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Port of Devonport Maintenance Dredging Long-term Monitoring and Management Plan 2025 -2035

Customer	TasPorts
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Deliverable	003
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Amendment Record

The Amendment Record below records the history and issue status of this document.

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00	21 June 2024	TasPorts	Draft for Client Review
01	16 August 2024	TasPorts	Updated from Client and 3rd Party Review Comments
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03	30 January 2025	TasPorts	Updated from DCCEEW RFI
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05	22 August 2025	TasPorts	Updated with SDPA permit conditions

Acknowledgement of Country

The project team acknowledges the Traditional Custodians of the land, sea, skies and waters that we live and work throughout Australia.

We recognise Aboriginal and Torres Strait Islander Peoples as the first scientists and engineers and acknowledge the importance of Indigenous Knowledge in sustainable management of our environment.

We pay our respects to Elders past and present, and extend that respect to all Aboriginal and Torres Strait Islander peoples today.

Artwork by Charmee Sutton

Document Control

Tables

Figures

Terms and Abbreviations

Term / Abbreviation	Definition
3D	Three-dimensional
AHO	Australian Hydrographic Office
AMMP	Adaptive Monitoring and Management Plan
AMSA	Australian Maritime Safety Authority
ANZG	Australian & New Zealand Guidelines for Fresh & Marine Water Quality
BIA	Biologically Important Area
BIL	Bass Island Line
CO_2	Carbon Dioxide
CRIMP	Centre for Research on Introduced marine Pests
DAFF	Department of Agriculture Fisheries and Forestry
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DGPS	Differential Global Positioning System
DSDG	Dredge Spoil Disposal Ground
EMP	Environmental Management Plan
EMS	Environmental Management System
EPA	Tasmanian Environment Protection Authority
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act (1999)*
GHG	Greenhouse Gas
HAT	Highest Astronomical Tide, the highest tide level which can be expected to occur under average meteorological conditions
HSE	Health, Safety & Environment
IMS	Introduced Marine Species
LAT	Lowest Astronomical Tide, the lowest tide level which can be expected to occur under average meteorological conditions
LTMMP	Long-term Monitoring and Management Plan
MFO	Marine Fauna Observer
MNES	Matters of National Environmental Significance
NAGD	National Assessment Guidelines for Dredging, Commonwealth of Australia 2009
NOx	Nitrogen Oxides
NRE Tas	Department of Natural Resources and Environment Tasmania
NTU	Nephelometric Turbidity Units
OWS	Oily Water Separator

Term / Abbreviation	Definition
PMS	Planned Maintenance System
PMST	Protected Matters Search Tool
PSD	Particle Size Distribution
PSU	Practical Salinity Units
RL	Reduce Level
RORO	Roll-On-Roll-Off
SAP	Sampling and Analysis Plan
SAPIR	Sampling and Analysis Plan Implementation Report
Sea Dumping Act	Commonwealth *Environment Protection (Sea Dumping) Act 1981*
SDP	Sea Dumping Permit
TACC	Technical Advisory and Consultative Committee
TasPorts	Tasmanian Ports Corporation Pty Ltd
TBT	Tributyltin
ToR	Terms of Reference
TSHD	Trailing Suction Hopper Dredge
TSIC	Tasmanian Industry Seafood Council
TSP Act	*Threatened Species Protection Act 1995*
TSS	Total Suspended Solids
UCL	Upper Confidence Limit
VOC	Volatile Organic Compounds
ZoHI	Zone of High Impact
ZoI	Zone of Influence
ZoMI	Zone of Medium Impact

1 Introduction

The Tasmanian Ports Corporation Pty Ltd (TasPorts) is a state-owned corporation operating under the *Tasmanian Ports Corporation Act 2005* and became responsible for the management and maintenance of the Port of Devonport (the 'Port') on 1st January 2006. The Port is situated at the mouth of the Mersey River and is heavily utilised by industrial and recreational vessels and is home to the Spirit of Tasmania passenger ferries, providing regular connection to mainland Australia.

Navigational channels which provide access to the Port naturally shallow over time due to siltation and sediment transport processes. Maintenance dredging involves the removal of accumulated sediments and is required to maintain designated channel depths to ensure the continued efficient passage of vessels utilising the Port. Most ports, including the Port of Devonport, cannot sustainably function without maintenance dredging.

Regular maintenance dredging of the shipping channel, swing basin and berths at the Port has been undertaken since 1984 to maintain safe navigation within the Port. Maintenance dredging and associated at sea placement has been undertaken in accordance with several Sea Dumping Permits (SDPs) issued by the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) (and its predecessors) under the *Environment Protection (Sea Dumping) Act 1981* (Sea Dumping Act).

As a Port Authority, TasPorts has obligations which include the requirement to undertake maintenance dredging to fulfil its function to provide and operate effective and efficient port facilities and services. To meet this legislative obligation, it is necessary to have in place ongoing approvals that allow the ability to dredge and otherwise maintain or improve navigational channels to ensure safe navigation within the port channels.

To provide long-term certainty for maintenance dredging activities, TasPorts is seeking a 10-year SDP for the period 2025-2035. This document presents a Long-term Monitoring and Management Plan (LTMMP) for maintenance dredging of the Port over this 10-year period. LTMMPs outline both the framework and specific measures for management, mitigation, and monitoring of potential environmental impacts. Specifically, this LTMMP incorporates details of maintenance dredging for the Port and the associated placement of the dredged material. The LTMMP demonstrates how the environment at the Port and surrounds will be protected over the longer term, identifies responsible parties, and includes mechanisms for the regular review of compliance with permit conditions, as well as a process for continuous improvement of environmental management and performance over the life of the permit. LTMMPs are a statutory requirement for the issue of a long-term SDP under the Sea Dumping Act.

