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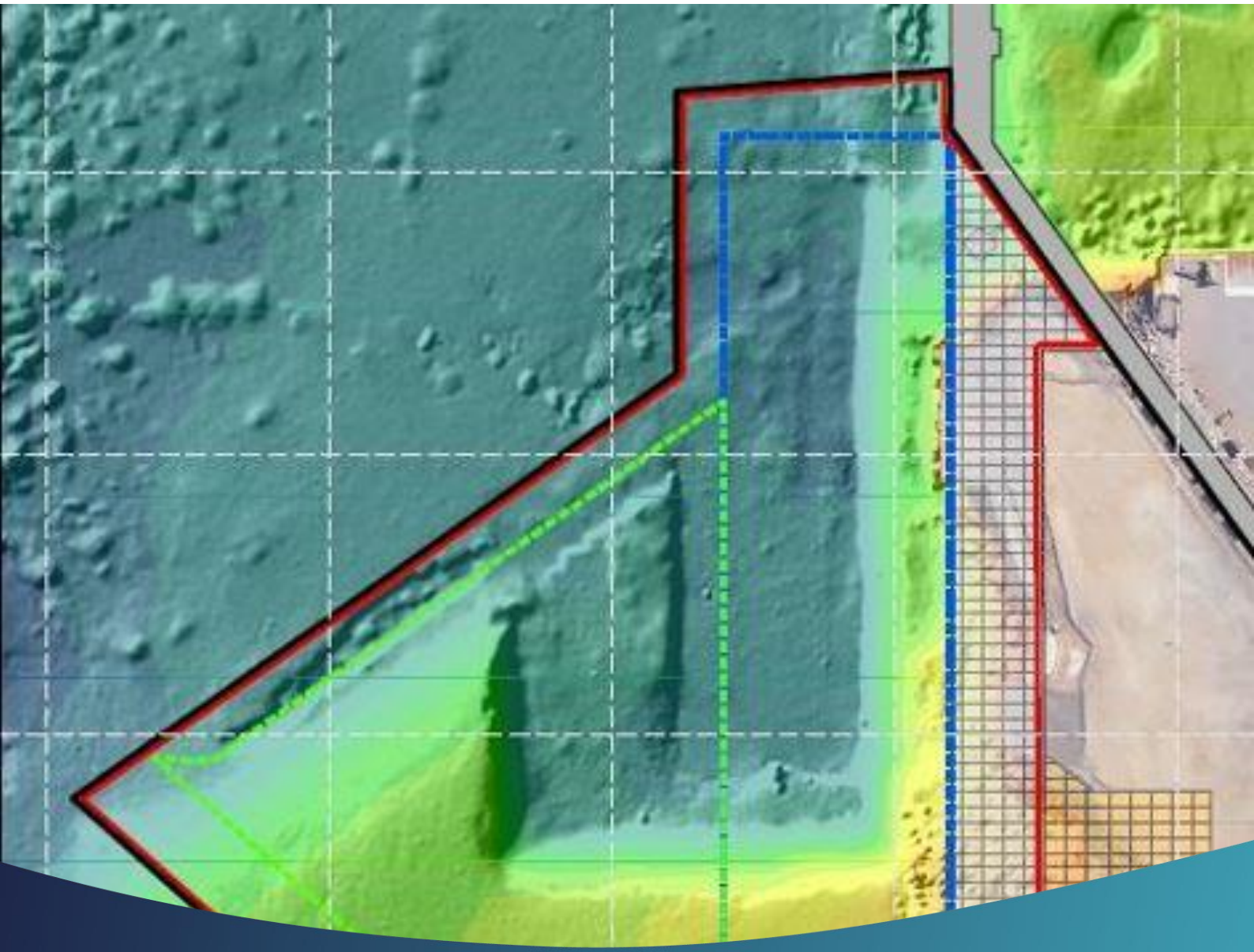
Dampier Cargo Wharf Extension and Landside Redevelopment Project

Dredge Environmental Management Plan

MARINE



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WA MARINE PTY LTD | ABN 84 168 014 819 | www.o2marine.com.au

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WA Marine Pty Ltd t/as O2 Marine
ACN 168 014 819
Head Office - 11 Mews Road, Fremantle WA 6160
T 08 9335 1232 | info@o2marine.com.au

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Name	Email Address
David Pozzari	David.pozzari@pilbaraports.com.au

Abbreviations and Acronyms

Acronyms/Abbreviation	Description
ANZG	Australian and New Zealand Guidelines
BCH	Benthic Communities And Habitat
CEMP	Construction Environmental Management Plan
COPC	Contaminants of Potential Concern
DAWE	Department of Agriculture, Water and the Environment
DEMP	Dredge Environmental Management Plan
DLI	Daily Light Integral
DoT	Department of Transport
DPIRD	Department of Primary Industry and Regional Development
DWER	Department of Water and Environmental Regulation
EMM	Environmental Monitoring and Management
EPA	Environmental Protection Authority
EPBC	Environmental Protection and Biodiversity Conservation Act
EPO	Environmental Protection Outcomes
HEPA	High Ecological Protection Area
LAU	Local Assessment Unit
MEER	Maritime Environmental Emergency Response
MEPA	Moderate Ecological Protection Area
MT	Management Target
MNES	Matters of National Environmental Significance
NAGD	National Assessment Guidelines for Dredging
PAH	Polycyclic aromatic hydrocarbon
PPA	Pilbara Ports Authority
POLREP	Pollution Report Form
TACC	Technical Advisory and Consultative Committee
TRH	Total Recoverable Hydrocarbons
ZoHI	Zone of High Impact
ZoI	Zone of Influence
ZoMI	Zone of Moderate Impact

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1. Introduction

1.1. Project Summary

Pilbara Ports Authority (**PPA**) is the proponent for the Dampier Cargo Wharf Extension and Landside Redevelopment Project (**the Project**). PPA is proposing to construct and operate a land-backed wharf extension to the Dampier Cargo Wharf (**DCW**) at the Port of Dampier (**the Port**). The ultimate scope of the Project incorporates the development of a new (adjoining) southern section of wharf and associated mooring dolphin, wharf connecting structure, dredged berth pocket and vessel manoeuvring area (Figure 1) design of the wharf structure is yet to be finalised; however, key construction elements of the Project may include pile driving works, stabilisation of the shoreline via construction of rock revetment or a retaining wall and construction of a concrete deck. The proposed Development Envelope (**DE**) and Project Footprint are shown in Figure 1.

A short description of the Project is provided in Table 1 and the Project's physical, construction and operational elements are provided below in Table 2.

Table 1 General proposal content description

Proposal title	Dampier Cargo Wharf Extension and Landside Redevelopment Project
Proponent name	Pilbara Ports Authority
Short description	The Proposal is for the construction and operation of a land-backed wharf extension to the DCW at the Port of Dampier. The Project incorporates the development of a new (adjoining) southern section of wharf, dredged berth pocket and vessel manoeuvring area. The Project will enable larger vessels (up to Panamax class) to access the terminal and facilitate new trades and products being handled at the Port.

Table 2 Proposal content elements

Proposal element	Location / description	Maximum extent, capacity or range
Physical elements		
Land-backed wharf Extension	Figure 1	• 325 m wharf face with a wharf connecting structure.
Berth pocket and vessel manoeuvring area	Figure 1	• Total dredge footprint of 8.4 hectares (**ha**). • Berth pocket to design depth of -13.2 m Chart Datum (**CD**). • Vessel manoeuvring area to design depth of -11 m CD (*Note that up to 1m of over-dredge may be required to achieve these design depths)*
Construction elements		
Construction of the DCW Extension and Landside Redevelopment Project	Figure 1	• Pile driving works: up to 470 steel piles of up to 1800 mm diameter and installation of concrete wharf deck. • Construction of rock revetment and installation to form the wharf deck and associated mooring dolphin.

Capital Dredging	Figure 4	• Up to 380,000 m^3 of capital dredging within the Dredging Footprint will be undertaken using a backactor or cutter suction dredge.
Drilling and blasting	Figure 4	• Approximately 100,000 m^3 of granophyre rock material to the south and east of the Dredging Footprint will be broken up using drilling and blasting techniques.
Disposal of material	Figure 5	• Dredge spoil, including blasted rock material to be placed at established spoil grounds located in Port waters including Spoil Ground 2B, Spoil Ground A/B and East Lewis Island (ELI) Spoil Ground. Suitable rock material may be beneficially reused for other approved Port projects and / or be placed within established Spoil Grounds within the Port. Where possible, PPA will seek to place rock material in such a way within ELI Spoil Ground that it can be colonised by corals.
Operational elements		
Vessels and wharf	Figure 1	• Enable larger vessels (Panamax class) to access the terminal and facilitate new trades and products being handled at the Port.
Ongoing maintenance dredging	Figure 1	• In accordance with PPA's 5-year SDP for maintenance dredging (SD2019/3962) and approved Long-Term Dredge Management Plan.

1.2. Purpose of this Plan

The purpose of this Dredge Environmental Management Plan (DEMP) is to minimise direct and indirect impacts from the Project dredging (including drilling and blasting) activities and associated dredge plume to ensure that the environmental protection outcomes are not compromised. This DEMP acts to support the environmental impact asessment (EIA) of the Project and as well as necessary state and Commonwealth approvals.

This DEMP will form part of the sea dumping permit application, as well as providing the framework for the Project dredging activities including:

- Relevant legislation and regulations
- Environmental Values to be protected and risks posed by the Project
- Dredging specifications including dredge and disposal areas, type and volumes of material to be dredged and proposed dredge methods
- Management Strategies
- Management Targets (MTs) and Environmental Protection Outcomes (EPOs)
- Monitoring and reporting
- Responsible parties
- Consultation.

Environmental risk management in relation to underwater noise impacts to marine fauna from piling and blasting associated with the Project is detailed in the Construction Environment Management Plan (CEMP) (O2M 2022f).

1.3. Legislation, Regulations and Guidelines

The potential environmental impacts of the Proposal were considered at Commonwealth, State and Local Authority level with each Authority providing guidance on the level of assessment required. This DEMP was developed with consideration of the following legislation and guidelines.

1.3.1. Commonwealth

- *Environmental Protection and Biodiversity Conservation Act (1999) (EPBC Act)*
- *Environment Protection (Sea Dumping) Act 1981*
- *Protection of the Seas (Prevention of Pollution from Ships) Act 1983*
- *Biosecurity Act 2015*
- *Biosecurity Regulations (2016)*
- *Australian Ballast Water Management Requirements Version 7 2017*
- National Water Quality Management Strategy (Commonwealth Government of Australia 1992).
- National Australian Guidelines for Dredging (NAGD) 2009

1.3.2. State

- *Environmental Protection Act 1986*
- *Biodiversity Conservation Act 2016*
- *Port Authorities Act 1999*
- *Navigable Waters Regulations 1958*
- *Shipping and Pilotage (Port and Harbour) Regulations 1967*
- *Western Australian Marine Act 1982*
- *Pollution of Waters by Oil and Noxious Substances Act 1987*
- *Marine and Harbours Act 1981*
- *Environmental Protection Act 1986*
- *Environmental Protection Regulations 1987*
- *Fisheries Resource Management Act 1994* (relevant to Introduced Marine Pests)
- Western Australia Environmental Protection Authority Technical Guidance - Assessment Guidelines of Marine Dredging Proposals (WA EPA, 2021)
- Western Australia Environmental Protection Authority Technical Guidance - Protecting the Quality of Western Australia's Marine Environment (WA EPA, 2016a)
- Western Australia Environmental Protection Authority Technical Guidance – Protection of Benthic Communities and Habitats (WA EPA, 2016b).

1.3.3. Port Requirements

The proposed dredging program shall be carried out in accordance with PPA standard operating requirements including:

1.3.3.1. Health and safety

The dredging program shall be carried out in accordance with PPA health and safety requirements, and a Health and Safety Management Plan shall be prepared by the dredging contractor(s) and approved by PPA prior to the commencement of dredging.

1.3.3.2. Quality assurance

PPA and the dredging contractor(s) undertaking the dredging program, shall have a Quality System certified by a third party to be compliant with ISO 9001, or equivalent. Quality records shall be kept for dredging and surveys, data management presentation and interpretation.

1.3.3.3. Survey

Hydrographic survey works will be the ultimate responsibility of PPA, however progress survey work may be undertaken by the dredging contractor(s) depending on the terms of the dredging contract. Surveys will be carried out in accordance with the latest revision of the PPA's Hydrographic Survey Standards and Deliverables requirements, requirements within the sea dumping permit and with the requirements of the contract between PPA and the dredging contractor(s).

1.3.3.4. Port Operations

The dredging program will be carried out adjacent to the Ports oporational facilities, berthing pockets, swing basin and Facilities Channel. The requirements for operating in the Port are outlined in PPA's Port of Dampier Port Handbook, the Port of Dampier Port User Guidelines and Procedures and in consultation with the Port of Dampier Harbour Master. PPA requirements shall be adhered by any vessels associated with the dredging program whilst within Port Waters.

1.4. Project Description

The Port is located approximately 1,540 kilometres (by road) north of Perth, WA and 260 kilometres (by road) west of Port Hedland. The Port is located on the western side of the Burrup Peninsula on the Pilbara coastline, approximately 20 km west of Karratha (Figure 2).

The Port consists of ten port terminals with separate navigational channels, which facilitate the export of iron ore, salt, gas products and the transfer of general cargo, break-bulk and bulk liquid fuels. PPA is responsible for managing Port waters and vessel traffic operating within the Port.

Port waters extend out into Mermaid Sound and the Indian Ocean beyond the limits of State Waters and incorporates the waters surrounding the Burrup Peninsula and some waters of the Dampier Archipelago.

There is currently no multi-user bulk solid export cargo capacity in the Port. The need for a new multi-user facility has been recognised by PPA, to support new and existing trades and proposed industrial developments in the Burrup Strategic Industrial Area (SIA). PPA is proposing to develop and operate a land-back wharf extension to the DCW at the Port. The extension of the DCW as proposed will connect to the existing land-based operational areas currently used by PPA as lay-down and project cargo off-loading and storage areas. The ultimate scope of the Project incorporates the development of a new (adjoining) southern section of wharf and associated mooring dolphin, wharf connecting structure, dredged berth pocket and vessel manoeuvring area (Figure 1).

The new multi-user wharf will align and extend directly south from the DCW, enabling larger vessels to access this terminal and support new trades and products being handled at the Port. The Project will be connected to the Burrup SIA by the existing Burrup Services Corridor (BSC), a dedicated infrastructure corridor designed to accommodate services which facilitate the export of a range of liquid and solid products.

Up to 380,000 cubic metres (m^3) of capital dredging will be undertaken to establish a new berth pocket and associated manoeuvring area to design depths of -13.2m (CD) and -11.0m (CD) respectively (note that up to 1m of over-dredging may be required to achieve these depths). This volume includes an estimated 100,000m^3 of underlying and surface granophyre rock at the south-east end of the Dredging Footprint (Figure 4). The undisturbed seabed within the Project Footprint, as well as the previous capital dredging areas, is shown in Figure 3.

