# Onslow Marine Support Base Stage 2: Dredging & Spoil Disposal Management Plan

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# 1. Introduction

## 1.1. Background

Beadon Creek is located approximately 2 km East of the town of Onslow in the Pilbara, within the Shire of Ashburton. Onslow is located 1386 kms north of Perth and 360 kms south of Karratha. The township is 80 km west off the North West Coastal Highway. It is ideally located to service offshore locations including the Mackerel Islands, Barrow Island (Gorgon LNG Plant), Exmouth Gulf, and the Carnarvon Basin (oil and gas reserves) as well as in-land mines including Rio Tinto's Mesa A site and Pannawonica.

The Beadon Creek Maritime Facility was developed in 1964 and is managed by the Department of Transport (DoT). The facility is used as a harbour for both recreational and commercial activities, but has recently transformed from a small facility supporting local and charter fishing activities to a significant facility supporting the myriad of industrial and commercial activities associated with the growing offshore oil and gas industry in the region. The Beadon Creek Maritime Facility covers an area of 15.29 ha and includes ~260 m wharf face, mooring berths, cyclone moorings, public service wharf, dual public boat ramp, diesel fuelling facilities, public car park and fish cleaning facilities.

In 2012, DoT proposed to upgrade the current facilities in Beadon Creek via the capital dredging of 65,000 $m^3$ of material to create a berth pocket to -2.6 m Chart Datum (CD) and turning basin to a design depth of -1.6m CD, immediately west of the existing channel (BMT Oceanica 2015). The proposed works were referred to the Environmental Protection Authority (EPA) in August 2013 and determined to be 'Not Assessed - Public Advice Given' in April 2014 (EPA 2014).

These upgrade works to the Beadon Creek Maritime Facility were undertaken by DoT in conjunction with Onslow Marine Support Base Pty Ltd (OMSB), as part of Stage 1 of the OMSB Project. Works for this stage included construction of a 2.58 ha land-backed wharf within the existing Beadon Creek Maritime Facility and capital dredging to facilitate the development of a marine support facility. Stage 1 of this project is now nearing completion and OMSB proposes to improve vessel access to the facilities as part of Stage 2 of the project.

## 1.2. Proposal Summary

OMSB Pty Ltd is proposing to modify and extend the Beadon Creek harbour approach channel (HAC), turning circle and berth pocket as part of Stage 2 of the OMSB project. The proposed capital dredging will enable offshore supply vessels to access the newly-constructed OMSB land-backed wharf infrastructure within the DoT managed, Beadon Creek Maritime Facility. Dredge material will be disposed of onshore within surplus land adjacent to the Onslow airport. A detailed description of the Proposal, including the key proposal characteristics is provided in Section 2.

## 1.3. Proponent

The proponent for the Proposal is OMSB Pty Ltd. Proponent details are provided in Table 1.

**Table 1 Proponent details**

| | |
|---|---|
| **Company Name:** | OMSB Pty Ltd |
| **Australian Business Number (ABN):** | 59 167 963 715 |
| **Address:** | PO Box 1077 SOUTH PERTH, WA 6951 |
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## 1.4. Purpose

The purpose of this DSDMP is to outline the proposed construction activities required for the project and to identify and manage potential environmental impacts associated with these works. Project specific objectives have been developed to ensure the environmental factors outlined in the EPA Statement (2016) are protected. Specific management actions for both dredging operations and sediment disposal activities have been developed to measure compliance against these specific project objectives.

# 2. Description of Works

## 2.1. Proposal Description

OMSB propose to modify and extend the harbour approach channel, turning circle and berth pocket as part of Stage 2 of the OMSB Project. The proposed capital dredging will enable offshore supply vessels to access the newly-constructed OMSB land-backed wharf infrastructure within the Beadon Creek Maritime Facility.

The capital dredging proposed includes a turning basin and channel to a declared depth of - 6.0 m CD and a berth pocket to -8.0mCD, with a total dredge volume anticipated to be approximately 930,000 cubic metres (**Figure 1**). Dredging will be undertaken using a medium-sized cutter suction dredge over a period of approximately eight (8) months.

Dredge material is proposed to be hydraulically transported from the dredge location to the proposed Dredge Material Management Area (DMMA) (**Figure 1**). The disposal site is located adjacent to the Onslow Airport, within freehold land owned by the Shire of Ashburton (SoA). During dredging, the dredge spoil area will be dewatered to the intertidal flats between the disposal site and the western tributary of Beadon Creek. In accordance with the strategic objectives of the SoA to meet the region’s demand for affordable serviced industrial land, the material is proposed for future reuse to develop and extend the Light Industrial Area in Onslow.

## 2.2. Proposal Key Characteristics

The key characteristics of the dredging and spoil disposal (Construction) elements of the Proposal are summarised in **Table 2**.

**Table 2 Location and proposed extent of physical proposal elements**

| Element | Location | Proposed Extent |
|---|---|---|
| ***Physical Elements*** | | |
| Approach Channel | Figure 1 | Harbour approach channel (HAC) dredge area of 32 ha, with a target depth of -6.0 m CD, width of 55 metres (m) and length of 2 km.<br>Direct removal of 21 ha of nearshore subtidal benthic communities and habitat (BCH) from within the HAC dredge area. |
| Turning Basin | Figure 1 | Turning basin dredge area of 2 ha, with a target depth of -6.0 m CD and a diameter of 143 m. |
| Berth Pocket | Figure 1 | Berth pocket dredge area of 3 ha, with a target depth of -8.0 m CD. |
| Dredge Material Management Area (DMMA) | Figure 1 | Onshore spoil disposal area of 44 ha.<br>Clearing of no more than 16.2 ha of native vegetation within the onshore spoil disposal area. |
| Channel Navigation Markers | Unspecified. | Floating (i.e. moored) channel navigation markers (approximately 15) will be installed within the development areas as required.<br>No removal of BCH is required. |
| Dredge Material Disposal Pipeline | Figure 1 (Two Options Proposed) | Two (2) pipeline route options are proposed:<br>Pipeline Route Option A – 450 mm diameter pipeline installed within a 50 m wide pipeline route corridor. Pipeline confined to existing tracks and road reserve. Clearing of 0.2 ha of native vegetation is expected within the pipeline corridor.<br>Pipeline Route Option B – 450 mm diameter pipeline installed within a 50 m wide pipeline route corridor. Pipeline confined to Beadon Creek and intertidal flats adjacent to Beadon Creek. Clearing of <0.1 ha of native vegetation is expected within the pipeline corridor. |

| Element | Location | Proposed Extent |
|---|---|---|
| | | Potential direct loss of 0.1 ha of BCH within the pipeline corridor. |
| ***Operational Elements*** | | |
| Capital Dredging – Approach Channel | Figure 1 | Capital dredging of 758,000 $m^3$ of marine sediment from within the harbour approach channel dredge area to target depth of -6.0 m CD. |
| Capital Dredging – Turning Basin | Figure 1 | Capital dredging of 86,500 $m^3$ of marine sediment from within the Turning Basin dredge area to target depth of -6.0 m CD. |
| Capital Dredging – Berth Pocket | Figure 1 | Capital dredging of 85,500 $m^3$ of marine sediment from within the Berth Pocket dredge area to target depth of -8.0 m CD. |
| Dredge Material Disposal Pipeline | Figure 1 | Two (2) pipeline route options are proposed:<br>Pipeline Route Option A – Temporary installation of 450 mm diameter onshore pipeline and booster stations within the pipeline corridor to transport dredge material from floating pipeline to DMMA.<br>Pipeline Route Option B – Temporary installation of 450 mm diameter floating pipeline and booster stations within the pipeline corridor to transport dredge material to an onshore pipeline connection and subsequently to the DMMA. |
| Onshore Spoil Disposal to DMMA | Figure 1 | Disposal of approximately 930,000 $m^3$ of clean, uncontaminated marine sediment to the DMMA. |
| Onshore Spoil Disposal Dewatering | Figure 1 | Controlled discharge of approximately 21 megalitres (ML) per day of dredge spoil return water to the adjacent intertidal catchment of Beadon Creek. |
| Channel Navigation Markers | Unspecified | Floating (i.e. moored) channel navigation markers will be installed within the development areas as required. |


**Figure 1 OMSB Stage 2 project area, including proposed capital dredging area and spoil disposal location**

## 2.3. Scope of Construction Work

The scope and sequencing of the construction elements of the Proposal includes:

1. Mobilisation and installation of a dedicated Cutter Suction Dredge (CSD);
2. Mobilisation and Installation of all pipeline (floating and land based) including required booster stations in order to discharge all of the dredged materials in the DMMA;
3. Preparation of the DMMA;
4. Dredging of the Berth Pocket and discharging of dredged materials to the DMMA;
5. Dredging of the Turning Circle and discharging of dredged materials to the DMMA;
6. Dredging of the Harbour Approach Channel (HAC) and discharging of dredged materials to the DMMA;
7. Dredged materials handling at the DMMA required;
8. Dredge tail water discharge from the DMMA to the adjacent Beadon Creek intertidal area as required;
9. Pre- and post-dredge hydrographic Survey(s); and
10. Demobilisation and site clearance upon completion of the Works.

### 2.3.1. Preliminary Construction Schedule

Under the current project schedule, dredging construction activities are planned to commence in Quarter 4, 2017 once all required internal and external approvals are granted. Dredging and onshore spoil disposal is proposed to be undertaken over a period of approximately eight months. An indicative project schedule is presented in Table 3.

**Table 3 Preliminary project construction schedule.**

| Project Schedule Milestone | Estimated Duration |
|---|---|
| Project Preliminaries | 5 Weeks |
| Mobilisation & Installation | 13 Weeks |
| Dredging & Spoil Disposal (Turning Basin) | 5 Weeks |
| Dredging & Spoil Disposal (Approach Channel inside Training Wall) | 10 Weeks |
| Dredging & Spoil Disposal (Approach Channel Offshore) | 13 Weeks |
| Dredging & Spoil Disposal (Berth Pocket) | 2 Weeks |
| Demobilisation & Site Clearance | 3 Weeks |

## 2.4. Mobilisation and Site Installation

All plant and equipment including pipeline will be transported via sea and/or public road from the various locations around Australia and the world to the Project Site at Onslow in WA. Two 200T mobile cranes will be mobilised from Karratha to assist with dredge assembly and to lift the dredge and auxiliary equipment into the water. Other required marine equipment (e.g. work boats and crew transfer vessels) will be chartered locally. Relevant required civil plant will be hired locally. Sufficient marine and land based survey equipment will be brought to site in order to successfully deliver the works. Proposed equipment includes:

- CSD;
- Booster Barge;
- Anchor/Bunker Barge;
- Booster Station x2;
- 3.5 km Floating Pipeline;

- 2.5 km Land Pipeline;
- Various Civil Plant; and
- Auxiliary Plant and Equipment.

## 2.5. Site Facility

The area which is intended for use for site facilities and lay-down is located south of the Beadon Creek Road and west of the current DoT facilities.

The Lay-Down area will need to provide sufficient storage space to store the containers with spare parts, pipeline, booster stations, etc. A basic site office with relevant amenities will be set-up. This site office will contain all the requirements under the contract as well as the superintendent's office (if required). A base station for survey will also be installed here to ensure the accuracy of works.

## 2.6. Pipeline Installation (Floating)

The floating pipeline will run from the rear of the dredge to the shore connection. When the floating length of pipeline exceeds 1500m, a floating booster station will be added to the line. The floating pipeline will be supported by flotation devises to maintain sufficient buoyancy and visibility at all times. After dredging the Turning Basin, the northern sections of the HAC will be dredged and progressively more floating pipeline will be added. In order to add pipeline, pipeline strings of up to 300 m (25 lengths) will be prepared in advance and will be scheduled to be added when the CSD is not operational. The final section to be dredged will be the southern section of the HAC (south of the Turning Basin) and the length of floating pipeline will be reduced to approximately 500m.

## 2.7. Pipeline Installation (Land)

The shore pipeline will have a fixed route from the shore connection through to the DMMA. Multiple road crossings and overpasses have been identified, of which the major one is the crossing with Beadon Creek Road.

During discharge operations, additional lengths of pipeline will be added as the site progresses in size. When the discharge distance between the last pump in the pipeline and the end of the pipe becomes larger than approximately 1,500 m, a (land) booster station will be added. Proper pipeline management and sequencing of work areas will focus on limiting the required length of pipe at all times.

For pipeline route option A, the pipeline will primarily be confined to existing tracks, roadside reserve and cleared areas. However, potential clearing of <0.2 ha native vegetation is expected.

For pipeline route option B, the pipeline will primarily be confined to the intertidal flats adjacent to the western tributary of Beadon Creek. However, potential clearing of <0.1 ha native vegetation and potential direct impact on 0.1 ha intertidal BCH is expected.

