

# Marine Construction Environmental Management Plan

## Onslow Recreational Jetty



CLIENT: Burbury Consulting/Shire of Ashburton

STATUS: Rev 1

REPORT NUMBER: 23ENV236 – R240257

ISSUE DATE: 20 December 2024



## Important Note

This report and all its components (including images, audio, video, text) is copyright. Apart from fair dealing for the purposes of private study, research, criticism or review as permitted under the Copyright Act 1968, no part may be reproduced, copied, transmitted in any form or by any means (electronic, mechanical or graphic) without the prior written permission of O2 Marine.

This report has been prepared for the sole use of Burbury Consulting/Shire of Ashburton (herein, 'the client'), for a specific site (herein 'the site', the specific purpose specified in Section 1 of this report (herein 'the purpose'). This report is strictly limited for use by the client, to the purpose and site and may not be used for any other purposes.

Third parties, excluding regulatory agencies assessing an application in relation to the purpose, may not rely on this report. O2 Marine waive all liability to any third-party loss, damage, liability or claim arising out of or incidental to a third-party publishing, using or relying on the facts, content, opinions or subject matter contained in this report.

O2 Marine waive all responsibility for loss or damage where the accuracy and effectiveness of information provided by the client or other third parties was inaccurate or not up to date and was relied upon, wholly or in part in reporting.

## Acknowledgement Of Country

O2 Marine acknowledges Aboriginal and Torres Strait Islander people as this land's first storytellers and holders of scientific knowledge through their ongoing and continued connection to land, sea and community. We pay our respect to Elders past and present for their custodianship of the land and sea over millennia, which inspires us daily in our collective responsibility to sustain the land and sea country which we live by, work in and dream about.



**ENVIRONMENT**  
An O2Marine company

WA Marine Pty Ltd t/as O2 Marine

ACN 168 014 819

Originating Office – Western Australia

20 Mews Road FREMANTLE WA 6160

T 1300 219 801 | info@o2marine.com.au



## Version Register

Version	Status	Author	Reviewer	Comment	Authorised for Release (signed and dated)
Rev A	Internal Review	N Claydon	D Walker		
Rev B	For Client Review	N Claydon B Campbell	D Walker		N Claydon 11 October 2024
Rev 0	Final	N Claydon	D Brentnall		N Claydon 5 December 2024
Rev 1	Final	B Campbell	N Claydon		N Claydon 20 December 2024

## Transmission Register

Controlled copies of this document are issued to the persons/companies listed below. Any copy of this report held by persons not listed in this register is deemed uncontrolled. Updated versions of this report if issued will be released to all parties listed below via the email address listed.

Name	Email Address
Drew Brentnall	dbrentnall@burburyconsulting.com.au

## Acronyms and Abbreviations

Term	Full term
ACH	Aboriginal Cultural Heritage
AHIS	Aboriginal Heritage Inquiry System
ANZG	Australian and New Zealand Guidelines
AHD	Australian Height Datum
BC Act	<i>Biodiversity Conservation Act 2016 (Western Australia)</i>
BCH	Benthic Communities and Habitats
BIA	Biologically Important Area
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
CD	Chart Datum
CSMF	Conservation Significant Marine Fauna
DAWE	Department of Agriculture, Water and the Environment
DAWR	Department of Agriculture and Water Resources
DBCA	Department of Biodiversity, Conservation and Attractions
dB	Decibels
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DE	Development Envelope
DEE	Department of Environment and Energy
DEWHA	Department of Water, Heritage and the Arts
DGV	Default Guideline Value
DPIRD	Department of Primary Industries and Regional Development
DPLH	Department of Planning, Lands and Heritage
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities
EEPL	Exotic Environmental Pests, Weeds and Diseases
EIA	Environmental Impact Assessment
EP Act	<i>Western Australian Environmental Protection Act 1986</i>
EPA	Environmental Protection Authority
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
EPOs	Environmental Protection Outcomes
EQG	Environmental Quality Guidelines

Term	Full term
HAT	Highest Astronomical Tide
IMP	Introduce Marine Pest
ISQG	Interim Sediment Quality Guidelines
IUCN	International Union for the Conservation of Nature
Km	Kilometre
LAT	Lowest Astronomical Tide
LoR	Limit of Reporting
m	metres
MTs	Management Targets
MCEMP	Marine Construction Environmental Management Plan
MEQ	Marine Environmental Quality
MFO	Marine Fauna Observer
MNES	Matters of National Environmental Significance
MOF	Material Offloading Facility
NAGD	National Assessment Guidelines for Dredging
NWS	North west shelf
PAH	Polycyclic Aromatic Hydrocarbons
PASS	Potential Acid Sulfate Soils
PEC	Priority Ecological Communities
PEIA	Preliminary Environmental Impact Assessment
PMST	Protected Matters Search Tool
PoA	Port of Ashburton
PSD	Particle Size Distribution
PTS	Permanent Threshold Shift
SoA	Shire of Ashburton
TEC	Threatened Ecological Community
TEQ	Terrestrial Environmental Quality
TN	Total Nitrogen
TRH	Total Recoverable Hydrocarbons
TOC	Total Organic Carbons
TP	Total Phosphorus

Term	Full term
TPH	Total Petroleum Hydrocarbons
TSS	Total Suspended Solids
TTS	Temporary Threshold Shift
WA	Western Australia

## Contents

<b>Acronyms and Abbreviations.....</b>	<b>4</b>
<b>1. Introduction .....</b>	<b>1</b>
1.1. Project description .....	1
1.2. Proposed construction works.....	3
1.3. Purpose of this Plan .....	6
1.4. Objectives .....	6
1.5. Legislation, regulations and guidelines .....	6
<b>2. Existing Environment .....</b>	<b>8</b>
2.1. Climate.....	8
2.2. Geology and geomorphology.....	8
2.3. Tidal Regime.....	8
2.4. Waves.....	9
2.5. Coastal Processes .....	9
2.6. Marine Environmental Quality .....	9
2.7. Benthic Communities and Habitats.....	10
2.8. Marine Fauna .....	13
2.9. Terrestrial Environmental Quality .....	17
2.10. Terrestrial flora and vegetation.....	17
2.11. Terrestrial Fauna.....	17
2.12. Social Surroundings.....	18
<b>3. Roles and responsibilities.....</b>	<b>22</b>
<b>4. Environmental factors and objectives.....</b>	<b>24</b>
<b>5. Monitoring and Management .....</b>	<b>28</b>
5.1. BCH.....	28
5.2. Marine Environmental Quality .....	29
5.3. Marine fauna .....	30
5.4. Social surroundings .....	32
5.5. Hydrocarbon/spill management .....	34
5.6. Waste management.....	35
<b>6. Stakeholder consultation .....</b>	<b>37</b>

<b>7.</b>	<b>Adaptive management</b> .....	<b>37</b>
7.1.	<i>Management of change</i> .....	37
<b>8.</b>	<b>Reporting</b> .....	<b>37</b>
8.1.	<i>Incident reporting</i> .....	37
8.2.	<i>Emergency response</i> .....	38
8.3.	<i>Spill response plan</i> .....	39
<b>9.</b>	<b>Audit and review</b> .....	<b>40</b>
<b>10.</b>	<b>References</b> .....	<b>41</b>
<b>Appendix A.</b>	<b>Marine Piling Provisions</b> .....	<b>46</b>
<b>Appendix A.1.</b>	<b>Dedicated Marine Fauna Observer</b> .....	<b>46</b>
A.1.1	<i>Training and qualifications</i> .....	46
A.1.2	<i>Shifts</i> .....	46
A.1.3	<i>Platform</i> .....	46
A.1.4	<i>Recording and Reporting</i> .....	46
A.1.5	<i>Reportable incidents</i> .....	47
A.1.6	<i>Completion Report</i> .....	47
<b>Appendix A.2.</b>	<b>Marine Piling Provisions</b> .....	<b>47</b>
<b>Appendix B.</b>	<b>Shore/Landside Piling Provisions</b> .....	<b>52</b>
B.1.	<i>Pre-start</i> .....	52
B.2.	<i>Normal piling</i> .....	52
B.3.	<i>Shut-down procedures</i> .....	53
B.4.	<i>Noise monitoring</i> .....	53
<b>Appendix C.</b>	<b>Trained Marine Fauna Observers</b> .....	<b>53</b>
<b>Appendix C.1.</b>	<b>Trained MFO</b> .....	<b>53</b>
<b>Appendix C.2.</b>	<b>Vessel approach distances</b> .....	<b>54</b>
<b>Appendix C.3.</b>	<b>Turtle nesting procedures</b> .....	<b>55</b>
<b>Appendix D.</b>	<b>Injured marine fauna</b> .....	<b>56</b>

## Tables

Table 1: Key Species’ Ecological Windows (Dark blue represent- full duration of presence. Light blue – represents timing of specific behaviours. Diagonal shading represents peak timing of specific behaviours).....	15
Table 2: Registered Aboriginal Heritage Sites (DPLH 2019).....	19
Table 3: MCEMP roles and responsibilities .....	22
Table 4: Potential environmental impacts from piling and associated Proposal specific Environmental Protection Outcomes and Management Targets.....	25
Table 5: Benthic communities and habitat environmental management framework .....	28
Table 6: Marine environmental quality environmental management framework.....	29
Table 7: Marine fauna environmental management framework .....	30
Table 8: Social surroundings environmental management framework .....	32
Table 9: hydrocarbon/spill environmental management framework.....	34
Table 10: Waste environmental management framework.....	35
Table 11: Spill response procedures.....	39
Table 12: MCEMP review schedule .....	40

## Figures

Figure 1: Project Location and indicative Development Envelope .....	2
Figure 2: Concept design plan (Burbury Consulting 2024a).....	4
Figure 3: Jetty Concept Design (Burbury Consulting 2024b) .....	5
Figure 4: BCH map of the Project Development Envelope (O2 Marine 2024).....	12
Figure 5: Registered Aboriginal heritage sites surrounding the Project .....	20

## 1. Introduction

### 1.1. Project description

The Shire of Ashburton (SoA) propose to build a new Onslow Recreational Jetty (the Project) at Beadon Point, northwest of the main township of Onslow, Western Australia (WA). The regional location and an indicative Project Development Envelope (DE) is shown in Figure 1. The location has previously been used as a jetty site in the past, and remains of the Onslow Jetty are still present. The historical Onslow Jetty was used for ships importing building equipment and general merchandise and exporting wool, shell, and minerals through Onslow. It was originally built in 1925, rebuilt in 1934 following cyclone damage and then fell into disrepair when an alternative landing was constructed in Beadon Creek in 1972. Onslow Jetty was then destroyed in an Army explosives exercise in 1982 (SoA 2024).

The proposed jetty will be a pedestrian accessible fixed jetty design, intended to provide access for deeper water fishing at low tide, with usage limited to walking and recreational fishing with no vehicle or vessel access (except for ad-hoc maintenance vehicles/vessels). It will be located adjacent to the remains of the historic Onslow Jetty, which will be able to be viewed from the proposed jetty.

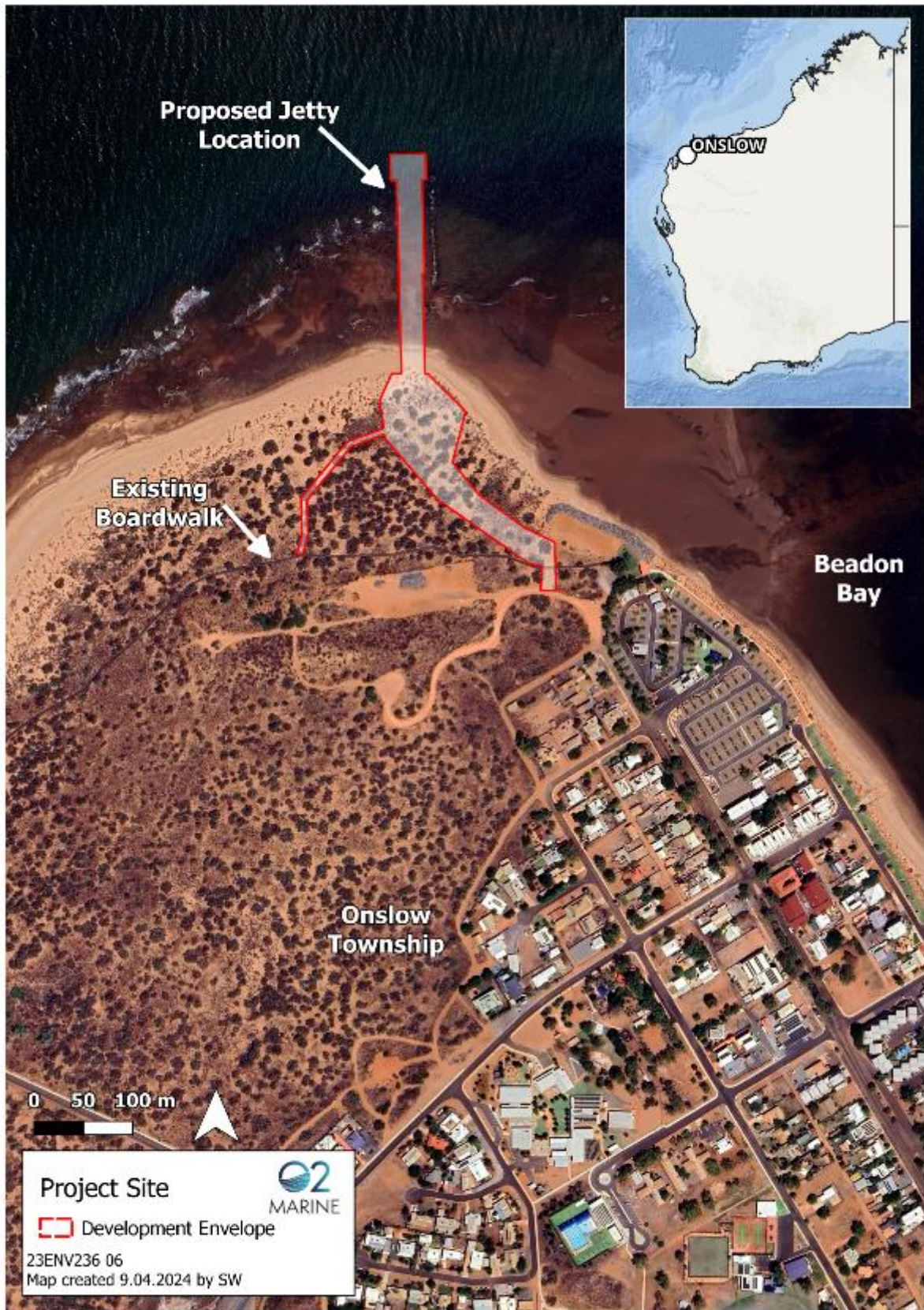


Figure 1: Project Location and indicative Development Envelope

## 1.2. Proposed construction works

Burbury Consulting prepared concept designs for the SoA (Figure 2 and Figure 3). A summary of this information is provided below.

The concept work indicates that the seaward end of the jetty will have a “T” shaped end (Figure 2 and Figure 3) and split into 2 levels, with a lower landing running parallel to the main jetty to provide greater functionality to the jetty (main jetty will be concrete with lower landing constructed from permeable grated decking to limit uplift loads) (MP Rogers & Associates 2020). The main deck level will be at +8 m Australian Height Datum (AHD) with the lower-level platform down to +2 m AHD (final levels to be confirmed following detailed metocean analysis and detailed design). It is envisaged that this would provide a reasonable level of access to the water during the full tidal range in this area. It is estimated that most of the jetty would have at least 0.5 m of water depth over 50% of the time with the jetty head is positioned to be within water at Lowest Astronomical tide (LAT) (MP Rogers & Associates 2020).

Modifications to this concept are expected as the preliminary design is finalised to address additional planning and engineering considerations (e.g. costing, constructability and availability of materials); however, these modifications are expected to be minor. The preliminary concept design is displayed in Figure 2 and Figure 3.

