RioTinto

# Cape Lambert Maintenance Dredging Program

6 July 2021

## Dredging Environmental Management Plan

Prepared for Robe River Mining Co. Pty. Ltd

From

MScience Pty Ltd

Western Australia

mScience marine research

# Cape Lambert Maintenance Dredging Program

## Dredging Environmental Management Plan

**Document Information**

| | |
|---|---|
| REPORT NO. | MSA294R03 |
| DATE | July 6, 2021 |
| CLIENT | Robe River Mining Co. Pty. Ltd |
| USAGE | This Dredging Environmental Management Plan is provided for the use of Robe River Mining Co. Pty. Ltd. to meet the requirements of the Commonwealth Department of Agriculture, Water and the Environment to support the Cape Lambert maintenance dredging program under the 2009 National Assessment Guidelines for Dredging. |
| KEYWORDS | Dredging, environment, monitoring, Cape Lambert |
| CITATION | MScience 2021. Cape Lambert Maintenance Dredging Program. Dredging Environmental Management Plan. Unpublished report MSA294R02 to Robe River Mining Co. Pty. Ltd, Perth Western Australia, pp55 |

**Version History**

| Version/Date | Issued as | Author | Approved |
|---|---|---|---|
| 1/22.05.2020 | Draft for client review of Management & Monitoring | IJP | JAS |
| 2/17.12.2020 | Client review | IJP | JAS |
| 3/22.02.2021 | Client comments addressed and monitoring thresholds updated | IJP | JAS |
| 4/26.02.2021 | Client Final | IJP | JAS |
| 5/06.07.2021 | Final – DAWE conditions | IJP | JAS |

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# GLOSSARY

| Acronym | Definition |
|---|---|
| AIS | Automatic Identification System (for shipping) |
| AMSA | Australian Marine Safety Authority |
| ANZG | Australian and New Zealand Guidelines for Fresh and Marine Water Quality |
| CLA | Cape Lambert Port A |
| CLB | Cape Lambert Port B |
| Cth | Commonwealth of Australia |
| DAWE | Australian Department of Agriculture, Water and the Environment |
| DEMP | Dredging Environmental Management Plan |
| DoT | Western Australian Department of Transport |
| DPIRD | Western Australian Department of Primary Industry and Regional Development |
| EPA | Western Australian Environmental Protection Authority |
| GPS | Geographical Positioning System |
| IMO | International Maritime Organisation |
| $m^3$ | Cubic metres |
| MARPOL | International Convention for the Prevention of Pollution from Shipping |
| MODIS | Moderate Resolution Imaging Spectroradiometer |
| NAGD | National Assessment Guidelines for Dredging |
| POLREP | Pollution Report |
| The Proponent | Robe River Mining Co. Pty. Ltd |
| The Project | All activities undertaken as part of the maintenance dredging campaigns |
| RTIO | Rio Tinto Iron Ore (Rio Tinto is the parent company of the Proponent) |
| SDP | Sea Dumping Permit |
| SG | Spoil Ground |
| SOPEP | Ship Oil Pollution Emergency Plan |
| QA/QC | Quality Assurance/Quality Control |
| WAMSI | Western Australian Marine Science Institute |

# 1 INTRODUCTION

## 1.1 Project Background

Robe River Mining Co. Pty. Ltd. (the Proponent) plans to undertake maintenance dredging (the Project) within the berth pockets, tug pen basins, swing basins and approach/departure channels associated with its Cape Lambert Port A (CLA) and Cape Lambert Port B (CLB) facilities, located in the Pilbara Region of Western Australia (Figure 1-1). The dredging will involve the disposal of spoil within one or more of the approved Spoil Grounds 1, 2 and 3 (Figure 1-1). Part of Spoil Ground 1 and Spoil Grounds 2 and 3 are located in the Multiple Use Zone (IUCN VI) of the Dampier Marine Park.

This document describes the best practice environmental management of maintenance dredging and any environmental conditions imposed on the project by regulators.

## 1.2 Regulations and Guidelines

This Dredging Environmental Management Plan (DEMP) has been prepared to ensure compliance with the following legislation, including contingent regulations and advisories:

- *Environment Protection (Sea Dumping) Act 1981 (Cth)*
- *Environment Protection and Biodiversity Conservation Act 1999 (Cth)*
- *Environmental Protection Act 1986 (WA)*

Components of the DEMP are based on guidance obtained from the following sources

- National Assessment Guidelines for Dredging (NAGD) (Commonwealth of Australia 2009)
- Western Australian Environmental Protection Authority Technical Guidance – Environmental Impact Assessment of Marine Dredging Proposals (WAEPA 2016);
- Long Term Monitoring and Management Plan Requirements for 10-year Permits to Dump Maintenance Dredge Material at Sea (Australian Government 2012);
- Current recommendations for monitoring and impact assessments promulgated by the Western Australian Marine Science Institution (WAMSI) Dredging Science Node;
- Australian National Guidelines for Interactions with Whales and Dolphins (Commonwealth of Australia 2017a);
- Recovery Plan for Marine Turtles in Australia (Commonwealth of Australia 2017b); and
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG 2018).

## 1.3 Objectives and Scope

The objectives of the DEMP are to manage maintenance dredging at Cape Lambert Ports A and B in a way that ensures the safe and efficient operation of the Port while minimising impacts to the local environmental, social and cultural values, by

- Providing a framework for the management and monitoring of maintenance dredging campaigns at Cape Lambert over the next 5 years;
- Making consultation and monitoring arrangements publicly available; and
- Providing a framework to assist continual improvement practices in maintenance dredging at Cape Lambert.

## 1.4 Context and Review

This plan demonstrates commitment to the management of maintenance dredging and placement activities for the five-year life of the SDP (SD2021/4007). The plan is complemented by existing marine environmental management arrangements at Cape Lambert, including:

- Cape Lambert Operations Marine Environmental Quality Management Plan (Rio Tinto 2011)
- Cape Lambert Port B Development Marine Turtle Management Plan (Rio Tinto 2013)
- Rio Tinto Ports Oil Spill Contingency Plan (revision in preparation) (Rio Tinto 2020)

This DEMP will be reviewed and updated if necessary, in response to one or more of the following:

- Completion of annual maintenance dredging campaigns;
- If monitoring demonstrates substantially different impacts than were predicted; and
- If an incident occurs that poses a significant risk of impact.

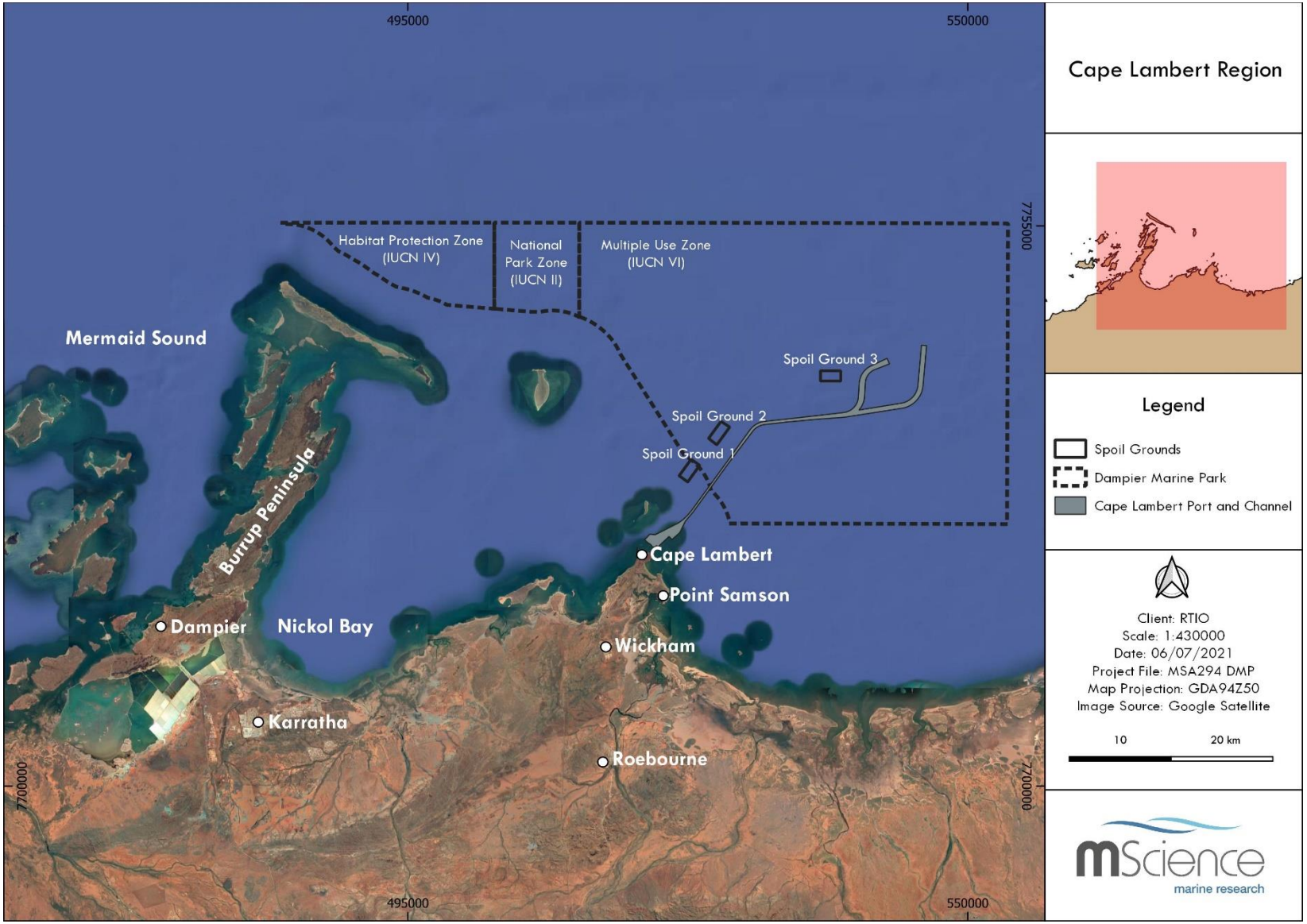


*Figure 1-1 Cape Lambert region*

## 1.5 Proposed Dredging and Disposal

Maintenance dredging campaigns are required to return the Proponent's berths, tug pens, swing basins and channel areas to their design depths following ingress and redistribution of sediments occurring since the previous dredging campaign. Table 1-1 details the design depths of the proposed dredge areas.

During the life of the SDP (five years), maintenance dredging campaigns may occur in some, or all, of the Proponent's dredge design areas depicted in Figure 1-2, these areas include:

- CLA berths and surrounding areas
- CLB berths and surrounding areas
- CLA tug pens and approach channel
- CLB tug pens and approach channel
- Swing Basins adjacent to both CLA and CLB
- Departure channel

It is anticipated that up to 500,000 $m^3$ of dredge material may require disposal over the life of the permit. This volume has been calculated based on an average annual disposal volume of approximately 100,000 $m^3$ which has been estimated using best available survey information and historic accumulation rates. Annual disposal volumes will be heavily influenced by cyclone activity and deposition of sediments in the area.

Dredge material will be disposed of at one or more of the existing approved Spoil Grounds 1, 2 or 3 (Figure 1-1).

Maintenance dredging may be conducted as frequently as annually. Actual dredged volumes per campaign will vary depending on the amount of accumulated material within the proposed dredge areas. The actual volumes to be dredged will be determined from pre and post dredge surveys, but the dredge material as placed and measured at the nominated spoil grounds during the combination of all dredge campaigns over the 5-year period will not exceed the total volume proposed for marine disposal (500,000 $m^3$).

Each dredging program is expected to last approximately one to four weeks and is planned to be conducted in conjunction with other dredging programs in the Region. The exact timing and duration of the works will depend on the availability and size/capacity of the dredge offered by the preferred contractor.

It is anticipated that a single large trailer suction hopper dredge (TSHD) will be utilised for each routine maintenance dredging campaign of the berths, swing basins and channels. A large backhoe, or back actor dredge (BHD), and associated hopper barge, may be utilised for dredging of areas not suited to a TSHD.

Once the TSHD or hopper barge (the vessel) is filled with dredged material, the vessel would then relocate to the spoil ground for marine disposal. Each load of dredged material will be dumped so that the material is distributed evenly over the area of the disposal site in the long term. The volume placed as measured at the disposal site will be logged. Prior to dumping the vessel will establish by GPS that it is inside the disposal site before commencing dumping.

Upon entering the designated area for disposal, the vessel would slow whilst material is being placed. A minimum steaming speed is required to maximise agitation within the hopper to clear the dredged material, which would not otherwise be affected if the dredge were to remain stationary. Once the vessel has been emptied and cleared of dredged material the vessel would return to the dredge site to collect the next load.

Post dredging bed levelling operations may be necessary to remove any peaks or troughs generated from dredging operations to enable safe passage. Bed levelling produces minimal to no plume when shifting previously dredged material and is not expected to result in the release of contaminants in excess of the

NAGD guidelines, given sediment characterisation in the port area has shown that the sediments are suitable for offshore disposal (MScience 2020a).

*Table 1-1 Design depths of proposed dredge areas*

| Area | Figure 1-2 Code | Design Depth (m LAT) |
|---|---|---|
| CLA Berth 1 | CLA | -19.4 |
| CLA Berth 2 | | -19.4 |
| CLA Berth 3 | | -19.4 |
| CLA Berth 4 | | -19.4 |
| CLB Berth 5 | CLB | -20.0 |
| CLB Berth 6 | | -20.0 |
| CLB Berth 7 | | -20.0 |
| CLB Berth 8 | | -20.0 |
| CLA Channel | CH | -15.6 |
| CLB Channel (adjacent to Berth 6 & 8) | | -15.6 |
| CLB Channel (excluding adjacent Berth 6 & 8 | | -15.6 |
| Swing Basin West | SBW | -10.0 |
| Swing Basin East | SBE | -10.0 |
| Departure Channel | CH | -15.6 |
| Outer North Channel | | -15.6 |
| Outer South Channel | | -15.8 |
| Tug Pen CLA Approach Channel | TA | -6.0 |
| Tug Pen CLB Approach Channel | | -6.8 |
| Tug Pen CLA Harbour Basin | TB | -6.5 |
| Tug Pen CLB Harbour Basin | | -6.8 |

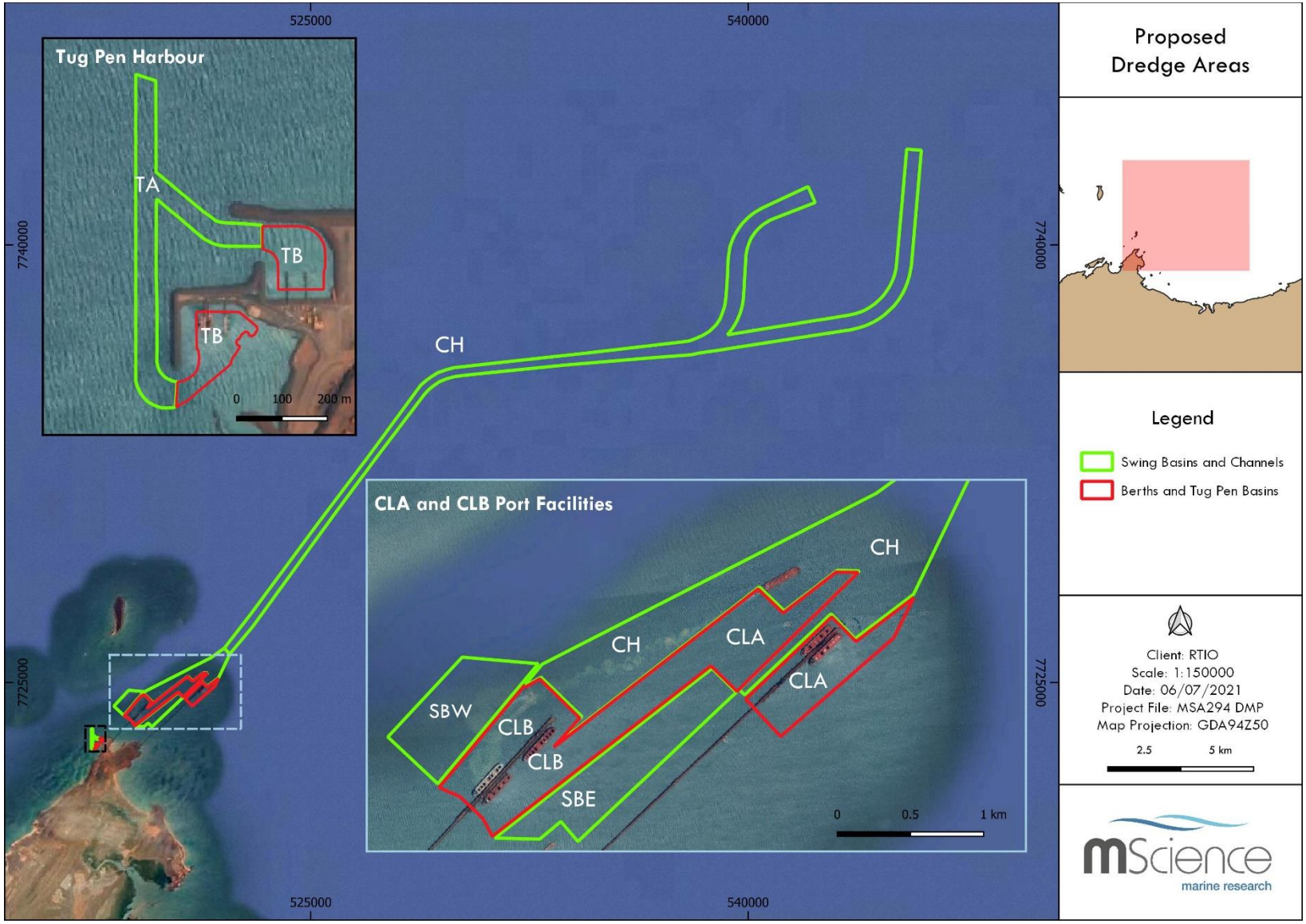


*Figure 1-2 Proposed dredge areas*

## 1.6 Spoil Grounds

Spoil disposal will occur within one or more of the approved Spoil Grounds 1, 2 and/or 3 (spoil ground coordinates are detailed in Table 1-2). See Figure 1-3 for spoil ground locations and bathymetry.

*Table 1-2 Spoil ground coordinates*

| Spoil Ground | Easting (GDA94Z50) | Northing (GDA94Z50) |
|---|---|---|
| Spoil Ground 1 | 522842 | 7732018 |
| | 523570 | 7731490 |
| | 522453 | 7729953 |
| | 521725 | 7730481 |
| Spoil Ground 2 | 525748 | 7735714 |
| | 526476 | 7735186 |
| | 525359 | 7733649 |
| | 524631 | 7734177 |
| Spoil Ground 3 | 537470 | 7740726 |
| | 537470 | 7739826 |
| | 535570 | 7739826 |
| | 535570 | 7740726 |

Table 1-3 details the practical available capacity ($m^3$) remaining up to the -11m LAT limit (assuming 1:4 slope around perimeter) using the 2019 post-dredge survey data of the disposal grounds. There is sufficient capacity at all three spoil grounds to accommodate the anticipated dredge volume for the life of the permit.