## 2.8. Dredging

### 2.8.1. Cutter Suction Dredge (Damen Cutter Suction Dredger CSD450)

A Damen CSD450 dredger is proposed to be used for the Project. The dredger and specifications are presented in **Figure 2.**

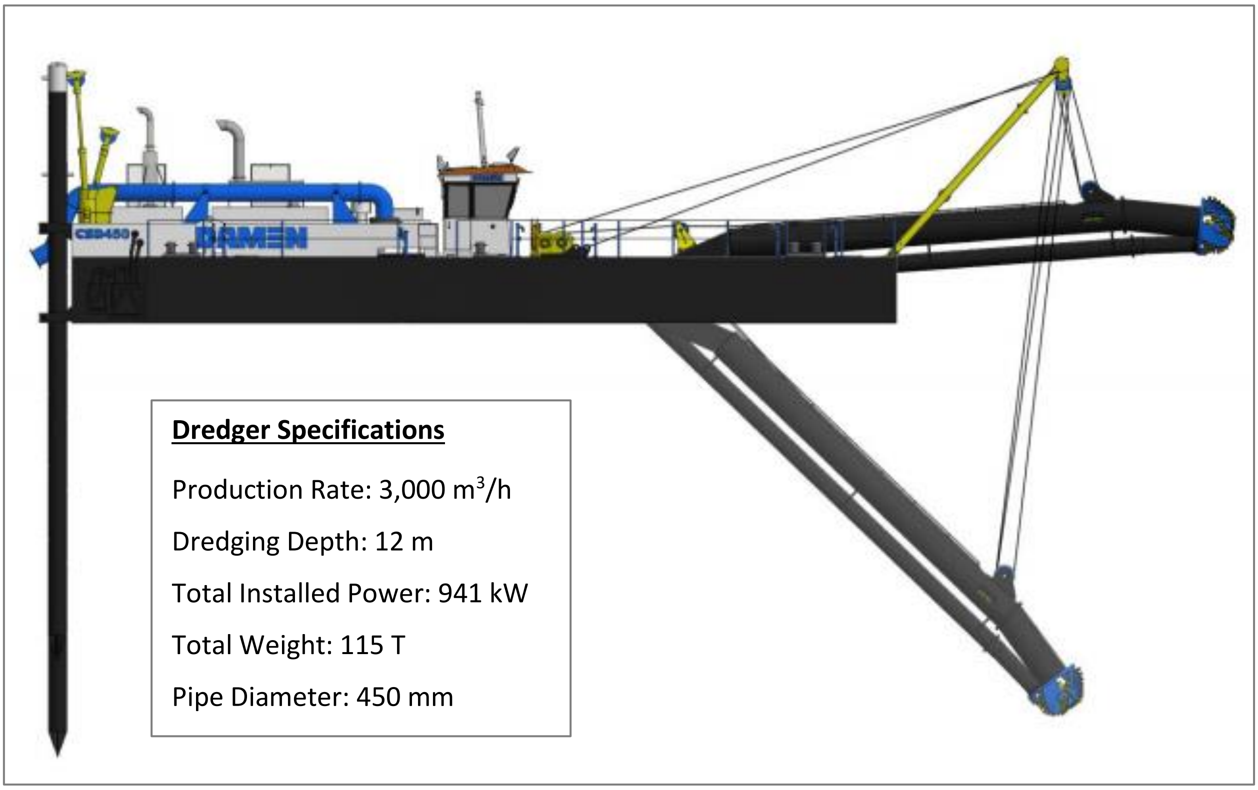


**Figure 2 Damen cutter suction dredger CSD450 specifications (DAMEN 2017)**

After the CSD has been assembled and placed in the water, the required commissioning activities will take place. This will include the installation of the latest version of the DREDGEPACK software updated with the design of the various dredge areas. The required dredge parameters will be calibrated and the dredge will be towed into position for the first cut.

In general, a cutter suction dredge is a stationary dredge and consists of a U-shaped pontoon, which is held in position by a fixed spud and two anchors. The soil is loosened by rotating a cutting head (the “cutter”). The cutter head, which is hydraulically driven, encloses the suction intake of a centrifugal (dredge) pump. The cutter head is mounted at the extremity of a fabricated steel structure (the ‘ladder’), which is attached to the main hull by heavy hinges, enabling rotation in the vertical plane. The ladder assembly is lowered and raised by means of the ladder winch controlled from the operator’s cabin.

During the dredging activities, the CSD swings around the main spud with the help of its side winches which pull on two anchor lines. These will be placed in positions to minimise intermediate relocation. The total area which a dredge can cover without re-locating its anchors is called the “cut”. Depending on the width and length of the dredge area, several “cuts” might be needed. Each “cut” will then have an overlap with another cut in order to cover the entire dredge area. The operation of the cutter section consists of cutting the seabed with the cutter head and pumping the mixture of water and materials by means of the centrifugal pump into the suction mouth. The water and sediment mix is pumped through a floating pipeline, which is connected to the rear end of the CSD, through to the land based pipe and discharge location.

Each of the proposed dredge areas will have a pre-dredge survey performed prior to commencement of that section in order to determine the final cut-plan. The cut-plan will be based on the Box-cut Method. The number of Box-cut layers will be dependent on the soil type and the total depth to be dredged. As such the number of dredged layers within one box can be different. Intermediate surveys will be carried out during dredging to monitor progress, and are also used for internal planning purposes. Immediately upon completion of a section data will be handed over to the client by means of a post dredge survey. Details of the out-survey method are to be integrated into the contract.

To enable the dredged materials to be transported hydraulically over a length of approximately 5-6 km and to generate a constant flow of material in the pipeline, at least 2 booster stations will be installed at various locations. The total length of the pipeline, the diameter of the pipeline, the constitution of the material transported, friction losses and the capacity of the cutter suction dredger determine the capacity and locations of the required booster stations. The locations of the booster stations are of significant importance, to guarantee a stable system and to maintain a minimum required pressure level throughout the pipeline alignment.

### 2.8.2. Process Control

The dredging and disposal process is largely controlled by computing software and the vessels positioning system. The dredge software package to be utilised is the DREDGEPACK Dredge Operations Software. This software and hardware package is specifically designed to monitor the exact position and depth of the cutter head and keeps track of the computed “as dredged” surface.

The positioning system will be Differential Global Positioning System, DGPS in combination with a tidal receiver. The output of this positioning system will be X, Y and Z co-ordinates of the vessel. Cutter position is determined relative to the ship by means of an angle transducer, measuring the angle between the cutter ladder and the horizontal. The x, y, and z of the cutter position is calculated by the dredge computer. With this software package and in combination with regular hydrographic surveys it is possible to accurately calculate the quantity of materials moved during a shift. Regular hydrographic surveys will be performed in co-ordination with the Client to check the actual progress of the dredge, which will be used for reporting purposes.

## 2.9. Onshore Dredge Spoil Disposal

Dredge material is proposed to be disposed onshore within the DMMA, which is situated south west of the Beadon Creek Road at the back of the current industrialised area. The DMMA will be prepared by stripping the existing topsoil and stockpiling it at strategic locations surrounding the disposal site(s).

The dredged materials will be transported to the DMMA via a series of pipelines and booster stations as described in **Sections 2.6** and **Section 2.7**. At the DMMA, the discharge lines will be subdivided into branches. The initial discharge pipeline layout will be installed using standard civil plant. The dredged materials will be pumped in a controlled and sequenced manner into the respective sections of the DMMA. Filling will progress from the point of discharge (i.e. the outlet of the dredging discharge pipe). Controlling and managing the filling process will be achieved by monitoring and spreading the fill material using earthmoving equipment such as bulldozers and hydraulic excavators. After the fines have settled out the dredge water will be tailed to Beadon Creek via a controllable valve.

### 2.9.1. Dredge Material Disposal Strategy

A Dredge Material Disposal Strategy (DMDS) is to be developed prior to the commencement of construction works. The DMDS will:

- Define various stages of the spoil disposal;
- Include a plan showing the locations, characteristics and dimensions of weirs, culverts and outfalls;
- Consider and describe flow paths through the DMMA and settling basins;
- Describe the layout and utilisation of settling basins to ensure that the Suspended Solids Concentration (SSC) levels are minimised at the outflow location towards the Beadon Creek;
- Provide information on the quantity and characteristics of material to be pumped into the DMMA, including results of geotechnical assessment of the material;
- Address the practical constraints regarding initial perimeter bund construction; and
- Present the modelling outcome to demonstrate how the proposed DMDS will achieve target SSC at the tail water discharge outfall.

Preliminary considerations for the DMDS are described in **Section 2.9.2**, **2.9.3** and **2.9.4** below.

### 2.9.2. Bund Design

A bund design will be prepared based on DMMA subsoil stratigraphy and conditions regarding width and height of the bund. The bund design will be checked for geotechnical stability. The stability analyses will include limit equilibrium methods to compute the safety factor of the slopes like the Bishop critical slip circle analysis. The Bishop circular failure calculations are based on moment equilibrium along a circular failure envelope through the slope. For this method, no interslice shear forces are taken into account. Furthermore, the bund stability will be checked for horizontal/lateral sliding. The resulting safety factors are defined as the ratio between the driving and the resisting forces or moments.

Safety factors will be established as part of the design. Safety factors depend on coverage (planar as well as vertical) of soil information and the type of strength parameter tests performed during the soils investigation.

### 2.9.3. Design Conditions and Reference Information

**Initial Considerations**

The DMMA must be designed and operated to provide adequate initial storage capacity and surface area to hold the dredged materials during the filling operations and to retain the suspended solids such that clear water is discharged (USACE, 2015).

**Required fill quantities & dredge productions**

A total quantity of about 930,000m$^3$ of dredged materials will be discharged into the DMMA. All materials will be dredged by means of a medium Cutter Suction Dredge (CSD) and hydraulically transported towards the DMMA via a combination of floating and shore pipelines and booster stations. The following average productions and discharge levels are envisaged for this CSD:

- Medium CSD production: 500 m$^3$/noh (solids); and
- Medium CSD discharge rate: 1.0 m$^3$/s (total flow).

Productions will be lower in the outer areas of the channel.

**Soil characteristics and fines contents**

<u>OMSB Stage 1 - Dredge Material Classification</u>

A geotechnical assessment of materials dredged during Stage 1 has been carried out by Galt Geotechnics and is reported via a Technical Memorandum on 30 May 2017. This assessment was used in conjunction with the Stage 2 results presented below to provide a preliminary determination of the dredged soil characteristics for Stage 2 Dredging works.

On the basis of this assessment, the following commentary was made regarding the classification of the soil (Galt Geotechnics 2017):

*Based on the laboratory test results, the proposed material generally meets the requirement for not being classified as unsuitable material under Clause 4.4.3, with the following comments made regarding the material*:

- *The material is classified as SAND (SP);*
- *The material does not have significant components of clayey, silty or organic fines (less 5%), and is non plastic;*
- *The material does not contain particles greater than 75mm;*
- *The material does not contain deleterious materials (rubbish, debris, vegetable matter, wood and roots); and*
- *Under compaction the gravel (shells) generally breaks down into sand sized fragments, not clay sized.*

For the purpose of this report all volumes dredged will be classified as SAND as per the above description.

The Particle Size Distributions (PSD) of three samples of the sands envisaged to be dredged and placed in the DMMA have been summarized in Figure 2. The $D_{50}$ of these sands is about 340 µm while the $D_{10}$ is approximately 150 µm, with approximately 10% of the materials classified as gravel (Galt Geotechnics 2017):

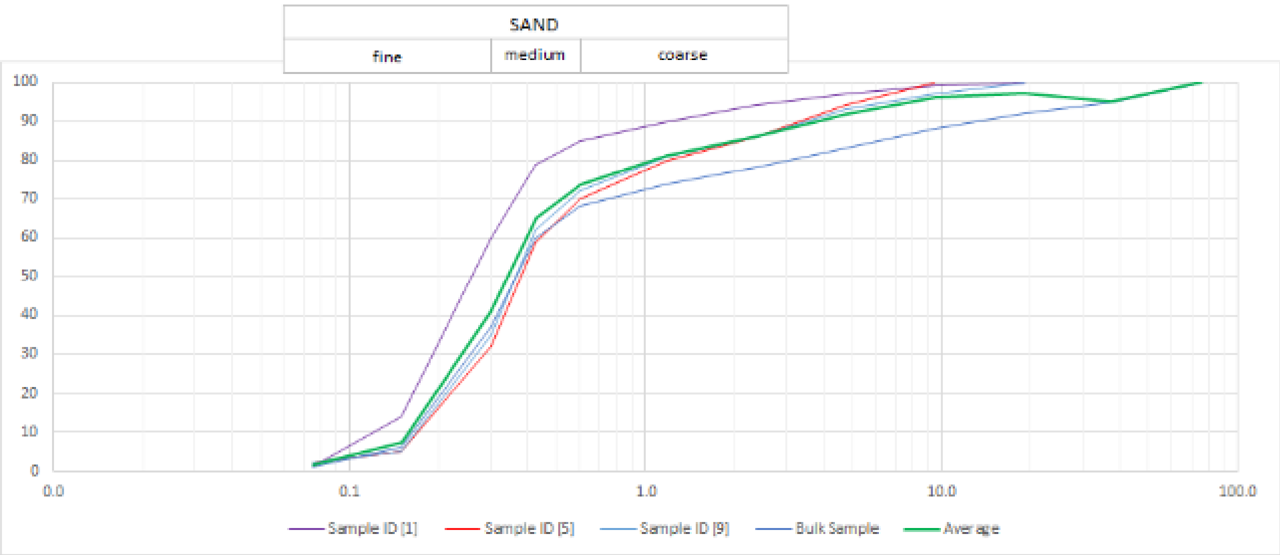


**Figure 3 Particle Size Distribution OMSB Stage 1**

In principle, the Particle Size Distribution indicates that well over 90% of the material is either sand or gravel with less than 5% of silts (finer than 60 µm).

OMSB Stage 2 - Preliminary Dredge Material Classification

The full volume of OMSB Stage 2 dredge material has not yet been classified or assessed by a qualified geotechnical engineer. Geotechnical assessment of the dredge material is proposed to be undertaken prior to commencement of dredging. However, in the interim environmental sediment quality investigations undertaken by O2 Marine (2017) provide a summary of the sediment characteristics identified during historic sampling by CHM2HILL (2014) (**Table 4**) and during the O2 Marine (2017) sediment quality investigation (**Table 5**). Although it is noted that the O2 Marine (2017) investigation was primarily focussed on surface sediments, with sampling to -1.5 mCD in the berth pocket/turning circle, -1.2 mCD in the inner channel and -1.0 mCD in the outer channel.