To undertake dredging of this material it must be broken up first using drilling and blasting techniques. Dredging will be undertaken using either a cutter suction or backactor dredge. Material dredged as part of the Project will be placed within the three established spoil grounds within the Port depending on the type of material to be disposed in accordance with a Sea Dumping Permit under the *Environment Protection (Sea Dumping) Act 1981*.. These spoil grounds are named East Lewis Island (ELI) Spoil Ground, Spoil Ground A/B and Spoil Ground 2B (locations displayed in Figure 5). Suitable rock material may be beneficially reused for other approved Port projects and / or be placed within established Spoil Grounds within the Port. Where possible, PPA will seek to place rock material in such a way within ELI Spoil Ground that it can be colonised by corals.

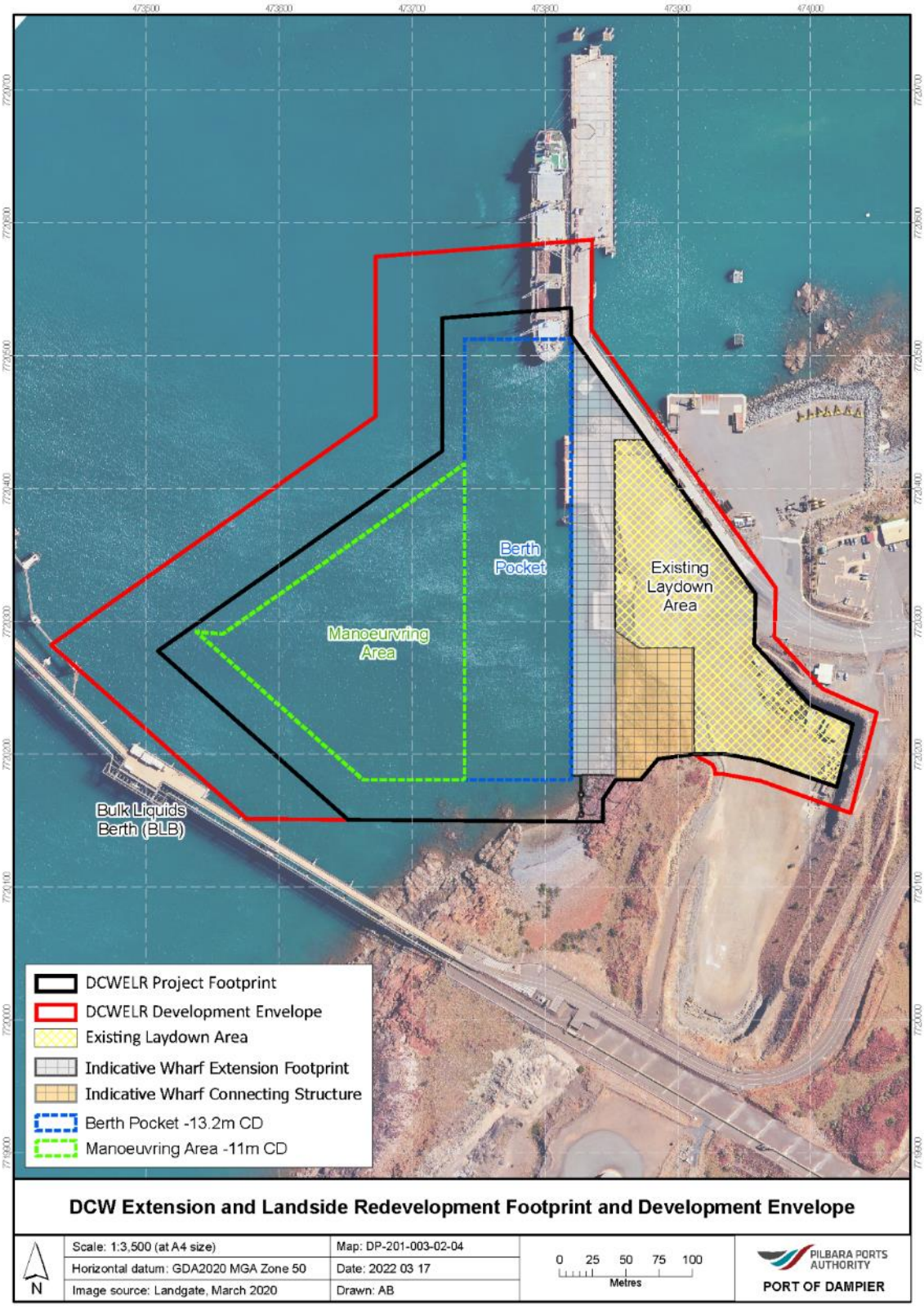

Figure 1 Project DE and Footprint

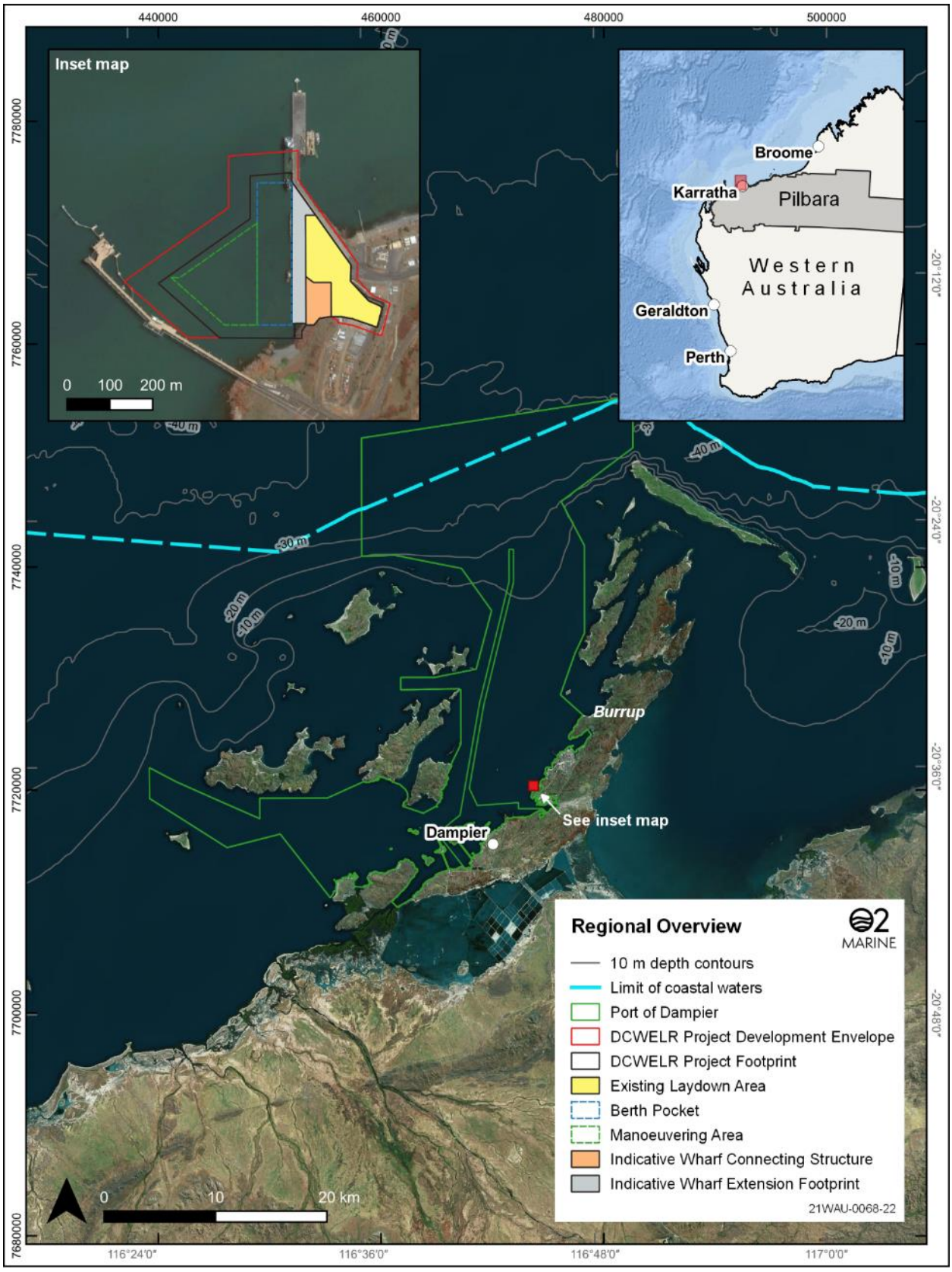

Figure 2 Regional Setting of Project

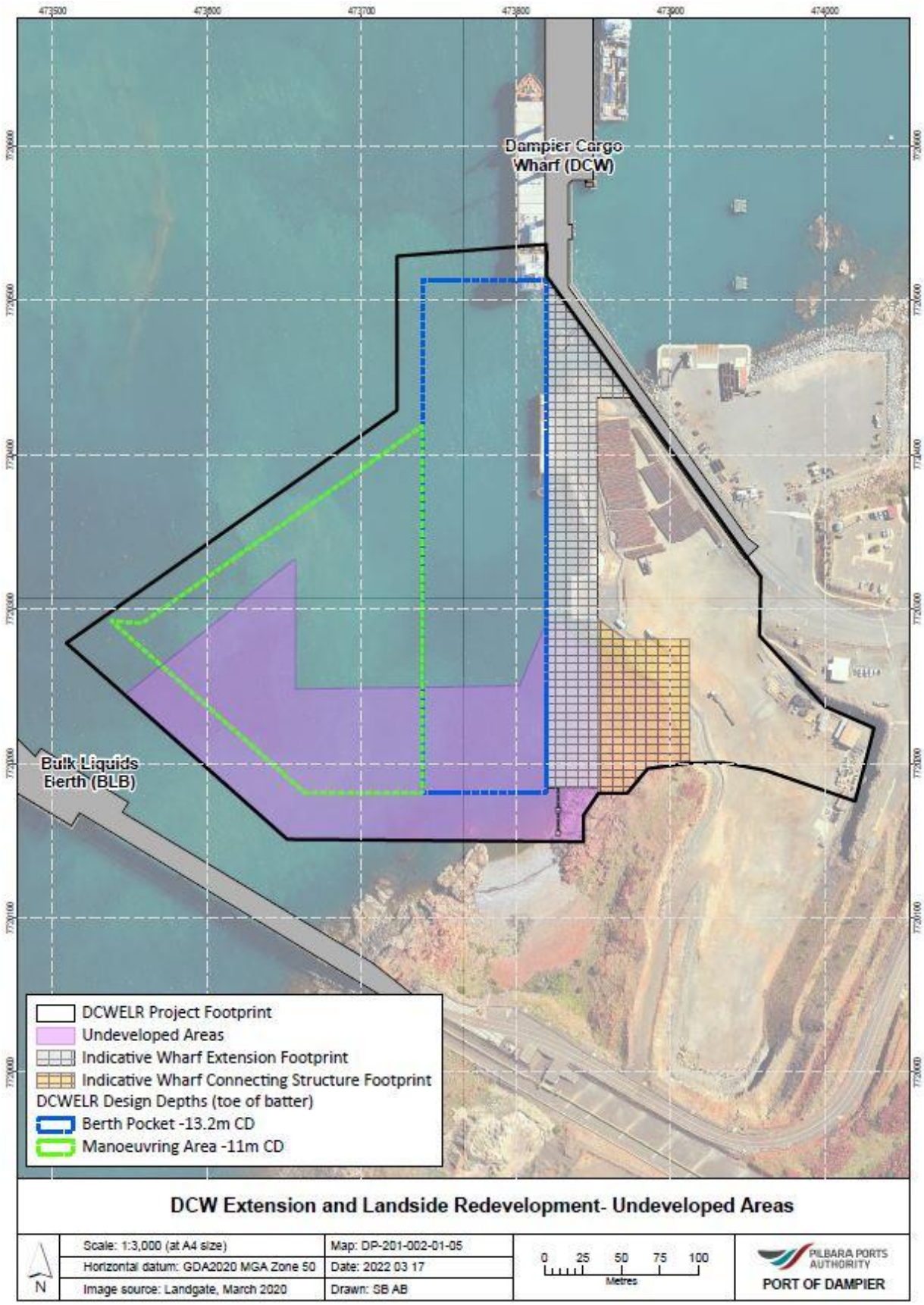

Figure 3 Undeveloped seabed within Project Footprint

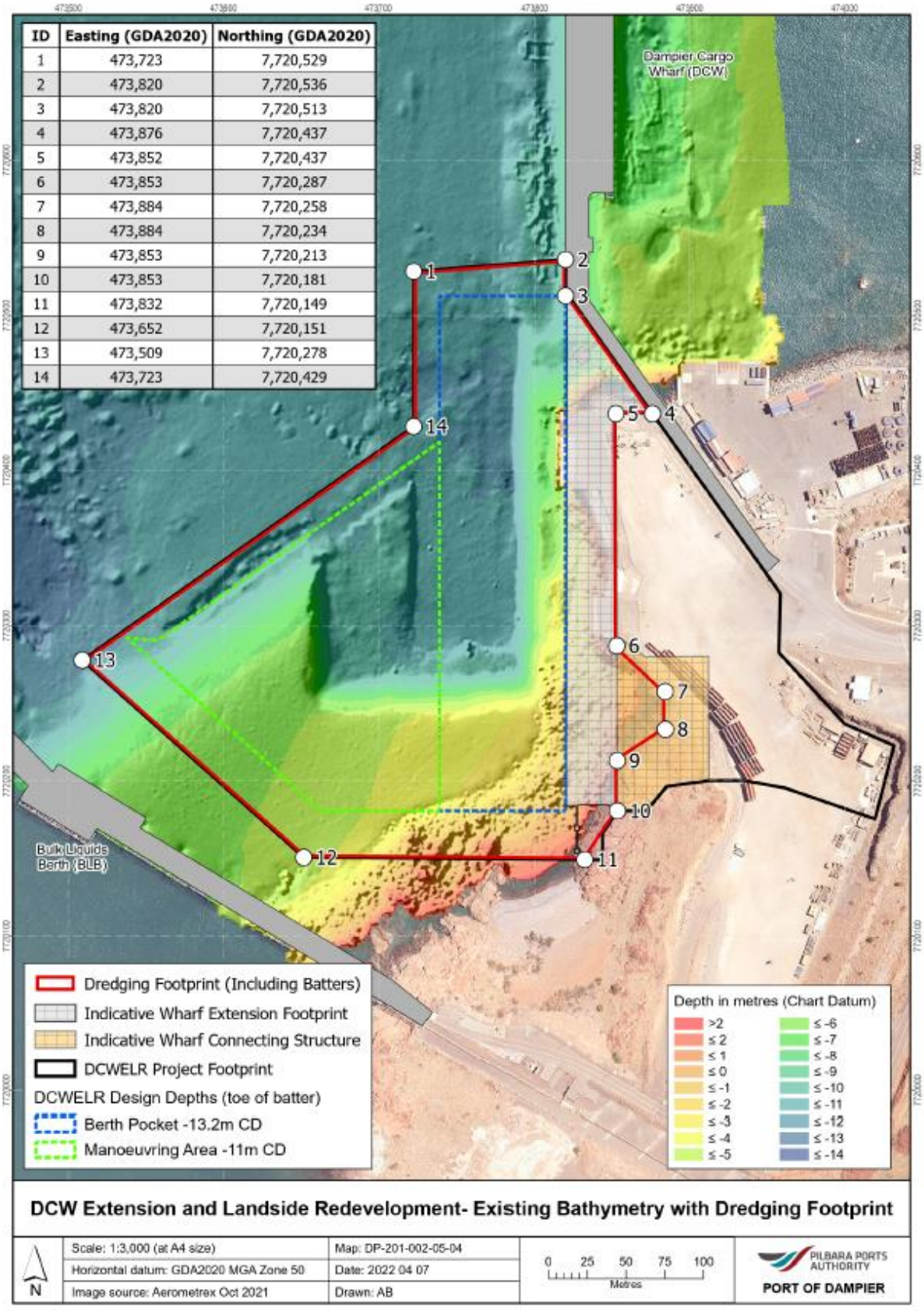

Figure 4 Dredging Footprint with existing bathymetry

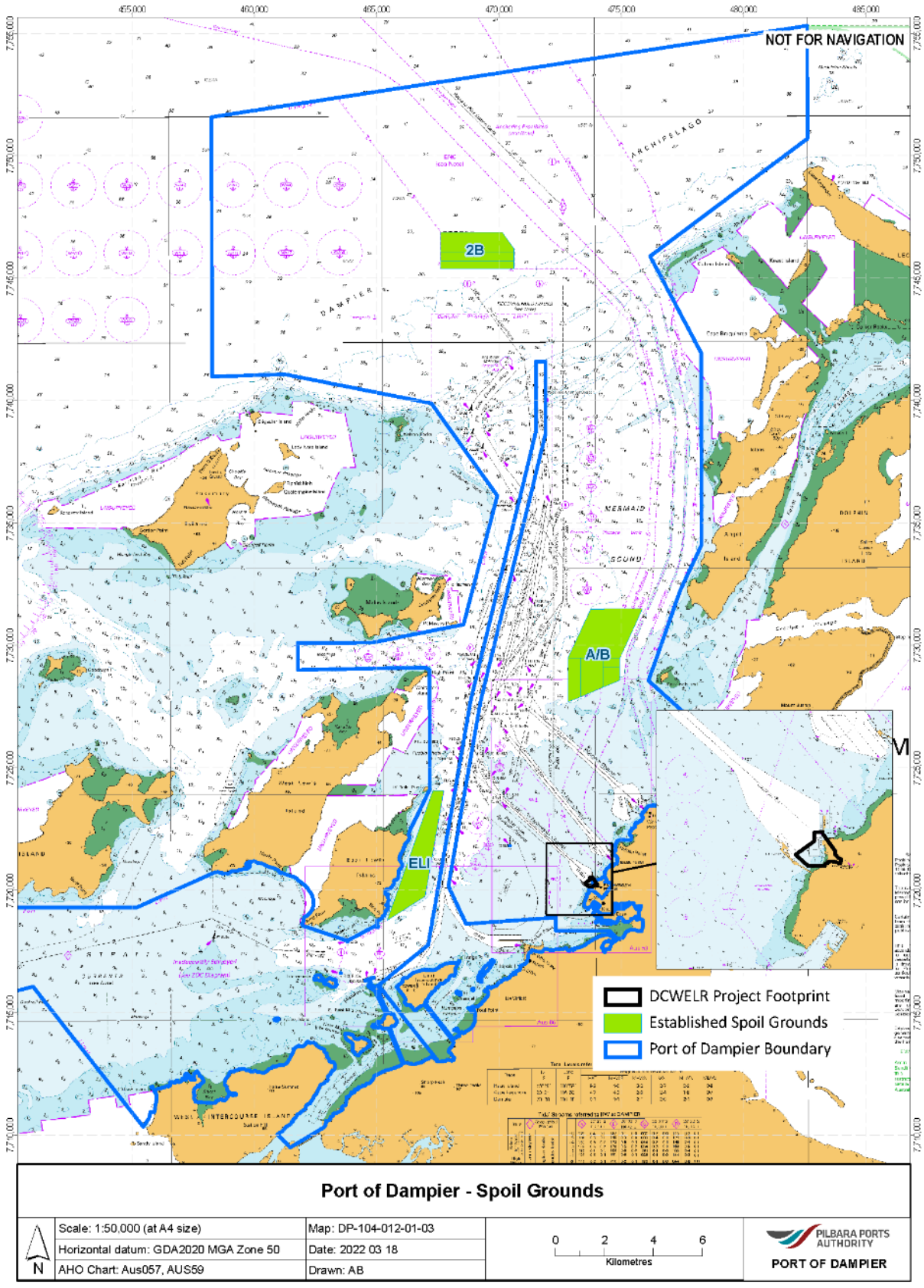

Figure 5 Port of Dampier and established spoil grounds

2. Environmental Setting

2.1. Marine Environmental Quality

2.1.1. Water quality

The Port is a multiple use environment that is associated with construction of Port infrastructure and heavy industrial activities. Nevertheless, marine water quality studies including PPA's Marine Environmental Quality Sampling and Analysis Program (MEQSAP) demonstrate that marine water quality in outer Port areas (i.e., distant industrial or urban contaminant sources) is still at near background levels (O2 Marine 2022a). Only a relatively small proportion of the broader Port area is heavily utilised, and this inner Port area continues to maintain an acceptable level of environmental quality for the protection of all Environmental Values (EVs) and Environmental Quality Objectives (EQOs).

2.1.2. Sediment quality

Marine sediments of the Port

MEQSAP sediment results to date have provided a thorough understanding of the physical and chemical parameters of the marine sediments of the area and support previous sediment investigations undertaken in the Port since 2003. The evidence from previous surveys suggest that the sediments are essentially free from any form of anthropogenic contamination.

The sediments within the Port vary from coarse sands in outer parts of the Dampier Archipelago (0 - 30% < 63 µm), to silt and mud which accumulate in sheltered embayment's along the Burrup Peninsula and some of the inner islands (10 - 65% < 63 um) (DEC 2006). Nearshore subtidal sediments are primarily terrigenous sands (eroded terrestrial rocks) and muds with a lesser calcareous biogenic component. Port sediments are generally very low in organic components (<1% TOC) (PPA 2013). Dredging campaigns conducted in the southern end of Mermaid Sound may have significantly affected the composition of surface sediments in the area. The resettlement of fine relatively uncontaminated sediment particles dredged from the deeper sediment layers and suspended in the water column may have diluted, or blanketed, the surrounding surface sediments.

Metals (except for chromium and nickel) in the sediments are all below the relevant National Assessment Guidelines for Dredging (NAGD) (low) screening levels in all sampling programs. At times, concentrations of nickel and chromium in excess of the relevant NAGD (low) screening levels have been found in previous surveys of marine sediments in and around the Port. When analysed in detail, these exceedances have always been considered as naturally occurring (Stoddard et al., 2019). These findings are consistent with those of DEC (2006) in a Pilbara wide study of the marine sediments which found that these metals occurred in many places at levels in excess of the appropriate NAGD (low) screening level. There are no anthropogenic sources of elevated levels of nickel or chromium within the Port that may have influenced the concentrations of these metals in the sediments of the Port.

Total Recoverable Hydrocarbons (TRH) and Polycyclic Aromatic Hydrocarbons (PAH) have not been detected at levels exceeding the NAGD (low) screening levels at any time.

Organotins have been detected at times during surveys implemented in the early 2000s. However, their occurrence seems to be diminishing and in the past five years have not been found at levels above the NAGD (low)

screening levels. All other parameters that have been samples have never exceeded the relevant NAGD (low) screening levels.

Marine sediment to be dredged

PPA undertook an assessment of sediment characterisation within the Project Footprint (MScience 2022) in line with the Sampling and Analysis Plan (GHD 2021) to determine the quality of the material to be dredged and potentially disposed at established spoil grounds within the Port. Sampling results were compared against the NADG. Sediment samples were collected and depth analysed at 0.5m and 1.0m below sea floor. Sediment sampling sites within the Project Footprint are shown in Figure 6.

Comparison of sediment metal and metalloid concentrations showed concentrations of metals in the Project Footprint were below the NAGD screening guideline levels for all metals. These results are consistent with other recent sediment surveys (Advisian 2019; MScience 2020) and historic (GHD 2016; Jacobs 2015; MScience 2007; Worley Parsons 2009; Worley Parsons 2011) completed within the Port of Dampier. Sediment concentrations of all metals assayed in this survey suggest that they met the NAGD criteria for unconfined ocean disposal.