*Table 1-3 Practical available capacity of the spoil grounds*

| Spoil Ground | Practical available capacity ($m^3$) to ceiling of -11.0m LAT |
|---|---|
| SG1 | 1,507,000 |
| SG2 | 1,446,500 |
| SG3 | 2,130,000 |

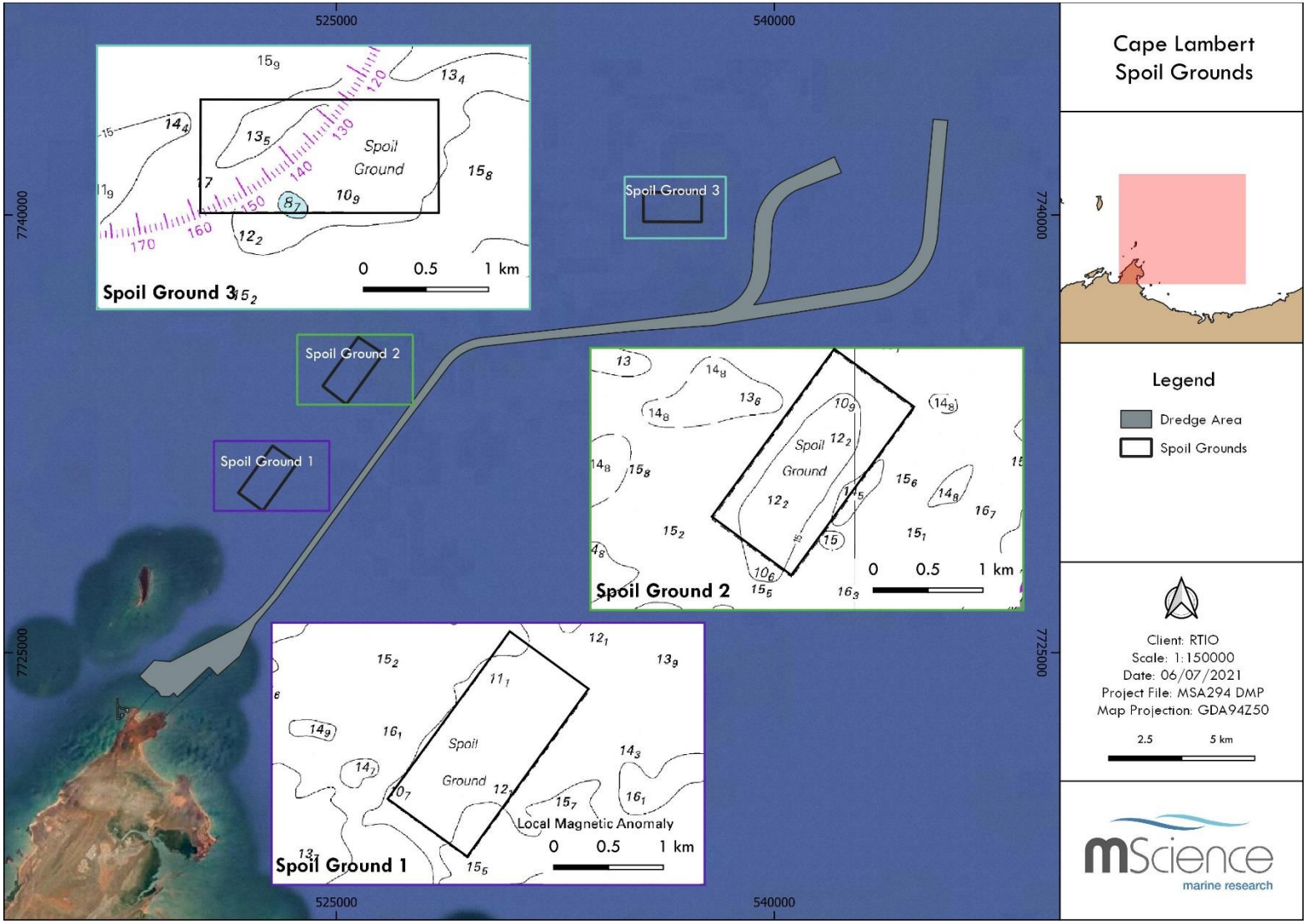


*Figure 1-3 Spoil disposal sites*

# 2 BACKGROUND INFORMATION ON THE PORTS

## 2.1 History of Cape Lambert

The existing iron ore processing plant and shipping facility at Cape Lambert is operated by the Proponent. The history of the Cape Lambert industrial site has previously been summarised by URS (2006) and SKM (2011a). The Cape Lambert facility was established between 1972 and 1973 and has undergone additional dredging to upgrade the port facilities in 1983, 2001, 2005, 2007 and 2011/2012: a history of dredging is shown in Table 2-1

*Table 2-1 Dredging history of Cape Lambert*

| Year | Activity |
|---|---|
| 1972 - 1973 | Establishment of Cape Lambert Port Facility infrastructure. Dredging of 400,000 to 600,000 $m^3$ for the construction of Berth 1 and Berth 2. |
| 1983 | 2,900,000 $m^3$ of dredging to:<br>- Construct a 210 m wide, 30 km long channel<br>- Deepen Berth 1 and 2<br>- Deepen turning areas |
| 1998 - 2000 | Maintenance dredging of both berth pockets and under the wharf |
| 1990 - 2001 | Annual dredging of the power station intake area |
| 2001 | 135,000 $m^3$ of dredging to widen the turning area and port entrance |
| 2005 | 114,000 $m^3$ of dredging to construct tug pens |
| 2007 | 1,890,000 $m^3$ of dredging for Cape Lambert Port A Upgrade |
| 2011 - 2012 | 14,000,000 $m^3$ of dredging for Cape Lambert Port B development |
| 2016 | 105,000 $m^3$ of maintenance dredging |
| 2019 | 194,306 $m^3$ of maintenance dredging |

### 2.1.1 Potential Sources of Marine Contamination

A contaminated site investigation was conducted by URS (2006). The following sources of contaminants were identified as having potential pollutant linkages to marine receptors:

- Former Caltex Yard: Dissolved phase of Total Petroleum Hydrocarbons (TPHs) and polyaromatic hydrocarbons (PAHs) in the groundwater potentially migrating to the marine environment.
- Landfill: Dissolved phase of TPHs and Volatile Organic Compounds (VOCs) in groundwater in the vicinity of the contaminated soils disposal area, potentially migrating to the marine environment.
- Car Dumper No. 1: Potential for direct run off containing oils to impact Sam's Creek.
- Decommissioned and Current Workshop Pond: Potential TPH and metals in unsaturated soils and risk to groundwater.
- Light Vehicle Refuelling Facility: Potential dissolved phase TPH impacts in groundwater.
- Fuel pipeline: TPH in unsaturated soils.

The port upgrades at Cape Lambert to CLA and development of the CLB port facilities have resulted in additional but similar items of infrastructure as previously existed at CLA; the potential sources of contamination from this infrastructure are unchanged. In addition, some potential sources have been removed from Cape Lambert (i.e. the power station).

Soil and groundwater screening, conducted by URS (2006) for a wide array of contaminants associated with the potential sources of contamination across the site, did not detect or find pathways to the marine environment for PCB's, phenols, phthalate esters, nitrosamines, nitroaromatics and ketones, haloethers, chlorinated hydrocarbons or oxygenated compounds.

Activities nearby to Cape Lambert are generally associated with the exploration and production of petroleum and minerals, although CLA and CLB are exclusively associated with the export of iron ore. For the current proposal, likely contaminants from the industrial site and shipping activities include:

- Organotins from historic anti-foulant coatings (such as TBT) applied to vessels;
- Metals from port-related activities, iron ore dust, ground water and cooling water discharge (from the now decommissioned/removed power station); and
- Hydrocarbons (TPH and PAH) in run-off and groundwater from port related activities, the industrial site and, potentially, previous discharge of cooling water from the now decommissioned/removed power station.

Within berth areas, abrasion of ship hulls (e.g. against adjacent wharf structures) can cause flaking of paints and anti-foulants. In and around departure and approach channels, sediments dispersed from berths and paints flaking during ship movements may provide an ongoing source of organotin. Previous studies have shown TBT to occur above guideline levels in berths and departure channels near to berths (Oceanica 2008a; Oceanica 2010; SKM 2006) . Given the phasing out of TBT paints under International Maritime Organisation (IMO) guidelines, TBT may no longer be a significant factor around berths, but there is still the potential for it to be present. Historical studies have shown the proportion of samples returning TBT concentrations above the screening guidelines has been decreasing over subsequent surveys.

Other organic compounds, such as TRH and PAH, may accumulate from small releases of fuel or oils from vessels and service infrastructure on the wharf. While no significant spills of such compounds in the marine environment have been reported, low levels of PAH (below NAGD guidelines) have been found in previous studies (Oceanica 2008a; Oceanica 2010). Those results and the industrial nature of the area (URS 2006) provide a sufficient risk for these compounds to occur.

Within close proximity to berths, metal contaminants (as discussed in Section 2.2) appear to be derived from the periodic spillage of iron ore product. Historical surveys of the area have repeatedly identified high background concentrations of chromium and nickel in uncontaminated Cape Lambert sediments. Given the high background concentration of chromium and nickel, these trace metal contaminants are not considered to represent a significant risk. Based on past studies, it is unlikely that product-derived trace metals will occur more than 500 m from ore-loading wharfs.

## 2.2 Existing Sediment Chemistry Information

The history of sampling and testing of sediments in Cape Lambert has been described in the approved Sampling and Analysis Plan (SAP) for the current maintenance dredging program (MScience 2020b).

The material to be dredged has been characterised in the SAP Implementation Report (MScience 2020a), the results of that survey are summarised below.

Chemical analysis of sediments returned similar concentrations of organic contaminants recorded in previous surveys. Tributyltin (TBT) levels, total petroleum hydrocarbons (TPH) and polycyclic aromatic hydrocarbons (PAH) were below NAGD screening guidelines. Total organic carbon levels remain low (<1%), similar to previous surveys, reflecting the low level of organic inputs to Cape Lambert sediments.

Metal levels (Ag, Al, As, Cd, Cr, Cu, Fe, Hg, Ni, Pb, Sb, Zn) remained similar to those reported in previous surveys. For all metals, other than nickel and chromium, the upper 95 per cent confidence limit (95% UCL) was below NAGD screening guidelines. The 95% UCLs for chromium and nickel exceeded the screening guidelines in both areas proposed for dredging (classified as 'clean' and 'potentially contaminated'). Mean chromium and nickel concentrations in sediments from around the berths were greater than the 80th percentile of ambient baseline; however the occurrence of high concentrations of both chromium and nickel at inshore sites at Cape Lambert, and throughout the Pilbara, was shown to be naturally occurring. Normalisation of nickel and chromium concentrations for grain size in Pilbara sediments has been confirmed to be indicative of reduced bioavailability of these metals – both through dilute acid extraction and elutriation of sediment metals (Stoddart et al. 2019). Chromium and nickel concentrations were associated with sediments with a high proportion of fine grain sediments (clays) suggesting that metals would be tightly bound to sediment and not become bioavailable during loading or disposal activities.

Overall, sediment concentrations of candidate contaminants of potential concern (COPC) were shown to be either below the initial screening levels described in the NAGD or below screening levels after normalisation for grain size; noting there are no fixed screening guidelines for some of the analytes investigated in this survey. These findings suggest that sediment from the proposed dredge areas at Cape Lambert meet NAGD criteria for unconfined ocean disposal at the approved spoil grounds.

# 3 ENVIRONMENTAL, SOCIAL AND CULTURAL VALUES

## 3.1 Environmental Setting

Cape Lambert has a history of development dating back to when it was first commissioned in 1972. The nearest township is Point Samson and the next closest towns are Wickham and Roebourne (Figure 1-1). Other than shipping of iron ore, no intensive agriculture or other industry is based in the immediate area of Cape Lambert.

### 3.1.1 Physical Environment

Cape Lambert has a tidal range similar to that of the Dampier Archipelago: semi-diurnal, with mean low water neap and mean high water spring tides ranging from 0.8 m – 4.5 m. The currents in the area are dominated by tidal currents and wind forcing. The wind forcing is more influential in the shallow water areas than in deeper waters, where currents are predominantly influenced by tides. However, tidal currents in the shallower areas can be strong during spring tides (Pearce et al. 2003), causing re-suspension and mixing of sediments. Re-suspension in shallow areas may also occur as a result of wind waves generated by vessel propeller wash and tropical cyclone or rainfall events (Stoddart and Anstee 2005). Prevailing winds are from the WSW during summer except during cyclones, where wind direction can be erratic. During winter, prevailing winds are from the East.

The marine geology of the Cape Lambert area has been well documented by Coffey Geoscience (2006) and Oceanica (2008b), and the following is based on those two reports unless referenced otherwise. There are three major geotechnical layers within the seabed:

- Unit 1 (0 – 19 m CD) – Marine Sediments (sand/silty sand). Fine to medium grained, un-cemented to weakly cemented. Fines are of low plasticity, contain variable amounts of shell fragments and angular to sub-angular calcarenite gravels.
- Unit 2 (19 – 37.2 m CD) - Variably cemented calcareous soils and weak rock (calcareous sandstone/siliceous calcarenite/calcareous conglomerate). Typically, extremely low to low strength, but with some un-cemented, medium strength or high strength material. Low strength zones generally contain medium plasticity clay. Gravels in the conglomerate layers are generally sub-angular and both siliceous and calcareous. The medium strength zones are typically 1 to 2 m thick and occur at apparently random elevations and locations.
- Unit 3 (Below 37.2 m CD) - meta-sedimentary rocks (chert and/or volcanic rock). High strength.

The potential distribution of contaminants in these areas is most likely to be in the fine sediments within the upper stratum (0 - 1 m) (Oceanica 2008a). The historic consolidated sediments and calcarenite are effectively impermeable to contamination by particulate matter and also to migration of dissolved contaminants in pore waters. Furthermore, Cape Lambert is not at a river terminus and has very little to no natural sediment supply that would result in a layer of potentially contaminated material deeper than one metre. No naturally occurring deep strata with high risk chemistry (i.e. historic beds of paleo-carbon) have been found in previous studies.

The Cape Lambert shorelines have only minimal development of mangroves where sediments may accumulate, and are generally rocky substrates, although substantial mangroves occur near Point Samson. There is no significant record of acid-generating soils in these areas and none are expected within the subtidal environments.

### 3.1.2 Biological Environment

#### 3.1.2.1 BENTHIC COMMUNITIES AND HABITATS

The distribution of benthic communities and habitats at Cape Lambert shown in Figure 3-1 is derived from multiple sources of spatial habitat data collected between 2000 and 2021 (MScience 2018; MScience 2021a). The presented boundaries of each habitat must be assumed to be variable through time as any mapped habitat is subject to natural variability and could have changed following collection of the spatial data.

The marine environments of the Dampier Archipelago are well described in Semeniuk *et al*. (1982) and Wells and Walker (2003). Cape Lambert is located in the Pilbara inshore unit of the Integrated Marine and Coastal Regionalisation of Australia (IMCRA) North West Bioregion, which includes the greater Dampier Archipelago marine environment. The Cape Lambert Port B development Public Environmental Review (PER) provides an extensive review of the Cape Lambert marine environment (Rio Tinto 2009a). The following sections are based on those references, unless cited otherwise.

**Rocky Shores**

Rocky shores are the most conspicuous intertidal habitat within the Dampier Archipelago. The coastline is largely Precambrian igneous rock, but in some areas, there is an overlay of Pleistocene limestone. The fauna of the upper shores is sparse, dominated by littorinid snails and grapsid crabs. The intertidal region has a diverse fauna dominated by oysters and associated species such as limpets, chitons, crabs, and barnacles. The biota becomes increasingly diverse in the lower intertidal, with a variety of sessile and motile invertebrates and benthic algae. Corals reach into the lowest portions of the intertidal zone, and then dominate most subtidal rocks in areas of lower turbidity.

**Sandy and Muddy Shores**

Sedimentary shorelines dominate in the bays and inlets of the Pilbara coastline. There are few sandy beaches in the area. The exception is Hearson's Cove on the north-eastern Burrup Peninsula and a few coarse sand beaches and sand flats in the outer areas of the Dampier Archipelago, including the western and eastern side of Cape Lambert. The sedimentary upper intertidal areas are dominated by extensive mudflats, which generally have mangroves. Seaward of the mangroves, the mudflats extend into subtidal areas. The seabed is mostly mud and fine sand. In many areas both the intertidal and subtidal areas have a rich and diverse benthos; however, the biota is impoverished in the vicinity of port infrastructure where there is a very fine mud on the bottom. Both seagrasses and algae are also relatively sparse in the intertidal, increasing in the shallow subtidal, but still reduced in biomass compared to temperate regions.

**Mangroves**

The geographical distribution of mangrove habitat is typically restricted to sheltered areas such as estuaries, tidal creeks and sheltered bays. Mangroves are recognised as being important habitats for feeding grounds and fish nurseries, as well as protecting coastal areas from erosion by stabilising sediments. The Pilbara region supports a small number of mangrove species: *Avicennia marina*, *Aegialitis annulata*, *Aegiceras corniculatum*, *Bruguiera exaristata*, *Ceriops tagal*, and *Rhizophora stylosa*. *Avicennia marina* is the most abundant and ubiquitous of those species, occurring within bays east and west of Cape Lambert.

**Coral Reefs**

Coral reefs are widely distributed throughout the Dampier Archipelago. Those of the inner and mid zones of the Archipelago, particularly on the western side of the Burrup Peninsula within the Port of Dampier, are often limited to narrow bands adjacent to rocky shorelines. Although live coral cover can be reasonably high, the reefs themselves are generally only a veneer over rock rather than being of entirely biogenic origin.

The majority of corals in the Archipelago occur at depths between 0-10 m (Jones 2004). A total of 120 scleractinian coral species from 43 genera have been recorded in the Dampier Archipelago (Blakeway and Radford 2005). Coral reef communities fringe the islands and coastline of Mermaid Sound.

The area of habitat suitable for coral settlement and growth at Cape Lambert is much less than in Mermaid Sound because of the absence of large islands and limited amount of rocky shores on the mainland. Hard coral communities exist on reefs along the western and northern shoreline of Cape Lambert, reefs fringing Point Samson, at Bezout Island, Bezout Rock, Boat Rock, Bell's Reef, Middle Reef and at several locations near Dixon island (see Figure 3-1).

**Turf Algae, Macroalgae and Seagrass Communities**

Nine species of seagrasses occur in the Dampier Archipelago, including the Cape Lambert area; *Cymodocea angustata*, *Enhalus acoroides*, *Halophila decipiens*, *Halophila minor*, *Halophila ovalis*, *Halophila spinulosa*, *Halodule uninervis*, *Syringodium isoetifolium*, *Thalassia hemprichii*. These seagrasses tend to have reduced biomass compared to the dense seagrass meadows found in southern Western Australia (Wells and Walker 2003). Studies at Cape Lambert determined that seagrasses (predominantly *H. ovalis*) formed low density patches and did not exceed $2m^2$ at any site.