**Table 4 Geotechnical test results for engineering geological units (CH2MHILL 2014)**

| Tests | | Marine/Estuarine Deposits | Tantabiddi Member | Upper Onslow Red Beds | Lower Onslow Red Beds |
|---|---|---|---|---|---|
| Top of horizon | | +1-0 m CD | -1-1.6 m CD | -1-4 m CD | -6.2-10 m CD |
| Thickness | | 2-6.5 m | 0-2.4 m | 3-6 m | Extends below 13 m CD |
| Moisture (%) | | 16.1-40.8% | N/A | 14.5-24% | |
| TOC (%) | | <5% | N/A | | |
| PSD | Gravel | 0-27% | N/A | 0-39% | 0-5% |
| | Sand | 41-95% | N/A | 9-74% | 28-55% |
| | Fines | 3-45% | N/A | 14-71% | 42-68% |

**Table 5 Descriptive statistics of sediment PSD from the berth pocket/turning circle, inner channel and outer channel**

| Area | Statistic | Clay (%) | Silt (%) | Sand (%) | Gravel (%) |
|---|---|---|---|---|---|
| Berth Pocket/ Turning Circle Sampling Depth (to -1.5 m CD) | Min | 0 | 0 | 51 | 0 |
| | Max | 29 | 20 | 97 | 13 |
| | Mean | 8.2 | 5.2 | 83.5 | 3.2 |
| | SD | 11.1 | 7.6 | 16.7 | 5.4 |
| | n | 6 | 6 | 6 | 6 |
| Inner Channel Sampling Depth (to -1.2 m CD) | Min | 0 | 0 | 73 | 0 |
| | Max | 11 | 5 | 99 | 25 |
| | Mean | 2.1 | 1.2 | 85 | 11.7 |
| | SD | 3.4 | 1.5 | 9.4 | 8.5 |
| | n | 9 | 9 | 9 | 9 |
| Outer Channel Sampling Depth (to -1.0 m CD) | Min | 0 | 0 | 65 | 1 |
| | Max | 9 | 9 | 99 | 25 |
| | Mean | 3.8 | 2.8 | 79.9 | 13.5 |
| | SD | 2.5 | 2.5 | 10.8 | 8.1 |
| | n | 12 | 12 | 12 | 12 |

**Necessity of Bunds**

The natural slope angles of fill after hydraulic placement are usually (very) gentle and for this particular site will be mainly dependent on the placement method and particle size distribution of the fill. The majority of the sand pumped will have a grain size of 0.2mm-2mm and will have a slope of between 1:10 – 1:100 (van 't Hoff 2013). By constructing bunds and profiling their slopes to their required stable slope angle it is possible to limit the total area of fill.

Initial perimeter bunds will be constructed around the fill and settling basins. The bunds to be placed prior to hydraulic filling will be constructed from locally available materials from within the DMMA. As the available quantity of this material is scarce, bunds need to be constructed with a minimum amount of material. The bund height is governed by the minimum water level inside the settlement basins (see **Section 2.9.4**), while the side slopes of the bunds are governed by the geotechnical stability of the bund.

Intermediate (management) bunds or berms will also be constructed within the confines of the DMMA. These bunds will function to direct the flow of sediment mixture and maximise the settlement regime within the DMMA. These bunds will not need to be engineered bunds and will just be pushed up from within with locally available materials.

### 2.9.4. DMMA Layout

**Staging of the Disposal Process**

In order to ensure that the dredged materials are all disposed of within the designated DMMA, the area has been divided into three main sections as indicated in figure 3 below.

The eastern part of the DMMA is currently a low-lying area of minimal bearing capacity and not accessible by continuous use of heavy construction equipment. This area is identified as “Area A”. The average height of Area A is between 0.0m AHD and 1.0m AHD. Area B has been identified as an area with sufficient bearing capacity to allow continuous use of heavy construction equipment. Area C is currently used as a settlement area for stormwater run-off from the airport and will be used as the area for settlement of fines from the disposal process.


**Figure 4 DMMA layout**

In order to provide for a level DMMA ensuring safe access for all equipment throughout the works, the following stages have been envisaged:

<u>Stage 1: Area A Improvement</u>

Initially this area will be filled with approximately 1m of hydraulically placed sand to a level of about 2m AHD to allow access for excavators and bulldozers. An estimated 150,000 m$^3$ of sand will be placed in this phase.

<u>Stage 2: Area A Levelling</u>

After Area A has been improved, the overall level of this area will be raised to about 4m AHD. An estimated 400,000 m$^3$ of sand will be placed in this phase.

<u>Stage 3: Final Filling</u>

In stage 3 the remainder of the DMMA will be filled. About 400,000 m$^3$ is estimated to be placed here and will cover both Area A and Area B.

**DMMA Layout for each Phase**

The main objective when filling over soft soils is to place the fill in a manner which does not lead to instability and the formation of mud waves. This is particularly important when the fill material is granular and of markedly differing engineering characteristics to the substrate (Bray *et al.* 1997).

<u>Stage 1</u>

As only a layer of approximately 1m of fill is required in this phase to an approximate level of 2m AHD, an initial bund will be constructed with locally available materials using a LGP Bulldozer (**Figure 5**).

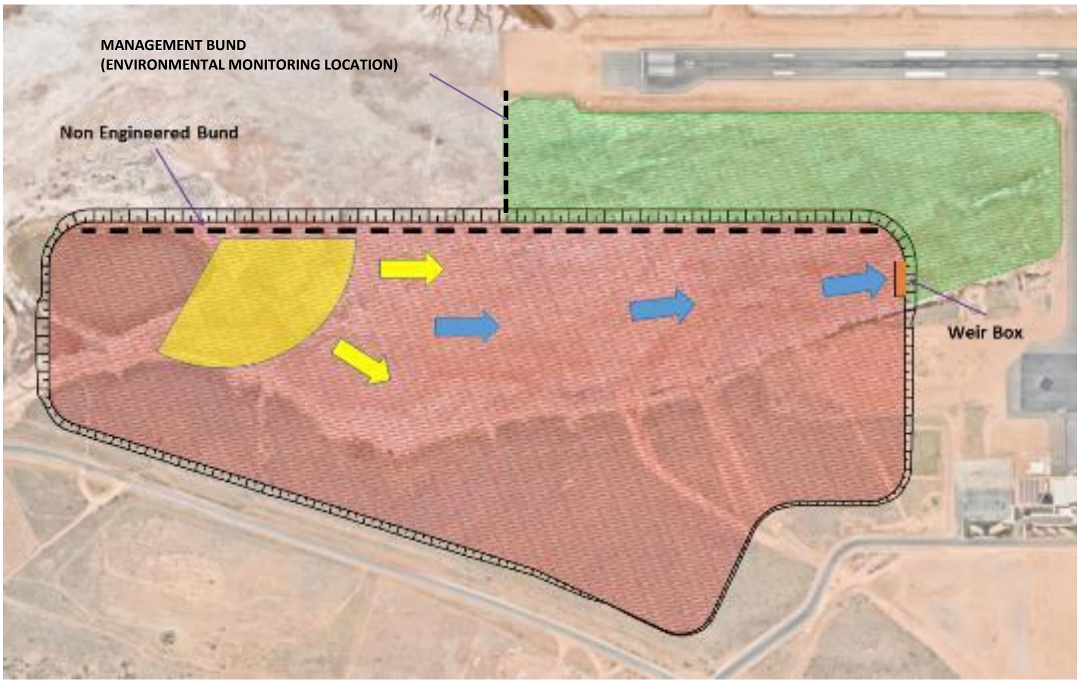


**Figure 5 Dredge Spoil Disposal Stage 1**

This bund will only be marginally engineered and will only function as a barrier for the dredged materials. Typical bund dimensions are:

- Crest level: 2.5m AHD
- Approximate crest width: 2.5m

The water levels within the DMMA needs to be kept low. Therefore, the water level within the settling basin (Area C) needs to be kept at approximately 1.5m AHD to allow sufficient drainage from Area A. This will be accomplished with a weir-box at the southern end of Area A with flexible overflow. The northern end of Area C will have a management bund in order to reduces the outflow of water and encourage settlement of fines.

<u>Stage 2</u>

The perimeter bund is constructed by utilising previously placed dredged fill material adjacent to the bund where the bund is constructed (**Figure 6**). Typical bund dimensions are:

- Crest width: 3m; and
- Crest level: 4.5m AHD

During Stage 2 filling, internal DMMA bunds will be constructed by using fill material placed during Stage 1 by LGP bulldozers. The function of these bunds is to maximise settling distance within the DMMA and to guide the tail water through the weir box to Area C.

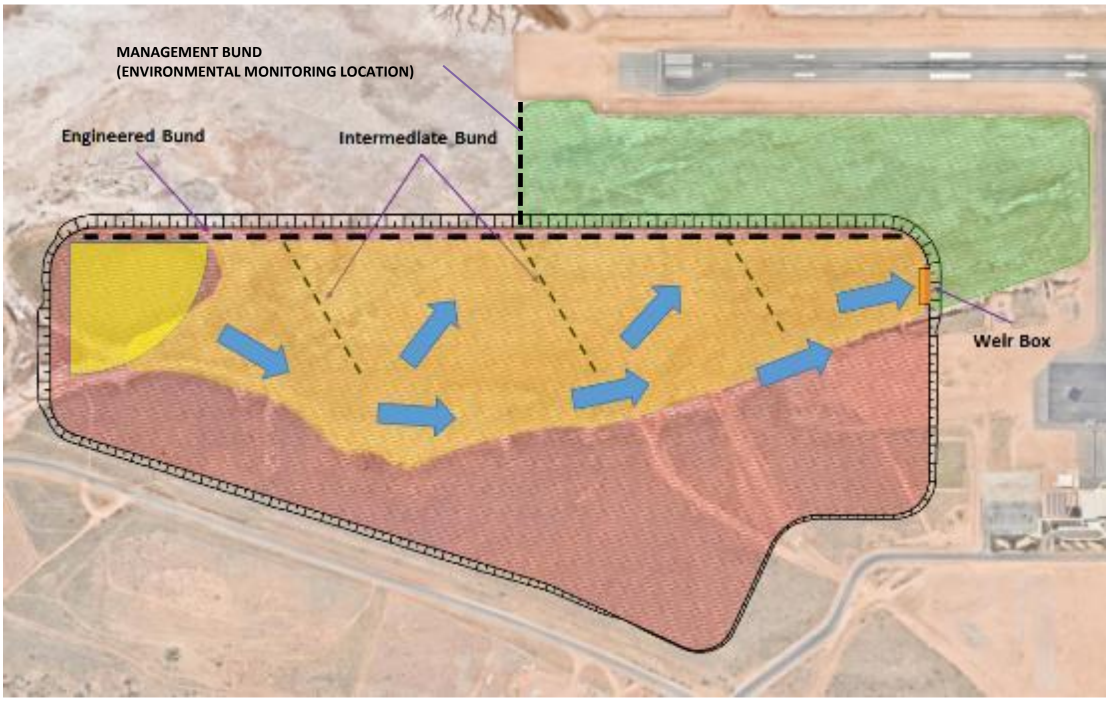


**Figure 6 Dredge Spoil Disposal Stage 2**

Stage 3

During the final Stage of the works, the perimeter bund is constructed by borrowing material adjacent to the bund where the bund is constructed on previously placed fill. Typical bund dimensions are:

- Crest width: 5.5m
- Crest level: 5.9m AHD

The final composition of the bund will be as per the engineered design thereof. Sequencing of the fill will follow a similar pattern as for stage 2.

Depending on the total quantity of fines which were not captured within the DMMA it may be necessary to construct a secondary bund from the northern end of the Airport's runway towards the Eastern bund of the DMMA in order to ensure that all remaining fines are captured within the Settling Basin (Area C) (**Figure 7**)

The tail water from all Stages of disposal will enter the settlement basin on the far southern end of the DMMA.

Flow paths of the tail water will run across the settling basin from south to north and the tail water will then be drained via the northern bund back to Beadon Creek. To pass this bund, two weir-boxes each with four pipes will be placed within the bund in order to spread the flow path across the width of the northern bund and avoid unnecessary erosion. The over-flow level within the weir boxes will have to be placed at an even level to ensure an evenly distribution of flow.

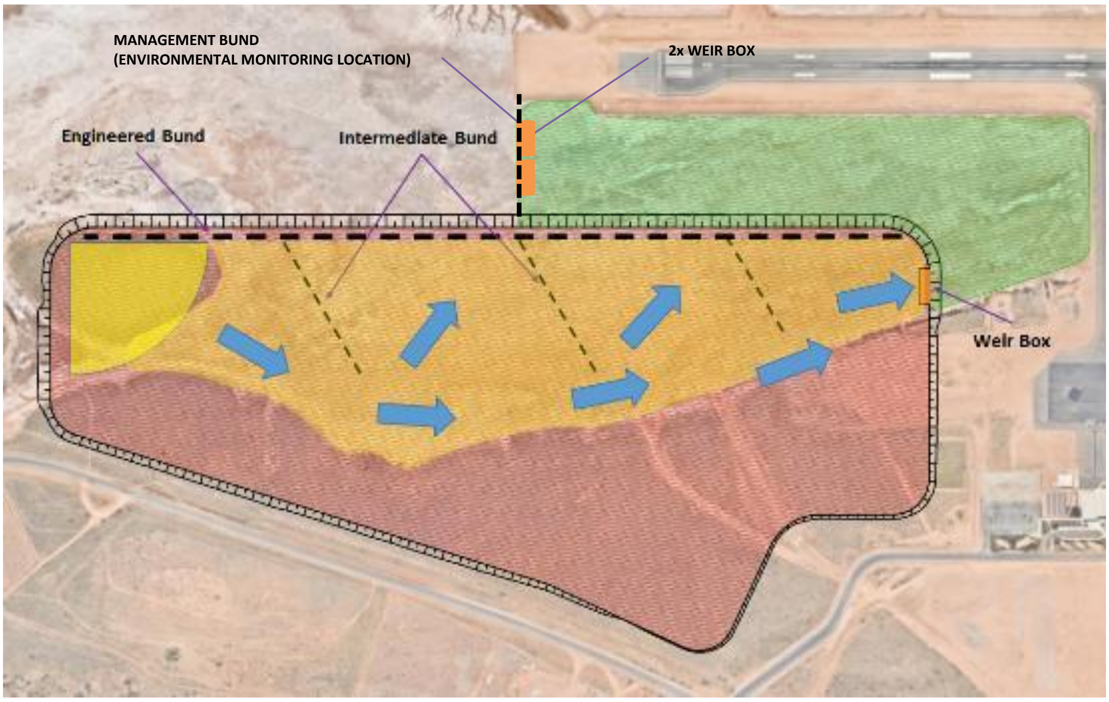


**Figure 7 Dredge Spoil Disposal Stage 3**

**Estimated Suspended Solids Concentration of Tail Water**

The following assumptions and starting points are adopted in the estimations:

1. 50% of the fines remain within the soil matrix of the fill and hence do not wash out during the hydraulic filling process; and
2. Fines content of the sands are reported in **Section 2.9.3** and are to be assumed 5%[1] by volume.

