the Kimberley, with the gulf representing the westward extent of the turbid tropical coast in Western Australia.

The waters immediately east of Point Murat are generally the only waters in the gulf that can be transported directly into the Ningaloo Reef area and modelling shows that there is no 'direct' link between the east coast of the gulf and the Ningaloo Marine Park (Massel. S.R et al., 1997).

Ningaloo Reef is considerably influenced by the southward-flowing Leeuwin Current and as found by Woo and Pattiarachi (2003), experiences wind-driven northward currents that have the capacity to trap organic material and nutrients (such as coral spawn) within the reef system.

It is considered highly unlikely that the eastern gulf mangrove system is a fundamental component supporting the Ningaloo Reef ecosystem.

#### 15. Cyclones

Approximately every 25 years, a severe cyclone will have a direct impact on the Exmouth Gulf region.

Such storms can permanently alter the coastline and cause wide-scale loss of benthic habitat and mangrove systems.

It has been demonstrated that the system recovers from these events.

Loneragan et al. (2003) reported that the post-Vance recovery of benthic habitat was the most rapid observed in Australia.

### 4.4 Marine fauna

Exmouth Gulf is an important habitat for whales and dugongs, turtles, sharks and other marine fauna, and supports a valuable prawn fishery. The whales and dugongs, along with sharks and reptiles (turtles, sea snakes) found in the region are protected under national legislation. Exmouth Gulf also supports a diverse array of tropical fish.

A number of marine studies have been undertaken within the region, as outlined in Table 4-2. Subsea 7 additionally augmented this information. The current scope of the ongoing investigations includes:

- Desktop review and searches of relevant literature to source and collate the most current information on marine fauna, and other recent risk assessments and impact monitoring work from other port developments within Australia and globally.
- Consultation with local and national specialists familiar with this site, along with searches of existing public databases, to access and collate all relevant existing data on marine fauna utilisation specific to the site. An agreement to utilise a citizen science database such as Darwin Ledger to capture specimens.





- Spatial analysis of existing records of fauna flagged at the site and coordinates. The objective of this will be to develop a preliminary map of marine fauna based on two decades of surveys, as shown in Table 4-2.
- Potential impacts on migratory marine species, and the extent and nature of their use of the site is being undertaken as part of the marine fauna factor (Section 5.6).

Table 4-2: Marina fauna studies to date

Survey date	Researcher/consultant	Study description/title
1998-1999	Department of Conservation and Land Management (now DBCA)	North West Cape and Muiron Islands Marine Turtle Nesting Population Study
2001	Centre for Whale Research	Geographical and temporal movements of Humpback Whales in Western Australian waters
1994	James Cook University	Aerial survey (cetacean, dugong, turtle) of Exmouth and Ningaloo Reef
1995-2004	Centre for Whale Research	Humpback Whale survey report for Exmouth Gulf (1995–2004)
2004-2005	Centre for Whale Research	Distribution and abundance of Humpback whales and other mega-fauna in Exmouth Gulf during 2004/2005
2005	Oceanwise	Review of the dugong in Exmouth Gulf
2004-2005	Biota	Survey of migratory birds along eastern and southern shores of Exmouth Gulf
2010	Murdoch University	Vessel-based survey of inshore dolphins off the North West Cape
2016	University of Tasmania, Institute for Marine & Antarctic Studies, Curtin University	Aerial survey program to describe the distribution and abundance of Humpback whale calves within Ningaloo Marine Park
1981-2018	Bird Life Australia	Exmouth Gulf shorebird 2020 surveys
2018	Oceanwise	Exmouth Gulf, north western Australia: A review of environmental and economic values and baseline scientific survey of the south western region
<b>Subsea 7 Studies</b>		
2017	360 Environmental	Opportunistic observations of marine fauna within and adjacent to the LAU
2017	360 Environmental	Learmonth level 1 fauna survey
2018	Western Wildlife	Learmonth migratory bird survey
2018	Lyn Irvine	Exmouth Gulf aerial humpback whale survey (southern migration)



#### 4.5 Flora and vegetation survey

The proponent has chosen a consultant for the post wet-season survey in 2021 for the northern botanical province. All surveys will adhere to the relevant EPA policy, specifically:

- *Environmental Factor Guideline: Terrestrial Flora and Vegetation* (EPA, 2016f)
- *Technical Guide – Terrestrial Flora and Vegetation Surveys* (EPA, 2016j).

The terrain, soils and vegetation of the area inland of the coastal dunes consists of *scrub steppe* on sand hill country and it is representative of the Carnarvon Basin (Beard, 1975) and is part of the Learmonth Land System (Payne et al. 1984).

Single Jetty Deep-water Port & Renewables Hub adjoins the coastal dunes of Exmouth Gulf and it consists of three landscape units of the Learmonth Land System that is located on the coastal strip between the Cape Range and the ocean. A fourth landscape unit (Landscape Unit D) separates Single Jetty Deep-water Port & Renewables Hub from the beach.

According to Payne et al. (1984) the Learmonth Land System (Figure 4-14) consists of approximately 255 square kilometres.

The four landscape units are consistent with the description by Payne et al. (1984) and they include the following:

- Landscape Unit A: Sandy plain with a shrubland over a hummock grassland
- Landscape Unit B: Drainage lines with trees and shrubs
- Landscape Unit C: Calcrete plain with open shrubland over hummock grasses
- Landscape Unit D: Beaches and coastal dune system

The distribution of these landscape units is given in Figure 4-15. A detailed description of the soils and vegetation of each landscape unit is given in Appendix E.

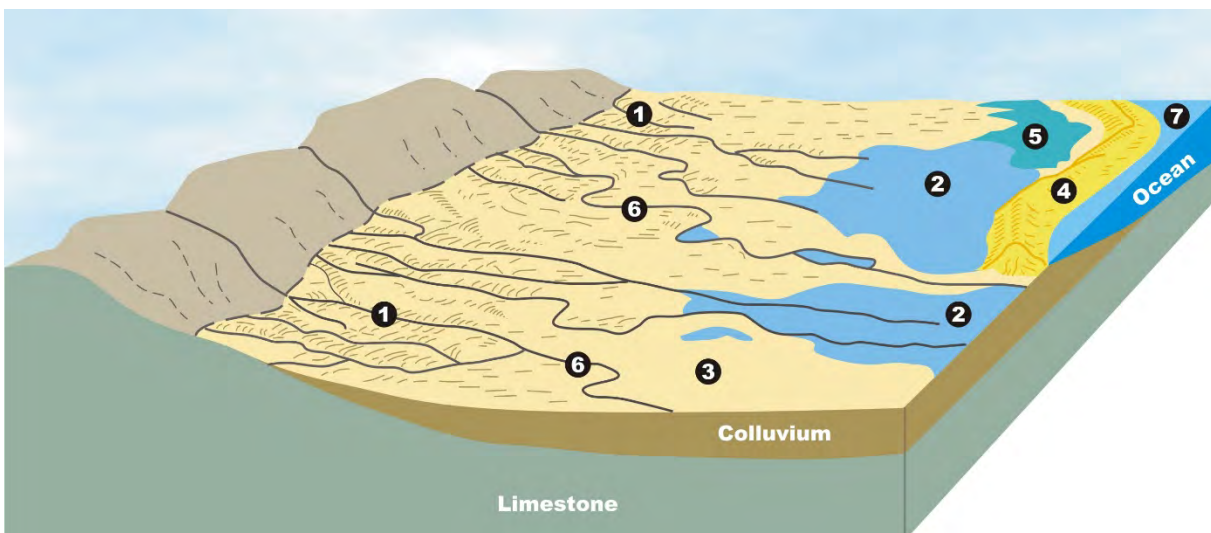


Figure 4-14: Learmonth Land System (1. Stony foot slopes 2. Outwash plains 3. Sandy plains 4. Coastal dunes 5. Saline plains 6. Drainage lines 7. Beaches and foredunes) (modified from Payne et al., 1987)

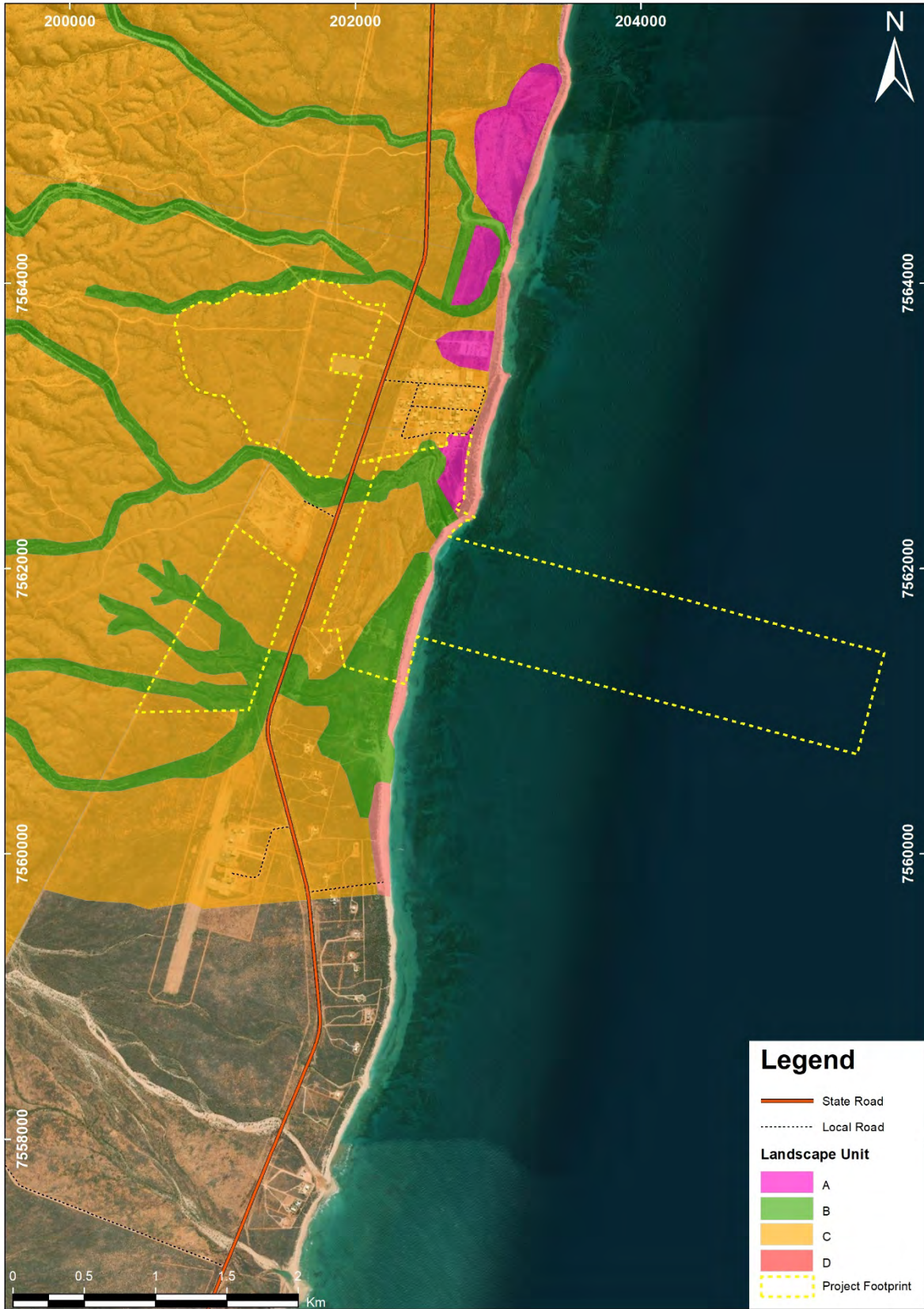


Figure 4-15: Distribution of the landscape units

Rare and priority listed flora, which are likely to be found in the Cape Range are tabled in *Consultative Environmental Review: Proposed Special Residential Development, Exmouth: Lyndon Locations 222 and 223*



- Appendix 4 (W G Martinick and Associates Pty Ltd, 1995) and then again in *Environmental Protection Statement - Industrial Subdivision of Lot 51 Murat Road, Exmouth Appendix 7* (Springdale Holdings Pty Ltd, 2000; W G Martinick and Associates Pty Ltd, 1995). Only *Scaevola acaoides* have been found on the coastal plain to the east of the Cape Range of these species. All of the other species were found in the Cape Range National Park or to the west of the Cape Range (W G Martinick and Associates Pty Ltd, 1995). The Cape Range National Park has a very different land system to that of the project location and thus it is unlikely that any of the rare and priority listed species recorded within the Cape Range will occur on the project site and its immediate surrounds. Further extensive surveys are planned as detailed above.

Introduced plant species that are widespread within project site including *Aerva javonica*, *Cenchrus ciliaris* and *Cenchrus setigerus*. *C. ciliaris* and *C. setigerus* are grasses and *A. javonica* is a bush that is valued by the pastoral industry of the North West.

Some of these fauna habitat types are known to support vertebrate fauna species of conservation significance; for example, species listed as threatened and/or migratory under the *Biodiversity Conservation Act 2016* (WA) and the federal *Environment Protection and Biodiversity Conservation Act 1999*. In addition, species listed under the Department of Biodiversity, Conservation and Attractions (DBCA) priority list are considered. However, these fauna habitat types are not restricted to the proposal footprint and can be found within the vicinity of Exmouth and Learmonth and the greater coastal regions of the Gascoyne. Fauna of conservation significance will be discussed in the EIA.

The ephemeral creek line has a distinct lack of vegetation (in terms of three storey components) and microhabitats.

Beach/rocky coastline habitat contains little to no vegetation and consists predominantly of coastal sands, limestone outcrops and exposed reef platforms at low tide. Above the high tide mark, the limestone outcrops and sandy beaches may provide roost and nest locations for marine and migratory birds.

The shrubland and sandplain habitats provide a moderate diversity of microhabitats including shrubs, tree hollows, grass hummocks, leaf litter and sandy soils suitable for digging and burrowing animals. This habitat type is important for a number of locally significant ground-dwelling reptiles and small mammals, and is expected to support the conservation significant species.

The dunal habitat is restricted to a small area and includes gulf-facing sand dunes consisting of low open shrublands over grasslands, the habitat is not used by nesting marine turtles and has significant 4wd traffic.

The grassland habitat consists of spinifex grasslands (predominantly *Triodia sp.*) on sandy clay soils. This habitat has limited vegetation complexity and is considered of low value.

The rocky grassland habitat consists of grasslands of *\*Cenchrus ciliaris* and *Triodia spp.* in shallow sand over limestone capping. It has limited vegetation complexity and is considered of low value.

#### **4.5.1 Environmentally sensitive areas**

A search of DBCA records has indicated that there are no recorded occurrences of Specially Protected fauna within the potential development sites. Sporadic occurrences of threatened bird, reptile and mammal species are recorded along the Gascoyne coast including within the corridor areas for potential supporting infrastructure.

These records refer to nesting sea turtles, seabirds and marsupials on island refuges. Using the EPBC Protective Matters Search Tool (PMST), Gascoyne Gateway has identified 29 EPBC-listed threatened species





and 41 migratory species that may inhabit or traverse through the area. The automatic report is attached as Appendix B.

The following summarises the threatened fauna that may be present within this area of interest. Terrestrial fauna EPBC-listed species that may be present include black-flanked rock-wallaby, Pilbara leaf-nosed bat, humpback whale and southern right whale, northern quoll and a number of migratory and residential bird species. Subterranean fauna (stygo fauna and troglodyte fauna) may also be present.

Marine fauna turtles are known to nest along the Gascoyne coastline. The EPBC search result displayed five species of marine turtle that may be present within the development area of interest. The EPBC search result also suggested that dugongs may breed through the area. A number of threatened seabirds may migrate through or inhabit the area. EPBC search results indicated that hake hark and six species of migratory cetaceans may occur in the area.

The proposed Gascoyne Gateway site is situated about 10 km south of Exmouth. The proposed site is on low-lying plains, comprising floodplain channels and rivers and creek beds. One ephemeral creek with isolated occurrences of the common grey mangrove (*Avicennia marina*) is located along the shoreline of the site. The existing industrial area for Exmouth abuts the site.

The nearest national park to the site is the Cape Range National Park, approximately 20 km west of the proposal. The nearest nature reserve is Thevenard Island Class C Nature Reserve, approximately 100 km north-west of the proposed development area.

Environmentally Sensitive Areas are shown to occur within the broad corridor – see Appendix A.

#### **4.6 Terrestrial fauna survey**

The fauna of the Cape Range Peninsula was reviewed in the Symposium of the Biogeography of the Cape Range Peninsula and post survey updates (Slack-Smith, 1993; Harvey et. al., 1993; Kendrick, 1993; Baynes and Jones, 1993). Fauna that have been extensively reviewed include the various cave fauna, including Arachnids (spiders), Myriapoda (millipedes and centipedes) and nonmarine molluscs (land snails). The mammalian, amphibian and reptilian fauna have also been reviewed and an extensive fauna list has been established for the Cape Range Peninsula.

These extensive lists have not been reproduced here. Many of the vertebrate fauna that have been listed could occur in the spinifex habitats of Single Jetty Deep-water Port & Renewables Hub. These species are widely distributed and the habitats of the Single Jetty Deep-water Port & Renewables Hub are representative of vast areas of the region.

The Cape Range National Park provides a variety of ecosystems due to its rugged and complex terrain. It provides water catchments in deep gullies and gorges where floral assemblages are found in sheltered areas that do not occur on the adjacent coastal plains. In contrast, Single Jetty Deep-water Port & Renewables Hub is composed of an extensive plain supporting a hummock grassland of predominantly *Triodia pungens* with scattered trees and shrubs, thus providing substantially less diverse and common habitats. Single Jetty Deep-water Port & Renewables Hub does not support any fresh surface water.

A large number of bat species occur in the coastal region but none of these are likely to roost in the Single Jetty Deep-water Port & Renewables Hub location due to the lack of roosting sites. Most of the bats roost in caves and trees that are common in the Cape Range National Park. Vermin that are likely to be found in the Single Jetty Deep-water Port & Renewables Hub location include cats, fox, mice, rabbit, rats and



possibly goats. Goats have been seen in the Cape Range near the Single Jetty Deep-water Port & Renewables Hub location and fox and rabbit dung was frequently observed during field surveys.

Of the gazetted rare or endangered native mammals that might be found in the greater project area, only the mulgara (*Dasyercus cristicauda*) is known to favour the spinifex habitats of the Single Jetty Deep-water Port & Renewables Hub location. The mulgara has been identified in cave remains in the Cape Range (Baynes & Jones 1993) but it is not listed for the locality. There are no local records of sightings of the mulgara, although it is known to occur much further inland.

Other larger endangered species that are endemic to the Pilbara, such as the spectacled hare wallaby (*Largochestes conspicillatus*), the burrowing bettong (*Bettongia lesueur*) and the bilby (*Macrotis lagotis*), which are all gazetted as rare and endangered, have not been recorded locally nor have their remains been recorded in caves of the Cape Range. No evidence of these species was found within the Single Jetty Deep-water Port & Renewables Hub location during extensive field traverses.

Bird species which have been gazetted as rare and endangered, such as the peregrine falcon (*Falco peregrinus*) could be found within study area. These species are wide-ranging in their daily and seasonal habits and they are very unlikely to be affected by activities in the project area. The habitats of the project site are thus considered to not have an impact on these birds.

The fish species *Lebistes reticulatus* (the common guppy) exists in surface water pools in the northern adjoining creekline. This is an exotic species that was most likely released from an aquarium into local creeks. It is recommended that steps be taken to eradicate the fish from the creek. It is concluded that the creek cannot be considered to be pristine.

Based on previous surveys and a desktop assessment of the study area, potential Short-Range Endemic (SRE) habitat was found. These included limestone rocky outcropping located along the coast and some rocky outcropping in the south of the study area. Invertebrate fauna recorded from past surveys are not considered to be SRE invertebrate fauna species, due to their widespread habitat types and/or known occurrences elsewhere.

#### **4.7 Subterranean fauna**

Extensive subterranean habitats exist within the limestone cavities (karst formations) that honeycomb across the Cape Range Peninsula, albeit not uniformly. These are known to contain cave fauna that are considered unique. Other similar habitats are known for Barrow Island (Humphreys, 1993) but the ultimate distribution of individual species is not well understood. This fauna has been reviewed by Knott (1993), Harvey et al. (1993) and Humphreys and Adams (1991). Cave fauna is a simple term used to embrace several categories of animals (troglaphiles, troglobites, troglonexes, stygofauna and stygophiles) that utilise a range of underground habitats varying in void size and type, from dry to fresh and brackish water (Humphreys, 1993).

The nationally important wetland – Cape Range Subterranean Waterways – occurs partially within the project area. This wetland was listed because of its known or potential values for subterranean fauna. More generally, the occurrence of globally important subterranean fauna values in parts of the Exmouth peninsula were among the reasons for nominating Cape Range as part of the Ningaloo World Heritage site (DEWHA, 2010), although subterranean species do not occur necessarily across the whole peninsula.

Several species of subterranean fauna that occur on Cape Range Peninsula have been gazetted (July, 1998) under the *Wildlife Conservation Act 1950* as rare and/or endangered. These include:



- Two fish species: *Ophisternon candidum* (blind cave eel) and *Milyeringa veritas* (blind gudgeon).
- Three crustacean species: *Stygiocaris lancifera* (lance-beaked cave shrimp), *Lasionectes exleyi* (Cape Range lasionectes) and *Liagoceradocus branchialis* (Cape Range liagocercodocus), which occupy groundwater habitats beneath the coastal plain.
- Four arachnid species: *Draculoides bramstokeri* (Barrow Island draculoides), *Bamazomus* sp. nov. (Western Cape Range bamazomus), *Draculoides* sp. nov. (Western Cape Range draculoides) and *Hyella* sp. nov. BES 1154.2525.2546.2554 (Cameron's Cave pseudoscorpion).
- Three millipede species: *Stygiochiropus isolatus*, *Stygiochiropus peculiaris* (Cameron's Cave millipede) and *Stygiochiropus sympatricus*.

#### 4.7.1 Preferred habitats of Subterranean fauna

The extent of limestone cavities and gravel habitats in Cape Range Peninsula is not known. The distribution of cave fauna has been estimated mainly from wells and bores on the coastal plain and foothills of the western and eastern sides of the Cape Range Peninsula. The extent of habitats and the distribution of species are further complicated by the interaction of salt and fresh water beneath the coastal plain. Various researchers have attempted to quantify the type of habitat that aquatic subterranean fauna prefer, with Knott (1993) observing that most aquatic species appear to prefer habitats of fresh water. Humphreys (1997), however, states that the aquatic subterranean fauna of Cape Range Peninsula "occur primarily in anchialine habitats in which fresher water overlies sea water. A wide range of salinities in which stygofauna occur on the Peninsula have been documented, some apparently being restricted to low (Haptolana pholeta) and some to high salinity waters (*Liagoceradocus branchialis*, *Lasionectes exleyi*, *Danieloploina* sp.), while others occupy water with a wide range of salinity. Indeed many stygofauna have been found in water with salinities exceeding 15,000mg/L (*Milyeringa veritas*, *Stygiocaris* sp.)."