Subtidal limestone pavements within the Pilbara region are colonised by varying abundances of large communities of macroalgae including brown algae species *Sargassum sp.*, *Dictyopteris sp.* and *Padina*, green algae species *Halimeda sp.* and *Caulerpa sp.* and red algal species of crustose corallines, non-corallines and algal turf (CALM 2005). Several of these species form thick canopies in summer which can compete with scleractinian corals (MScience 2010).

#### 3.1.2.2 MARINE MEGAFAUNA

Marine megafauna of the area includes both listed (see Appendix A) and non-listed species. Of particular interest to the maintenance dredging program are whales and turtles.

Humpback whales migrate annually from feeding grounds in the Antarctic to breeding grounds in Camden Sound in the Kimberley region of Western Australia. The north bound migration peaks adjacent to the Cape Lambert area between approximately the last week of July and the first week of August. The peak of the south bound migration occurs during the last week in August and the first week of September. Jenner et al. (2001) suggested that the majority of migrating whales are found in waters deeper than 50 m; however, some individuals come closer to shore, particularly during the southern migration. Recent surveys indicate that Nickol Bay is used as a single day staging post, mainly by pods with calves using the areas close to shore during the southern migration (BMT Oceanica 2017a).

Prince (2001) undertook aerial surveys of marine mammals and other large fauna of the Pilbara coast and concluded that Pilbara coastal waters support small populations of dolphins, the majority of which appear to be bottlenose. Dolphins are not protected under the EPBC Act. Dolphins do have the potential to occur in the area, but due to their intelligent and mobile nature, they are not generally considered at threat from vessel operations. The Cape Lambert area does not support any significant populations of dugongs due to the absence of large seagrass meadows.

Four species of turtle are known to nest on the islands of the Dampier Archipelago and in the greater Cape Lambert region (Biota 2009; Prince 1993); the Green turtle (*Chelonia mydas*), Hawksbill turtle (*Eretmochelys imbricata*), Flatback turtle (*Natator depressus*) and Loggerhead turtle (*Caretta caretta*). Of the four species known to nest in the Cape Lambert region, two species (flatback and hawksbill) nest on Bell's Beach and Cooling Water Beach (Figure 3-1). The Dampier Archipelago (including Rosemary and Delambre islands) has been identified by the May 2017 Recovery Plan for Marine Turtles in Australia (Commonwealth of Australia 2017b) as critical nesting habitat for green, hawksbill and flatback turtles.

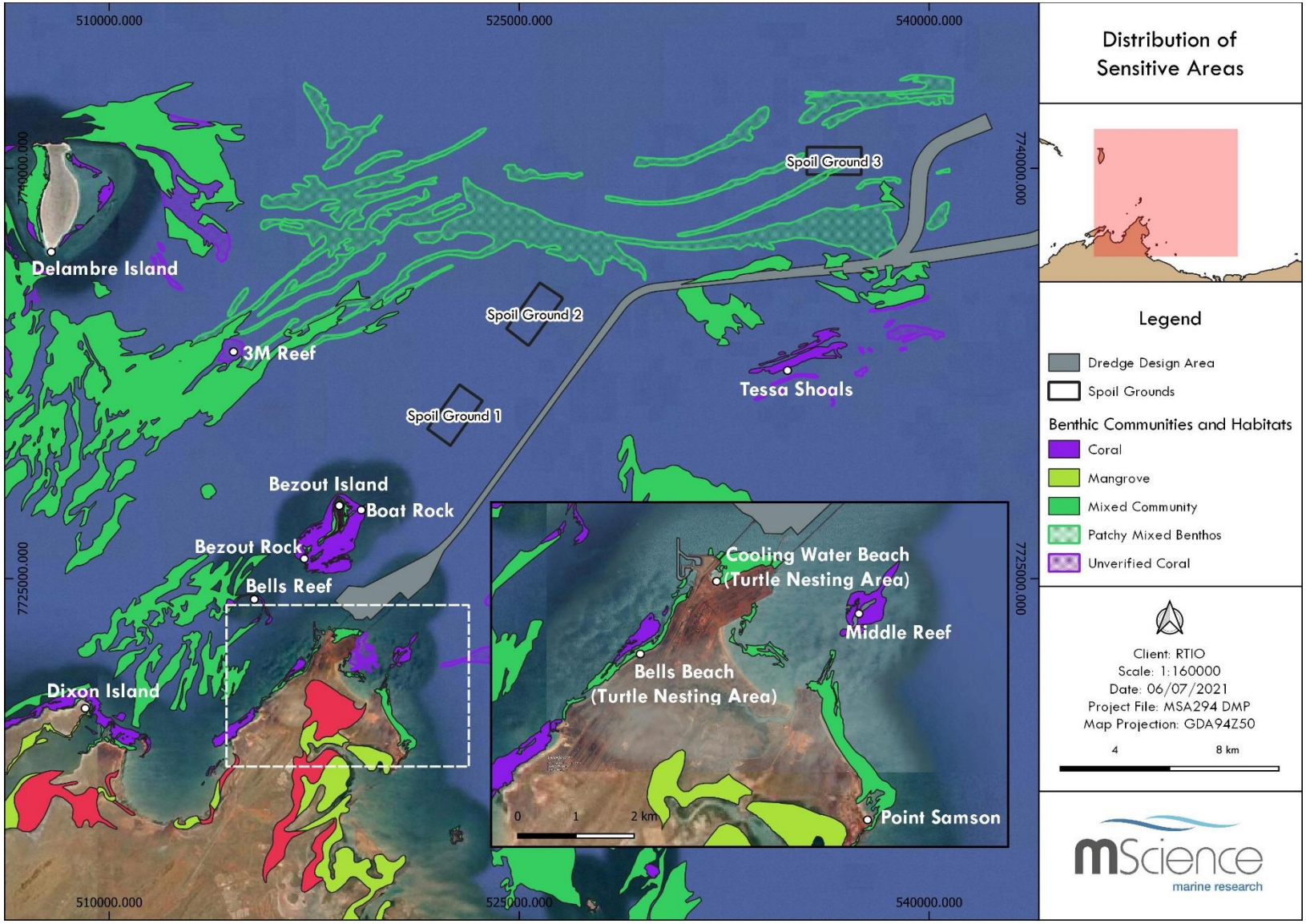


*Figure 3-1 Distribution of sensitive areas around Cape Lambert*

#### 3.1.2.3 INTRODUCED MARINE PESTS

Routine introduced marine pest surveys have been conducted in the Port Walcott area since 2001 (BMT Oceanica 2017b; Ecologia 2002; SKM 2011b; SKM 2014; URS 2007). No target (or suspected) introduced marine pest has been identified in any survey with the exception of *Didemnum perlucidum*. *D. perlucidum* was found in the Port Walcott area during routine monitoring activities in late 2012 and a management strategy was developed. In 2013 it was reported as occurring at a variety of locations within Port Walcott and Johns Creek. It had not been reported in surveys conducted in 2011, which means it spread relatively rapidly as has been reported elsewhere (Kremer et al 2010). Although its abundance could not be confirmed in a 2016 survey, a white encrusting invertebrate resembling *D. perlucidum* was observed on wharf pylons (BMT Oceanica 2017b).

## 3.2 Social and Cultural Setting

### 3.2.1 Regional Setting

Cape Lambert is located in the Pilbara region of Western Australia within the City of Karratha local government area (Figure 1-1). The City of Karratha includes the major centres of Karratha, Dampier and Wickham along with the smaller communities of Roebourne and Point Samson.

Point Samson is located at the eastern tip of the Dampier Archipelago 5km east of the Proponent's facilities at Cape Lambert. The town, with a population of 231 (ABS 2016), is comprised of residential homes, holiday homes, restaurants, a caravan park and a small harbour which supports a small commercial fishing fleet.

The town of Wickham was established to service the needs of the mining industry in the 1970s and it remains the principal support town for the Proponent's port operations at Cape Lambert. It is located 6 km south-west of Cape Lambert and has a population of approximately 1079 people (ABS 2016).

Roebourne has a population of approximately 980 (ABS 2016) and is located 17 km south from Cape Lambert.

The major regional centre of Karratha is situated ~35km south-west of Cape Lambert and holds a population of 15,828 (ABS 2016). The other port facilities operated by RTIO in the region are located at Dampier, almost 50km to the west-south-west of Cape Lambert. The town of Dampier supports a population of approximately 1100 (ABS 2016).

### 3.2.2 Cultural Values

The Pilbara region and Dampier Archipelago contain a prolific and diverse range of Aboriginal heritage sites and objects dating back ~20,000 years, including; petroglyph (rock art) sites, ethnographic sites, standing stones, shell middens, artefact scatters, quarries and grinding patches (CALM 2005). The Dampier Archipelago, including the Burrup Peninsula, is an indigenous class feature on the National Heritage List. There is still a strong Aboriginal identity in the region today and the area is culturally and recreationally significant to Indigenous people.

The Proponent maintains an active program of Aboriginal heritage consultation and management. Previous consultation with Traditional Owners undertaken during capital dredging and other port developments at Cape Lambert has not identified any marine heritage sites. The Proponent currently has an agreement with the Australian Government in relation to the National Heritage Listing of the Burrup Peninsula, including a management plan for this area's protection. This agreement and the associated obligations are specifically focused on the rock art and stone arrangements (the National Heritage values). The Cape Lambert area is outside the National Heritage Place.

Maintenance dredging operations at Cape Lambert will be entirely located in areas that have been previously disturbed during capital and port development works, thus the current proposed program is unlikely to result in impacts to heritage sites.

### 3.2.3 Marine Protected Areas

The Commonwealth's Dampier Marine Park is located ~10 km north of the Cape Lambert port facilities. The outer approach/departure channel, part of Spoil Ground 1 (~9 ha) and Spoil Ground 2 and 3 are within the Commonwealth's Dampier Marine Park Multiple Use Zone (IUCN VI) as shown in Figure 3-2, whereas the remaining area of Spoil Ground 1 (~197 ha) and the rest of the port infrastructure fall outside Park boundaries. The closest other existing Commonwealth marine protected area is the Montebello Islands Marine Park, 180 km from Cape Lambert. The multiple use zone management regime allows continued use for spoil placement in approved designated areas under a Class Approval. Dredging activities in the Multiple Use Zone require additional authorisation from Parks Australia.

The proposed dredge area and spoil grounds are also in the vicinity of the proposed Dampier Archipelago Marine Park (DAMP). Planning for that park by the Department of Conservation and Land Management (CALM 2005) (now the Department of Biodiversity, Conservation and Attractions (DBCA)) culminated in a draft plan of management which has not been progressed. At present, the DAMP has not been declared under State legislation and is not under active consideration for declaration.

The proposed DAMP occurs west and north-west of Cape Lambert (Figure 3-2). Both Dixon and Delambre islands are included in the proposed DAMP. Dixon Island is about 8 km west of Cape Lambert, while the Delambre Island Sanctuary Zone is about 20 km to the north-west. The area between Cape Lambert and Cape Thouin is one of six study areas in the Pilbara-Kimberley region from within which marine parks and reserves will be identified (CALM 2005). One of these study areas includes Bell's Beach.

Some of the islands of the Dampier Archipelago are contained within nature reserves for the protection of flora and fauna and are managed under the Dampier Archipelago Nature Reserves Management Plan 1999 – 2000 (CALM 1990).

Point Samson Reef, fringing the shoreline of sections of the town of Point Samson, has fishing restrictions imposed as a fish habitat protection area under Section 43 of the Fish Resources Management Act 1994 (WA).

### 3.2.4 Fisheries

Recreational fishing is popular around Cape Lambert and the Dampier Archipelago; however recreational fishers target subtidal reefs and rocky shoals offshore. There would be minimal effects on recreational fishers as the areas targeted for dredging and spoil disposal are largely within those experiencing heavy vessel traffic and not used by fishers. Similarly, while commercial fisheries occur in the general area (State managed include: Nickol Bay Prawn Fishery, Pilbara Demersal Finfish Fisheries, Pearl Oyster Fishery Zone, Western Australian Mackerel Fishery, North Coast Blue Swimmer Crab Fishery and Western Australia Northern Shark Fishery. Commonwealth managed fisheries include: the Western Tuna and Billfish, Skipjack Tuna and Southern Bluefin Tuna Fisheries; however there is limited fishing under these Commonwealth managed fisheries in the coastal waters around Cape Lambert) there are no active commercial fisheries in the areas of potential impact (i.e. within 500 m of spoil disposal).

Aquaculture in the region is dominated by the production of pearls from the species *Pinctada maxima*. This industry utilises both wild-caught and hatchery reared oysters for the production of cultured pearls. The nearest aquaculture lease is for a pearling hatchery located 1 km to the south-east of CLA operation and is currently inactive. A trial commercial rock oyster program is currently underway within the Dampier Archipelago with the closest trial location at Cossack, ~5 km south of Cape Lambert.

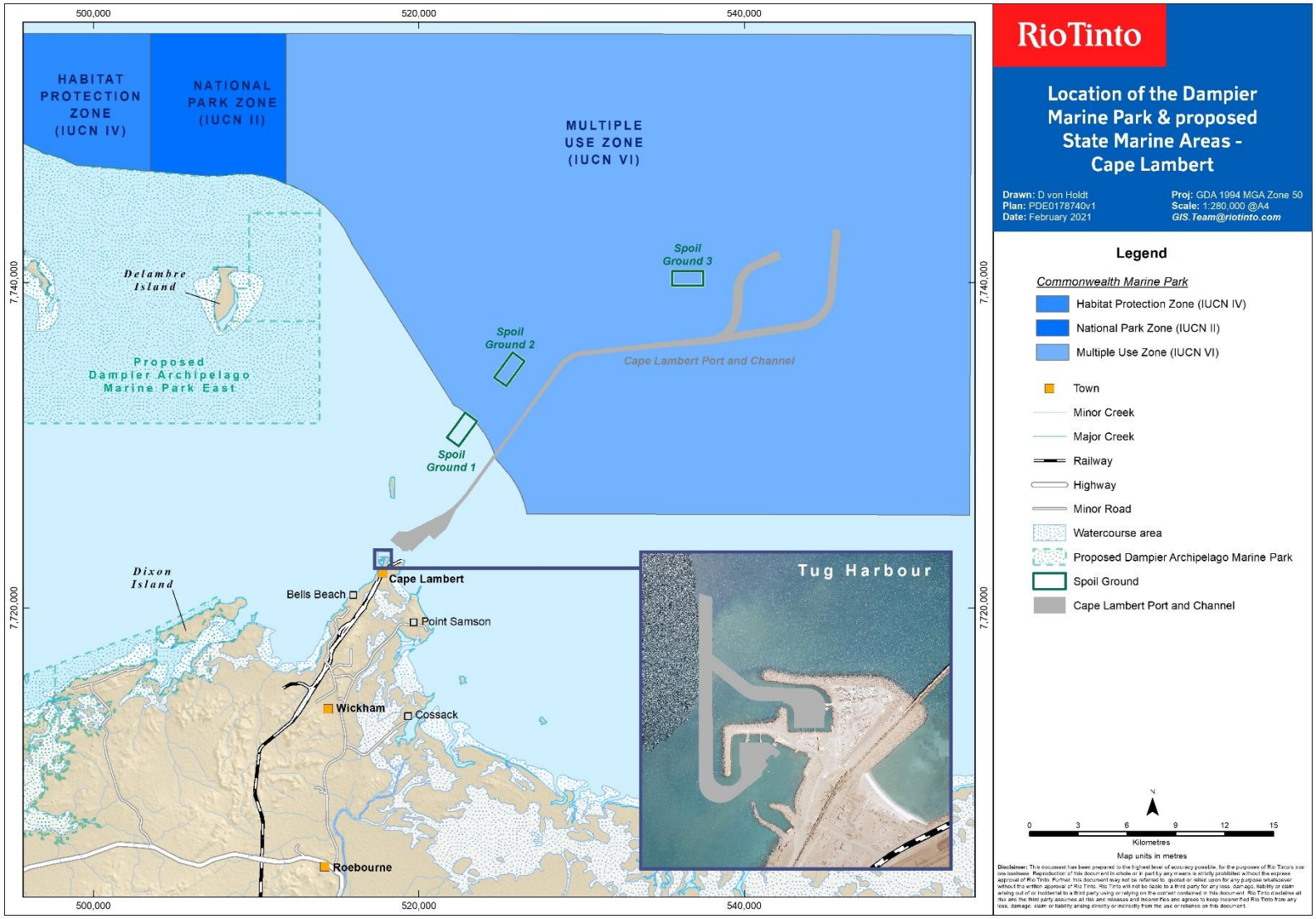


*Figure 3-2 Location of the Dampier Marine Park and proposed State Marine Areas*

# 4 ASSESSMENT OF RISKS

## 4.1 Rationale

An assessment of the risks of maintenance dredging to environmental, social and cultural values at Cape Lambert has been undertaken to ensure that monitoring and management are directed at the areas of highest risk. This assessment identifies the level of potential harm that various maintenance dredging consequences represent to environmental, social or cultural values. The outcome of the assessment has been used in developing management measures to avoid, reduce or mitigate impacts. Prior to each dredging campaign to be conducted under this permit, the risk assessment will be revisited as shown in Figure 4-1 and the DEMP revised where necessary. In this Section and its follow-up (Sections 5 & 6), "dredging activities" is used to include both uplift and disposal of spoil.

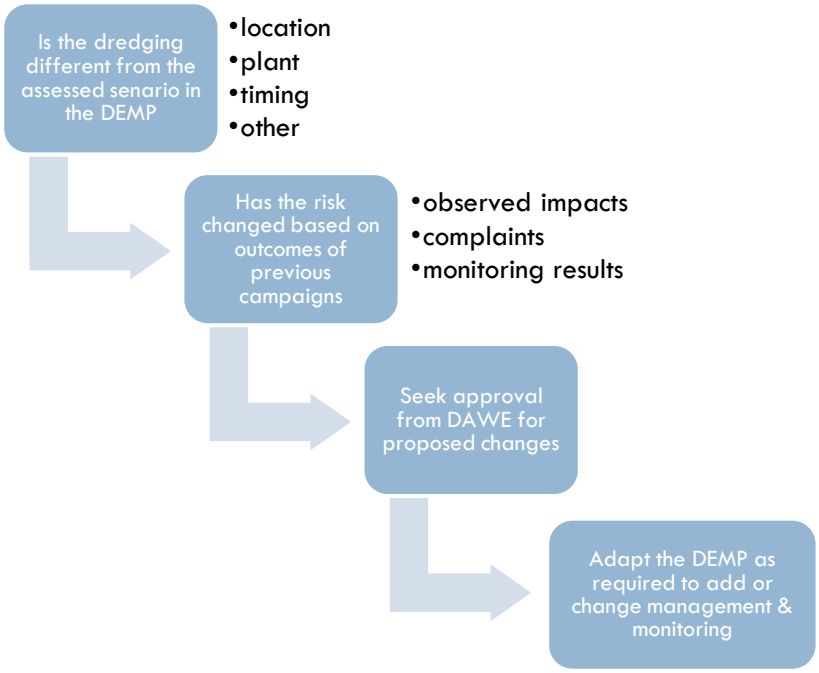


*Figure 4-1 Adaptive management process for updating risk assessment before each campaign*

## 4.2 Risk Assessment of Potential Impacts

The risk assessment was undertaken using a systematic approach, based on international best practice standards (AS/NZS ISO 31000:2018: Risk Management – Guidelines), of assigning a consequence and probability to potential negative outcomes of the various impacting processes of maintenance dredging and associated activities. Consequence and probability in this case have been drawn from experience with past dredging programs at Cape Lambert and nearby ports and professional judgement based on experience with dredging programs elsewhere in the Pilbara Region. SDP (SD2021/4007) grants approval for sea disposal of dredge spoil and rock material remaining in the dredged areas after previous capital dredging programs.