This LTMMP is supported by a number of studies undertaken to support the SDP application and also data collected during previous campaigns. Figure 1.1 illustrates the process and knowledge that has informed development of this LTMMP.

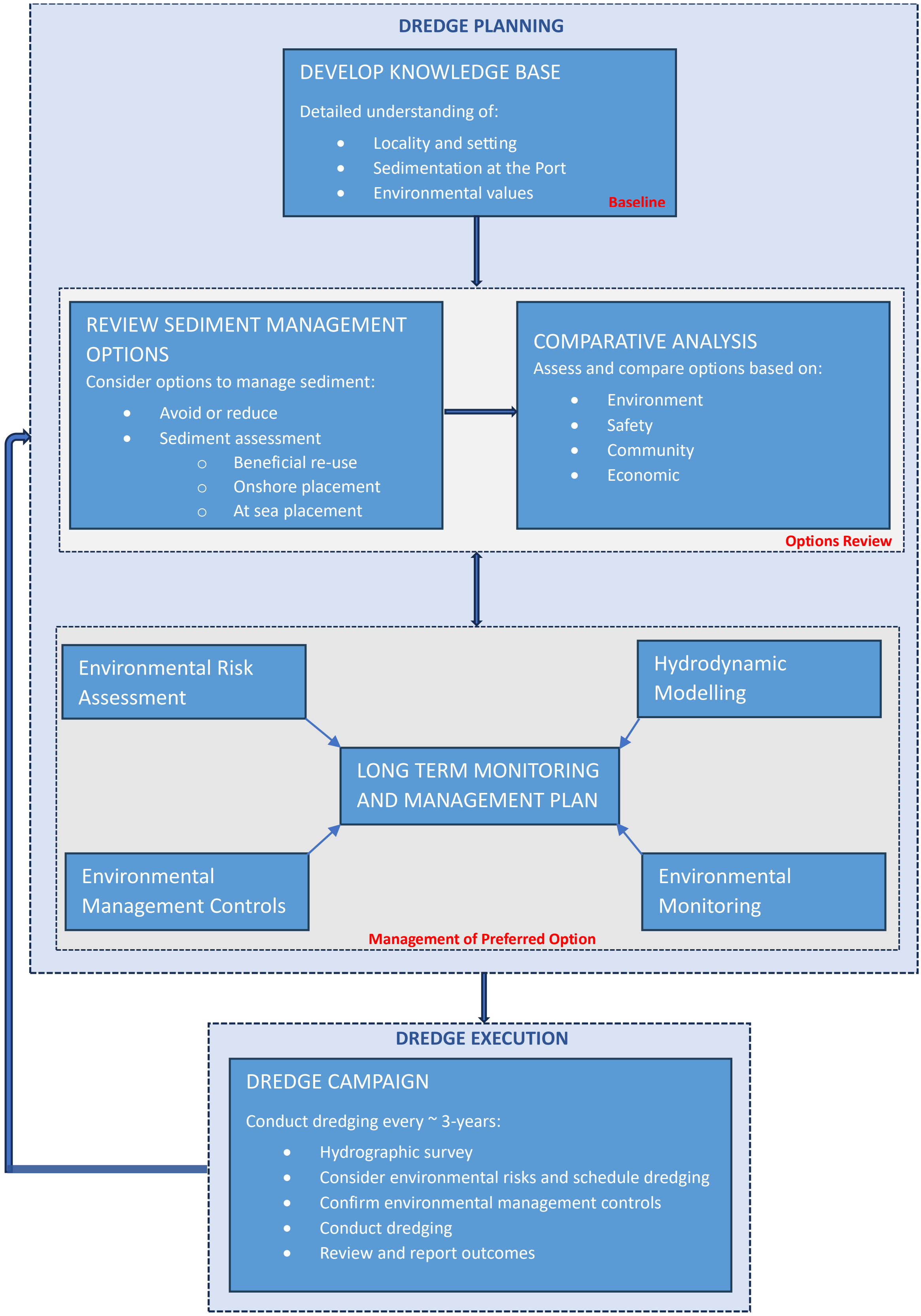


Figure 1.1 LTMMP Development Process

1.2 Purpose of this Document

TasPorts is seeking to obtain a new 10-year SDP to ensure that maintenance dredging can continue to maintain the Port's critical depths. The purpose of this LTMMP is to document the strategy for managing natural sediment accumulation within the navigable waters at the Port. The strategy ensures the safe and efficient operation of the Port and the ongoing protection of local environmental values.

This LTMMP forms a part of the SDP application as well as providing the framework for maintenance dredging and disposal activities by TasPorts over the lifetime of the SDP. This plan outlines:

- Overall environmental management framework
- The areas where dredging is to occur
- Type of materials to be dredged
- Offshore disposal location and activities
- Legislation and regulations that apply to the maintenance dredging program
- Environmental values to be protected, the risks that dredging may pose, and the mechanisms to be implemented to mediate these risks (management strategies)
- Responsible parties
- Monitoring and reporting
- Consultation.

The objectives of the LTMMP are to:

1. Provide a framework for maintenance dredging and disposal at the Port over the next 10 years
2. Establish a robust, transparent long-term planning approach to managing port sediment
3. Outline operational, planning, consultation and monitoring arrangements
4. Maintain local environmental values
5. Apply continual improvement practices in the management of sediment and dredging actions.