Stage 1

In the first layer it is estimated that approximately 150,000 $m^3$ of sands will be placed in Area A. As the overflow at the weir box is to be kept low in order to quicken the dewatering of Area A, initially the settling basin will be the only area for the settling of fines.

The total quantity of fines during this phase is estimated to be about 7,500$m^3$ (5%[1]) of which 50% is assumed to remain within the soil matrix. This means that only about 3,750$m^3$ of fines will settle within the settlement basin. As the settlement area is approximately 68,000$m^2$, this results in an average layer of about 5-6cm which technically does not require a management bund at the northern end of the settlement area. However, as the velocity of the tail water at the weir is relative large, some erosion prevention solution should be adopted. Hence it is therefore good practice to have a management bund at the northern end of Area C from when the works commence.

Stage 2

The second stage requires approximately 400,000 $m^3$ of sands. The bunds surrounding the DMMA have now been built in accordance with an engineered design and will be able to hold some excess water. As such the overflow at the weir box can be kept a little higher so that part of Area A will become a settlement area for fines in addition to Area C.

The total quantity of fines during this phase is estimated to be about 20,000$m^3$ (5%[1]) of which 50% is assumed to remain within the soil matrix and 25% settles at the southern end of the DMMA before it leaves through the weir box. This means that only about 5,000$m^3$ of fines will settle within the settlement basin. This adds another 7-8cm on average to Area C.

Stage 3

Similar to stage 2, the third stage requires another 400,000 $m^3$ of sand. The total quantity of fines during this phase is estimated to be about 20,000$m^3$ (5%[1]) of which 50% is assumed to remain within the soil matrix and 25% assumed to settle at the southern end of the Reclamation Area before it leaves through the weir box. This means that only about 5,000$m^3$ of fines will settle within the settlement basin. This adds another 7-8cm on average to Area C bring the total of area C to approximately 14 – 16cm.

[1] Estimate of fines to be updated following provision of planned geotechnical investigation results of the full dredge depth.

# 3. Stakeholder Consultation

## 3.1. Stakeholder consultation

In developing this DSDMP, and throughout the environmental approvals process, OMSB has undertaken consultation with a number of key stakeholders, including:

- Beadon Creek Maritime Facility Users, including:
  - Bhagwan Marine;
  - Chevron Australia;
  - Eco Tours and Mackerel Island Group;
  - Total AMS;
- Department of Biodiversity Conservation and Attractions (DBCA);
- Department of Primary Industries and Regional Development (DPIRD);
- Department of Transport (DoT);
- Department of State Development (DSD);
- Department of Water and Environment Regulation (DWER);
- Discovery Parks;
- Onslow Chamber of Commerce and Industry (OCCI);
- Pilbara Ports Authority (PPA);
- Shire of Ashburton (SoA);
- Thalanyji Aboriginal People; and
- Western Australian Fisheries Industry Council (WAFIC) (i.e. Representing local commercial fishing licence holders).

OMSB has committed to ongoing consultation with these key stakeholders throughout the proposed Stage 2 dredging and onshore spoil disposal activities. Ongoing consultation will include OMSB reporting through the Port of Ashburton Technical Advisory and Consultative Committee (TACC) and this process is described in **Section 3.2** below.

## 3.2. Dredging Technical Advisory and Consultative Committee

A TACC was established by PPA for the Port of Ashburton in early 2017 to support the implementation of effective, transparent and timely engagement with stakeholders who may have an interest or be affected by dredging programs within the PPA-managed Port of Ashburton (Located adjacent to the Proposal area).

The TACC meets approximately twice per annum (i.e. April and October) or more frequently as required, such as during dredging campaigns. The TACC typically includes representation from:

- Chevron Australia;
- DoEE;
- DBCA;
- DPIRD;
- DoT;
- DSD;
- DWER;
- OCCI;
- OMSB;
- Onslow Salt;
- PPA; and
- Buurabalayji Thalanyji Aboriginal Corporation (BTAC).

In addition to the above stakeholders, the Chair may invite specialist consultants to attend meetings and provide input to the TACC on specific issues. Advice may also be sought from specialist consultants through the Chair outside TACC meetings.

The main objective of the TACC is to ensure a transparent process with respect to dredging and disposal of dredged material. The purpose of the TACC is to:

- Keep stakeholders informed on maintenance dredging activities;
- To provide continuity of direction and effort for environmental protection matters related to dredging and ocean disposal of dredged material;
- Provide a forum for communication and resolution of any issues that may arise that stakeholders would like to be addressed;
- Assist in establishment of long-term permitting arrangements, including review over development and implementation of:
    - Sampling and Analysis Plans;
    - Long-term Dredge Material Management Plans; and
    - Other research and monitoring programmes.
- Review on-going management of dredging and ocean disposal activities in accordance with guidelines and permits; and
- Make recommendations as appropriate.

Although not identified as a decision-making authority for the OMSB Stage 2 Proposal, the PPA invited OMSB Pty Ltd to participate as a Member of the TACC during the dredging phase of the OMSB Stage 2 Proposal. The primary aim of engagement through the TACC regarding the OMSB Stage 2 Proposal is to enable open and transparent reporting of environmental performance against the management commitments made within the DSDMP. It is also envisaged that the TACC will offer independent advice to OMSB Pty Ltd regarding effective implementation of the environmental management commitments made within the DSDMP.

Given the TACC is already established in the region, and includes representation from most key stakeholders of the OMSB Stage 2 Project, this opportunity is considered to provide significant confidence to key stakeholders (including DWER), that OMSB Pty Ltd is committed to achieving a high standard of environmental management and performance on the Project.

Further information regarding the role and scope of TACC is provided in the Terms of Reference, which is included in **Appendix A**.

# 4. Roles and Responsibilities

The roles and responsibilities for the implementation of the DSDMP are summarised in **Table 6**.

**Table 6 Roles and Responsibilities of Key Personnel**

| Position | Responsibility |
|---|---|
| Proponent | • Overall responsibility for implementation of this DSDMP.<br>• Overall responsibility for complying with all relevant legislation, standards and guidelines.<br>• Ensures dredging activities are conducted in an environment safe for both site personnel and the public.<br>• Report environmental performance for the project to the TACC.<br>• Responsible for reporting all incidents to the TACC. |
| Proponent's Representative (Construction Manager) | • Complies with the requirements of this DSDMP.<br>• Provides advice on dredging and dredge material management related environmental issues.<br>• Oversee implementation of environmental controls, monitoring programs, inspections, audits and management actions in this DSDMP.<br>• Completes compliance reporting requirements.<br>• Responsible for the implementation of the environmental monitoring programs and inspections.<br>• Prepares environmental monitoring reports.<br>• Provides advice with respect to environmental issues as required. |
| Dredging Contractor | • Prepares and implements an environmental management plan in accordance with the requirements of this DSDMP.<br>• Implements the management actions of this DSDMP.<br>• Ensures adequate training of all staff within their area of responsibility.<br>• Ensures all equipment is adequately maintained and correctly operated.<br>• Responsible for reporting all environmental incidents to OMSB Environmental Advisor within 24 hours in accordance with OMSB incident reporting procedures. |
| All persons involved in the project. | • Comply with the requirements of this DSDMP.<br>• Comply with all legal requirements under the approvals documents and relevant Acts.<br>• Exercise a Duty of Care to the environment at all times.<br>• Report all environmental incidents |

# 5. Environmental Factors and Objectives

The environmental factors and objectives to be managed under this DSDMP have been derived from the Statement of Environmental Principles, Factors and Objectives (EPA 2016), which outlines objectives aimed at protecting all environments (Themes) including: Sea, Land, Water, Air and People. In consideration of potential environmental impact pathways associated with the proposed dredging and onshore spoil disposal activities, subsequent project specific objectives were derived and these are outlined in **Table 7**.

**Table 7 Potential environmental impacts and associated project specific management objectives.**

| Environmental Factor | EPA Objective | Potential Environmental Impact Pathway | Project Specific Objective | Management Measures |
|---|---|---|---|---|
| **THEME: SEA** | | | | |
| Benthic Communities and Habitats | To protect benthic communities and habitats so that biological diversity and ecological integrity are maintained. | Direct loss of benthic habitat due to dredging. | Dredging operations do not occur outside the defined dredge footprint | Table 8 |
| | | Turbidity impacts on benthic habitats resulting from dredge and tail water discharge operations. | Dredging and disposal related turbidity is managed to minimise the generation and migration of turbid plumes which may cause impacts to benthic communities and habitat. | |
| Coastal Processes | To maintain the geophysical processes that shape coastal morphology so that the environmental values of the coast are protected. | Changes to hydrodynamics and coastal morphology resulting in indirect modification of intertidal communities. | Dredging operations do not occur outside the defined dredge footprint. | Table 9 |
| Marine Environmental Quality | To maintain the quality of water, sediment and biota so that environmental values are protected. | Disturbance of contaminants in sediments during dredging and tail water discharger has the potential to deteriorate water quality and contaminate marine organisms.<br>Changes to the physico-chemical properties of the water column as a result of dredging and tail water discharge. | Maintain water quality to achieve:<br>• A Moderate Level of Ecological Protection at the tail water discharge (Weir box) and at a location to be determined within western tributary of Beadon Creek; and<br>• A High Level of Ecological Protection in the other upper tributaries of Beadon Creek.<br>(Refer to Appendix B for further information). | Table 10 |

| | | | | |
|---|---|---|---|---|
| | | There is potential for a hydrocarbon release into the marine environment from a vessel spill and or bunkering operations. | Manage vessel bunkering, chemical storage and spill response to ensure no adverse impacts to the marine environment. | |
| | | Changes to water quality in the vicinity of the Onslow Salt Seawater intake has the potential to result in adverse impacts upon Onslow Salt's operations. | Maintain water quality to meet industrial water supply criteria for Onslow Salt's seawater intake. | |
| Marine Fauna | To protect marine fauna so that biological diversity and ecological integrity are maintained. | Turbidity impacts on marine fauna. | No reported incidences of marine fauna injury or death as a result of turbidity impacts. | Table 11 |
| | | Injury or death of marine fauna as a result of dredge operations. | No reported incidences of marine fauna injury or death as a result of dredge operations. | |
| | | Injury or death of marine fauna due to vessel movement (strike). | No reported incidences of marine fauna injury or death as a result of vessel strike. | |
| | | Introduced Marine Pests (IMP) translocation from construction or operational vessels. | Minimise the risk of IMP translocation to protect biological diversity and integrity. | |
| **THEME: LAND** | | | | |
| Flora & Vegetation | To protect flora and vegetation so that biological diversity and ecological integrity are maintained. | Vegetation removal or disturbance for the pipeline route and/or spoil disposal site. | No unauthorised vegetation clearing. | Table 12 |
| Terrestrial Environmental Quality | To maintain the quality of land and soils so that environmental values are protected. | Disposal of marine based ASS at spoil disposal site. | Assess and manage sediment ASS to maintain the quality of land and soil. | Table 13 |
| | | Disturbance of existing ASS at the proposed disposal site. | Assess and manage land based ASS to maintain the quality of land and soil. | |
| Terrestrial Fauna | To protect terrestrial fauna so that biological diversity and ecological integrity are maintained. | Removal/smothering of terrestrial fauna habitat. | No unauthorised vegetation clearing. | Table 14 |
| | | Disturbance of conservation significant terrestrial fauna. | | |
| | | Disturbance to the foraging and feeding habitats of migratory birds | Manage dredge and construction operations to minimise disturbance of migratory bird foraging and feeding habitats. | |

| | | | | |
|---|---|---|---|---|
| | | Attraction of migratory birds to spoil disposal site due to ponding water. | Manage site conditions to minimise the potential for migratory birds to gather in the spoil disposal site. | |
| **THEME: WATER** | | | | |
| Hydrological Processes | To maintain the hydrological regimes of groundwater and surface water so that environmental values are protected. | Altered surface water runoff patterns. | Manage construction works and water discharge to maintain surface runoff patterns. | Table 15 |
| **THEME: AIR** | | | | |
| Air Quality | To maintain air quality and minimise emissions so that environmental values are protected. | Dust generation from stockpiles. | Manage construction works to minimise impact on air quality. | Table 16 |
| **THEME: PEOPLE** | | | | |
| Social Surrounds | To protect social surroundings from significant harm. | Disturbance of a significant aboriginal heritage site. | Site boundaries and construction works will be managed to protect social surroundings form significant harm. | Table 17 |

# 6. Monitoring and Management

The potential environmental impacts identified above in Table 4, have been assigned monitoring and management actions to measure compliance against the project specific objectives. Monitoring and Management measures for each environmental factor (EPA, 2016) are detailed below.