Aquatic subterranean species that occur in the cavernous limestone system of the coastal plain sediments are likely to be more widely distributed than terrestrial species, because of the high degree of interconnectedness between caverns of the coastal plain limestone (EPA, 1997).

A review of surveys previously undertaken at sites near the project identified no sites with subterranean fauna in the vicinity. The absence of stygofauna suggested that if stygofauna did occur near the project, it was likely to be very low both in diversity and abundance. A summary of sites with fauna is shown in Figure 4-16



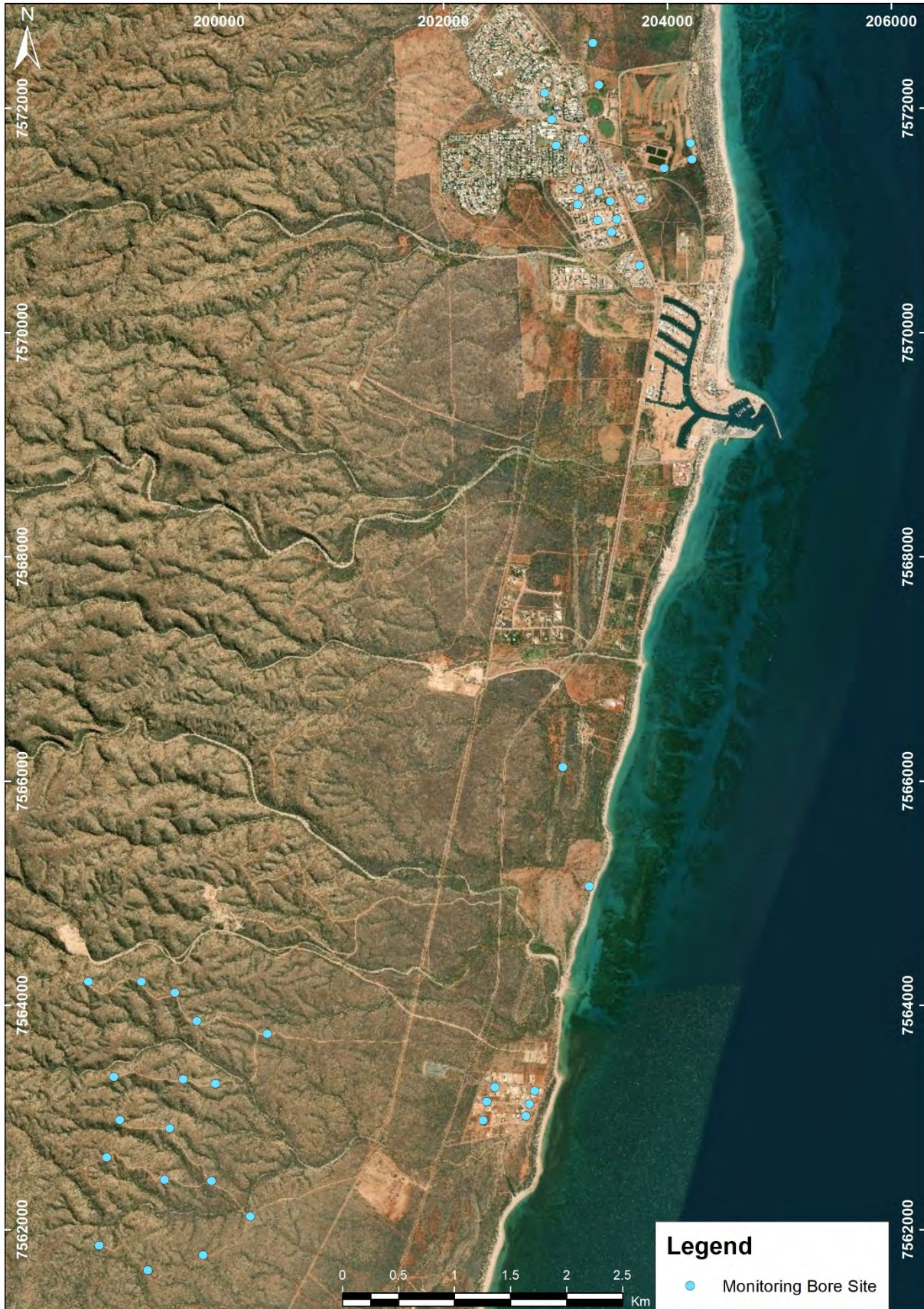


Figure 4-16: Groundwater bores surrounding the project



#### 4.8 Migratory shorebird survey

A search of the online EPBC Act PMST revealed three critically endangered, four endangered, four vulnerable and 21 migratory marine and wetland bird species, most of which are listed in one or more of the following international treaties for migratory birds:

- the Japan-Australia Migratory Bird Agreement
- the China-Australia Migratory Bird Agreement
- Republic of Korea-Australia Migratory Bird Agreement.

Potential impacts on migratory shorebird species, and the extent and nature of their use of the site is being undertaken as part of the terrestrial fauna factor (Section 5.8). A targeted study addressing this has begun (Figure 4-17 – note the passive motion detection wildlife monitoring camera in the image).

There is no mudflat/tidal habitats to support migratory bird species and as such the survey area proposed for the EIA is situated back from the shoreline. Migratory species will still be assessed as part of the survey and will be part of the likelihood of occurrence assessment, the assessment in Table 4-4 uses data collected as part of Subsea 7's referral and as such is considered conservative as it was targeting migratory shorebirds in an intertidal environment. The drainage line on the site is seasonal.

The current scope of the ongoing investigations includes:

- Desktop review and searches of relevant literature to source and collate the most current information on wader species utilising the East Asian-Australasian flyway, shorebird species flight heights, agility and visual acuity, and other recent risk assessments and impact monitoring work from other port developments within Australia and globally.
- Consultation with local and national bird specialists familiar with this site, along with searches of existing public databases, to access and collate all relevant existing data on shorebird utilisation specific to the site. An agreement to utilise a citizen science database such as Darwin Ledger to capture specimens.
- Spatial analysis of existing records of shorebirds flagged at the site and coordinates for any subsequent recordings at points further south within Australia. The objective of this will be to develop a preliminary map of the potential movement routes of shorebirds after their arrival at the site during southward migration, make inferences on how these are used, and understand return routes to the site when mustering before their northward departure.
- Targeted avifauna field surveys are being conducted along the development envelope. This work comprises counts and species identification of all migratory shorebird and other avifauna sighted in those locations to supplement existing data. Where possible, this will be combined with ornithologist estimates of flying heights for each species. Audible acoustic call recorders have also been deployed long-term along the development envelope. These units passively log bird calls. The targeted fieldwork will be done across two field mobilisations and scheduled to coincide with the timing of wader southward and northward migration.





Figure 4-17: Osprey nesting platform near the project site

## 4.9 Social surroundings investigations

### 4.9.1 Stakeholder analysis

The proponent undertook stakeholder analysis early in the proposal's development. A list of key stakeholders was compiled to facilitate consultation and key stakeholder interests were identified. The stakeholders listed in Table 4-3 were consulted both before this referral was prepared and during the original assessment. The proponent will further consult with these stakeholders during the environmental impact assessment process. Refer Table A2- S38 Form and Appendix C/Appendix D of this document for further details.

Table 4-3: Key stakeholders consulted to date in the development of the proposal

Stakeholder	Interest / context
All neighbouring properties within 5 km of the development envelope	Closest commercial and residential neighbours to the proposal Specific mail out – see Appendix C
All Exmouth residents	Closest commercial and residential neighbours to the proposal Development of community reference groups Specific mail out – see Appendix C
Broome Bird Observatory	Major interest in migratory avifauna in the area, including expert opinion on migratory species
CASA and Department of Defence	Ensuring the proposal will not affect aviation interests





Department of Biodiversity, Conservation and Attractions	Manager of Conservation estates, in addition to specialist expertise in threatened fauna species occurring in the development envelope
Department of Foreign Affairs and Trade	The proposal represents a major initiative with strategic international neighbours
Department of Jobs, Tourism, Science and Innovation	Supporting the proposal under the Lead Agency Framework
Department of Mines and Petroleum	Representing mining, oil and gas interests and responsible for Mining Act tenure overlapping and adjacent to the development envelope
Department of Planning, Lands and Heritage	Important stakeholder for several aspects of the proposal
Department of Primary Industries and Regional Development	Interest in regional development and fisheries
Department of the Premier and Cabinet	Key interest in the proposal and its successful progress
Environmental Protection Authority	Responsible for assessing and advising on all environmental aspects of the proposal, including relevant environmental factors and survey and assessment requirements
Gascoyne Development Commission	Interested in promoting investment in the Gascoyne region
Native Title Claimants	Traditional owners of the land Relevant native title representative body
Protect Ningaloo	Key interest in the proposal
Shire of Exmouth	The proposal is located in the Shire of Exmouth
Western Australia Fishing Industry Council (WAFIC)	The key industry body representing professional fishing, pearling and aquaculture enterprises, processors and exporters in Western Australia

#### 4.9.2 Community consultation

The proponent's key community consultation activities to date include:

- visits to all neighbouring properties of the development envelope boundary to brief them on the proposal and seek preliminary comment
- mailing-out consultation documents to all community members
- briefing Shire of Exmouth councillors on the proposal
- establishing key reference groups and stakeholder evenings (Appendix C)

#### 4.9.3 Aboriginal heritage

The proposal lies entirely within a native title claim. Aboriginal heritage is one of the proposal's key considerations. Hence, the proponent has been working with the Claimants to ensure that all work requiring ground disturbance within the development envelope to date has been the subject of clearance surveys and known sites of Aboriginal heritage significance avoided.

#### 4.9.4 Noise

A port can create localised noise for nearby sensitive receivers. The proposal's nearest neighbour would be about 1.7 km from the berthed ships, according to the current conceptual design (Figure 1-1), and the nearest public road (the Minilya-Exmouth Road) crosses through the proposed land-side facilities. Given the road is situated in regional setting adjacent to a rubbish tip and an industrial estate, the onshore footprint is considered compatible with the surrounding environs.



Modelling has been conducted using industry-standard software and the current conceptual design. The modelling showed the noise generated by the proposal would be virtually indistinguishable from existing background noise at the nearest sensitive receptor from the marine facility.



Figure 4-18: Minilya-Exmouth Road surrounding environs (looking north (left) and south (right) from the site)



Figure 4-19: Current rubbish tip adjacent to the proposed land

#### 4.9.5 Landscape

The project's surrounding area has a combination of land tenures. Most of the tenure is overlapping. Table 3-3 provides a further breakdown of the extents of the above interests. Figure 3-5 illustrates the range of land tenure above.

Gascoyne Gateway Ltd plans to conduct a landscape and visual assessment (which meets all applicable industry guidelines) as part of the environmental impact assessment.

#### 4.9.6 Commercial and recreational fishing

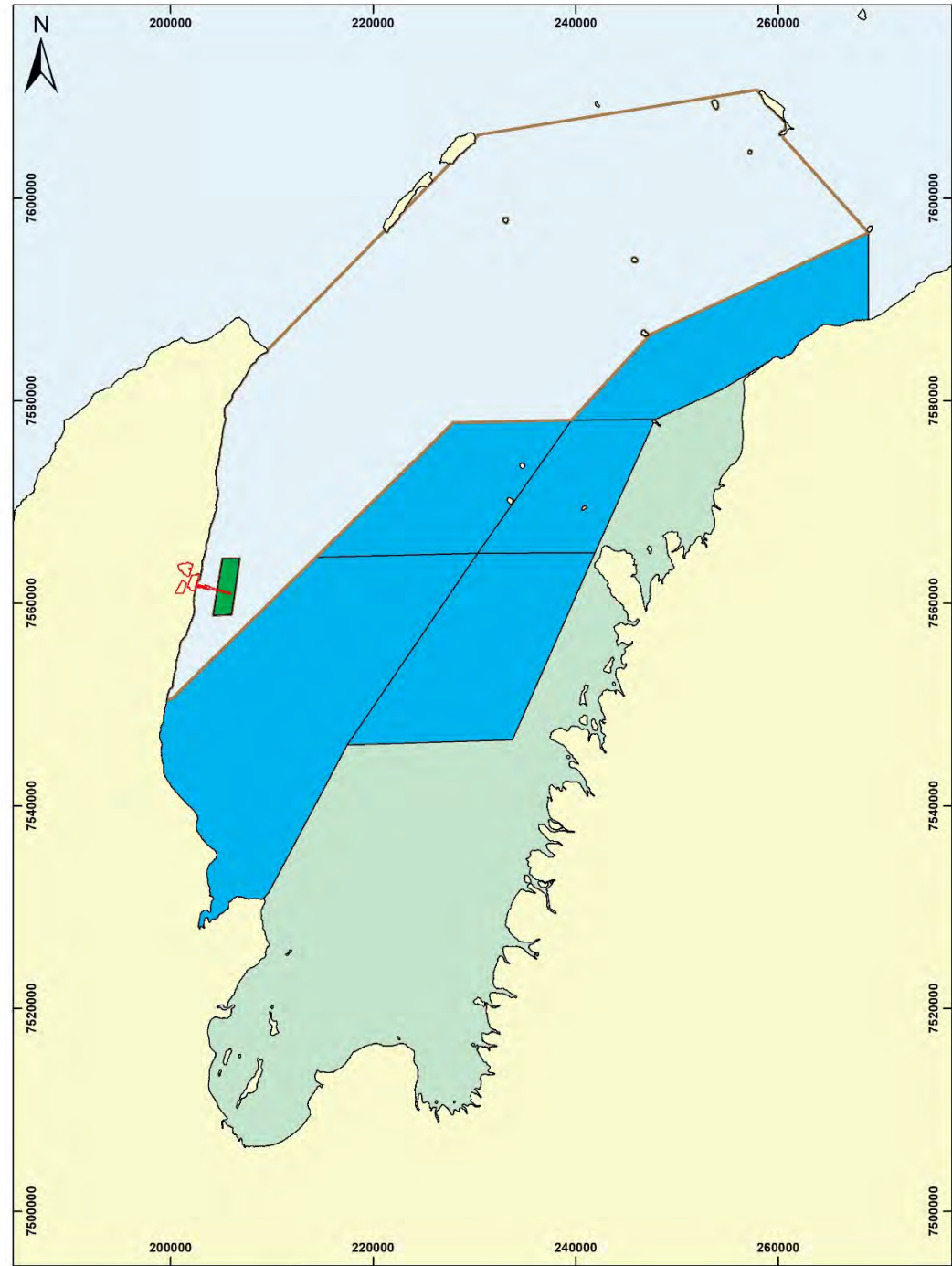
The Exmouth Gulf Prawn Managed Fishery (EGPMF) targets prawns using low-opening demersal otter trawl nets. It has an estimated annual value of \$10 to 20 million, landing around 500 to 1400 tonnes of prawns per year. There are currently 15 managed fishery licences, all of which are held by a single licensee. The



fleet has six boats, each of which has onboard processing and freezing facilities. The EGPMF covers an area of about 2790 km<sup>2</sup>, or 70 per cent of Exmouth Gulf, with the remaining 30 per cent permanently closed to trawling. Closed areas include sanctuary and recreation areas of the Ningaloo Marine Park and Muiron Marine Management Zone (~67.54 km<sup>2</sup> or ~2%) and a permanently legislated fishery closure (nursery grounds) to the south and east of the gulf (~139 km<sup>2</sup> or ~28%) (Figure 4-20)(DPIRD, 2020).

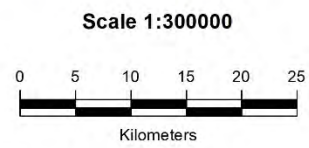
Pearling and aquaculture sites as of February 2003 for Exmouth Gulf are shown in Figure 4-20. Two companies are licensed and hold pearling leases for silver-lip pearl oyster (*Pinctada maxima*) within the Gulf, and a pearl oyster hatchery became operational in early 1996.



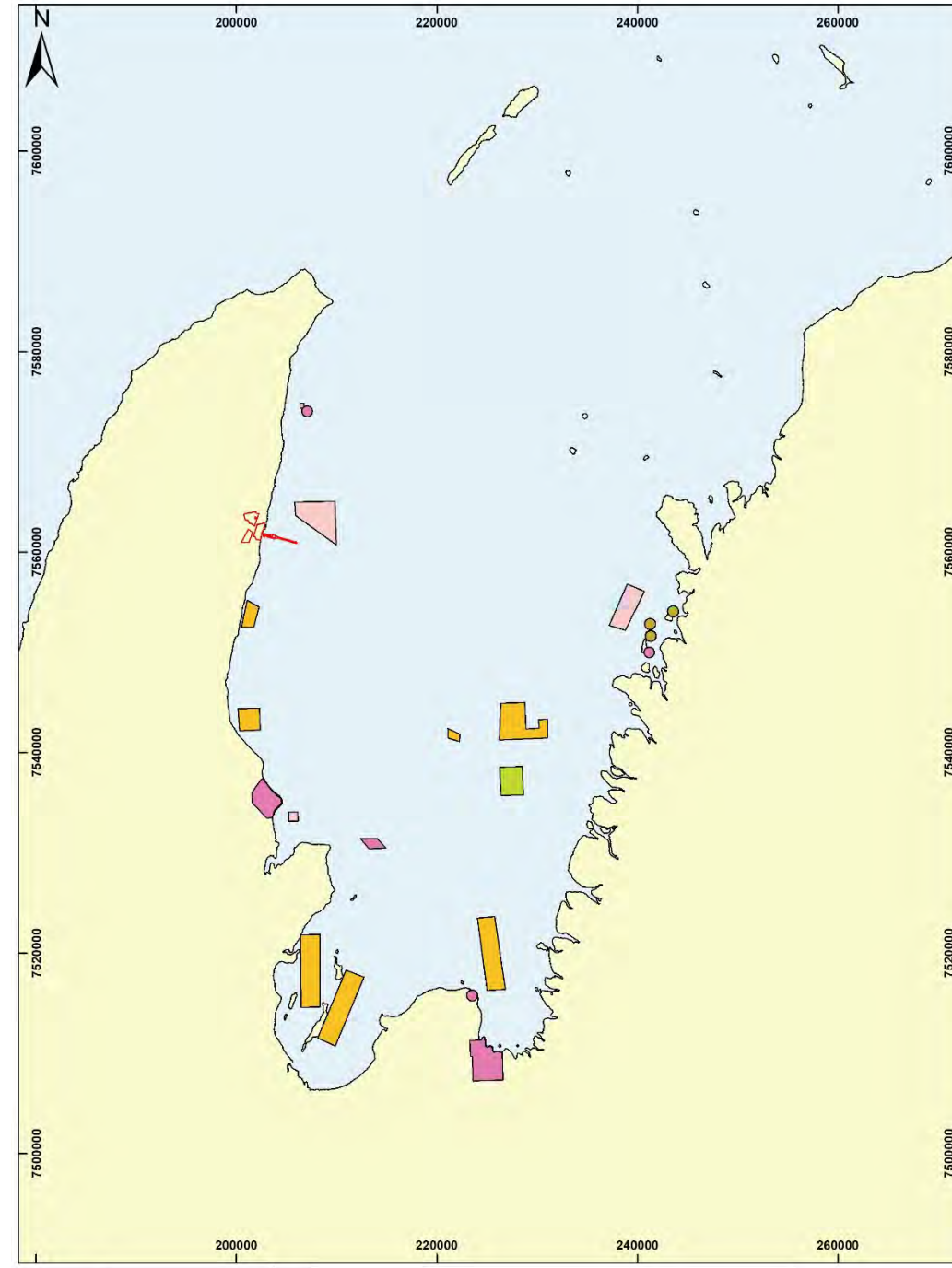


- Legend**
- Project Area Footprint
  - Fishery Licence Area Boundary
  - Gear Trailing Area
  - Temporal Closure
  - Permanent Closure (Nursery Area)
  - WA Mainland & Islands

**Current Commercial Use  
in Exmouth Gulf  
Prawn Trawl Fishery**

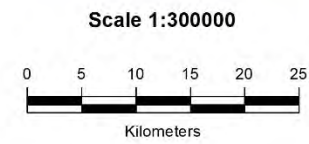


Datum: GDA94 Projection: MGA Zone 50



- Legend**
- Project Area Footprint
  - Pearl Farm Lease Area
  - Pearl Holding Site - Leased
  - Pearl Farm Application Area
  - Aquaculture Licence Site
  - Aquaculture Application Site
  - WA Mainland & Islands

**Current Aquaculture Use  
in Exmouth Gulf**



Datum: GDA94 Projection: MGA Zone 50

Figure 4-20: Current commercial prawn fishery and current aquaculture use in Exmouth Gulf



## **4.10 Matters of National Environmental Significance**

Referral to the Commonwealth DAWE under the EPBC Act is triggered if a proposed action has or potentially has a significant impact on any Matter of National Environmental Significance (MNES). This section assesses potential impacts associated with the Proposal on MNES listed under the EPBC Act. A detailed flora and vegetation survey, target flora survey and single season Level 2 fauna survey is proposed for the entire terrestrial footprint in March 2021. The surveys will cover the entire footprint, and included desktop and field components and likelihood of occurrence assessments. This section should be read in conjunction with Sections 4.5 (Flora and vegetation), 4.6, 4.7, 4.8 (Fauna) and 4.9 (Social surroundings).

### **4.10.1 Controlling provisions**

Controlled action provisions will be discussed with DAWE as part of future consultation.

### **4.10.2 Agreements, Policy and guidelines**

The following policies and guidance are considered relevant to the Proposal:

- Environment Protection and Biodiversity Conservation Act 1999 and associated regulations
- Survey Guidelines for Australia's Threatened Reptiles (DEWHA 2010)
- Threat abatement plan for predation by feral cats (DotE 2015)
- Significant Impact Guidelines 1.1 – Matters of National Environmental Significance (DotE, 2013)

The Environment Protection and Biodiversity Amendment Regulations 2000 make provision for regulation of the interaction of persons with cetaceans within the Australian Whale Sanctuary<sup>16</sup>.

The Listed Migratory Species protected under the EPBC Act includes those listed under the following international conventions:

- Japan-Australia Migratory Bird Agreement (JAMBA).
- China-Australia Migratory Bird Agreement (CAMBA).
- Agreement between the Government of Australia and the Government of the Republic of Korea on the Protection of Migratory Birds (ROKAMBA).
- Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention).