Dredging impacts may occur through a number of pathways (WAEPA 2016) and may include:

Direct Impacts:

- the direct removal or destruction of benthic habitat in the dredged area;
- marine fauna collisions and disturbance from vessel movements;

- smothering of benthic organisms in dredge spoil placement locations

Indirect Impacts:

- changes to marine water quality from increased turbidity and sedimentation, and reduction in light penetrating the water column at distance from the dredging uplift and spoil disposal;
- mobilisation of contaminants from dredged sediments during uplift; and
- increased noise and lighting from associated vessel operations.

For maintenance dredging, disposal of dredge material and relocation of remnant rocks, the risk of direct removal of habitat within the dredge area is very low, as dredging and associated work is restricted to previously dredged areas where the original habitat has been removed.

Risk ratings were assigned to each impacting process using the risk matrix in Table 4-1. Inherent risk ratings assume minimum industry standard would be achieved without the application of any additional management controls.

Management controls relevant to each inherent risk were identified, applying the management response criteria (Table 4-2) and particularly focussing on those inherent risks rated as 'moderate' and above.

*Table 4-1 Risk matrix*

| | Consequence | 1-Minor | 2-Medium | 3-Serious | 4-Major | 5-Catastrophic |
|---|---|---|---|---|---|---|
| Likelihood | A-Almost certain | Moderate | High | Critical | Critical | Critical |
| | B-Likely | Moderate | High | High | Critical | Critical |
| | C-Possible | Low | Moderate | High | Critical | Critical |
| | D-Unlikely | Low | Low | Moderate | High | Critical |
| | E-Rare | Low | Low | Moderate | High | High |

*Table 4-2 Risk rating and associated risk management response*

| Rating | Risk management response |
|---|---|
| Critical | Risks that significantly exceed the risk acceptance threshold and need urgent and immediate attention. |
| High | Risks that exceed the risk acceptance threshold and require proactive management. Includes risks for which proactive actions have been taken, but further risk reduction is impracticable. However active monitoring is required, and the latter requires the signoff by Business Unit senior management. |
| Moderate | Risks that lie on the risk acceptance threshold and require active monitoring. The implementation of additional measures could be used to reduce the risk further. |
| Low | Risks that are below the risk acceptance threshold and do not require active management. Certain risks could require additional monitoring. |

## 4.3 Outcomes

Table 4-3 presents the outcomes of the risk assessment, including the inherent and residual risks and management controls. If unmanaged, maintenance dredging in this area was assessed as having:

- One Critical risk (hydrocarbon spill);
- Ten High risks (associated with benthic communities and habitats, invasive marine species and potential social impacts);
- Ten Moderate risks (associated with marine environmental quality, marine megafauna and potential social impacts); and
- Two Low risks.

Where a risk is assessed as above Low for any item, management actions are required. Management actions were developed to ameliorate risks to a Moderate or Low level, where possible (Section 5). When managed, maintenance dredging in this area was assessed as having:

- One High risk (potential social impact – vessel/fauna interaction);
- Eleven Moderate risks (associated with benthic communities and habitats, invasive marine species, marine environmental quality, marine megafauna and potential social impacts); and
- Eleven Low risks.

Where it was assessed that there may be a chance that a Low or Moderate risk would produce a significant impact due to unforeseen circumstances, monitoring has been specified to allow for adaptive management (Section 6).

*Table 4-3 Risk assessment of maintenance dredging/disposal and management controls*

| Scenario/Activity | Potential Impact | Cause | Consequence | Likelihood | Inherent Risk | Management Control | Consequence | Likelihood | Residual Risk |
|---|---|---|---|---|---|---|---|---|---|
| Works are carried out without required approvals or are not consistent with the approved activities. | **Social Impact**<br><br>Non-compliance with legal requirements resulting in licence to operate and/or reputational impact. | • Relevant approvals are not sought.<br>• Scope of work is not consistent with approved activities.<br>• Approval has expired. | 3 | C | High | • Ensure all relevant approvals (environmental and operational) are valid and do not expire within current works period.<br>• Ensure all conditions of approval are communicated to the Contractor prior to works commencing.<br>• Ensure all boundary areas for dredging and spoil disposal are well documented and provided to the dredge contractor prior to commencing works.<br>• Check the dredge contractor has measures in place to meet conditions of approval and ensure boundary areas are not exceeded.<br>• Ensure all reporting requirements are met. | 3 | D | Mod |
| Excessive visual exhaust emissions from vessels associated with the dredging program. | **Social Impact**<br><br>Community concerns and/or reputational damage. | Operation of internal combustion engines on vessels. | 1 | C | Low | Adherence to MARPOL Annex VI for international vessels. Where required, Vessel to hold an International Air Pollution | 1 | C | Low |

| Scenario/Activity | Potential Impact | Cause | Consequence | Likelihood | Inherent Risk | Management Control | Consequence | Likelihood | Residual Risk |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Prevention (IAPP) Certificate as appropriate to class. | | | |
| Noise and light emissions from vessels associated with the dredging program. | **Environmental Impact**<br><br>Behavioural changes to marine megafauna (transiting, resting, mating, nesting and foraging). | • Transportation, Equipment & Supplies (vessel related noise).<br>• Light emissions from vessel operations during hours of darkness. | 2 | C | Mod | Maintenance dredging campaigns will be relatively short in duration (typically 1-4 weeks); the short duration limits potential impacts to fauna.<br><br>Detailed management actions for vessel noise and light emissions are provided in Section 5.1, Table 5-1. | 2 | D | Low |
| Vessel collision, grounding or collision with marine infrastructure. | **Social Impact**<br><br>Community concerns and/or reputational damage. | Failure to navigate safely or to avoid a collision. | 2 | C | Mod | Management actions for vessel collision and grounding are detailed in Section 5.4, Table 5-5. | 2 | D | Low |
| | **Environmental Impact**<br><br>Reduction in water quality. | | 2 | C | Mod | | 2 | D | Low |
| Interaction of marine megafauna with vessels associated with dredging activities. | **Environmental Impact**<br><br>Injury to or fatality of marine megafauna (including protected species). | • Entrainment of marine megafauna at the drag head.<br>• Vessel collision with marine megafauna. | 2 | C | Mod | Maintenance dredging campaigns are of relatively short duration (typically 1-4 weeks); the short duration limits potential impacts to fauna.<br><br>Detailed management actions for vessel interaction with marine | 2 | C | Mod |
| | **Social Impact** | | 3 | C | High | | 3 | C | High |

| Scenario/Activity | Potential Impact | Cause | Consequence | Likelihood | Inherent Risk | Management Control | Consequence | Likelihood | Residual Risk |
|---|---|---|---|---|---|---|---|---|---|
| | Injury/fatality of marine megafauna leading to potential non-compliance with regulatory requirements and/or reputational issues | | | | | megafauna are provided in Section 5.1, Table 5-1. | | | |
| Elevated turbidity and production of visible plumes from dredging and spoil disposal activities. | **Environmental Impact**<br><br>Decrease in water quality. | • Dredging activities have the potential to increase suspended sediments and turbidity levels leading to a reduction in water quality.<br>• Visible turbidity plumes may lead to community concerns/complaints. | 1 | B | Mod | Risks associated with elevated turbidity will be controlled in accordance with the management actions detailed in Section 5.2, Table 5-2.<br><br>Turbid plumes and water quality will be monitored to determine whether plumes are dredging related (see Section 6.1 and 6.2). | 1 | D | Low |
| | **Social Impact**<br><br>Visible turbidity plumes present near local values (Point Samson Beach, 3-Mile Reef) result in community complaints and/or loss of trust that takes weeks/months to resolve with residual local reputational impact. | | 2 | C | Mod | | 2 | C | Mod |
| Elevated turbidity and increased sedimentation rates | **Environmental Impact**<br><br>Sub-lethal effects on benthic primary producers (habitat disturbance) outside the | Elevated turbidity and increased sedimentation resulting in temporary | 2 | B | High | Risks associated with elevated turbidity and increased sedimentation rate will be controlled in accordance with the management | 2 | D | Low |

| Scenario/Activity | Potential Impact | Cause | Consequence | Likelihood | Inherent Risk | Management Control | Consequence | Likelihood | Residual Risk |
|---|---|---|---|---|---|---|---|---|---|
| from dredging and disposal activities. | approved dredging and disposal footprint. | reduction in productivity and growth rates due to:<br>• reduced light penetration.<br>• smothering of benthic habitats.<br>• damage to filter feeding organisms. | | | | actions provided in Section 5.2, Table 5-2.<br>Turbid plumes and water quality will be monitored to provide an early warning of any potential impacts to benthic primary producer habitat within the Zone of Influence from the dredging and disposal activities (see Section 6.1 and 6.2). | | | |
| | **Social Impact**<br>Sub-lethal effects on benthic primary producers leading in turn to potential non-compliance with regulatory conditions and/or reputational impacts. | | 2 | C | Mod | | 2 | D | Low |
| | **Environmental Impact**<br>Mortality of coral (habitat loss). | | 3 | C | High | | 3 | E | Mod |
| | **Social Impact**<br>Mortality of coral leading in turn to potential non-compliance with regulatory conditions and/or reputational impacts. | | 3 | C | High | | 3 | E | Mod |
| Dredging and disposal activities occurring during a mass coral spawning event. | **Environmental Impact**<br>Reduction in the success of coral fertilisation during a significant spawning event. Changes to settlement and | Elevated turbidity levels as a result of dredging and spoil disposal activities present a risk to coral fertilisation if elevated turbidity levels occur near coral | 2 | C | Mod | • Mass coral spawning in the Pilbara occurs between February and April, with most spawning occurring in March. | 2 | D | Low |

| Scenario/Activity | Potential Impact | Cause | Consequence | Likelihood | Inherent Risk | Management Control | Consequence | Likelihood | Residual Risk |
|---|---|---|---|---|---|---|---|---|---|
| | early development of coral larvae after spawning events, when most larval metamorphosis and recruitment occurs. | reefs (WAMSI has shown the risk is to fertilisation, rather than to the larvae. As fertilisation occurs within hours of spawning, before significant transport occurs, the risk from elevated turbidity is limited to areas immediately adjacent to coral reefs). | | | | • Prediction of the timing of mass coral spawning has been completed to determine the expected timing of mass coral spawning within the February to April period each year for the duration of the sea dumping permit.<br>• The period between February and April is within cyclone season in the Pilbara; dredging is unlikely to occur during these months.<br>• Dredging activities would need to occur within 500m of coral spawning for suspended sediment levels to be likely to cause impacts. Dredging activities are not proposed to occur within 500m of coral communities.<br>• If dredging is to occur across the period of mass coral spawning, alter the dredging activities to ensure turbidity plumes do not approach coral reefs e.g. change | | | |

| Scenario/Activity | Potential Impact | Cause | Consequence | Likelihood | Inherent Risk | Management Control | Consequence | Likelihood | Residual Risk |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | to a different location within the dredge area. | | | |
| Introduction of Invasive Marine Species (IMS). | **Environmental Impact**<br><br>The introduction and establishment of IMS via the vessels or equipment associated with dredging activities leading to ecological impacts to other marine species or habitats. | The use of intrastate, interstate and/or overseas vessels has the potential to introduce IMS to Port Walcott from contaminated hulls and/or ballast waters which could impact benthic communities. | 3 | C | High | Detailed management actions for IMS are detailed in Section 5.3, Table 5-4. | 3 | D | Mod |
| | **Social Impact**<br><br>The introduction and establishment of IMS leading to non-compliance with regulatory requirements and/or reputational impacts. | | 3 | C | High | | 3 | D | Mod |
| Unplanned dredging and/or spoil disposal in areas other than approved operational areas. | **Environmental Impact**<br><br>Direct localised disturbance to benthic communities and habitats. | Dredging activities outside of approved operational areas due to:<br><br>• Incorrect communication of approved operational areas. | 3 | C | High | • Establish clear locations and boundaries for dredging and spoil disposal with the Contractor prior to commencing works.<br>• Include relevant checks on the vessels GPS and navigation | 3 | D | Mod |
| | **Social Impact** | | 3 | C | High | | 3 | D | Mod |

| Scenario/Activity | Potential Impact | Cause | Consequence | Likelihood | Inherent Risk | Management Control | Consequence | Likelihood | Residual Risk |
|---|---|---|---|---|---|---|---|---|---|
| | Impact to marine Aboriginal heritage sites leading to impacts to cultural heritage values and/or reputational impacts.<br><br>Non-compliance with SDP, leading to impact to licence to operate and/or reputational impacts. | • Incorrect positioning of vessel.<br>• Inaccurate vessel positioning system. | | | | systems to ensure correct operation of the system prior to and during operations.<br>• Ensure positioning system is active and to suitable accuracy prior to commencing any dredging or dumping activities.<br>• Contractor to confirm the dredge vessel is positioned (using DGPS) within approved footprints prior to dredging, during dredging, prior to spoil disposal and during spoil disposal.<br>• Dredged material will be disposed evenly over the spoil ground area within the specified dump boxes as far as practically possible and to not limit navigable access by the dredge to other areas of the disposal site or cause a grounding of the vessel.<br>• Conduct hydrographic survey of dredge area prior to the start of the works and at the completion of all dredging-related activities. | | | |

| Scenario/Activity | Potential Impact | Cause | Consequence | Likelihood | Inherent Risk | Management Control | Consequence | Likelihood | Residual Risk |
|---|---|---|---|---|---|---|---|---|---|
| Hydrocarbon spill event or unplanned discharge from a vessel associated with dredging activities. | **Environmental Impact**<br><br>Reduction in water quality, toxic effects on marine fauna and flora, sediment contamination and smothering of benthic primary producers. | Hydrocarbon spill due to:<br><br>• Vessel collision.<br>• Diesel or heavy fuel oil spill during refuelling (bunkering).<br>• Hydraulic oil spills due to equipment failure (for example, burst hydraulic hose).<br>• Incorrect storage and handling of hydrocarbons.<br>• Release of oily bilge waters.<br>• Contaminated deck wash. | 4 | C | Crit | Detailed management actions for hydrocarbons and other spills are provided in Section 5.2, Table 5-3. | 3 | E | Mod |
| | **Social Impact**<br><br>Potential non-compliance with regulatory requirements and/or reputational issues. | | 3 | C | High | | 3 | E | Mod |
| Sewage or other waste (greywater, food waste, deck drainage and bilge) discharge event or unplanned discharge into the marine environment. | **Environmental Impact**<br><br>Reduction in water quality through eutrophication, increased particulate concentration and introduction of toxicants. | Unplanned discharge of sewage or other waste during operations resulting from:<br><br>• incorrect handling or storage of waste.<br>• equipment malfunction/failure. | 2 | C | Mod | Detailed management actions for sewage and other waste discharge and spills are provided in Section 5.2, Table 5-3.<br><br>Routine discharges from dredging vessels (sewage and greywater, food waste, deck drainage and bilge) will comply with MARPOL requirements. Sewage and putrescible wastes will be discharged beyond 3 nm. | 2 | D | Low |
| | **Environmental Impact**<br><br>Reduction in water quality leading to a decline in the health of benthic | | 1 | C | Low | | 1 | D | Low |

| Scenario/Activity | Potential Impact | Cause | Consequence | Likelihood | Inherent Risk | Management Control | Consequence | Likelihood | Residual Risk |
|---|---|---|---|---|---|---|---|---|---|
| | communities and habitats and marine fauna. | | | | | | | | |
| | **Social Impact**<br><br>Reduction in water quality affecting social amenity. | | 2 | C | Mod | | 2 | D | Low |

# 5 MANAGEMENT AND MONITORING OF POTENTIAL IMPACTS

## 5.1 Marine Megafauna Management

Marine megafauna may be affected by dredging and disposal activities through:

- direct strike by vessels;
- physical interaction with the dredge head (turtle specific);
- artificial lighting (turtle specific); and
- underwater noise during dredge and disposal activities.

The marine megafauna management framework is provided in Table 5-1.