## 6.1. Benthic Communities and Habitats

Monitoring and management proposed to minimise potential impacts on the environmental factor 'Benthic Communities and Habitat' are described in **Table 8**.

**Table 8 Monitoring and Management actions to minimise impacts on Benthic Communities and Habitats.**

| **Environmental Factor** | **Benthic Communities and Habitats** | | | | | |
|---|---|---|---|---|---|---|
| **Activity** | Dredging and tail water discharge. | | | | | |
| **Potential Impacts** | Direct loss of benthic communities and habitats due to dredging activities.<br>Indirect loss of benthic communities and habitats due to increased Total Suspended Sediment (TSS) levels – caused by suspended sediments released into the water column during dredging and discharge of spoil water. | | | | | |
| **Project Specific Objective (Target)** | **Management Actions** | | | **Environmental Performance** | | |
| | **Item** | **Actions** | **Responsibility** | **Reporting/Evidence** | **Timing** | **Contingency** |
| Dredging operations do not occur outside the defined dredge footprint. | 8.1 | Undertake a HAZID risk assessment to identify potential impacts on benthic communities and habitats. | Proponent | • Assessment included in referral support document. | • Prior to commencement of dredging. | • Dredge operations not to commence prior to client approval of HAZID. |
| | 8.2 | Utilise a satellite-based vessel monitoring system on the dredge to ensure no dredging occurs outside the planned area. | Contractor | • Inspection of satellite-based vessel monitoring system,<br>• Dredge progress reports submitted to the proponent throughout dredging. | • Prior to and during dredge operations.<br>• Weekly throughout dredging | • Cessation of dredging and relocation of dredge; and<br>• Maintenance of tracking system. |
| | 8.3 | Verify calibration of the hydrographic survey systems onboard the dredge. | Contractor | • Provide calibration documentation. | • Prior to commencement of dredging. | • Dredging to commence only after calibration certification for survey equipment is verified. |
| Dredging and disposal related turbidity is managed to minimise the | 8.4 | Undertake a HAZID risk assessment to identify potential impacts of dredge related turbidity. | Proponent | • Assessment included in referral support document. | • Prior to commencement of dredging. | • Dredge operations not to commence prior to client approval of HAZID. |

| | | | | | | |
|---|---|---|---|---|---|---|
| generation and migration of turbid plumes which may cause impacts to benthic communities and habitat. | 8.5 | Develop and implement a Dredging Water Quality Monitoring Program (WQMP). WQMP should further address items: 8.6, 8.7, 8.8, 8.13 & 8.14.<br>Note – This action is also included in Table 10 (Item 10.2) and Table 11 (Item 11.2). | Proponent | • WQMP | • Prepare prior to commencement of dredging.<br>• Implement for the duration of dredging. | • Dredge operations not to commence prior to an approved WQMP. |
| | 8.6 | Use satellite imagery (i.e. MODIS or equivalent) to ensure the extent of dredge related plumes does not extend beyond the predicted ZoMI and ZoHI for more than three consecutive days. Methodology to be described within WQMP (Item 8.5) | Proponent | • Satellite imagery and/or data | • Daily commencing one month prior to commencement of dredging and continuing until one month following the completion of dredging. | • Slow or adapt dredge operations to minimise turbidity plume extent |
| | 8.7 | Collect TSS water samples to validate satellite imagery assessment. Methodology to be described within WQMP (Item 8.5) | Proponent | • Laboratory results for TSS | • Monthly during dredging. | • TSS validation to be confirmed prior to dredge commencement<br>• Utilise additional telemetered turbidity sensors to provide adequate data. |
| | 8.8 | Visual monitoring of dredge related plumes to ensure they do not extend beyond the predicted ZoMI and ZoHI* for more than three consecutive days.<br>* Dredge Plume Visual Monitoring Proforma to be provided by Proponent. | Contractor | • Plume sketch proforma | • Daily during dredging. | • Slow or adapt dredge operations to minimise turbidity outputs |
| | 8.9 | Undertake inspection and maintenance of erosion, sediment control and drainage structures particularly following heavy or prolonged rainfall. | Contractor | • Site ES&H inspection checklist | • Daily | • Investigate reasons for erosion or drainage damage and adopt management measures (e.g. manage tail water flow rates). |
| | 8.10 | Ensure no unplanned alterations are made to existing on-site drainage infrastructure that could lead to potential water quality impacts off site. | Contractor | • Site ES&H inspection checklist | • For the duration of tail water discharge. | • Investigate reasons for erosion or drainage damage and adopt management measures (e.g. manage tail water flow rates). |
| | 8.11 | Install scour protection measures such as gabions where scouring is likely to occur. | Contractor | • Site ES&H inspection checklist | • For the duration of dredging. | • Investigate reasons for erosion or drainage damage and adopt management measures (e.g. |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | manage tail water flow rates). |
| | 8.12 | Use suitable dredging plant and equipment to minimise turbidity, including well maintained floating pipelines to minimise leakage of turbid water during pumping of material to the DMMA. | Contractor | • Pre-mobilisation equipment checklist<br>• Equipment maintenance schedule/documentation | • Prior to commencement of dredging. | • Dredge operations not to commence prior to document approval. |
| | 8.13 | Monitor water turbidity (NTU) at the tail water discharge point, within the western arm of Beadon Creek and at a suitable reference location (TBA). Methodology to be described within WQMP (Item 8.5).<br>Criteria: 48-hr rolling median turbidity <80th percentile of baseline data[2] at tail water discharge monitoring location. | Proponent | • Telemetered monitoring data,<br>• Monthly reporting | • For the duration of DMMA tail water discharge. | • Investigate causes and modify discharge flow as required. |

[2] Baseline water quality data for Beadon Creek to be provided by Onslow Salt and described in the WQMP.

## 6.2. Coastal Processes

Monitoring and management proposed to minimise potential impacts on the environmental factor 'Coastal Processes' are described in **Table 9**.

**Table 9 Monitoring and Management actions to minimise impacts on Coastal Processes.**

| **Environmental Factor** | **Coastal Processes** | | | | | |
|---|---|---|---|---|---|---|
| **Activity** | Dredging | | | | | |
| **Potential Impacts** | Dredge activities have the potential to modify coastal morphologies and hydrodynamics. | | | | | |
| **Project Specific Objective (Target)** | **Management Actions** | | | **Environmental Performance** | | |
| | **Item** | **Actions** | **Responsibility** | **Reporting/Evidence** | **Timing** | **Contingency** |
| Dredging operations do not occur outside the defined dredge footprint. | 9.1 | Undertake a HAZID risk assessment to identify potential impacts on hydrodynamics and coastal morphology. | Proponent | • Assessment included in referral support document. | • Prior to commencement of dredging. | • Dredge operations not to commence prior to client approval of HAZID. |
| | 9.2 | Utilise a satellite-based vessel monitoring system on the dredge to ensure no dredging occurs outside the planned area. | Contractor | • Inspection of satellite-based vessel monitoring system,<br>• Dredge progress reports submitted to the proponent throughout dredging. | • Prior to and during dredge operations.<br>• Weekly throughout dredging | • Cessation of dredging and relocation of dredge; and<br>• Maintenance of tracking system. |
| | 9.3 | Verify calibration of the hydrographic survey systems onboard the dredge. | Contractor | • Provide calibration documentation. | • Prior to commencement of dredging. | • Dredging to commence only after calibration certification for survey equipment is verified. |

## 6.3. Marine Environmental Quality

Monitoring and management proposed to minimise potential impacts on the environmental factor ‘Marine Environmental Quality’ are described in **Table 10**.

**Table 10 Monitoring and Management actions to minimise impacts on Marine Environmental Quality.**

| **Environmental Factor** | **Marine Environmental Quality** | | | | | |
|---|---|---|---|---|---|---|
| **Activity** | Dredging and tail water discharge | | | | | |
| **Potential Impacts** | Water quality (physico-chemical and contamination) in the marine environment and Beadon Creek may be adversely impacted by dredge operations and tail water discharge. | | | | | |
| **Project Specific Objective (Target)** | **Management Actions** | | | **Environmental Performance** | | |
| | **Item** | **Actions** | **Responsibility** | **Reporting/Evidence** | **Timing** | **Contingency** |
| Maintain water quality to meet:<br>• A Moderate Level of Ecological Protection at the tail water discharge (Weir box) and at a location to be determined within western tributary of Beadon Creek; and<br>• A High Level of Ecological Protection in the other upper tributaries of Beadon Creek. | 10.1 | Undertake a sediment contamination investigation prior to dredge operations. | Proponent | • Assessment included in referral support document. | • Prior to commencement of dredging. | • Dredge operations not to commence prior to client approval of HAZID. |
| | 10.2 | Develop and implement a WQMP. WQMP should further address items: 10.3, 10.4, 10.5 & 10.16.<br>Note – This action is also included in Table 8 (Item 8.5) and Table 11 (Item 11.2). | Proponent | • WQMP | • Prepare prior to commencement of dredging.<br>• Implement for the duration of dredging. | • Dredge operations not to commence prior to an approved WQMP. |
| | 10.3 | Monitor dissolved metal and TBT concentrations of the tail water prior to discharge. Methodology and parameters to be described within WQMP (Item 10.2).<br>Criteria: Dissolved metals and TBT <95% species protection limit for moderate ecological protection area (refer Appendix B). | Proponent | • Laboratory results for contamination | • Weekly for the first month of tail water discharge.<br>• Based on results, continued contamination sampling may be required. | • Continue monitoring if dissolved metal levels are recorded above the moderate ecological protection limits.<br>• If results exceed water quality criteria, investigate the causes, treat tail water or modify discharge flow as required. |
| | 10.4 | Measure and report physico-chemical parameters:<br>• pH;<br>• Temperature;<br>• Dissolved Oxygen; and | Proponent | • Telemetered monitoring data; and<br>• Water Quality Report | • Data to be collected continuously for the duration of tail water | • Tail water discharge will be minimised or ceased if physico-chemical data is not available for tail water.<br>• If results exceed water |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | • Conductivity.<br>Monitor at tail water discharge, within Beadon Creek (TBA) and suitable reference site(s). Methodology and parameters to be described within WQMP (Item 10.2).<br>Criteria: All parameters within 20th and 80th percentile of baseline[3] data. | | | discharge.<br>• Results to be reported monthly for the duration of tail water discharge. | quality criteria, investigate the causes, treat tail water or modify discharge flow as required. |
| | 10.5 | Provide calibration certification for all water quality sensors. | Proponent | • Provide calibration documentation. | • Prior to commencement tail water discharge. | • Dredging to commence only after calibration certification for sensor equipment is verified.<br>• |
| | 10.6 | Conduct inspections of all dredge equipment and pipelines including land based) to check for leaks or damage. | Contractor | • Vessel and Site ES&H inspection checklist | • Daily throughout dredging | • Cease discharge if significant spillage or damage noted;<br>• Activate spill response actions (control drainage, clean up) as required; and<br>• Implement recommendations from incident investigations. |
| Manage vessel bunkering, chemical storage and spill response to ensure no adverse impacts to the marine environment. | 10.7 | Develop a bunkering procedural document. | Contractor | • Vessel management procedure | • Prior to commencement of dredging. | • Dredge operations not to commence prior to development and approval of vessel management procedures. |
| | 10.8 | Undertake vessel maintenance and bunkering in accordance with dredging contractors approved vessel management systems. | Contractor | • Vessel management procedure | • For the duration of dredging. | • Vessel management systems to be reviewed and refined (if required) in the event of an identified procedural breach or hydrocarbon spill. |

[3] 3 Baseline water quality data for Beadon Creek to be provided by Onslow Salt and described in the WQMP.

| | | | | | | |
|---|---|---|---|---|---|---|
| | 10.9 | Industry standard hydrocarbon management practices including implementation of SOPEP to be implemented | Contractor | • Vessel management procedure | • For the duration of dredging. | • Dredge operations not to commence prior to development and approval of vessel management procedures. |
| | 10.10 | All equipment shall be designed and operated to prevent spills and leaks through the provision of in-built safeguards including, but not limited to, relief valves, overflow protection, and automatic and manual shut-down systems. | Contractor | • Vessel and Site ES&H inspection checklist<br>• Vessel management procedure | • Weekly inspection checklist.<br>• For the duration of dredging. | • Rectify any equipment that is damaged or missing as soon as practicable.<br>• Dredge operations not to commence prior to development and approval of vessel management procedures. |
| | 10.11 | Hydrocarbons (including hydrocarbon wastes) shall be stored in accordance with AS1940-2004. | Contractor | • Vessel and Site ES&H inspection checklist<br>• Vessel management procedure | • Weekly inspection checklist.<br>• For the duration of dredging. | • Rectify any hydrocarbons or waste that are not stored correctly as soon as practicable.<br>• Dredge operations not to commence prior to development and approval of vessel management procedures. |
| | 10.12 | The proponent is to be notified immediately in the event of a hydrocarbon spill of any volume. | Contractor | • Verbal communication | • Immediately after the event (as soon as it is safe to do so). | • Dredge operations to cease until spill investigation is complete, and or Proponent has given authority to proceed. |
| | 10.13 | An incident report is to be submitted in the event of a hydrocarbon spill of any volume. | Contractor | • Incident report | • Within 24 hours of the incident. | • Dredge operations to cease until spill investigation is complete, and or Proponent has given authority to proceed. |

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| | 10.14 | Store and segregate chemicals as directed on labels and maintain MSDS for each chemical. | Contractor | • Vessel and Site ES&H inspection checklist | • Weekly throughout dredging | • Any item not compliant during inspection will be rectified prior to follow up inspection (typically one week). |
| | 10.15 | Provide and maintain spill response equipment adequate for the size of vessel and activity. | Contractor | • Vessel ES&H inspection checklist | • Weekly throughout dredging | • Any item not compliant during inspection will be rectified prior to follow up inspection (typically one week). |
| Maintain water quality to meet industrial water supply criteria for Onslow Salt's seawater intake | 10.16 | Monitor water turbidity (NTU) in the vicinity of the Onslow Salt Seawater Intake and at a suitable reference location (TBA). Methodology to be described within WQMP (Item 10.2)<br>Criteria: 48-hr rolling median turbidity <10 NTU at Onslow Salt Seawater intake monitoring site. | Proponent | • Online monitoring data,<br>• Monthly reporting | • For the duration of dredging. | • Investigate causes and modify discharge flow, amend dredging strategies (including potential relocation of the dredge), and/or alterations to operational mode. |

## 6.4. Marine Fauna

Monitoring and management proposed to minimise potential impacts on the environmental factor 'Marina Fauna' are described in **Table 11**.