Sediment concentrations of organotins were below the LOR for all organotin compounds in all samples and at these concentrations should not prevent unconfined ocean disposal of dredge spoil at the established spoil grounds.

Low concentrations (5 – 100ug/kg) of 14 PAH species were detected across six of 15 samples. This aligns with previous recent studies conducted within the Port of Dampier (Advisian 2019; MScience 2020) and past studies detailed by GHD (GHD 2021) showed hydrocarbons never been found at concentrations near the NAGD (low) screening levels. The 95% UCL of the sum of PAHs, across all sites when normalised to 1 % TOC, was well below the 10,000 µg/kg screening guideline presented in the NAGD

Overall, sediment concentrations of Contaminants of Potential Concern (COPC) were shown to be below the screening levels described in the NAGD. These findings suggest that sediment from the Project Footprint meet NAGD criteria for unconfined ocean disposal at the established spoil grounds.

Figure 6 Sediment Sampling in the Project Footprint

2.2. Benthic Communities and Habitat (BCH)

2.2.1. Port of Dampier BCH Overview

PPA has developed a benthic habitat map using publicly available reports and papers on the Dampier Archipelago including the Port (MScience 2018). The key BCH of the Dampier Archipelago, including the Port, are discussed in this Section and are shown in Figure 7.

The Port includes inshore, relatively calm and turbid environments that are sheltered by the 42 islands of the Dampier Archipelago and Murujuga. Offshore areas of the Port are influenced by clearer oceanic waters and rougher seas. The Port is bounded by the western coastline of the Burrup Peninsular to the east and Dampier Archipelago to the west. The marine waters between these boundaries are shallow in bathymetry, with depths ranging from 5-20 m lowest astronomical tide. The channel between these two boundaries is known as Mermaid Sound. The area is described as a drowned coastal embayment which is interspersed by a number of small islands often fringed by limestone rock platforms. The seabed generally comprises silt/sand sediments of mixed terrestrial and marine origin, with occasional limestone reef outcrops (Stoddart and Anstee, 2005). These sediments become coarser with increasing wave exposure and are typically relatively fine in the southern region of Mermaid Sound adjacent to the Project.

With its variety of conditions, the Port supports a wide range of marine benthic communities and habitats including coral, limited seagrass, macroalgae, mangrove and mixed communities (unconsolidated sediment with

filter feeder and infauna communities). The fringing and subtidal coral communities provide habitat for a range of species including diverse corals, fish and invertebrates. Intertidal areas generally feature mudflats, sand/gravel beaches and rocky shores.

There are five key types of BCH categorised and found within the Port (PPA 2021). These habitats include:

- Coral
- Seagrass
- Macroalgae
- Mangroves (and Saltmarsh)
- Mixed Community.

The dominant habitat (by area) on the seabed within the Port is soft sediment largely composed of sand and silt (Bancroft and Sheridan 2000). This habitat is typically bare however in patches there may occur seasonal macroalgae and seagrass as well as filter feeder and infauna communities (WorleyParsons 2009; MScience 2014). The silty subtidal habitats of the Dampier Archipelago are in more sheltered areas around the shorelines of the island and mainland coast of the Burrup Peninsula, and it is in these locations that the seagrasses and corals generally occur.

2.2.2. BCH - Project Footprint

The BCH within and adjacent to the Project Footprint is mostly bare sediment with an intertidal and shallow subtidal rocky shore containing high to moderate profile reef colonised by coral communities (with some macroalgal and filter feeder communities). This coral/rocky reef habitat is categorised and mapped simply as 'coral' in the PPA benthic habitat map (

Figure 7). The coral habitat extends from approximately -1m to -6m CD, seawards of the rocky shoreline areas. Coral cover is generally sparse to moderate, ranging from under 10% to more than 20% with limited areas of dense cover (>50%). This coral habitat occurs as a veneer of living coral growing on a substratum of bedrock outcrop and large boulders and is typically restricted to <100 m before the habitat becomes bare sediment. The unconsolidated benthic substrate beyond this coral habitat typically comprises bare sediment typical of the south of Mermaid Sound.

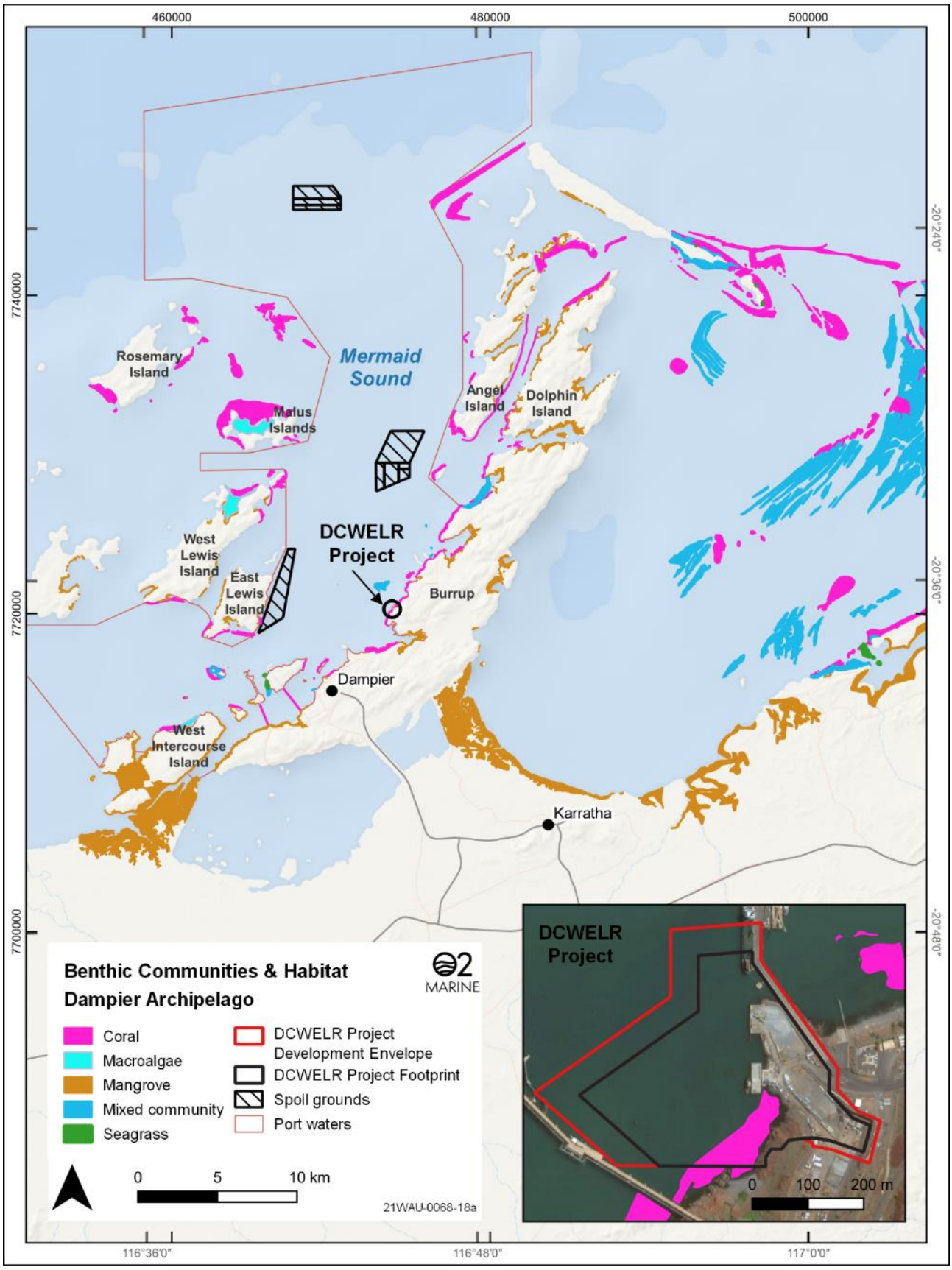

Figure 7 Significant BCH of the Dampier Archipelago and within and adjacent to Project DE

3. Dredging and Spoil Disposal Activities

3.1. History of dredging at Port of Dampier

There have been a number of capital dredging programs undertaken in the Port of Dampier in support of several Port expansion projects and channel improvements. Major capital dredging programs include:

- RioTinto (Parker Point / East Intercourse Island – 2.0 M m^3 (1998) 3.0M m^3 (2006))
- Woodside (1986 – LNG Shipping Channel – 6.6 M m^3)
- Woodside (2006 – Pluto LNG development – 14.1 M m^3)
- PPA (2004 - Dampier Bulk Liquids Berth – 4.6 M m^3)

Numerous other significant but smaller capital dredging programs and maintenance dredging campaigns have also been conducted in the Port. PPA conducts maintenance dredging in the Port of Dampier in accordance with an approved Long-Term Dredge Management Plan (PPA, 2021) and associated sea dumping permit (SD2019/3962), which is issued by the Commonwealth environmental regulator under the *Environment Protection (Sea Dumping) Act 1981.*

Three established spoilgrounds within the Port have been used for disposal of dredged material in the past (Figure 5).