### **4.10.3 Summary of Existing Environmental Values that relate to MNES**

This section provides a summary of the information relevant to MNES contained within various sections of this document including:

- Section 4.4 and 4.8 (Marine Fauna, including migratory birds).
- Section 4.7 (Subterranean Fauna).
- Section 4.6 (Terrestrial Fauna).
- Section 4.9 (Social Surroundings).

### **4.10.4 World Heritage Properties**

The Ningaloo Coast World Heritage Area (Reference 1369) was inscribed on the World Heritage List on 1 November 2011. The adopted boundary includes the Ningaloo Marine Park (Commonwealth Waters), Ningaloo Marine Park (State Waters), Muiron Islands Marine Management Area (including the Muiron

---

<sup>2</sup> The Australian Whale Sanctuary covers Australian waters within 200 nautical miles of the coast of Australia.



Islands), Jurabi Coastal Park, Bundegi Coastal Park, Cape Range National Park and Learmonth Air Weapons Range.

Ningaloo is recognised for its diverse and abundant marine life, its unique cave fauna and the contrast between the rugged landscapes of the Cape Range and the serene seascapes of the Ningaloo Coast (UNESCO 2019).

The Proposal's footprint does not intersect any part of the Ningaloo Coast World Heritage Area both directly or indirectly (Figure 3-2).

#### **4.10.5 National Heritage Places**

The Ningaloo Coast National Heritage Place covers approximately 710,000 ha, comprising Ningaloo Marine Park, Muiron Islands Marine Management Area (including the Muiron Islands), Jurabi Coastal Park, Bundegi Coastal Park, Cape Range National Park, Learmonth Air Weapons Range and portions of Exmouth, Ningaloo, Cardabia, Warroora, Gnaraloo, and Quobba Pastoral Leases.

The Proposal's footprint does not intersect any part of the Ningaloo Coast Heritage Place both directly or indirectly (Figure 3-2)

#### **4.10.6 Listed Threatened Species, Communities, and Migratory Species**

A number of marine studies have been undertaken within the region, as was extensively outlined in Subsea 7s submission (Table 7-2) (Subsea 7, 2019).

A search of the EPBC Act database identified approximately 72 listed marine species that may occur within the Exmouth Gulf area. Of these, there are 29 threatened species that are likely to occur within the region. Appendix B summarises the EPBC Act status of the 29 threatened species.

There is no mudflat/tidal habitats to support migratory bird species and as such the survey area proposed for the EIA is situated back from the shoreline. Migratory species will still be assessed as part of the survey and will be part of the likelihood of occurrence assessment, the assessment in Table 4-4 uses data collected as part of Subsea 7's referral and as such is considered conservative as it was targeting migratory shorebirds in an intertidal environment. The drainage line on the site is seasonal.

The listed migratory species that may occur within the study area include:

- 3 species of migratory terrestrial birds
- 11 species of migratory wetland birds
- 7 species of migratory marine birds
- 2 species of migratory shark
- 8 species of migratory marine mammals
- 5 species of migratory reptiles.

The listed marine species which may also use the area include:

- numerous species of pipefish
- several species of seahorse
- several sea snake species
- several bird species
- several mammal species.



Table 4-4: Listed species and known studies

Scientific Name	Common Name	EPBC Listing	Comments	Type of Presence
<b>Whales</b>				
<i>Megaptera novaeangliae</i>	Humpback whale	Vulnerable Migratory	Species known to pass Exmouth during the northern and southern migrations, mother and calf pairs known to rest in Exmouth Gulf during southern migration (Jenner et al., 2001). Contemporary aerial survey programme completed for Proposal (Irvine 2019) for Subsea 7s proposal.	Known to Occur
<i>Eubalaena australis</i>	Southern right whale	Endangered Migratory	Sightings in more northern waters are relatively rare, but there have been records from Exmouth on the west coast (DoEE, 2017g). Not recorded during surveys for Subsea 7s Proposal (Irvine 2019).	Unlikely to Occur
<i>Balaenoptera edeni</i>	Bryde's whale	Migratory	Species may occur in area. Small numbers recorded offshore of Subsea 7's Proposal area during historic surveys.	Unlikely to Occur
<i>Orcinua orca</i>	Killer whale	Migratory	In Western Australia, Orcas are known to frequent the colder, southern waters near Albany. In 2014 a group of up to 27 killer whales were reported to be resident in the Exmouth Gulf for up to two months each year (ABC 2014). Species not recorded during surveys for the Subsea 7 Proposal.	May Occur
<b>Dolphins</b>				
<i>Tursiops aduncus</i>	Indo-pacific nose dolphin	Migratory	Species or species habitat likely to occur in area. Dolphins were observed during surveys for Subsea 7s proposal (but species not identified).	Likely to Occur
<i>Tursiops aduncus</i>	Spotted Bottlenose Dolphin			Likely to Occur
<b>Marine Turtles</b>				
<i>Carretta caretta</i>	Loggerhead turtle	Endangered Migratory	Major nesting at Muiron Islands (150 to 350 females breeding per year) and the beaches of the North West Cape (50 to 150 females breeding per year) (DoEE, 2017d)	Known to Occur
<i>Chelonia mydas</i>	Green turtle	Vulnerable Migratory	The Green turtle is the most common to the Ningaloo region (Preen et al., 1997). No nesting activity has been recorded on beaches of the Exmouth Gulf, however the mangrove creeks and vegetated shallows of the east coast of the Exmouth Gulf are an important nursery for this species (Oceanica, 2006b).	Known to Occur
<i>Eretmochelys imbricata</i>	Hawksbill turtle	Vulnerable Migratory	Hawksbill turtles nest on the Muiron Islands, located approximately 30 km off the coast of Exmouth. Feeding areas for this species potentially occur as far south as Shark Bay (DoEE, 2017f). The species was recorded from Sandalwood Peninsula (located at the bottom of Exmouth Gulf) between 1990-1998 (Oceanica, 2006b).	Known to Occur
<i>Dermochelys coriacea</i>	Leatherback turtle	Endangered Migratory	There are no records of Leatherback turtles nesting in Western Australia. Furthermore the area is not known as a foraging ground or a nursery. It is unlikely that this species occurs in the Exmouth Gulf (Oceanica, 2006b).	Unlikely to Occur
<i>Natator depressus</i>	Flatback turtle	Vulnerable Migratory	No nesting sites or rookeries have been recorded in the Exmouth Gulf (DoEE, 2017h). Some data on foraging distribution comes from bycatch, with three adult turtles having been caught in trawler nets from the top half of the Exmouth Gulf (Oceanica, 2006b). An interesting habitat buffer is mapped across the northern end of Exmouth Gulf and to the west (DoEE, 2018).	May Occur
<b>Other Marine Fauna</b>				
<i>Dugong dugon</i>	Dugong	Migratory	Species or species habitat known to occur in Exmouth Gulf. Species was recorded during surveys Subsea 7 surveys.	Known to Occur
<i>Rhincodon typus</i>	Whale shark	Vulnerable Migratory	Whale sharks aggregate close to the Ningaloo Reef from late March to early May following the mass spawning of coral when there is an abundance of food in the form of planktonic larvae and schools of small fish in the waters adjacent to the reefs. Whale Sharks have been sighted within the northern end of Exmouth Gulf (Oceanica, 2006b). Not recorded within Exmouth Gulf during surveys undertaken for the Subsea 7 proposal (Irvine 2019).	Known to Occur
<i>Carcharias taurus</i>	Grey nurse shark (west coast population)	Vulnerable	The Grey nurse shark (west coast population) is predominantly found in the south west coastal waters of Western Australia but has been recorded as far north as the North West Shelf (DoEE, 2017b). There have been occasional sightings of this species near Exmouth and the Muiron Islands (DoEE, 2017b). A study of footage from a camera deployed at the Point Murat Navy Pier in Exmouth, 12 km north of the site, recorded 16 <i>C. taurus</i> individuals and suggested that the systematic nature of visitations by individual sharks, over a number of years, qualifies the location as a noteworthy aggregation site (Hoschke et al., 2016).	Known to Occur
<i>Carcharodon carcharias</i>	Great white shark	Vulnerable Migratory	Great white sharks are widely, but not evenly, distributed in Australian waters. Tagging of sharks suggests that the species is highly mobile and movement is often seasonal. In Western Australia tagging has shown the species to move north during spring and return south during summer (DoEE, 2017c). The aggregation of calving Humpback whales may attract Great white sharks to the Exmouth Gulf (Oceanica, 2006b). For this reason, it is possible that the Great white shark may occasionally forage within the Exmouth Gulf and to the north and west.	Unlikely to Occur
<i>Pristis clavata</i>	Dwarf sawfish, Queensland sawfish	Vulnerable, migratory	There are no known records of the Dwarf sawfish occurring within the Exmouth Gulf (DoEE, 2017i). Surveys of Dwarf sawfish have previously encountered individuals over fine substrates (mainly silt) in river channels. There is a low likelihood of this species occurring in Exmouth Gulf.	Unlikely to Occur
<i>Pristis zijsron</i>	Green sawfish, Dindagubba, Narrowsnout sawfish	Vulnerable Migratory	Green sawfish occur in inshore coastal environments including estuaries, river mouths, embayments and along sandy and muddy beaches, as well as offshore marine habitat (Department of Environment, 2015). They have been recorded in very	Unlikely to Occur

			shallow water (< 1 m) to offshore trawl grounds in over 70 m of water (DoEE, 2017j). The Ashburton River estuary is currently the only identified pupping site and nursery for Green Sawfish (Morgan et al., 2016). While individuals may occur in Exmouth Gulf, they are considered unlikely to occur in proximity to the Project.	
<i>Anoxypristis cuspidata</i>	Narrow sawfish	Migratory	It is possible that the species may occasionally utilise shallow waters within Exmouth Gulf.	Unlikely to Occur
<i>Aipysurus apraefrontalis</i>	Short-nosed seasnake	Critically Endangered	The Short-nosed seasnake is endemic to Western Australia, and has been recorded in Exmouth Gulf, Western Australia (DoEE, 2017a)	May Occur
<i>Carcharhinus longimanus</i>	Oceanic Whitetip Shark		The Oceanic Whitetip Shark, inhabits more than 80% of Australian waters and is not specific to the Exmouth Gulf but predominates locations to the South of Australia (DoEE, 2020).	Unlikely to Occur
<b>Marine fish</b>				
<i>Manta alfredi</i>	Reef manta ray, Coastal manta ray, Inshore manta ray	Migratory	Single individuals have been recorded in Exmouth Gulf during studies undertaken for Subsea 7 (Attachment 2J, Subsea 7, 2019)	Known to Occur
<i>Manta birostris</i>	Giant manta ray, Chevron manta ray	Migratory	Recorded as part of Subsea 7 survey off the North West Cape, likely to occasionally enter the northern portion of the Gulf. Single individuals have been recorded in Exmouth Gulf during studies undertaken for the Subsea 7 Proposal (Attachment 2J, Subsea 7, 2019)	Known to Occur
<b>Migratory birds</b>				
<i>Calidris canutus</i>	Red Knot, Knot	Endangered Migratory	Not recorded within the 'Bay of Rest North' survey area (including Heron Point) during southern migration survey or non-breeding season survey as part of the Subsea 7 proposal (Attachment 2K, Subsea 7, 2019)	May Occur
<i>Calidris ferruginea</i>	Curlew sandpiper	Critically Endangered Migratory	Not recorded within the 'Bay of Rest North' survey area (including Heron Point) during southern migration survey or non-breeding season survey as part of the Subsea 7 proposal (Attachment 2K, Subsea 7, 2019)	May Occur
<i>Limosa lapponica baueri</i>	Bar-tailed godwit (baueri)	Vulnerable Migratory	Exmouth Gulf is known as an area of international conservation significance (numbers greater than 1% of the flyway population) for this species.	Known to Occur
<i>Limosa lapponica menzbieri</i>	Northern Siberian bar-tailed godwit	Critically Endangered Migratory	Small numbers recorded within the 'Bay of Rest North' survey area as part of the Subsea 7 proposal (Attachment 2K, Subsea 7, 2019)	Known to Occur
<i>Numenius Madagascariensis</i>	Eastern curlew	Critically Endangered Migratory	Exmouth Gulf is known as an area of international conservation significance (numbers greater than 1% of the flyway population) for this species.	Known to Occur
<i>Sternula nereis nereis</i>	Australian fairy tern	Vulnerable	Not recorded within the 'Bay of Rest North' survey area (including Heron Point) during southern migration survey or non-breeding season survey as part of the Subsea 7 proposal (Attachment 2K, Subsea 7, 2019)	May Occur
<i>Pandion haliaetus</i>	Eastern osprey	Migratory	Single individual recorded within the 'Bay of Rest North' survey area (including Heron Point) during southern migration survey as part of the Subsea 7 proposal (Attachment 2K, Subsea 7, 2019)	Known to Occur
<i>Tringa nebularia</i>	Common greenshank	Migratory	Common greenshank occurs around most of the coast from Cape Arid in the south to Carnarvon in the north west. Sites of international importance in Australia include Eighty Mile Beach and Roebuck Bay in WA (DoEE, 2017k). Small numbers recorded within the 'Bay of Rest North' survey area (including Heron Point) as part of the Subsea 7 proposal (Attachment 2K, Subsea 7, 2019)	Known to Occur
<i>Actitis hypoleucos</i>	Common sandpiper	Migratory	Small numbers recorded within the 'Bay of Rest North' survey area (including Heron Point) as part of the Subsea 7 proposal (Attachment 2K, Subsea 7, 2019)	Known to Occur
<i>Charadrius veredus</i>	Oriental plover	Migratory	Small numbers recorded within the 'Bay of Rest North' survey area (including Heron Point) as part of the Subsea 7 proposal (Attachment 2K, Subsea 7, 2019)	Known to Occur
<i>Falco hypoleucos</i>	Grey Falcon		Possible fly over. Not recorded within the 'Bay of Rest North' survey area (including Heron Point) during southern migration survey or non-breeding season survey as part of the Subsea 7 proposal (Attachment 2K, Subsea 7, 2019)	Likely to Occur
<i>Macronectes giganteus</i>	Southern Giant-Petrel	Migratory	Possible fly over. Not recorded within the 'Bay of Rest North' survey area (including Heron Point) during southern migration survey or non-breeding season survey as part of the Subsea 7 proposal (Attachment 2K, Subsea 7, 2019)	Unlikely to Occur
<i>Rostratula australis</i>	Australian Painted Snipe		Possible fly over. Not recorded within the 'Bay of Rest North' survey area (including Heron Point) during southern migration survey or non-breeding season survey as part of the Subsea 7 proposal (Attachment 2K, Subsea 7, 2019)	Likely to Occur
<i>Thalassarche impavida</i>	Campbell Albatross	Migratory	Possible fly over. Not recorded within the 'Bay of Rest North' survey area (including Heron Point) during southern migration survey or non-breeding season survey as part of the Subsea 7 proposal (Attachment 2K, Subsea 7, 2019)	Unlikely to Occur
<i>Anous stolidus</i>	Common Noddy	Migratory	Possible fly over. Not recorded within the 'Bay of Rest North' survey area (including Heron Point) during southern migration survey or non-breeding season survey as part of the Subsea 7 proposal (Attachment 2K, Subsea 7, 2019)	Likely to Occur
<i>Apus pacificus</i>	Fork-tailed Swift	Migratory	Possible fly over. Not recorded within the 'Bay of Rest North' survey area (including Heron Point) during southern migration survey or non-breeding season survey as part of the Subsea 7 proposal (Attachment 2K, Subsea 7, 2019)	Likely to Occur
<i>Ardenna carneipes</i>	Flesh-footed Shearwater	Migratory	Possible fly over. Not recorded within the 'Bay of Rest North' survey area (including Heron Point) during southern migration survey or non-breeding season survey as part of the Subsea 7 proposal (Attachment 2K, Subsea 7, 2019)	Unlikely to Occur
<i>Calonectris leucomelas</i>	Streaked Shearwater	Migratory	Possible fly over. Not recorded within the 'Bay of Rest North' survey area (including Heron Point) during southern migration survey or non-breeding season survey as part of the Subsea 7 proposal (Attachment 2K, Subsea 7, 2019)	Unlikely to Occur

<i>Fregata ariel</i>	Lesser Frigatebird	Migratory	Possible fly over. Not recorded within the 'Bay of Rest North' survey area (including Heron Point) during southern migration survey or non-breeding season survey as part of the Subsea 7 proposal (Attachment 2K, Subsea 7, 2019)	Likely to Occur
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	Migratory	An individual was recorded within the 'Bay of Rest North' survey area (including Heron Point) as part of the Subsea 7 proposal (Attachment 2K, Subsea 7, 2019)	Likely to Occur
<i>Calidris melanotos</i>	Pectoral Sandpiper	Migratory	Possible fly over. Not recorded within the 'Bay of Rest North' survey area (including Heron Point) during southern migration survey or non-breeding season survey as part of the Subsea 7 proposal (Attachment 2K, Subsea 7, 2019)	Unlikely to Occur
<i>Glareola maldivarum</i>	Oriental Pratincole	Migratory	Possible fly over. Not recorded within the 'Bay of Rest North' survey area (including Heron Point) during southern migration survey or non-breeding season survey as part of the Subsea 7 proposal (Attachment 2K, Subsea 7, 2019)	Unlikely to Occur
<i>Hirundo rustica</i>	Barn Swallow	Migratory	Possible fly over. Not recorded within the 'Bay of Rest North' survey area (including Heron Point) during southern migration survey or non-breeding season survey as part of the Subsea 7 proposal (Attachment 2K, Subsea 7, 2019)	Unlikely to Occur
<i>Motacilla cinerea</i>	Grey Wagtail	Migratory	Possible fly over. Not recorded within the 'Bay of Rest North' survey area (including Heron Point) during southern migration survey or non-breeding season survey as part of the Subsea 7 proposal (Attachment 2K, Subsea 7, 2019)	Unlikely to Occur
<i>Motacilla flava</i>	Yellow Wagtail	Migratory	Possible fly over. Not recorded within the 'Bay of Rest North' survey area (including Heron Point) during southern migration survey or non-breeding season survey as part of the Subsea 7 proposal (Attachment 2K, Subsea 7, 2019)	Unlikely to Occur
<b>Terrestrial Fauna</b>				
<i>Dasyurus hallucatus</i>	Northern quoll, Digul	Endangered	Not known to occur within region.	Unlikely to Occur
<i>Petrogale lateralis lateralis</i>	Black-flanked rock-wallaby, Moororong, black-footed	Endangered	Known to occur across the North West Cape, unlikely to occur within the Development Envelope.	Unlikely to Occur
<i>Rhinonictis aurantia (Pilbara form)</i>	Pilbara leaf-nosed bat	Vulnerable	Given the lack of records for this species in the area (and region) and the lack of suitable habitat, the Pilbara leaf-nosed bat is considered unlikely to occur.	Unlikely to Occur
<i>Pezoporus occidentalis</i>	Night parrot	Endangered	There is an absence of nearby records and a very limited number of records in WA. The key habitats for the Night Parrot are thought to be chenopod shrublands and spinifex grasslands, with the chenopod shrublands a refuge during dry conditions (Garnett et al., 2011). Nesting sites are in mature spinifex, often large ring-forming clumps (DPAW 2017). Foraging habitats are likely to vary across Australia, but include herbs, grasses, grass-like plants, <i>Sclerolaena spp.</i> and other chenopods (DPAW, 2017). Given the absence of regional records and of key habitat, the Night parrot is considered unlikely to occur.	Unlikely to Occur
<b>Subterranean Fauna</b>				
<i>Milyeringa veritas</i>	Blind gudgeon	Vulnerable	The nearest species records are from habitat is 50 km south of the Development Envelope (DoEE, 2017e). Based on known geology and salinity levels, it is not expected that the Blind gudgeon will be present in the Development Envelope.	Possible
<i>Ophisternon candidum</i>	Blind cave eel	Endangered	The nearest species records are from 25 km south of the Development Envelope (DoEE, 2017e). The species has been recorded from a total of 18 locations across the North West Cape, on Barrow Island and Bungaroo Creek in the Pilbara (Moore et al., 2018). Based on known geology and salinity levels, it is not expected that the Blind gudgeon will be present in the Development Envelope.	Possible





## 5. Assessment of preliminary key environmental factors

---

### 5.1 Environmental Principles

Table 5-1 summarises how the project conforms to the key environmental principles advocated by the EPA.

Table 5-1: Environmental Principles

Principle	Response
<p>Precautionary principle</p> <p>Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, decision should be guided by:</p> <ul style="list-style-type: none"> <li>a) Careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and</li> <li>b) An assessment of the risk-weighted consequences of various options.</li> </ul>	<p>Gascoyne Gateway Ltd has started comprehensive environmental studies on aspects of the Proposal that may impact the environment and has planned more studies as detailed in Figure 2-9, including BCH, terrestrial flora and fauna, coastal processes and marine fauna. These studies are described under the relevant preliminary key environmental factor, within the 'receiving environment' section.</p> <p>As much as practicable, the Proposal design has taken into account the environmental technical studies' outcomes in consultation with the relevant agencies. The project design was amended to minimise the risk of serious or irreversible impacts, and appropriate management measures have been adopted to minimise residual impacts. This includes jetty on piles at the beach interface to allow for coastal process and recreational thoroughfare along the beach and the narrowest of jetties to minimise footprint where practical.</p> <p>Management and mitigation measures to minimise potential environmental impacts during construction and operations will be addressed through an overarching Construction Environmental Management Plan (CEMP) and Operational Environmental Management Plan (OEMP). Specific key management plans will be developed as components of the ERD (refer Figure 2-9).</p>
<p>Inter-generational equity</p> <p>The present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.</p>	<p>This is a 21st-century type of development that minimises impacts on the local and global environment and mitigates current risk while repairing and regenerating past impacts.</p> <p>Net environmental benefits are gains in the value of environmental services or other ecological properties attained by remediation or ecological restoration minus the value of adverse environmental effects caused by those actions.</p> <p>Gascoyne Gateway Ltd has already identified areas that will be further developed as part of the ERD (Figure 2-8). This ERD will be the first to our knowledge to be reversing pre-disturbance ecosystems as part of the proposal execution. The quality of the environment is improved and enhanced by implementing the proposal.</p>



<p>Conservation of biological diversity and ecological integrity</p> <p>Conservation of biological diversity and ecological integrity should be a fundamental consideration.</p>	<p>From the ecological work undertaken to assess the impacts to date, Gascoyne Gateway Ltd has concluded that the Proposal would not compromise the affected areas' biological diversity and ecological integrity.</p> <p>Worst cases will be presented as part of the ERD and confirmed in the final ERD.</p>
<p>Principles relating to the improved valuation, pricing and incentive mechanisms</p> <p>a) Environmental factors should be included in the valuation of assets and services.</p> <p>b) The polluter pays principle that those who generate pollution and waste should bear containment, avoidance, or abatement.</p> <p>c) The users of goods and services should pay prices based on the full life cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any wastes.</p> <p>d) Environmental goals, having been established, should be pursued most cost-effectively by establishing incentive structures, including market mechanisms, which enable those best placed to maximise benefits and/or minimise costs to develop their solutions and responses to environmental problems.</p>	<p>As detailed in Figure 6-2 Gascoyne Gateway Ltd will employ appropriately trained local personnel and source local goods and services.</p> <p>As the world's first green port with regenerative aspects built into the design and operational budgets, this project is protecting Ningaloo at its very core. Unsustainable or ecosystem damaging practices that have been mapped as the baseline, i.e. anchor scour and unsustainable groundwater use, are among the many regenerative aspects that will be tackled as part of the ERD carried forward into execution.</p>
<p>Waste minimisation</p> <p>All reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment.</p>	<p>All reasonable and practicable measures to minimize the generation of waste and its discharge to the environment will be taken. Waste generated from the Proposal will be minimised by implementing the hierarchy of waste controls; avoid, re-use, recycle, recover and dispose of waste avoidance, and minimisation objectives will be outlined in the CEMP and OEMP.</p>

## 5.2 Identification of Key Environmental Factors

The framework of environmental factors and objectives that the EPA has adopted is detailed in its *Statement of Environmental Principles, Factors and Objectives* (EPA, 2016i). The proponent has identified the following preliminary key environmental factors as being relevant to the proposal (a further summary is provided in Appendix G):

- Benthic communities and habitat (Section 5.3)
- Coastal processes (Section 5.4)
- Marine environmental quality (Section 5.4)
- Marine fauna (Section 5.6)
- Flora and vegetation (Section 5.7)
- Terrestrial fauna (Section 5.8)
- Social surroundings (Section 5.9)



The above factors are discussed in sections 5.3 to 5.9. The proponent considers that the remaining environmental factors identified in EPA (2016) are not relevant to the proposal or will not result in a significant impact (see Section 7).