*Table 5-1 Marine megafauna management framework*

| **Marine Megafauna Management Framework** | |
|---|---|
| Objective | To protect marine megafauna, including marine mammals (in particular whales, dolphins and dugongs) and turtles, so that biological diversity and ecological integrity are maintained. |
| Performance Target | • No injury or mortality incidents attributable to dredging for marine mammals and turtles<br>• Light and noise mitigation measures included in the dredging contractors HSE management plan and implemented for the duration of each dredging campaign.<br>• Compliance with monitoring criteria established within the SDP |
| Term | For the duration of dredging and disposal activities |
| Management Action | <u>Direct Strike by Vessel</u><br>• A Marine Fauna Observer (MFO) will be aboard the dredge at all times when the dredge is in motion (see monitoring section).<br>• Vessels will be contractually required to comply with all relevant maritime legislation and operate safely and use only authorised shipping routes for all travel.<br>• Vessels will comply with all requests from the Australian Maritime Safety Authority (AMSA) and the relevant harbour master unless it is unsafe to do so.<br>• In water depths less than 2.5 m, vessel speed will be restricted to a maximum of 6 knots.<br>• Vessel tracking systems, including automated identification systems (AIS) will be used on all project related vessels.<br>• All dredging vessels will be required to comply with applicable parts of:<br>  ○ AMSA Marine Notice 15/2016; and<br>  ○ Division 8.1 of the EPBC Regulations 2000 regarding vessel interactions with cetaceans (e.g. distance, speeds). |
| | <u>Physical Interaction with the dredge head</u><br>• A MFO will be aboard the dredge at all times during dredge and disposal activities (see monitoring section). |

| Marine Megafauna Management Framework | |
|---|---|
| | • Ensure that the dredge is fitted with turtle exclusion devices on the drag heads for the duration of works. Dredging is not permitted unless these devices are installed and operational.<br>• Implement procedural controls whilst dredging to minimise off-bed suction time. These controls must ensure that drag head water jets are activated at times when the drag heads are not in contact with the seabed (except where low density sediments are present), and pumps are in operation, to minimise the risk of turtle capture.<br>• Implement a soft start procedure (i.e. limit suction from the drag head until the drag head has engaged the sea bed) whenever commencing dredging.<br>• The length of the campaign will be minimised and planned as far as practicable to be outside of turtle nesting times – these being November/December. |
| | <u>Artificial Lighting</u><br><br>Minimise impacts of light on marine megafauna:<br><br>• Light levels from the dredging and support vessels will be minimised to those lights that are necessary for the safe operation of the vessels and all lights shown at anchor will be shielded to avoid light spill.<br>• Operational lights will not be directed towards the sea unless required for the safe operation of the vessel.<br>• The Dredging Contractor will be notified by the Project Environmental Representative of any critical periods for turtle breeding (October to December), nesting females (November/December) or hatchlings (December). During those periods, additional care will be taken to ensure light spill is minimised.<br>• Operational lights will not be directed towards Cooling Water Beach or Bells Beach during turtle nesting season. |
| | <u>Underwater Noise</u><br><br>• Ensure all vessel equipment and machinery is in good condition and subject to regular maintenance while engaged on the Project.<br>• When in transit, all Project vessels will be operated in accordance with EPBC Regulations 2000 – Part 8 Division 8.1<br>• Minimise the duration of run-time for vessel engines, thrusters and dredging plant by avoiding stand-by or running mode to the degree practical and consistent with safe operations. |
| Monitoring | • Prior to dredging and disposal activities, a trained MFO must check using binoculars from a high observation platform (vessel bridge) for marine megafauna within a 300 metres monitoring zone. If marine megafauna are sighted within the monitoring zone, dredging and disposal activities must not commence until 20 minutes after the last individual is sighted/observed to leave the monitoring zone or the vessel is to move to another area to maintain a minimum distance of 300 m between the vessel and the observed megafauna.<br>• Regular monitoring (after each uplift of spoil at a minimum) for the presence of injured or dead turtles will be conducted by:<br>  ○ Examining the spoil in the dredge hopper for fragments of turtle; and<br>  ○ Checking the dredge wake for floating turtles or turtle fragments. |

| **Marine Megafauna Management Framework** | |
|---|---|
| Incident Management | In the event that turtle injury or mortality occurs as a result of the Project, the incident will be investigated. The investigation will inform the implementation of two trigger levels to guide the management action(s):<br><br>**Level 1**<br><br>One injured or dead turtle is found during a single dredging campaign which is attributable to Project activity.<br><br>Action:<br><br>• Report the incident as per the reporting section<br>• Check that all management procedures are being implemented. If not, then ensure implementation and increase compliance checks i.e. ensure pumping procedures and inspections of turtle chains are being carried out by the dredge contractor each time the drag head is lifted.<br><br>**Level 2**<br><br>More than one turtle is found injured or dead during a single dredging campaign attributable to Project activity.<br><br>Action:<br><br>• As per Level 1<br>• If management measures were being implemented, conduct a review of the current management measures to identify alternative or additional practical management measures that could be undertaken |
| Reporting | • Records of all monitoring will be established and maintained for the duration of works.<br>• Immediately report any incident involving marine fauna to the RTIO Environmental Representative.<br>• Report any injury or mortality of marine turtles or other threatened or specially protected fauna within 72 hours of receiving notification of the incident to:<br>  ○ The Department of Biodiversity, Conservation and Attractions (DBCA) Pilbara Regional Office (9182 2000); and<br>  ○ The Department of Agriculture, Water and the Environment (DAWE) on 1800 803 732 or protected.species@environment.gov.au<br>• Report any injury or mortality of marine turtles or other threatened or specially protected fauna that occurs within the boundaries of the Dampier Marine Park to the Director of National Parks' Duty Officer (0419 293 465) within 72 hours of the incident.<br>  ○ Details of the incident, the measures taken, success of those measures and any additional corrective actions proposed to be taken must be submitted in a report via email to marineparks@awe.gov.au within 14 days of the incident. |

| Marine Megafauna Management Framework | |
|---|---|
| Responsibility | • Establish and maintain records of marine fauna monitoring for the duration of the works: *Dredge Contractor*<br>• Compliance with dredging plant and dredge operation requirements: *Dredge Contractor*<br>• Compliance with management provisions: *Dredge Contractor*<br>• Check on compliance: *RTIO Project Manager*<br>• Timing of dredging campaign: *RTIO Project Manager*<br>• Notify RTIO Project Manager of incident: *Dredge Contractor*<br>• Notify government of incident: *RTIO Environment Superintendent* |

## 5.2 Marine Environmental Quality Management

Dredging and spoil disposal activities may result in increased suspended sediment levels within the water column and an associated decrease in light and increase in sedimentation rates to benthic environments. These events have the potential to affect marine flora and fauna in the water column and on the sea bed. Visible turbidity plumes have potential to result in community concerns and reputational impacts. The marine environmental quality management framework for water quality is provided in Table 5-2.

Various waste materials are generated during maintenance dredging activities, including oil, sewage, chemical, food and packaging waste, solid waste from maintenance or replacement of plant, and other liquid wastes. These have the potential to impact the environment and social amenity of the project area and require management. Wastes defined as Controlled Wastes under the Western Australian *Environmental Protection Act* 1986 must be handled and disposed according to the *Environmental Protection (Controlled Waste) Regulations* 2004. The marine environmental quality management framework for chemicals, waste, hydrocarbons and spills is provided in Table 5-3.

*Table 5-2 Water quality management framework*

| Marine Environmental Quality Management Framework – Water Quality (Benthic Communities and Habitats) | |
|---|---|
| Objective | To maintain the quality of water and manage sedimentation to ensure that any subsequent impacts to benthic communities and habitats are restricted to the zone of impact as defined in the SDP application and that turbidity plumes do not extend to local values (Point Samson Beach and 3-Mile Reef). |
| Performance Target | • Establishment of all required environmental monitoring equipment and obligations relating to water prior to works commencing.<br>• No instances of exceedance of total suspended solid (TSS) trigger values at the monitoring sites, as defined in Section 6.1.<br>• Conduct appropriate environmental monitoring (see Section 6) with regular reviews during dredging and disposal activities to identify potential for community concerns.<br>• Dredges and dredging meet specified management actions.<br>• No dredging to take place outside the approved dredge footprint.<br>• All dredge material to be disposed of within the boundaries of the approved spoil grounds. |

| **Marine Environmental Quality Management Framework – Water Quality (Benthic Communities and Habitats)** | |
|---|---|
| Term | For the duration of dredging and disposal activities |
| Management Action | • Dredging will be planned on a weekly basis to consider the 7-day weather forecast. The weekly dredging plan will consider the proposed location of dredging and disposal with respect to the strength of metocean forcing factors in driving sediment plumes towards sensitive habitats and local values. The requirements to adjust a dredging plan to forecast metocean conditions will consider:<br>  ○ Previous dispersion models constructed for capital dredging at CLA and CLB;<br>  ○ Plume dispersion tracking conducted for recent maintenance dredging (2016 and 2019); and<br>  ○ Plume dispersion tracking conducted as part of monitoring activities for this program (See Section 6.1).<br>• Dredging will adapt to forecast weather conditions (e.g. storm surges, or strong winds and currents).<br>• The dredge plant will utilise mechanical devices to reduce turbidity generation during dredging and disposal, such as turbidity-reducing ("green") valves in the overflow of the dredge.<br>• The dredge hopper doors will be kept in good condition to minimise loss of sediment during transport.<br>• Dredging and disposal will only occur in the permitted areas specified on approved plans and with material approved in the Sea Dumping Permit.<br>• Dredge plant will be managed to ensure that there is no visible evidence of oil, grease, scum, litter or other objectionable matter in the water.<br>• All practical measures will be implemented to minimise the concentration of suspended solids released during the loading and disposal of dredge material.<br>• Routes to and from the spoil ground will be selected to consider, safety, environmental impacts and to minimise the risk of spillage outside of defined areas.<br>• Accurate positioning systems will be used on the dredge plant to ensure direct impacts are restricted to the approved dredging and disposal areas. |
| Monitoring | • Dredge and disposal plume monitoring program (Section 6.1).<br>• Water quality monitoring program (Section 6.2).<br>• Benthic habitat monitoring program (Section 6.3).<br>• Auditing of condition, positioning and sailing routes of the dredging plant. |
| Adaptive Management | • See adaptive management section of the dredge and disposal plume monitoring program (Section 6.1) and water quality monitoring program (Section 6.2).<br>• See adaptive management section of the benthic habitat monitoring program (Section 6.3). |
| Reporting | • The dredge contractor will provide daily track plots of the dredge plant to the Project Manager.<br>• Final reports on turbidity and plume monitoring to made available to regulators upon request. |

| **Marine Environmental Quality Management Framework – Water Quality (Benthic Communities and Habitats)** | |
|---|---|
| Responsibility | • Compliance with dredging plant and operation: *Dredge Contractor*<br>• Produce weekly dredge plan considering forecast: *Dredge Contractor*<br>• Approve dredge plan: RTIO *Project Manager*<br>• Commission appropriate monitoring programs:<br>  ○ Dredge and disposal plume monitoring: *RTIO Project Manager*<br>  ○ Water quality monitoring: *RTIO Environment Superintendent*<br>  ○ Benthic habitat monitoring program: *RTIO Environment Superintendent*<br>• Audit compliance as appropriate: *RTIO Project Manager* |

*Table 5-3 Chemical, waste, hydrocarbons and spill management framework*

| **Marine Environmental Quality Management Framework – Chemicals, Waste, Hydrocarbons and Spills** | |
|---|---|
| Objective | To maintain the quality of water, sediment and biota so that environmental and social values are protected. |
| Performance Target | • Compliance with MARPOL.<br>• Compliance with Marine Order 91 – Oil (as relevant to vessel class).<br>• No loss of solid or liquid hazardous waste to the marine environment.<br>• All project personnel to complete a project induction, including information on waste management practices.<br>• Vessel premobilisation to include checks and information on waste management practices. |
| Term | For the duration of dredging and disposal activities. |
| Management Action | <u>Chemical Management</u><br>• All chemical substances used on the dredge plant must comply with the dredge contractor's chemical management system. At a minimum, all chemicals must be recorded in a chemical register and maintained for the duration of the dredging campaign, which identifies the chemical properties of the substance, storage and handling requirements and any potential for environmental harm. |
| | <u>Waste Management</u><br>All vessels will manage wastes in accordance with Port Walcott requirements appropriate to the class of vessel (including AMSA and MARPOL legislative requirements).<br>• All waste or sewage will be disposed using the following pollution prevention and waste management measures:<br>  ○ No disposal of wastes within the marine environment within State Waters;<br>  ○ Seagoing vessels will manage waste in accordance with MARPOL 73/78 Annex IV, vessel waste logs and waste receipts (including sewage receipts) to be kept on board; |

| Marine Environmental Quality Management Framework – Chemicals, Waste, Hydrocarbons and Spills | |
|---|---|
| | ○ Disposal of any wastes outside of State Waters to comply with MARPOL Annex V;<br>○ Adoption of waste minimisation initiatives wherever practicable, in particular with regards to procurement and (sub)contracting processes;<br>○ Other than sewage or putrescible waste, all waste must be separated into scrap steel, chemical wastes, hazardous wastes, recyclable wastes (paper, cardboard, aluminium cans) and general wastes;<br>○ Waste skips and bins will be sufficient in number and fitted with lids to avoid fugitive wastes;<br>○ All bins shall be clearly labelled including waste oil storage tanks;<br>○ All employees and contractors involved in the handling, transfer, storage, and disposal of oil and hazardous substances will be appropriately trained, including the relevant regulatory requirements;<br>○ Use of licensed waste contractors for collection and disposal of vessel waste (including food scraps), untreated sewage and listed wastes;<br>○ Any wastes received at Port Walcott shall be removed from site for disposal at approved landfill or recycling facilities. |
| | Hydrocarbons and Spills Management<br><br>Operational spill management controls to prevent hydrocarbon and other spills into the marine environment during dredging activities include:<br><br>• Daily inspection logged for excessive oil and grease from cutter and drag heads.<br>• Complying with vessel traffic management protocols.<br>• Detailed records will be maintained of all vessel collision incidents (see Section 5.4).<br>• Bunkering of larger vessels (e.g. TSHD) will occur at facilities suitable for larger vessel, such as the Pilbara Ports Authority bulk liquids berth or Toll King Bay facility in the Port of Dampier. Smaller vessels may utilise RTIO provided refuelling facilities.<br>• Bunkering will occur in accordance with the standard operating procedures for the facility being used.<br>• The hydraulic oil systems on all vessels will be well maintained and regularly inspected with appropriate maintenance records and certificates. No obvious leaks. Vessels will be equipped with standard low pressure alarms and shut down systems to minimise hydrocarbon loss in the event of a burst hydraulic hose.<br>• Vessels will comply with AMSA Marine Order 32 (2017); https://www.amsa.gov.au/about/regulations-and-standards/marine-order-32-cargo-handling-equipment with clearly identified roles and responsibilities.<br>• Regular and documented maintenance of all vessels and equipment.<br>• All hydrocarbons stored on deck will be bunded in a secured area.<br>• Relevant employees and contractors involved in the storage, handling, transfer and disposal of fuel and other materials will be trained to ensure they are aware of their responsibilities systems, processes and procedures.<br>• Relevant contractors will be required to undertake spill response training and appropriate training exercises in accordance with their plans.<br>• Trained and certified crew members present on-board.<br>• AIS on all vessels. |

| **Marine Environmental Quality Management Framework – Chemicals, Waste, Hydrocarbons and Spills** | |
|---|---|
| | • Regular drills and exercises for crews. |
| Spill Response | • In the event that waste is lost overboard, all reasonable and practicable measures must be employed to retrieve the waste.<br>• Any hydrocarbon spill will be responded to following the procedures stated in the existing Cape Lambert First Strike Oil Spill Response Plan (Rio Tinto 2009b).<br>• First response hydrocarbon spill containment and recovery equipment will be available at RTIO operations to respond in the event of a potential hydrocarbon release. The appropriate harbour authority (Department of Transport) will then coordinate large scale responses. |
| Monitoring | • Housekeeping inspections to ensure appropriate storage of waste and no accumulation of waste materials in work areas.<br>• Should a significant hydrocarbon spill occur within the Proponent's dredge design area over the life of the SDP a further sediment sampling program (consistent with the NAGD) would be required to update the sediment quality assessment conducted for the application for SDP (SD2021/4007). |
| Reporting | • Waste discharges will be reported to the WA Department of Transport Marine Environmental Emergency Response Unit (for all spills within State Waters), or AMSA (spills outside of State Waters).<br>  ○ WA DoT - discharges will be reported using the Marine Pollution Report form (POLREP) via email. This can be accessed online https://www.transport.wa.gov.au/imarine/reporting-marine-oil-pollution.asp.<br>  ○ AMSA - discharges will be reported using procedures found at https://www.amsa.gov.au/marine-environment/marine-pollution/mandatory-marpol-pollution-reporting.<br>  ○ POLREPs are required for any illegal vessel discharge to the marine environment.<br>• The dredge contractor shall record the quantities and types of waste received and disposed of and the disposal method<br>• The dredge contractor shall report listed wastes to RTIO as required<br>• The dredge contractor shall report any significant loss of waste material to RTIO Marine Operations & Port Walcott harbour master as soon as practicable |
| Responsibility | • Compliance with above Management Actions: *Dredge Contractor*<br>• Availability of shore-side waste disposal facilities: *Dredge Contractor*<br>• Audit compliance as appropriate: RTIO *Project Manager*<br>• Reporting Spills to Authorities: *Dredge Contractor* |

## 5.3 Invasive Marine Species Management

Dredging vessels and plant and associated support vessels have the potential to transport IMS to site as biofouling or in ballast water. The management framework for IMS is provided in Table 5-4.

*Table 5-4 Invasive marine species management framework*

| **Invasive Marine Species Management Framework** | |
|---|---|
| Objective | To prevent the introduction of IMS to the marine environment at Port Walcott via vessels associated with dredging and disposal. |
| Performance Target | • Compliance with Condition 9 of Ministerial Statement (MS) 840<br>• Compliance throughout the project with IMS assessment process required by WA DPIRD.<br>• Compliance with Australian Quarantine inspection Service (AQIS) mandatory ballast water requirements.<br>• No establishment of IMS within waters adjacent to the development as a result of the dredging and spoil disposal activities. |
| Term | For the duration of dredging and disposal activities. |
| Management Action | • All Project vessels, including dredge and dredge support vessels, will be subjected to a marine pest risk procedure which complies with the Western Australian Government's Biofouling Biosecurity Policy of 2017 (DoF 2017).<br>• Prior to entry to the Port, all vessels will be required to undertake the RTIO IMS risk assessment which was developed to meet requirements of MS 840 and is aligned with the WA DPIRD Vessel-Check (DHI 2021). The RTIO IMS risk assessment considers:<br>  ○ vessel type.<br>  ○ cleaning and marine pest inspection history.<br>  ○ the presence, age and suitability of antifouling coating.<br>  ○ the type and treatment history of internal seawater systems.<br>  ○ previous areas of operation (including climatic region, and the presence of marine pests of concern) since the last documented cleaning and/or marine pest inspection, and the duration the vessel spent in those areas.<br>  ○ potential for residual sediment.<br>  ○ the nature of previous vessel operations.<br>  ○ any periods spent out of water immediately prior to mobilisation.<br>• Based on the outcomes of each IMS assessment, implement management measures commensurate with the risk (e.g. treatment of internal systems, IMS inspections or cleaning) to minimise the likelihood of IMS being introduced.<br>• Project vessels will manage their ballast water using one of the approved ballast water management options, as specified in the Australian Ballast Water Management Requirements (DAWE 2017, version 7) and in accordance with the Biosecurity Act 2015.<br>• Most dredging vessels used by RTIO will have completed dredging programs in local waters immediately prior to arrival at Cape Lambert (Port Walcott) and |

| Invasive Marine Species Management Framework | |
|---|---|
| | will, therefore, be able to provide supporting IMS assessment information and AQIS approvals. |
| Monitoring | • IMS surveys consistent with the National Monitoring Network for the Prevention and Management of Marine Pest Incursions, are conducted at Cape Lambert every three years (last survey conducted in 2019) in order to meet compliance with MS 840 as amended by MS 876 and MS 1049.<br>• Maintain records of vessel compliance with RTIO IMS risk assessment. |
| Reporting | • The IMS report must be provided to the RTIO Environmental Representative and any recommendations for further cleaning or biosecurity measures completed prior to starting work on the project. The report and documents providing evidence of required works must be held in the Project Office and be available for WA DPIRD inspectors.<br>• Should a marine pest listed on the Australian Priority Marine Pest List (APMPL) be detected (or suspected to be present), the Project will notify DPIRD via the Fishwatch line 1800 815 507 within 24 hours of becoming aware of the issue. DPIRD officers would then determine what management was required. |
| Responsibility | • Ensure contracts have relevant requirements: *RTIO Project Manager*<br>• Compliance with IMS provisions: *Dredge Contractor*<br>• IMS assessment: *RTIO Environment Representative*<br>• Notify DPIRD of any IMS: *RTIO Environment Representative* |

## 5.4 Vessel Management

Dredging within a working port presents the risk of vessel collision and the subsequent environmental and social impacts. The vessel management framework is detailed in Table 5-5.