3.2. Proposed Dredging Activity

The detailed design and implementation of the proposed dredging activity is yet to be finalised, however the following dredging footprints for the Berth Pocket and vessel Manouvering Area within the Dredging Footprint (as detailed in Figure 4) will be applied.

- Total Dredging Footprint of 8.4 hectares (ha).
- Berth pocket to design depth of -13.2 m CD.
- Vessel manoeuvring area to design depth of -11.0 m CD

(Note: the berth pocket / manoeuvring area are toe of batter and the total dredging footprint is the top of batter with a buffer. Up to 1m of over-dredge may be required to achieve these design depths).

3.2.1. Dredge Volume

Up to 380,000m^3 of capital dredging (to be confirmed through detailed design) will be undertaken to establish a new Berth Pocket and associated Manoeuvring Area to design depths of -13.2m (CD) and 11.0m CD (plus an allowance for up to 1 metre of over dredging), respectively. Drilling and blasting is anticipated to be required to break up a volume (estimated 100,000m^3) of granophyre rock material at the southeast of the Dredging Footprint (Figure 4). The majority of the Project's marine development footprint lies within a highly modified seabed environment (Figure 4) which has undergone previous capital dredging and is partly within PPA's maintenance dredging footprint (SD2019/3962).

3.2.2. Dredging Methods

Dredging will most likely be conducted using conventional marine dredging plant and equipment such as a backactor dredge and associated split hopper barges or a small cutter suction dredger pumping to awaiting barges. A conservative dredging rate estimate of 150m^3/hour is predicted using either method. Barges will be filled with excavated material which will then be transported to either one of the three established spoil grounds within the Port for disposal The barge/backactor combination is considered the most suitable due to the limited disturbance footprint during operations, however it does require sufficient space around the backactor to manoeuver and locate the split hopper barges alongside the backactor unit. It is expected that this method will be used to dredge the vast majority of the marine sediments.

3.2.3. Dredging Schedule

Drilling and blasting of the granophyre rock in the southeast corner will precede the commencement of dredge operations. Dredging activities are planned to occur without interruption over approximately 250 days. Dredge and spoil disposal operations will be conducted 24 hours per day.

3.2.4. Project Vessels

Mobilisation of dredge plant and associated equipment will be carried out in accordance with the requirements of PPA through its contract with the dredging contractor(s) undertaking the dredging program, the requirements of the Sea Dumping Permit and PPA's standards, procedures and regulations for the Port of Dampier. Vessels used during the dredging period will include the below:

- 2 x Hopper Barge (approx. 1,500m^3 capacity)
- 1 x Backactor Dredge (preferred) or Cutter Suction Dredge.

3.3. Dredge Material Management

3.3.1. Offshore Dredge Spoil Disposal

The Port's established spoil grounds are shown in Figure 5 with boundary coordinates provided in Table 3. The preferred option for the management of dredge material for this Project is offshore disposal within ELI Spoil Ground. PPA propose to maintain a level of flexibility during the construction period. If necessary, Spoil Ground A/B and 2B may also be utilised for placement of dredged spoil. Accordingly, potential sediment plume extent associated with the placement of sedimentary materials at each Spoil Ground has been predicted using hydrodynamic/numerical modelling under a range of conditions (O2Marine, 2022c).

Management and allocation of space within established Spoil Grounds is subject to PPA's consultation with the Dampier Technical Advisory Consultative Committee (TACC). The precise location of dumping within each spoil ground during the term of the Project will be dependent on the dredge vessel(s) used and the sea conditions at the time. This will be determined in consultation between the PPA Harbour Master, Dredging and Survey Manager and Environment and Heritage Manager (West Pilbara).

PPA is investigating the suitability of rock material to be beneficially reused for other approved Port projects as well as strategically placing some of the rock material within the shallow waters (<10m) of the western side of ELI Spoil Ground to create potential coral habitat. Feasibility of this will depend on navigational depth requirements and safety.

A brief overview of each spoil ground is provided below. Detailed location and characteristics of the three spoil grounds are provided in Appendix A.

East Lewis Island Spoil Ground

Dredged material has been placed within the ELI Spoil Ground since the establishment of the Port as an Iron Ore Port in the 1960s. Due to its shallow depths, it is often not possible / practical for a larger Trailer Suction Hopper Dredge (TSHD) to utilise this spoil ground to place dredged materials in. PPA currently maintains an agreed upper 'ceiling' depth of -6m CD. Based on the most recent hydrographic survey data available for this area, there is approximately 6.7 Mm^3 of capacity remaining within this spoil ground so there is ample capacity to receive the expected volume of dredge spoil from the Project.

Spoil Ground A/B

Spoil Ground A/B was originally established in 1986 by Woodside for the disposal of dredged material from several capital and subsequent maintenance dredging programs. It has been used extensively by Rio Tinto, Woodside and PPA since that time. Spoil Ground A/B has an agreed upper ceiling depth of -10.5m CD and following its use in 2017, PPA has determined that Spoil Ground A/B has a remaining capacity of 7.1Mm^3 so there is ample capacity to receive the expected volume of dredge spoil from the Project.

Spoil Ground 2B

Spoil Ground 2B was developed for the capital dredging activities associated with Woodside's Pluto LNG Development (2007 – 2010). Spoil Ground 2B was established as the result of an extensive options investigation to provide a site distant from sensitive habitats. Accordingly, this site is located outside the mouth of Mermaid Sound and away from shallow reefs. The Pluto capital dredging program has been the only use of Spoil Ground 2B to date. The current capacity of Spoil Ground 2B is 38.5Mm^3, calculated to an agreed ceiling of -23.5mCD. As such there is significant remaining capacity to accommodate the entire volume of dredge spoil from the Project as well as future proponents.

Table 3 Spoil Ground boundary coordinates (WGS84)

Spoil Ground	Latitude	Longitude
East Lewis Island Spoil Ground	20° 34.926' S	116° 41.174' E
	20° 34.927' S	116° 41.427' E
	20° 37.266' S	116° 40.985' E
	20° 37.793' S	116° 40.093' E
Spoil Ground A/B	20° 30.912' S	116° 44.898' E
	20° 30.912' S	116° 46.104' E
	20° 31.998' S	116° 45.576' E
	20° 31.998' S	116° 44.358' E
	20° 32.491' S	116° 45.573' E
	20° 32.963' S	116° 44.368' E
Spoil Ground 2B	20° 22.556' S	116° 41.380' E
	20° 22.558' S	116° 42.817' E
	20° 22.938' S	116° 43.104' E

Spoil Ground	Latitude	Longitude
	20° 23.372' S	116° 43.103' E
	20° 23.369' S	116° 41.378' E

4. Roles and Responsibilities

The roles and responsibilities for the implementation of the DEMP are summarised in Table 4.

Table 4 Roles and responsibilities of key personnel

Position	Responsibility
Dredging Contractor	• Undertakes dredging and excavation works • Prepares and implements an environmental management plan in accordance with the requirements of this DEMP • Implements the management actions of this DEMP • Ensures adequate training of all staff within their area of responsibility • Ensures all equipment is adequately maintained and correctly operated • Responsible for reporting all environmental incidents to PPA as soon as practible but within 12 hours. in accordance with PPA incident reporting procedures
PPA Dredging and Survey Manager	• Overall responsibility for implementation of this DEMP • Overall responsibility for complying with relevant legislation, standards, and guidelines • Ensures dredging activities are conducted in an environment safe for both site personnel and the public
PPA Environment and Heritage Manager	• Complies with the requirements of this DEMP • Reports on environmental performance for the Project to key stakeholders • Responsible for environmental compliance reporting • Responsible for reporting all environmental non-compliance incidents. • Provides advice on dredging and dredge material environmental issues • Oversee implementation of environmental controls, monitoring programs, inspections, audits, and management actions in this DEMP • Completes compliance reporting requirements • Responsible for the implementation of the environmental monitoring program and inspections • Prepares environmental monitoring reports • Provides advice with respect to environmental issues as required
All persons involved in the project	• Comply with the requirements of this DEMP • Comply with all legal requirements under the approval's documents and relevant Acts • Exercise a Duty of Care to the environment at all times • Report all environmental incidents

5. Predicted Impacts from Dredging

During the dredging phase of the Project, which is expected to be less than 12 months, the following activities and resulting impacts have the potential to adversely affect BCH:

- direct loss of BCH by removal or burial in the immediate vicinity of the development
- indirect impacts on BCH from the effects of sediments introduced to the water column by the dredging and disposal.

PPA undertook dredge plume modelling (02 Marine 2022c) to evaluate the probable and possible environmental impact associated with dredging and dredge plume disposal associated with the Project in accordance with the EPA Technical Guidance for EIA of Marine Dredging Proposals (EPA 2021). Modelling is required to determine the extent, duration and severity of dredging related impacts to BCH.

A summary of the predicted impacts to BCH and dredge plume modelling assessment is provided in this Section.

5.1. Direct Irreversible Impact - Development Envelope

Direct impacts are certain to occur within and immediately adjacent to the proposed dredging, drilling and blasting footprint. Direct impacts typically involve irreversible loss. To be consistent with the PPA's approach on assessing historical loss of BCH, it is assumed that all coral habitat within the Project DE will be permanently lost (or seriously damaged) such that the impact is irreversible. This is considered conservative as the DE is 50m beyond the Project Footprint (which includes slope of batters).

The extent of coral habitat within the DE is shown in Figure 11. The DE overlaps with 0.8 ha of existing mapped coral habitat. It is therefore assumed that proposed dredging, drilling and blasting for the construction of the Project will result in direct irreversible impact to 0.8 ha of coral habitat.

5.2. Indirect Impacts (Irreversible and Recoverable)

In addition to direct physical removal, EPA (2021) states that the critical indicators of dredging pressure on corals are light limitation caused by the shading effects of the sediment suspended through the water column and sediment deposition on coral surfaces as those sediments settle out. Indirect impacts to coral habitat can be caused due to increased Suspended Sediment Concentration (SSC), resulting in increased turbidity, reduction in available benthic light and localised increase in sedimentation.

The guideline values from EPA (2021) adopted for the Dredge Plume Impact Assessment relate to the impact of dredging on corals as that is the primary BCH type mapped through numerous studies in the vicinity of the dredge area. As such the Zone of Moderate Impact (ZoMI) and Zone of High Impact (ZoHI) possible-effect and probable-effect guideline values for corals were adopted. For each zone of impact, possible and probable effects are given, outlining two confidence levels in the spatial extent of each zone, as stipulated in EPA (2021), which represent the worst- and best-case extent, respectively, for each zone.

The Dredge Plume Modelling Assessment (O2 Marine 2022c) modelled both a backactor and CSD as it is not yet confirmed which type will be used. To ensure all potential impact from dredging is assessed the predicted extent of the zones of impact in this report represent the combined worst case of both the backactor and CSD model outputs. It is noted that the CSD typically generates the largest spatial extent of effect due to both the grinding action of the cutter head and the quantity of fines liberated through overflow as the hopper barge is filled.

The modelling results for the ZoMI and ZoHI for the proposed dredging and spoil disposal, including probable and possible impacts, are presented in Figure 8 and Figure 9.

The Dredge Plume Modelling Report (O2 Marine 2022c) for the Project does not predict any indirect recoverable impact (ZoMI) or permanent loss (ZoHI) of BCH from spoil disposal (Figure 9) using either backactor or CSD.

The extent of the Zone of Influence (ZoI) has been calculated by including any region where SSC (at any height in the water column) exceeded background by 5mg/L at any time. This is a highly conservative threshold in which the plume would not be visually discernible, yet the influence may be detected in monitoring with appropriately selected control sites, and where detectible impacts to stable benthic habitat would be highly improbable. The predicted combined ZoI for both a backactor dredge and CSD (presented in Figure 10) appears quite large but at any point in time the dredge plume is likely to be restricted to a relatively small portion of it. The intent of the predicted ZoI is to indicate to regulators and the public where visible plumes may be present, albeit only occasionally, if the Project is implemented.