**Table 11 Monitoring and Management actions to minimise impacts on Marine Fauna.**

| **Environmental Factor** | **Marine Fauna** | | | | | |
|---|---|---|---|---|---|---|
| **Activity** | Dredge and tail water discharge | | | | | |
| **Potential Impacts** | Marine fauna may be disturbed, injured or killed by dredge related activities. | | | | | |
| **Project Specific Objective (Target)** | **Management Actions** | | | **Environmental Performance** | | |
| | **Item** | **Actions** | **Responsibility** | **Reporting/Evidence** | **Timing** | **Contingency** |
| No reported incidences of marine fauna injury or death as a result of turbidity impacts. | 11.1 | Visual monitoring of dredge related plumes to ensure they do not extend beyond the predicted ZoMI and ZoHI* for more than three consecutive days.<br>* Dredge Plume Visual Monitoring Proforma to be provided by Proponent. | Contractor | • Plume sketch proforma | • Daily during dredging. | • Slow or adapt dredge operations to minimise turbidity outputs |
| | 11.2 | Develop and implement a WQMP. WQMP should further address item 11.3.<br>Note – This action is also included in Table 8 (Item08.5) and Table 10 (Item 10.2). | Proponent | • WQMP | • Prepare prior to commencement of dredging.<br>• Implement for the duration of dredging. | • Dredge operations not to commence prior to an approved WQMP. |
| | 11.3 | Monitor water turbidity (NTU) at the tail water discharge point and at a suitable reference location (TBA). Methodology to be described within WQMP (Item 11.2)<br>Criteria: 48-hr rolling median turbidity <80th percentile of baseline data at tail water discharge monitoring location. | Proponent | • Telemetered monitoring data; and<br>• Monthly reporting | • For the duration of DMMA tail water discharge. | • Investigate causes and modify discharge flow as required. |
| No reported incidences of marine fauna injury or death as a result of | 11.4 | Implement a soft start procedure prior to activating cutter head operations. | Contractor | • Daily dredge logs. | • Each occasion, prior to activating cutter head. | • Dredge operations not to commence unless a soft start procedure has been implemented. |

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| dredge operations. | 11.5 | All project vessels are to have at least one crew member trained as a Marine Fauna Observer (MFO) on board at all times. | Contractor | • Training certificate. | • Prior to commencement of dredging. | • Dredge operations not to commence unless at least one crew member is a trained MFO. |
| | 11.6 | MFO logs to be complete during all dredge operations. | Contractor | • MFO logs. | • Daily whilst dredge operations are occurring. | • Investigate why MFO logs were not complete, and ensure adequate staff and resources are in place to fulfil requirement. |
| | 11.7 | Dredge operations are to cease if marine mega fauna (whale, dugong, sawfish or turtle) are observed within 100 m of the dredge vessel. | Contractor | • MFO logs,<br>• Daily dredge logs. | • For the duration of dredging. | • Investigate why dredge operations were not ceased and apply required correction actions. |
| | 11.8 | Incident report to be complete if any marine mega fauna (whale, dugong, sawfish, turtle or dolphin) remains are observed within the spoil disposal site. | Contractor | • Site ES&H inspection checklist. | • As required. | • Investigate fauna death and apply required corrective actions and or modifications to dredge operations. |
| No reported incidences of marine fauna injury or death as a result of vessel strike. | 11.9 | All vessels to operate at a speed under 10 knots at all times during the project. | Contractor | • Vessel GPS monitoring system<br>• DoT harbour master regulation and monitoring. | • Continuous throughout vessel operations. | • Investigate why vessel was recorded in excess for the defined speed limit and amend vessel operations and activities as appropriate. |
| | 11.10 | All project vessels are to have at least one crew member trained as a MFO on board at all times. | Contractor | • Training certificate. | • Prior to commencement of dredging. | • Dredge operations not to commence unless at least one crew member is a trained MFO. |
| Minimise the risk of IMP translocation to protect biological diversity and integrity. | 11.11 | All relevant vessels should comply with Commonwealth Department of Agriculture and Water Resources – Australian Ballast Water Management Requirements, the National Biofouling Management Guidelines for commercial vessels. | Contractor | • Vessel management procedures. | • Prior to dredge entering Australian Waters or moving from one Australian port to the Port of Ashburton. | • Vessel are not to mobilise to Onslow without approved IMP documentation. |

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|---|---|---|---|---|---|---|
| | 11.11 | All vessels that mobilise to the Port of Onslow to undertake / support dredging are required to complete the WA DoF's 'Vessel Check' risk assessment (https://vesselcheck.fish.wa.gov.au) | Contractor | • A copy of the Vessel Check report is to be submitted to PPA for assessment along with any supporting documentation including antifoul certificates and inspection reports. | • Prior to dredge entering Australian Waters or moving from one Australian port to the Port of Ashburton. | • Vessel are not to mobilise to Onslow without approved IMP documentation. |

## 6.5. Flora and Vegetation

Monitoring and management proposed to minimise potential impacts on the environmental factor 'Flora and Vegetation' are described in **Table 12**.

**Table 12 Monitoring and Management actions to minimise impacts on Flora and Vegetation**

| **Environmental Factor** | **Flora and Vegetation** | | | | | |
|---|---|---|---|---|---|---|
| **Activity** | Construction of spoil disposal site and pipe corridor. | | | | | |
| **Potential Impacts** | There is potential to impact natural flora and vegetation when constructing the spoil disposal site and dredge pipe corridor. | | | | | |
| **Project Specific Objective (Target)** | **Management Actions** | | | **Environmental Performance** | | |
| | **Item** | **Actions** | **Responsibility** | **Reporting/Evidence** | **Timing** | **Contingency** |
| No unauthorised vegetation clearing. | 12.1 | Obtain a vegetation clearing permit to cover all possible areas where flora and vegetation will be cleared. | Proponent | • Vegetation Clearing Permit. | • Prior to clearing activities. | • Flora and vegetation clearing not to commence prior to an approved vegetation clearing permit is in place. |
| | 12.2 | Undertake inspection to ensure no flora or vegetation outside the approved permit is cleared or damaged. | Contractor | • Vegetation Clearing Permit.<br>• Site ES&H checklist | • Throughout construction | • Flora and vegetation clearing not to commence prior to an approved vegetation clearing permit is in place.<br>• Report damage or clearing of any flora or vegetation outside the approved permit to the Proponent. |
| | 12.3 | Develop and maintain a weed register | Contractor | • Weed register | • Prior to clearing. | • N/A |
| | 12.4 | Undertake weed inspections | Contractor | • Site ES&H checklist | • Prior to clearing and monthly during construction | • Implement appropriate weed control measures as required. |
| | 12.5 | Include identification of environmental weeds on site induction process. | Contractor | • Staff and Contractor inductions | • As required. | • Update inductions as required. |

## 6.6. Terrestrial Environmental Quality

Monitoring and management proposed to minimise potential impacts on the environmental factor 'Terrestrial Environmental Quality' are described in **Table 13**.

**Table 13 Monitoring and Management actions to minimise impacts on Terrestrial Environmental Quality.**

| **Environmental Factor** | **Terrestrial Environmental Quality** | | | | | |
|---|---|---|---|---|---|---|
| **Activity** | Disposal of dredge sediments, and disturbance of existing land based soils. | | | | | |
| **Potential Impacts** | Potential transportation and accumulation of contaminates in dredge spoil which may impact terrestrial environmental quality.<br>Disposal of ASS from dredge sediments, and disturbance of existing ASS at the disposal site. | | | | | |
| **Project Specific Objective (Target)** | **Management Actions** | | | **Environmental Performance** | | |
| | **Item** | **Actions** | **Responsibility** | **Reporting/Evidence** | **Timing** | **Contingency** |
| Assess and manage sediment ASS to maintain the quality of land and soil. | 13.1 | Undertake a sediment investigation to investigate Potential Acid Sulfate Soils (PASS) in dredge sediment. | Proponent | • Assessment included in referral support document. | • Prior to commencement of dredging. | • Dredge operations not to commence prior to client approval of HAZID. |
| | 13.2 | Prepare an Acid Sulfate Soil Management Plan (ASSMP). | Contractor | • ASSMP | • Prior to construction works. | • Dredge operations not to commence prior to an approved ASSMP. |
| | 13.3 | Water Quality monitoring in the DMMA to monitor dredge material for ASS.<br><u>Criteria:</u> - maintain pH >6;<br>- maintain Total Titratable Acidity (TTA) <40 mg/L | Contractor | • Telemetered water quality monitoring data.<br>• Laboratory analysis reports | • Continuous pH monitoring.<br>• Weekly TTA monitoring. | • Liming and dosing equipment will be installed onsite.<br>• Liming of the fines/tail water mix will be carried out prior to discharge if required. |
| Assess and manage land based ASS to maintain the quality of land and soil. | 13.4 | Undertake a soil investigation to investigate PASS at the DMMA. | Contractor | • ASSMP | • Prior to disturbance for construction of DMMA | • Land based earth works not to commence prior to client approval of HAZID. |
| | 13.5 | Prepare an Acid Sulfate Soil Management Plan (ASSMP). | Contractor | • ASSMP | • Prior to construction works. | • Land based earth works not to commence prior to an approved ASSMP. |

## 6.7. Terrestrial Fauna

Monitoring and management proposed to minimise potential impacts on the environmental factor 'Terrestrial Fauna' are described in **Table 14**.

**Table 14 Monitoring and Management actions to minimise impacts on Terrestrial Fauna.**

| **Environmental Factor** | **Terrestrial Fauna** | | | | | |
|---|---|---|---|---|---|---|
| **Activity** | Flora and vegetation clearing and construction activities | | | | | |
| **Potential Impacts** | Fauna habitats may be damaged or removed as a result of vegetation clearing.<br>Construction equipment used outside site boundary may impact fauna. | | | | | |
| **Project Specific Objective (Target)** | **Management Actions** | | | **Environmental Performance** | | |
| | **Item** | **Actions** | **Responsibility** | **Reporting/Evidence** | **Timing** | **Contingency** |
| No unauthorised vegetation clearing. | 14.1 | Obtain a vegetation clearing permit to cover all possible areas where flora and vegetation will be cleared. As required pending outcome of Part iV referral. | Proponent | • Vegetation Clearing Permit. | • Prior to clearing activities. | • Flora and vegetation clearing not to commence prior to an approved vegetation clearing permit is in place. |
| | 14.2 | Undertake a pre-clearance fauna/spotter catcher survey. | Proponent | • Pre-clearance fauna/spotter catcher survey. | • Prior to clearing activities. | • Flora and vegetation clearing not to commence prior to a pre-clearance fauna/spotter catcher survey. |
| | 14.3 | All vehicles and plant are to remain within the defined site boundaries. | Contractor and Proponent | • Appropriate boundary signage and barriers,<br>• Site ES&H inspection checklist | • Throughout construction | • Site boundaries are to be clear and visible, and rectified if required. |
| Manage dredge and construction operations to minimise disturbance of migratory bird foraging and feeding habitats. | 14.4 | Utilise a satellite-based vessel monitoring system on the dredge to ensure no dredging occurs outside the planned area. | Contractor | • Inspection of satellite-based vessel monitoring system.<br>• Dredge progress reports submitted to the proponent. | • Prior to and during dredge operations.<br>• Weekly throughout dredging | • Cessation of dredging and relocation of dredge; and<br>• Maintenance of tracking system. |

| | | | | | | |
|---|---|---|---|---|---|---|
| | 14.5 | All vehicles and plant are to remain within the defined site boundaries. | Contractor and Proponent | • Appropriate boundary signage and barriers,<br>• Site ES&H inspection checklist | • Throughout construction | • Site boundaries are to be clear and visible, and rectified if required. |
| | 14.6 | Project lighting spill will be minimised where practicable. (lighting direction, duration and level). | Contractor | • Site ES&H inspection checklist. | • Throughout construction | • Investigate alternative ways in which lighting spill can be minimised on site. |
| Manage site conditions to minimise the potential for migratory birds to gather in the spoil disposal site. | 14.7 | Monitor the level of bird aggregation in spoil disposal site. | Contractor | • Site ES&H inspection checklist. | • Daily throughout construction | • Implement Item 12.8 as required. |
| | 14.8 | If required, deterrents such as bunting, tape, sirens, scare guns, mock hawks, or bio-acoustics (natural predator and distress calls) can be used to deter birds from aggregating in spoil disposal site. | Contractor | • Visual or audio deterrent equipment,<br>• Site ES&H inspection checklist. | • Throughout construction | • Investigate alternative ways in which bird life could be deterred from aggregating on spoil disposal site. |

## 6.8. Hydrological Processes

Monitoring and management proposed to minimise potential impacts on the environmental factor 'Hydrological Processes' are described in **Table 15**.