*Table 5-5 Vessel management framework*

| Vessel Management Framework | |
|---|---|
| Objective | To minimise the risk of vessel collision/grounding and the resulting environmental and social impacts. |
| Performance Target | No vessel collisions (vessel to vessel or vessel to marine infrastructure) or groundings during dredging and disposal activities |
| Term | For the duration of dredging and disposal activities |
| Management Action | • A communication plan with RTIO Marine Coordinators will be in place, Marine Coordinators will be in control of all RTIO vessel sailing movements within RTIO channel (sailing to dredging area or to spoil area for dumping)<br>• Pilot Exemption certificate and local knowledge (pilot and harbour master) completed<br>• Communications with RTIO Vessel Traffic Services (VTS) will be conducted as per the communication plan<br>• Electronic Chart Display and Information System (ECDIS) maintained |

| **Vessel Management Framework** | |
|---|---|
| | • The dredge contractor will use an experienced and competent crew<br>• A constant bridge watch will be maintained<br>• An Emergency Response Plan and vessel specific procedures will be maintained<br>• Drills will be conducted according to ISM Schedule<br>• The operability of all vessels will be well maintained<br>• The DoT harbour master will be notified of activities (DoT to issue marine notice if deemed necessary)<br>• Vessel tracking systems, including automated identification systems (AIS) will be used on all project related vessels.<br>• Radar transponder<br>• Use of Blast Horn<br>• VHF radio communications will be established and maintained<br>• Vessel lighting and shapes will be maintained as per legislative requirements<br>• Vessel maintained according to AMOS requirements. Identified faults repaired as per OEM maintenance requirements<br>• Vessel Emergency Operations maintained (including emergency steering and black out auxiliary engines, monthly emergency drills rehearsed)<br>• All Project vessels will have suitable bridge lighting for night watch (maintain night vision)<br>• The dredge contractor and RTIO will undertake specific critical risk management/ control verification (CRM) |
| Monitoring | N/A |
| Reporting | • Any vessel collision or grounding will be reported to the DoT using the marine incident report form. This can be accessed online:<br><br>https://www.transport.wa.gov.au/mediaFiles/marine/MAC_F_MarineIncidentReport.pdf |
| Responsibility | • Compliance with management measures: *Dredge Contractor*<br>• Check on compliance: RTIO *Project Dredge Manager*<br>• Reporting Spills to Authorities: *Dredge Contractor* |

## 5.5 Management Checklist

A checklist of the major management actions is provided in Table 5-6.

*Table 5-6 Management actions checklist*

| When | Action | Responsibility |
|---|---|---|
| PRIOR TO COMMENCEMENT OF DREDGING | Sea Dumping Permit in place | RTIO Approvals Project Manager |
| | Dredging contract contains provisions for compliance with DEMP | RTIO Marine Operations |
| | Vessel risk check for IMS completed and assessed as suitable | |
| | Vessel audited for chemicals and containment of hydrocarbons | |
| | Ambient monitoring program (plumes, water quality, benthos) in place to appropriate degree | RTIO Environment Representative |
| DURING OPERATIONS | Vessel in correct location (within approved dredge footprint or spoil ground and in compliance with any weather-related guidance on dredging location) | Dredge Contractor |
| | Turbidity controls in place and functional | |
| | Turtle exclusion devices fitted and working | |
| | Soft start of pumps | |
| | MFO conducts pre-start observation and confirms no marine fauna within 300 m monitoring zone | |

# 6 OPERATIONAL MONITORING PROGRAMS AND INCIDENT MANAGEMENT PROCESS

The following monitoring programs will be undertaken to support the management measures listed in Section 5 for environmental quality management:

- Dredge and disposal plume monitoring;
- Water Quality monitoring (*in situ* light and turbidity); and
- Benthic Communities and Habitats monitoring.

Monitoring compliance with other management measures, such as marine fauna management, hydrocarbon management, IMS assessments and vessel management will be undertaken by a rolling audit program.

## 6.1 Dredge and Disposal Plume Monitoring

### 6.1.1 Rationale

The monitoring of dredge and disposal plumes conducted during past maintenance dredging campaigns at Cape Lambert suggests plumes may be visible within the 2 - 3 km around dredging and disposal (BMT 2020; MScience 2016), however, it is possible that they may disperse further if unexpected events occur (strong winds, tides; or patches of very fine sediment). If plumes are regularly intersecting sensitive habitats, impacts on benthos or loss of amenity at bathing beaches may occur.

In addition to a tool for adaptive management (both within and between campaigns), monitoring of visible sediment plumes provides an evidence base to test whether the origin of elevated turbidity events is related to dredging activity.

### 6.1.2 Methodology

Monitoring of suspended sediment concentrations in surface waters (<5 m) at the dredging and disposal sites will be conducted using imagery from NASA's Moderate Resolution Imaging Spectroradiometer (MODIS), the monitoring will include:

- Assessment of the location and extent of the visible plume around dredge and disposal sites using MODIS satellite imagery on a daily, or twice daily, basis dependent on the availability and quality of the MODIS satellite images; and
- Estimation of suspended sediment concentration (expressed as Total Suspended Sediment in mg/l - TSS) above background TSS within plumes using MODIS digital band data and the WAMSI algorithm of Dorji et al. (2016).

### 6.1.3 Reporting

The daily location of plumes will be reported to the RTIO Project dredge manager within 24 hours of MODIS satellite capture.

On completion of each dredge campaign all plumes will be amalgamated to produce an estimate of the 'realised plume' or Zone of Influence to demonstrate the area potentially impacted. The realised plume will be used to update the estimated Zone of Influence and, if necessary, update the DEMP management section to reduce potential environmental and social impacts.

### 6.1.4 Management Triggers

**Trigger Level 1**: A plume of intensity greater than 1 mg/l above background present over areas mapped as coral communities shown in Figure 6-1 for three (3) consecutive days.

**Trigger Level 2**: A plume of intensity greater than 10 mg/l above background present over areas mapped as coral communities shown in Figure 6-1 for three (3) consecutive days, or a plume of >1 mg/l above background over areas mapped as coral communities for seven (7) consecutive days.

### 6.1.5 Adaptive Management

Exceedance of the Level 1 trigger will invoke:

- a review of dredging and metocean conditions to investigate the cause of the exceedance and to improve the speed of any response to exceedance of a Level 2 trigger; and
- adaptation of dredging to reduce potential impacts if practical.

Exceedance of a Level 2 trigger will require alteration of the dredging activity which caused the exceedance. This might take the form of one or more of the following:

- Relocating the dredge to a different area;
- Altering the dredging cycle; and/or
- Disposing of spoil in a different spoil ground or different area of the same spoil ground.

## 6.2 Water Quality Monitoring

### 6.2.1 Rationale

Water quality monitoring programs conducted during previous dredging campaigns at Cape Lambert (BMT 2020; MScience 2016) have indicated that, outside of a 500 m zone of impact, sedimentation and light loss due to suspended sediments should not occur at frequency-intensity-duration (FID) combinations which would cause mortality of Benthic Primary Producers (BPP). Any impacts of dredging activities outside of the direct footprint and a 500 m buffer are likely to be transitory and sub-lethal. However, to confirm this hypothesis a water quality monitoring program will be implemented to assist with adaptive management, between campaigns, of potential indirect impacts to BPP from increased turbidity and reduced light using *in-situ* instrumentation.

The risk of significant impact on water quality has been assessed as low and previous maintenance dredging campaigns have not been shown to have significant impacts on water quality around sites with sensitive benthic receptor communities (BMT 2020; MScience 2016). Thus, real-time monitoring and adaptive management is proposed only for campaigns lasting longer than 7 days of dredging and disposal activity. For campaigns of less than 7 days, instruments would be deployed in logging mode and retrieved following dredging, with adaptive management taking the form of revising future dredging plans based on past results where necessary.

### 6.2.2 Methodology

Water quality monitoring instrument sets are to be placed at the sites listed in Table 6-2 and shown in Figure 6-1 prior to commencement of each dredging campaign.

Instrument sets would include light meters (telemetered for campaigns of >7d) and nephelometers for recording turbidity. Instruments would be set to measure every 30 minutes and, when relevant, to regularly transmit data (for example every 6 hours).

Instruments will be deployed and tested at least three days prior to commencement of any sediment disturbance from the dredging program and for seven days following the completion of the dredging activity (including post-dredging bed levelling). The proposed sites have been used previously for the Proponent's long-term water quality monitoring program at Cape Lambert and have documented turbidity and light profiles of many years data to obviate the need for extended monitoring periods before or after dredging.

The monitoring parameters and schedule will follow those detailed in Table 6-2.

### 6.2.3 Management Triggers

A review of the history of water quality at the monitoring sites has been undertaken and triggers derived from that data (MScience 2021b) and the most relevant published works on Pilbara dredging triggers (Jones et al. 2019; Jones et al. 2020). The review concluded that light-based triggers are the most appropriate monitoring metric to determine potential water quality impacts from maintenance dredging campaigns at Cape Lambert, and used the triggers developed by the WAMSI Dredging Science Node Program (as shown in Table 6-1). A trigger would only be deemed to be reached where it was determined that there was a causal link to dredging in part or whole for the reduction in light levels below the threshold. That determination would be made on the basis of MODIS tracking of plumes and water quality at Reference sites from that period and, when available, reference to turbidity recordings.

*Table 6-1 Water quality thresholds for management triggers at Test Sites (Jones et al. 2019).*

| Thresholds | | | |
|---|---|---|---|
| **Level 1** | | **Level 2** | |
| Duration of running mean calculation | DLI* | Duration of running mean calculation | DLI* |
| 7 day | 1.8 | 7 day | 0.6 |
| 14 day | 2.5 | 14 day | 1.1 |
| 28 day | 3.1 | 28 day | 1.8 |
| | | | |
| *DLI – Daily Light Index (mol photon/$m^2$/d) – stated as running means that Test Sites are not to drop below | | | |

### 6.2.4 Adaptive Management

For all dredging campaigns:

Running mean light levels below a Level 1 threshold will invoke:

- a review of dredging and metocean conditions to investigate the cause of reaching the threshold; and
- where reaching the threshold is due to the dredging campaign, the causes of reaching the threshold will be addressed in future dredging programs to reduce the potential of recurrence, where practical.

Running mean light levels below a Level 2 trigger will invoke:

- a review of dredging and metocean conditions to investigate the cause of reaching the threshold; and
- amendment(s) to the DEMP which will have a high degree of confidence of ensuring that similar levels of impact on water quality do not recur in subsequent campaigns.

For dredging campaigns of longer than 7 days, where real-time data are available:

In addition to the above management measures, the following actions will be taken:

Running mean light levels below a Level 1 threshold:

- Will be reported to the RTIO Project Manager as soon as practical after it is confirmed; and
- the RTIO Project Manager will discuss the implementation of potential measures to avoid recurrence with the Dredge Contractor.

Running mean light levels below a Level 2 threshold:

- Will be reported to the RTIO Project Manager as soon as practical after it is confirmed.
- The Dredge Contractor will be required to amend dredging or disposal characteristics as soon as practical to allow the light levels to recover above the Level 2 threshold at the site where the Level 2 threshold was reached.
- Evidence of the success of those measures shall be taken to be a rise in the Daily Light Index above the relevant means in Table 6-1. Should that criterion not be met following the change in dredging/disposal, further changes will be sought until the criterion is met.

As rolling means are subject to data averaged over a long period, light levels (DLI) for days at the end of the rolling period may already be above the rolling mean, indicating improving water quality. Where that occurs, the Level 2 management action above will default to that of Level 1 – i.e. examine measures to avoid recurrence, rather than seek immediate changes.

Where light levels continue to be below a threshold for consecutive days, it will be counted as one trigger event only (e.g. if a rolling 14 day threshold is reached on Day 15 as a result of a few very low light levels in days 8-9, light levels may continue to be below the threshold value for days 16 to 22 until there are sufficient new readings to average out the very low light levels recorded on days 8-9).

*Table 6-2 Water quality and benthic habitat monitoring sites, parameters and schedule*

| Site Name (ID) | Easting (GDA94Z50) | Longitude (GDA94Z50) | Monitoring Program | | | | |
|---|---|---|---|---|---|---|---|
| | | | Water Quality | | | Benthic Communities and Habitats | |
| | | | Parameters | | Schedule | Parameters | Schedule |
| **Test Sites** | | | | | | | |
| Bells Reef (BLR) | 514687 | 7723863 | <u>Turbidity (NTU)</u><br>Logged during every dredging campaign | <u>Light (PAR)</u><br>• Logged during dredging campaigns <7days.<br>• Telemetered during dredging campaigns >7days. | <u>All dredging campaigns</u>:<br>NTU and PAR measured and logged every 30mins, 24hrs a day for each dredging and disposal campaign.<br><br><u>Dredging campaigns >7days</u>:<br>NTU is logged and PAR is telemetered. Telemetered data are regularly transmitted (for example every 6 hours). | Images and Observations (as per section 6.3.2) | Pre and Post dredging for campaigns anticipated to take 7 days or more. |
| Bezout Island (BZI) | 517913 | 7727251 | | | | | |
| Bezout Rock (BZR) | 516819 | 7726127 | | | | | |
| Middle Reef (MDR) | 520361 | 7722103 | | | | | |
| Cape Lambert West (CLW) | 516959 | 7721946 | | | | | |
| Intertidal Communities | (see Figure 6-1) | | N/A | | N/A | Images and Observations (as per section 6.3.2) | Pre and Post dredging for campaigns anticipated to take 7 days or more. |
| **Reference Sites** | | | | | | | |
| Dixon Island East (DIE) | 507194 | 7720119 | <u>Turbidity (NTU)</u><br>Logged during every dredging campaign | <u>Light (PAR)</u><br>• Logged during dredging campaigns <7days.<br>• Telemetered during dredging campaigns >7days. | <u>All dredging campaigns</u>:<br>NTU and PAR measured and logged every 30mins, 24hrs a day for each dredging and disposal campaign.<br><br><u>Dredging campaigns >7days</u>:<br>NTU is logged and PAR is telemetered. Telemetered data are regularly transmitted (for example every 6 hours). | Images and Observations (as per section 6.3.2) | Pre and Post dredging for campaigns anticipated to take 7 days or more. |
| Hat Rock (HAT) | 529747 | 7714522 | | | | | |

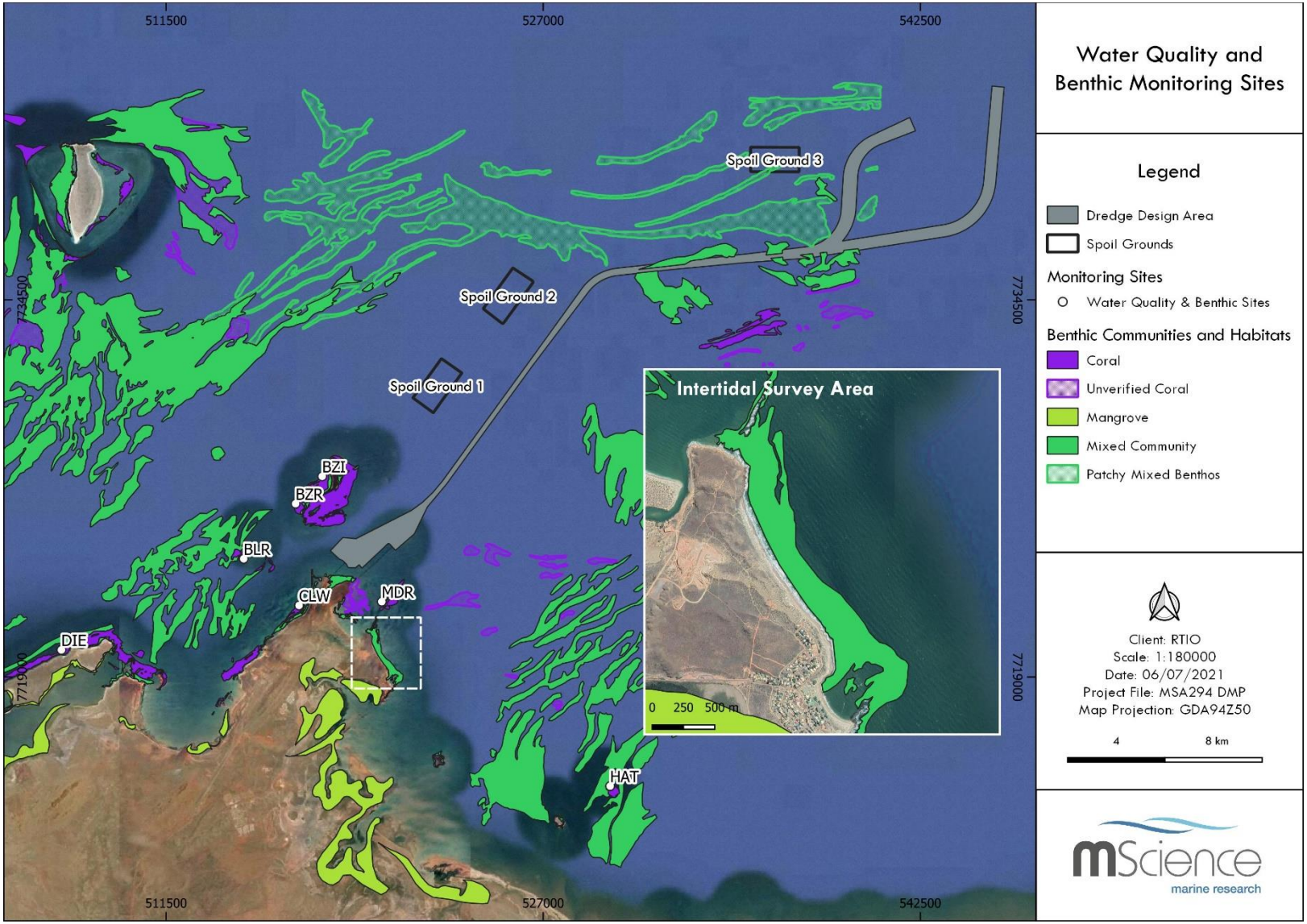


*Figure 6-1 Water quality and BCH monitoring sites*

## 6.3 Benthic Communities and Habitats Monitoring

### 6.3.1 Rationale

While the risk assessment predicts a low risk to benthos from maintenance dredging, unexpected conditions may lead to excessive sediment load at sensitive receptor sites. In addition, there is a reputational risk from impacts on benthos from non-project causes. Tropical reef communities are regularly subject to degradation from thermal bleaching, coral predators and cyclones. While mixed coral reef communities around the Cape Lambert and Point Samson area have been noted to have healthy levels of biotic cover in the past, these may have been affected adversely by natural events occurring since the last surveys. Surveys of potential risk areas prior to and after extended dredging (dredging programs longer than 7 days) will provide evidence to allow assessment as to whether any changes were caused by the Project.

Given the relatively low risk ranking of benthic impacts and the lack of impacts within these communities observed during previous (larger) dredging campaigns, the intent of monitoring would be to record the general status of benthic communities rather than undertake fully quantified assessments of single status indicators (such as coral cover) for use in statistical inferential testing of change.

### 6.3.2 Methodology

For dredging campaigns longer than 7 days:

Surveys will record representative images of the coral reef communities at receptor sites closest to dredging and relevant reference sites. In-situ observations will be recorded, and images captured for later assessment of:

- General levels of cover of living organisms and the type of organisms present;
- The proportion of living versus 'dead-in-place' organisms;
- Levels of sediment cover on biota;
- The prevalence of bleaching within corals;
- Presence of mucus on sentinel corals such as *Porites*;
- Evidence of coral predator impacts or disease.