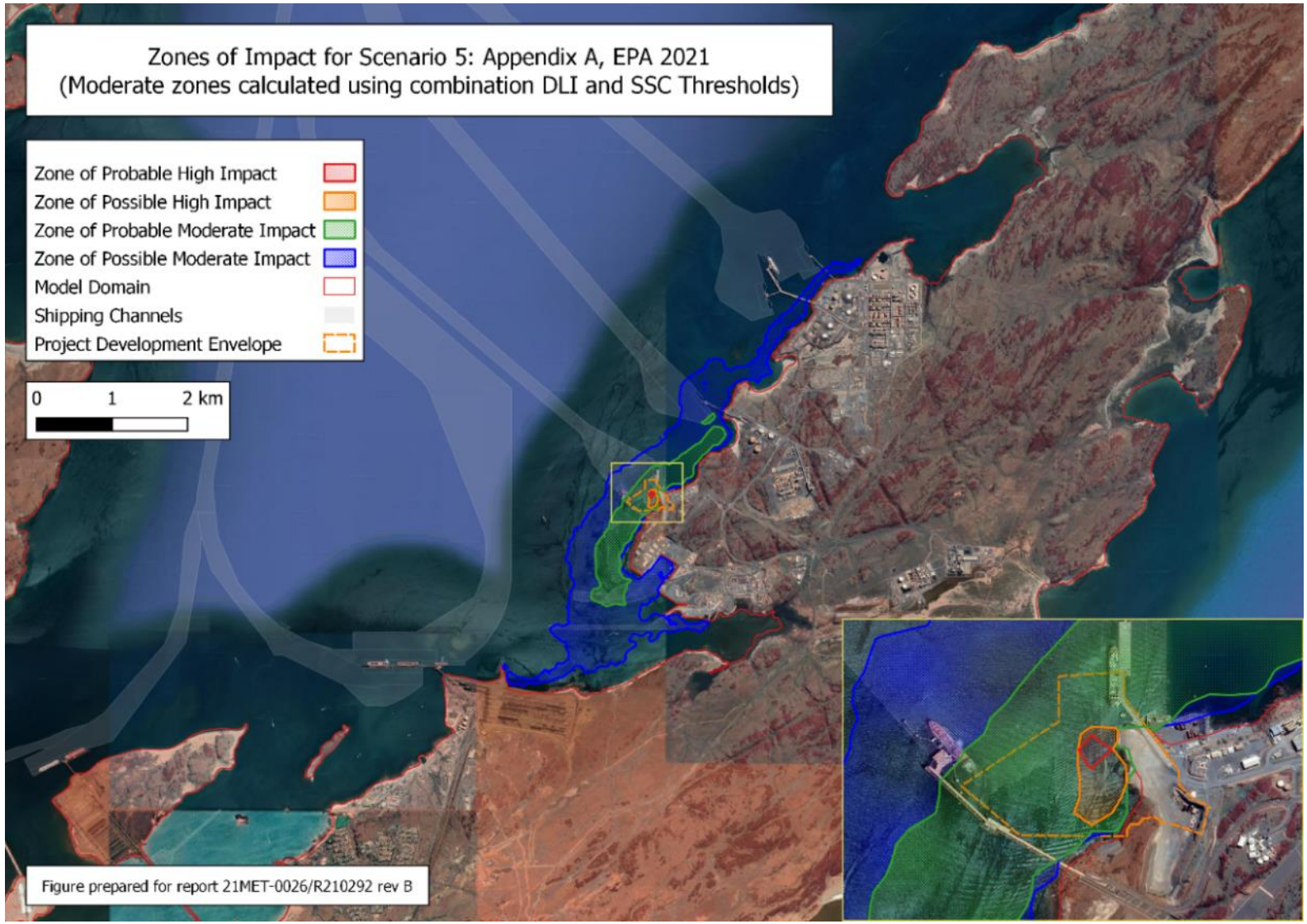

Figure 8 Dredging Zones of Impact showing ZoMI and ZoHI from dredging at Project DE (source: O2Marine 2022c)

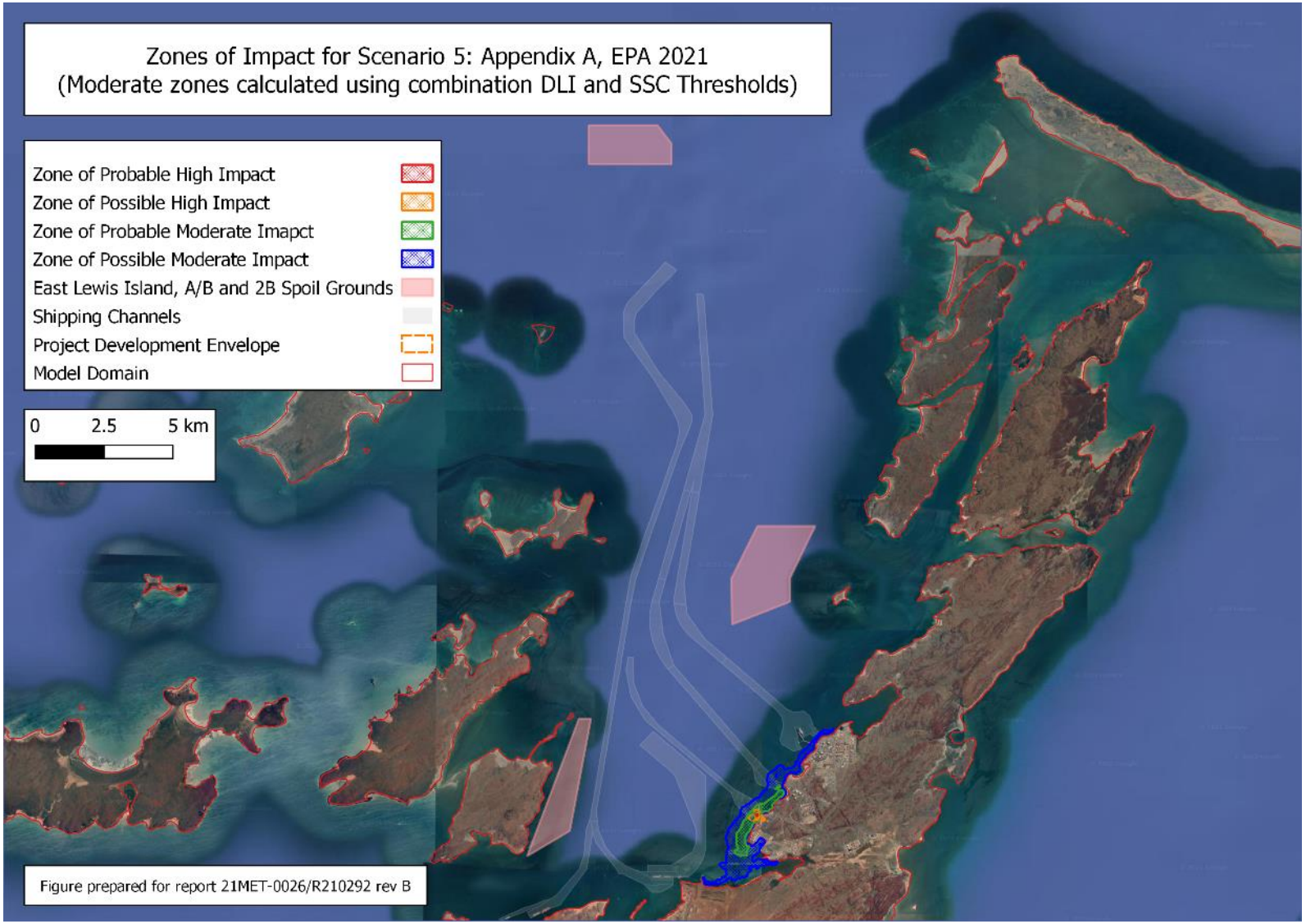

Figure 9 Dredging Zones of Impact showing no ZoMI or ZoHI from disposal at established spoil grounds

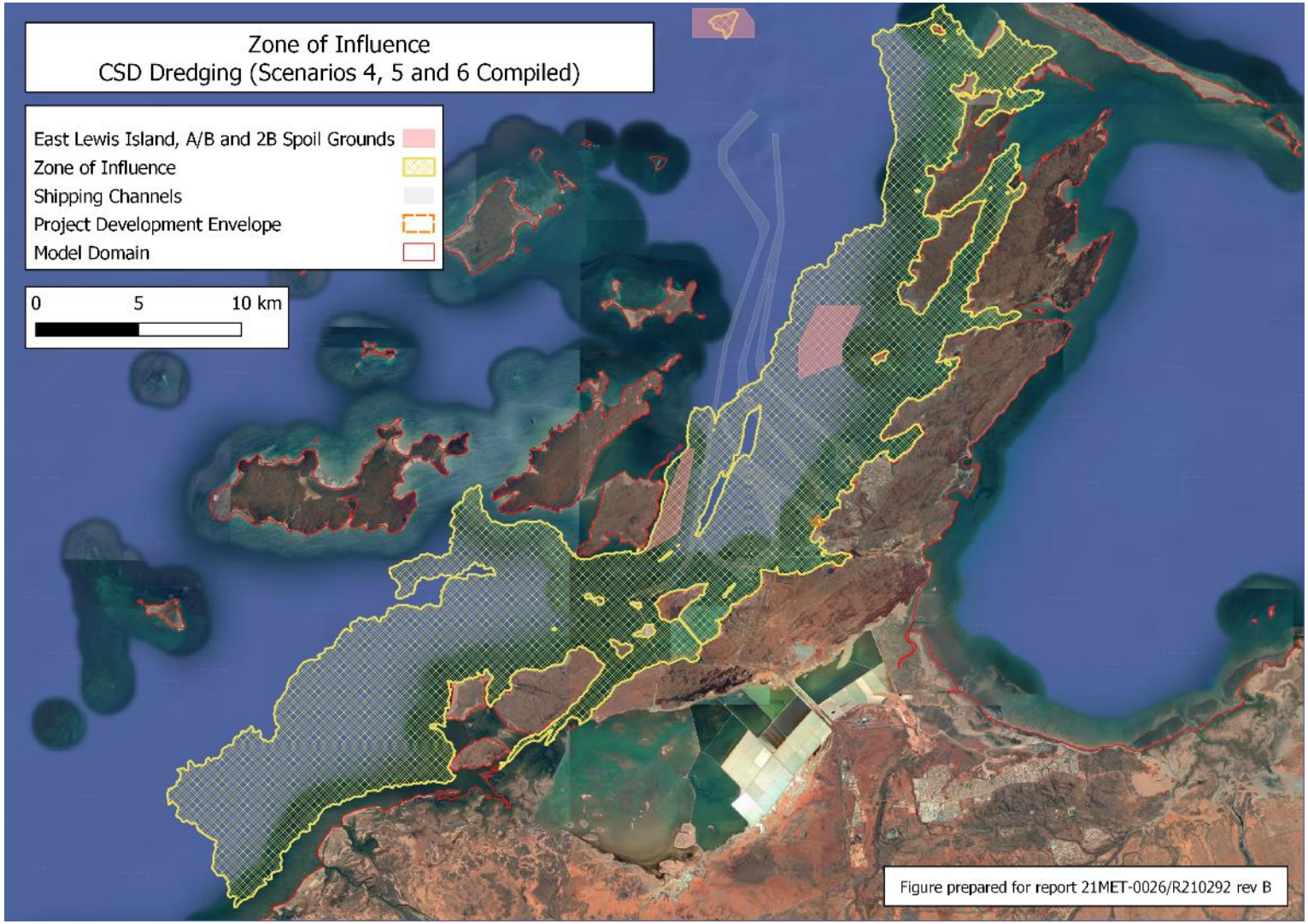

Figure 10 Dredging Zone of Influence for proposed dredging and disposal.

5.3. Intersection of Zones of Impact and Mapped BCH

Following determination of the zones of impact it was determined if they overlap with mapped coral habitat. Figure 8 shows that the ZoHI (from dredging) does not extend beyond the DE. Figure 9 shows that no ZoHI was observed within or outside any of the established spoil grounds. Therefore no indirect permanent loss of BCH from dredging is expected outside of the DE from either a backactor or CSD being used. The boundary of the DE is therefore applied when calculating irreversible impact to coral habitat. This is consistent with the PPA's approach on assessing historical loss of coral BCH.

The DE overlaps with 0.8 ha of existing mapped coral habitat (Figure 11). It is therefore assumed that proposed dredging, drilling and blasting for the construction of the Project will result in direct irreversible impact to 0.8 ha of coral habitat.

No indirect recoverable impact (ZoMI) of BCH from spoil disposal (Figure 9) was predicted using either backactor or CSD. The possible ZoMI from dredging in Figure 8 was therefore used to estimate the extent of predicted indirect recoverable impacts to coral habitat as a result of dredging. The predicted recoverable impact to coral habitat (within the possible ZoMI) is shown in Figure 12.

A further 14.4 ha of bare substrate within the DE will also be directly or indirectly impacted as a result of dredging. However, this area will remain classified as bare substrate after the completion of dredging and so has not been considered further in the BCH assessment.

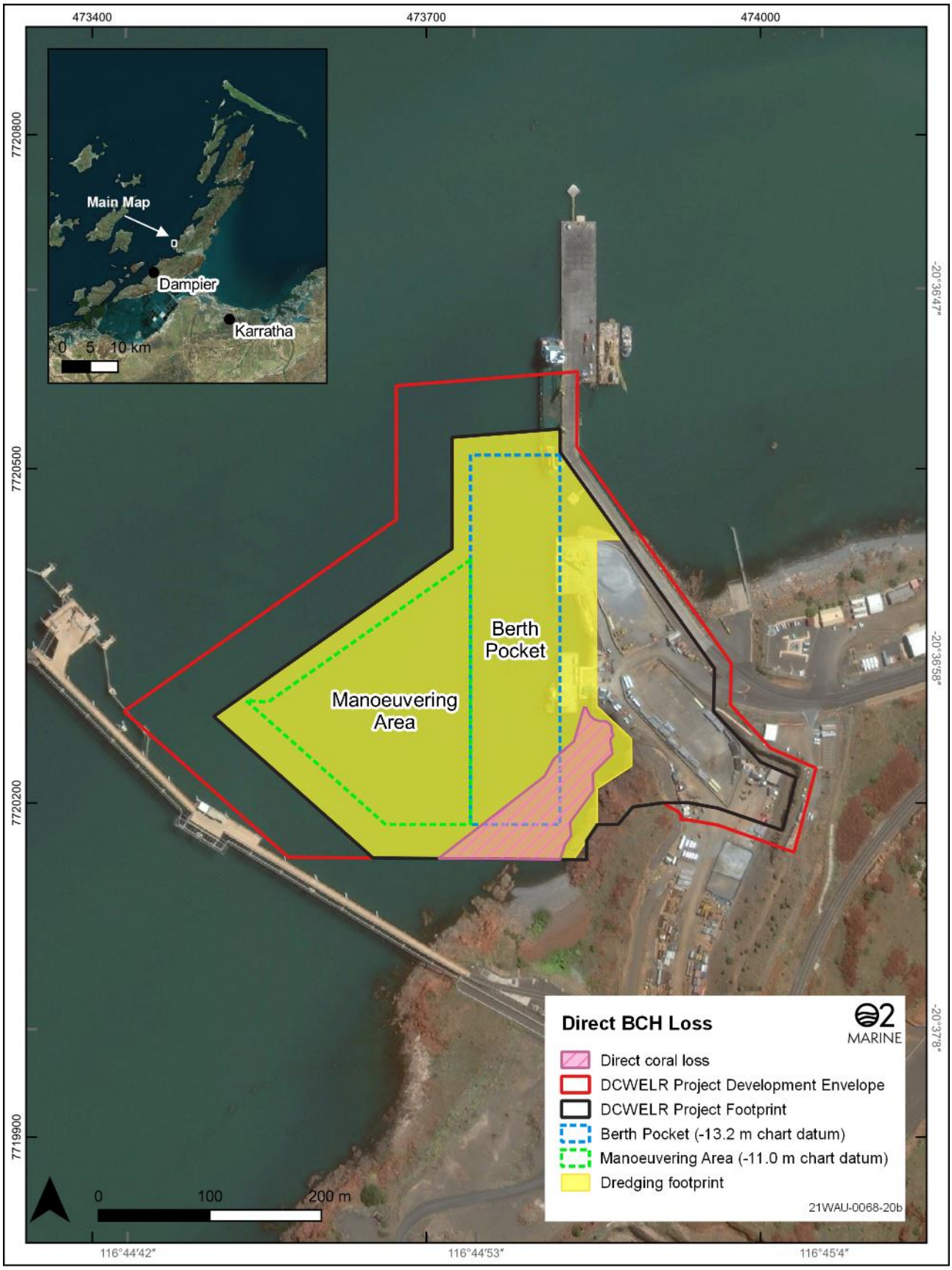

Figure 11 Project DE within which irreversible impact of coral habitat is assumed