The jetty will be constructed using piles driven into the sediment and landings constructed. Currently there are no roads or access to the site, and therefore land clearing is likely to be required to gain access for the building materials and equipment. A small excavator may also be required to track over the seabed at low tide within the development envelope to facilitate pre-drilling at the pile locations in the event of pile refusal. It is unlikely this will be needed, but this will be considered in this MCEMP.

Construction may be built from the land and progressively work seaward using a mobile construction rig that is moved along the jetty as the structure is progressively built. The additional weight from a mobile construction setup will need to be considered during design (MP Rogers & Associates 2020).

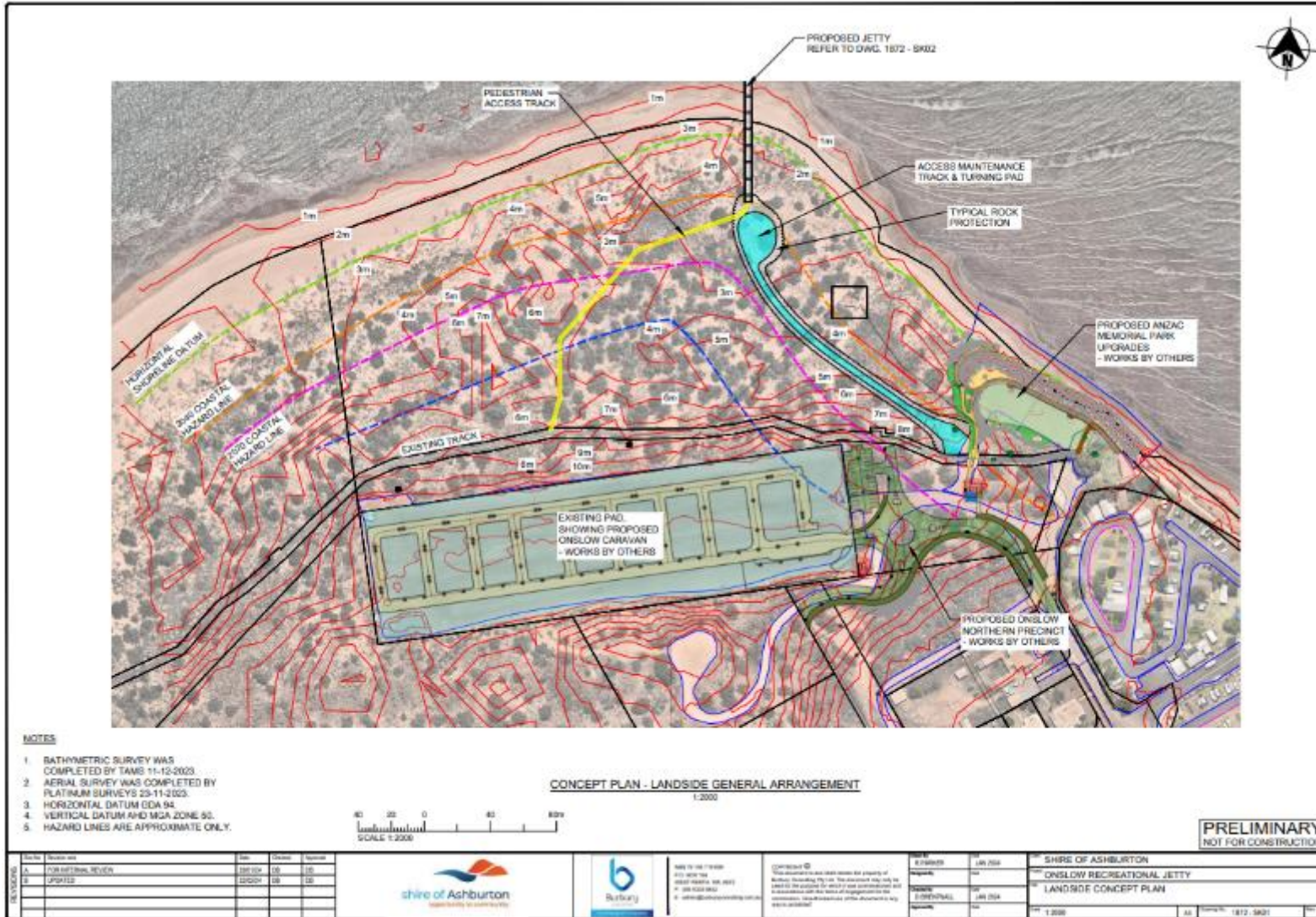


Figure 2: Concept design plan (Burbury Consulting 2024a)

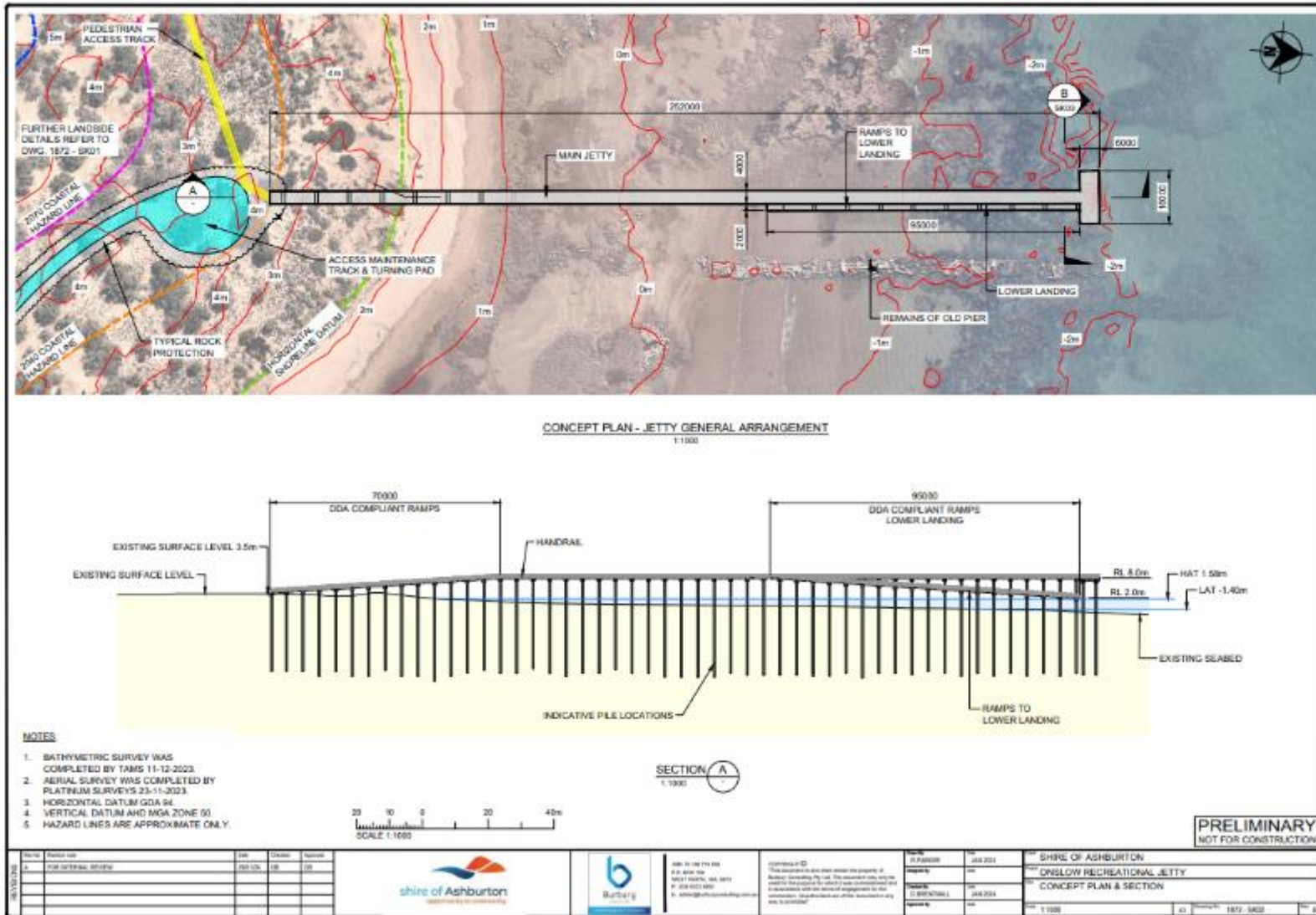


Figure 3: Jetty Concept Design (Burbury Consulting 2024b)

### 1.3. Purpose of this Plan

The purpose of this Marine Construction Environmental Management Plan (MCEMP) is to ensure that potential environmental impacts resulting from construction activities (including piling) in the marine environment are effectively mitigated and to assign appropriate management targets and management actions.

This MCEMP has been prepared to be included in the environmental referral documents to the Western Australian Environmental Protection Authority (EPA) for the approval of the Project. This MCEMP outlines the framework for the construction activities including:

- Legislation and regulations that apply to construction activities
- Overall management framework
- The areas where construction and piling are to occur
- Environmental values to be protected, the risks that these activities may pose, and the mechanisms to be implemented to mediate these risks (management strategies)
- Responsible parties
- Monitoring and reporting
- Consultation.

Note this MCEMP may need to be revised to meet conditions of any approvals issued for the Project.

### 1.4. Objectives

The specific objectives of this MCEMP are aligned with the environmental objectives presented within the EPA's statement of principles, environmental factors, objectives and aims of EIA which are summarised below and explained in greater details in Section 4 (EPA 2021):

- To protect benthic communities and habitat (BCH) so that biological diversity and ecological integrity are maintained
- To maintain the quality of water, sediment and biota so that environmental values are protected
- To protect marine fauna so that biological diversity and ecological integrity are maintained.

### 1.5. Legislation, regulations and guidelines

The potential environmental impacts of the Proposal will be assessed at Commonwealth, State and Local Authority level with each Authority providing guidance on the level of assessment required. In addition to the EP Act and EPBC Act approvals the other key State and Federal statutory approvals relating to the proposed Project are outlined below.

#### 1.5.1. State

- *Aboriginal Heritage Act 1972*  
Regarding Registered Aboriginal sites
- *Aquatic Resources Management Act 2016*  
Regarding fishing and public benefit of aquatic resources
- *Biodiversity Conservation Act 2016 (BC Act)*

Regarding the potential to impact fauna and flora directly and indirectly

- *Contaminated Sites Act 2003*  
Regarding land contamination
- *Fish Resources Management Act 1994*  
Regarding fishing and aquaculture
- *Heritage of Western Australia Act 1990*
- *Heritage of Western Australia Regulations 1991*  
Regarding historic sites
- Environmental Protection Act 1986  
Regarding native vegetation clearing

### 1.5.2. Commonwealth

- *Aboriginal and Torres Strait Islander Heritage Protection Act 1984 (ATSHP Act) (Cth)*  
Regarding registered Aboriginal sites
- Biosecurity Act 2015 (Biosecurity Act) (Cth)  
Regarding monitoring, controlling, and responding to introduced pests and diseases
- *Underwater Cultural Heritage Act 2018 (UCH Act)*  
Regarding historic shipwrecks

### 1.5.3. Other Key Guidance documents

The following key Guidance documents (not an exhaustive list) has also been referred to during the EIA process:

- *Environmental Factor Guideline – Benthic Communities and Habitats*  
Regarding the potential direct and indirect impacts to Benthic Communities and Habitats (BCH)
- *Technical Guidance – Protection of Benthic Communities and Habitats*  
Regarding characterisation of the BCHs and the assessment of impacts
- *Environmental Factor Guideline – Marine Environmental Quality*
- *Technical Guidance – Protecting the Quality of Western Australia’s Marine Environment*  
Regarding the potential for direct and indirect impacts to the quality of water, sediment, and biota
- *Environmental Factor Guideline – Marine Fauna*  
Regarding the potential for direct and indirect impacts on marine fauna
- *Matters of National Environmental Significance Significant Impact Guidelines 1.1 Environmental Protection and Biodiversity Conservation Act 1999*
- *National Light Pollution Guidelines for Wildlife Including Marine Turtles, Seabirds and Migratory Shorebirds. Commonwealth of Australia (2020).*

## 2. Existing Environment

### 2.1. Climate

Located in the Pilbara, Onslow experiences two seasons: a dry season between April and October and wet season between November and March. The dry season is characterised by warm temperatures with the average daily minimum and maximum temperatures of 14.3°C and 26.1°C respectively (BoM 2024). The wet season is characterised by hot temperatures, long sunny days (with more than 10 hours of sunlight per day), and variable rainfall (BoM 2024). February holds the average monthly maximum temperature and highest rainfall (35.3°C and 86 mm). The coolest average monthly maximum temperatures are experienced in July (25.4°C), with the lowest average rainfall in October (0.8mm) (BoM 2024). Onslow is often impacted by cyclones as the Pilbara is the most cyclone prone area along the Australian coastline (DPIRD 2016). Cyclones are attributed as the source of 25 to 34% of the total annual rainfall (DPIRD 2016). The annual mean rainfall for Onslow is 328.8 mm. In the wet season, winds are typically stronger and from a southwest, west, or northwest direction creating a sea-breeze effect (DoT 2017).

### 2.2. Geology and geomorphology

The Pilbara coast is described as a riverine coastal plain in a tropical arid setting. The Onslow coast lies at the western end of the Pilbara and is part of the Carnarvon Basin facing northeast (Semeniuk 1993). The modern shore is developed on Quaternary sediments overlying Tertiary sedimentary rocks at shallow depth. The geomorphic structures of the coastline reflect the repeated rise and fall of sea level and repositioning of the coastline during that period, and the modern complex coastal geomorphology and habitats are a direct outcome of those events reflecting historic environmental conditions, centuries or millennia before present (Eliot et al 2013; Semeniuk 1993). In places the riverine sediments have been lithified. Along with old reef structures and beach rock, these now form coastal limestones outcropping along the shore (O2Marine 2017). More mobile sediments are intermittently delivered to the coast by numerous rivers and flowing streams, the largest being the Ashburton, Fortescue and De Grey Rivers (Eliot et al 2013).

Nearshore sediments are predominantly silty sandy substrate that extends out seaward to the 10 m isobath (which extends at least 10 kilometres (km) offshore) (O2Marine 2017). The offshore bathymetry is characterised by a wide continental shelf that extends out to the Exmouth Plateau further characterising shallow bathymetry along the North-West Shelf (DEWHA 2007).

### 2.3. Tidal Regime

Numerous islands (Muiron Islands, Serrurier Island, Thevenard Island, and Barrow Island) influence waves and tidal currents in the area. Tidal regimes in the Onslow area are semi-diurnal but also experience a monthly spring-neap cycle, a bi-annual cycle due to movement of the solar equator and a 4.4-year cycle developed from lunar elliptic motion with a mean spring tide range of 1.9 m and a neap tide range of 0.5 m (Baird 2020; Damara 2010). The seasonal variations of tides, surges and mean sea level do not generally occur in phase:

- Tidal peaks occur near the equinoxes in March and September

- Surge peaks mainly occur in January to March due to tropical cyclones, and from June to August due to mid-latitude systems
- The seasonal mean sea level peaks during April.

This relative timing means that there is opportunity for high water level events (>2.8 m Chart Datum (CD)) over most of the year. The relative timing of the tidal and mean sea level peaks provides increased potential for extreme water level events to occur as a result of late season tropical cyclones, in March or April (Damara 2010). Currents are predominately influenced by the Leeuwin Current that flows from south along the WA coastline (DEWHA 2007). The current is driven by the Indonesian Throughflow current, which brings warm water down from the Pacific to the Indian Ocean (O2Marine and Teal Solutions 2021). The Leeuwin current is strongest during the dry season.

## 2.4. Waves

Wave conditions are relatively minor due to the shallow bathymetry, with the total wave height lower than 1 m and often less than 0.5 m throughout the year (DoT 2017). Waves along the northwest shelf (NWS) of WA originate from either the Indian Ocean swell, locally generated waves or from tropical cyclones (Baird 2020). During cyclonic events, strong winds can generate extreme wave conditions. The impact of these waves on the Project site is dependent on the prevailing water level conditions and the cyclones direction of approach.