**Table 15 Monitoring and Management actions to minimise impacts on Hydrological Processes.**

| **Environmental Factor** | **Hydrological Processes** | | | | | |
|---|---|---|---|---|---|---|
| **Activity** | Land based construction activities | | | | | |
| **Potential Impacts** | Surface water drainage patterns (excluding the spoil disposal area) may be altered by construction activities. | | | | | |
| **Project Specific Objective (Target)** | **Management Actions** | | | **Environmental Performance** | | |
| | **Item** | **Actions** | **Responsibility** | **Reporting/Evidence** | **Timing** | **Contingency** |
| Manage construction works and water discharge to maintain surface runoff patterns. | 15.1 | Tail water discharge is to be undertaken in accordance with a DoW 'Permit to interfere with the bed and banks of a watercourse'. As required pending outcome of Part iV referral. | Contractor | • Permit to interfere with the bed and banks of a watercourse. | • Prior to tail water discharge. | • If significant changes to surface runoff patterns are observed, an investigation is to be undertaken to identify possible corrective actions (e.g. modify tail water discharge rates). |
| | 15.2 | Install a control valve where tail water is to be released, so that flow rates can be modified. | Contractor | • Site ES&H inspection checklist. | • Prior to tail water discharge | • Tail water is not to be discharged prior to installation of a control valve in the DMMA. |
| | 15.3 | Construction activities and earth works are not to significantly disrupt natural drainage patters (excluding the proposed spoil disposal area). | Contractor | • Site ES&H inspection checklist. | • Throughout construction | • Corrective actions to restore natural drainage patters will be implemented in the event of unplanned disturbance. |

## 6.9. Air Quality

Monitoring and management proposed to minimise potential impacts on the environmental factor 'Air Quality' are described in **Table 16**.

**Table 16 Monitoring and Management actions to minimise impacts on Air Quality.**

| **Environmental Factor** | **Air Quality** | | | | | |
|---|---|---|---|---|---|---|
| **Activity** | Construction activities | | | | | |
| **Potential Impacts** | Construction works have the potential to create dust, impacting the town of Onslow. | | | | | |
| **Project Specific Objective (Target)** | **Management Actions** | | | **Environmental Performance** | | |
| | **Item** | **Actions** | **Responsibility** | **Reporting/Evidence** | **Timing** | **Contingency** |
| Manage construction works to minimise impact on air quality. | 16.1 | Dust suppression will be implemented to reduce impacts of general construction works (e.g. water trucks). | Contractor | • Site ES&H inspection checklist. | • Daily throughout construction. | • Additional suppression efforts or methods are to be implemented if dust levels are reported to be impacting the town of Onslow or Onslow Airport. |
| | 16.2 | Appropriate dust suppression (e.g. seeded hydromulch or topsoil) will be implemented within the spoil disposal area once tail water has drained away. | Contractor | • Site ES&H inspection checklist | • Daily once tail water has drained away. | • If dust levels persist after initial suppression efforts, alternative method for suppression will be investigated |

## 6.10. Social Surrounds

Monitoring and management proposed to minimise potential impacts on the environmental factor 'Social Surrounds' (Aboriginal Heritage) are described in **Table 17**.

**Table 17 Monitoring and Management actions to minimise impacts on Social Surrounds.**

| **Environmental Factor** | **Social Surrounds** | | | | | |
|---|---|---|---|---|---|---|
| **Activity** | Construction works. | | | | | |
| **Potential Impacts** | Potential disturbance of a significant Aboriginal Heritage site. | | | | | |
| **Project Specific Objective (Target)** | **Management Actions** | | | **Environmental Performance** | | |
| | **Item** | **Actions** | **Responsibility** | **Reporting/Evidence** | **Timing** | **Contingency** |
| Site boundaries and construction works will be managed to protect social surroundings from significant harm. | 17.1 | Undertake pre-clearance ethnographic and archaeological surveys for any areas of the disposal site and pipeline route that have not previously been surveyed.<br>Where required surveys will be undertaken in consultation with the traditional owners. | Proponent | • Ethnographic and archaeological survey reports. | • Prior to commencement of dredging and construction works. | • Dredge operations and land based construction works are not to commence prior to Ethnographic and archaeological surveys (if required). |
| | 17.2 | If survey results determine it is required, prepare and submit a Section 18 referral to the Department of Aboriginal Affairs (DAA). | Proponent | • Section 18 referral. | • Prior to commencement of dredging and construction works. | • Dredge operations and land based construction works are not to commence prior to the submission of a Section 18 referral to the DAA (if required). |
| | 17.3 | Liaise with traditional owners and community groups and implement appropriate cultural protocols prior to dredging commencement, to ensure that proper respect is shown to the Warnamankura (mythological water serpent). | Contractor<br>Proponent | • Stakeholder consultation with traditional owners and local communities. | • Prior to commencement of dredging and construction works. | • Dredge operations and land based construction works are not to commence prior to discussion with traditional owners and local communities. |
| | 17.4 | Heritage Monitors onsite during clearing and/or land-based ground disturbance works. | Contractor | • Daily monitor logs. | • During clearing or ground disturbance works (excludes dredging) | • Reporting of any incidents to DAA. |

# 7. Waste Management

The waste management measures identified in **Table 18** (applicable to vessels and land based) are aimed at minimising impacts on the marine and terrestrial environment arising from waste discharge and disposal. Daily Vessel and Site ES&H inspections will be undertaken to check that all reasonable and practicable measures are being taken to minimise the generation of waste and its discharge into the environment.

**Table 18 Waste management objectives and measures.**

| Objective | Management Measure |
|---|---|
| Ensure staff, contractors, and subcontractors are aware of responsibilities to appropriately manage waste, including achieving recycling targets. | All personnel are to be appropriately inducted prior to any site works. Waste management plans/procedures to be made available to all personnel. |
| Appropriately segregate waste. | Recycle waste where possible. |
| Store waste with minimum impact on the environment. | Provide sufficient recycling and waste bins on site including offices, crib rooms and vessels. |
| | Store waste in enclosed bins with no exposure to the elements. |
| | Store waste in accordance with Australian Standards, Codes of Practice and relevant legislation. |
| | Avoid large stockpiles of materials on site. |
| | Avoid overloading bins. |
| | Avoid storing waste on site for long periods of time. |
| Disposal of waste with minimum impacts on the environment. | Use appropriate & licensed contractors for waste disposal. |
| | Dispose of waste regularly. |

## 8. Reporting

A summary of the environmental reporting requirements identified within this DSDMP is provided in **Table 19**.

**Table 19 Reporting requirements during dredging and dredge disposal.**

| Name of Report | Content | Timeframe | Recipient |
|---|---|---|---|
| Plume Sketches | Illustration and observation of dredge plume extent. | Daily whilst dredge operating. | Proponent |
| Water Quality Report | Monthly summary of physico-chemical data, sample results and MODIS imagery to provide a status of water quality health. | Monthly. | Proponent<br>TACC |
| Aboriginal Heritage Survey Report<br>(If required) | Investigation results from Aboriginal Heritage Survey, Archaeological, historical and/or anthropological background, field test results etc. | Prior to construction activities. | DAA |
| Vegetation Clearing Permit (If required) | Verify authority to clear flora and vegetation within the defined project boundary. | Prior to vegetation clearing. | DER |
| Bed and Banks Permit (If required) | Verify authority to interfere with or obstruct a watercourse or its banks or surrounds. | Prior to construction of disposal site. | DoW |
| IMP Risk Assessment | Department of Fisheries 'Vessel check risk assessment', copy of Vessel Check report, supporting documentation including antifoul certificates and inspection reports.<br>Statement from lead inspector on marine pest status of the vessel. | Within 72 hours of inspection. | DOT<br>DoF |
| Vessel Quarantine Report | Checklist of vessel components checked during vessel inspection.<br>Statement from lead inspector. | Within 14 days of inspection or risk assessment. | DoT<br>DoF |
| Incident Report | The contractor shall notify the Proponent as soon as possible following an incident.<br>The Contractor will submit an incident report to the Proponent within 24hrs of the event. | As per the OMSB Incident Management Procedure. | Proponent |
| Environmental Performance Report | Summary of environmental compliance with the requirements of this DSDMP.<br>Overview of any environmental incidents (e.g. breach of water quality criteria) and management action taken, including the results of any follow-up investigations. | At each TACC meeting. ~TACC Meetings are planned to occur during April and October each year. | TACC |

### 8.1. Daily Inspections/Checklists

Below is a list of required daily environmental inspection/checklists that are to be submitted to verify ES&H compliance. Note the list below is the minimum requirement, the contractor may wish to undertake addition inspections/checklists to demonstrate compliance.

- Site ES&H inspection – (e.g. dredge pipe integrity, erosion, bund integrity, dust, drainage, site boundaries, waste management).
- Vessel ES&H inspection – (e.g. equipment inspection, navigation equipment systems, speed, MFO personnel, waste management, chemical storage, spill kits).
- Dredge operation log – (e.g. operations times, types of operations, soft start times, gps positioning, dredge volumes).

- <u>MFO Logs</u> – (e.g. dredge operation time, MFO name, fauna species, distance from vessel, management response).

# 9. Review

This DSDMP should be reviewed on an as required basis. It is considered that review and revision should at least occur in response to the following circumstances:

- To address any conditions imposed by relevant decision-making authorities (i.e. EPA, DoT, SoA);
- New information relating to potential environmental impacts comes to hand;
- Finalisation of Dredge Spoil Disposal Strategy; and
- Significant changes to dredging or spoil disposal methodology.

Upon review of the DSDMP, the document will be revised where appropriate and the revision status of the document will be updated as required.

# 10. References


BMT Oceanica (2015) *Technical Memorandum: Pre-referral meeting for proposed Onslow Marine Support Base.* Memorandum issued to the Office of the Environmental Protection Authority on 12th November 2015.

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EPA (2014) *Beadon Creek Capital Dredging and Construction of Land-Backed Wharf. Not Assessed* – Public Advice Given. 28 April 2014.

Environmental Protection Authority (EPA) (2016) *Statement of Environmental Principles, Factors and Objectives*. Environmental Protection Authority. December 2016.

Galt Geotechnics (2017) *Technical Memorandum: Geotechnical Assessment of Imported Fill, Proposed Boat Harbour Access Road Upgrade Beadon Creek Road*, Onslow.

PIANC (2014) *Classification of Soils and Rocks for the Maritime Dredging Process.* Report No 144

USACE (2015) *Dredging and Material Management* (EM-1110-2-5025)

van 't Hoff, J. (2013) *Hydraulic Fill Manual: For Dredging and Reclamation Works.* CRC Press

# Appendix A Port of Ashburton Technical Advisory and Consultative Committee – Terms of Reference

PILBARA PORTS AUTHORITY

# Port of Ashburton - Technical Advisory and Consultative Committee

# Terms of Reference – Dredging and Dredged Material Disposal

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## 1. CONTEXT

On 2 December 2016, the Department of the Environment and Energy issued Pilbara Ports Authority (PPA) with a Sea Dumping Permit (SD2016/3282), which commences on 23 March 2017 for a period of five years.

PPA's Permit allows for the dumping of dredged material derived from maintenance dredging of the shipping channel, turning basins, product loading facility and Materials Off-loading Facility within the Port of Ashburton to approved spoil grounds.

Ongoing stakeholder input is important in the execution of any successful dredging program. PPA is committed to the implementation of effective, transparent and timely engagement and communication with stakeholders interested in or affected by dredging programs within its ports. To achieve this, PPA has established a Technical Advisory and Consultative Committee (TACC) for the Port of Ashburton.

## 2. SCOPE

The Port of Ashburton TACC will have an interest in all dredging and disposal activities within the port limits and adjacent approved spoil grounds (Figure 1). These activities may include:

- Capital dredging projects;
- Maintenance dredging projects;
- Dredged material placement within approved spoil grounds; and
- Strategic and administrative issues relating to the above, such as long term dredge management plans, spoil ground capacity management and allocation, new spoil ground site selection or other similar issues as they arise.

In accordance with the *National Assessment Guidelines for Dredging (2009)*[1], the intent of the TACC is to:

- Provide continuity of direction and effort in protecting the local environment of the Port of Ashburton in relation to dredging and material placement;
- Aid communication between stakeholders and provide a forum where points of view can be discussed and conflicts resolved;
- Assist in the establishment, as appropriate, of longer term permitting arrangements through activities such as the provision of comments, review of plans and integration of activities;
- Review ongoing management of dredging and dumping activities in accordance with the guidelines and permitting arrangements; and

[1] Available at: https://www.environment.gov.au/marine/publications/national-assessment-guidelines-dredging-2009

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- Make recommendations to PPA, State agencies and/or relevant Commonwealth agencies as necessary in relation to the above as appropriate.

The role of the TACC is not to duplicate the responsibilities of existing State or Federal agencies. Further, it is not to duplicate or be a substitute for focused consultative groups established under other legislation or process.

It is to provide a single point of reference for dredging planning and management in the Port of Ashburton, and to facilitate the flow of information from these groups/agencies to and from Port of Ashburton stakeholders.

It is envisaged that the TACC will provide opportunities for:

- Proponents to seek comment on a proposal, such as under the *National Assessment Guidelines for Dredging (2009)*. Comment would be collated by the TACC Chair, conflicts resolved and provided back to the proponent for submission to the Department of the Environment and Energy;

- Members to have input to the forward planning of dredging issues within the port, such as spoil ground utilisation; and

- Combining of resources, such as joint research.

## 3. TACC MEMBERSHIP

Membership is drawn from relevant Commonwealth, State and local government and non-government organisations with expertise, responsibilities or interest in the dredging in the port. The stakeholders represented on the TACC are:

- Pilbara Ports Authority(Chair)
- Chevron Australia;
- Onslow Salt;
- Onslow Chamber of Commerce and Industry;
- Thalanyji people as Traditional Owners (represented by Buurabalayji Thalanyji Aboriginal Corporation);
- WA Department of Parks and Wildlife;
- WA Department of Fisheries;
- WA Department of Transport;
- WA Department of State Development;
- Commonwealth Department of the Environment and Energy; and
- WA Office of the Environmental Protection Authority.