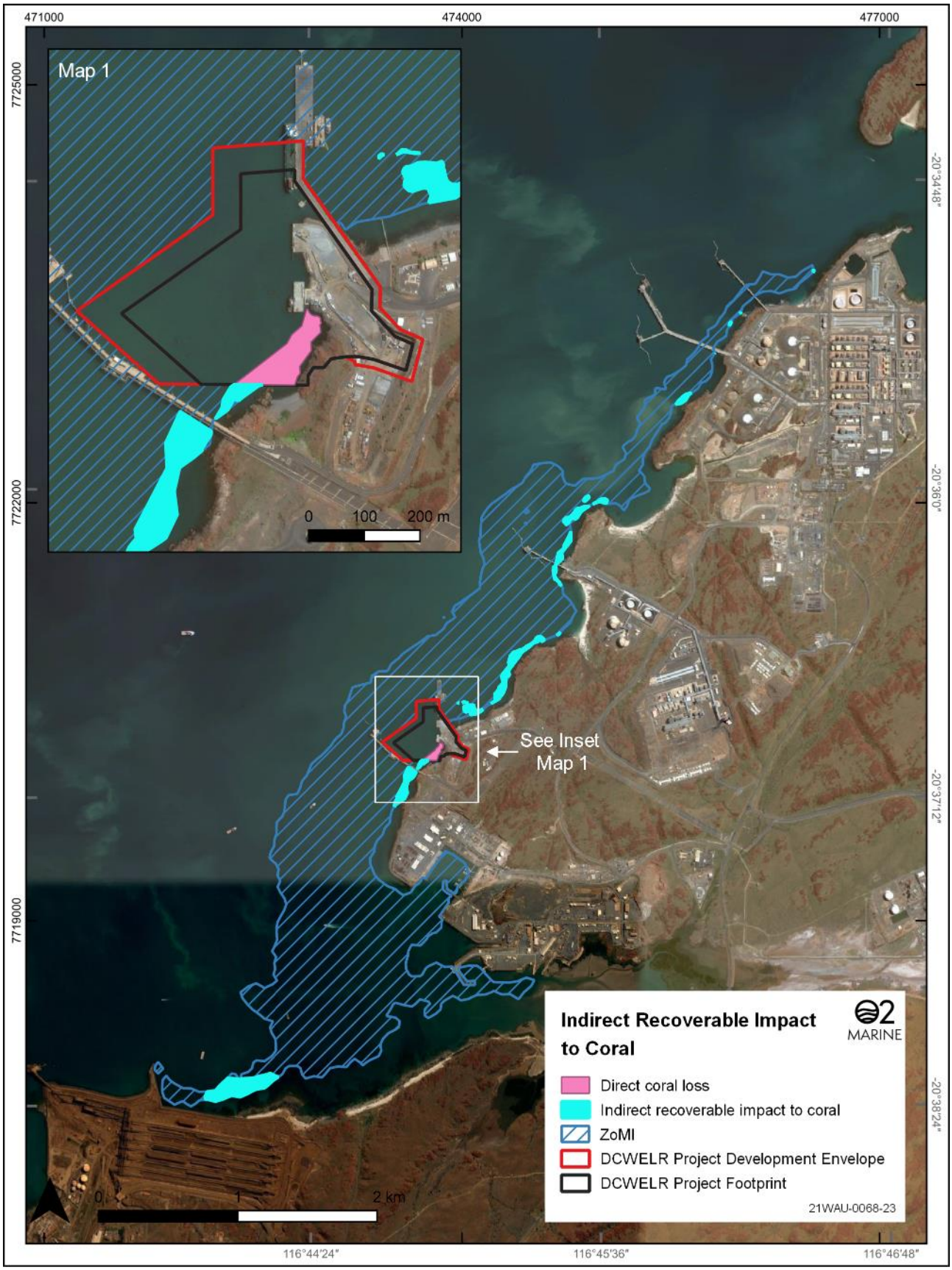

Figure 12 Predicted ZoMI and recoverable impact to coral habitat

5.4. Predicted direct and indirect impact to coral habitat

The area of existing mapped coral habitat overlapping with the predicted ZoHI and ZoMI for the proposed dredging and spoil disposal is presented in Table 5.

Table 5 Coral habitat impacted by the proposed dredging and spoil disposal

Zone of Impact	Certainty	Coral (ha)
Moderate (Recoverable)	Possible	10.5
High (Irreversible)	Certain (everything within the Project DE)	0.8

All impact to coral habitat within the DE is considered to be irreversible. The possible 'worst case' ZoMI was used to estimate the extent of predicted indirect recoverable impacts to subtidal BCH as a result of dredging. The predicted recoverable impacts to BCH are also considered to be conservative in the event a backactor dredge is used rather than a CSD which was used in the modelled predictions as a worst case. In summary:

- The area of estimated *irreversible* impact (i.e. ZoHI) of coral habitat from direct dredging impacts is 0.8 ha.
- The area of estimated *recoverable* impacts (i.e. ZoMI) to coral habitat from indirect dredging impacts is 10.5ha.

6. Environmental Factors and Objectives

The Key Environmental Factors and EPA Objectives to be managed under this DEMP were identified through the EIA of the Project. These are listed below:

- Benthic Communities and Habitats
- Marine Environmental Quality
- Marine Fauna

The project specific Environmental Protection Outcomes (EPOs) and Management Targets (MTs) for each of the Key Environmental Factors are outlined in Table 6.

Table 6 Key environmental factors, potential environmental impact pathways and management outcomes

Environmental Factor	EPA Objective	Potential Environmental Impact Pathway	Environmental Protection Outcome (EPO)	Management Target (MT)	Risk Management Strategy
THEME: SEA					
Benthic Communities and Habitats (BCH)	To protect BCH so that biological diversity and ecological integrity are maintained.	Direct impacts on BCH (0.8 ha of coral) due to removal within the Development Envelope.	No direct irreversible impact to coral habitat outside of the Development Envelope (Figure 11).	No direct irreversible impact to coral habitat outside of the Project Footprint. No direct disturbance outside Dredging Footprint and designated spoil grounds with minimal mounding of spoil within the spoil grounds	Risk Management Strategies are presented in Table 8.
		Indirect impacts on BCH due to reduction in available light caused by increase in suspended sediments released into the water column during dredging and dredge spoil disposal (including overflow/spillage)	No indirect irreversible impact to coral habitat outside of the Development Envelope (Figure 11).	No indirect irreversible impact to coral habitat outside of the Project Footprint.	
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 has the potential to deteriorate water quality and contaminate marine organisms	Within one month following cessation of construction activities water quality will return to the established Levels of Ecological Protection for Mermaid Sound as determined by DWER (2019) (Figure 13).	The extent and duration of increased turbidity as a result of construction activities will be minimised as far as practicable.	PPA consider this is not required due to its ongoing MEQSAP monitoring, frequent high levels of turbidity within
		Changes to the physico-chemical properties of the water column as a result of dredging.			

Environmental Factor	EPA Objective	Potential Environmental Impact Pathway	Environmental Protection Outcome (EPO)	Management Target (MT)	Risk Management Strategy
		Hydrocarbon release into the marine environment from a vessel spill and or bunkering operations			the Port from daily operations and the restrictions on public access within the Port.
Marine Fauna	To protect marine fauna so that biological diversity and ecological integrity are maintained.	Injury or death of marine fauna as a result of dredge operations.	No reported negative impacts on marine fauna attributable to marine dredging works.	No incidences of marine fauna injury or death as a result of dredge operations	Risk Management Strategies are presented in Table 9.
		Introduced Marine Pests (IMPs) translocation from construction vessels.		No introduction and/or spread of invasive marine species	

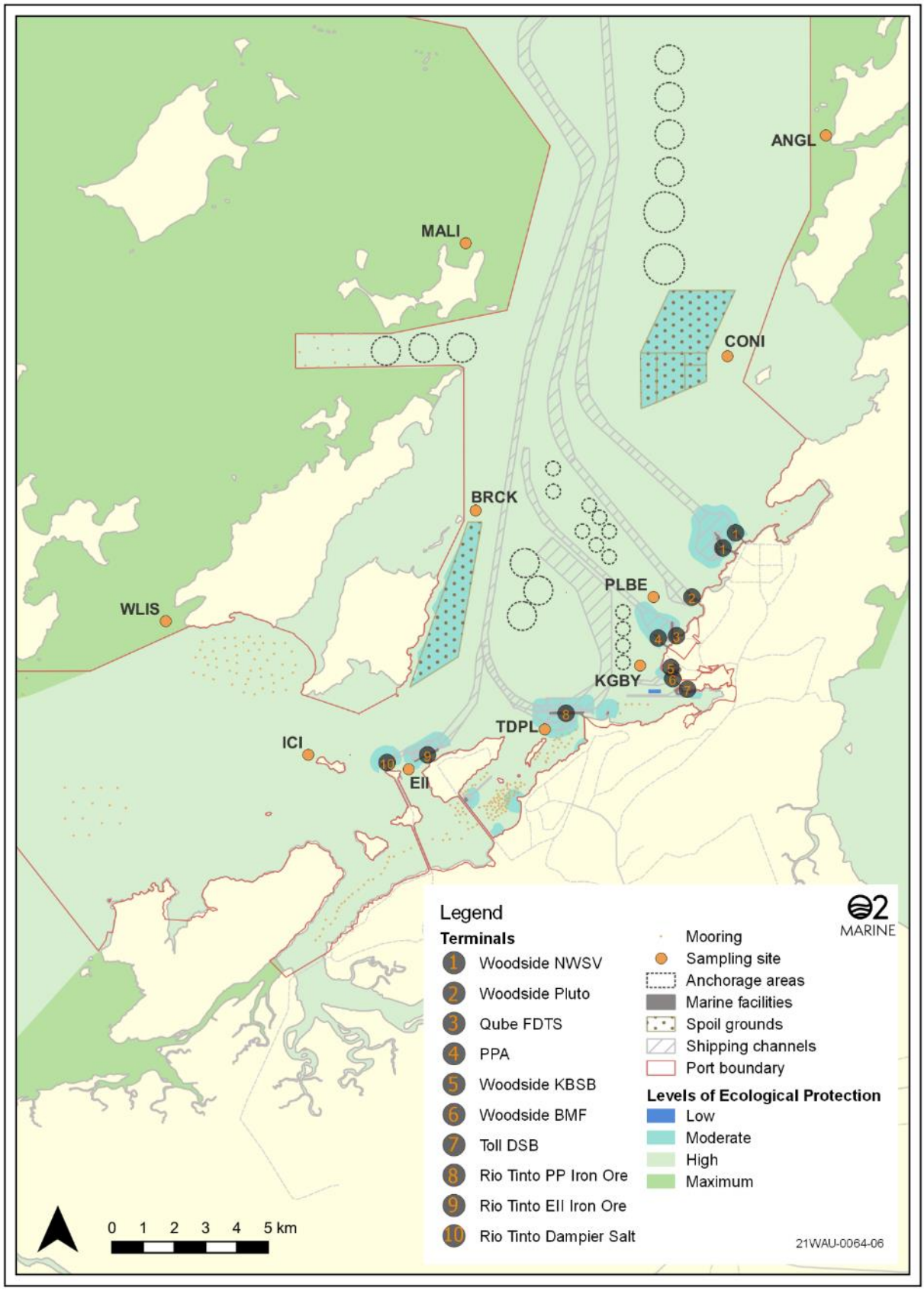

Figure 13 Levels of Ecological Protection in the Port of Dampier.

7. Monitoring and Management

Where it is considered necessary, the potential environmental impacts in Table 6 have been assigned environmental monitoring and management (EMM) actions to measure compliance against the EPOs[1] and MTs. Management actions have been separated into Tier 1, which specifically address dredging impacts to benthic communities and habitat and marine fauna; and Tier 2, which relate to the overall works and can be managed through standard operating procedures (including IMPs, hydrocarbons and waste).

Table 7 provides the framework for EMM tables.

Table 7 Environmental monitoring and management framework

Element	Description
Objective	What is intended to be achieved.
Management Action	The actions required to assist in meeting the objective. These can be single actions or multiple liked actions to address the objective.
Responsibility	Who is responsible for implementing the actions.
Timing	The time period when the management actions need to be implemented.
Measures	The metrics for recording the outcomes.
Reporting	The way in which the compliance with the management actions and outcomes are reported.
Target	The thresholds, which, if exceeded, require differed management actions (contingency) to be implemented.
Contingency	Actions to be undertake if the management action is not met.

7.1. Benthic Communities and Habitats

If this Project is implemented it will result in the loss of approximately 0.8 ha, or approximately 1% of the coral habitat existing in LAU1 prior to industrial development. Approximately 58.8 ha of healthy and resilient coral habitat will remain within LAU1 which equates to approximately 80% of the coral that existed prior to European habitation (O2 Marine 2022b). PPA consider this a good outcome for what is a highly modified Port environment that has undergone many significant dredging projects and is exposed to chronic disturbance and turbidity from vessel propwash and frequent resuspension of fine sediment from severe weather events.

Considered within this context, the predicted irreversible impact to coral habitat and cumulative loss from the Project is not considered to pose a significant risk to ecological integrity and biological diversity within the LAU or the broader Port environment. PPA is confident that the MTs and EPO can be achieved and does not consider water quality monitoring and associated reactive management is required to protect BCH from indirect dredging related effects. This is considered reasonable for the following reasons:

[1] EPOs identified in Table 6 are not presented in the following tables as it is assumed that if the MT is achieved then the corresponding EPO will also be achieved.

- the small size, scale and intensity of the dredging proposed for the Project
- the natural tolerance and resilience of local corals to turbidity and low light (O2 Marine 2022b)
- evidence of minimal actual indirect impacts to coral from previous significant dredging projects in the Port (e.g., Pluto LNG Project, MScience 2010).
- application of best available science for predicting impacts to BCH from dredging, consistent with EPA Technical Guidance.

7.1.1. Dredge Plume Validation Program

PPA proposes to implement a Dredge Plume Validation Program (to be finalised prior to commencement of dredging) with the overall objective to generate new information to improve predictive modelling and management of future dredging activity within the Port. This program may have the following key elements:

- Direct measurement during dredging of turbidity, SSC and Daily Light Integral (DLI) to validate and improve understanding of suspended sediment and light attenuation relationships used in the dredge plume modelling assessment and subsequently improve predictions for future dredging projects at this location (Port of Dampier/Mermaid Sound).
- Pre and post assessment of coral health on the boundary of the probable ZoMI (and suitable reference site) to generate directly relevant information to contribute to the development of more suitable SSC and light thresholds for local Pilbara nearshore corals, compared to those within EPA (2021) which are designed for offshore corals.
- Direct measurement during dredging of suspended sediment generated from specific benthic substrates to validate and improve estimation of source terms in future dredge plume modelling assessments and to refine management strategies.
- Direct measurement of water temperature during dredging to assist in determining the cause of any coral bleaching that may be evident during the proposed summer dredging campaign.

All results from the Dredge Plume Validation Program will be made publicly available on the DWER Index of Marine Surveys for Assessment.

A summary of Tier 1 measures proposed to minimise potential impacts on the environmental factor 'Benthic Communities and Habitats' and achieve the MTs are described in Table 8.

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

Task	Actions	Responsibility	Timing
Management Actions	Implement the Dredge Plume Validation Program. • Direct measurement during dredging of turbidity, SSC and DLI. • Pre and post assessment of coral health on the boundary of the probable ZoMI (and suitable reference site). • Direct measurement during dredging and disposal of suspended sediment generated from specific benthic substrates (source terms). • Direct measurement of water temperature during dredging.	PPA	• Dredge Plume Validation Program to be finalised prior to dredging. • Implement program from 4 weeks before dredging commences to 4 weeks after dredging is completed.
	Dredge hopper doors and seals to be inspected and maintained to prevent loss of dredge spoil during transport.	Dredging Contractor	Throughout project.
	Dredge spoil to only be dumped within the area allocated by PPA, inside the designated spoil grounds listed within the SDP.	Dredging Contractor	Throughout project.
	Dredge spoil shall be dumped in a manner such that it minimises mounding and optimises spoil ground utilisation for the proposed, and future, maintenance dredging program(s).	Dredging Contractor	Throughout project.
	Dredge hoppers to only be washed within boundaries of the designated spoil grounds.	Dredging Contractor	Throughout project.