This LTMMP also provides the framework to guide the preparation of a detailed operational dredge management plan to be developed by the appointed dredge contractor(s) or included within specific contract conditions accepted by the dredge contractor(s), prior to the commencement of the dredging activities. The information provided in this LTMMP has been prepared in accordance with the National Assessment Guidelines for Dredging (NAGD) using guidance from DCCEEW.

Items addressed in this LTMMP as required by the NAGD are listed in Table 1.2, with a cross-reference to where each item is addressed in this LTMMP.

Table 1.1 Items addressed in this LTMMP

Item	LTMMP Reference
Approvals and policy	Section 1.3 & 1.4
Overall management framework	Section 1.5
Stakeholder consultation, including the Technical Advisory and Consultative Committee (TACC)	Section 2

Item	LTMMP Reference
Context of the local environment, including history of dredging and dredge material disposal at the site	Section 3 & 4.1
Description of dredging and disposal for the term of the plan or permit	Section 4
Description of the existing environment	Section 5
Description of the material for disposal	Section 5.1.4
Description of potential impacts	Section 8
Management strategies and actions	Section 9
Auditing requirements and reporting	Section 11.1 & 11.2
Review of management plan	Section 11.2
Contingency arrangements	Section 11.4
Continuous improvement	Section 11.5

1.3 Policy Context

Several high-level policy requirements outline the approach to be taken regarding management of maintenance dredging and disposal, and this LTMMP aligns with the following:

- The **National Assessment Guidelines for Dredging** (NAGD) (CoA 2009) aims to provide a clear set of standards for assessment and permitting of dredge material proposed for sea placement. The Port uses these guidelines in determining the sediment suitability for offshore placement applications for maintenance dredge material to the Commonwealth government.

- The **Ports Australia Environmental Code of Practice for Dredging and Dredged Material Management** (Ports Australia 2016) sets out several environmental principles that Australian ports should meet when undertaking dredging and disposal of dredged material. The principles have been defined based on ecologically sustainable development principles. This LTMMP has been developed to ensure alignment with the environmental principles of the Environmental Code of Practice for Dredging and Dredged Material Management.

1.4 Legislation Relevant to Maintenance Dredging

Maintenance dredging programs at the Port are subject to Commonwealth and Tasmanian government laws. The relevance of legislation that applies to a proposed dredging project are assessed in the initial planning stage of any proposed campaign. Table 1.2 and Table 1.3 provide a brief overview of Commonwealth and State legislation pertinent to this LTMMP.

Table 1.2 Commonwealth Legislation, Regulations and Guidelines

Legislation/Requirement	Scope	Authority
Environment Protection (Sea Dumping) Act 1981	The Sea Dumping Act implements Australia's obligations under the London Protocol. An SDP is required under the Sea Dumping Act to authorise the dumping, and the loading for the purposes of dumping, of any wastes or other matter into Australian waters. DCCEEW has the authority to grant multi-year SDPs for long-term routine maintenance dredging requiring ocean disposal. This LTMMP seeks to support the application for an SDP under the Sea Dumping Act.	DCCEEW
Environment Protection and Biodiversity Conservation Act 1999	The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides a legal framework for the Australian Government to protect and manage internationally and nationally important flora, fauna, ecological communities, and heritage places, (Matters of National Environmental Significance (MNES)). Dredging and sea placement of maintenance dredge material for the Port does not trigger a referral under the EPBC as it is not expected to significantly impact upon MNES; however, all considerations for MNES are incorporated in the Port's Environmental Management System (EMS) and this LTMMP.	DCCEEW
Underwater Cultural Heritage Act 2018	The *Underwater Cultural Heritage Act 2018* protects shipwrecks, sunken aircraft and other types of underwater cultural heritage, that occurred 75 or more years ago, regardless of whether their location is known. The following additional requirements may be relevant to dredging activities: • Provide authorities with a notification of any new underwater heritage discovery within 21 days.	DCCEEW
Protection of the Sea (Prevention of Pollution from Ships) Act 1983	Australia implements (MARPOL through the *Protection of the Sea (Prevent of Pollution from Ships) Act 1983*. The Act includes regulations aimed at preventing both accidental pollution and pollution from routine vessel operations in relation to the discharge of marine pollutants from ships, including oil, chemicals, sewage, garbage and air pollution. Vessels used dredging will be required to adhere to the requirements of this Act.	Australian Maritime Safety Authority (AMSA)
Biosecurity Act 2015 Biosecurity Regulations 2016 Biosecurity Amendment (Biofouling Management) Regulations 2021	The *Biosecurity Act 2015* manages the introduction of exotic pests and diseases in Australia. Of most relevance is requirements around vessels that enter Australian waters and requirements for ballast exchange offshore and pest inspections. This Act will guide requirements for any incoming dredge vessels. Provides a definition of 'quarantine' and establishes the DAFF. The Biosecurity Amendment (Biofouling Management) Regulations 2021 entered into force on 15 June 2022 and requires all vessels to provide information on biofouling management practices prior to arriving in Australia.	Department of Agriculture Fisheries and Forestry (DAFF)