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PPA typically sends three delegates to TACC meetings, including: Environment and Heritage Manager – West Pilbara (Chair), Harbour Master – Regional Ports, and Dredging Manager. The latter role performs an important function on the TACC, providing specialist advice and information on both planned and completed dredging activities, hydrographic surveys, and metocean equipment installations, as well as status updates on the performance of this equipment.

Current TACC membership and contact details are shown in Schedule 1, which will be updated as required. The principal from the stakeholder organisation will be responsible for circulating material within their respective organisation and providing consolidated feedback as required.

The principal will be responsible for nominating a second and keeping contact details up to date. The Chair will maintain the contacts list in Schedule 1.

In addition to the above stakeholders, the Chair may invite specialist consultants to attend meetings and provide input to the TACC on specific issues. Advice may also be sought from specialist consultants through the Chair outside TACC meetings.

Organisational membership can be changed from time to time as required, either for specific in-port projects, or identified gaps in stakeholder representation. A request will be made through the Chair and considered by the TACC.

Organisations will be responsible for the appropriate selection of a representative on the TACC.

## 4. MEETINGS

The TACC will meet twice annually, nominally in April and October. Depending on circumstances, additional meetings may be held outside these nominal times.

Pilbara Ports Authority will be responsible for providing secretariat services and meeting facilities.

Meetings will generally be held with video and conference call lines available for those unable to attend in person.

## 5. QUORUM

A minimum of the Chair (or delegate) and five member stakeholders must attend a meeting to obtain a quorum.

Attendance of a meeting may be in-person or via suitable electronic means.



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## 6. AGENDA

The Chair will call for agenda items before the proposed meeting. This will advise of the proposed meeting date, time and location.

The Chair will collate agenda items and circulate an agenda before the meeting date. Where an agenda item requires presentation material at the meeting, the Chair will make all attempts to source this material and provide to stakeholders attending the meeting via electronic means prior to the meeting.

## 7. MINUTES

Minutes of the meeting will be taken on behalf of the Chair or delegate. These will be circulated to all stakeholders post meeting for comment, and finalised before the next meeting.

PPA will be responsible for retaining copies of meeting minutes, and providing these to member stakeholders upon request.

## 8. OUT OF SESSION ITEMS

Where an issue arises that cannot be dealt with at a meeting, but does not necessitate calling an additional meeting, the Chair may circulate the required material out-of-session by whatever means are appropriate (e-mail, hardcopy).

The Chair will provide the material, allow sufficient time for consideration (nominally two weeks), collate information and then circulate a summary of the responses and, where appropriate, an outcome.

Out of session material will be limited as much as possible, recognising the value of collective discussions via the TACC meetings.

## 9. REVIEW OF TERMS OF REFERENCE

A review of the Terms of Reference will be undertaken by members of the TACC every 3rd year or as need arises.

## 10. VERSION CONTROL

A record will be maintained of changes to this document (Schedule 2). Administrative changes will be made as required. Substantive changes will be circulated to the TACC membership for review and acceptance.

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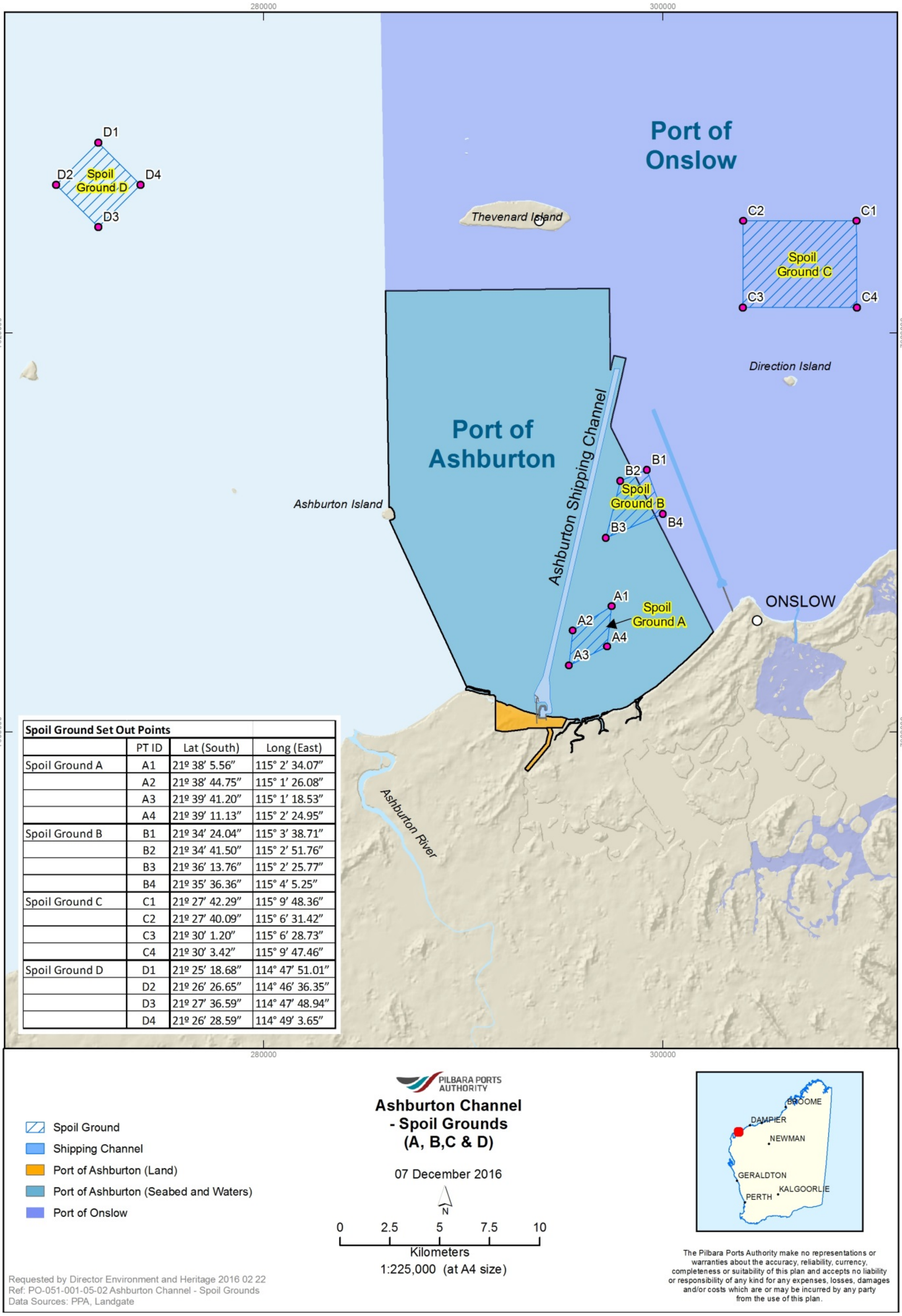


**Spoil Ground Set Out Points**

| | PT ID | Lat (South) | Long (East) |
|---|---|---|---|
| Spoil Ground A | A1 | 21º 38' 5.56" | 115° 2' 34.07" |
| | A2 | 21º 38' 44.75" | 115° 1' 26.08" |
| | A3 | 21º 39' 41.20" | 115° 1' 18.53" |
| | A4 | 21º 39' 11.13" | 115° 2' 24.95" |
| Spoil Ground B | B1 | 21º 34' 24.04" | 115° 3' 38.71" |
| | B2 | 21º 34' 41.50" | 115° 2' 51.76" |
| | B3 | 21º 36' 13.76" | 115° 2' 25.77" |
| | B4 | 21º 35' 36.36" | 115° 4' 5.25" |
| Spoil Ground C | C1 | 21º 27' 42.29" | 115° 9' 48.36" |
| | C2 | 21º 27' 40.09" | 115° 6' 31.42" |
| | C3 | 21º 30' 1.20" | 115° 6' 28.73" |
| | C4 | 21º 30' 3.42" | 115° 9' 47.46" |
| Spoil Ground D | D1 | 21º 25' 18.68" | 114° 47' 51.01" |
| | D2 | 21º 26' 26.65" | 114° 46' 36.35" |
| | D3 | 21º 27' 36.59" | 114° 47' 48.94" |
| | D4 | 21º 26' 28.59" | 114° 49' 3.65" |

PILBARA PORTS AUTHORITY

### 11. SCHEDULE 1: TACC MEMBERSHIP CONTACT DETAILS

| ORGANISATION | PRINCIPAL | CONTACT | SECOND | CONTACT |
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## 12. SCHEDULE 2: VERSION HISTORY

| VERSION NUMBER | DATE | DESCRIPTION OF CHANGE | ADMINISTRATIVE / SUBSTANTIVE? |
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# Appendix B Environmental Quality Plan

An existing Environmental Quality Plan (EQP) for Beadon Creek is presented in the *Pilbara Coastal Water Quality Consultation Outcomes* (DoE, 2006) and shown in **Figure A-1** below. Water quality in the High Ecological Protection Area (HEPA) shown in the western tributary of Beadon Creek (Figure A-1), has the potential to be temporarily impacted as a result of dredge tail water discharge to the intertidal area which flows to this tributary. Therefore, discharge water quality from the DMMA is proposed to be monitored during dredging and onshore spoil disposal to achieve:

- A Moderate Level of Ecological Protection at the tail water discharge (Weir box) and at a location to be determined within western tributary of Beadon Creek; and
- A High Level of Ecological Protection in the other upper tributaries of Beadon Creek.

Specific water quality monitoring sites and criteria will be selected and described in the WQMP, which is proposed to be presented to the Port of Ashburton Dredging Technical Advisory and Consultative Committee (TACC) for review and comment.

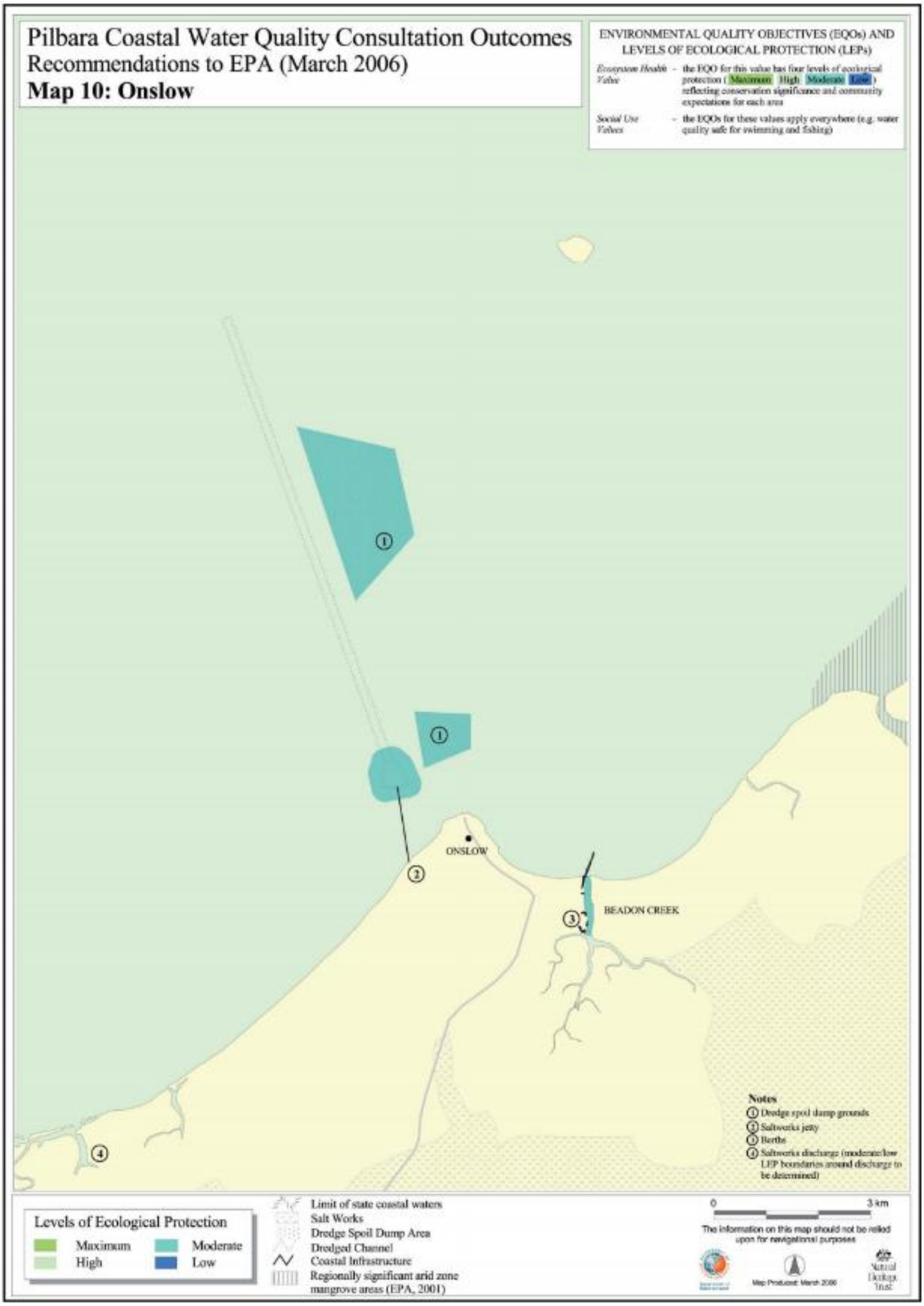


**Figure A-1 Environmental Quality Plan for Onslow (Including Beadon Creek) (DoE, 2006)**