At least five transects of 20 m will be established at each of the Test and Reference sites identified in Table 6-2 and Figure 6-1. Images will be collected along each transect. Observations (as above) and image assessments will be conducted by qualified marine scientists with experience in surveying coral reefs.

Timing:

Pre-dredging surveys will be undertaken as close as practical before the start of dredging. Post dredging surveys will be completed within 2 weeks after the dredging campaign, weather permitting.

Following each post-dredging survey, the indicators of reef health listed above will be evaluated in a semi-quantitative before-after-control-impact assessment to determine whether any observed stress or mortality was related to dredging activity.

### 6.3.3 Adaptive Management

Should significant impacts on benthic communities be identified and assessed as due to the dredging activity an investigation would be undertaken and include:

- Evaluation of the local significance of the impact;
- Root cause assessment of the impact, including review of dredging activities, plume tracking and water quality monitoring;
- Assessment of how the DEMP might be amended to avoid recurrence of such impacts in future maintenance dredging campaigns.

The DEMP would be amended to reflect the above at the next review point.

# 7 CONSULTATION AND COMMUNITY FEEDBACK

The key stakeholders engaged with specific reference to maintenance dredging activities included:

- City of Karratha
- Coastal Community Environmental Forum, including representatives from:
    - The Department of Biodiversity, Conservation and Attractions
    - The Department of Fisheries
    - The Department of Water and Environmental Regulation
    - Dampier Salt
    - Pilbara Ports Authority
    - City of Karratha
    - Pilbara Development Commission
    - Ngarluma Aboriginal Corporation
    - Karratha Community Association
    - General Community
    - RecFish West
- Dampier Technical Advisory and Consultative Committee (TACC), including representatives from:
    - Pilbara Ports Authority
    - The Department of Biodiversity, Conservation and Attractions
    - The Department of Planning, Lands and Heritage
    - The Department of Water and Environmental Regulation
    - The Department of Agriculture, Water and the Environment
    - Woodside Energy
- Department of Transport - Harbour Master
- Marine Services Western Australia Pilots
- Ngarluma Aboriginal Corporation
- Parks Australia
- Point Samson Community Association
- The Department of Agriculture, Water and the Environment

Full details of this stakeholder engagement including key outcomes are provided in Appendix B.

# 8 PERFORMANCE AUDIT

A compliance audit schedule will be developed based on the conditions/obligations contained within the SDP and any other relevant approval documents. It is envisaged that the management and mitigation actions detailed in the DEMP will form the basis of the audit criteria.

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# 10 APPENDIX A – EPBC PROTECTED MATTERS SEARCH

Australian Government

Department of Agriculture, Water and the Environment

# EPBC Act Protected Matters Report

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

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

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

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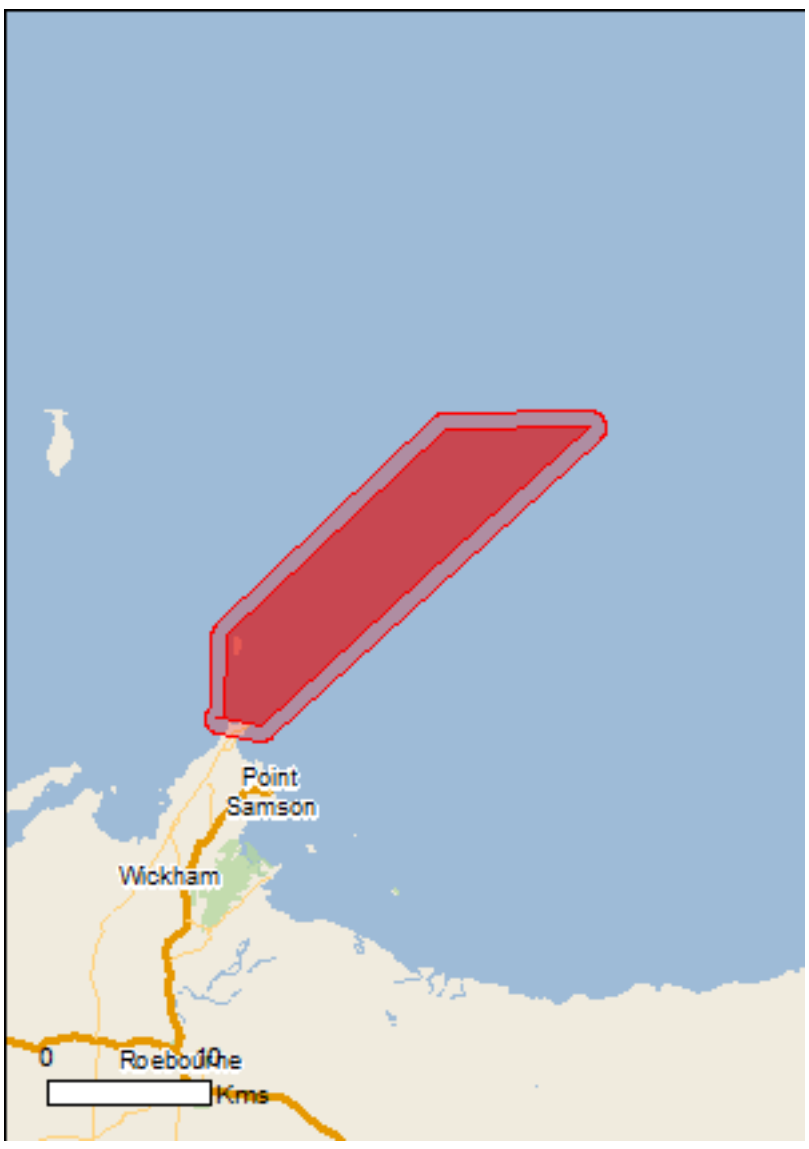




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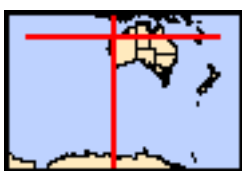

# Summary

## Matters of National Environmental Significance

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

| | |
|---|---|
| World Heritage Properties: | None |
| National Heritage Places: | None |
| Wetlands of International Importance: | None |
| Great Barrier Reef Marine Park: | None |
| Commonwealth Marine Area: | 1 |
| Listed Threatened Ecological Communities: | None |
| Listed Threatened Species: | 26 |
| Listed Migratory Species: | 41 |

## Other Matters Protected by the EPBC Act

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

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

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

| | |
|---|---|
| Commonwealth Land: | None |
| Commonwealth Heritage Places: | None |
| Listed Marine Species: | 80 |
| Whales and Other Cetaceans: | 12 |
| Critical Habitats: | None |
| Commonwealth Reserves Terrestrial: | None |
| Australian Marine Parks: | 1 |

## Extra Information

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

| | |
|---|---|
| State and Territory Reserves: | None |
| Regional Forest Agreements: | None |
| Invasive Species: | 11 |
| Nationally Important Wetlands: | None |
| Key Ecological Features (Marine) | None |

# Details

## Matters of National Environmental Significance

### Commonwealth Marine Area [ Resource Information ]

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside the Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area. Generally the Commonwealth Marine Area stretches from three nautical miles to two hundred nautical miles from the coast.

Name

EEZ and Territorial Sea

### Marine Regions [ Resource Information ]

If you are planning to undertake action in an area in or close to the Commonwealth Marine Area, and a marine bioregional plan has been prepared for the Commonwealth Marine Area in that area, the marine bioregional plan may inform your decision as to whether to refer your proposed action under the EPBC Act.

Name

North-west

### Listed Threatened Species [ Resource Information ]

| Name | Status | Type of Presence |
|---|---|---|
| Birds | | |
| Calidris canutus<br>Red Knot, Knot [855] | Endangered | Species or species habitat known to occur within area |
| Calidris ferruginea<br>Curlew Sandpiper [856] | Critically Endangered | Species or species habitat may occur within area |
| Falco hypoleucos<br>Grey Falcon [929] | Vulnerable | Species or species habitat likely to occur within area |
| Limosa lapponica  menzbieri<br>Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri) [86432] | Critically Endangered | Species or species habitat known to occur within area |
| Macronectes giganteus<br>Southern Giant-Petrel, Southern Giant Petrel [1060] | Endangered | Species or species habitat may occur within area |
| Numenius madagascariensis<br>Eastern Curlew, Far Eastern Curlew [847] | Critically Endangered | Species or species habitat known to occur within area |
| Pezoporus occidentalis<br>Night Parrot [59350] | Endangered | Species or species habitat may occur within area |
| Rostratula australis<br>Australian Painted Snipe [77037] | Endangered | Species or species habitat may occur within area |
| Sternula nereis  nereis<br>Australian Fairy Tern [82950] | Vulnerable | Species or species habitat known to occur |

| Name | Status | Type of Presence within area |
|---|---|---|
| **Mammals** | | |
| Balaenoptera musculus<br>Blue Whale [36] | Endangered | Species or species habitat likely to occur within area |
| Dasyurus hallucatus<br>Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331] | Endangered | Species or species habitat known to occur within area |
| Macroderma gigas<br>Ghost Bat [174] | Vulnerable | Species or species habitat likely to occur within area |
| Megaptera novaeangliae<br>Humpback Whale [38] | Vulnerable | Breeding known to occur within area |
| Rhinonicteris aurantia (Pilbara form)<br>Pilbara Leaf-nosed Bat [82790] | Vulnerable | Species or species habitat may occur within area |
| **Reptiles** | | |
| Aipysurus apraefrontalis<br>Short-nosed Seasnake [1115] | Critically Endangered | Species or species habitat likely to occur within area |
| Caretta caretta<br>Loggerhead Turtle [1763] | Endangered | Species or species habitat known to occur within area |
| Chelonia mydas<br>Green Turtle [1765] | Vulnerable | Breeding known to occur within area |
| Dermochelys coriacea<br>Leatherback Turtle, Leathery Turtle, Luth [1768] | Endangered | Breeding likely to occur within area |
| Eretmochelys imbricata<br>Hawksbill Turtle [1766] | Vulnerable | Breeding known to occur within area |
| Lerista nevinae<br>Nevin's Slider [85296] | Endangered | Species or species habitat likely to occur within area |
| Liasis olivaceus  barroni<br>Olive Python (Pilbara subspecies) [66699] | Vulnerable | Species or species habitat likely to occur within area |
| Natator depressus<br>Flatback Turtle [59257] | Vulnerable | Breeding known to occur within area |
| **Sharks** | | |
| Carcharodon carcharias<br>White Shark, Great White Shark [64470] | Vulnerable | Species or species habitat may occur within area |
| Pristis clavata<br>Dwarf Sawfish, Queensland Sawfish [68447] | Vulnerable | Species or species habitat known to occur within area |
| Pristis zijsron<br>Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442] | Vulnerable | Species or species habitat known to occur within area |
| Rhincodon typus<br>Whale Shark [66680] | Vulnerable | Species or species habitat may occur within area |

| Listed Migratory Species | | [ Resource Information ] |
|---|---|---|
| * Species is listed under a different scientific name on the EPBC Act - Threatened Species list. | | |
| Name | Threatened | Type of Presence |
| **Migratory Marine Birds** | | |

| Name | Threatened | Type of Presence |
|---|---|---|
| Anous stolidus<br>Common Noddy [825] | | Species or species habitat may occur within area |
| Apus pacificus<br>Fork-tailed Swift [678] | | Species or species habitat likely to occur within area |
| Ardenna pacifica<br>Wedge-tailed Shearwater [84292] | | Breeding known to occur within area |
| Calonectris leucomelas<br>Streaked Shearwater [1077] | | Species or species habitat likely to occur within area |
| Fregata ariel<br>Lesser Frigatebird, Least Frigatebird [1012] | | Species or species habitat known to occur within area |
| Macronectes giganteus<br>Southern Giant-Petrel, Southern Giant Petrel [1060] | Endangered | Species or species habitat may occur within area |
| **Migratory Marine Species** | | |
| Anoxypristis cuspidata<br>Narrow Sawfish, Knifetooth Sawfish [68448] | | Species or species habitat likely to occur within area |
| Balaenoptera edeni<br>Bryde's Whale [35] | | Species or species habitat may occur within area |
| Balaenoptera musculus<br>Blue Whale [36] | Endangered | Species or species habitat likely to occur within area |
| Carcharhinus longimanus<br>Oceanic Whitetip Shark [84108] | | Species or species habitat likely to occur within area |
| Carcharodon carcharias<br>White Shark, Great White Shark [64470] | Vulnerable | Species or species habitat may occur within area |
| Caretta caretta<br>Loggerhead Turtle [1763] | Endangered | Species or species habitat known to occur within area |
| Chelonia mydas<br>Green Turtle [1765] | Vulnerable | Breeding known to occur within area |
| Dermochelys coriacea<br>Leatherback Turtle, Leathery Turtle, Luth [1768] | Endangered | Breeding likely to occur within area |
| Dugong dugon<br>Dugong [28] | | Species or species habitat known to occur within area |
| Eretmochelys imbricata<br>Hawksbill Turtle [1766] | Vulnerable | Breeding known to occur within area |
| Isurus oxyrinchus<br>Shortfin Mako, Mako Shark [79073] | | Species or species habitat likely to occur within area |
| Isurus paucus<br>Longfin Mako [82947] | | Species or species habitat likely to occur within area |
| Manta alfredi<br>Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray [84994] | | Species or species habitat known to occur within area |

| Name | Threatened | Type of Presence |
|---|---|---|
| Manta birostris<br>Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995] | | Species or species habitat likely to occur within area |
| Megaptera novaeangliae<br>Humpback Whale [38] | Vulnerable | Breeding known to occur within area |
| Natator depressus<br>Flatback Turtle [59257] | Vulnerable | Breeding known to occur within area |
| Orcinus orca<br>Killer Whale, Orca [46] | | Species or species habitat may occur within area |
| Pristis clavata<br>Dwarf Sawfish, Queensland Sawfish [68447] | Vulnerable | Species or species habitat known to occur within area |
| Pristis zijsron<br>Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442] | Vulnerable | Species or species habitat known to occur within area |
| Rhincodon typus<br>Whale Shark [66680] | Vulnerable | Species or species habitat may occur within area |
| Sousa chinensis<br>Indo-Pacific Humpback Dolphin [50] | | Species or species habitat likely to occur within area |
| Tursiops aduncus (Arafura/Timor Sea populations)<br>Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900] | | Species or species habitat likely to occur within area |
| **Migratory Terrestrial Species** | | |
| Hirundo rustica<br>Barn Swallow [662] | | Species or species habitat may occur within area |
| Motacilla cinerea<br>Grey Wagtail [642] | | Species or species habitat may occur within area |
| Motacilla flava<br>Yellow Wagtail [644] | | Species or species habitat may occur within area |
| **Migratory Wetlands Species** | | |
| Actitis hypoleucos<br>Common Sandpiper [59309] | | Species or species habitat known to occur within area |
| Calidris acuminata<br>Sharp-tailed Sandpiper [874] | | Species or species habitat likely to occur within area |
| Calidris canutus<br>Red Knot, Knot [855] | Endangered | Species or species habitat known to occur within area |
| Calidris ferruginea<br>Curlew Sandpiper [856] | Critically Endangered | Species or species habitat may occur within area |
| Calidris melanotos<br>Pectoral Sandpiper [858] | | Species or species habitat may occur within area |
| Charadrius veredus<br>Oriental Plover, Oriental Dotterel [882] | | Species or species habitat may occur within area |

| Name | Threatened | Type of Presence |
|---|---|---|
| Glareola maldivarum | | |
| Oriental Pratincole [840] | | Species or species habitat may occur within area |
| Limosa lapponica | | |
| Bar-tailed Godwit [844] | | Species or species habitat known to occur within area |
| Numenius madagascariensis | | |
| Eastern Curlew, Far Eastern Curlew [847] | Critically Endangered | Species or species habitat known to occur within area |
| Pandion haliaetus | | |
| Osprey [952] | | Breeding known to occur within area |

## Other Matters Protected by the EPBC Act

| Listed Marine Species | | [ Resource Information ] |
|---|---|---|
| * Species is listed under a different scientific name on the EPBC Act - Threatened Species list. | | |
| Name | Threatened | Type of Presence |
| Birds | | |
| Actitis hypoleucos | | |
| Common Sandpiper [59309] | | Species or species habitat known to occur within area |
| Anous stolidus | | |
| Common Noddy [825] | | Species or species habitat may occur within area |
| Apus pacificus | | |
| Fork-tailed Swift [678] | | Species or species habitat likely to occur within area |
| Ardea alba | | |
| Great Egret, White Egret [59541] | | Species or species habitat likely to occur within area |
| Ardea ibis | | |
| Cattle Egret [59542] | | Species or species habitat may occur within area |
| Calidris acuminata | | |
| Sharp-tailed Sandpiper [874] | | Species or species habitat likely to occur within area |
| Calidris canutus | | |
| Red Knot, Knot [855] | Endangered | Species or species habitat known to occur within area |
| Calidris ferruginea | | |
| Curlew Sandpiper [856] | Critically Endangered | Species or species habitat may occur within area |
| Calidris melanotos | | |
| Pectoral Sandpiper [858] | | Species or species habitat may occur within area |
| Calonectris leucomelas | | |
| Streaked Shearwater [1077] | | Species or species habitat likely to occur within area |

| Name | Threatened | Type of Presence |
|---|---|---|
| Charadrius veredus<br>Oriental Plover, Oriental Dotterel [882] | | Species or species habitat may occur within area |
| Chrysococcyx osculans<br>Black-eared Cuckoo [705] | | Species or species habitat likely to occur within area |
| Fregata ariel<br>Lesser Frigatebird, Least Frigatebird [1012] | | Species or species habitat known to occur within area |
| Glareola maldivarum<br>Oriental Pratincole [840] | | Species or species habitat may occur within area |
| Haliaeetus leucogaster<br>White-bellied Sea-Eagle [943] | | Species or species habitat likely to occur within area |
| Hirundo rustica<br>Barn Swallow [662] | | Species or species habitat may occur within area |
| Larus novaehollandiae<br>Silver Gull [810] | | Breeding known to occur within area |
| Limosa lapponica<br>Bar-tailed Godwit [844] | | Species or species habitat known to occur within area |
| Macronectes giganteus<br>Southern Giant-Petrel, Southern Giant Petrel [1060] | Endangered | Species or species habitat may occur within area |
| Merops ornatus<br>Rainbow Bee-eater [670] | | Species or species habitat may occur within area |
| Motacilla cinerea<br>Grey Wagtail [642] | | Species or species habitat may occur within area |
| Motacilla flava<br>Yellow Wagtail [644] | | Species or species habitat may occur within area |
| Numenius madagascariensis<br>Eastern Curlew, Far Eastern Curlew [847] | Critically Endangered | Species or species habitat known to occur within area |
| Pandion haliaetus<br>Osprey [952] | | Breeding known to occur within area |
| Puffinus pacificus<br>Wedge-tailed Shearwater [1027] | | Breeding known to occur within area |
| Rostratula benghalensis (sensu lato)<br>Painted Snipe [889] | Endangered* | Species or species habitat may occur within area |
| Fish | | |
| Acentronura larsonae<br>Helen's Pygmy Pipehorse [66186] | | Species or species habitat may occur within area |
| Bulbonaricus brauni<br>Braun's Pughead Pipefish, Pug-headed Pipefish [66189] | | Species or species habitat may occur within area |
| Campichthys tricarinatus<br>Three-keel Pipefish [66192] | | Species or species habitat may occur within |