Legislation/Requirement	Scope	Authority
Australian Ballast Water Management Requirements (Version 8) 2020	The Australian Ballast Water Management Requirements set out the obligations on vessel operators with regards to the management of ballast water and ballast tank sediment when operating within Australian seas. Vessels used dredging will be required to adhere to these requirements.	DAFF
Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2018)	The Water Quality Management Framework guides you through the necessary steps for planning and managing water quality or sediment quality. The Water Quality Guidelines help improve confidence in our water quality assessments by introducing a systematic approach to selecting and assessing indicators that represent a number of lines of evidence. In this way, decisions can be made on the basis of an integrated weight-of-evidence process for assessing and managing water/sediment quality. In conjunction with the NAGD, These guidelines will be applied to all sediment and water quality sampling.	DCCEEW (as the permitting authority)

Table 1.3 Tasmanian Legislation, Regulation and Guidelines

Legislation/Requirement	Scope	Authority
Biosecurity Act 2019	The Act consolidates Tasmania's biosecurity laws into a single modern statute. It establishes a Biosecurity Advisory Committee, which provides advice to the Tasmanian Government and Minister for Primary Industries and Water on biosecurity in Tasmania. Applicable where project activities may pose biosecurity risk to Tasmanian waters and coastlines.	Department of natural Resources and Environment Tasmania (NRE Tas)
Environmental Management and Pollution Control Act 1994	This is the primary environment protection and pollution control legislation in Tasmania, with focus on prevention, reduction and remediation of environmental harm. Applicable in the event of oil spill in State waters.	Tasmanian Environment Protection Authority (EPA)
Environmental Management and Pollution Control (Waste Management) Regulations 2020	The Regulations are to regulate and manage controlled waste and some aspects of the general waste disposal within Tasmania.	
Pollution of Waters by Oil and Noxious Substances Act 1998	This Act is the Tasmanian state legislation giving effect to the requirements of MARPOL 73/78 within state waters and is responsible for ensuring preparedness for and response to oil and chemical spills in Tasmania.	EPA

Legislation/Requirement	Scope	Authority
Threatened Species Protection Act 1995	The *Threatened Species Protection Act 1995* (TSP Act) provides for the protection and management of threatened native flora and fauna and to enable and promote the conservation of native flora and fauna. For a species to be eligible for listing on the Act, it must be considered to be a native Tasmanian flora or fauna. In conjunction with the EPBC Act, considerations for threatened species are incorporated in the Port's Environmental Management System (EMS) and this LTMMP.	NRE Tas
Crown Lands Act 1976	Under the *Crown Lands Act 1976* a Works Application will be required to be submitted and approved prior to commencement of dredging activities.	Tasmania Parks and Wildlife Service (Property Services Division)

1.5 Overall Environmental Management Framework

TasPorts maintains an environmental management system (EMS) aligned with ISO 14001 and EcoPorts, and the Port of Devonport operates under TasPorts Health Safety and Environment (HSE) Policy and Sustainability Policy. This LTMMP has been developed in accordance with the principles of TasPorts' EMS, Sustainability and HSE Policy.

The specific EMS requirements relating to dredging projects include:

- Mandatory technical advisory consultation committees for stakeholder consultation and communication on all dredging projects.
- A commitment to baseline ecological assessments and marine pest assessments of all major port locations every 5 years.
- Marine sediment quality assessments every 5 years.
- An agreed Dredge Contractor environmental management plan for all dredge projects.

TasPorts Programme Manager Dredging & Hydrographic Survey has overall responsibility for dredging at the Port. The maintenance dredging program is conducted in accordance with conditions of the SDP and the requirements of TasPorts as detailed in the contract between TasPorts and the dredging contractor(s) undertaking the maintenance dredging works.

The dredging contractor is responsible for the implementation of the dredging program within the constraints of the requirements of TasPorts and the SDP including this LTMMP.

Further information on environmental management can be found in Section 9 and Annex D.

2 Stakeholder Consultation

The consultation objectives for this LTMMP and permit compliance processes include:

- Establish and maintain positive relationships with the community and external stakeholders.
- Provide regular information on maintenance activities on a variety of media, social platforms, and targeted stakeholder engagement sessions.
- Effectively manage any complaints, concerns, or incidents related to maintenance dredging.

The process of stakeholder consultation and review is described further below, along with details of existing and future identification of affected stakeholders.

2.1 Engagement Approach

To support maintenance dredging activities at the Port of Devonport, TasPorts identified and engaged with key stakeholders to ensure visibility and understanding of works, seek feedback and promptly respond to concerns.

To enable this, TasPorts developed and implemented a Stakeholder Community Engagement Plan, which established a framework for ongoing, authentic engagement with key stakeholders for dredging activities at the Port of Devonport.

With understanding of identified stakeholder sentiment, interest and risks, TasPorts undertook engagement utilising the following methods and tools:

- Notifications to key stakeholders
- One-on-one engagement through online meetings, phone calls and in person meetings, as required
- TasPorts' Technical Advisory Consultative Committee.

As part of its engagement approach, TasPorts undertook to directly consult with Traditional Owners relevant to the dredging location in the Mersey River, as well as the preferred dredge disposal ground (Six Rivers Aboriginal Corporation). As part of this, TasPorts invited representatives to join its TACC, in addition to direct engagement. Traditional Owners have received all reports relevant to decision-making regarding the determination of the preferred dredge disposal site, as well as the development of preferred dredge methodology.

2.2 Technical Advisory Consultative Committee

The establishment of TasPorts' Technical Advisory Consultative Committee (TACC) forms part of TasPorts' objective of strengthening relationships with stakeholders across all sectors to ensure sustainable growth, in response to evolving community and market needs.

In addition, the guidance within the NAGD sets out the development of a TACC being a necessary component to assist in the consultation process required for an SDP application. The NAGD states that:

The TACC is intended to assist ports and other proponents and Determining Authority to access local knowledge and reconcile various stakeholder interests.