Task	Actions	Responsibility	Timing
	Employ high-resolution positioning system to control dredge and disposal operations	Dredging Contractor	Throughout project.
Measures	Dredging only occurs within nominated footprint, in accordance with the SDP.	Dredging Contractor	Throughout project.
	All dredge spoil dumped within designated spoil grounds.	Dredging Contractor	Throughout project.
Reporting Evidence	Submit Dredge Plume Validation Program Final Report and all monitoring data to the DWER Index of Marine Surveys for Assessment (IMSA).	PPA	Within 3 months following cessation of dredging.
	Plotting sheets or a certified extract of the ship's log which shall include (as a minimum): • the dates and times of when each dumping run commenced and finished • the track of all dredge vessels (as determined by GPS) during: (a) dredging activities, and (b) transit between the dredging area(s) and the nominated spoil ground (s) • the position (as determined by GPS) of the dumping vessel at the commencement of dumping (i.e. hopper doors opened) and at the completion of dumping (i.e. hopper doors closed), including the path / track taken during dumping.	Dredging Contractor	Throughout project.
	Documented report provided to the PPA Dredging and Survey Manager on the incident (i.e. dredging or dumping outside footprint), including (as a minimum) details of the incident, the measures taken, the success of those measures in addressing the incident or risk and any additional measures proposed to be taken.	Dredging Contractor	Throughout project.
	Undertake bathymetric survey of the disposal site (by a suitably qualified person).	PPA Dredging and Survey Manager	Prior to dredging; and following completion of all dumping under the proposed dumping permit.

Task	Actions	Responsibility	Timing
Management Target	No irreversible impacts to BCH outside of the Development Envelope	Dredging Contractor	Throughout project.
	No direct disturbance outside Dredging Footprint and designated spoil grounds with minimal mounding of spoil within the spoil grounds	Dredging Contractor	Throughout project.
Contingency	Investigate and report any breaches of dredge material placement to DAWE and commence processes to investigate any impact.	PPA	ASAP after breach is identified

7.2. Marine Fauna

The (Tier 1) Management actions proposed to minimise potential dredging impacts on the environmental factor 'Marine Fauna' are described in Table 9.

Table 9 Management actions to minimise impacts on marine fauna

Task	Action	Responsibility	Timing
Management Actions	Internal training of Marine Fauna Observer(s) (**MFO**), which provides clear direction on: • The area that comprises the 'monitoring zone'[2], being the area within a 300 metre radius of the dredge vessel • How to identify marine megafauna (i.e. whales, dolphins, dugong, turtles) that are known or likely to be encountered within the Port • The actions to be undertaken by the MFO in the event of marine fauna being sighted within the monitoring zone • The actions to be undertaken by the MFO in the event of an incident resulting in injury or death of a marine species.	Dredging Contractor	Prior to commencement of dredging project
	Minimise impacts of the dredge through underwater noise through proper maintenance of equipment.	Dredging Contractor	At all times throughout dredging project
	Minimise impacts of light on fauna through the minimisation of unnecessary light sources not required for safe operation of the dredge.	Dredging Contractor	At all times throughout dredging project
	Prior to the commencement of the dumping activities, the dredging contractor must ensure that a check is undertaken, using binoculars from a high observation platform, for marine megafauna within the 'monitoring zone'. If any marine megafauna are sighted in the 'monitoring zone', dumping activities must not commence until the marine megafauna is no longer observed in the monitoring zone, or the vessel is to move to another area of the disposal site to maintain a minimum distance of 300 metres between the vessel and any marine species.	Dredging Contractor	Prior to dredging activities, during daylight hours only

[2] Refers to the area within a 300 metre radius of the vessel

Task	Action	Responsibility	Timing
	Dredge pumps will be stopped as soon as practicable after the cutter head is lifted from the sea floor to minimise potential for intake of marine megafauna, and then only re-engaged once in close proximity to the seabed floor.	Dredging Contractor	During dredging
	Ongoing internal training of MFOs as required to ensure that a trained MFO is always available.	Dredging Contractor	At appropriate times throughout dredging project
Measures	Number of reported incidents involving marine megafauna.	Dredging Contractor	During Dredging
Reporting / Evidence	MFO training package and training/attendance record for each MFO.	Dredging Contractor	Prior to and throughout project
	A log detailing all marine fauna observations within the monitoring zone (during daylight operations only) shall be maintained. The log shall include (as a minimum) the following information: date, name of MFO, time (commencement of pre-dumping observations), time (completion of pre-dumping observations), whether marine megafauna was sighted in the monitoring zone during the pre-dumping monitoring period, type of marine species identified (where possible), general comments on animal behaviour, description of mitigation measures undertaken (e.g. location of fauna monitored until it exited the monitoring zone. Dumping did not occur until fauna exited the monitoring zone), time (commencement of dumping) and time (completion of dumping).	Dredging Contractor	Throughout dredging and disposal activities
	Report any incidents involving the dredging or dumping activities that result in injury or death to any marine megafauna to PPA Dredging and Survey Manager and PPA Environment and Heritage department as soon as practicable but within 12 hours. Record the date, time and nature of each incident as well as a description of the species involved.	Dredging Contractor	As soon as practicable after an incident is observed, but within 12 hours
	Notify DAWE of any incidents involving the dredging or dumping activities that result in injury or death to any marine megafauna.	PPA Environment and Heritage Manager (West)	Within 48 hours from the time that the incident occurred.
Management Target	No injury or death to any marine megafauna.	Dredging Contractor	Throughout the project

Task	Action	Responsibility	Timing
Contingency	Completion of detailed incident analysis and implementation of any corrective measures in consultation with DAWE.	PPA Environment and Heritage Manager (West)	ASAP after an incident has occurred

7.3. Introduced Marine Pests

The (Tier 2) Management actions proposed to minimise potential impacts associated with introduced marine pests (**IMPs**) are described in Table 10.

Table 10 Management actions to minimise the risk of introduced marine pests

Task	Action	Responsibility	Timing
Management Actions	WA DPIRD's 'Vessel Check' risk assessment (https://vesselcheck.fish.wa.gov.au) submitted to PPA (including supporting documentation) for all dredging and support vessels (i.e., Dredge vessel and Barges) that mobilise to the Port of Dampier from interstate or international waters. Risk assessment must indicate that the vessel poses a low risk of IMP to Port of Dampier waters.	Dredging Contractor	Prior to vessel(s) entering Australian / Western Australian waters
	All vessels will have a ballast water management plan and ballast water exchanges will be in accordance with IMO requirements and the Commonwealth *Biosecurity Act 2015*.	Dredging Contractor	Prior to vessel(s) entering Australian waters
	Continue to implement the State Wide Array Surveillance Program (SWASP) in collaboration with DPIRD and WA Port Authorities within Western Australia.	PPA	Ongoing
Measures	Vessel Check IMP risk assessment undertaken for all dredging and support vessels (i.e. Dredge vessel and Barge) entering Port of Dampier waters.	Dredging Contractor	Prior to vessel(s) entering the Port of Dampier
	Ballast water management undertaken in accordance with IMO and Commonwealth *Biosecurity Act 2015* requirements.	Dredging Contractor	Prior to vessel(s) entering the Port of Dampier
Reporting / Evidence	'Vessel Check' risk assessment report (including supporting documentation).	Dredging Contractor	Prior to vessel(s) entering the Port of Dampier
Target	No introduction or movement of IMPs.	Dredging Contractor	Throughout project.
Contingency	Notify DPIRD if the introduction of IMPs is suspected in accordance with existing procedures under the collaborative SWASP.	Dredging Contractor	Immediately

7.4. Hydrocarbon Management

The (Tier 2) Management actions proposed to minimise potential impacts associated with hydrocarbon pollution are described in Table 11.

Table 11 Management actions to minimise the risk of hydrocarbon pollution

Task	Action	Responsibility	Timing
Management Actions	Dredge vessels shall have and implement a Shipboard Oil Pollution Emergency Plan (SOPEP), including having spill control equipment/materials available on board.	Dredging Contractor	Throughout project
	All equipment on board to be maintained and inspected in accordance with the manufacturer's recommendations or dredging contractor's vessel management systems in order to minimise the risk of hydrocarbon leaks.	Dredging Contractor	Throughout project
Measures	Number of hydrocarbon spills to harbour.	Dredging Contractor	Throughout project
Reporting / Evidence	Report any discharge of hydrocarbons to the marine environment (irrespective of quantity / volume) to PPA Vessel Traffic Services *without delay* on 08 9159 6556 or VHF Ch 11 or 16.	Dredging Contractor	Immediately
	All reports provided to WA DoT electronically via "Pollution Report" (POLREP) form in accordance with PPA Port of Dampier Handbook.	Dredging Contractor	Immediately (but no later than 12 hours from the incident occurring)
	A documented report provided to the PPA Dredging and Survey Manager on the incident, including (as a minimum) details of the incident, the measures taken, the success of those measures in addressing the incident or risk and any additional measures proposed to be taken.	Dredging Contractor	Immediately (but no later than 24 hours from the incident occurring)
Target	No discharges of hydrocarbons to the marine environment.	Dredging Contractor	Throughout project
Contingency	Implement oil spill response measures in accordance with the requirements of PPA's *Marine Pollution Contingency Plan* for the Port of Dampier.	PPA	Immediately on notification of spill incident

7.5. Waste Management

The (Tier 2) Management actions proposed to minimise potential impacts that waste management may have on the environment are listed in Table 12.

Table 12 Management actions to manage waste

Task	Action	Responsibility	Timing
Management Actions	All vessels to comply with the requirements of the Port of Dampier Handbook Section 39.1 *Management and Discharge of Shipboard Wastes*. This includes sewage, grey water, oil or oily mixtures, garbage, cargo hold and deck washing / cleaning and waste incineration.	Dredging Contractor	Duration of dredging operations
	Controlled waste, including hydrocarbons and oily water, shall be stored in appropriately labelled receptacles and be correctly disposed of ashore not to be discharged to sea. Controlled waste shall be disposed of ashore (as required) via licenced controlled waste contractor, and waste tracking sheets to be retained.	Dredging Contractor	Duration of dredging operations
	Solid and liquid wastes and hazardous materials shall be stored in appropriately labelled receptacles and be correctly disposed of ashore (as required) through a licenced waste contractor, and waste tracking sheets to be retained.	Dredging Contractor	Duration of dredging operations
	Number of incidents where waste has entered the marine environment, or incorrect storage / segregation.	Dredging Contractor	Duration of dredging operations
Measures	Certificate to demonstrate sewage treatment / disinfection system is approved in accordance with MARPOL and International Sewage Prevention Certificate provided to PPA.	Dredging Contractor	Prior to sewage discharge
Reporting / Evidence	Vessel garbage disposal log for all discharges to shore.	Dredging Contractor	Duration of dredging operations
	Waste delivery receipts for all discharges to shore.	Dredging Contractor	Duration of dredging operations

Task	Action	Responsibility	Timing
	Controlled waste tracking forms for controlled waste (hydrocarbons and oily water).	Dredging Contractor	Duration of dredging operations
	Any incident of discharge (eg. uncontrolled or unauthorised) of solid or liquid wastes to the marine environment (irrespective of quantity / volume) shall be reported to PPA Vessel Traffic Services without delay on 9159 6556 or VHF Ch 11 or 16.	Dredging Contractor	Immediately
	A documented report on any solid or waste spill incident shall be submitted to PPA's Dredging and Survey Manager, including (as a minimum) details of the incident, the response measures taken, the success of those measures in addressing the incident or risk and any additional measures proposed to be taken.	Dredging Contractor	Within 24 hours of a reportable incident.
Target	No unauthorised discharges of wastes to the marine environment.	Dredging Contractor	Throughout project
Contingency	Implement waste clean-up and/or other corrective actions as required by PPA.	Dredging Contractor	Throughout project

8. Reporting

A summary of the reporting requirements for the project are provided in Table 13. In addition, all project vessels operating within the Port of Dampier are required to adhere to all reporting requirements outlined in the Port of Dampier Port Handbook (as published on PPAs Website).

Table 13 Project reporting requirements

Report	Content	Timeframe	Responsibility	Recipient
Environmental Incidents or Environmental Risks Report	• Report any environmental incident or environmental risk • Detail the incident or risk, the measures taken, the success of those measures in addressing the incident or risk and any additional proposed to be taken • Document any incidents involving the dumping activities that result in injury or death to any marine species. The date, time and nature of each incident and the species involved, if known, must be recorded.	Within 12 hours	Contractor PPA PPA	PPA DoT – Reportable Oil Spill/POLREP DAWE – Reportable wildlife incident
Notification of Non-Compliance	Notification of any non-compliance with the management target. The notification must specify: • any commitment which is or may be in breach • a short description of the incident and/or non-compliance • the location (including co-ordinates), date, and time of the incident and/or non-compliance. In the event the exact information cannot be provided, provide the best information available.	Within two business days of becoming aware of incident or non-compliance	Contractor	PPA

8.1.1. Reporting to PPA

- All marine pollution incidents shall be reported to PPA as an environmental incident. PPA will coordinate the state reporting requirement to the DoT Maritime Environmental Emergency Response (MEER) duty officer (24 hours) on (08) 9480 9924 and followed by an online Pollution Report Form (POLREP), which is available at: http://www.transport.wa.gov.au/mediaFiles/marine/MAC-F-PollutionReport.pdf.
- Refer to Port of Dampier Marine Pollution Contingency Plan for more information on marine pollution reporting. All marine incidents (including pollution) to be reported to PPA immediately to Dampier VTS on (08) 9159 6556 or VHF Ch11 or 16 or Dampier.VTS@pilbaraports.com.au.

8.1.2. Public Complaint Resolution

PPA welcomes feedback from its wide range of stakeholders and has a process to ensure this feedback is captured and responded to in a timely manner. PPA has a formal process for handling complaints which can either be made in person, by visiting one of PPAs business locations, over the phone on (08) 6217 7112 or via PPAs website: https://www.pilbaraports.com.au/about-ppa/contact-us.

8.2. Availability of the DEMP

This DEMP will be made available on PPA's website (www.pilbaraports.com.au).

9. Audit and Review

PPA will undertake audits of the dredge contractor and their operations as required throughout the Project, to assess compliance against this DEMP.

The performance of the dredging operations against these requirements will be reported at scheduled meetings of the TACC.

This DEMP is a living document and will be reviewed in accordance with Table 14. Any significant changes will require re-submission to DAWE for consideration and approval. PPA are committed to continual improvement and will conduct regular review of the content and implementation of this DEMP.

Table 14 DEMP Review Schedule

Timing	Rationale
At the request by regulator or upon receipt of any approval conditions	Any request during assessment by DWER and DAWE or upon any approval conditions imposed would necessitate a comprehensive review of this DEMP to ensure all relevant aspects are covered within this Plan to meet requirements or ensure compliance.
Prior to commencement of action	To ensure that the contractor and approval holder implement all commitments accordingly and that no minor operational details are non-compliant.
Any time construction activities significantly alter	Design and construction method changes to the Project may result in an altered risk profile. Therefore, the DEMP will require a review to ensure that it remains fit-for-purpose for altered operational conditions. Any significant change in environmental risk will require the DEMP to be resubmitted to DAWE for endorsement.
Following any significant incidents or non-compliance events	To ensure that the management actions and controls in place are adequate to ensure no re-occurrence of incidents or non-compliances.