### 5.3 Benthic communities and habitat

#### 5.3.1 EPA objective

To protect benthic communities and habitat so that biological diversity and ecological integrity are maintained.

#### 5.3.2 Potential environmental impacts

The preliminary assessment of potential environmental impacts on benthic communities is summarised below.

	Benthic communities and habitat
<b>EPA policy &amp; guidance</b>	<p>Environmental Factor Guideline – Benthic Communities and Habitats (EPA, 2016e). This guidance was consulted in the consideration of potential direct and indirect impacts to Benthic Communities and Habitat (BCH) as a result of the Proposal, and in the development of options to avoid or mitigate impacts.</p> <p>Desktop assessment and survey requirements have been determined in the context of the guidance provided in Technical Guide – Benthic Communities and Habitat (EPA, 2016k).</p> <p>Surveys are currently ongoing and will be completed in accordance with the requirements of EPA (2016k).</p> <p>Technical Guidance Environmental Impact Assessment of Marine Dredging (EPA, 2016o). This guidance was referenced in the consideration of potential indirect impacts associated with dredging .</p>
<b>Consultation</b>	Refer Table A2- S38 Form and Appendix C this document
<b>Receiving environment</b>	<p>The receiving environment has been characterised by a combination of existing literature and field-based surveys conducted during the past 12 months.</p> <p>The project footprint will traverse a nearshore area characterised by a variable cover of rocky reef (both high profile and veneer), densely colonised by macroalgae and interspersed with a sparse cover of seagrass, coral colonies and other biota. The project footprint in the offshore area is characterised by large tracts of sandy seabed with pockets of sparse filter feeders.</p>
<b>Proposal activities</b>	<p>The aspects of the proposal that may impact on benthic communities and habitats include:</p> <ul style="list-style-type: none"> <li>• installation of the trestle structure, rock groyne and steel pilings</li> <li>• dredging around the berths and approach channel</li> <li>• increased vessel activity (associated with construction and operation of the facility).</li> </ul>
<b>Impacts</b>	The potential impacts arising from the proposal include:



- temporary increase in water column turbidity due to nearshore construction activities and dredging offshore
- temporary release of contaminants from marine sediments during nearshore construction and dredging activities
- increased vessel activity from operations may result in the introduction of invasive marine species
- increased vessel activity and the potential for spills.

It is likely that direct impacts to benthic communities and habitat will be limited to areas of bare sand and sparse filter feeders (from dredging) and reef veneer in the inshore areas (from construction of the rock groyne). Indirect impacts from dredging and construction will be subject to detailed assessment following completion of additional field surveys and collection of metocean data.

#### Mitigation

Mitigation measures that will be implemented to minimise impacts on benthic communities and habitat will include:

- positioning of offshore infrastructure to minimise direct and indirect impacts during construction and operation
- preparing and implementing a *Dredging and Construction Management Plan* for all aspects of the proposal including specific measures for management of turbidity-generating activities.
- preparing and implementing an Operational Management Plan including contingency for unplanned spills (fuel)
- Cyclone emergency planning.
- Low impact installation methods for breakwater and dredging.

#### Assumptions

The preliminary assessment is based on existing available information which has been supplemented by seasonal field-based surveys and project-specific habitat mapping. Further field survey data will be collected within the project footprint to support the environmental assessment.

## 5.4 Coastal processes

### 5.4.1 EPA objective

To maintain the geophysical processes that shape coastal morphology so that the environmental values of the coast are protected.

### 5.4.2 Potential environmental impacts

The preliminary assessment of potential environmental impacts on benthic communities is summarised below.

Coastal processes	
<b>EPA policy &amp; guidance</b>	Environmental Factor Guideline – Coastal Processes (EPA, 2016c). This guidance was consulted in the consideration of potential impacts to geophysical processes and how these



may impact natural coastal dynamics causing an impact to coastal ecosystems and associated values such as landforms, recreation and tourism.

<b>Consultation</b>	Refer Table A2- S38 Form and Appendix C this document
<b>Receiving environment</b>	The shoreline movement assessment (Section 4.2) shows that while there has been some degree of fluctuation in the shoreline position, the shoreline adjacent to the abutment has experienced a net accretion trend. Notwithstanding, the extent of the accretion is much higher on the abutment’s northern side than its southern side (Figure 4-11 and Figure 4-12).
<b>Proposal activities</b>	<p>The aspects of the proposal that may impact coastal processes include:</p> <ul style="list-style-type: none"> <li>• alteration of wave energy and dynamics, current patterns and interruption to longshore sediment transport caused by jetty construction across the nearshore zone</li> <li>• construction of the rock groyne structure further offshore having the potential to trap sediment and causing changes to the morphology of the coastal zone and potentially impacting near-shore benthic communities and habitat</li> <li>• Closure and decommissioning.</li> </ul>
<b>Impacts</b>	<ul style="list-style-type: none"> <li>• Potential sediment accretion to the north of the facility and potential minor erosion of perched beaches to the south.</li> <li>• Given the relatively slow rates of sediment transport and the proposed implementation of sand bypassing in the event that minor changes to the shoreline are recorded, the geophysical processes that shape coastal morphology will be maintained so that the environmental values of the coast are protected.</li> <li>• The EPA objective will be met.</li> </ul>
<b>Mitigation</b>	<p>Mitigation measures for minimising impacts on coastal processes follow the Western Australian mitigation hierarchy: Avoid, Minimise, Rehabilitate, Offset (Government of Western Australia 2011). This will comprise:</p> <ul style="list-style-type: none"> <li>• incorporation of a trestle structure inshore to allow unimpeded longshore transport of sediment along the coastline.</li> </ul>
<b>Assumptions</b>	<p>This assessment of impacts on coastal processes assumes:</p> <ul style="list-style-type: none"> <li>• the assessment of coastal processes is acceptable</li> <li>• Field-based beach profiles already collected support the future studies (Figure 5-1)</li> <li>• the findings of the hydrodynamic modelling survey validate the current assessment of the nature of the coastal processes within the development envelope.</li> </ul>



Figure 5-1: Beach transects undertaken as part of baseline studies





## 5.5 Marine environmental quality

### 5.5.1 EPA objective

To maintain the quality of water, sediment and biota so that environmental values are protected.

### 5.5.2 Potential environmental impacts

The preliminary assessment of potential environmental impacts on marine environmental quality is summarised below.

	Marine environmental quality
<b>EPA policy &amp; guidance</b>	<ul style="list-style-type: none"> <li>• Environmental Factor Guideline - Marine Environmental Quality (EPA, 2016b)</li> <li>• Technical Guidance Protecting the Quality of Western Australia’s Marine Environment (EPA, 2016p)</li> <li>• Western Australia’s coastal waters are managed under the EPA’s environmental quality management framework (EQMF), which sets levels of ecological protection to achieve various environmental quality objectives. The EQMF is based on the principles and guidelines of the National Water Quality Management Strategy (ARMCANZ, 2018).</li> </ul>
<b>Consultation</b>	Refer Table A2- S38 Form and Appendix C this document
<b>Receiving environment</b>	Marine monitoring is being undertaken at a range of sites for water quality (monthly), sediment quality (biannually) and benthic invertebrates (biannually). These sites have been chosen based on predicted impacts and appropriate reference sites.

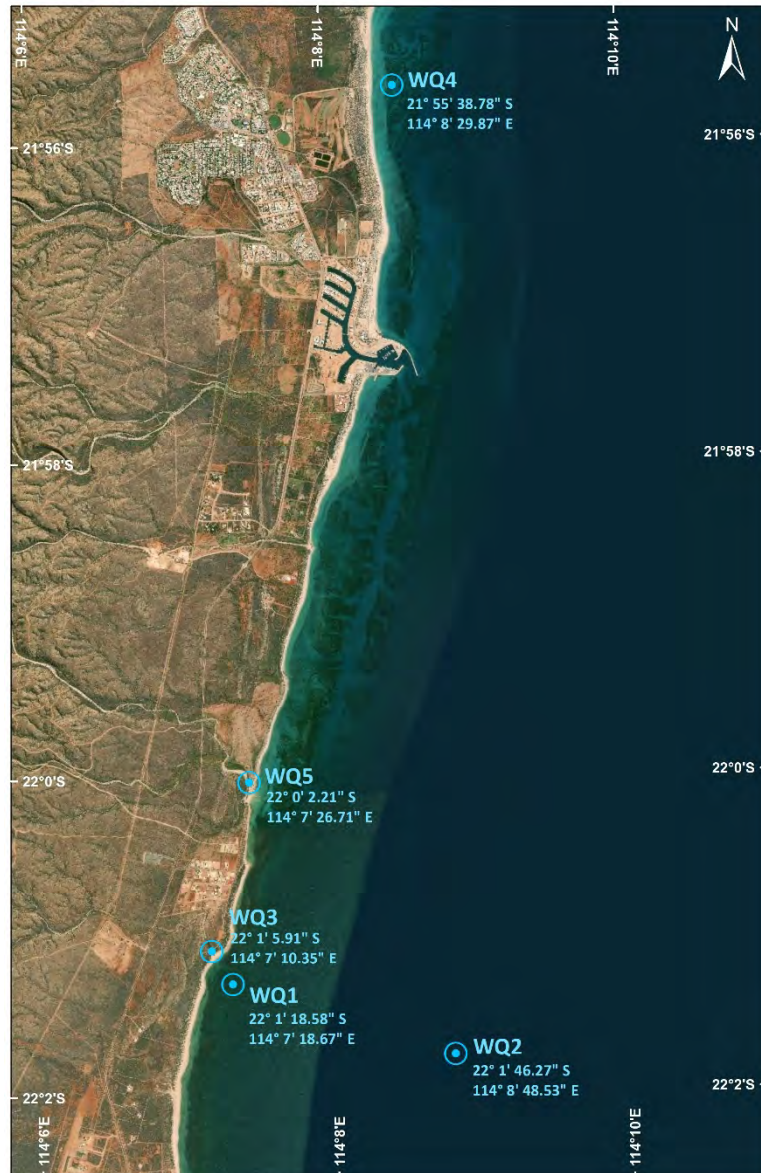


Figure 5-2: Baseline water quality monitoring sites

<p><b>Proposal activities</b></p>	<p>The aspects of the proposal that may impact on marine environmental quality include:</p> <ul style="list-style-type: none"> <li>• increased vessel activity in the region during construction, operation and maintenance</li> <li>• increased vessel activity to site may result in the introduction of non-native marine species.</li> <li>• The Proposal will require water for the desalination plant and will accordingly result in an increased discharge of brine from the ocean outfall.</li> </ul>
<p><b>Impacts</b></p>	<p>The potential impacts arising from the proposal include:</p> <ul style="list-style-type: none"> <li>• temporary increase in water column turbidity because of piling, groyne construction and dredging</li> <li>• temporary release of contaminants from marine sediments during dredging</li> </ul>

- unplanned spill of hazardous chemicals (e.g. hydrocarbons)
- increased vessel activity and potential increase of contaminants in the water column (biofouling paints, hydrocarbons, liquid wastes)
- introduced marine species from vessel biofouling or ballast water during construction or operations.
- the increased discharge has the potential to affect marine water quality.

### Mitigation

Mitigation measures that will be implemented to minimise impacts on marine environmental quality include:

- use of a low-impact installation method appropriate to the substrate
- suitable dredge plant to minimise turbidity
- sediments within the development envelope confirm low likelihood of the release of contaminants arising from seabed disturbance
- prepare and implement a *Marine Environmental Management Plan* for the construction, operation, maintenance and decommissioning of marine components of the proposal, including specific measures in regard to turbidity-generating activities, risk of contamination as a result of sediment contaminants, hydrocarbons or waste materials stored onsite
- prepare and implement *Operational Management Plans*, including contingency for unplanned spills (e.g. hydrocarbons)
- prepare and implement cyclone emergency management planning.
- Intake for the desalination will be from beach wells
- A 40 m mixing zone at the outfall allows brine to meet ANZECC & ARMCANZ (2000) 99% species protection criteria for toxicants on entry into the brine discharge system based on preliminary diffusion modelling.

### Assumptions

This preliminary assessment of impacts on marine environmental quality assumes:

- concentrations of contaminants in sediments are within acceptable environmental protection limits
- that engineering controls and environmental management intended to mitigate construction and operational impacts are effective.

## 5.6 Marine fauna

### 5.6.1 EPA objective

To protect marine fauna so that biological diversity and ecological integrity is maintained.





### 5.6.2 Potential environmental impacts

The preliminary assessment of potential environmental impacts on benthic communities is summarised below.

	Marine fauna
<b>EPA policy &amp; guidance</b>	<ul style="list-style-type: none"> <li>• Environmental Factor Guideline – Marine Fauna (EPA, 2016g). This guidance was consulted in the consideration of potential direct and indirect impacts on marine fauna as a result of the Proposal, and in the consideration of critical habitats and ecological windows.</li> <li>• Environmental Assessment Guideline (No. 5) for Protecting Marine Turtles from Light Impacts (EPA, 2010). General guidance on light design (wavelength, height, direction, shielding) referred to in the lighting design for the Proposal to minimise impacts to marine fauna (noting that turtle nesting does not occur within Exmouth Gulf).</li> <li>• Management Plan for the Ningaloo Marine Park and Muiron Islands Marine Management Area 2005 – 2015 (MPRA et al., 2005). This management plan was reviewed during the assessment of potential impacts on marine fauna within the Ningaloo Marine Park and Muiron Islands Marine Management Area, and in the development of management measures.</li> </ul>
<b>Consultation</b>	Refer Table A2- S38 Form and Appendix C this document
<b>Receiving environment</b>	<p>The marine waters within and adjacent to the development envelope support a variety of fauna, several of which are significant and protected under the EPBC Act.</p> <ul style="list-style-type: none"> <li>• A search of the EPBC Act PMST for the original proposal identified about 72 listed marine species that may occur within the Exmouth Gulf area. Of these, there are 29 threatened species that are likely to occur within the region.</li> <li>• These records refer to nesting sea turtles, seabirds and marsupials on island refuges. Using the PMST, Gascoyne Gateway has identified 29 EPBC-listed threatened species and 41 migratory species that may inhabit or traverse through the area. Threatened marine fauna that may be present within this area of interest include humpback whale and southern right whale.</li> <li>• Marine fauna turtles are known to nest along the Gascoyne coastline. The PMST result displayed five species of marine turtle that may be present within the development area of interest. The result also suggested that dugongs may breed in the area.</li> </ul>
<b>Proposal activities</b>	<p>The aspects of the proposal that may impact on marine fauna include:</p> <ul style="list-style-type: none"> <li>• construction of the trestle structure across the intertidal area</li> <li>• construction of the rock groyne in the subtidal area</li> </ul>

- piling and construction of the minimal offshore platform and buoys
- construction, operations and maintenance, shipping and support vessels
- operational shipping.

---

**Impacts**

The potential impacts of the proposal on marine fauna include:

- direct disturbance of beach nesting areas for marine turtles
- disturbance from increased vessel movements (collisions/noise) in the region, both in relation to international shipping for the proposal during operations and marine infrastructure installation and maintenance vessels
- direct impacts on marine fauna include vessel strike or entanglement in equipment such as dredges
- behaviour modification from artificial lighting associated with offshore infrastructure, vessels and behind-dune infrastructure
- underwater noise
- construction, operation, decommissioning and maintenance works may result in the introduction of non-indigenous marine species to the area in vessel ballast water and on vessel hulls
- impacts to benthic communities affecting marine fauna
- changes in marine environmental quality (brine discharge, turbidity, release of contaminants during construction/operation) impacting marine fauna
- introduced marine species from vessel biofouling or ballast water during construction or operations
- unplanned spill of hazardous chemicals (hydrocarbons).

---

**Mitigation**

Mitigation measures that may be implemented to minimise impacts on marine fauna may comprise:

- implementation of dredging during ecological windows to avoid peak periods of dugong and whale visitation
- marine fauna observation and avoidance management measures to ensure vessel strikes or entanglement of marine fauna are avoided
- mitigation of behavioural impacts from artificial lighting through avoidance, both by staging construction works to avoid peak turtle nesting period, and by managing works such that they are preferentially conducted during daylight hours
- if required, piling works will be managed with standard industry protocols, including soft-starts and marine fauna observation
- management of coastal recreation activities for the proposal's workforce and other residents of the town
- vessel operational history, fouling control and ballast water details will be audited to confirm they are accurate and reliable before contracting vessels (all State and

	<p>Commonwealth regulatory requirements for vessel biosecurity management will be met)</p> <ul style="list-style-type: none"> <li>• prepare and implement a <i>Marine Environmental Management Plan</i> for the construction, operation, maintenance and decommissioning of marine components of the proposal, including marine fauna observation and cease-work zones and seasonal restrictions for relevant significant species during construction.</li> </ul>
Assumptions	<p>This preliminary assessment of impacts on marine fauna assumes:</p> <ul style="list-style-type: none"> <li>• no significant marine fauna values existing within the development envelope, but these do occur in the broader locality of the Exmouth Gulf</li> <li>• engineering controls and environmental management intended to mitigate construction and operational impacts are effective.</li> </ul>

## 5.7 Flora and vegetation

### 5.7.1 EPA objective

To protect flora and vegetation so that biological diversity and ecological integrity are maintained.

### 5.7.2 Potential environmental impacts

The preliminary assessment of potential environmental impacts on flora and vegetation is mentioned below.

	Flora and vegetation
<b>EPA policy &amp; guidance</b>	<ul style="list-style-type: none"> <li>• Environmental Factor Guideline – Flora and Vegetation (EPA, 2016f). Referred to in the assessment of potential impacts as a result of the Proposal.</li> <li>• Technical Guidance – Flora and vegetation surveys for environmental impact assessment (EPA, 2016j). Referred to in the survey design</li> </ul>
<b>Consultation</b>	Refer Table A2- S38 Form and Appendix C of this document
<b>Receiving environment</b>	<p>Habitats considered to be of high habitat value (tidal creek lines, mangroves, samphire and inter-tidal mudflats, beach/rocky coastline and riverine habitats) comprise about 5 per cent of the study area.</p> <p>Habitats considered to be of moderate habitat value (woodlands, shrublands, sandplain and dunal habitats) comprise about 61 per cent of the study area.</p> <p>Habitats considered to be of low habitat value (rocky grassland and grassland habitats) comprise approximately 24 per cent of the study area.</p> <p>Highly disturbed areas make up about 10 per cent of the study area.</p>
<b>Proposal activities</b>	The aspects of the proposal that may impact on flora and vegetation include:



- clearing of vegetation in the construction footprint to accommodate the proposal infrastructure, including access roads and laydown areas.

---

**Impacts**

Potential impacts arising from the proposal include:

- clearing of a total of 259ha of native vegetation within the development envelope to accommodate the proposal's infrastructure
- mowing and operational management of vegetation within the development envelope
- the long-term presence of access tracks altering fire regimes within the development envelope (in terms of frequency, extent and intensity) and consequent changes to vegetation structure
- risk of weed introduction and spread during construction activities.

---

**Mitigation**

Measures to avoid have been built into native flora buffers (Figure 2-1) designed to avoid flora and associated landscapes around watercourses and adjoining lifestyle blocks.

Mitigation measures that will be implemented to minimise impacts on flora and vegetation will comprise:

- avoiding threatened and priority flora locations during proposal design wherever possible, with provision for pre-clearance targeted surveys of final design clearing limits
- reduction of vegetation clearing footprint during the design stage to the minimum practicable, including utilisation of existing cleared tracks and co-location of infrastructure to the extent feasible
- development and implementation of an *Environmental Management Plan* (EMP) addressing comprehensive weed hygiene management
- vegetation clearing control measures
- rehabilitation protocols (including specific consideration of priority flora where appropriate)
- erosion control and dune stabilisation where required
- rehabilitation and weed monitoring and contingency measures
- general construction site matters such as waste management, fire risk management and workforce environmental inductions.

Given the above, the proponent considers that the proposal is likely to meet the EPA objective for the flora and vegetation factor.

---

**Assumptions**

This preliminary assessment of impacts on flora and vegetation assumes:

- the vegetation surveyed represents the range of units present in the development envelope
-



- no currently unidentified flora species or vegetation communities of conservation significance occur within the development envelope
- environmental management measures intended to mitigate construction and operational impacts on flora and vegetation are effective.

## 5.8 Terrestrial fauna

### 5.8.1 EPA objective

To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.

### 5.8.2 Potential environmental impacts

The preliminary assessment of potential environmental impacts on benthic communities is summarized below.