## 2.5. Coastal Processes

The Onslow region is a highly dynamic coastline with both constructional and erosional processes ongoing (URS 2010a). Beadon Point is characterised by low easterly sediment transport (Damara 2010). However, large sediment erosive transport can occur during large storm surges that can accompany tropical low pressure and cyclone weather systems (Cardno 2017). For example, tropical Cyclone Vance in 1999 resulted in erosion at the western end of town beach (Cardno 2017). A seawall was constructed in 2002 running from the western end of town beach to Cameron Avenue to prevent the erosion inundating property and infrastructure. The beach width at the northern end of town beach is narrow with much of the sediment transported through eastern longshore sediment transport.

To maintain longshore sediment transport around the nearby Port of Ashburton (PoA) Material offloading facility (MOF), sand is excavated from a sand-trap on the west of the MOF and trucked to the beach on the eastern side of the MOF. This illustrates sediment transport in the Ashburton area is generally along the shore from west to east (O2 Marine 2021a).

## 2.6. Marine Environmental Quality

### 2.6.1. Water quality

Various water quality surveys have been carried out in the greater Onslow area surrounding the Project site (Wenziker et al 2006; MScience 2009; MScience 2013; O2 Marine 2021b). Generally, metals concentrations have been found to be generally below the limit of reporting and therefore also below recommended Environmental Quality Guidelines (EQGs) applied. For example, MScience (2013) results indicated that the

water quality guidelines for 99% and 90% species protection (ANZG 2018) for all metals (except possibly Zn) were suitable for application to the waters around Onslow.

Nutrient concentrations in previous studies were generally below the recommended EQGs (ANZG 2018) though total nitrogen and phosphorus exceeded the EQGs at a number of inshore and offshore sites sampled (MScience 2009; O2 Marine 2021b). Ammonia has also exceeded the EQGs in a small proportion of samples previous undertaken (O2 Marine 2021b).

Samples analysed for hydrocarbons (BTEX, TPHs, and PAHs) have been consistently barely detectable in the previous investigations in the area (Wenziker et al 2006; MScience 2009; MScience 2013; O2Marine 2021b).

Turbidity and salinity baseline data have been generally higher than guideline values, and overall exhibit high natural variability (O2 Marine 2021b).

### 2.6.2. Sediment quality

A sediment assessment of potential constituents and contaminants including metals, potential acid sulfate soil (PASS), moisture content, total organic carbon (TOC) and particle size distribution (PSD) was undertaken as part of the suite of studies conducted to support the Project approvals process (O2Marine 2024a).

A total of seven randomly positioned sediment samples were collected within the Project development envelope (DE) during the field survey, along with a further two samples collected for quality assurance and control. Sample site selection, sample collection and storage procedures were undertaken in accordance with the NAGD (2009). The metals results were then compared to the Default Guideline Values (DGVs) defined in ANZG (2018), which align with the recommended interim sediment quality guidelines (ISQG) screening levels in the NAGD (2009). Where DGVs did not exist, results were compared to available baseline concentrations. PASS was also assessed against the guidelines established in DER (2015) to see whether sediment samples had a 'positive field sulphide identification'.

Results indicated all metals except for arsenic were below the ISQG/DGV screening levels. Arsenic has been considered to naturally occur at elevated concentrations in the Pilbara when compared to ambient concentrations determined by previous studies. The moisture content, PSD and TOC of sediments sampled were typical for Pilbara nearshore sediments in the Onslow region. No sites presented a 'positive field sulphide identification', hence, PASS is unlikely to be present. Therefore, it is concluded that any disturbance of sediments associated with the jetty construction is considered unlikely to result in adverse effects to marine living resources, human health, and terrestrial living resources.

## 2.7. Benthic Communities and Habitats

Generally, the surrounding coastline of the Onslow region is comprised of sandy beaches with sand bars and shoals at the mouth of tidal creeks. Beaches are backed by coastal dunes, tidal flats, and limestone barriers and there are also pockets of mangroves lining the fringes of tidal creeks. The intertidal zone along the Beadon Point area is characterised by an extensive limestone pavement and rocky platforms (~300 m wide) partially covered by mud, which transitions to a steep beach slope (URS 2010a).

The mid littoral rocky platform is populated by low muddy algal turf with very little invertebrate fauna. However, the lower littoral rock platform has moderately diverse invertebrate fauna, particularly molluscs,

with moderate patchy growth of leafy algae and low seagrasses. Some shallow lower littoral pools have small but numerous coral colonies (URS 2010a). The subtidal BCH composition around Beadon Point is dominated by unvegetated sand and silts (O2 Marine 2021a).

A string of nearshore reefs forms a chain of shoals along the 10 m isobath to the northwest of Beadon Point. The closest of these reefs is Ward Reef, located 4.5 km northwest of Onslow. Ward Reef has previously been recognised as being regionally important for recreational fishing and conservation values (URS 2010b). However, widespread natural disturbance events including coral bleaching (Babcock et al. 2020), have resulted in a decline of coral cover by up to 97% at monitored reef locations (Chevron 2013). A state of the environment report indicated the coral cover on Ward Reef to be 2.2% in 2015 (Chevron 2017).

A BCH study of the Development Envelope has been undertaken recently for the Project (O2 Marine 2024b), which found bare sediment and intertidal reef dominated the area (39.7% and 38.5% respectively). BCH cover was low, with low cover macroalgae and seagrass areas covering only 0.8% and 0.1 % of the area respectively. Except for oysters in the lower tidal zone, the intertidal area was largely devoid of encrusting or surface-dwelling marine flora and fauna due to the wide range of tidal inundation (~4.5 m) and associated impacts from exposure and desiccation.

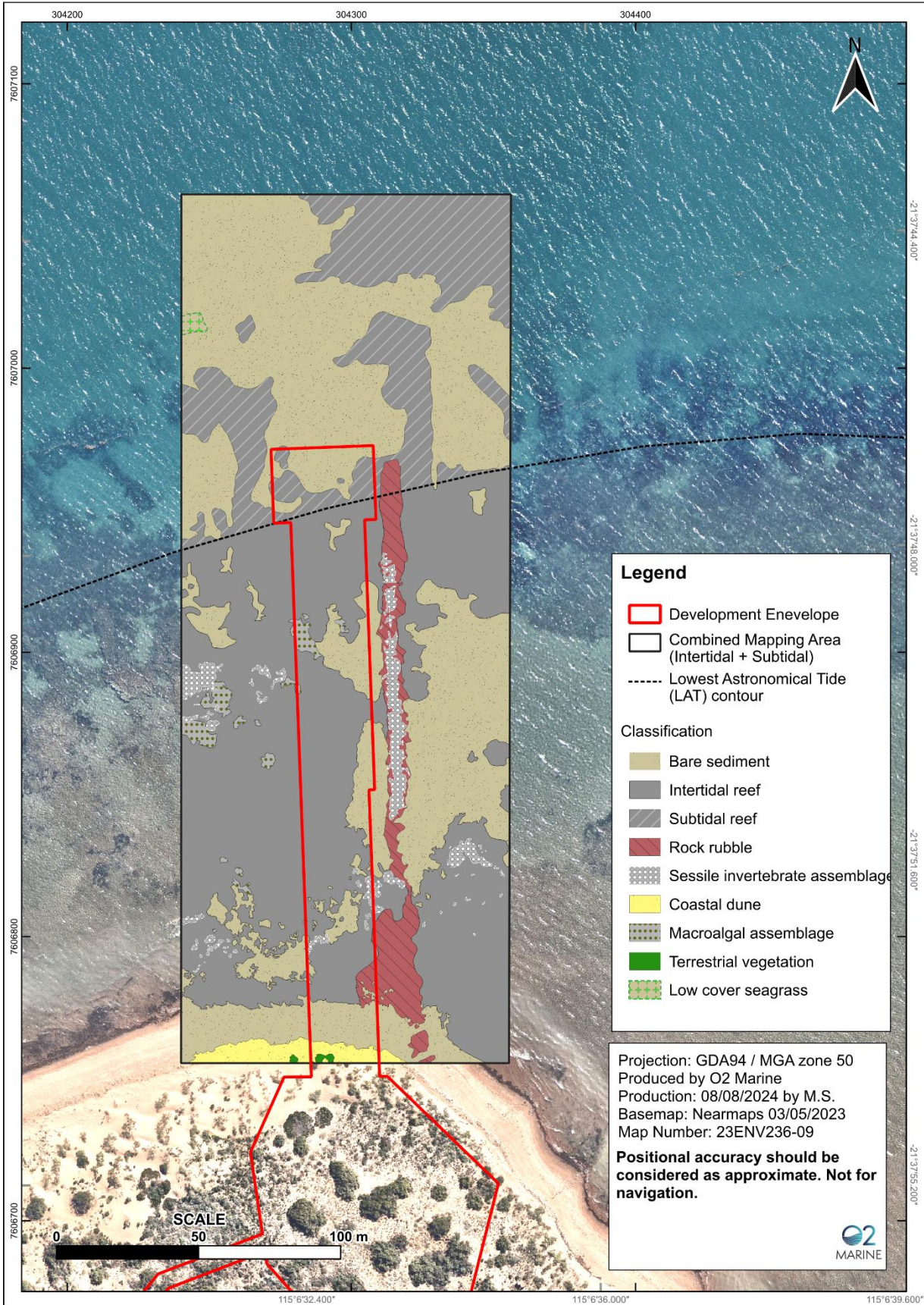


Figure 4: BCH map of the Project Development Envelope (O2 Marine 2024)

## 2.8. Marine Fauna

### 2.8.1. Key species

Key species were identified for the project through a Marine Fauna Desktop Assessment (O2 Marine 2024c). The key species for this Project for marine fauna identified for their high likelihood of occurrence and conservation significance within the area are:

- Australian humpback dolphin
- Indo-pacific bottlenose dolphin
- Dugong
- Humpback whale
- Hawksbill turtle
- Flatback turtle
- Green turtle
- Scalloped hammerhead
- Short-nosed sea snake
- Australian fairy tern
- Bar-tailed godwit
- Caspian tern
- Common greenshank
- Common sandpiper
- Greater crested tern
- Eastern curlew
- Eastern osprey
- Greater sand plover
- Grey-tailed tattler
- Lesser crested tern
- Red-necked stint
- Roseate tern
- Silver gull.

Several key species are likely to be present throughout the year; however some species are only present within or near the Project area during certain month or seasons. Ecological windows have been identified for those species that are present periodically, and these are presented in Table 1. By referring to these ecological windows and undertaking certain construction activities during certain times of the year (for example piling with underwater noise during times of the year when migrating marine fauna are not present) the impacts can be minimised.

Certain activities of species may also require further management and monitoring considerations due to different impacts, and therefore activities including migrations, nesting, inter-nesting and foraging have been

assessed separately for certain species. In particular, construction works should be avoided during peak turtle nesting periods.

Noise modelling found that humpback whales have the greatest potential to be impacted by underwater noise generated by piling (ANV 2024) and humpback whales are more likely to be closer to the shore during the southern migration (O2 Marine 2024) and therefore marine piling should also be avoided during these times.

There are species that will be present throughout the year, however peak turtle nesting and humpback whale southern migration will be prioritised. Therefore, marine piling will not be undertaken between August and February to avoid both these priority species activities, and construction activities that require works or disturbance on the beach will not be undertaken between October and February to avoid peak turtle nesting.

Table 1: Key Species' Ecological Windows (Dark blue represent- full duration of presence. Light blue – represents timing of specific behaviours. Diagonal shading represents peak timing of specific behaviours)

Species presence	J	F	M	A	M	J	J	A	S	O	N	D	Data Source
Humpback whale*						Dark Blue	Dark Blue	Dark Blue	Dark Blue		Dark Blue	Dark Blue	Irvine and Salgado Kent (2019); Jenner et al. (2010)
Northern migration						Light Blue	Light Blue	Light Blue					Jenner et al. (2010)
Southern Migration								Light Blue	Light Blue	Light Blue	Light Blue		Irvine and Salgado Kent (2019); Jenner et al. (2010)
Southern migration – peak mother calf								Light Blue	Light Blue	Light Blue			Irvine and Salgado Kent (2019); Jenner et al. (2010)
Australia humpback dolphin	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Hanf et al. (2022)
Indo-Pacific bottlenose dolphin	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Hanf et al. (2022)
Dugong	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Hodgson et al. (2008)
Hawksbill turtle	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	DoEE (2017a)
-Foraging	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	DoEE (2017a)
-Nesting	Diagonal	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Diagonal	Diagonal	Diagonal	DoEE (2017a)
-Inter-nesting	Light Blue	Light Blue								Light Blue	Light Blue	Light Blue	DoEE (2017a)
-hatchlings emerging	Diagonal	Diagonal	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Diagonal	DoEE (2017a)
Flatback turtle	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	DoEE (2017a)
-Foraging	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	DoEE (2017a)
-Nesting	Diagonal	Light Blue	Light Blue							Light Blue	Diagonal	Diagonal	DoEE (2017a)
-Inter-nesting	Light Blue	Light Blue	Light Blue							Light Blue	Light Blue	Light Blue	DoEE (2017a)
-hatchlings emerging		Light Blue	Light Blue										DoEE (2017a)
Green turtle	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	DoEE (2017a)
Foraging	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	Light Blue	DoEE (2017a)

Species presence	J	F	M	A	M	J	J	A	S	O	N	D	Data Source
-Nesting	■	■	■								■	■	DoEE (2017a)
-Inter-nesting	■	■	■								■	■	DoEE (2017a)
-hatchlings emerging	■	■	■	■	■								DoEE (2017a)
Loggerhead turtle	■	■	■	■	■	■	■	■	■	■	■	■	DoEE (2017a)
-Foraging	■	■	■	■	■	■	■	■	■	■	■	■	DoEE (2017a)
-Nesting	■	■	■								■	■	DoEE (2017a)
-Inter-nesting	■	■	■	■	■						■	■	DoEE (2017a)
-hatchlings emerging	■	■	■	■	■								DoEE (2017a)
Green sawfish	■	■	■	■	■	■	■	■	■	■	■	■	Bateman et al. (2024); Lear et al. (2023); Morgan et al. (2017)
-Pupping								■	■	■	■	■	Lear et al. (2023)
Scalloped hammerhead	■	■	■	■	■	■	■	■	■	■	■	■	Bartes and Braccini (2021); Chin et al. (2017); TSSC (2024)
-Pupping*	■	■								■	■	■	TSSC (2024)
Reef manta ray	■	■	■	■	■	■	■	■	■	■	■	■	Armstrong et al. (2020a,b)
Seabirds	■	■	■	■	■	■	■	■	■	■	■	■	DCCEEW (2024)
-Nesting across species				■	■	■	■	■	■	■	■		DCCEEW (2024)
Migratory Shorebirds (Non-breeding migration)	■	■	■	■					■	■	■	■	DoE (2015); Bamford et al. (2008)
*Pupping can occur throughout the year but predominantly occurs between October and January/February													

## 2.9. Terrestrial Environmental Quality

According to the DWER contaminated sites database (DWER 2024a) there are three contaminated sites within 5 km of Beadon Point, though these are more than 2.5 km away. These include:

- 127 Onslow Road - asbestos-impacted fill material buried (2.6 km away)
- Lot 549 On Plan 173181 – hydrocarbons (such as from diesel/oil) present in soil (2.9 km away)
- Lot 561 Beadon Creek Rd - hydrocarbons (such as from diesel/oil) present in soil, sediment and groundwater surrounding the diesel pipe terminals in the wharf area. Barium is also present in soil and an isolated location on the site historically filled with drilling mud (3.9 km away).

Mapping of acid sulfate soils indicates areas with a high probability of acid sulfate soils within the SoA occur largely along the coastal areas, both north and south of Onslow. Small pockets of high probability areas also occur in the south along waterways, as well as in localised sites in the southwest, north and east of Onslow (DWER 2024b).