During review of the DEMP consideration should be given to (but not limited to):

- Overall effectiveness of the Plan
- Dredge Plume Validation Program
- Appropriateness of EVs, EQO and LEPs
- New environmental threats or impacts that may be identified
- Lessons learned during sampling or analysis
- Changes in industry best practice
- Any changes in methodology or equipment used.

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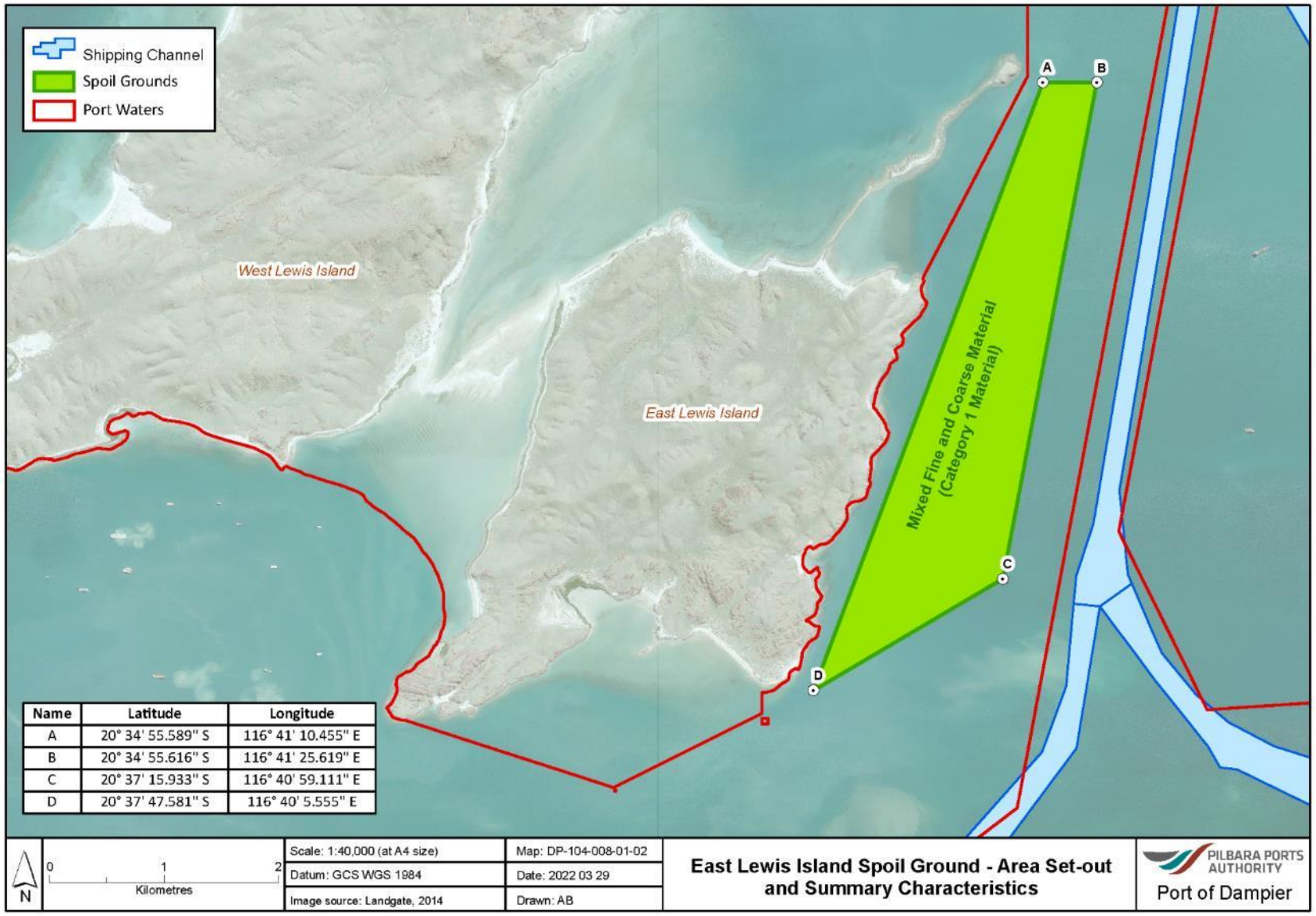
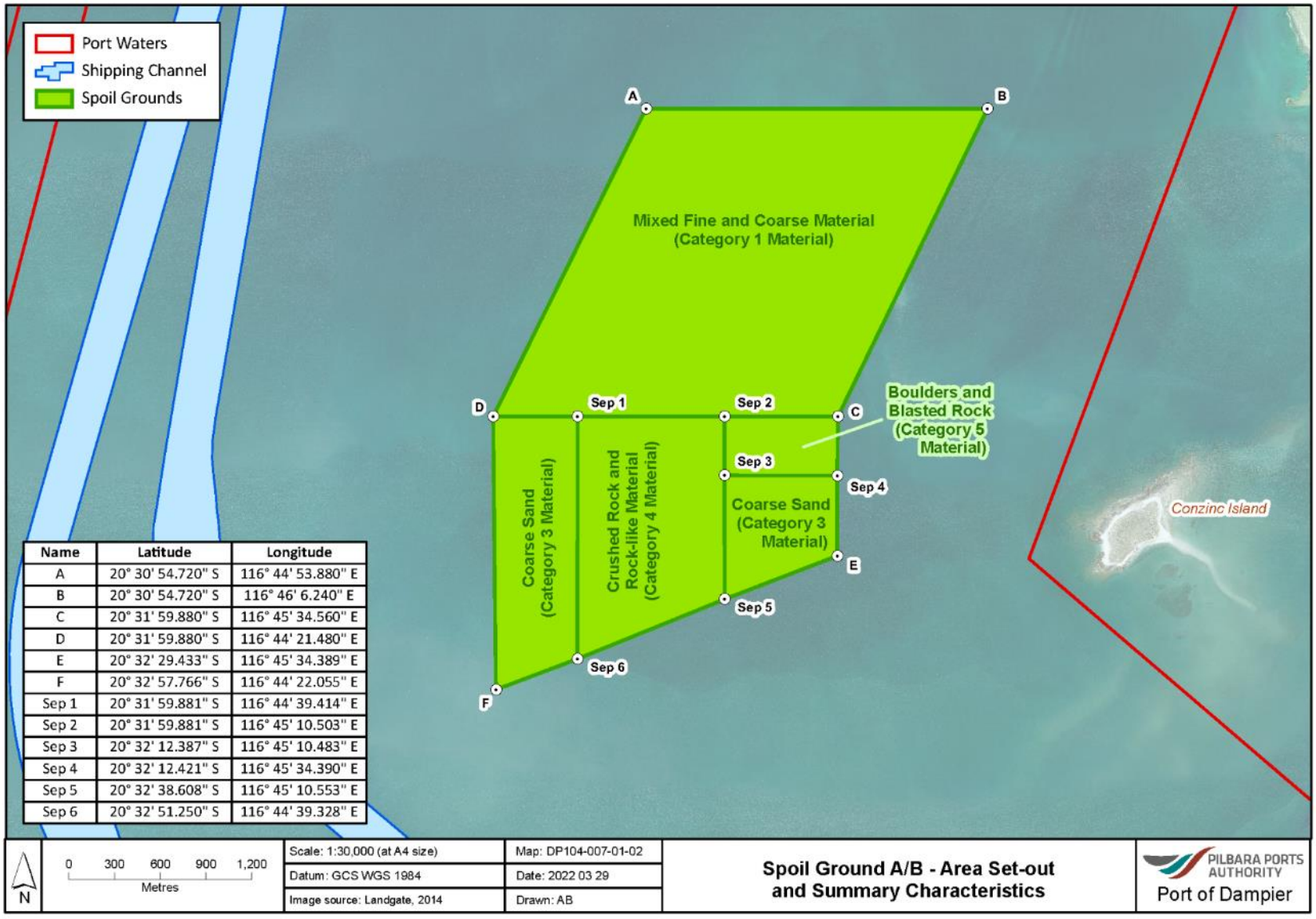
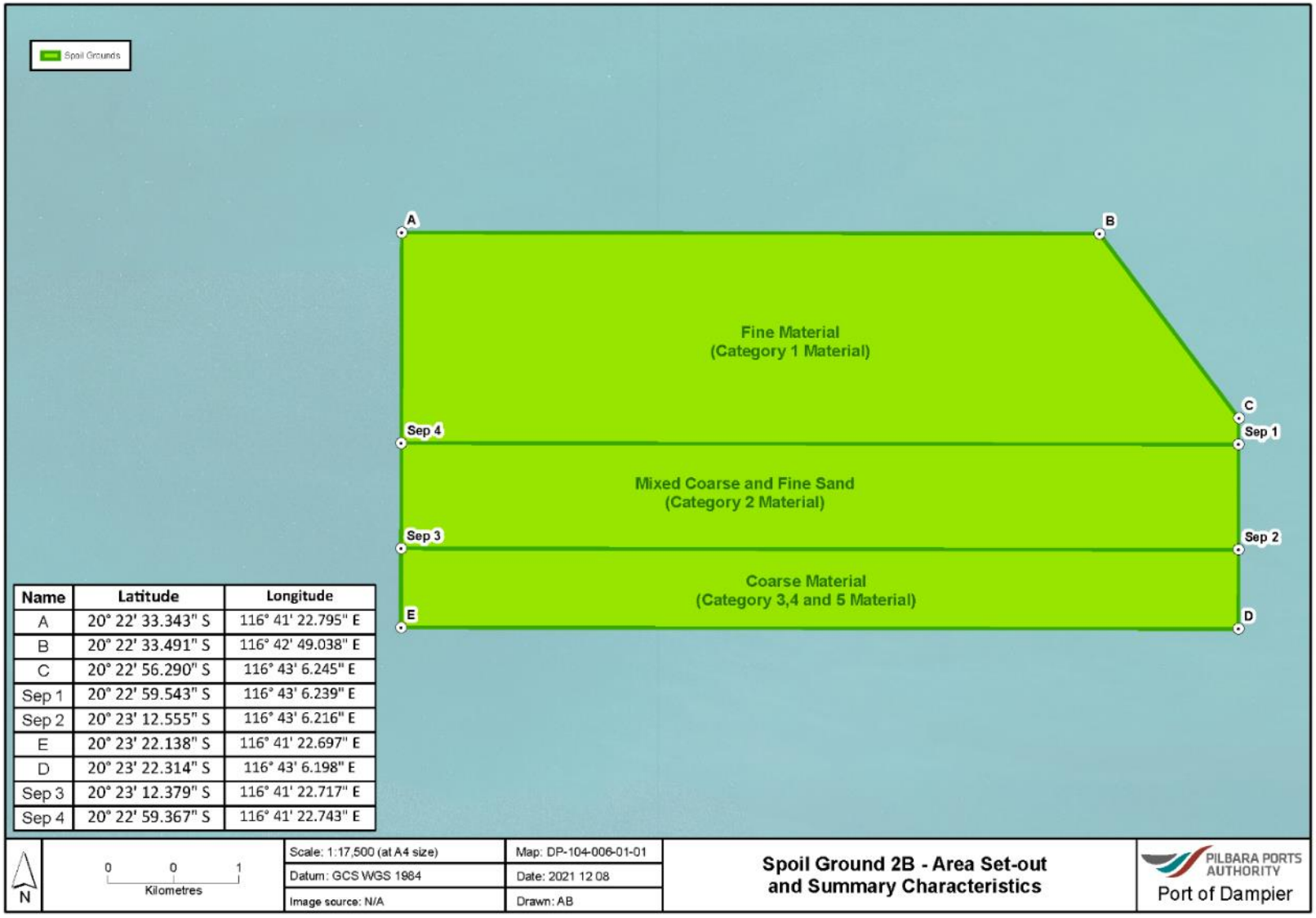
Appendix A. Details of the Spoil Grounds


Shipping Channel
Spoil Grounds
Port Waters
West Lewis Island
East Lewis Island
Mixed Fine and Coarse Material (Category 1 Material)
A
B
C
D
Name | Latitude | Longitude
A | 20° 34' 55.589" S | 116° 41' 10.455" E
B | 20° 34' 55.616" S | 116° 41' 25.619" E
C | 20° 37' 15.933" S | 116° 40' 59.111" E
D | 20° 37' 47.581" S | 116° 40' 5.555" E
N
0
1
2
Kilometres
Scale: 1:40,000 (at A4 size)
Datum: GCS WGS 1984
Image source: Landgate, 2014
Map: DP-104-008-01-02
Date: 2022 03 29
Drawn: AB
East Lewis Island Spoil Ground - Area Set-out and Summary Characteristics
PILBARA PORTS AUTHORITY
Port of Dampier


Port Waters
Shipping Channel
Spoil Grounds
A
B
C
D
E
F
Sep 1
Sep 2
Sep 3
Sep 4
Sep 5
Sep 6
Mixed Fine and Coarse Material (Category 1 Material)
Boulders and Blasted Rock (Category 5 Material)
Coarse Sand (Category 3 Material)
Crushed Rock and Rock-like Material (Category 4 Material)
Coarse Sand (Category 3 Material)
Conzinc Island
Name | Latitude | Longitude
A | 20° 30' 54.720" S | 116° 44' 53.880" E
B | 20° 30' 54.720" S | 116° 46' 6.240" E
C | 20° 31' 59.880" S | 116° 45' 34.560" E
D | 20° 31' 59.880" S | 116° 44' 21.480" E
E | 20° 32' 29.433" S | 116° 45' 34.389" E
F | 20° 32' 57.766" S | 116° 44' 22.055" E
Sep 1 | 20° 31' 59.881" S | 116° 44' 39.414" E
Sep 2 | 20° 31' 59.881" S | 116° 45' 10.503" E
Sep 3 | 20° 32' 12.387" S | 116° 45' 10.483" E
Sep 4 | 20° 32' 12.421" S | 116° 45' 34.390" E
Sep 5 | 20° 32' 38.608" S | 116° 45' 10.553" E
Sep 6 | 20° 32' 51.250" S | 116° 44' 39.328" E
N
0 300 600 900 1,200
Metres
Scale: 1:30,000 (at A4 size)
Datum: GCS WGS 1984
Image source: Landgate, 2014
Map: DP104-007-01-02
Date: 2022 03 29
Drawn: AB
Spoil Ground A/B - Area Set-out and Summary Characteristics
PILBARA PORTS AUTHORITY
Port of Dampier



Name	Latitude	Longitude
A	20° 22' 33.343" S	116° 41' 22.795" E
B	20° 22' 33.491" S	116° 42' 49.038" E
C	20° 22' 56.290" S	116° 43' 6.245" E
Sep 1	20° 22' 59.543" S	116° 43' 6.239" E
Sep 2	20° 23' 12.555" S	116° 43' 6.216" E
E	20° 23' 22.138" S	116° 41' 22.697" E
D	20° 23' 22.314" S	116° 43' 6.198" E
Sep 3	20° 23' 12.379" S	116° 41' 22.717" E
Sep 4	20° 22' 59.367" S	116° 41' 22.743" E