	Terrestrial fauna
<b>EPA policy &amp; guidance</b>	<ul style="list-style-type: none"> <li>• Environmental Factor Guideline – Terrestrial Fauna (EPA, 2016d). Referred to in the assessment of potential impacts as a result of the Proposal.</li> <li>• Technical Guidance – Sampling methods for terrestrial vertebrate fauna (EPA, 2016l). Referred to in the survey design which included a desktop study and reconnaissance survey.</li> <li>• Technical Guidance – Terrestrial fauna surveys (EPA, 2016n). Referred to in the survey design.</li> <li>• Technical Guidance – Sampling of short range endemic invertebrate fauna (EPA, 2016m). Referred to in the assessment of potential impacts as a result of the Proposal.</li> <li>• Other guidance (EPA Position Statement No. 3, Terrestrial Biological Surveys as an Element of Biodiversity Protection (EPA, 2002), EPA Guidance Statement No. 20, Short Range Endemic Invertebrate Fauna (EPA, 2009), EPA Guidance Statement No. 56, Terrestrial Fauna Surveys for Environmental Impact Assessment (EPA, 2016h), EPA and DEC Technical Guide – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment (EPA et al., 2010), Survey Guidelines for Australia’s Threatened Mammals (DSEWPaC, 2011a), Survey Guidelines for Australia’s Threatened Reptiles (DSEWPaC, 2011b) were referred to in the survey design.</li> </ul>
<b>Consultation</b>	Refer Table A2- S38 Form and Appendix C this document
<b>Receiving environment</b>	The fauna habitats of the development envelope are generally in good condition, although parts of the site abut the existing industrial precinct. Terrestrial fauna EPBC-listed species that may be present include the black-flanked rock wallaby, Pilbara leaf-nosed bat,



	northern quoll and a number of migratory and residential bird species.
<b>Proposal activities</b>	<p>The aspects of the proposal that may impact on terrestrial fauna include:</p> <ul style="list-style-type: none"> <li>• clearing of fauna habitat in the construction footprint to accommodate the proposal's infrastructure</li> <li>• the long-term (approximately 50 years) presence of finished access roads in linear corridors within the landscape of the development envelope, including ongoing vehicle movements</li> <li>• installation of the trestle structure through beach and intertidal habitat.</li> </ul>
<b>Impacts</b>	<p>Potential impacts arising from the proposal include:</p> <ul style="list-style-type: none"> <li>• clearing of a total of 259ha of native vegetation within the development envelope to accommodate the proposal's infrastructure</li> <li>• potential direct and indirect impacts on threatened and priority fauna species (including direct loss or displacement of individuals during clearing or as a result of operational vehicle movements)</li> <li>• risk of weed introduction and spread during construction activities, modifying fauna habitats with potential flow-on effects to fauna community structure</li> <li>• potential for migratory shorebirds or other avifauna impacts through interaction.</li> </ul>
<b>Mitigation</b>	<p>Mitigation measures for minimising impacts on terrestrial fauna follow the Western Australian mitigation hierarchy: Avoid, Minimise, Rehabilitate, Offset (Government of Western Australia 2011). This will comprise:</p> <ul style="list-style-type: none"> <li>• avoiding threatened species habitats, with provision for specific pre-clearance surveys and the development of management measures specific to these species at final design, ahead of construction start date</li> <li>• scheduling of trestle construction works through the coastal zone to avoid disturbance during seasonal activity peaks for migratory shorebirds, flatback turtle and other marine fauna</li> <li>• specifically recognising the confirmed priority and SRE fauna species in the construction EMP measures where relevant, and avoiding known records in the proposal design where practicable</li> <li>• reducing the habitat clearing footprint during the design stage to the minimum practicable, including utilisation of existing cleared tracks and co-location of infrastructure to the extent feasible</li> <li>• developing and implementing an EMP addressing: <ul style="list-style-type: none"> <li>○ comprehensive weed hygiene management</li> <li>○ habitat clearing control measures</li> <li>○ rehabilitation protocols</li> </ul> </li> </ul>

- erosion control and dune stabilisation if required
- rehabilitation and weed monitoring and contingency measures
- feral fauna management
- general construction site matters such as waste management, fire risk management and workforce environmental inductions
- design and implementation of a landscape-scale staged fire management plan for the development envelope for the proposal’s operational life
- design and implementation of a biodiversity monitoring program to provide continuous feedback to the staged fire management plan for long-term maintenance of biodiversity and infrastructure protection.

Given the above, the proponent considers that the proposal is likely to meet the EPA objective for the terrestrial fauna factor.

Assumptions	<p>This preliminary assessment of impacts on terrestrial fauna assumes:</p> <ul style="list-style-type: none"> <li>● the terrestrial fauna habitats surveyed represent the range of units present in the development envelope</li> <li>● that no currently unidentified fauna species or communities of conservation significance occur within the development envelope</li> <li>● that environmental management measures intended to mitigate construction and operational impacts on terrestrial fauna are effective.</li> </ul>
-------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

## 5.9 Social surroundings

### 5.9.1 EPA objective

To protect social surroundings from significant harm.

### 5.9.2 Potential environmental impacts

The preliminary assessment of potential environmental impacts on benthic communities is summarised below.

Social surroundings	
<b>EPA policy &amp; guidance</b>	<ul style="list-style-type: none"> <li>● Environmental Factor Guideline – Social Surroundings (EPA, 2016a). This guidance was consulted in the consideration of potential impacts from the Proposal to the social surroundings.</li> <li>● Guidance for the Assessment of Environmental Factors – Assessment of Aboriginal Heritage (EPA 2004). Provides guidance on the process of Environmental impact assessment of Aboriginal Heritage. Referred to in the design of Aboriginal Heritage surveys.</li> </ul>





<b>Consultation</b>	Refer Table A2- S38 Form and Appendix C/Appendix D this document
<b>Receiving environment</b>	<p>The remote development envelope is not a tourist destination, nor is it host to any other regular land use activities apart from mineral exploration (see Section 4.4). The study area is located within the Learmonth system, of which 'Plains' are the dominant landform. These are characterised by 'Sandy outwash plains' marginal to the Cape Range, supporting mainly soft spinifex hummock grasslands with scattered acacia shrubs.</p> <p>In regard to visual and noise amenity, very few potential sensitive receivers exist near the development envelope.</p> <p>The prawn fishery has an estimated annual value of \$10 to 20 million, landing between 500 and 1400 tonnes per year. The EGPMF covers an area of about 2790 km<sup>2</sup>, or 70 per cent of Exmouth Gulf and does not intersect the study area. Pearling and aquaculture sites are spread throughout the Gulf, mainly in the southern and eastern sections.</p>
<b>Proposal activities</b>	<p>The aspects of the proposal that may impact social surroundings include:</p> <ul style="list-style-type: none"> <li>• construction and operation of the land and marine components of the proposal</li> <li>• clearing during construction to accommodate the proposal's infrastructure, including access roads and the renewable energy hub</li> <li>• construction and operation of the offshore infrastructure</li> <li>• increased vessel activity in the region during construction and operation.</li> </ul>
<b>Impacts</b>	<p>The potential impacts of the proposal on social surroundings may include:</p> <ul style="list-style-type: none"> <li>• reduction in visual amenity for any sensitive receivers in the locality</li> <li>• project-induced noise increases for sensitive receivers</li> <li>• potentially restricted traditional and recreational use in the locality, including temporarily during construction</li> <li>• disturbance to the seabed during construction of offshore infrastructure, and risk of marine pest introduction, and any potential consequent impacts on existing wild fishery or aquaculture operations</li> <li>• additional human-use pressure on the coastal strip.</li> </ul>
<b>Mitigation</b>	<p>The most effective means of mitigating amenity impacts (visual and noise) is to choose a site that is far enough away from potential sensitive receivers. The proponent has sought to do this by locating the land-based development within an existing industrial precinct.</p> <p>Based on industry best practice, the proponent will take the following mitigation measures to further minimise amenity impacts:</p>

- Noise modelling to confirm that no increase for sensitive receivers will arise as result of the proposal.
- Management of work force and town coastal recreational activities to designated roads, parking etc.
- Other mitigation measures relevant to the social surroundings factor, including:
  - The proponent will continue working with the traditional owners to undertake heritage clearances in areas that are being considered for ground disturbance. This will include pre-construction clearance surveys and the signing of an Indigenous Land Use Agreement. Given the nature of the infrastructure it will be possible to mitigate potential impacts by shifting proposed infrastructure locations to avoid any areas of significance that may be discovered later in the design process.
  - Meeting all State and Commonwealth regulatory requirements for vessel biosecurity management.
  - Prepare and implement a *Marine Environmental Management Plan*.

Assumptions	<p>Preliminary assessment of impacts on social surroundings assumes that:</p> <ul style="list-style-type: none"> <li>• the Native Title Claimants has already highlighted all the known potential heritage concerns in the development envelope and that these have been avoided</li> <li>• the noise modelling and visual impact analysis completed thus far meet the EPA objectives.</li> </ul>
-------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

### 5.10 Other environmental factors

The only other factors which may still be relevant to the proposal are subterranean fauna and inland waters. Potential impacts on these factors will still be assessed in the ERD, but the proponent's current assessment is that these are not likely to be key factors for the proposal.

The proponent has no plans to withdraw groundwater, and all activities will be designed to appropriate standards, i.e. bunding and double lines for chemicals. This means any impacts to groundwater use or contamination are limited and supports our assessment to place subterranean fauna as not a key environmental factor.

Local hydrological regimes will be maintained, and a buffer around Qualing Pool has been proposed, which was taken into the assessment of Inland Waters not being a key environmental factor.

All other remaining factors (i.e. landforms, inland waters, subterranean fauna, terrestrial environmental quality, air quality, greenhouse gas emissions and human health) (EPA, 2020b) are not considered relevant to the proposal.



## 6. Benefits of the proposal

### 6.1 Environmental benefits

Current threats to the Exmouth Gulf have been summarised by Fitzpatrick et al. (2019).

- The effects of anchor scour from vessels moored around the world (Hastings et al., 1995; Macreadie et al., 2009; Montefalcone et al., 2006) and in the Exmouth Gulf (Mellor et al., 2020) are also well documented.
  - Designated anchorages reduce the footprint in which anchoring occurs and enable anchoring to be located away from sensitive habitats and environments.
  - Gascoyne Gateway Ltd is proposing three anchorages of 282,743 m<sup>2</sup>. This would mean an annual ongoing impact of 9,047,776 m<sup>2</sup> would be reduced by 8,199,547 m<sup>2</sup> annually. Having regulated vessel movements would significantly remove the risk of collisions with fauna such as whales and cetaceans, while noise and emissions would also lessen. Waste management, pests, oil spills, sewage disposal and amenity, would be managed appropriately, dramatically reducing any risk to the environment that currently exists.
- The Karst limestone systems and associated stygofauna are currently impacted by the extraction of fresh water, limestone mining and invasive introduced fish (Department of Environment and Conservation Commission Western Australia ( DEC & CCWA ), 2010; Environmental Protection Authority, 1997, 1999).
  - Gascoyne Gateway Ltd is proposing to produce desalinated water for the Exmouth township to reduce the reliance on groundwater draw.

### 6.2 Other benefits of the proposal

#### 6.2.1 Employment and industrial development

The proposal will create a significant number of high-quality regional jobs. Figure 6-1 shows the direct job creation as estimated by the proponent.

Figure 6-1: Expected job creation

AU\$ M	Construction	Operation
Direct	400	70
Indirect	1600	130

Subject to the success of these initiatives, the number of direct and indirect jobs that will be created could be much greater than outlined in Figure 6-1.

#### 6.2.2 Tourism

At present six Western Australian ports (Esperance, Busselton, Fremantle, Geraldton, Exmouth and Broome) take cruise ship calls on a regular basis, with only four of these providing reliable alongside berths (Esperance, Fremantle, Geraldton and Broome). These ports provide sufficient depth and proximity to tourism destinations to warrant the trade and are continuing to develop this industry for the prosperity of their local and regional economies.



With no suitable wharf facilities available at Exmouth, cruise ships currently anchor off the township and ferry passengers ashore in tender vessels. This practice has inherent risk given it involves the transfer of people, and the sea conditions in Exmouth Gulf often prohibit this undertaking. With up to half of visiting ships having to abandon their visits for reasons of unsuitable weather, the tourism industry and reputation of Exmouth has been significantly damaged, and the prospect of future calls remains low.

### 6.2.3 Science and Innovation

The proposal will be at the cutting edge of ports and regeneration, that is, the fourth wave of development, where proponents give back. This includes supporting the local vision to be completely reliant on renewables, find an alternative to groundwater draw and turn around the current unregulated impacts on the Gulf. Western Australia will catapult itself to the forefront of global green port innovation.

The proponent will pre-requisite the supply chain to base as much development as possible within the State and in particular Exmouth. This will ensure technology and high-value skills are transferred into the region, and can be used to diversify and enhance the regional economy on a sustainable basis (Figure 6-2).



Figure 6-2: Buy Local Infographic

At present WAMSI (West Australian Marine Science Node) has two priority project areas underway: Cockburn Sound and Shark Bay. Gascoyne Gateway Ltd has committed to support the proposed ongoing marine research in the region and advocated for Exmouth Gulf to be a priority area.

Additionally Gascoyne Gateway Ltd has signed a memorandum of understanding with the Harry Butler Institute. The Harry Butler Institute champions a research space where community, business and





biodiversity can co-exist; and where our efforts integrate and balance the needs and aspirations of all three sectors.



## 7. Conclusions

---

Gascoyne Gateway Ltd acknowledges the diverse environmental and socio-economic values of Exmouth Gulf. It proposes to construct and operate a cruise and multi-user marine facility on the western shoreline of the Gulf in a manner consistent with the principles of environmental sustainability, while also providing socio-economic benefits to the Exmouth community. Gascoyne Gateway Ltd is confident that carefully considered development, such as the multi-user facility, can coexist without compromising the environmental values that make Exmouth Gulf a unique marine environment. More so, Gascoyne Gateway Ltd believes the Single Jetty Deep-water Port & Renewables Hub will operate to provide a net benefit to the environment and community. Some of the key aspects are summarised below:

- The Gascoyne Gateway Ltd project is based on the concept of regenerative development. This has a net positive benefit on the environment through excess production of renewable energy and the potential renewal of impacted habitat and ecosystems. One example of habitat renewal will come from the current practice of anchoring in random sections of the seabed being stopped because of the project's new designated anchorage areas. The effect of this will be twofold: areas of seabed with high habitat value will be avoided and the seabed already impacted by anchoring may recover.
- Potential relocation of Defence-related fuel vessels out of the Marine Park (at Point Murat) to a more appropriate location inside the Gulf. This will also have the indirect effect of minimising the risk of spills at Navy Pier that may impact the Marine Park (due to tidal currents north of Point Murat), whereas spills that may occur at the Single Jetty Deep-water Port & Renewables Hub would be easily managed with immediate response capability and less likely to spread (as the water in the Gulf tends to be driven by winds not tidal currents).
- Careful consideration has been given to siting the Single Jetty Deep-water Port & Renewables Hub along a section of coastline with the least environmental values and the lowest direct impact. Impacts on coastal processes will also be minimal as the net movement of sand along the coastline is very slow. The site is also ideal in terms of developing an optimal configuration for the jetty structure and minimising the volume of dredging required (both capital and maintenance). The site is also adjacent to the Exmouth industrial estate, including the shire landfill site.
- Seagrass and coral cover along the project footprint are minimal in both abundance and spatial extent and the Single Jetty Deep-water Port & Renewables Hub also avoids the high biodiversity areas located in the south and east of the Gulf.

Gascoyne Gateway Ltd acknowledges that development in the Exmouth Gulf will introduce the potential for greater vessel movements and visitation, with associated risks including marine pest introduction, noise and light. However, these risks can be actively managed as they are in coastal ports elsewhere in Western Australia. From an environmental management perspective, the Gulf is not a pristine environment as it is already subject to various pressures that are both natural (cyclones, coral bleaching) and anthropogenic (trawling, limestone mining). Gascoyne Gateway Ltd is nevertheless committed to ensuring that the Single Jetty Deep-water Port & Renewables Hub does not contribute to potential cumulative impacts on the Gulf ecosystem.

The Single Jetty Deep-water Port & Renewables Hub will also provide a series of socio-economic benefits that will complement the existing industries already operating in Exmouth, such as tourism and Defence, of which the local community is largely supportive. From this perspective, the Single Jetty Deep-water Port & Renewables Hub should not be viewed as encroaching industrial development, but rather an opportunity to have a unique, world class and best-practice operational port facility that will be designed and operated with environmental sustainability at its heart.



## 8. References

---

- AIMEX & Superyacht Australia. (2016). *Economic Impact of the Superyacht Sector on the Australian Economy*.
- APASA. (2005). *Yannarie Salt Project: Regional-scale circulation of Exmouth Gulf Phase 2 Draft Report*.
- ARMCANZ, A. (2018). *Australian & New Zealand Guidelines for fresh and marine water quality*.
- Australian Government. (2020). Exmouth Microgrid- 100% Renewable Energy Town Transition. *Regional and Remote Communities Reliability Fund Microgrids grant recipients*. Retrieved from <https://www.business.gov.au/grants-and-programs/regional-and-remote-communities-reliability-fund-microgrids/grant-recipients>
- Australian Government. (2021). National Map,. Retrieved from <https://nationalmap.gov.au/#share=s-eCuM0ypRp4B6PIn9oU4r069M22P>
- Ayukai, T., & Miller, D. (1998). Phytoplankton biomass, production and grazing mortality in Exmouth Gulf, a shallow embayment on the arid, tropical coast of Western Australia. *Journal of Experimental Marine Biology and Ecology*, 225, 239–251.
- Biota. (2005). *Yannarie Salt Project: Mangrove and Coastal Ecosystem Study– Baseline Ecological Assessment*.
- Brunskill, G., Orpin, A., Zagorskis, I., Woolfe, K., & Ellison, J. (2001). Geochemistry and particle size of surface sediments of Exmouth Gulf, Northwest Shelf, Australia. *Continental Shelf Research*, 21, 157-201.
- CALM. (1994). *A representative marine reserve system for Western Australia*.
- Coyne, J. (2020). Exmouth base need to plug naval gap between Perth and Darwin. *The Strategist*. Retrieved from <https://www.aspistrategist.org.au/exmouth-base-needed-to-plug-naval-gap-between-perth-and-darwin/>
- DC Blandford & Associates and Oceanica Consulting. (2005). *Yannarie Salt Project: Physical Environment of Eastern Exmouth Gulf*. .
- Department of Environment. (2015). *Sawfish and River Sharks: Multispecies Recovery Plan*. Canberra: Department of Environment and Conservation Commission Western Australia ( DEC & CCWA ). (2010). *Cape Range National Park Management Plan No.65*.
- Department of Transport. (2009). *Coastal Demarcation Lines for Administrative & Engineering Purposes: Delineation Methodology & Specification*. Perth.:
- DEWHA. (2010). *Ningaloo coast: World Heritage nomination*. Canberra:
- DoE. (2006). *Pilbara Coastal Water Quality Consultation Outcomes: Environmental Values and Environmental Quality Objectives*. Western Australia:  
[http://portal.environment.wa.gov.au/pls/portal/docs/PAGE/DOE\\_ADMIN/PROJECTS/TAB1142249/PILBARACOASTALWATERQUALITY\\_REPORT2.PDF](http://portal.environment.wa.gov.au/pls/portal/docs/PAGE/DOE_ADMIN/PROJECTS/TAB1142249/PILBARACOASTALWATERQUALITY_REPORT2.PDF)
- DoEE. (2017a). *Aipysurus apraefrontalis* in Species Profile and Threats Database. Retrieved from <http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>
- DoEE. (2017b). *Carcharias taurus* (west coast population) — Grey Nurse Shark in Species Profile and Threats Database. Retrieved from <http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>
- DoEE. (2017c). *Carcharodon carcharias* — White Shark, Great White Shark in Species Profile and Threats Database. Retrieved from <http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>
- DoEE. (2017d). *Caretta caretta* in Species Profile and Threats Database. Retrieved from <http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>
- DoEE. (2017e). EPBC Protected Matters Search Tool.
- DoEE. (2017f). *Eretmochelys imbricata* in Species Profile and Threats Database. Retrieved from <http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>
- DoEE. (2017g). *Eubalaena australis* in Species Profile and Threats Database. Retrieved from <http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>



- DoEE. (2017h). *Natator depressus* in Species Profile and Threats Database. Retrieved from <http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>
- DoEE. (2017i). *Pristis clavata* — Dwarf Sawfish in Species Profile and Threats Database. Retrieved from <http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>
- DoEE. (2017j). *Pristis zijsron* — Green Sawfish in Species Profile and Threats Database. Retrieved from <http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>
- DoEE. (2017k). *Tringa nebularia* in Species Profile and Threats Database. Retrieved from <http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>
- DoEE. (2018). National Conservation Values Atlas, Environmental Resources Information Network (ERIN). Retrieved from <http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>
- DoEE. (2020). *Carcharhinus longimanus* — Oceanic Whitetip Shark in Species Profile and Threats Database. Retrieved from <http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>
- DPaW. (2017). *Interim guideline for preliminary surveys of night parrot (Pezoporus occidentalis) in Western Australia*.
- DPIRD. (2020). *Ecological Risk Assessment of the Exmouth Gulf Prawn Managed Fishery*.
- DSEWPaC. (2011a). *Survey Guidelines for Australia's Threatened Mammals*.
- DSEWPaC. (2011b). *Survey Guidelines for Australia's Threatened Reptiles*.
- Environmental Protection Authority. (1997). *Limestone Mine, Quicklime Plant and Use of Existing Port Facility (Point Murat) Shire of Exmouth, Whitecrest Enterprises Pty Ltd: Report and Recommendations of the Environmental Protection Authority*.
- Environmental Protection Authority. (1999). *Environmental protection of Cape Range province position statement No.1*.
- EPA. (1997). *Melanie-1 Petroleum Exploration Well, Cape Range Peninsula, Sun Resources NL: Report and Recommendations of the Environmental Protection Authority*.
- EPA. (2000). *Industrial Subdivision of Lot 51 Murat Road, Exmouth*.
- EPA. (2002). *EPA Position Statement No. 3, Terrestrial Biological Surveys as an Element of Biodiversity Protection* Perth:
- EPA. (2009). *EPA Guidance Statement No. 20, Short Range Endemic Invertebrate Fauna*. Perth:
- EPA. (2010). *Environmental Assessment Guideline for Protecting Marine Turtles from Light Impacts*. . Perth:
- EPA. (2016a). *Environmental Factor Guideline-Social Surroundings*.
- EPA. (2016b). *Environmental Factor Guideline - Marine Environmental Quality*. Perth:
- EPA. (2016c). *Environmental Factor Guideline – Coastal Processes*. Western Australia:
- EPA. (2016d). *Environmental Factor Guideline – Terrestrial Fauna*. Perth:
- EPA. (2016e). *Environmental Factor Guideline: Benthic Communities and Habitats*, . Western Australia:
- EPA. (2016f). *Environmental Factor Guideline: Flora and Vegetation*. Western Australia:
- EPA. (2016g). *Environmental Factor Guideline: Marine Fauna*. . Perth:
- EPA. (2016h). *EPA Guidance Statement No. 56, Terrestrial Fauna Surveys for Environmental Impact Assessment*. Perth:
- EPA. (2016i). *Statement of Environmental Principles, Factors and Objectives*. Western Australia:
- EPA. (2016j). *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment*. Western Australia:
- EPA. (2016k). *Technical Guidance – Protection of Benthic Communities and Habitats*. Western Australia:
- EPA. (2016l). *Technical Guidance – Sampling methods for terrestrial vertebrate fauna*. Perth:
- EPA. (2016m). *Technical Guidance – Sampling of short range endemic invertebrate fauna* Perth:
- EPA. (2016n). *Technical Guidance – Terrestrial fauna surveys*.
- EPA. (2016o). *Technical Guidance Environmental Impact Assessment of Marine Dredging*. . Perth:
- EPA. (2016p). *Technical Guidance Protecting the Quality of Western Australia's Marine Environment*. Perth:
- EPA. (2020a). *EPA Strategic Advice for the Exmouth Gulf - Consultation*.
- EPA. (2020b). *Statement of Environmental Principles, Factors and Objectives*. Western Australia:
- EPA, & DEC. (2010). *Technical Guide – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment*.