The TACC is intended to:

- Provide continuity of direction and effort in protecting the local environment
- Support communication between stakeholders
- Assist in the establishment of longer-term management arrangements, including reviewing the development and implementation of management plans and monitoring programs
- Review dredging and placement activities in accordance forecast plans and programs
- Make recommendations to the port authority and regulators as necessary or appropriate.

TasPorts' TACC for the Port of Devonport was initially established to support consultation and engagement for capital dredging, as part of its QuayLink Project in 2021. The TACC includes standing members who are expected to attend most meetings to promote continuity and consistency (state-wide for all port locations), alongside site specific TACC representatives, relevant to the Port of Devonport activities. Therefore, the TACC is representative of industry, community and government at all levels and is independently chaired.

The TACC for the Port of Devonport includes representation from the following organisations:

- TasPorts (Programme Manager – Dredging & Hydrographic Survey, Harbour Master, Manager Environment and Sustainability, Group Executive Major Projects, Assets and Technical Services, Senior Advisor Communications)
- Cradle Coast Authority
- Seafood Industry Tasmania (SIT)
- TARFish (recreational fishers)
- Government organisations:
  - Tasmanian Environment Protection Authority (EPA)
  - Department of Natural Resources and the Environment Tasmania (NRE Tas)
  - Devonport City Council
- Port users:
  - Mersey Yacht Club

External consultants invited to provide technical input and presentations to TACC members include, but are not limited to:

- AW Maritime
- BMT
- ERA Planning and Environment
- GHD

The current TACC is operating under formal Terms of Reference (ToR; TasPorts 2022). Where possible, meetings are in a face-to-face format, but videoconferencing facilities are also available to facilitate remote attendance. Each meeting of the TACC is facilitated by TasPorts and includes participating in a review of survey plans and outcomes, and monitoring and management plans and outcomes. The TACC is updated via email or letters on an as needs basis between meetings.

2.3 Future Consultation

TasPorts remains committed to ensuring ongoing engagement with key stakeholders for the term of the LTMMP, in support of all dredging activities at the Port. The established mechanisms and engagement frameworks established to support TasPorts 10-year Sea Dumping Permit through DCCEEW provide an important foundation for this to continue.

The existing consultation processes and stakeholders associated with the TACC are considered appropriate for stakeholder input into the future management of dredging operations in the Port. Any issues raised during TACC meetings have been addressed either in committee sessions, or directly with stakeholders outside of meetings and will be considered during future consultation. TasPorts has received valuable feedback on its proposed dredging activities within the Port.

For each dredging campaign, there will be a TACC standing agenda item to review any updates to the LTMMP and SDP (if applicable). This will provide the opportunity for stakeholders to provide comment on matters applicable to their area of expertise or interest, relevant to the ongoing management of dredging and disposal. This practice will be continued over the term of this LTMMP.

In addition to ongoing TACC engagement, TasPorts will continue to provide project updates through its other communication channels to key stakeholders. This will ensure ongoing engagement with stakeholders as dredging campaigns are planned and undertaken. This ongoing engagement will ensure TasPorts continues to deliver on its key engagement objectives in keeping community and stakeholders informed, obtain feedback and promptly respond to concerns.

2.4 Publication and Accessibility

To ensure transparency and stakeholder understanding and acceptance of the environmental management of the Port, this LTMMP will be made available to the public on the TasPorts website (www.tasports.com.au), including any updated and subsequent versions.

3 Port Locality, Setting and Shipping

3.1 Overview

The Port of Devonport is located on the traditional lands of the Pannilerpanner clan. It is located within the city of Devonport on Tasmania's north coast. The Port is situated on both sides of the Mersey River and encompasses 30 ha of port land area and 105 ha of port waters, licenced by the Crown. Port limits include all waters bounded by a circle with a 3 nm radius, centred on Mersey Bluff Lighthouse and all waters of the Mersey River up to the Victoria Bridge (Figure 3.1).

The Port is divided into two major functional areas: the entrance channel and bend (hereafter referred to as entrance channel), and the inner harbour comprising the swing basin and seven working berths (Figure 3.2).