Metals in soils were sampled as part of the AIP approximately 15 km south-west south of the Project site. Screening of heavy metals and metalloids in comparison to DGVs for Ecological Investigation Levels (EILs) available in the National Environmental Protection Measure (NEPC 2013) indicated that exceedances of copper, nickel and zinc were recorded. However, it was noted that concentrations of metals are likely to represent naturally occurring concentrations. Limited data exists of soil metals and metalloids at the Project site (DWER 2024b).

## 2.10. Terrestrial flora and vegetation

The Project is within the Carnarvon bioregion (CAR01) of Western Australia and conservation listed species have been assessed as having a low likelihood of occurrence within the Project terrestrial footprint (WEPL 2022). A detailed flora and vegetation survey recorded the floristic composition and vegetation types from four quadrats, mapping notes and opportunistic observations. A total of 43 taxa were recorded from 33 genera across 17 families. No Threatened flora species pursuant to the EPBC Act and/or gazetted as Threatened Flora pursuant to the BC Act and/or Priority Flora species were recorded during the survey or expected to occur. This finding is consistent with that reported by 360 Environmental (2021) and ENV Australia (2011) in biological surveys covering lots directly adjacent to the Survey area containing similar vegetation types/habitats.

Two vegetation types were described and mapped, both being representative of existing broad scale vegetation, and soil and land system mapping for the area. None of the vegetation types were representative of Threatened or Priority Ecological Communities (PEC). Four introduced taxa were recorded during the survey with Buffel grass (*Cenchrus ciliaris*), birdwood grass (*Cenchrus setiger*) and kapok (*Aerva javanica*) cumulatively covering 25-40% of the ground stratum in most areas. Vegetation condition was degraded throughout the whole Survey area. There was also evidence of disturbance including weed invasion, vehicle tracks, previous clearing, and historical infrastructure.

## 2.11. Terrestrial Fauna

The following species have a 'known' or 'likely' occurrence within the search area:

Known

- Northern quoll (*Dasyurus hallucatus*) (Endangered)
- Black-eared cuckoo (*Chalcites osculans*) (listed as Marine under *Chrysococcyx osculans*).

Likely

- Northern short-tailed mouse (*Leggadina lakedownensis*) (Priority 4 species under the BC Act)
- Maryan's keeled slider (*Lerista planiventralis*) (Priority 1 species under the BC Act)
- Fork-tailed swift (*Apus pacificus*) (Migratory)
- Grey falcon (*Falco hypoleucos*) (Vulnerable).

WEPL (2022) conducted a basic terrestrial fauna survey during a flora and vegetation survey in a survey area encompassing the Project development envelope (DE). During the survey, there were no observations or secondary evidence recorded for threatened and priority fauna within the survey area. An old nesting site was recorded for the Migratory species osprey (*Pandion cristatus*) outside of the Project DE.

Habitat types were also mapped during this survey, and two fauna habitat types were recorded within the survey area (Acacia shrublands on stable dunes, and acacia and spinifex beach/primary dunes), both well represented within the region. These habitat types corresponded with the vegetation types and the major soil landscape/ geology units present and had similar characteristics with sandy dunes covered by Acacia shrubs and open grasslands. It was noted that the proximity to town, presence of cats, disturbance through prior clearing and invasion by weeds had reduced the quality of the habitat across the survey area (WEPL 2022).

## 2.12. Social Surroundings

The town of Onslow has a population of less than 1,000 people and is located within the SoA. It was originally located 18 km south-west of the current site, at the mouth of the Ashburton River, and was heavily affected by flood and cyclones. It was relocated to Beadon Point as surveys indicated that the water was deeper and more suitable for vessels there (SoA 2024).

The Onslow Recreational Jetty is part of the Onslow Foreshore Promenade Masterplan which outlines aims to develop a beach front with modern amenities from the northwestern end at the jetty, to Beadon Creek to the east of the townsite.

### 2.12.1. Aboriginal Heritage

The Thalanyji, Nhuwala and Burama people have been the traditional owners of the Onslow area for thousands of years (Place Laboratory 2022). The area holds special significance to other Aboriginal peoples from the inland Pilbara whose stories, song lines and spiritual beliefs are connected to the land and place. The Thalanyji have held the native title rights of the land in and around the township and port of Onslow in 2008 (WCD2008/003).

A search of the Department of Planning, Lands and Heritage (DPLH) Aboriginal Cultural Heritage Inquiry System (Department of Planning 2024) identified that the Project is located within the DEW TALU Aboriginal Heritage Site (Table 2). The ONSLOW 1 Aboriginal Heritage Site is noted due to its proximity to the Project site and the location of proposed access points. ONSLOW 1 is located 350 m to the south southwest of the Project site. Both sites have no gender restrictions to this site (Table 2).

Table 2: Registered Aboriginal Heritage Sites (DPLH 2019)

ID	Name	Place Status	Type
6618	DEW TALU.	Registered site	Ceremonial, Water Source
8920	ONSLOW 1	Registered site	Artefacts/Scatter; Midden/Scatter



Figure 5: Registered Aboriginal heritage sites surrounding the Project

### 2.12.2. Onslow Jetty Heritage

The proposed site for the Onslow Recreational Jetty is directly adjacent the previous Onslow Jetty, where remains are still present.

An historical timeline of the Onslow Jetty has been previously prepared by SoA (2024). The wooden jetty approximately three-quarters of a kilometre was constructed off Beadon Point in 1925 to cater for ships importing building equipment and general merchandise and exporting wool, shell, and minerals through Onslow. It was rebuilt in 1934 after being damaged from a cyclone. Another cyclone damaged the jetty in 1961 and it fell into disrepair after an alternative landing was built in Beadon Creek in 1972. The original jetty was destroyed in an Army explosives exercise in 1982 (SoA 2024).

### 2.12.3. Other land users

The area is currently used for recreational fishing, and there is a pedestrian path along the coast. Users identified for the upgraded Onslow Promenade (Place Laboratory 2022) include:

- Mature travellers aged 55 and over
- Residents from neighbouring areas
- Families on vacation (mainly during school holidays)
- Backpackers
- Local residents
- Semi-permanent mine workers (fly in fly out).

These users are likely to have various expectations and requirements from the facility, including cultural and historical information, places to walk safely and sit, but also continue to fish and use the beach.

### 3. Roles and responsibilities

The overarching responsibility for the implementation of this MCEMP lies with the SoA as the Proponent and permit holder for the proposed work. All positions across the Proposal have environmental responsibilities to some extent. The roles and responsibilities for the implementation of the MCEMP are summarised in Table 3. Everyone has a base level of Duty of Care to prevent Environmental Impacts as described in the EP Act.

Table 3: MCEMP roles and responsibilities

Position		Responsibilities
Designated Manager/Director	Project	<p>SoA is the party with ultimate responsibility of the site during the Construction Phase. This may include but not limited to the following:</p> <ul style="list-style-type: none"> <li>• Develop, implement and review health, safety &amp; environmental systems</li> <li>• Promotes and maintains environmental management by aiming to prevent environmental impacts caused by work practices.</li> <li>• Monitors compliance with environmental legislation, regulation, standards, and codes</li> <li>• Ensures all environmental management needs are adequately met within construction contractor(s) Scope of Works.</li> <li>• Provision of competent person(s) to investigate environmental incidents and accidents and initiate corrective (preventative) actions.</li> <li>• Provision of adequate resources for effective environmental management</li> <li>• Notification to contractor(s) of potential environmental issues</li> <li>• Assessing and reviewing Contractor(s) abilities to comply with environmental management requirements, including safe systems of work and other WHS documentation</li> <li>• Confirmation of contractor(s) adherence to the MCEMP requirements</li> <li>• Ensuring adequate instruction and training is provided for all employees</li> <li>• Conducts inspections and audits of environmental performance and compliance on the proposal.</li> </ul>
Construction Manager	Contractor	<p>The Contractor(s) is responsible for the day-to-day activities during normal site operations during construction. The Contractor(s), as far as it is practical, are responsible for:</p> <ul style="list-style-type: none"> <li>• Monitoring construction activities against the requirements of MCEMP and oversees all day-to-day environmental matters</li> <li>• Conducting inspections and periodic formal audits of the worksite to monitor Environmental performance and identify and implement improvement strategies</li> <li>• Ensuring subcontractor compliance with approved safe systems of work and the maintenance of records to demonstrate compliance</li> <li>• Conducting regular toolbox meetings to discuss Environmental issues with employees and identify areas for improvement</li> <li>• Directly accountable for the safe operation of the proposal's works and compliance with the MCEMP</li> </ul>

Position	Responsibilities
	<ul style="list-style-type: none"> <li>Ensures that a proposal’s risk identification, assessment, and control process has been undertaken and that all persons working on the proposal are made aware of the hazards and the risk control requirements</li> <li>Manages all aspects of workers’ compensation and rehabilitation</li> <li>Responsible for reporting all environmental incidents to SoA Environmental Advisor’s within 24 hours in accordance with incident reporting.</li> </ul>
Piling contractor	<ul style="list-style-type: none"> <li>Prepares and implements an environmental management plan in accordance with the requirements of the MCEMP</li> <li>Implement the management actions of this MCEMP</li> <li>Ensures adequate training of all staff within its area of responsibility</li> <li>Ensure all equipment is adequately maintained and correctly operated</li> <li>Responsible for reporting all environmental incidents to SoA Environmental Advisor’s within 24 hours in accordance with incident reporting.</li> </ul>
Site Supervisor	<ul style="list-style-type: none"> <li>Directly accountable for setting up the worksites to ensure that all activities can be conducted in a safe manner both for persons working on the site, visitors, and members of the general public</li> <li>Responsible for ensuring pre-start communications are held daily with all personnel working on the proposal including subcontractor personnel</li> <li>Ensures that all incidents are reported to the Construction Contractor Manager as soon as possible</li> <li>Conducts visual daily inspections of the work site to ensure that Health Safety and Environment (HSE) procedures are being followed</li> <li>Documents fortnightly inspections and take immediate and effective action to correct reported or observed breaches</li> <li>Ensures that all personnel working on the site are competent to carry out the tasks for which they are assigned by checking evidence of competency and observing work practices.</li> </ul>
Construction employees	<p style="text-align: right;">Contractor</p> <ul style="list-style-type: none"> <li>Must always work in a safe manner and immediately report all incidents, hazards or near misses to the site supervisor</li> <li>Takes all reasonable steps to seek information on the Environmental working requirements of the proposal. Ensures their own fitness for work</li> <li>Always co-operates with site management in ensuring compliance with company health, safety and environment procedures and statutory requirements</li> <li>Does not work outside areas of competency</li> <li>Where applicable, completes pre-start checks correctly for plant and equipment prior to operation and reports any damages or repairs immediately to the site supervisor</li> <li>Actively participates in safety discussions at pre-start and toolbox meetings</li> </ul>

Position	Responsibilities
	<ul style="list-style-type: none"> <li>Actively participates in the completion of JHA's and Risk Assessments where applicable</li> <li>Take part in onsite audits when required.</li> </ul>
Two Dedicated Marine fauna observers	<ul style="list-style-type: none"> <li>Two dedicated MFOs to be on shift at all times during marine piling works (except when one MFO is on breaks etc)</li> <li>Undertake management and mitigation measures for marine piling</li> <li>Dedicated MFOs will be suitably trained and qualified</li> <li>Adhere to the requirements of the (Closed Season Marine Mammals) Wildlife Conservation Notice 1998</li> <li>Knowledge of marine wildlife species in the Proposal area, including Threatened and Migratory Species listed under the EPBC Act and BC Act</li> <li>Evidence of MFO suitability will be kept on record through staff curriculum vitas, training certifications and daily MFO logs, which may be used in future audits.</li> </ul>
Trained Marine Fauna observers	<ul style="list-style-type: none"> <li>Trained MFOs are crew members trained in marine fauna species observations and mitigation measures, consistent with the Project environmental management plans.</li> <li>Trained MFOs will be on duty on Project vessels during construction and during landside piling construction works. There will be always at least one Trained MFO on duty during vessel transits and during landside piling.</li> <li>Maintain detailed daily records of all sightings of marine mammals, marine reptiles (i.e. turtles) shorebirds and seabirds and other notable observations</li> <li>Evidence of MFO training/induction.</li> </ul>

## 4. Environmental factors and objectives

The key environmental factors and objectives to be managed under this MCEMP have been derived from the Statement of environmental principles, factors, objectives and aims of EIA (EPA 2021), which outlines objectives aimed at protecting all environments (Themes) including Sea, Land, Water, Air and People. The Key Environmental Factors and EPA Objectives to be managed under this MCEMP are listed below:

- Benthic communities and habitats
- Marine environmental quality
- Marine fauna
- Social surroundings.

The Proposal specific Environmental Protection Outcomes (EPOs) and Management Targets (MTs) for each of these key marine environmental factors are outlined in Table 4.

Table 4: Potential environmental impacts from piling and associated Proposal specific Environmental Protection Outcomes and Management Targets

<b>Environmental Factor</b>	<b>EPA Objective</b>	<b>Potential Environmental Impact Pathway</b>	<b>Environmental Protection Outcome (EPO)</b>	<b>Management Target (MT)</b>	<b>Risk Management Strategy</b>
<b>Benthic Communities and Habitats</b>	To protect BCH so that biological diversity and ecological integrity are maintained	Direct impacts of BCH at piling locations (minor loss)	Direct disturbance of BCH from construction activities is confined to the Development Envelope.	Piling operations do not remove BCH outside of the piling locations	Refer to Table 5
		Indirect impacts of BCH due to reduction in available light caused by increase in suspended sediments released into the water column during piling activities (from the pile and the vessel movement)	No detectable impacts to BCH outside the Development Envelope.	Minimise localised turbidity so that BCH are protected	
<b>Marine Environmental Quality (MEQ)</b>	To maintain the quality of water, sediment and biota so that environmental values are protected.	Disturbance of contaminants in sediments during piling and vessel movement has the potential to deteriorate water quality and contaminate marine organisms	No residual changes to MEQ as a result of Proposal activities	Maintain MEQ and minimise localised turbidity so that environmental values are protected, including visual aesthetics	Refer to Table 6
		Hydrocarbon release into the marine environment from a vessel spill		No hydrocarbons spills to the marine environment.	
		Waste release into the marine environment from construction activities		No waste released into the marine environment	

Environmental Factor	EPA Objective	Potential Environmental Impact Pathway	Environmental Protection Outcome (EPO)	Management Target (MT)	Risk Management Strategy
Marine Fauna	To protect marine fauna so that biological diversity and ecological integrity are maintained.	Behaviour change, injury or death of marine fauna as a result of piling.	No reported negative impacts on marine fauna attributable to the Proposal	No incidences of marine fauna behavioural change, injury or death as a result of construction works including piling	Refer to Table 7
		Injury or death of marine fauna due to vessel movement (strike).		No incidences of marine fauna injury or death as a result of vessel strike	
		Behaviour change, injury or death of marine fauna (particularly marine turtles) as a result of construction activities on beach including transporting equipment and materials		No incidences of turtle nesting disturbance or destruction of turtles nests as a result of construction activities on the beach	
		Introduced Marine Pests translocation from construction vessels.		No introduction and/or spread of invasive marine species	
		Hydrocarbon or waste spill		No hydrocarbon or waste spills to the marine environment	
		Direct impacts to marine fauna from light pollution from vessels and construction works		No impacts to marine fauna associated with light pollution	
		Increased waste due to construction activities		No waste released to the environment	

Environmental Factor	EPA Objective	Potential Environmental Impact Pathway	Environmental Protection Outcome (EPO)	Management Target (MT)	Risk Management Strategy
<b>Social surroundings</b>	To protect social surroundings from significant harm.	Noise generated from construction and piling activities occurring close to residential areas	No reported complaints from the general public associated with the Proposal	Noise emissions do not exceed assigned noise levels as prescribed in the <i>Environmental Protection (Noise) Regulations 1997</i>	Refer to Table 8
		Airborne dust particles released from construction activities		No dust generated from construction activities	
		Temporary restricted public access to construction area during construction phase		No complaints from the public and other stakeholders associated with the Project	
		Increased waste due to construction activities		No waste released to the environment	
		Damage to old jetty ruins due to construction activities		No damage to old jetty ruins due to construction activities	

## 5. Monitoring and Management

Identified environmental receptors most susceptible to piling and other construction activities associated with the proposal include:

- BCH
- Marine environmental quality (MEQ) – water quality
- Marine fauna
- Social surroundings.