| Name | Threatened | Type of Presence |
|---|---|---|
| | | area |
| Choeroichthys brachysoma<br>Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194] | | Species or species habitat may occur within area |
| Choeroichthys latispinosus<br>Muiron Island Pipefish [66196] | | Species or species habitat may occur within area |
| Choeroichthys suillus<br>Pig-snouted Pipefish [66198] | | Species or species habitat may occur within area |
| Doryrhamphus dactyliophorus<br>Banded Pipefish, Ringed Pipefish [66210] | | Species or species habitat may occur within area |
| Doryrhamphus janssi<br>Cleaner Pipefish, Janss' Pipefish [66212] | | Species or species habitat may occur within area |
| Doryrhamphus multiannulatus<br>Many-banded Pipefish [66717] | | Species or species habitat may occur within area |
| Doryrhamphus negrosensis<br>Flagtail Pipefish, Masthead Island Pipefish [66213] | | Species or species habitat may occur within area |
| Festucalex scalaris<br>Ladder Pipefish [66216] | | Species or species habitat may occur within area |
| Filicampus tigris<br>Tiger Pipefish [66217] | | Species or species habitat may occur within area |
| Halicampus brocki<br>Brock's Pipefish [66219] | | Species or species habitat may occur within area |
| Halicampus grayi<br>Mud Pipefish, Gray's Pipefish [66221] | | Species or species habitat may occur within area |
| Halicampus nitidus<br>Glittering Pipefish [66224] | | Species or species habitat may occur within area |
| Halicampus spinirostris<br>Spiny-snout Pipefish [66225] | | Species or species habitat may occur within area |
| Haliichthys taeniophorus<br>Ribboned Pipehorse, Ribboned Seadragon [66226] | | Species or species habitat may occur within area |
| Hippichthys penicillus<br>Beady Pipefish, Steep-nosed Pipefish [66231] | | Species or species habitat may occur within area |
| Hippocampus angustus<br>Western Spiny Seahorse, Narrow-bellied Seahorse [66234] | | Species or species habitat may occur within area |
| Hippocampus histrix<br>Spiny Seahorse, Thorny Seahorse [66236] | | Species or species habitat may occur within area |
| Hippocampus kuda<br>Spotted Seahorse, Yellow Seahorse [66237] | | Species or species habitat may occur within area |

| Name | Threatened | Type of Presence |
|---|---|---|
| Hippocampus planifrons<br>Flat-face Seahorse [66238] | | Species or species habitat may occur within area |
| Hippocampus trimaculatus<br>Three-spot Seahorse, Low-crowned Seahorse, Flat-faced Seahorse [66720] | | Species or species habitat may occur within area |
| Micrognathus micronotopterus<br>Tidepool Pipefish [66255] | | Species or species habitat may occur within area |
| Phoxocampus belcheri<br>Black Rock  Pipefish [66719] | | Species or species habitat may occur within area |
| Solegnathus hardwickii<br>Pallid Pipehorse, Hardwick's Pipehorse [66272] | | Species or species habitat may occur within area |
| Solegnathus lettiensis<br>Gunther's Pipehorse, Indonesian Pipefish [66273] | | Species or species habitat may occur within area |
| Solenostomus cyanopterus<br>Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183] | | Species or species habitat may occur within area |
| Syngnathoides biaculeatus<br>Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279] | | Species or species habitat may occur within area |
| Trachyrhamphus bicoarctatus<br>Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280] | | Species or species habitat may occur within area |
| Trachyrhamphus longirostris<br>Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281] | | Species or species habitat may occur within area |
| **Mammals** | | |
| Dugong dugon<br>Dugong [28] | | Species or species habitat known to occur within area |
| **Reptiles** | | |
| Acalyptophis peronii<br>Horned Seasnake [1114] | | Species or species habitat may occur within area |
| Aipysurus apraefrontalis<br>Short-nosed Seasnake [1115] | Critically Endangered | Species or species habitat likely to occur within area |
| Aipysurus duboisii<br>Dubois' Seasnake [1116] | | Species or species habitat may occur within area |
| Aipysurus eydouxii<br>Spine-tailed Seasnake [1117] | | Species or species habitat may occur within area |
| Aipysurus laevis<br>Olive Seasnake [1120] | | Species or species habitat may occur within area |
| Aipysurus tenuis<br>Brown-lined Seasnake [1121] | | Species or species habitat may occur within area |
| Astrotia stokesii<br>Stokes' Seasnake [1122] | | Species or species habitat may occur within |

| Name | Threatened | Type of Presence |
|---|---|---|
| | | area |
| Caretta caretta<br>Loggerhead Turtle [1763] | Endangered | Species or species habitat known to occur within area |
| Chelonia mydas<br>Green Turtle [1765] | Vulnerable | Breeding known to occur within area |
| Dermochelys coriacea<br>Leatherback Turtle, Leathery Turtle, Luth [1768] | Endangered | Breeding likely to occur within area |
| Disteira kingii<br>Spectacled Seasnake [1123] | | Species or species habitat may occur within area |
| Disteira major<br>Olive-headed Seasnake [1124] | | Species or species habitat may occur within area |
| Emydocephalus annulatus<br>Turtle-headed Seasnake [1125] | | Species or species habitat may occur within area |
| Ephalophis greyi<br>North-western Mangrove Seasnake [1127] | | Species or species habitat may occur within area |
| Eretmochelys imbricata<br>Hawksbill Turtle [1766] | Vulnerable | Breeding known to occur within area |
| Hydrelaps darwiniensis<br>Black-ringed Seasnake [1100] | | Species or species habitat may occur within area |
| Hydrophis czeblukovi<br>Fine-spined Seasnake [59233] | | Species or species habitat may occur within area |
| Hydrophis elegans<br>Elegant Seasnake [1104] | | Species or species habitat may occur within area |
| Hydrophis mcdowelli<br>null [25926] | | Species or species habitat may occur within area |
| Hydrophis ornatus<br>Spotted Seasnake, Ornate Reef Seasnake [1111] | | Species or species habitat may occur within area |
| Natator depressus<br>Flatback Turtle [59257] | Vulnerable | Breeding known to occur within area |
| Pelamis platurus<br>Yellow-bellied Seasnake [1091] | | Species or species habitat may occur within area |

| Whales and other Cetaceans | | [ Resource Information ] |
|---|---|---|
| Name | Status | Type of Presence |
| Mammals | | |
| Balaenoptera acutorostrata<br>Minke Whale [33] | | Species or species habitat may occur within area |
| Balaenoptera edeni<br>Bryde's Whale [35] | | Species or species habitat may occur within area |
| Balaenoptera musculus<br>Blue Whale [36] | Endangered | Species or species habitat likely to occur |

| Name | Status | Type of Presence |
|---|---|---|
| | | within area |
| Delphinus delphis<br>Common Dophin, Short-beaked Common Dolphin [60] | | Species or species habitat may occur within area |
| Grampus griseus<br>Risso's Dolphin, Grampus [64] | | Species or species habitat may occur within area |
| Megaptera novaeangliae<br>Humpback Whale [38] | Vulnerable | Breeding known to occur within area |
| Orcinus orca<br>Killer Whale, Orca [46] | | Species or species habitat may occur within area |
| Sousa chinensis<br>Indo-Pacific Humpback Dolphin [50] | | Species or species habitat likely to occur within area |
| Stenella attenuata<br>Spotted Dolphin, Pantropical Spotted Dolphin [51] | | Species or species habitat may occur within area |
| Tursiops aduncus<br>Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418] | | Species or species habitat likely to occur within area |
| Tursiops aduncus (Arafura/Timor Sea populations)<br>Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900] | | Species or species habitat likely to occur within area |
| Tursiops truncatus s. str.<br>Bottlenose Dolphin [68417] | | Species or species habitat may occur within area |

| Australian Marine Parks | [ Resource Information ] |
|---|---|
| Name | Label |
| Dampier | Multiple Use Zone (IUCN VI) |

## Extra Information

| Invasive Species | [ Resource Information ] |
|---|---|

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

| Name | Status | Type of Presence |
|---|---|---|
| Birds | | |
| Columba livia<br>Rock Pigeon, Rock Dove, Domestic Pigeon [803] | | Species or species habitat likely to occur within area |
| Passer montanus<br>Eurasian Tree Sparrow [406] | | Species or species habitat likely to occur within area |
| Mammals | | |
| Canis lupus familiaris<br>Domestic Dog [82654] | | Species or species habitat likely to occur |

| Name | Status | Type of Presence within area |
|---|---|---|
| Equus caballus<br>Horse [5] | | Species or species habitat likely to occur within area |
| Felis catus<br>Cat, House Cat, Domestic Cat [19] | | Species or species habitat likely to occur within area |
| Oryctolagus cuniculus<br>Rabbit, European Rabbit [128] | | Species or species habitat likely to occur within area |
| Rattus rattus<br>Black Rat, Ship Rat [84] | | Species or species habitat likely to occur within area |
| Vulpes vulpes<br>Red Fox, Fox [18] | | Species or species habitat likely to occur within area |
| **Plants** | | |
| Cenchrus ciliaris<br>Buffel-grass, Black Buffel-grass [20213] | | Species or species habitat likely to occur within area |
| Opuntia spp.<br>Prickly Pears [82753] | | Species or species habitat likely to occur within area |
| **Reptiles** | | |
| Ramphotyphlops braminus<br>Flowerpot Blind Snake, Brahminy Blind Snake, Cacing Besi [1258] | | Species or species habitat likely to occur within area |

# Caveat

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

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

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

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

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

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

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

- migratory and
- marine

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

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

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

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

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

# Coordinates

-20.590785 117.169162,-20.547713 117.170535,-20.439657 117.291385,-20.439014 117.371722,-20.593999 117.189075,-20.590785 117.167102,-20.590785 117.169162

# Acknowledgements

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

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

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

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


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# 11 APPENDIX B – STAKEHOLDER ENGAGEMENT

| Stakeholder | Date | Topic | Comments | Rio Tinto response |
|---|---|---|---|---|
| Department of Agriculture, Water and the Environment | 19/2/20, 28/7/20, 6/11/20, 30/11/20 | • Requirement for a new Sea Dumping Permit for maintenance dredging at Cape Lambert<br>• Approval process<br>• Need to dispose of rock material from near the berth pockets<br>• Proposed change to the permitted disposal depth from -12.0m to -11.0m LAT at the Cape Lambert spoil grounds | DAWE confirmed approval process, advised a Dredge Management Plan should be provided with the Sea Dumping Permit application and advised stakeholder consultation should be completed particularly in relation to the proposed change to the permitted disposal depth | A draft Dredge Management Plan has been prepared and will be provided with the Sea Dumping Permit Application.<br>Stakeholders have been consulted in relation to the proposed change to the permitted disposal depth; no issues were raised. |
| Marine Services Western Australia (MSWA) Pilots | 18/03/2020 | Proposed change to permitted disposal depth from -12.0m LAT to -11.0m LAT at the Cape Lambert spoil grounds | MSWA confirmed they have no concerns with the proposed changed in permitted disposal depth in relation to pilotage/shipping navigation | - |

| Stakeholder | Date | Topic | Comments | Rio Tinto response |
|---|---|---|---|---|
| Coastal Communities Environmental Forum (CCEF)<br><br>Including representatives from:<br>• City of Karratha:<br>• Department of Biodiversity, Conservation and Attractions<br>• Department of Water and Environmental Regulation<br>• General community<br>• Karratha Community Association<br>• Ngarluma Aboriginal Corporation<br>• Pilbara Development Commission<br>• Pilbara Port Authority | 16/6/2020 | • Requirement for a new Sea Dumping Permit for maintenance dredging at Cape Lambert<br>• Sediment sampling to be undertaken<br>• Copy of presentation provided to attendees | 1. Will the annualised dredge volumes be the same as currently approved?<br><br>2. What is the minimum depth of water over the dredge spoil grounds? | 1. Annualised dredge volumes will remain similar to those currently approved. Application is for 500,000m$^3$ over 5 years.<br><br>2. Minimum (low tide) freeboard over the Cape Lambert spoil grounds is -12m (LAT).<br>*This information was updated in the CCEF meeting on 19/11/20.* |
| City of Karratha | 7/10/2020 | • Requirement for a new Sea Dumping Permit for maintenance dredging at Cape Lambert<br>• Scope of the Sea Dumping Permit application | No specific items raised in this forum | - |

| Stakeholder | Date | Topic | Comments | Rio Tinto response |
|---|---|---|---|---|
| Point Samson Community Association | 8/10/2020 | • Requirement for a new Sea Dumping Permit for maintenance dredging at Cape Lambert<br>• Scope of the Sea Dumping Permit application<br>• Copy of the presentation provided to attendees | 1. Can Rio Tinto build an artificial reef in the spoil ground locations once the spoil grounds are full?<br><br>2. How is Rio Tinto going to inform the broader community of these dredging activities?<br><br>3. How is Rio Tinto going to manage interactions with local vessels?<br><br>4. Will the change in seabed height have an impact on navigation?<br><br>5. Queries on sediment suspension plumes and how the sediment will be disposed of within the spoil grounds<br><br>6. Does the spoil ground move and how will re-suspension between dredging activities be managed?<br><br>7. Will fish be smothered by the dredging disposal activity? How will this impact be minimised? | 1. This may be an option in the future. However, the scope of the current application is to seek to undertake a further 5 years of maintenance dredging at Cape Lambert and does not include these activities. A proposal to install an artificial reef would trigger a separate approval process.<br><br>2. The stakeholder consultation process will include a notice to mariners, notifications at the local boat ramps, a notice on community Facebook pages and engagement with the Australian Hydrographic Office, City of Karratha, DAWE and DoT in preparation for this activity. Other community organisations will also be consulted through the CCEF, with the next meeting scheduled for November 2020.<br><br>3. Vessel interactions are managed through stakeholder engagement, as detailed above, as well as the use of required communication tools while in the water, such as:<br>• Constant bridge watch<br>• Notification to PPA / DoT of activities<br>• Monitoring of AIS<br>• Radar transponder<br>• Use of Blast Horn<br>• VHF radio communications<br>• Vessel lighting and shapes as per legislative requirements<br>• Vessel maintained according to AMOS requirements<br><br>4. Annualised dredge volumes will remain approximately the same as currently approved. Application is for 500,000$m^3$ over 5 years with a proposed permitted disposal depth of -11.0m. Existing minimum (low tide) freeboard over the Cape Lambert spoil grounds is generally -12m (LAT) however some shallower sections |

| Stakeholder | Date | Topic | Comments | Rio Tinto response |
|---|---|---|---|---|
| | | | | naturally exist so the change in permitted disposal depth is not expected to impact navigation.<br><br>5. Dredge spoil is deposited based on a deposition plan that is informed by the pre-dredging hydrographic survey. This survey provides an understanding of the current heights of the spoil grounds and therefore where the optimal locations for deposition are to maintain compliance with navigational requirements and maintain the agreed water depth. Sampling of the berth pocket sediment is also implemented to detect any contaminants that may be mobilised during the activities. Results from the sampling indicate the material is suitable for ocean disposal.<br><br>6. Hydrographic surveys are conducted prior to and post dredging activities to determine movement since previous activities. A buffer is established around each of the spoil grounds and historically these buffer grounds have remained intact between dredging activities. There is potential for mobilisation of sediment during cyclonic activity.<br><br>7. Dredge spoil material is deposited from the TSHD hopper in a slow, controlled manner just above the spoil grounds. The deposition of spoil material is very specific and localised with different dump boxes used for each campaign in order to meet depth requirements associated with the spoil grounds. Some disturbed habitat within the spoil grounds will be affected. Deposited material is, however, similar to material in the spoil grounds and re-colonization by similar species is expected post disposal of dredge spoil. |

| Stakeholder | Date | Topic | Comments | Rio Tinto response |
|---|---|---|---|---|
| Ngarluma Aboriginal Corporation | 9/11/2020 | • Requirement for a new Sea Dumping Permit for maintenance dredging at Cape Lambert<br>• Scope of the Sea Dumping Permit application<br>• Copy of the presentation provided to attendees | No specific items raised in this forum | - |
| Coastal Communities Environmental Forum<br><br>Including representatives from:<br>• City of Karratha:<br>• Dampier Salt<br>• Department of Biodiversity, Conservation and Attractions<br>• Department of Fisheries<br>• Department of Water and Environmental Regulation<br>• General community<br>• Karratha Community Association<br>• Pilbara Port Authority<br>• RecFish West | 19/11/2020 | • Update on the Sea Dumping Permit application for maintenance dredging at Cape Lambert<br>• Scope of the Sea Dumping Permit application<br>• Copy of the presentation provided to attendees | Which spoil grounds will the change in permitted disposal depth apply to? | The proposed change in disposal depth applies to the three current spoil grounds at Cape Lambert to enable them to be used to their maximum capacity |
| Department of Transport Harbour Master | 26/11/2020, 27/11/20 | Proposed change to permitted disposal depth from -12.0m LAT to -11.0m LAT at the Cape Lambert spoil grounds | No marine safety concerns or other issues raised; supportive of the proposed change to permitted disposal depth. | - |

| Stakeholder | Date | Topic | Comments | Rio Tinto response |
|---|---|---|---|---|
| Dampier Technical Advisory and Consultative Committee (TACC)<br><br>Including representatives from:<br>• Pilbara Port Authority<br>• Department of Biodiversity, Conservation and Attractions<br>• Department of Planning, Lands and Heritage<br>• Department of Primary Industries and Regional Development<br>• Department of Agriculture, Water and the Environment<br>• Murujuga Aboriginal Corporation<br>• Woodside | 27/11/2020 | • Information about previous dredging campaigns<br>• Requirement for a new Sea Dumping Permit for maintenance dredging at Cape Lambert<br>• Scope of the Sea Dumping Permit application<br>• Copy of the presentation provided to attendees | Will the change in permitted disposal depth at the spoil grounds change the retention of sediment? | The change in disposal depth is not expected to change the retention of sediment as some areas in the spoil grounds naturally have height at -11m LAT. A 100 m buffer is designated inside the spoil grounds to accommodate potential movement of sediment. |
| Parks Australia | 17/2/2021 | • Requirement for a new Sea Dumping Permit for maintenance dredging at Cape Lambert<br>• Scope of Sea Dumping Permit application<br>• Licensing requirements for activities in Dampier Marine Park | Parks Australia confirmed the disposal of dredge spoil can be undertaken under the Class Approval for artificial reefs and disposal of dredged material in accordance with a Sea Dumping Permit.<br><br>Parks Australia indicated some of RTIO's proposed activities in the Marine Park will require a Marine Park license. | Provide additional information to Parks Australia about sampling in the Marine Park and existing Cape Lambert approvals granted under the EPBC Act.<br><br>Submit an application to Parks Australia for a Marine Park Licence as required for proposed activities in the Dampier Marine Park. |