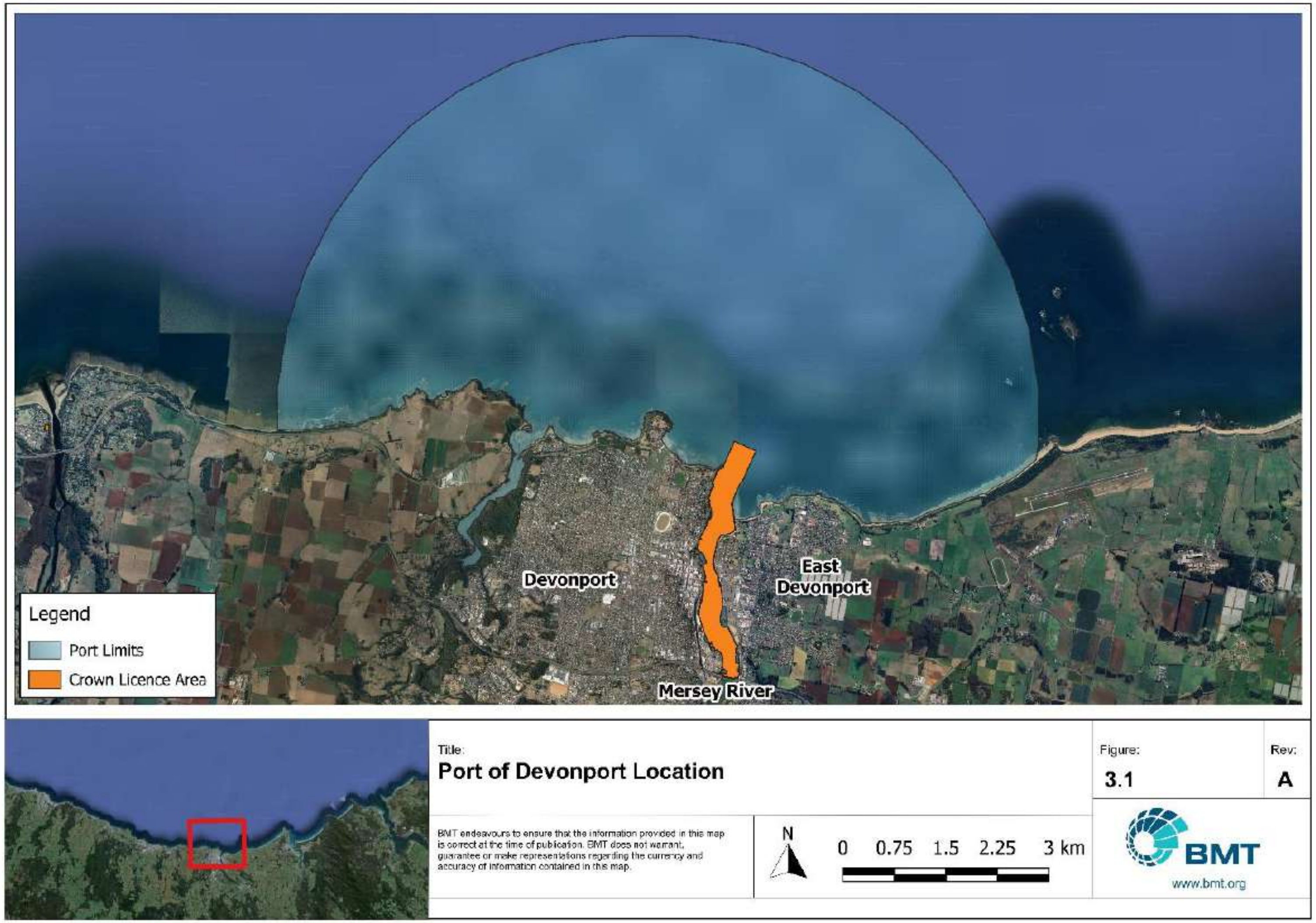


Figure 3.1 Port of Devonport location

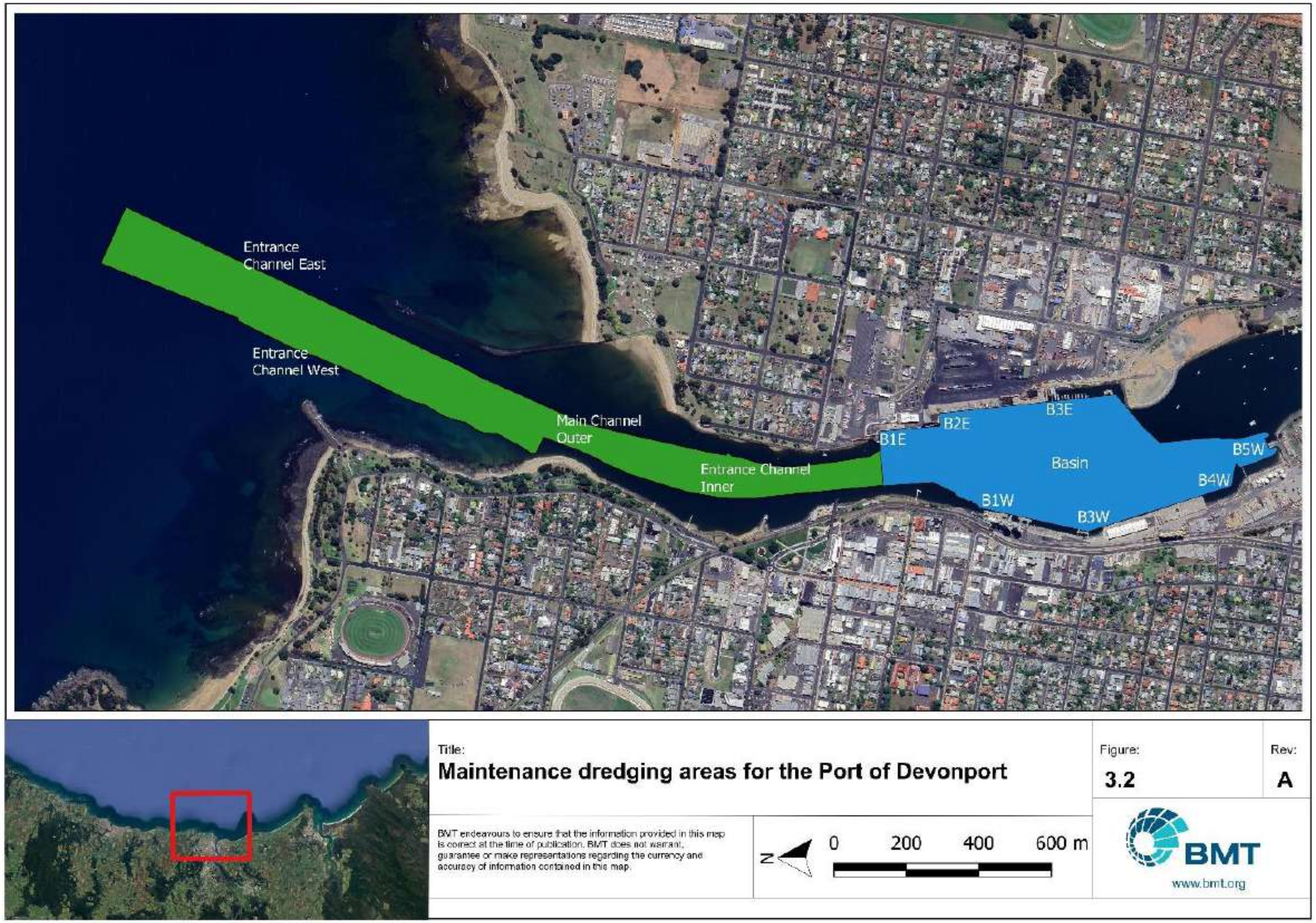


Figure 3.2 Maintenance dredging areas for the Port of Devonport. The entrance channel and bend are shaded green, and the inner harbour is shaded blue

3.2 Existing Port Facilities

The operation of the Port dates to the mid-1850s when developments on both sides of the Mersey River serviced coal and timber exports. Currently, the Port precinct services the TT line passenger ferry, SeaRoad freight, Bass Island Line service to King Island (BIL), Cement Australia exports and bulk imports and exports of materials including fuel, fertiliser and grain. Bulk goods and fuel (mostly gas) loading facilities are on the western berths, while the passenger ferry and container vessels are on the eastern berths. The Port also provides berths and loading facilities for a small range of commercial fishing and recreation vessels. A list of berth operations is summarised in Table 3.1.

Table 3.1 Summary of berth operations at the Port of Devonport

Berth	Operation
No 1 Berth West (B1W)	Customer berth. Bulk commodities (cement)
No 3 Berth West (B3W)	Small craft berth. Tug berthing and maintenance, small craft refuelling, fish unloading
No 4 Berth West (B4W)	General use berth. Oil products, bulk wheat, container, general cargo, livestock. Bulk tallow.
No 5 Berth West (B5W)	Vessel berth. Bulk LPG unloading Bass Island Line operation RORO
No 1 Berth East (B1E)	TT-Line operations for passengers and RORO freight ferry
No 2 Berth East (B2E)	SeaRoad RORO freight service
No 3 Berth East (B3E)	General purpose berth (under construction for future TT-Line operations)

3.3 Future Port Development

In June 2021, the Tasmanian Government approved the $241 million East Devonport redevelopment project – QuayLink, which will significantly enhance trade through improved infrastructure and facilitation of larger ships. As part of QuayLink, dredging and reclamation works at East Devonport commenced in 2023 to support two state-of-the-art, roll-on-roll-off (RORO) berths and terminals to be developed, alongside a multi-user berth. The Port’s freight capacity is expected to increase by 40%, along with an additional 160,000 passengers visiting Devonport every year.

3.4 Extreme Weather Events