The potential environmental impacts identified above in Table 4 have been assigned monitoring and management actions to measure compliance against the Environmental Protection Objectives (EPOs) and Management Targets (MTs). Management measures for each environmental factor (EPA 2023) are detailed below. Hydrocarbon and waste management MTs have been presented in separate sections as they relate to several of the environmental factors.

### 5.1. BCH

Piling operations and movement of construction vessels have the potential to impact BCH as described in Table 4. The environmental management framework for BCH is outlined below in Table 5.

Table 5: Benthic communities and habitat environmental management framework

Management Target	Management Actions	Responsible party	Monitoring	Frequency/timing	Reporting
Piling operations do not remove BCH outside of the piling locations	<ul style="list-style-type: none"> <li>• Piling is only undertaken within the development envelope using a global positioning system (GPS) and ensuring activities are undertaken in the correct locations</li> <li>• Piling will be undertaken as efficiently as possible to minimise the extent of disturbance</li> </ul>	Contractor	Daily logs	GPS checked prior to each pile being driven	Daily logs to be provided to SoA
Minimise localised turbidity so that BCH are protected	<ul style="list-style-type: none"> <li>• Piling will be undertaken using hydraulic hammering which encapsulates sediment within the core of the pile and</li> </ul>	Contractor	Visual monitoring during piling will be undertaken by the contractors. If a sediment plume	Throughout construction	Daily logs to be provided to SoA

Management Target	Management Actions	Responsible party	Monitoring	Frequency/timing	Reporting
	<p>therefore no suspended sediment should be released to the water column</p> <ul style="list-style-type: none"> <li>• If any pre-drilling is required, it will be undertaken so that spoil remains within the hole and not suspended.</li> <li>• Ensure all vessel equipment and machinery is in good condition and subject to regular maintenance</li> </ul>		is being seen during piling, a silt curtain will be deployed to minimise sediment flow		

## 5.2. Marine Environmental Quality

Piling operations and movement of construction vessels have the potential to impact MEQ as described in Table 4. The environmental management framework for MEQ is outlined in Table 6.

Table 6: Marine environmental quality environmental management framework

Management Target	Management Actions	Responsible party	Monitoring	Frequency/timing	Reporting
Maintain MEQ and minimise localised turbidity so that environmental values are protected, including visual aesthetics	<ul style="list-style-type: none"> <li>• Minimise the number of piles required during Project design phase</li> <li>• Planning and undertaking piling as efficiently as possible to minimise the duration of the disturbance.</li> </ul>	SoA/ Contractor	Visual monitoring during piling will be undertaken by the contractors. If a sediment plume is being seen during piling, a silt curtain will be deployed to minimise sediment flow	Throughout construction	Daily logs to be provided to SoA
No hydrocarbons spills to the marine environment	See Section 5.4	See Section 5.4	See Section 5.4	See Section 5.4	See Section 5.4
No waste released into the marine environment	See Section 5.6	See Section 5.6	See Section 5.6	See Section 5.6	See Section 5.6

### 5.3. Marine fauna

Piling operations and movement of construction vessels have the potential to impact Marine Fauna as described in Table 4. The environmental management framework for marine fauna is outlined in Table 7.

Table 7: Marine fauna environmental management framework

Management Target	Management Actions	Responsible party	Monitoring	Frequency/timing	Reporting
No incidences of marine fauna behavioural change, injury or death as a result of construction works including piling	<ul style="list-style-type: none"> <li>For marine piling implement marine fauna monitoring and management as outlined in Appendix A, including using marine fauna observers (MFOs)</li> <li>For landside piling implement marine fauna monitoring and management as outlined in Appendix B.</li> <li>Ensure all vessel equipment and machinery is in good condition and subject to regular maintenance</li> <li>Ensure piling equipment and/or hammer selection is appropriate to reduce cumulative noise where possible</li> <li>Piling (landside and marine piling) will not be undertaken during sensitive ecological windows for key marine fauna species where possible, such as the humpback whale southern migration (August to November) and peak turtle nesting periods (November to February)</li> </ul>	Contractor	<ul style="list-style-type: none"> <li>MFOs to undertake visual monitoring throughout marine piling activities (including prior to and pre-start) (See Appendix A)</li> <li>If marine fauna is observed within an exclusion zone for marine piling will pause immediately and resume as described in Appendix A</li> <li>If marine fauna (turtles and migratory shorebirds) are observed within 100 m of landside piling will pause immediately and resume as described in Appendix B.</li> </ul>	Throughout piling activities	<p>As described in Appendix A, the following reporting will be undertaken:</p> <ul style="list-style-type: none"> <li>Dedicate MFO daily logs</li> <li>Final summary report</li> </ul> <p>Injured marine fauna to be reported as outlined in Appendix D.</p>

Management Target	Management Actions	Responsible party	Monitoring	Frequency/timing	Reporting
No incidences of marine fauna injury or death as a result of vessel strike	<ul style="list-style-type: none"> <li>Vessel speed limit will be &lt;8 knots in the Project area</li> </ul>	Contractor	Vessel Master to maintain vessel speeds and approach distances (See Appendix C.2)	Throughout construction activities	Daily logs Injured marine fauna to be reported as outlined in Appendix D.
No incidences of turtle nesting disturbance or destruction of turtles nests as a result of construction activities on the beach	<ul style="list-style-type: none"> <li>Construction activities to be undertaken outside of peak turtle nesting periods (November to February)</li> <li>For landside piling implement management as outlined in Appendix B</li> <li>MFOs to be present to avoid nests</li> <li>Movement of equipment etc on the beach will be restricted to a small area rather than travelling along the beach, avoiding dunes as much as possible</li> </ul>	Contractor	Trained MFOs to implement turtle nesting procedures (See Appendix C.3)	Throughout construction activities	Daily MFO logs Injured marine fauna to be reported as outlined in Appendix D.
No introduction and/or spread of invasive marine species	<ul style="list-style-type: none"> <li>Construction vessels to be sourced from WA waters and/or transported via dry docking</li> <li>All construction vessels to comply with the Department of Agriculture, Water and the Environment (DAWE) – Australian Ballast Water Management Requirements and the National Biofouling Management Guidelines for commercial vessels.</li> </ul>	Contractor	Undertake a Vessel Biofouling Risk Assessment by the Department of Primary Industry and Regional Development (DPIRD)	Prior to vessel arriving at the site.	Completed Vessel Biofouling Risk Assessment and Management actions outlined by DPIRD (DHI Water and Environment Pty Ltd 2021). To be undertaken together with any supporting documentation, including antifoul certificates and inspection reports.

Management Target	Management Actions	Responsible party	Monitoring	Frequency/timing	Reporting
No hydrocarbon or waste spills to the marine environment	Refer to Section 5.4 and 5.6	Refer to Section 5.4 and 5.6	Refer to Section 5.4 and 5.6	Refer to Section 5.4 and 5.6	Refer to Section 5.4 and 5.6
No impacts to marine fauna associated with light pollution	All construction to be undertaken during daylight hours and therefore artificial light will not be required during construction.	Contractor	Monitoring of sunset and sunrise times	Daily	Daily logs

## 5.4. Social surroundings

The environmental management framework for social surroundings is outlined in Table 8.

Table 8: Social surroundings environmental management framework

Management Target	Management Actions	Responsible party	Monitoring	Frequency/timing	Reporting
Noise emissions do not exceed assigned noise levels as prescribed in the <i>Environmental Protection (Noise) Regulations 1997</i>	<ul style="list-style-type: none"> <li>Undertake activities in accordance with <i>Environmental Protection (Noise) Regulations 1997</i>, including producing loud noise only during set times of the day (for example between 7 am and 7 pm Monday to Saturday). Works will only be undertaken during daylight hours, however the times set out in Table 1 of the Regulations will also need to be adhered to.</li> <li>Maintain machinery and equipment</li> </ul>	Contractor	Monitoring of time of day, including sunset and sunrise, and noise limiting times  Monitoring of machinery and equipment	Daily throughout construction	Daily logs

Management Target	Management Actions	Responsible party	Monitoring	Frequency/timing	Reporting
No dust generated from construction activities	<ul style="list-style-type: none"> <li>Dust suppression and management controls to be included in the Contractor construction plan for relevant activities that may cause dust including jetty construction</li> <li>Daily inspections of work sites during dry or windy weather</li> </ul>	Contractor/SoA	<p>Monitor weather for windy days and prioritise construction activities.</p> <p>Contractor to immediately report any issues to Project Manager.</p> <p>Investigate cause of excessive dust.</p> <p>SoA to audit performance during construction if/as required.</p>	Monitor weather daily, performance audit if required	Daily logs
No complaints from the public and other stakeholders associated with the Project	<ul style="list-style-type: none"> <li>Have appropriate signage around construction area and having an exclusion zone</li> <li>Appropriate stakeholder engagement prior to construction as described in Section 1</li> </ul>	SoA	Monitor noise and dust complaints to the SoA	Throughout construction	Complaints register
No waste released to the environment	<ul style="list-style-type: none"> <li>See Section 5.6</li> </ul>	See Section 5.6	See Section 5.6	See Section 5.6	See Section 5.6
No damage to old jetty ruins due to construction activities	<ul style="list-style-type: none"> <li>Construction will be undertaken to the west of the ruins and all construction equipment and vessels to avoid old jetty ruins area.</li> </ul>	Contractor	Daily monitoring of positioning	Daily throughout construction	Daily logs

## 5.5. Hydrocarbon/spill management

The environmental management framework for hydrocarbon/spill management is outlined in Table 9.

Table 9: hydrocarbon/spill environmental management framework

Management Target	Management Actions	Responsible party	Monitoring	Frequency/timing	Reporting
No hydrocarbons spills to the marine environment	<ul style="list-style-type: none"> <li>Utilise piling equipment that has no leaks or damage</li> <li>Implement vessel refuelling at appropriately licenced bunkering facilities</li> <li>Vehicles and land-side construction equipment to return back to a safe designated refuelling zone away from the marine environment</li> <li>Follow vehicle/vessel pre-start checks to ensure hydraulics are in working order</li> <li>Have spill kits available onsite</li> </ul>	Contractor	<p>Inspections of all piling and construction equipment to check for leaks or damage</p> <p>Undertake vessel maintenance and bunkering in accordance with piling and construction contractor's vessel management systems</p> <p>If a spill occurs, it should be cleaned up immediately. Depending on the size of the spill, a monitoring program may need to be prepared</p>	Prior to the commencement of piling / construction activities daily	Daily logs Report any significant spillage to SoA and MARPOL
	<ul style="list-style-type: none"> <li>Vessel speeds to be restricted to &lt;8 knots within construction zones, to reduce vessel collision risk</li> </ul>	Contractor	<p>Vessel master to maintain vessel speeds</p> <p>If a vessel collision occurs, an investigation will be conducted to determine if speed limits need to be adjusted</p>	Throughout construction	Vessel logs
	<ul style="list-style-type: none"> <li>Maintain volumes of hydrocarbons stored onsite as low as responsibly practicable, implement all controls and provide appropriate training and resources for spill response.</li> </ul>	Contractor	Auditing of maintenance and training records	Throughout construction	Vessel logs

Management Target	Management Actions	Responsible party	Monitoring	Frequency/timing	Reporting
	<ul style="list-style-type: none"> <li>Ensure all construction vessels are compliant with the <i>Dangerous Goods Safety Act 2004</i>, associated regulations and Australian Standards and Codes of practice to ensure appropriate storage and handling of hazardous materials, and with the International Maritime Organisation International Convention for the Prevention of Pollution From Ships (MARPOL).</li> </ul>				

## 5.6. Waste management

The environmental management framework for waste management is outlined in Table 10.

Table 10: Waste environmental management framework

Management Target	Management Actions	Responsible party	Monitoring	Frequency/timing	Reporting
No waste released into the marine environment	<ul style="list-style-type: none"> <li>Manage the correct disposal and storage of waste by ensuring the work area is tidy and all rubbish is taken away from the site</li> <li>Tie down rubbish to avoid becoming air borne from high winds</li> </ul>	Contractor	Daily site inspections	Daily	Daily vessel/construction logs
	<ul style="list-style-type: none"> <li>Avoid and reduce waste generation where practicable, by separating waste and taking to appropriate waste treatment/recycling centres</li> </ul>	Contractor	Construction design prior to construction commencing, and daily monitoring	Daily	Daily vessel/construction logs

Management Target	Management Actions	Responsible party	Monitoring	Frequency/timing	Reporting
	<ul style="list-style-type: none"> <li>Reporting of any type of spillage within the marine environment directly to the SoA</li> </ul>	Contractor	Visual monitoring throughout construction activities	As soon as possible, throughout construction activities	As required in the event of a spill event. If required complete the Marine Pollution Report (POLREP) ( <a href="#">MAC-F-PollutionReport.pdf</a> )

## 6. Stakeholder consultation

Stakeholders are important to any development within Western Australia, and Burbury/SoA understands the stakeholders are extremely important in this process. Stakeholders will be notified of proposal developments through the SoA website. This will include (but not limited to):

- Providing information to community regarding beach access closures due to construction
- Enabling community feedback through noise and dust complaints register.

## 7. Adaptive management

### 7.1. Management of change

In the event there is a change in equipment, vessels, machinery, materials used for construction, procedures, processes or roles and responsibilities during the construction phase the following information should be written in a management of change document:

- Reasons for change – Why is it needed and what are beneficial outcomes of the change
- Determine the scope – Who will the change impact, what policies and processes will it impact
- Who is responsible for the change
- How will this change be executed to employees, contractor(s) and other stakeholders.

The management of change should be approved by the SoA Designated Project Manager/Director prior to the execution of the change

## 8. Reporting

### 8.1. Incident reporting

All employees or contractors of the Project shall immediately report all environmental incidents as a non-conformance (i.e. performance indicators are not met, or management actions have not been followed) to their site supervisor who will investigate the incident with the with the Project Manager.

The following examples are reportable incidents:

- Injury to conservation significant fauna or listed due to project activities or general observations of injured wildlife not related to the project activities
- Release/spill of contaminants (e.g. fuels/chemical/sewage) to land
- Release/spill of contaminants (e.g. fuels / chemicals / sewage) of any amount to the marine environment
- Any environmental complaints received due to activities associated with construction
- Non-compliance with the environmental management commitments made under this MCEMP, or any other development or environmental approval obtained in relation to activities associated with the EMPs (refer Section 5).

All employees are to report the incident immediately to the relevant supervisory. The following point will be recorded in the contractor's environment incident form:

- Time and date of the incident
- Location and description of event
- Incident category
- Involved parties
- Person recording complain and witness
- Steps to rectify the problem
- Steps to ensure incident will not occur again
- Notification to relevant authority
- Due date to rectify incident
- Evidence of incident resolution.

Incidents that cause or have the potential to cause environmental impacts external to the Proposal boundary need to be reported to the Project Manager. Full copies of the report/incident investigation shall be provided to SoA Project Manager upon completion.

Recommended corrective and preventative actions should be included in the investigation report. Upon review and approval of the investigation report, recommended actions to correct underlying causes and the contributing factors to prevent the incident from occurring again are to be assigned to the appropriate persons. Acceptance of the actions and timeframes should be sought from the action owner or Manager. All actions must be completed within the agreed timeframes and evidence of action completion provided to the SoA Environmental representative.

## 8.2. Emergency response

The Construction Contractor Manager will establish a Project Emergency Response Plan at the Job Start-up Meeting. The Construction Contractor Manager will ensure that all site personnel are aware of the Emergency Response Plan, have been trained in its implementation, and can follow through with the Emergency Response Plan in the event of an emergency response.