- Exmouth Water Reserve Water Source Protection Plan. (2000). Perth:
- Fitzpatrick, B., Davenport, A., Penrose, H., Hart, C., Gardner, S., Morgan, A., . . . Langlois, T. (2019). *Exmouth Gulf, north Western Australia: A review of environmental and economic values and baseline scientific survey of the south western region*.
- Garnett, S. T., Szabo, J. K., & Dutton, G. (2011). *The Action Plan for Australian Birds*. , Collingwood, Victoria:
- Hastings, K., Hesp, P., & Kendrick, G. (1995). Seagrass loss associated with boat moorings at Rottnest Island, Western Australia. *Ocean Coastal Management*, 225-246, 26.
- Horizon Power. (2020, 22nd October 2020). *Exmouth Future Energy System*. Paper presented at the Exmouth community information session, Exmouth Golf Club.
- Hoschke, A., M. , & Whisson, G. J. (2016). First aggregation of grey nurse sharks (*Carcharias taurus*) confirmed in Western Australia. *Marine Biodiversity Records*, 9(17).
- Hutchins. J.B, Slacksmith. S.M, Bryce. C.W, Morrison. S.M, & Hewitt. M.A. (1996). *Marine Biological Survey of the Muiron Islands and the Eastern Shore of Exmouth Gulf, Western Australia*.
- Jenner, K. C. S., Jenner, M.-N. M., & McCabe, K. A. (2001). Geographical and temporal movements of Humpback Whales in Western Australian waters. *APPEA Journal*.
- Jones. E, Qadir. M, van Vliet. M, Smakhtin. V, & Kang. S. (2019). The state of desalination and brine production: A global outlook. *Science of the Total Environment*, 657, 1343-1356.
- Loneragan N.R., Kenyon R.A., Crocos P.J., Ward R.D., Lehnert S., Haywood M.D.E., . . . Toscas P. (2003). *Developing techniques for enhancing prawn fisheries, with a focus on brown tiger prawns (Penaeus esculentus) in Exmouth Gulf*. Cleveland:
- Lyne, V., Fuller, M., Last, P., Butler, A., Maiiin, M., & Scott, R. (2006). *Ecosystem characterisation of Australia's North West Shelf*.
- Macreadie, P. I., Hindell, J. S., Jenkins, G. P., Connolly, R. M., & Keough, M. J. (2009). Fish Responses to Experimental Fragmentation of Seagrass Habitat. *Conservation Biology*, 23, 644-652.
- Massel. S.R, Brinkman. R.M, Mason. L, & Bode. L. (1997). *Water circulation and waves in Exmouth Gulf*. Paper presented at the Proceedings of the Australian Physical Oceanography Conference
- Maunsell. (2007). *Independent Assessment Report 1668/06 – Tuggerah Beach*.
- McCook, L. J., Klumpp, D. W., & McKinnon, A. D. (1995). Seagrass communities in Exmouth Gulf, Western Australia: a preliminary survey. *Journal of the Royal Society of Western Australia*, 78, 81-87.
- Mellor, P., & Gautier, S. (2020). Benthic Habitat loss associated with unregulated shipping in the Exmouth Gulf, Western Australia. *Ocean Coastal Management, In Pres*.
- Montefalcone, M., Lasagna, R., Bianchi, C. N., Morri, C., & Albertelli, G. (2006). Anchoring damage on *Posidonia oceanica* meadow cover: A case study in Prelo cove (Ligurian Sea, NW Mediterranean),. *Chemistry and Ecology*, 22, S207-S217.
- Moore, G. L., Humphreys, W. F., & Foster, R. (2018). New populations of the rare subterranean blind cave eel *Ophisternon candidum* (Synbranchidae) reveal recent historical connections throughout north-western Australia. *Marine and Freshwater Research*.
- Morgan, D., Whitty, J., Allen, M., Ebner, B., Gleiss, A., & Beatty, S. (2016). *Wheatstone Environmental Offsets - Barriers to sawfish migrations*. .
- MPRA, & CALM. (2005). *Management Plan for the Ningaloo Marine Park and Muiron Islands Marine Management Area 2005 – 2015*.
- Newman, P. (2020). *GASCOYNE GATEWAY - a new model for Regenerative Development?* .
- Oceanica. (2005). *Yannarie Salt Project, Exmouth Gulf Fisheries and Aquaculture: Potential Impacts and Management*.
- Oceanica. (2006a). *Yannarie Salt Project – Marine and Coastal Environment of the Eastern Exmouth Gulf*.
- Oceanica. (2006b). *Yannarie Salt Project Marine and coastal environment of the eastern Exmouth Gulf*.
- Paling, E. (1986). *The ecological significance of blue-green algal mats in the Dampier mangrove ecosystem*.
- Paling, E., & McComb, A. (1994). Cyanobacterial Algal Mats: A Possible Nitrogen Source for Arid-Coast Mangroves. *Int. J. Ecol. Env. Sci.*, 20, 47-54.
- Parsons Brinckerhoff. (2005). *Surface Hydrology for Yannarie Salt Project*.



- Payne, A., Spencer, G., & Curry, P. (1987). *An inventory and condition survey of rangelands in the Carnarvon Basin, Western Australia*.
- Preen, A. R., Marsh, H., Lawler, I. R., Prince, R. I. T., & Shepherd, R. (1997). Distribution and Abundance of Dugongs, Turtles, Dolphins and other Megafauna in Shark Bay, Ningaloo Reef and Exmouth Gulf, Western Australia. *Wildlife Research*, 24(2), 185 – 208.
- Short, A. (2005). *Beaches of the Western Australian Coast: Eucla to Roebuck Bay. A guide to their nature, characteristics, surf and safety*. Sydney University Press,:
- Springdale Holdings Pty Ltd. (2000). *Environmental Protection Statement - Industrial Subdivision of Lot 51 Murat Road, Exmouth*.
- Subsea 7. (2019). *Learmonth Pipeline Fabrication Facility*, .
- W G Martinick and Associates Pty Ltd. (1995). *Consultative Environmental Review: Proposed Special Residential Development, Exmouth: Lyndon Locations 222 and 223*.
- Wolanski, E., Mazda, Y., & Ridd, P. (1992). Mangrove Hydrodynamics. In A. I. Roberston & D. M. Alongi (Eds.), *Tropical Mangrove Ecosystems* (pp. 43-62). Washington: American Geophysical Union.
- Woo, L. M., & Pattiaratchi, C. B. (2003). *Summer surface circulation on the Gascoyne Continental Shelf*. Paper presented at the Oceans 2003, San Diego, California.



## 9. Acronym list

---

<b>A</b>	<b>a</b>
<b>ANZECC</b>	Australian and New Zealand Environment and Conservation Council
<b>APPEA</b>	The Australian Petroleum Production & Exploration Association
<b>ARI</b>	Average Recurrence Interval
<b>ARMCANZ</b>	Agriculture and Resource Management Council of Australia and New Zealand
<b>B</b>	<b>b</b>
<b>BCH</b>	Benthic Communities and Habitat
<b>C</b>	<b>c</b>
<b>CALM</b>	Department of Conservation and Land Management
<b>CAMBA</b>	China-Australia Migratory Bird Agreement
<b>CASA</b>	Civil Aviation Safety Authority
<b>CCWA</b>	Department of Conservation and Land Management
<b>CNG</b>	Compressed natural gas
<b>D</b>	<b>d</b>
<b>DAWE</b>	
<b>DBCA</b>	Department of Biodiversity, Conservation and Attractions
<b>DEC</b>	Department of Environment and Conservation
<b>DEWHA</b>	
<b>DMIRS</b>	Department of Mines, Industry Regulation and Safety
<b>DOE</b>	Department of Environment
<b>DPAW</b>	
<b>DPIRD</b>	Department of Primary Industries and Regional Development
<b>DPLH</b>	
<b>E</b>	<b>e</b>
<b>EGPMF</b>	Exmouth Gulf Prawn Managed Fishery
<b>EIA</b>	Environmental Impact Assessment
<b>EMP</b>	Environmental Management Plan
<b>EPA</b>	Western Australian Environmental Protection Authority
<b>EPBC</b>	Environment Protection and Biodiversity Conservation Act 1999
<b>EQMF</b>	Environmental Referral Document
<b>ERD</b>	Department of Agriculture and Food Western Australia
<b>ESD</b>	Western Australian Environmental Protection Authority
<b>G</b>	<b>g</b>
<b>GDPR</b>	Global Data Protection Regulation
<b>J</b>	<b>h</b>
<b>JAMBA</b>	Japan-Australia Migratory Bird Agreement

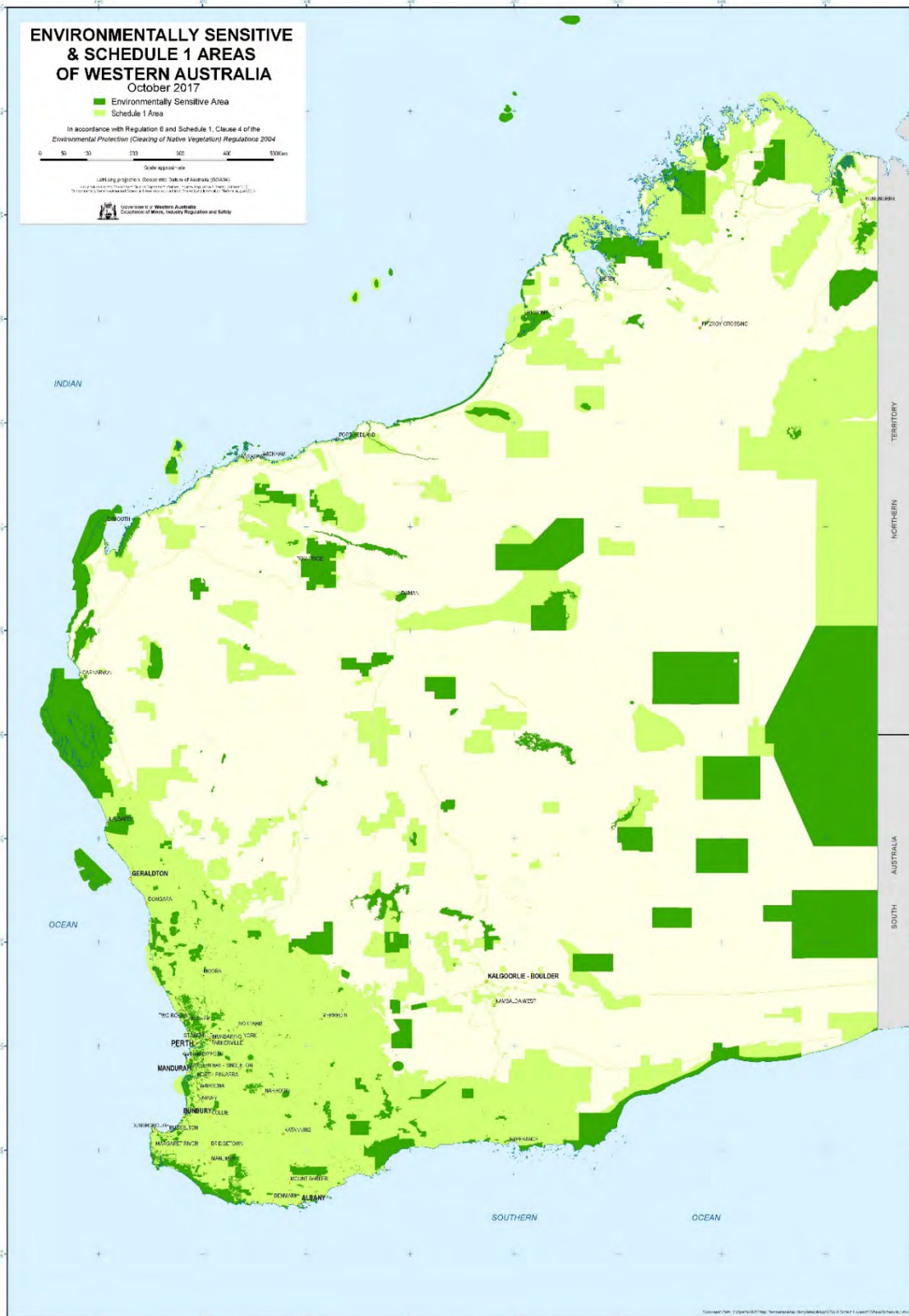


<b>L</b>	<b>l</b>
	LAT Lowest Astronomical Tide LAU Local Assessment Unit LPG Liquefied Petroleum Gas LPS Local Planning Scheme
<b>M</b>	<b>m</b>
	MNES Matters of National Environmental Significance
<b>N</b>	<b>n</b>
	NWSJEMS North West Shelf Joint Environmental Management Study
<b>P</b>	<b>p</b>
	PDWSA Public Drinking Water Source Area PMST Protective Matters Search Tool
<b>R</b>	<b>r</b>
	RAAF Royal Australian Air Force RAV Restricted Access Vehicle ROKAMBA Agreement between the Government of Australia and the Government of the Republic of Korea on the Protection of Migratory Birds RTAA Road Train Assembly Area
<b>S</b>	<b>s</b>
	SRE Short Range Endemics
<b>U</b>	<b>u</b>
	UNESCO United Nations Educational, Scientific and Cultural Organization
<b>W</b>	<b>w</b>
	WAFIC Western Australia Fishing Industry Council WAMSI Western Australian Marine Science Institute WAPC Western Australian Planning Commission





## **Appendix A. Environmentally Sensitive & Schedule 1 Areas of Western Australia**





## **Appendix B. EPBC Search Tool**



# EPBC Act Protected Matters Report

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

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

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 11/11/20 14:37:08

[Summary](#)

[Details](#)

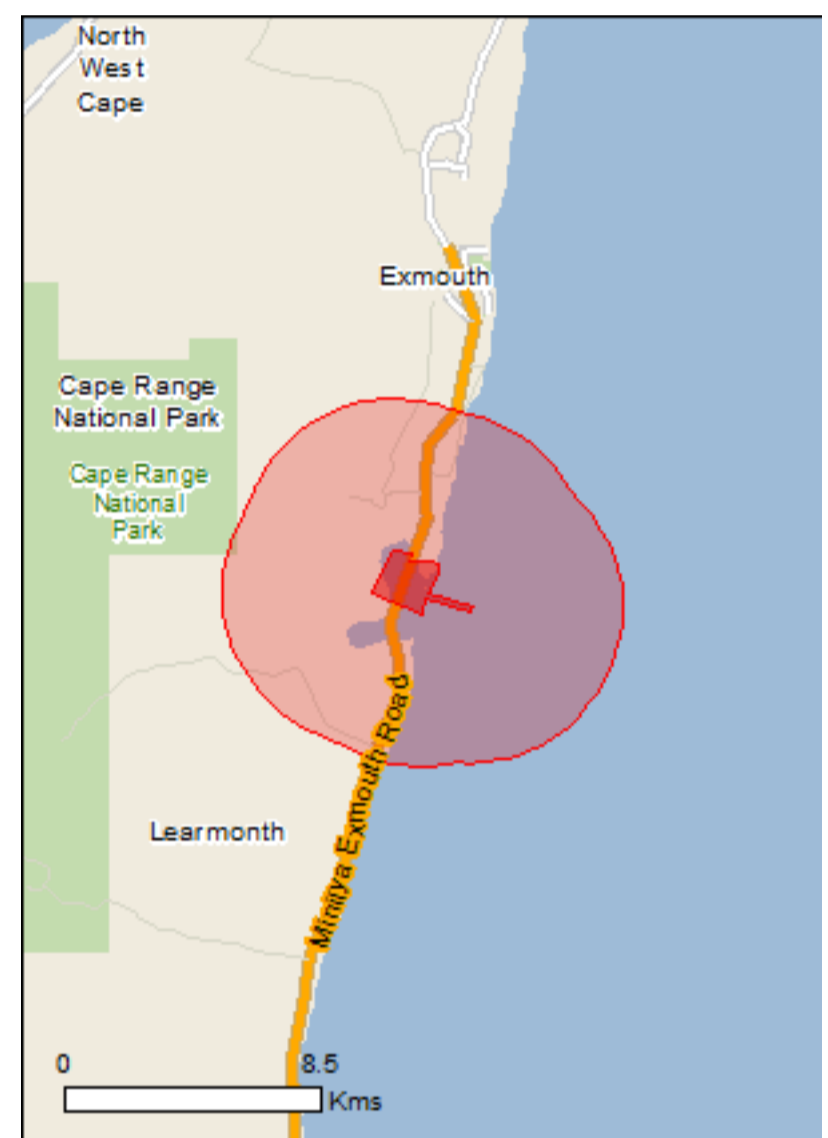
[Matters of NES](#)

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

[Extra Information](#)

[Caveat](#)

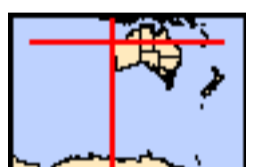
[Acknowledgements](#)



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2015

[Coordinates](#)

Buffer: 5.0Km





# Summary

## Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

<a href="#">World Heritage Properties:</a>	1
<a href="#">National Heritage Places:</a>	1
<a href="#">Wetlands of International Importance:</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>	29
<a href="#">Listed Migratory Species:</a>	41

## Other Matters Protected by the EPBC Act

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

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

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

<a href="#">Commonwealth Land:</a>	None
<a href="#">Commonwealth Heritage Places:</a>	None
<a href="#">Listed Marine Species:</a>	72
<a href="#">Whales and Other Cetaceans:</a>	12
<a href="#">Critical Habitats:</a>	None
<a href="#">Commonwealth Reserves Terrestrial:</a>	None
<a href="#">Australian Marine Parks:</a>	None

## Extra Information

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

<a href="#">State and Territory Reserves:</a>	1
<a href="#">Regional Forest Agreements:</a>	None
<a href="#">Invasive Species:</a>	11
<a href="#">Nationally Important Wetlands:</a>	1
<a href="#">Key Ecological Features (Marine)</a>	None

# Details

## Matters of National Environmental Significance

### World Heritage Properties [\[ Resource Information \]](#)

Name	State	Status
<a href="#">The Ningaloo Coast</a>	WA	Declared property

### National Heritage Properties [\[ Resource Information \]](#)

Name	State	Status
Natural		
<a href="#">The Ningaloo Coast</a>	WA	Listed place

### Listed Threatened Species [\[ Resource Information \]](#)

Name	Status	Type of Presence
Birds		

<a href="#">Calidris canutus</a> Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
----------------------------------------------------------	------------	--------------------------------------------------

<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically 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 baueri</a> Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat may occur within area
------------------------------------------------------------------------------------------------------------------	------------	--------------------------------------------------

<a href="#">Limosa lapponica menzbieri</a> Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri) [86432]	Critically Endangered	Species or species habitat may 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="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely 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 likely to occur within area
-------------------------------------------------------------------------	------------	--------------------------------------

<a href="#">Thalassarche impavida</a> Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
------------------------------------------------------------------------------------------------------	------------	--------------------------------------------------

### Fish

Name	Status	Type of Presence
<a href="#">Milyeringa veritas</a> Blind Gudgeon [66676]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Ophisternon candidum</a> Blind Cave Eel [66678]	Vulnerable	Species or species habitat known to occur within area
<b>Mammals</b>		
<a href="#">Dasyurus hallucatus</a> Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat may occur within area
<a href="#">Eubalaena australis</a> Southern Right Whale [40]	Endangered	Species or species habitat may occur within area
<a href="#">Megaptera novaeangliae</a> Humpback Whale [38]	Vulnerable	Breeding known to occur within area
<a href="#">Petrogale lateralis lateralis</a> Black-flanked Rock-wallaby, Moororong, Black-footed Rock Wallaby [66647]	Endangered	Species or species habitat known to occur within area
<a href="#">Rhinonictoris aurantia (Pilbara form)</a> Pilbara Leaf-nosed Bat [82790]	Vulnerable	Species or species habitat may occur within area
<b>Reptiles</b>		
<a href="#">Aipysurus apraefrontalis</a> Short-nosed Seasnake [1115]	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	Foraging, feeding or related behaviour known to occur within area
<a href="#">Eretmochelys imbricata</a> Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
<a href="#">Natator depressus</a> Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
<b>Sharks</b>		
<a href="#">Carcharias taurus (west coast population)</a> Grey Nurse Shark (west coast population) [68752]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Carcharodon carcharias</a> White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Pristis clavata</a> Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Pristis zijsron</a> Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Rhincodon typus</a> Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area

## Listed Migratory Species

[\[ Resource Information \]](#)

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

Name	Threatened	Type of Presence
<b>Migratory Marine Birds</b>		
<a href="#">Anous stolidus</a> Common Noddy [825]		Species or species habitat likely to 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 may occur within area
<a href="#">Calonectris leucomelas</a> Streaked Shearwater [1077]		Species or species habitat may occur within area
<a href="#">Fregata ariel</a> Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely 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="#">Thalassarche impavida</a> Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
<b>Migratory Marine Species</b>		
<a href="#">Anoxypristis cuspidata</a> Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat likely to occur within area
<a href="#">Balaena glacialis australis</a> Southern Right Whale [75529]	Endangered*	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="#">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 likely 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	Foraging, feeding or related behaviour known to occur within area
<a href="#">Dugong dugon</a> Dugong [28]		Breeding known to occur within area
<a href="#">Eretmochelys imbricata</a> Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
<a href="#">Manta alfredi</a> Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta		Species or species habitat known to occur