The process of sedimentation within the Port is a complex process. Severe weather events, including high volume, intense rain result in erosion of waterways, flooding and sediment transport downstream in the Mersey River. The silt load of the river varies during any individual flood event and from one flood to another; therefore, the processes of siltation are dynamic and variable throughout the Port. The risk of flooding and debris not only affects shipping during the event, but sedimentation impacts safe Port access thereby increasing the need for sediment removal.

4 Dredging Activities

4.1 History of Dredging at the Port

TasPorts is responsible for maintenance dredging of the berths, channel and turning basin at the Port, and has also undertaken several capital dredging programs to facilitate Port expansion projects. Table 4.1 summarises the dredging campaigns at the Port since 1984. Historically, maintenance dredging campaigns were conducted annually, and then as needed. More recently, seabed levelling has also been adopted to relocate sediment in critical areas of the entrance channel and bend and inner harbour. The most recent seabed levelling activity at the Port took place at the end of 2022 and mid-2024. Going forward a regular maintenance dredging program is planned for approximately every three years.

Table 4.1 Previously permitted dredging activities at the Port of Devonport

Year	Type if Dredging	Proponent	Volume (m^3)
1984-85	Maintenance	Port of Devonport Corporation Pty Ltd	55,121
1985-86	Maintenance	Port of Devonport Corporation Pty Ltd	70,083
1986-87	Maintenance	Port of Devonport Corporation Pty Ltd	63,220
1987-88	Maintenance	Port of Devonport Corporation Pty Ltd	99,180
1988-89	Maintenance	Port of Devonport Corporation Pty Ltd	98,480
1989-90	Maintenance	Port of Devonport Corporation Pty Ltd	96,261
1990-91	Maintenance	Port of Devonport Corporation Pty Ltd	86,425
1991-92	Maintenance	Port of Devonport Corporation Pty Ltd	65,739
1992-93	Maintenance	Port of Devonport Corporation Pty Ltd	47,369
1993-94	Maintenance	Port of Devonport Corporation Pty Ltd	36,760
1994-95	Maintenance	Port of Devonport Corporation Pty Ltd	19,905
1995-96	Maintenance	Port of Devonport Corporation Pty Ltd	32,046
1996-97	Capital & Maintenance	Port of Devonport Corporation Pty Ltd	176,200
1997-98	Capital & Maintenance	Port of Devonport Corporation Pty Ltd	201,400
1998-99	Maintenance	Port of Devonport Corporation Pty Ltd	55,000
2001-02	Maintenance	Port of Devonport Corporation Pty Ltd	205,865
2002-03	Maintenance	Port of Devonport Corporation Pty Ltd	7,800
2005	Maintenance	Port of Devonport Corporation Pty Ltd	200,000
2015*	Maintenance	TasPorts	378,452
2023^	Capital	TasPorts	45,900