Records of all induction training (company and site specific), attendance at Job Start up Meetings and Toolbox Meetings will be stored in the server Job File.

The plan shall detail the following:

- Emergency muster points and the accounting of personnel and this will be communicated to all site personnel via signage, project notice boards, start-up meetings, toolbox meetings and site inductions
- Locations of firefighting equipment, spill response kit and emergency contact details will be formulated and communicated to all personnel attending the Job Start Up Meeting, at Site Specific Inductions
- Outlines procedures, spill tracking and reporting, and records of onsite inspections.
- Identifies the potential hazards onsite
- Develops systems for preventing accidents including appropriate training

- Provides mechanisms for minimising risks, loss, and damage from any incidents
- Provides a Proposal-specific incident management structure to guide response activities in the event of an accidental spill.

### 8.3. Spill response plan

All marine spills, regardless of volume, are to be reported directly to the SoA. In the event of a spill onsite, SoA (through its lead contractor) shall implement the procedures outlined in Table 11.

Table 11: Spill response procedures

Order	Procedures	Safety steps
1	Ensure safety	<ul style="list-style-type: none"> <li>• Ensure that site personnel are safe from the release as well as the public, equipment, property, and environment are at no other immediate risk due to the release.</li> <li>• Wear appropriate PPE to manage the release.</li> <li>• Take a step back and re-evaluate the situation. Do not rush and sure you are adequately protected before entering a spill area with appropriate knowledge (check Material Safety Data Sheet)</li> <li>• Notify people in the immediate vicinity of the incident</li> <li>• Ensure there are no ignition sources in the area if the spill is a flammable material.</li> </ul>
2	Remove source	<ul style="list-style-type: none"> <li>• Act quickly to reduce the amount of product spilled and the environment impact where possible</li> <li>• Close valves, shut off equipment, or plug any holes or leaks as appropriate</li> <li>• Stop the flow at its source.</li> </ul>
3	Secure the area	<ul style="list-style-type: none"> <li>• Limit access to the spill area</li> <li>• Prevent unauthorised entry onto the site.</li> </ul>
4	Contain the spill	<ul style="list-style-type: none"> <li>• Prevent migration of the spill offsite, into any water body, or into any drainage structures</li> <li>• Use sorbent materials to contain the spill</li> <li>• Locate spill kits onsite</li> <li>• Prevent migration of the material</li> <li>• Attempt to minimise the contamination onsite.</li> </ul>
5	Notify and report	<ul style="list-style-type: none"> <li>• Notify the appropriate internal managers of the spill</li> <li>• Provide details of the spill to any other relevant stakeholders</li> <li>• Record the following information about the spill:               <ul style="list-style-type: none"> <li>• Date and time</li> <li>• Location - incident coordinates (latitude &amp; longitude)</li> <li>• Weather conditions</li> <li>• Type of pollutant</li> <li>• Record size of spill (length &amp; width)</li> <li>• Amount spilt, if known (litres)</li> <li>• Has/when the spill was contained</li> <li>• Record photos and/or videos of the spill.</li> </ul> </li> </ul>

Order	Procedures	Safety steps
		<ul style="list-style-type: none"> <li>• Complete an internal incident report</li> <li>• Notify DoT immediately via VHF Channel 16/14 of the spill or calling (08) 9480 9924 (24 hours)</li> <li>• If required complete the Marine Pollution Report (POLREP) (<a href="#">MAC-F-PollutionReport.pdf</a>)</li> </ul>

## 9. Audit and review

This MCEMP is a living document and will be reviewed per the timings listed in Table 12.

Table 12: MCEMP review schedule

Timing	Rationale
Upon receipt of approval conditions	Regulator (DWER) approval conditions obtained will necessitate a comprehensive review of this MCEMP to ensure all relevant commitments are covered within this Plan to ensure compliance.
Prior to the commencement of action	Ensure that the contractor and approval holder implement all commitments accordingly and that no operational details are non-compliant. To confirm the most suitable monitoring locations, trigger levels and monitoring methods are appropriate.
Any time operational activities significantly alter	Operational changes to the project may result in an altered risk profile. Therefore, the MCEMP will require a review to ensure that it remains fit for purpose for altered operational conditions. Any significant change in environmental risk will require the MCEMP to be resubmitted to DWER for endorsement.
Following any significant incidents or non-compliance events	To ensure that the management actions and controls in place are adequate to ensure no re-occurrence of incidents or non-compliance.

## 10. References

- ANV consultants (2024) Onslow Recreational Jetty: Underwater piling noise modelling. Prepared for O2 Marine. 2024.
- ANZG (2018) Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia. Available at [www.waterquality.gov.au/anz-guidelines](http://www.waterquality.gov.au/anz-guidelines). Accessed 24/1/2024.
- Armstrong A, Armstrong AO, Bennett MB, McGregor F, Abrantes KG, Barnett A, Richardson AJ, Townsend KA and Dudgeon CL (2020a) The geographic distribution of reef and oceanic manta rays (*Mobula alfredi* and *Mobula birostris*) in Australian coastal waters. *Journal of Fish Biology*, 96(3):835–840. doi: 10.1111/jfb.14256
- Armstrong A, Armstrong AO, McGregor F, Richardson AJ, Bennett MB, Townsend KA, Hays GC, Keulen MV, Smith J and Dudgeon CL (2020b) Satellite tagging and photographic identification reveal connectivity between two UNESCO world heritage areas for reef manta rays. *Frontiers in Marine Science*. 7(725):1-18. doi:10.3389/fmars.2020.00725.
- Babcock RC, Plagányi ÉE, Condie SA, Westcott DA, Fletcher CS, Bonin MC and Cameron D (2020). Suppressing the next crown-of-thorns outbreak on the Great Barrier Reef. *Coral Reefs*, 39(5), pp.1233-1244.
- Baird (2020) Onslow SWRO: Hydrodynamic Modelling Report. [https://www.epa.wa.gov.au/sites/default/files/Referral\\_Documentation/Appendix%20C\\_Onslow\\_SDP\\_HydrodynamicModellingReport.PDF](https://www.epa.wa.gov.au/sites/default/files/Referral_Documentation/Appendix%20C_Onslow_SDP_HydrodynamicModellingReport.PDF). Accessed 24/1/2024
- Bamford M, Watkins D, Bancroft W, Tischler G and Wahl J (2008). *Migratory shorebirds of the East Asian-Australasian flyway: Population estimates and internationally important sites* (p. 237). Canberra: Wetlands International, Oceania.
- Bartes S and Braccini M (2021) Potential expansion in the spatial distribution of subtropical and temperate west Australian sharks. *Journal of Fish Biology*, 99(4), 1503-1506.
- Bateman RL, Morgan DL, Wueringer BE, McDavitt M and Lear KO (2024) Collaborative methods identify a remote global diversity hotspot of threatened, large-bodied rhino rays. *Aquatic Conservation: Marine and Freshwater Ecosystems*, 34(1), e4047. doi: 10.1002/aqc.4047
- BoM (Bureau of Meteorology) (2024) Climate statistics for Australian locations. [http://www.bom.gov.au/climate/averages/tables/cw\\_005016.shtml](http://www.bom.gov.au/climate/averages/tables/cw_005016.shtml). Accessed 15/3/2024.
- Burbury Consulting (2024a) Landside Concept Plan. The Onslow Recreational Jetty prepared for the Shire of Ashburton. Drawing No. 1872 – SK01
- Burbury Consulting (2024b) Concept Plan and Section. The Onslow Recreational Jetty prepared for the Shire of Ashburton. Drawing No. 1872 – SK02
- Cardno (2017) Coastal Hazard Risk Management & Adaption Plan: CHRMAP For the Onslow Coast. Prepared for the Shire of Ashburton. [https://www.ashburton.wa.gov.au/Profiles/ashburton/Assets/ClientData/Documents/Town\\_Planning/Other\\_Planning\\_Documents/59916801\\_R06\\_0\\_CHRMAP\\_Final\\_.pdf](https://www.ashburton.wa.gov.au/Profiles/ashburton/Assets/ClientData/Documents/Town_Planning/Other_Planning_Documents/59916801_R06_0_CHRMAP_Final_.pdf) Accessed 22/02/2024.

- Chevron (2013) *Wheatstone Project State of the Marine Environment Baseline Report*.
- Chevron (2017) *Wheatstone Project First Post-Development State of the Marine Environment Report*.
- Chin A, Simpfendorfer CA, White WT, Johnson GJ, McAuley RB and Heupel MR (2017) Crossing lines: A multidisciplinary framework for assessing connectivity of hammerhead sharks across jurisdictional boundaries. *Scientific Reports*. 7:46061. doi: 10.1038/srep46061
- Damara (Damara WA Pty Ltd) (2010). Coastal Geomorphology of the Ashburton River Delta and Adjacent Areas. Prepared by Demara WA Pty Ltd for Chevron Australia Ltd. Document Number Report 82-01.  
[https://www.researchgate.net/publication/355034214\\_Coastal\\_Geomorphology\\_of\\_the\\_Ashburton\\_River\\_Delta\\_and\\_Adjacent\\_Areas](https://www.researchgate.net/publication/355034214_Coastal_Geomorphology_of_the_Ashburton_River_Delta_and_Adjacent_Areas). Accessed 6/2/2024.
- DBCA (Department of Biodiversity, Conservation and Attractions) (2020a) Turtle Watching Code of Conduct.  
[https://flatbacks.dbca.wa.gov.au/sites/default/files/20180235%20Turtle%20GUIDE\\_hatchlings%20A4.pdf](https://flatbacks.dbca.wa.gov.au/sites/default/files/20180235%20Turtle%20GUIDE_hatchlings%20A4.pdf).
- DBCA (Department of Biodiversity, Conservation and Attractions) (2020b) Guide to Turtle Watching.  
[https://flatbacks.dbca.wa.gov.au/sites/default/files/20180235%20Turtle%20GUIDE\\_hatchlings%20A4.pdf](https://flatbacks.dbca.wa.gov.au/sites/default/files/20180235%20Turtle%20GUIDE_hatchlings%20A4.pdf).
- DBCA (Department of Biodiversity, Conservation and Attractions) (2024) Marine Wildlife of WA's north-west identification guide. <https://exploreparks.dbca.wa.gov.au/media/4804/download>
- DCCEEW (Department of Climate Change, Energy, the Environment and Water) (2023) National Light Pollution Guidelines for Wildlife. Commonwealth of Australia.
- DCCEEW (2024) Species Profile and Threats Database. <https://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>. Accessed 4 July 2024.
- DES (Department of Environment and Science) (2021) *Queensland Marine Turtle Field Guide*, Queensland Parks and Wildlife Service, Department of Environment and Science. Available from: [Queensland Marine Turtle Field Guide \(www.qld.gov.au\)](http://www.qld.gov.au)
- DEWHA (2007) A Characterisation of the Marine Environment of the North-West Marine Region. <https://parksaustralia.gov.au/marine/pub/scientific-publications/archive/nw-characterisation.pdf>. Accessed 24/1/24
- DHI Water and Environment Pty Ltd (2021) *Vessel-Check | Marine Biofouling Biosecurity Management Tool*. Available at: <https://vessel-check.com/>. Accessed: 02.02.2024.
- DoE (Department of the Environment) (2015). *Wildlife Conservation Plan for Migratory Shorebirds*. Canberra, ACT: Department of the Environment. Available from: <http://www.environment.gov.au/biodiversity/publications/wildlife-conservation-plan-migratory-shorebirds-2016>.
- DoEE (Department of the Environment and Energy) (2017a) Recovery plan for marine turtles in Australia. Commonwealth of Australia 2017.
- DoEE (Department of Energy and the Environment) (2017b) Australian National Guidelines for Whale and Dolphin Watching. Canberra, ACT: Commonwealth of Australia.

- DoEE (Department of Energy and the Environment) (2017c) National Strategy for Reducing Vessel Strike on Cetaceans and other Marine Megafauna. Commonwealth of Australia 2017
- DoT (2017) Onslow Beadon Creek Breakwater Literature and Data Review. Department of Transport, Perth, Western Australia.
- DPIRD (2016) Climate in the Pilbara: Bulletin 4873. <https://library.dpird.wa.gov.au/cgi/viewcontent.cgi?article=1224&context=bulletins>. Accessed 24.01.2024.
- DSEWPaC (Department of Sustainability, Environment, Water, Population and Communities) (2012) *Marine bioregional plan for the North-west Marine region*. Department of Sustainability, Environment, Water, Population and Communities. Prepared under the Environment Protection and Biodiversity Conservation Act 1999. Commonwealth of Australia. Accessed 24/1/2024.
- DWER (2024a) Contaminated Sites Database. [dow.maps.arcgis.com/apps/webappviewer/index.html?id=c2ecb74291ae4da2ac32c441819c6d47](http://dow.maps.arcgis.com/apps/webappviewer/index.html?id=c2ecb74291ae4da2ac32c441819c6d47). Accessed 27/2/2024.
- DWER (2024b) Acid sulfate soil risk map, Pilbara Coastline (DWER-053) <https://catalogue.data.wa.gov.au/dataset/acid-sulfate-soil-risk-map-pilbara-coastline-dwer-053/resource/052e6047-cc52-49d3-b3c7-13e173ffa30c>. Accessed August 2024.
- Eliot I, Gozzard B, Eliot M, Stul T and McCormack G. (2013) Geology, Geomorphology & Vulnerability of the Pilbara Coast, In the Shires of Ashburton, East Pilbara and Roebourne, and the Town of Port Hedland, Western Australia. Damara WA Pty Ltd and Geological Survey of Western Australia, Innaloo, Western Australia.
- ENV Australia (2011) Onslow Townsite Strategy Flora, Vegetation and Fauna Assessment.
- EPA (Environmental Protection Authority) (2016) Environmental Factor Guideline: Marine Fauna. [https://www.epa.wa.gov.au/sites/default/files/Policies\\_and\\_Guidance/Guideline-Marine-Fauna-131216\\_2.pdf](https://www.epa.wa.gov.au/sites/default/files/Policies_and_Guidance/Guideline-Marine-Fauna-131216_2.pdf) Accessed July 2024
- EPA (2021) Statement of environmental principles, factors, objectives and aims of EIA. [Statement of environmental principles, factors, objectives and aims of EIA \(epa.wa.gov.au\)](https://www.epa.wa.gov.au/sites/default/files/Statement_of_environmental_principles_factors_objectives_and_aims_of_EIA.pdf). Accessed July 2024.
- EPA (2024) Environmental Assessment Process. [www.epa.wa.gov.au](https://www.epa.wa.gov.au). Accessed July 2024.
- Jenner KCS, Jenner MN, and McCauley R (2010). A description of Megafauna Distribution and Abundance in the SW Pilbara Using Aerial and Acoustic Surveys- Final Report 2010. Prepared for Chevron and URS (Online).
- Hanf D, Smith J, Hodgson AJ, Kobryn H and Bejder LB (2022) Dolphin distribution and habitat suitability in coastal north Western Australia: Applications of a broadscale, opportunistic dataset. *Frontiers in Marine Science*. 8(733841):1-18. doi: 10.3389/fmars.2021.733841
- Hodson A, Anesio AM, Tranter M, Fountain A, Osborn M, Priscu J, Laybourn-Parry J and Sattler B (2008). Glacial ecosystems. *Ecological monographs*, 78(1), pp.41-67.