Name	Threatened	Type of Presence
Ray [84994] <a href="#">Manta birostris</a> Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		within area  Species or species habitat known to occur within area
<a href="#">Megaptera novaeangliae</a> Humpback Whale [38]	Vulnerable	Breeding known to 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 clavata</a> Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Pristis zijsron</a> Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Rhincodon typus</a> Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
<a href="#">Sousa chinensis</a> Indo-Pacific Humpback Dolphin [50]		Species or species habitat known to occur within area
<a href="#">Tursiops aduncus (Arafura/Timor Sea populations)</a> Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat known to occur within area
<b>Migratory Terrestrial Species</b>		
<a href="#">Hirundo rustica</a> Barn Swallow [662]		Species or species habitat may occur within area
<a href="#">Motacilla cinerea</a> Grey Wagtail [642]		Species or species habitat may occur within area
<a href="#">Motacilla flava</a> Yellow Wagtail [644]		Species or species habitat may 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 may occur within area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Calidris melanotos</a> Pectoral Sandpiper [858]		Species or species habitat may occur within area
<a href="#">Charadrius veredus</a> Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
<a href="#">Glareola maldivarum</a> Oriental Pratincole [840]		Species or species habitat may occur within area
<a href="#">Limosa lapponica</a> Bar-tailed Godwit [844]		Species or species habitat may occur within area
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area
<a href="#">Pandion haliaetus</a> Osprey [952]		Breeding 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 [\[ Resource Information \]](#)

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

Name	Threatened	Type of Presence
<b>Birds</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 likely to occur within area
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat likely to occur within area
<a href="#">Ardea alba</a> Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
<a href="#">Ardea ibis</a> Cattle Egret [59542]		Species or species habitat may 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 may occur within area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Calidris melanotos</a> Pectoral Sandpiper [858]		Species or species habitat may occur within area
<a href="#">Calonectris leucomelas</a> Streaked Shearwater [1077]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
<a href="#">Charadrius veredus</a> Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
<a href="#">Chrysococcyx osculans</a> Black-eared Cuckoo [705]		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="#">Glareola maldivarum</a> Oriental Pratincole [840]		Species or species habitat may occur within area
<a href="#">Haliaeetus leucogaster</a> White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
<a href="#">Hirundo rustica</a> Barn Swallow [662]		Species or species habitat may occur within area
<a href="#">Limosa lapponica</a> Bar-tailed Godwit [844]		Species or species habitat may 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
<a href="#">Motacilla cinerea</a> Grey Wagtail [642]		Species or species habitat may occur within area
<a href="#">Motacilla flava</a> Yellow Wagtail [644]		Species or species habitat may occur within area
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area
<a href="#">Pandion haliaetus</a> Osprey [952]		Breeding known to occur within area
<a href="#">Puffinus carneipes</a> Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Species or species habitat may occur within area
<a href="#">Rostratula benghalensis (sensu lato)</a> Painted Snipe [889]	Endangered*	Species or species habitat likely to 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="#">Tringa nebularia</a> Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area
<b>Fish</b>		
<a href="#">Bulbonaricus brauni</a> Braun's Pughead Pipefish, Pug-headed Pipefish [66189]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
<a href="#">Campichthys tricarinatus</a> Three-keel Pipefish [66192]		Species or species habitat may occur within area
<a href="#">Choeroichthys brachysoma</a> Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194]		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="#">Doryrhamphus janssi</a> Cleaner Pipefish, Janss' Pipefish [66212]		Species or species habitat may occur within area
<a href="#">Doryrhamphus negrosensis</a> Flagtail Pipefish, Masthead Island Pipefish [66213]		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
<a href="#">Halicampus brocki</a> Brock's Pipefish [66219]		Species or species habitat may occur within area
<a href="#">Halicampus grayi</a> Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area
<a href="#">Halicampus nitidus</a> Glittering Pipefish [66224]		Species or species habitat may occur within area
<a href="#">Halicampus spirostris</a> Spiny-snout Pipefish [66225]		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="#">Hippichthys penicillus</a> Beady Pipefish, Steep-nosed Pipefish [66231]		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 kuda</a> Spotted Seahorse, Yellow Seahorse [66237]		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



Name	Threatened	Type of Presence
<a href="#">Micrognathus micronotopterus</a> Tidepool Pipefish [66255]		Species or species habitat may occur within area
<a href="#">Solegnathus hardwickii</a> Pallid Pipehorse, Hardwick's Pipehorse [66272]		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="#">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
<a href="#">Trachyrhamphus longirostris</a> Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281]		Species or species habitat may occur within area
<b>Mammals</b>		
<a href="#">Dugong dugon</a> Dugong [28]		Breeding known to occur within area
<b>Reptiles</b>		
<a href="#">Acalyptophis peronii</a> Horned Seasnake [1114]		Species or species habitat may occur within area
<a href="#">Aipysurus apraefrontalis</a> Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat known to occur within area
<a href="#">Aipysurus duboisii</a> Dubois' Seasnake [1116]		Species or species habitat may occur within area
<a href="#">Aipysurus eydouxii</a> Spine-tailed Seasnake [1117]		Species or species habitat may occur within area
<a href="#">Aipysurus laevis</a> Olive Seasnake [1120]		Species or species habitat may occur within area
<a href="#">Astrotia stokesii</a> Stokes' Seasnake [1122]		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	Foraging, feeding or related behaviour known to occur within area
<a href="#">Disteira kingii</a> Spectacled Seasnake [1123]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
<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="#">Eretmochelys imbricata</a> Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
<a href="#">Hydrophis elegans</a> Elegant Seasnake [1104]		Species or species habitat may occur within area
<a href="#">Hydrophis ornatus</a> Spotted Seasnake, Ornate Reef Seasnake [1111]		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 ]

Name	Status	Type of Presence
<b>Mammals</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 may occur within area
<a href="#">Grampus griseus</a> Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
<a href="#">Megaptera novaeangliae</a> Humpback Whale [38]	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="#">Sousa chinensis</a> Indo-Pacific Humpback Dolphin [50]		Species or species habitat known to 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

Name	Status	Type of Presence
<a href="#">Tursiops aduncus (Arafura/Timor Sea populations)</a> Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat known 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 [\[ Resource Information \]](#)

Name	State
Cape Range	WA

### Invasive Species [\[ Resource Information \]](#)

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

Name	Status	Type of Presence
------	--------	------------------

### Birds

Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
----------------------------------------------------------------	--	--------------------------------------------------------

### Mammals

Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
------------------------------------------------	--	--------------------------------------------------------

Capra hircus Goat [2]		Species or species habitat likely to occur within area
--------------------------	--	--------------------------------------------------------

Equus caballus Horse [5]		Species or species habitat likely to occur within area
-----------------------------	--	--------------------------------------------------------

Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
--------------------------------------------------	--	--------------------------------------------------------

Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
-----------------------------------	--	--------------------------------------------------------

Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
--------------------------------------------------------	--	--------------------------------------------------------

Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
-------------------------------------------	--	--------------------------------------------------------

Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
------------------------------------	--	--------------------------------------------------------

### Plants

Name	Status	Type of Presence
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat likely to occur within area

#### Reptiles

Hemidactylus frenatus Asian House Gecko [1708]		Species or species habitat likely to occur within area
---------------------------------------------------	--	--------------------------------------------------------

#### Nationally Important Wetlands

[ Resource Information ]

Name	State
<a href="#">Cape Range Subterranean Waterways</a>	WA



# Caveat

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

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

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

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

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

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

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

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

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

# Coordinates

-22.028854 114.118007,-22.028854 114.118007,-22.029013 114.118093,-22.022966 114.10333,-22.01103 114.109166,-22.011985 114.115175,-22.014372 114.114145,-22.013815 114.120839,-22.01485 114.123243,-22.018112 114.123243,-22.022648 114.119809,-22.026467 114.132856,-22.028217 114.132169,-22.02408 114.119209,-22.028854 114.118007

# Acknowledgements

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

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

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

Please feel free to provide feedback via the [Contact Us](#) page.

© Commonwealth of Australia

Department of Agriculture Water and the Environment

GPO Box 858

Canberra City ACT 2601 Australia

+61 2 6274 1111



## **Appendix C. Community Reference Groups**

### **C.1 October 2020 Direct mail out – adjoining land holders**

---



## PROPOSED SINGLE JETTY DEEP-WATER PORT

Dear [NAME],

As an owner of a property in and around the Cape Wilderness Estate, we're writing to you about our proposal to fund, build and operate a single jetty deep-water port on the land to the south-eastern side of Minilya-Exmouth Road.

We have enclosed a brochure which provides more information about the jetty; however, we want to assure you that plans for the site and the proposed jetty are still very much under development.

As a property owner near the proposed site, we understand that the project is likely to be of high interest to you, and would like to offer a face-to-face meeting or phone call with you to discuss the proposal and any questions, concerns or suggestions you may have.

Gascoyne Gateway COO, Daniel Jackson will be in Exmouth from Monday 26 October if you would like to discuss the proposal in person. To arrange a convenient time to meet, please email [Daniel.jackson@gascoynegateway.com.au](mailto:Daniel.jackson@gascoynegateway.com.au).

We want to ensure that the final plans for the jetty have been genuinely developed in partnership with the community, reflect the aspirations of Exmouth residents and address any concerns the community may have.

We look forward to meeting with you to discuss the project in more detail.

Kind regards,

Michael Edwards  
**Gascoyne Gateway Limited**  
Managing Director

Daniel Jackson  
**Gascoyne Gateway Limited**  
Chief Operating Officer



[gascoynegateway.com.au](http://gascoynegateway.com.au)





## C.2 October 2020 – Exmouth Community Mail out

# Gascoyne Gateway single jetty deep-water port

Providing reliable, year-round berthing for cruise ships in Exmouth and creating new jobs in a diverse range of regional industries.

Gascoyne Gateway Limited, a wholly Australian-owned company, proposes to develop a single jetty deep-water port to provide certainty to the cruise ship industry and provide opportunities for economic diversification in the region.

While the founding purpose of the jetty will be to support cruise ships and large private yachts for the tourism industries, the jetty will be made viable over the next 50 to 100 years by servicing other users.

Gascoyne Gateway will create 400 jobs during construction, 70 ongoing full-time jobs directly at the jetty and more than 130 ongoing additional jobs will be created in Exmouth.

The jetty will put downward pressure on the cost of living, through cheaper fuel supplies and providing more affordable ways of getting goods and produce into Exmouth.

Importantly, the jetty could see thousands of truck movements taken off regional roads each year, improving safety and reducing greenhouse gas emissions.

There will also be the opportunity to support other sectors, creating jobs in industries as diverse as agriculture, renewable energy, water and logistics.

Located 10km south of Exmouth Township, adjacent to the industrial zone, the jetty will offer secure deep-water (12.0m depth) berths to support a variety of vessels and cargoes.



The location for the proposed jetty is adjacent to the zoned industrial area and well outside the Ningaloo Marine Park.

## Stay updated

Visit [gascoynegateway.com.au](http://gascoynegateway.com.au) and register to receive regular updates.

Gascoyne Gateway Limited



Gascoyne Gateway



## Possible jetty users



### Cruise ships

Day or overnight tourist visits to Ningaloo Reef, Cape Range World Heritage areas and Exmouth Township.

### Private yachts and adventure cruises

Vessels that are too large to utilise the Exmouth Marina.

### Royal Australian & Allied Navies

Ships and submarines to allow for provisions, as well as rest and recreation.



Border Force Australia  
Parcel boats and cutters for maintenance and provisions.



Agriculture exports  
Agricultural exports direct to Asia from growers in the Gascoyne region.



Support vessels  
Provisions for offshore support vessels.



Break bulk vessels  
Import of various cargoes to support the construction and operations in the Gascoyne region.



Cargo vessels  
Small scale container exports in the Gascoyne. Import of consumer goods and building materials to reduce cost of living.



Fuel supplies  
Periodic visits by tankers to import fuel to replicate the Point Mural import facility, as well as provide fuel for jetty users, RAAF Learmonth and the local community.

## Jobs, skills and all-year-round industry

Gascoyne Gateway wants Exmouth residents to benefit directly from the jobs created, skills developed, local goods procured and diversification of industry that this jetty has the potential to deliver.

Gascoyne Gateway will support year-round local jobs by:

- Maximising local industry participation in construction and operation.
- Providing year-round berthing certainty for cruise ships and luxury yachts.
- Providing other sectors with an efficient logistics solution.
- Putting downward pressure on costs for local businesses.

70+ Direct ongoing full-time jobs at jetty

130 Additional ongoing full-time jobs created in Exmouth

\$60M Annual revenue

\$34M Per annum into local Exmouth economy

Printed on 100% recycled paper.

[gascoynegateway.com.au](http://gascoynegateway.com.au)





## C.3 December 2020 – Exmouth Community Mail Out

### Listening to the community

Following our first community reference group discussions, it makes sense for us to establish two community reference groups, with one permanently focused on design and environment and the other on jobs and community. The purpose and terms of reference for each group are below.

- Design and Environment**
- Collaborating to minimise the environmental impact of the projects design and maximise regenerative environmental opportunities.
- Minimising Impacts**
- Ensure the design of the jetty and on the operations minimise the impact on the environment.
  - Provide local knowledge to inform the design of the jetty and essential services as part of EPA process.
  - Aesthetic, light and noise considerations.
- Maximising the benefits**
- Focus on ensuring the uniqueness of the area is maintained for future generations.
  - Help Exmouth to become a town run on renewables, including the development of potable water through renewable energy.
  - Expand the understanding of the broader benefits through the better regulation of current and future port traffic.
  - Identifying and developing additional regenerative initiatives while also combating climate change.
- Jobs & Community**
- Identifying the potential for the jetty to support the community through local industry participation, economic diversification, community access and community partnerships while minimising impacts on the community during construction and operations.
- Minimising Impacts**
- Undertake to have upgrades to infrastructure in place prior to construction, given the capacity and safety issues currently facing local roads.
  - Support advocacy for federal resources for major road upgrades as part of the infrastructure stimulus investment.
  - Identify a water source for construction phase of the project, ahead of the facility's own water production coming online, so as not to strain on Exmouth's currently constrained capacity.
  - Support Exmouth in its efforts to secure additional resourcing for government services to support sustainable population growth.
- Maximising the benefits**
- Develop strategies to maximise the involvement of local businesses and workers in the project, both during construction and in operation.
  - Explore opportunities to provide local and public access to the port, including the beach.
  - Explore opportunities for new community infrastructure, such as a fishing platform.
  - Explore opportunities linked to population and industry growth – including road and wildlife protection, as well as new and improved government services.
  - Explore opportunities for new community partnerships, such as the funding of local community groups and projects.

**A new global benchmark in marine environmental management**

**Regulating existing traffic**  
We expect much of the existing traffic within the Gulf to use our facilities, making us immediately viable and delivering a net environmental benefit, as this traffic becomes better regulated.

**Renewables**  
Developing a solar farm and battery storage to power the jetty. Using renewable energy to produce potable water for the local community and to recharge local aquifers.

**Reducing road and shipping emissions**  
Reducing long haul trucks on the roads and introducing efficient freight solutions will reduce shipping emissions and road transport emissions.

Register for a Community Reference Group by visiting [gascoyneregistry.com.au/community](http://gascoyneregistry.com.au/community)

### Gascoyne Gateway single jetty deep-water port



Letter from  
Captain Michael Edwards, OAM

Dear Exmouth residents,

It's been almost three months since we shared our vision to design, build and operate Australia's first 'green' port that will set a new global benchmark in marine environmental management – just south of Exmouth. Since then, we've spoken to many supportive residents, held our first round of community reference groups and provided feedback on the Environmental Protection Authority (EPA) cumulative impact assessment. And we've now able to share the draft conceptual design of the port which is still under development.

Thanks to everyone who attended our first community reference groups in November. While there are a lot of questions that we still don't have complete answers to as we are in the concept stage of the project, we wanted to engage as early as possible to understand what is important to residents. We appreciate your patience and input as we work through different phases of the project. It's been humbling to hear from so many residents who want their children to be able to stay in Exmouth, which will be made possible with year-round employment, career opportunities and training pathways. Our commitment to Exmouth is to not only provide permanent jobs for residents but to buy local so that Exmouth businesses can benefit from our facility as well.

Just as important as the many economic and community benefits that the port will offer, is our commitment to renewables and regenerative initiatives that we believe will solve some of the environmental issues that currently exist in the Exmouth Gulf, and ultimately leave it better than when we left it.

Priority users of the jetty will be small to medium-sized tourism vessels and the Royal Australian Navy; however, we expect much of the existing traffic within the Gulf to also use our facilities. This will make us immediately viable and deliver a net environmental benefit as this traffic becomes better regulated.

We believe in the science behind our commitment to operate Australia's first 'green' port. As such, we have welcomed the EPA's cumulative impact assessment and will formally begin our EPA process in the new year. We expect to be held to the highest level of assessment, and as part of this, we will undertake 18 months of environmental surveys and studies. Exmouth is a special part of the world with a unique natural environment and lifestyle.

We want to ensure the port fits with the aspirations of the local community and will continue to work with Exmouth residents to make this a reality.

I encourage any Exmouth resident who wants to have a say to sign up to a community reference group by visiting [gascoyneregistry.com.au](http://gascoyneregistry.com.au).

Yours sincerely,

Michael Edwards  
Gascoyne Gateway Limited Managing Director



[gascoyneregistry.com.au](http://gascoyneregistry.com.au)

# Gascoyne Gateway single jetty deep-water port conceptual design



Gascoyne Gateway is currently in the concept design phase of the project, which means that no final decisions have been made about the design of the landside or sea structures. However, we understand that residents want to understand what the port may potentially look like so have developed a concept drawing of the proposed port.

## Stay updated

Visit [gascoynegateway.com.au](http://gascoynegateway.com.au) and register to receive regular updates



Based on ESC certified paper

[gascoynegateway.com.au](http://gascoynegateway.com.au)

Gascoyne Gateway Limited



Gascoyne Gateway

- 1 **Tourist reception area** Welcome area for visitors to Emnouth disembarking tourist vessels, including customs control facility
- 2 **Warehousing** Specialised storage facilities for port users, including cold storage
- 3 **Access road upgrades** Proposed road upgrades to ensure safe access to site and traffic management
- 4 **Cargo area** Designated area for the placement of cargo containers
- 5 **Administration building** One or two storey office space for the full-time port employees
- 6 **Port access** Road access to the facility will include landscaping, design and signage that is aesthetically in keeping with the current environment
- 7 **Jetty structure** Pylon for the first section of the jetty to allow for continued beach access, 4WD underpass and coastal water flow powered by renewables
- 8 **Solar farm** Solar panels in place to ensure the port is powered by renewables
- 9 **Tugboat pen** Tugboat facility to allow vessels such as tugs and large private yachts to safely berth at the port
- 10 **Fuel storage** Fuel storage facility with underground pipe directly to the port
- 11 **Desalination** Equipment to produce potable water for port usage and potentially supply the town
- 12 **Potential fishing platform** Public access fishing platform for locals to use
- 13 **Berths** Up to five berths for vessels at the end of the jetty
- 14 **Extended road upgrades** Proposed upgrades to Minilya-Emnouth Rd subject to Federal and State Government funding





**Appendix D. Community Engagement Summary**

# Gascoyne Gateway

## Community Engagement Overview

**Date:** 8 March 2021

**Author:** Gascoyne Gateway Limited / CGM Communications

**Purpose of document:** To provide the Shire of Exmouth with an overview of the Gascoyne Gateway engagement process with the Exmouth community, including materials, to feed into an independent desktop review conducted by Painted Dog Research.

## Context

Gascoyne Gateway Limited is a wholly Australian-owned company, looking to privately fund, build and operate a new single-jetty deep-water port and renewables hub in Exmouth.

The need to diversify the economy is generally accepted by large sectors of the local community. The stability of year-round industry is acknowledged as a need by many community members, and COVID-19 has highlighted that tourism alone is a weakness.

Young families are interested in diversification and intergenerational employment; however, they also want to maintain a lifestyle for their children and want to understand more about the benefits that the project will bring to the community.

Protecting the natural environment is a significant value for the Exmouth community. Gascoyne Gateway is seeking to deliver a new global benchmark in regenerative environmental management and must ensure it can clearly articulate its environmental initiatives to the community.

In August 2020, the Minister for Environment requested that the Environmental Protection Authority (EPA) provide advice on the cumulative impacts of current and future developments proposed for Exmouth Gulf, which will help him to make decisions about future proposals. Gascoyne Gateway has welcomed this study and contributed to the process.

Gascoyne Gateway was publicly named as part of the Minister's announcement which led to the need to start engaging with the local community ahead of plan. The public engagement was officially launched in October 2020.

## Objectives

Build community and stakeholder support for the project through:

1. The regular communication of accurate information about the project, when it becomes available; and
2. Providing early and ongoing opportunities for the community and stakeholders to influence project outcomes.

## Community engagement approach

Gascoyne Gateway is a multi-layered project that requires clear and simple messaging to articulate the benefits of the project. Community engagement is focusing on providing the broader Exmouth community with information about the project through multiple channels to ensure all community members are reached.

CGM Communications is an International Association of Public Participation (IAP2) accredited organisation, with IAP2-trained staff.

In alignment with IAP2 principles, early and ongoing engagement with community members is being undertaken using a combination of communications tools that informs all residents of the project, updates via Facebook and e-newsletters, as well as ongoing face-to-face engagement with

community influencers and those impacted by the project, such as owners of neighbouring properties.

Deeper engagement is occurring with interested community members through Community Reference Groups on key topics to collaborate with and empower community members, and provide opportunities to genuinely influence project outcomes. Participation in these groups is open to all permanent Exmouth residents, with the sessions promoted through a range of communications channels to maximise awareness. The number of community members involved continues to grow.

The Gascoyne Gateway website is the central source of factual information for the community and stakeholders. As well as providing a comprehensive overview of the project, the site is used to provide updates and allow interested people to either sign up to the reference groups or sign up for an e-newsletter to stay informed.

### **Engagement principles**

#### **1) Local community needs to come on their own journey**

The Exmouth community is well informed on industry, community and environmental issues. As with all communities, there are a number of different visions for the town's future. Some within the community want to see industry diversification, more jobs and an increase in tourism. However, many wish to maintain their existing lifestyle and feel a responsibility for protecting the environment. Gascoyne Gateway understands the importance of the community coming on the journey at their own pace. Ensuring community members have the chance to have their say, listening and responding to local aspirations and concerns and keeping the community informed as things progress are key elements of the Gascoyne Gateway approach.

#### **2) Open and honest**

Building trusted relationships with local community members will be critical to the project's success. Gascoyne Gateway is committed to an open and honest dialogue with the community, including communicating regularly both when things are progressing well, but also when road bumps are hit. Silence is not an option.

#### **3) Consistent messaging and coordinated approach**

Gascoyne Gateway has appreciated strong support from many within the Exmouth community. However, we understand that there are many people that need to be convinced, and some people who will never support the project, no matter what we do to address their concerns. All engagement is being carefully managed and coordinated to ensure that we provide accurate information and opportunities for influence, in ways that address the community's genuinely held concerns.

### **IAP2 Public Participation Spectrum**

The IAP2 Public Participation Spectrum is considered the internationally recognized best practice tool for public participation in major projects. The Community Engagement Approach adopts the IAP2's approach to public engagement through its Public Participation Spectrum, as set out below.