- Irvine L and Salgado C (2019) *The distribution and relative abundance of marine mega-fauna, with a focus on humpback whales (Megaptera novaeangliae), in Exmouth Gulf, Western Australia. Humpback Whale Aerial Survey Report, Subsea 7.* Exmouth, WA, Australia.
- Lear K, Fazeldean T, Bateman RL, Inglebrecht, J and Morgan DL (2023). Growth and morphology of Critically Endangered green sawfish *Pristis zijsron* in globally important nursery habitats. *Marine biology*, 170(6), 70.
- MP Rogers & Associates (2020) Onslow Jetty Concept Design Report. Shire of Ashburton. December 2020. Report No R1482 Rev 0.
- MScience (2009). Wheatstone LNG Development: Baseline Water Quality Assessment Report November 2009. Unpublished Report MSA134R3 by MScience Pty Ltd to URS Corporation, Perth, WA. Report No. MSA134R3.
- MScience (2013). Wheatstone LNG Development: Water Quality Around the Proposed Nearshore Outfall. Unpublished Report to Chevron Australia by MScience Pty Ltd, MSA188R1, Perth, WA.
- NAGD (National Assessment Guidelines for Dredging) (2009). Issued under Department of the Environment, Water, Heritage and the Arts.
- NEPC (National Environmental Protection Council) (2013) *National Environment Protection Measure (Assessment of Site Contamination)*. Australian Government.
- O2 Marine (2021a) Benthic Communities and Habitat: Ashburton Infrastructure Project. Prepared for MinRes. Report No. R200328.
- O2 Marine (2021b) Water Quality Desktop Review: Ashburton Infrastructure Project. Prepared for MinRes. Report NO.210065. Accessed 22.02.2024.
- O2 Marine (2024a) Onslow Recreational Jetty Sediment Sampling Report. Prepared for Burbury Consulting. Reference 23ENV236 / T240190.
- O2 Marine (2024b) Onslow Recreational Jetty: Benthic Communities and Habitat Survey Report. Reference 23ENV236 / R24022.
- O2 Marine (2024c) Marine Fauna Desktop and Impact Assessment: Onslow Recreational Jetty Project. Prepared for Burbury and Shire of Ashburton. Report No R240212.
- Place Laboratory (2022) Onslow Promenade: Landscape Concept Design. [https://www.ashburton.wa.gov.au/Profiles/ashburton/Assets/ClientData/2170-PL-01-Landscape\\_Concept\\_Final\\_220919.pdf](https://www.ashburton.wa.gov.au/Profiles/ashburton/Assets/ClientData/2170-PL-01-Landscape_Concept_Final_220919.pdf). Accessed 24/1/2024.
- Semeniuk, V (1993) The Pilbara Coast: a riverine coastal plain in a tropical arid setting, north western Australia. *Sedimentary Geology* 83: 235-256.
- Shire of Ashburton (2024) History. <https://www.ashburton.wa.gov.au/tour/onslow/history.aspx>. Accessed 1/2/2024.
- Standards Australia (2010) Guide to noise and vibration control on construction, demolition and maintenance sites. <https://store.standards.org.au/product/as-2436-2010>
- TSSC (Threatened Species Scientific Committee) (2024) *Listing Advice Sphyrna lewini scalloped hammerhead*. Canberra: Department of Climate Change, Energy, the Environment and Water. Available

from: <https://www.environment.gov.au/biodiversity/threatened/species/pubs/85267-listing-advice-27022024.pdf> In effect under the EPBC Act from 27-Feb-2024.

URS (2010a) Intertidal Habitats of the Onslow Coastline. Wheatstone Project. Prepared on behalf of Chevron Australia. Report 42907466-2163:R1426. [https://australia.chevron.com/-/media/australia/our-businesses/documents/wheatstone\\_draft\\_eis\\_erpmp\\_technical\\_appendices\\_n11\\_to\\_n15\\_an\\_web0F750EAAB7E1.pdf](https://australia.chevron.com/-/media/australia/our-businesses/documents/wheatstone_draft_eis_erpmp_technical_appendices_n11_to_n15_an_web0F750EAAB7E1.pdf) Accessed 22/2/2024.

URS. (2010b) Wheatstone Project Benthic Primary Producer Habitat Loss Assessment, Wheatstone Project EIS/ERMP Appendix N1. [https://australia.chevron.com/-/media/australia/our-businesses/documents/wheatstone\\_draft\\_eis\\_erpmp\\_technical\\_appendices\\_n1\\_and\\_n2\\_web-pdf-sflb.pdf](https://australia.chevron.com/-/media/australia/our-businesses/documents/wheatstone_draft_eis_erpmp_technical_appendices_n1_and_n2_web-pdf-sflb.pdf) Accessed 07/2/2024

Wenziker K, McAlpine K, Apte S, Masini R (2006). Background Quality for Coastal Marine Waters of the North West Shelf, Western Australia, North West Shelf Joint Environmental Management Study Technical Report 18. [https://www.epa.wa.gov.au/sites/default/files/Policies\\_and\\_Guidance/NWSJEMS%20Technical%20Report-NWS%20BG%20WaterQual.pdf](https://www.epa.wa.gov.au/sites/default/files/Policies_and_Guidance/NWSJEMS%20Technical%20Report-NWS%20BG%20WaterQual.pdf). Accessed 22/2/2024.

WEPL (Western Environmental Pty Ltd) (2022) Onslow Fauna, Flora and Vegetation Survey Onslow Hedland Plan. Prepared for the Shire of Ashburton. Report NO A22.052-RPT-FVSR\_A.

360 Environmental (2021) Onslow Township Village Environmental Assessment Report.

## Appendix A. Marine Piling Provisions

The following provisions are to be implemented when underwater noise is a risk (i.e. piling in water of depths more than 0.2 m).

These marine piling provisions have been developed based upon general piling operations and may need to be revised following confirmation of piling contractor and hydraulic hammer specifications.

### Appendix A.1. Dedicated Marine Fauna Observer

#### A.1.1 Training and qualifications

Two Dedicated Marine Fauna Observer (MFOs) will be used prior to and throughout marine piling works. The dedicated MFOs will be suitably trained and qualified, adhering to the requirement of the Wildlife Conservation (Closed Season Marine Mammals) Notice 1998. MFOs must demonstrate a knowledge of marine wildlife species in the North-west marine bio region, including Threatened and Migratory Species listed under the EPBC Act and BC Act and priority listing, including morphological and behavioural characteristics. The dedicated MFOs will have demonstrated knowledge and experience in marine fauna species observation, distance estimation and reporting. They will not have other duties while engaging in visual observations.

Evidence of personnel suitability will be kept on record through staff curriculum vitae, training certificates and in-field record keeping, which may be used in future audits. Information will include:

- MFO names and contact details.
- Details of MFOs training (including provider and course dates)
- Previous experience as MFOs on underwater piling works.
- Other MFO experience.

#### A.1.2 Shifts

Dedicated MFO shifts will be set prior to field mobilisation to prevent observer fatigue, which can reduce the quality of observation and data recording. From a health and safety perspective, having coordinated shifts will ensure that observers have amenity breaks and reduced weather exposure.

#### A.1.3 Platform

The dedicated MFOs will be on a suitably elevated platform that provides appropriate unimpeded vantage of the Management Zones and with 360-degree views around the noise source. This point may need to shift pending the location of the noise source on any given day (i.e. site construction activities).

#### A.1.4 Recording and Reporting

##### A.1.4.1 Field log

The dedicated MFOs will use a pre-designed datasheet to record observer effort, fauna observation and mitigation measures. All records will be sent to DBCA and DCCEE. Field logs will include:

- Location, date and start time of observations
- Name of the two Dedicated MFOs on shift
- Start/finish time of piling activities
- Other marine fauna observations within 1,500 m of piling operations
- Fauna behaviours, in particular any behaviours that could be attributed to piling activities
- Location, times and reason when observations were hampered by poor sighting conditions
- Location and time of pre-start, soft-start, and shut-down procedures
- Location, time and distance of any fauna sighting and mitigation applied
- Observed cetacean in a format consistent with the National Cetacean Sighting and Stranding's Database
- Adherence to management responses in relation to dead or injured wildlife.

### A.1.5 Reportable incidents

All employees and contractors shall immediately report all environmental incidents as a non-conformance, whether these are reportable non-reportable incidents (i.e. performance indicators are not met, or management actions are not followed to the Contractor site supervisor who will investigate the incident). It is a requirement that all incidents follow the Contractors' Incident Management Procedure to be approved by the Shire of Ashburton. The employee is to report the incident immediately to the site supervisor. In every case the site supervisor is to document the incident using the Incident Management System.

Reportable incidences are injury to conservation significant fauna or listed species as a result of the Proposal activities, or general observations of injured wildlife not related to proposal activities, to be reported to the Contractor. Reportable incidences are injury to conservation significant fauna or listed due to the Project activities or general observations of injured wildlife not related to the Project activities are to be reported to the Contractor PM. The Contractor PM is to notify the Shire of Ashburton PM who will notify DBCA within 24 hours and other regulators as required under Project conditions (See Appendix D).

### A.1.6 Completion Report

On completion of the construction activities, a full report will be submitted which will allow for compliance auditing. The report will include a full summary report of operations, sightings and mitigation actions impletion for the duration of the campaign. On completion of the program, the Shire of Ashburton will provide a full report to DBCA.

## Appendix A.2. Marine Piling Provisions

### A.2.1 Management Zones

Two Management Zones, that will be monitored by two Dedicated MFOs during marine piling works, have been set for target marine fauna groups, namely:

- Observation Zones

- Exclusion Zones.

The management zones have been informed by results of the underwater noise modelling (ANV Consultants 2024) These management zones are presented in Table A1 and Figure A1. These management zones will be monitored by two Dedicated MFOs

The zones have been based upon the recommendations within ANV Consulting however, they these have been informed with observation zones have been determined based on the modelled Temporary Threshold Shift (TTS) onset distance for marine fauna for 100 pulses and exclusion zones are based on the modelled Permanent Threshold Shift (PTS) onset distance for marine fauna for 100 pulses (ANV Consultants 2024) for the worst-case scenario (high-tide, end of jetty). The adopted management zones are broader than the modelled outputs, based on the inherent variability between underwater noise modelling and empirical values. Further, these zones are intended to act as the key mitigation measure for protecting marine fauna and as such are designed to be appropriate to prevent TTS and PTS impacts on marine fauna (i.e. not define the outer boundaries of a threshold exceedance distance per se), therefore, to achieve this outcome, the zones need to be broader than the modelled outputs. These zones are indicative and based upon the limited engineering information available at the time of modelling and may be subject to change.

Table A1: Proposed observation and exclusion zones distances (based on ANV Consultants 2024) based on 100 pulses

Marine Fauna Group	PTS Onset (m)	Distance	TTS Onset (m)	Distance	Observation Zone (m)	Exclusion Zone (m)
Whales*	90		750		1,500	500
Dolphins	<10		35		500	150
Dugongs	<10		48		500	150
Turtles**	10		60		500	200
Sea snakes	<10		85		500	200

*Note: the TTS and PTS distances used to inform the Observation and Exclusions Zones are based upon the 'worst-case' high tide scenarios to ensure a precautionary approach.*

*\*Noting timing of piling will avoid humpback whale migration, therefore, it is not expected that whales would not be present.*

*\*\*Note: sharks and manta rays have not been included in the marine fauna management zones as these are difficult to visually monitor from above sea level.*

Elasmobranchs are not included in the marine observation procedures because they are not surface breathers and often benthic feeders, and therefore are unlikely to be observed. The species are unlikely to be observed at the surface and therefore observations are an ineffective mitigation measure. The noise modelling results indicate that fish species are unlikely to experience mortality or potential mortal injury from marine piling with an onset threshold distance of <10 m and TTS onset distance of 450 m (ANV Consultants).

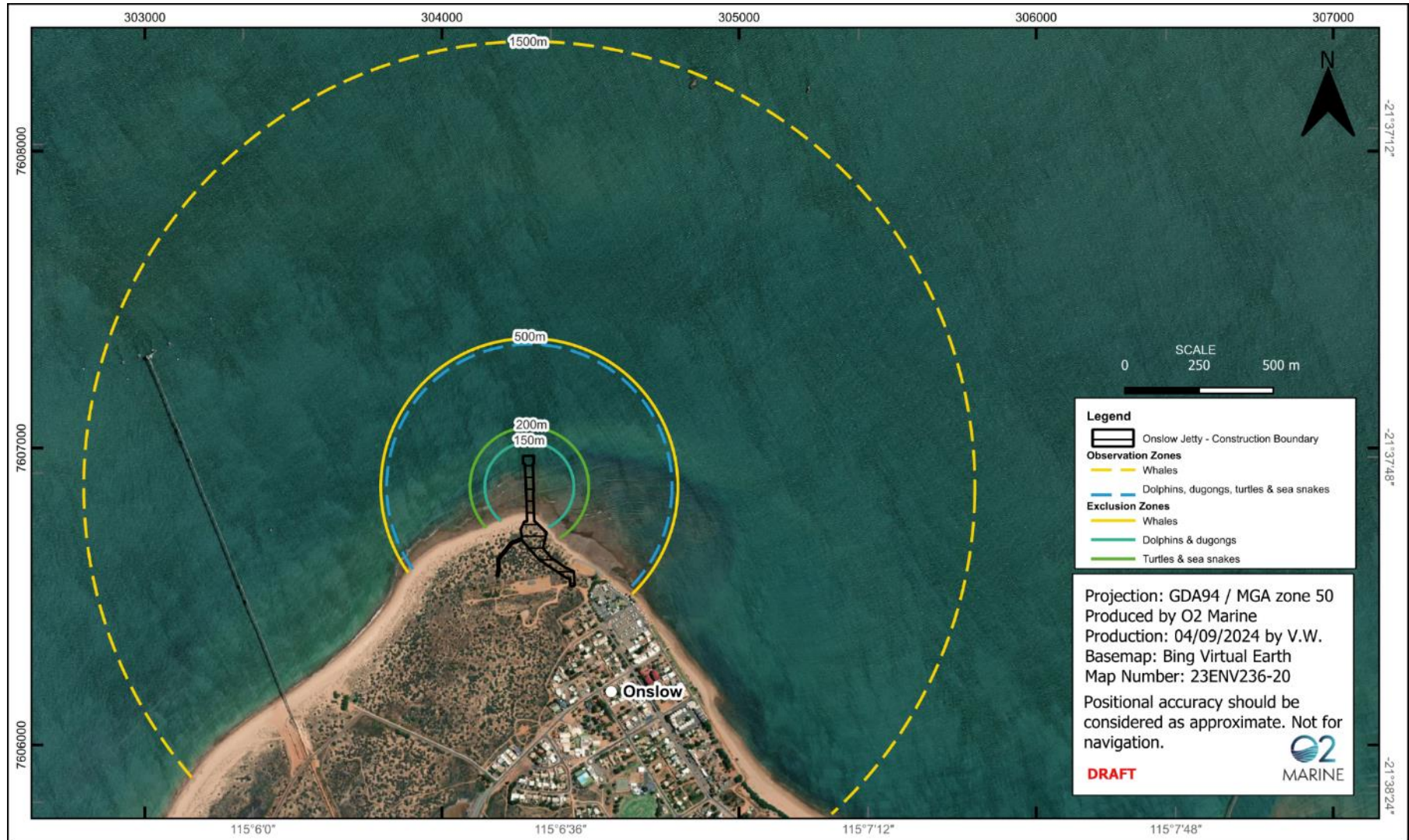


Figure A1:: Marine fauna management zones for marine piling

### A.2.2 Pre-start

Prior to marine piling works each day and for each pile the dedicated MFOs will commence continuous visual observation within the management zones for 30-minutes. MFOs must have sight lines of the piling Observation Zone, enabling them to effectively manage the disturbance distance and species management zones. MFOs in conjunction with the piling contractors and PM will carry out the following duties and comply with the following protocols in regard to pre-start procedures:

- If target marine fauna is observed within the management zone, marine piling operations shall be delayed until target marine fauna have been observed exiting the Observation Zone or have not been seen for 30-minutes
- If target marine fauna is not observed within either the Exclusion or Observation Zones within 30-minutes, marine piling can commence with soft-start procedures.

### A.2.3 Soft-Start piling

Soft-start procedures is required for all marine pile installation (except for piles that require dynamic load testing). Soft-start involves the commencement of impact hammer piling at low energy, where the hammer energy gradually increases but remains below 90% capacity over a continuous 30-minute period. This procedure may alert marine fauna to the presence of the marine piling activity and enable them to move away to distances where injury is unlikely. The dedicated MFOs will continuously monitor the management zones during soft-start procedures. Full energy may only be used after the 30-minute soft-start period, if no marine fauna are sighted within the Exclusion Zone.