IAP2 PUBLIC PARTICIPATION SPECTRUM					
	Inform	Consult	Involve	Collaborate	Empower
GOAL	To provide balanced and objective information in a timely manner	To obtain feedback on analysis, issues, alternatives and decisions	To work with the public to make sure that concerns and aspirations are considered and understood	To partner with the public in each aspect of the decision making	To place final decision making in the hands of the public
PROMISE	"We will keep you informed"	"We will listen to and acknowledge your concerns"	"We will work with you to ensure your concerns and aspirations are directly reflected in the decisions made"	"We will look to you for advice and innovation and incorporate this in decisions as much as possible"	"We will implement what you decide"
ROLE OF THE COMMUNITY	Listen	Contribute	Participate	Partner	Decide

Table 1: IAP2 Public Participation Spectrum and Public Engagement Strategies

The principle behind this approach is that stakeholder buy-in and support is built by offering engagement opportunities at the higher end of the engagement spectrum, which provide stakeholders with greater levels of influence over Project outcomes.

The Project is providing engagement opportunities at the Inform, Consult, Involve and Collaborate levels of engagement. This is involving identifying the intersection between the key concerns and aspirations of the community and the attributes of the Project that are negotiable. Reference groups have been formed to give the community influence through the co-design of project outcomes and solutions in these areas.

For example, in our first round of community reference groups, it was identified that beach access was important to the community, and that local fishers would appreciate the opportunity to fish from the jetty. Both of these are now being considered for adoption into the project.

Implementation of this strategy requires a highly collaborative and consultative approach with the community.

Accordingly, the strategy adheres to the following IAP2 principles of engagement:

- Engagement will be authentic and transparent;
- Communications will be accessible, timely and high quality; and
- Those who are affected by a decision will be provided with the opportunity to be involved in the decision-making process. This is a core value of the IAP2 public participation process.

## Community Reference Groups

Registrations for Community Reference Groups opened when community engagement began and four groups were originally established:

- 1) **Environment** – understanding design impacts and exploring how to minimise disruption in the Gulf while defining the most effective regeneration activities.
- 2) **Community** – identifying what the project can do to support the community, including grants, sponsorships and amenity, as well as supporting community aspirations for better services.
- 3) **Local Industry Participation** – maximising local procurement through local capability development, local work packages, tendering assistance and skills pathways.
- 4) **Industry Development** – identifying the potential for the jetty to support the development of the tourism industry, as well as supporting the diversification of the regional economy.

During the first round of reference groups, which were held in November 2020, the groups merged to form two groups focused on 'Jobs and Community' and 'Design and Environment'. The combination of topics discussed by each group worked well in the first round, with a clear focus and agreement of terms of reference.

Gascoyne Gateway began the reference groups early in the project to ensure that community members can influence decisions and outcomes as much as possible. However, at such an early stage, Gascoyne Gateway will not have answers to all community questions as a lot of work is still under development and many decisions have not yet been made.

There has been significant promotion in the lead up to the second round of reference groups, and numbers have increased to 45 registrations.

The objectives of the community reference groups are to provide interested community members with information about the project and demonstrate progress and to listen to the concerns raised by community members and answer questions raised (where possible).

## Community Engagement Activity Planner

\*please note all materials are available in the separate Dropbox link supplied -

<https://www.dropbox.com/sh/2rn84xdr93ibp9/AACPQrJhxXoCliqh8MKWldXQa?dl=0>

Date	Activity	Audience	IAP2 spectrum	Material
10/09/202	Shire of Exmouth Full Council Briefing	Shire Council	Consult	Presentation
10/09/2020	Individual face-to-face conversations	Community members	Consult	N/A <i>Discussions about preferred engagement methods</i>
10/09/2020	Face-to-face engagement	Young families	Consult	N/A <i>Discussions about preferred engagement methods</i>
16/10/2020	Email update on community engagement plan to Shire	CEO and President	Inform	Email
<b>PUBLIC LAUNCH</b>				
19/10/2020	The West op-ed - launch	WA (incl. Exmouth community)	N/A	<a href="https://gascoynegateway.com.au/general/cut-the-crap-in-country-wa-the-west-australian/">https://gascoynegateway.com.au/general/cut-the-crap-in-country-wa-the-west-australian/</a>
19/10/2020	Gascoyne Gateway website launched	WA (incl. Exmouth community)	Inform	<a href="http://www.gascoynegateway.com.au">www.gascoynegateway.com.au</a>
w/c 19/10	Direct mail to all Exmouth residents	Exmouth residents	Inform	Hard copy mail-out
w/c 19/10	Letter to neighbouring properties offering face-to-face meeting	Site neighbours	Consult	Tailored letter
21/10/2020	ABC News story - launch	WA (incl. Exmouth community)	N/A	<a href="https://gascoynegateway.com.au/general/port-plan-abc-news/">https://gascoynegateway.com.au/general/port-plan-abc-news/</a>
w/c 26/10	Exmouth post-launch community engagement visit	Community members and site neighbours	Consult	Face-to-face conversations
29/10/2020	Pilbara News article - launch	Exmouth community	N/A	<a href="https://gascoynegateway.com.au/general/green-port-push-firms/">https://gascoynegateway.com.au/general/green-port-push-firms/</a>
11/11/2020	Pilbara News article – conceptual design	Exmouth community	N/A	<a href="https://gascoynegateway.com.au/gen">https://gascoynegateway.com.au/gen</a>

				<a href="#">eral/comment-on-gulf-port-proposal/</a>
23/11/2020	E-newsletter 'Australia's first green port'	Project update stakeholders	Inform	E-newsletter
24/11/2020	First round of community reference groups	Exmouth community members	Collaborate	N/A
02/12/2020	Email to with discussion summary and draft TOR	Community reference group attendees	Involve	Email
14/12/2020	Facebook page launched	All interested stakeholders	Inform	<a href="http://www.facebook.com/gascoynegateway">www.facebook.com/gascoynegateway</a>
14/12/2020	Environmental benefits video released	All interested stakeholders	Inform	Facebook page Website update
21/12/2020	Conceptual design released	All interested stakeholders	Inform	E-newsletter Facebook post Website update
w/c 21/12	Direct mail – conceptual design	Exmouth residents	Inform	Hard copy mail-out
20/01/2021	EPA community meeting promotion	All interested stakeholders	Inform	E-newsletter Facebook post Website update
20/01/2021	Pilbara News – conceptual design	Exmouth community	Inform	<a href="https://gascoynegateway.com.au/general/new-green-port-design-underway/">https://gascoynegateway.com.au/general/new-green-port-design-underway/</a>
23/01/2021	ABC Radio Pilbara interview	Exmouth community	N/A	<a href="https://gascoynegateway.com.au/general/interview-on-abc-radio-pilbara/">https://gascoynegateway.com.au/general/interview-on-abc-radio-pilbara/</a>
02/02/2021	Email confirming dates for second round of community groups	Registered community members	Inform	Emails
09/02/2021	Community Reference Group promotion	All interested stakeholders	Inform	E-newsletter Facebook post Website update
9/10 March	Community Reference Groups	Exmouth community members	Collaborate	N/A





**Appendix E. Landscape Units**



## E.1 Landscape Unit A: Sandy plain with a shrubland over a hummock grassland

---

The soils are typically red brown loamy sands to sandy loams varying from 45cm to 2m in depth overlying a colluvium of limestone pebbles and larger stones. The terrain consists of a gently undulating plain and supports a shrubland which is dominated by *Acacia bivenosa* over *Triodia pungens*.

Very widely scattered trees up to 4m in height include *Acacia ampliceps*, *Acacia bivenosa*, *Acacia inaequilatera*, *Acacia murrayana*, *Grevillea stenobotrya*, *Gyrostemon ramulosus*, *Hakea preissii*, *Hakea suberea*, *Myoporum acuminatum* and *Santalum acuminatum* and occasional shrubs to 2.5m in height include *Acacia coriacea*, *Acacia tetragonophylla*, *Exocarpos aphyllus*, *Hakea aff. candolleana* and *Olearia axillaris*. Shrubs to 1.5m included *Acacia pyrifolia*, *Aerva javanica*, *Amaranthus pallidiflorus*, *Capparis spinosa*, *Corchorus sidoides*, *Corchorus walcottii*, *Crotalaria cunninghamii*, *Enchylaena tomentosa*, *Eremophila maitlandii*, *Gossypium robinsonii*, *Heterodendrum oleaefolium*, *Ipomoea costata*, *Maireana georgei*, *Melaleuca aff. cardiophylla*, *Pimelea microcephala*, *Psoralea martinii*, *Ptilotus obovatus*, *Rhagodia preissii*, *Senecio lautus*, *Senna glutinosa*, *Senna helmsii*, *Senna oligophylla*, *Stylobasium spathulatum* and *Verticordia sp.*; and small shrubs to 0.5m include *Acacia ligulata*, *Acanthocarpus preissii*, *Crotalaria cunninghamii*, *Dampiera cinerea*, *Ptilotus polakii*, *Scaevola canescens*, *Scaevola tomentosa*, *Solanum lasiophyllum*, *Zygophyllum fruticosum*; and annual herbs include *Cleome viscosa*, *Flaveria australasica*, *Sesbania cannabina*, *Swainsona pterostylis*, *Tribulus occidentalis* and the woody annual *Trichodesma zeylanicum*.

The creeper *Cassytha aurea* was common in some of the trees.

The introduced Kapok bush (*Aerva javanica*) is present on disturbed areas.

## E.2 Landscape Unit B: Drainage lines with trees and shrubs

---

The soils of the minor drainage lines consist of alluvial red/brown sandy loams over gravel, with bare limestone gravel in the larger creek beds.

The drainage lines transect the landscape units of the Study Area from east to west, and most of the trees and shrubs of landscape unit A are also present in the drainage lines, but typically to a greater height. The drainage lines are distinct in that they frequently support *Eucalyptus sp.* trees which are absent from the surrounding plains.



Common trees within the drainage lines which attain about 6m in height include *Eucalyptus sp.*, *Eucalyptus polycarpa* and *Eucalyptus prominens*. Occasionally *Ficus platypoda* and *Brachychiton gregorii* are present to a height of 3m. Tall shrubs to 3 metres include *Acacia ampliceps*, *Acacia bivenosa*, *Acacia coriacea*, *Acacia sclerophylla*, *Acacia tetragonophylla*, *Acacia xiphophylla*, *Enchylaena tomentosa*, *Gossypium robinsonii* and *Stylobasium spathulatum*. Low shrubs include *Atriplex tetragonophylla*, *Capparis spinose*, *Heliotropium undulatum*, *indigofera georgei*, *ipomoea costata*, *Lepidium platypetalum*, *Maireana planifolia*, *Olearia axillaris*, *Pileanthus sp*, *Psoralea pustulula*, *Ptilotus obovatus*, *Scaevola tomentosa*, *Senna desolata*, *Senna notabilis*, *Senna oligophylla* and *Solanum diversiflorum*, *Solanum lasiophyllum* and *Tephrosia rosea*.

The dominant grass is *Triodia pungens*, with *Triodia basedowii*, *Triodia secunda* and *Triodia wiseana* also being present. The introduced grasses *Aristida holanthera*, *Cenchrus ciliaris* and *Cenchrus setigerus* are also present. Herbs and other annuals include *Amaranthus pallidiflorus*, *Flaveria australasica*, *Rhynchosia minima* and *Sporobolus virginicus*.

### E.3 Calerete plain with open shrubland over hummock grasses

---

This landscape unit consists of shallow red/brown sandy loams over undulating calcrete terrain. Calcrete ridges with skeletal soils cover, and frequently no soil cover, are widespread and rise to 1m above the surrounding plain with deeper soils occurring in the depressions between these ridges. The soil surface of this landscape unit is variably covered by limestone gravel. With a denser cover of gravel along the slightly elevated ridges and less gravel on the depressions between ridges. The soils have a high content of gravel and larger stones.

The vegetation of the limestone ridges is dominated by *Melaleuca cardiophylla* to 1.5m in height over scattered hummocks of *Triodia pungens*. The depressions between ridges very occasionally support *Eucalyptus prominens* and *Eucalyptus sp.nr Euc. Polycarpa* and *Ficus platypoda* to 3m in height. Common shrubs in this stratum include *Acacia bivenosa*, *Acacia lysiphloia*, *Acacia coriacea*, *Acacia tetragonophylla*, *Clerodendrum sp.*, *Exocarpos aphyllus*, *Gossypium robinsonii*, *Hakea preissii*, *Hybanthus aurantiacus*, *Sarcostemma viminalis subsp. australe*, *Scaevola globulifera*, *Senna artemisioides subsp. oligophylla* and *Solanum lasiophyllum*.

The mistletoe *Amyema preissii* was found growing in a tall shrub of *Acacia victoriae*. *Jasminum didymum var. lineare* is a common creeper in trees and shrubs.



Shrubs to 1m in height include *Abutilon otocarpum*, *Canavalia rosea*, *Corchorus sp.*, *Corchorus parviflorus*, *Diplopeltis eriocarpa*, *Dipteracanthus australasicus*, *Enchylaena tomentosa*, *Enneapogon caeruleus*, *Eremophila longifolia*, *Halosarcia halocnemoides*, *Indigofera monophylla*, *Jasminum didymum subsp. lineare*, *Ptilotus obovatus*, *Ptilotus schwartzii*, *Sarcostemma australe*, *Scaevola tomentosa*, *Scaevola spinescens*, *Senna artemisioides subsp. Oligophylla*, *Senna glutinosa*, *Senna helmsii* and *Solanum aff. phlomoides*. The creeper *Cynanchum floribundum* is also present.

Herbs and other annuals include *Abutilon sp.*, *Tribulus occidentalis* and *Eriachne obtusa* and *Plectrachne schinzii* are scattered through this landscape unit. Other grasses included *Argrostis sp.*, *Aristida holanthera*, *Cenchrus ciliaris*, *Cenchrus setigerus* and *Chrysopogon fallax*.

## E.4 Landscape Unit D: Beaches and dune system

---

This landscape unit consists of the beaches and coastal foredunes over calcrete or limestone pebbles. In places coastal dunes rising to 10m or more above sea level.

The coastal dunes are generally stable with no large blow outs, and they support vegetation which provides good surface stability, although this would be easily eroded by trampling.

The sands of the coastal dunes and beach are white and of Recent origin. In the swale immediately behind the foredunes, the transition between the Recent coastal dunes and the older Quaternary alluvial soils is evident. Here red sand can be found at shallow depths below coastal beach sand deposits.

The beach above the high water mark supports a very sparse community of *Ptilotus villosiflorus* and *Salsola kali*. Higher up on the beach there are regularly spaced hummocks of *Spinifex longifolius*. Also present, but in very sparse are *Ipomoea brasiliensis*, *Ptilotus villosiflorus* and *Salsola kali*.

The dune consists of a hummock grassland with a scattered shrubland forming an overstorey of shrubs. *Spinifex longifolius* and *Triodia pungens* are equally common on the seaward slope, with *Triodia pungens* sometimes being dominant on the inland slope, together with the grasses *Eragrostis xerophila*, *Eriachne mucronata*, *Plectrachne schinzii* and *Triodia secunda*. There appears to be no difference in the species composition of shrubs on the seaward and inland slopes, but there are height differences. Shrubs on the seaward slope and crest rarely exceed a height of 1.5m whilst shrub heights of 2.5m are common on the inland slope.





Common shrubs include *Acacia coriacea*, *Acacia translucens*, *Acacia tetragonophylla* and *Oleria axillaris*. The following shrubs are also present: *Commicarpus australis*, *Corchorus sp. nr. Corchorus sidoides*, *Dampiera cinerea*, *Grevillea stenobotrya*, *Hannafordia bissillii*, *Neobassia astrocarpa*, *Rhagodia preissii var. obovata*, *Scaevola aff. canescens*, *Senecio lautus*, *Sida rohlenae*, *Solanum horridum* and *Threlkeldia diffusa*. The mistletoe *Amyema aff. preissii* and the creeper *Cassytha sp.* are present, and the groundcovers *Heliotropium undulatum*, *Euphorbia australis*, *Euphorbia inappendiculata*, *Suaeda sp.* and *Swainsona pterostylis* are common.



## **Appendix F. Overview of studies relevant to MNES as presented in Subsea 7 (2019)**

Survey Date	Researcher/Consultant	Study Description/Title
<b>Regional Surveys</b>		
1998-1999	Department of Conservation and Land Management (now DBCA)	North West Cape and Muiron Islands Marine Turtle Nesting Population Study
2001	Centre for Whale Research	Geographical and temporal movements of Humpback whales in Western Australian waters
1994	James Cook University	Aerial Survey (cetacean, dugong, turtle) of Exmouth Gulf and Ningaloo Reef
1995-2004	Centre for Whale Research	Humpback whale survey report for Exmouth Gulf (1995-2004)
2004-2005	Centre for Whale Research	Distribution and abundance of Humpback Whales and other mega-fauna in Exmouth Gulf during 2004/2005
2005	Oceanwise	Review of the Dugong in Exmouth Gulf
2004-2005	Biota	Survey of migratory birds along eastern and southern shores of Exmouth Gulf
2010	Murdoch University	Vessel—based survey of inshore dolphins off the North West Cape
2016	University of Tasmania, Institute for Marine & Antarctic Studies, Curtin University	Aerial survey program to describe the distribution and abundance of Humpback whale calves within Ningaloo Marine Park
Annually	Birdlife Australia	Surveys of Exmouth Gulf shoreline
<b>Site-specific Surveys</b>		
<b>Marine Fauna</b>		
2016	360 Environmental	Survey of benthic habitats off Heron Point
2017	360 Environmental	Survey of benthic habitats within the Heron Point Local Assessment Unit (LAU)
2017	360 Environmental	Opportunistic observations of marine fauna within and adjacent to the Heron Point LAU
2017	360 Environmental	Survey of benthic habitats within the 'Bundle Laydown Area'
2018	MBS Environmental	Exmouth Gulf Benthic Communities and Habitat survey report
2018	Lyn Irvine	Aerial Humpback whale surveys (southern migration)
<b>Migratory Birds</b>		
2018-19	Western Wildlife	Survey of the Bay or Rest North during southern migration and non-breeding seasons
<b>Terrestrial Fauna</b>		
2017	360 Environmental	Learmonth Level 1 Fauna Survey
<b>Subterranean Fauna</b>		
2017	Bennelongia	Desktop review of subterranean fauna.



---

2017	Invertebrate Solutions	Desktop Assessment of subterranean fauna for the Learmonth Bundle Project
2018-19	Bennelongia	Subterranean fauna surveys

---





## **Appendix G. Identification of Key Environmental Factors**

Factor	Objective	Relevance to Proposal	Significant Factor
<b>Sea</b>			
<b>Benthic Communities and Habitat</b>	To protect benthic communities and habitat so that biological diversity and ecological integrity are maintained.	Localised impacts to benthic habitats. Regional regenerative impacts restored by mitigating unregulated commercial anchoring	Yes
<b>Coastal Processes</b>	To maintain the geophysical processes that shape coastal morphology so that the environmental values of the coast are protected.	Nearshore design adapted to allow for longshore coastal processes.	Yes
<b>Marine environmental quality</b>	To maintain the quality of water, sediment and biota so that environmental values are protected.	Aspects of the proposal may impact on marine environmental quality	Yes
<b>Marine fauna</b>	To protect marine fauna so that biological diversity and ecological integrity are maintained.	The marine waters within and adjacent to the development envelope support a variety of fauna, several of which are significant and protected	Yes
<b>Land</b>			
<b>Flora and Vegetation</b>	To protect flora and vegetation so that biological diversity and ecological integrity are maintained.	Construction will require clearing of vegetation over a disturbance area.	Yes
<b>Landforms</b>	To maintain the variety and integrity of significant physical landforms so that environmental values are protected.	The impact on the landform of the Proposal site and its surrounds is not significant.	No
<b>Subterranean Fauna</b>	To protect subterranean fauna so that biological diversity and ecological integrity are maintained.	The Proposal will not impact subterranean fauna. No groundwater abstraction is proposed. All surface water retention areas will be engineered to prevent seepage and will be monitored. Any chemical use will be designed to be stored and maintained to appropriate standards	No
<b>Terrestrial Environmental Quality</b>	To maintain the quality of land and soils so that environmental values are protected.	The site is a vegetated, largely rural in nature. Acid sulphate soils are not present. Erosion and containment of sediment during construction will need to be managed.	No. Both sites will be designed to meet zero discharge of contaminated runoff. Drainage design to be assessed as part of works approval.
<b>Terrestrial Fauna</b>	To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.	Construction will impact natural habitat.	Yes

Factor	Objective	Relevance to Proposal	Significant Factor
<p><b>Inland Waters</b></p>	<p>To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.</p>	<p>Inland waters occur within the development envelope but have purposely been excluded from the footprint in a dedicated buffer zone. This gives these waters a natural buffer, not currently afforded from recreational vehicles who heavily frequent the area.</p>	<p>No</p> <p>Dangerous goods will be banded and stored to meet AS1940 or applicable standards. All by-products storage will be lined to meet 10<sup>-9</sup> m/s permeability.</p> <p>The buffer zone will mitigate existing pressures on the inland waters</p>
<p><b>Air Quality</b></p>	<p>To maintain air quality and minimise emissions so that environmental values are protected.</p>	<p>It is expected significant carbon emissions will be mitigated by the implementation of the proposal, as currently all freight is trucked from Perth. Actual emissions from operations is expected to be minimal and will be quantified in the ERD.</p>	<p>No</p>
<p><b>Social Surroundings</b></p>	<p>To protect social surroundings from significant harm.</p>	<p>The remote development envelope is not a tourist destination, nor is it host to any other regular land use activities apart from mineral exploration (see Section 3.3). The study area is located within the Learmonth system, of which 'Plains' are the dominant landform. These are characterised by 'Sandy outwash plains' marginal to the Cape Range, supporting mainly soft spinifex hummock grasslands with scattered acacia shrubs.</p> <p>In regard to visual and noise amenity, very few potential sensitive receivers exist near the development envelope.</p>	<p>The potential impacts of the proposal on social surroundings may include:</p> <ul style="list-style-type: none"> <li>• reduction in visual amenity for any sensitive receivers in the locality</li> <li>• project-induced noise increases for sensitive receivers</li> <li>• potentially restricted traditional and recreational use in the locality, including temporarily during construction</li> <li>• disturbance to the seabed during construction of offshore infrastructure, and risk of marine pest introduction, and any potential consequent impacts on existing wild fishery or aquaculture operations</li> <li>• additional human-use pressure on the coastal strip.</li> <li>• Preliminary noise assessment has been completed demonstrating compliance with Noise Regulations.</li> </ul>



Gascoyne Gateway