- If target marine fauna are observed in the Observation Zone, soft-start procedures will continue and the MFO will continue to monitor the marine fauna
- If target marine fauna are observed in the Exclusion zone, soft-start procedures will cease until the observed target marine fauna leaves the Exclusion Zone target or have not been seen for 30-minutes, on completion of the 30-minutes duration and no animal has been observed in the exclusion zone soft-start procedures will recommence
- If it is evident that the marine fauna are in distress then marine piling operations shall cease until marine fauna have exited the management zones or have not been seen for 30-minutes. Once target marine fauna have exited the management zone, soft start marine piling may recommence.

### A.2.4 Normal Piling

Where target marine fauna are not observed in Management Zones during soft-start procedures then normal marine piling can commence. Normal piling involves commencement of full energy piling. The dedicated MFOs will continually monitor the management zones during normal marine piling. If marine fauna is sighted, then the shut-down procedures will be implemented.

### A.2.5 Shut-down Procedures

The dedicated MFOs will maintain continuous observations during marine piling. They will notify the Project Manager/Piling contractor if target marine fauna is sighted within the corresponding Observation or Exclusion Zone. Where marine fauna is observed within the Observation Zone (but outside the Exclusion Zone) during marine piling activities (including Soft-start procedures), then the following action shall be taken:

- If target marine fauna is sighted and is in distress then marine piling activities shall be suspended within two minutes of the sighting, or as soon as safely possible
- If target marine fauna is not showing signs of distress and remains within the Observation Zones (but outside the Exclusion Zones), marine piling activities will continue and the MFO will continue to monitor the target marine fauna
- Marine piling works will cease if target marine fauna enters the Exclusion Zone.

Where target marine fauna is observed within the Exclusion Zone during marine piling activities (including Soft-start procedures), then the following actions will be taken:

- Marine piling works will cease when target marine fauna is identified within, or about to enter, the Exclusion Zone
- Marine piling activities that have been suspended must not recommence until the target marine fauna has exited the corresponding Exclusion Zone and Observation Zone of its own accord or has not been seen by the MFO within these zones for a period of 30-minutes
- Once able to resume, marine piling will recommence following soft-start procedures.

### A.2.6 Low-visibility conditions

During periods of low visibility (i.e. where a distance of 2 km cannot be clearly viewed), then marine piling operations may commence with soft-start procedures provided that during the preceding 24-hour period:

- There have not been three or more circumstances where marine fauna have been observed which resulted in ceasing of marine piling operations
- There have not been three or more whale instigated shut-down situations
- A 2-hour period of continual observations was undertaken in good visibility within the 24-hour period prior to proposed marine piling and no marine fauna sighted
- Marine piling will be restricted to daylight hours only, these hours will vary depending on the time of year piling is undertaken (unless in the case of a safety/emergency)
- If marine fauna are sighted, the shut-down procedures will apply.

### A.2.7 Operational pauses

In the instance where engineering conditions require surveying in-between pile strikes during soft-start or normal piling procedures, then the procedures outlined below will apply.

During soft-start these operational pauses are exclusive of the 30-minute continuous soft-start time period and in these instances the following procedures are to be followed:

- 30-minute period to re-start following an extended break (>5 mins)
- Following stop/break in marine piling, soft-start piling must recommence with a hammer energy that is lower than when work stopped and recommence with a small hit 30 seconds before restart
- If a 30-minute period of soft-start (marine piling) is unable to be achieved because the pile has reached the required depth before the continuous 30-minute soft-start period has elapsed, the piling contractor must provide proof to the Client and the dedicate MFO that during this period the hammer energy did not exceed the 90% full energy capacity

- If testing of pile is required and the 30-minute soft-start has not been achieved, then this testing can only occur if no marine fauna have been sighted within the management zone for 30-minutes.

During normal marine piling these operational pauses are not considered a stop work period if there has not been a break >5 minutes. If a break greater than 5 minutes than soft-start procedures apply. If <5 minutes piling can recommence following the procedures below:

- Marine piling must recommence with a hammer energy that is lower than when work stopped and recommence with a small hit 30 seconds before restart
- If testing of pile is required and the 30-minute soft-start has not been achieved, then this testing can only occur if no marine fauna have been sighted within the management zone for 30-minutes.

## Appendix B. Shore/Landside Piling Provisions

The following provisions are to be implemented when piling is occurring along above water (landside piling, generally water lower than 0.2 m). If piling is occurring within the tidal zone and the water is rising, marine piling provisions will need to be followed once the water is above 0.2 m.

Construction in the landside and shore areas are to be limited to daylight hours only, to reduce noise disturbance during roosting periods. Where possible piling of the shore/landside section of the jetty should aim to occur at mid-tide as migratory shorebirds are most susceptible to disturbance when foraging and during daytime roosting (DoE 2015). Low-tide time periods represent the period where shorebirds are most likely to be foraging along the intertidal zone. During high-tide shorebirds are more likely to be roosting.

Piling should also only occur during daylight hours and when visibility is not impeded within the observation zones around the piling works (i.e. during storms, heavy rainfall or intense fog).

### B.1. Pre-start

Prior to landside piling works each day and for each pile the trained MFOs (See Appendix C) will commence continuous visual observations along the shoreline, ensuring no fauna are located on the shore or the tidal zone. The MFOs must ensure that no turtles or migratory shorebirds are within 100 m distance of the landside piling in order to prevent noise pollution impacts.

If no fauna are sighted for 30-minutes within the 100 m distance, landside piling can commence.

### B.2. Normal piling

Landside piling must commence below 90% hydraulic hammer energy and begin with small strikes/10 hits of the hammer to alert shorebirds, and within the engineering constraints of the hammer.

During landside piling operations, the MFOs are to maintain continuous watch for marine fauna (shorebirds and turtles) that may be present in the intertidal zone and along the shoreline. If shorebirds and/or turtles are sighted within 100 m of the landside piling operations, then shut-down procedures will apply.

### B.3. Shut-down procedures

If shorebirds or turtles are sighted within 100 m of landside piling, then landside piling will be suspended as soon as safe to do so/operationally achievable. Landside piling activities that have been suspended must not recommence until the target marine fauna has exited the 100 m boundary. Once the fauna has left the zone and not re-entered (or another individual entered) for 30 minutes, then piling can recommence at a lower energy level when stopped and work up to the previous noise limit.

### B.4. Noise monitoring

All works will be carried out in accordance with the town of Onslow's requirements, which references the *Environmental Protection (Noise) Regulations 1997*.

Onslow Town Beach is regionally well-known as a shorebird and wader observation site and therefore it is considered that the species are more likely to use this area as opposed to the sites proposed for the Project. To ensure consistency with these Noise Regulations and reduce impacts to migratory shorebirds, air noise emissions will be measured during landside piling.

Noise levels to be monitored at two locations:

1. Sensitive receptor for human hearing (i.e. town/residential location)
2. Onslow Town Beach or Beadon Point where the tidal flat areas are regional hotspots for shorebird and wader observations.

Specifications of this monitoring will be developed prior to construction, following confirmed hydraulic hammer specifications and engineering designs.

## Appendix C. Trained Marine Fauna Observers

### Appendix C.1. Trained MFO

Trained MFOs are crew members trained in marine fauna species observations and mitigation measures, consistent with the Project environmental management plans. Trained MFOs will be on duty on Project vessels during construction and during landside piling construction works. There will be always at least one Trained MFO on duty during vessel transits.

All vessel crews engaged for the marine construction phase of the Project will attend a minimum of one marine fauna induction to become familiar with the range of conservation significant marine fauna that could be present in the Proposal area and the risks the piling may present to this fauna. All commitments made by the Contractor to manage construction activities with conservation significant marine fauna will be included in the induction. The content of the induction will be updated as required to ensure it remains current and reflects the marine fauna being observed in the Proposal area and any vessel interactions with marine fauna that has occurred. This marine fauna induction can be combined with other crew inductions that may be required.

Evidence of personnel and training certificates will be kept on record which may be used in future audits. Information will include:

- MFO name and contact details
- Details of MFO training.

## Appendix C.2. Vessel approach distances

The distances have considered the Australian National Guidelines for Whale and Dolphin Watching (DoEE 2017b) and the National Strategy for Reducing Vessel Strike on Cetaceans and other Marine Megafauna (DoEE 2017c) (Table A2).

The speed limit should be less than 8 kn within the Project DE. Caution zones cannot be entered into by a vessel if the animal is injured, stranded, entangled, or distressed or if a single calf or pod of calves are present. No more than three vessels are permitted to be in a caution zone at the same time. Should a travelling dolphin enter the no approach zone, including with an attempt to ‘bow ride’, the vessel shall either maintain its course and speed, or maintain its course and gradually slow down.

Table A2: Marine fauna - vessel approach distances (DoEE 2017b)

Marine fauna group	Vessel speed	Caution zone	No approach zone (metres)	Distress/disturbance
Adult whales	No faster than 6 knots within 300 m	300	100 m to the side of the whale 300 m in front or to rear of the whale	Withdraw from caution zone at speed less than 6 knots
Whale calf* present	No faster than 6 knots within 300 m	-	300 m	Withdraw from No approach zone at speed less than 6 knots
Adult dolphins	No faster than 6 knots within 150 m, with the exception of animals bow-riding	150	50 m to the side of the dolphin 150 m in front or to rear of the dolphin with the exception of animals bow-riding	Withdraw from caution zone at speed less than 6 knots
Dolphin calf* present	No faster than 6 knots within 150 m, with the exception of animals bow-riding	-	150 m	Withdraw from No approach zone at speed less than 6 knots
Dugong	No faster than 6 knots within 100 m	300	100 m	Withdraw from caution zone at speed less than 6 knots
Turtle	No faster than 6 knots within 150 m	300	150 m	Withdraw from caution zone at speed less than 6 knots

*\*A calf is defined as half the length of the mother/nearest adult*

### C.2.1. Platform

Trained MFO observations will be undertaken from a suitably elevated point that provides appropriate vantage of cautions zones during vessel transit and provides unimpeded views.

### C.2.2. Recording and reporting

Trained MFOs onboard vessels are to maintain detailed daily records of all sightings of target marine fauna and other notable observations. Trained MFOs will use a pre-designed datasheet to record

observer effort, fauna observations and mitigation measures, tailored to vessel operations. All records will be sent to DBCA and DCCEEW (Ports and Marine Section). Field logs will include:

- Location, date and start time of observations
- Name of MFO involved in the observations
- Finish time of MFO shift on transiting vessel
- Location, times and distance of any fauna sightings including species where possible
- Location, times and reason of when observation were hampered by poor sighting conditions
- Management responses including any vessel response to avoid marine fauna, and dead and injured wildlife
- Observed cetacean in a format consistent with the National Cetacean Sighting and Stranding's Database.

Reportable incidences are injury to conservation significant fauna or listed due to the Project activities or general observations of injured wildlife not related to the Project activities are to be reported to the Contractor PM. The Contractor PM is to notify the Shire of Ashburton PM who will notify DBCA within 24 hours and other regulators as required under Project conditions.

### Appendix C.3. Turtle nesting procedures

Avoidance of disturbance to turtles, nests and eggs will be conducted following the advice given in the following documentation:

- Marine wildlife of WA's north-west identification guide (DBCA 2024)
- Turtle Watching Code of Conduct (DBCA 2020a)
- Guide to Turtle Watching (DBCA 2020b)
- National Light Pollution Guidelines for Wildlife (DCCEEW 2023).

The Western Australian Department of Biodiversity, Conservation and Attractions (DBCA) provide a guide to turtle watching and a turtle watching code of conduct on their website (DBCA 2020b). To avoid direct disturbance including stepping or driving on nests or drilling into nests, the following actions will be undertaken in accordance with the guide:

- Remaining  $\geq 15$  m from a turtle that is digging or emerging from the ocean to a nesting site, or returning back to the ocean
- Remaining  $\geq 2$  m away from a turtle excavating an egg chamber (observations only, no flash photography and no sampling or drilling activities to be undertaken)
- Remaining  $\geq 3$  m away from a turtle covering a nest (observations only, no flash photography and no sampling or drilling activities to be undertaken)
- Staying below the dunes at all times to avoid trampling on nests and emerging hatchlings.

Further avoidance actions to be implemented will include:

- A trained MFO will be walking in front of all machinery including vehicles when moving, and where possible driving on hard sections of beach remaining  $\geq 15$  m away from any turtles spotted
- Limiting beach driving to development envelope only.

If no turtles are observed, turtle tracks may also be identified and disturbance to these should also be avoided. Examples of turtle tracks are shown below in Figure A2.

Trained MFOs will also ensure no turtles are within 100 m distance of the shoreline piling or of landside construction equipment/vehicles in order to prevent noise pollution indirectly impacting turtles.

## Appendix D. Injured marine fauna

Reportable incidences are injury to conservation significant fauna or listed species as a result of the Proposal activities or general observations of injured wildlife no related to the Proposal activities, are to be reported immediately to the Contractor Project Manager (PM). The PM is to notify the Shire of Ashburton who will notify DBCA and the Wildcare helpline (Table D1) within 24 hours.

All environmental incidents are to be reports by the Shire of Ashburton to the Department of Climate Change, Energy, the Environment and Water (DCCEEW) within 72 hours of being made aware.

Table D1: Contact details for injured marine fauna

Wildlife	Organisation	Contact details
Sick or injured wildlife; snake removal	WILDCARE Helpline (24 hr)	(08) 9474 9055
Fish deaths	Fish Watch (24 hr hotline)	1800 815 507
Animal or plant deaths obviously caused by pollution	DWER (24 hr Pollution Watch Hotline)	1300 784 784

## Marine Turtle Track Identification Key



### Alternating Stroke Flipper marks alternate

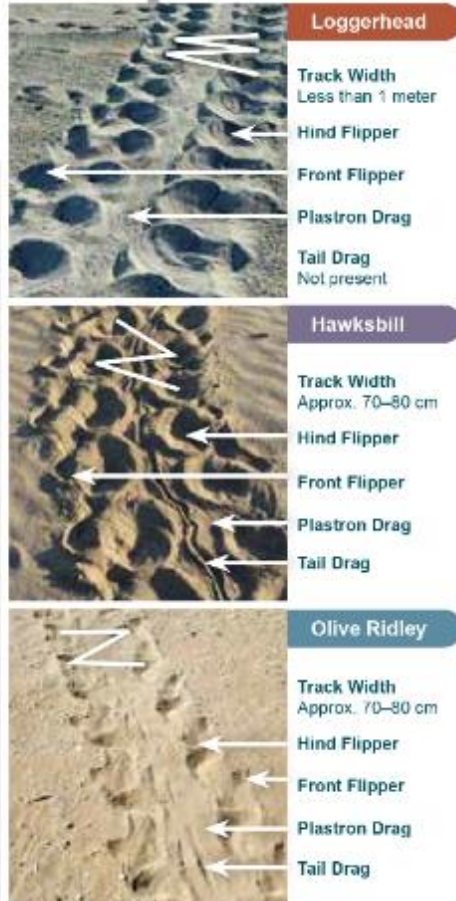


#### Track Features

Early morning monitoring is best as tracks will deteriorate over time. The clarity of tracks can be affected by flipper damage, terrain, sand moisture, tides, wind and weather. Look for several key identifying features, along different sections of track.

The key track identification features are:

- Stroke Style
- Track Width
- Hind Flipper Marks
- Front Flipper Marks
- Plastron Drag
- Tail Drag



### Breast Stroke Flipper marks side by side



#### Track Direction

Clues to determine track direction:  
Turtles push sand backwards, the higher sand mound is at the back.  
If track overlaps, the top track is the returning track.  
Sand is always thrown back over the emerging track when digging.

#### Measuring Width

Measure from outer edge of track. This may be the front or rear flipper, depending on species.

Figure A2: Marine turtle track identification key (DES 2021)