***Sea dumping permit SD2014/2622**
^State approvals for reclaim

4.2 Future Maintenance Dredging Requirements

The entrance channel and inner harbour at the Port are subject to accretion of approximately 65,000 m^3 per year (depending upon the occurrence of flooding events) because of the eastern and western transport of coastal material resulting in sand and cobble being deposited into the channel, and settlement of fine material in the inner harbour that is transported downstream from the Mersey River. This accretion if unmanaged will limit navigational areas and increase the risk of vessel grounding. Hence maintenance dredging is, and will continue to be, required to maintain the declared depths.

Table 4.2 summarises the declared design depths for various port infrastructure that require routine maintenance dredging. To attempt to accommodate siltation, without excessive and restrictive depth loss, a set of slightly deeper dredge depths are targeted (0.5 m over dredging allowance). The achieved actual declared depths after maintenance dredging are subject to change throughout the year and the relevant Notices to Mariners provides for advice on latest survey-based depth declarations.

Table 4.2 Target depths (below chart datum) for maintenance dredging

Dredging Location	Design Depth RL (m)*
Western Entrance	-9.5
Western Entrance Sand Trap Deepening	-10.5
Eastern Entrance	-9.5
Main Channel Outer	-9.5
Main Channel Inner / Entrance Bend	-9.5
Basin	-9.5
Berth 1 East	-6.7
Berth 2 East	-10.0
Berth 3 East	-10.0
Berth 1 West	-9.7
Berth 2 West	-7.0
Berth 3 West	-7.0
Berth 4 West	-10.0
Berth 5 West	-8.0

*In addition to these depths, an allowance of up to 0.5 m extra depth should be factored in for overdredging allowance during maintenance dredging

Dredging volume for 2025/26 (including 0.5 m overdredging) is approximately 474,000 m^3, and it is likely that approximately 300,000 m^3 of sediment would need to be dredged and disposed of every three years (including overdredging volume). An allowance of up to 0.5 m overdredging is typical in the industry and is an allowance to accommodate the accuracy and operational capabilities of dredge equipment. In other words, a small amount of overdredging is unavoidable due to the tolerances of the equipment being used. The actual volume dredged, however, will be minimised as much as possible by not paying the contractor for overdredging so that there is a strong incentive to minimise dredging at all stages of the project, and by supervising the contractor during the works.

This estimate is based on analysed trends and observations in siltation and accumulation over many years, review of progressive bathymetric survey results, and TasPorts extensive knowledge and experience in managing maintenance dredging campaigns.

Due to severe flood events and wetter years, TasPorts has included a contingency volume to enable re-establishment and safe operation of port infrastructure after an extreme weather event has passed through the region. From analysis of previous events, a flood event can bring as much as 200,000 m^3 of sediment in a single year. In the past 10 years, there have been two major flooding events in the Mersey (2016 and 2022). Accordingly, the contingency under this LTMMP is predicted as 600,000 m^3, to account for the likelihood of extreme weather events infilling the Port three times during the 10-year duration of the LTMMP, to account for increased likelihood due to climate change. The future maintenance dredging requirements for the life of the LTMMP and SDP (10 years) are summarised in Table 4.3.

Table 4.3 Summary of approximate sediment volumes requiring dredging during the 10-year permit

Feature	Volume (m^3)
Dredging volume 2025 (including overdredging)	474,000
Maximum dredging volume (including overdredging) for an additional three dredging campaigns	900,000
Contingency dredging limit (across the 10-year permit)	600,000*
Total requirement for 10-year permit duration	1,974,000

* Based on an estimate of three flooding events in 10 years

The area in which maintenance dredging will be undertaken during the life of the 2025-2035 SDP is shown in Figure 3.2. Dredging footprints within this area will be defined prior to each campaign based on up-to-date survey results. This approach optimises the amount of dredging required.

4.2.2 Dredging Methods

Dredging will likely be undertaken by a trailing suction hopper dredge (TSHD), contracted by TasPorts. The details of the actual dredge that will be used will be dependent on the dredging requirements for a particular area and each dredging campaign and also the availability of dredging equipment, which may vary. Over the 10-year duration of the LTMMP, the dredge may be sourced nationally or internationally.

Additional dredging methods may be needed in confined areas close to existing infrastructure. These methods incorporate smaller types of conventional dredging equipment that have the appropriate dimensions to access and manoeuvre within niche areas (i.e. a small cutter suction dredge, a submersible dredge pump or a backhoe dredge). Such maintenance dredging methods are commonly used within Australia and internationally.

4.2.3 Dredging Schedule

The maintenance dredging schedule may change from campaign to campaign depending upon conditions at the time, contingencies due to weather or equipment delays, or planned capital works. TasPorts will not commence the first dredging program associated with this LTMMP (and associated SDP application) prior to 22 October 2025, with dredging being undertaken for a period of up to 18 weeks (including standby time).

4.2.4 Dredge Vessels

TasPorts (and predecessors) has historically engaged a variety of different TSHDs to carry out its maintenance dredging campaigns. The choice of vessel is generally based on availability and proximity. Larger vessels are more efficient as they require fewer trips to the spoil grounds. TasPorts prefers to use dredges with a larger hopper capacity, which is better suited to restricting ‘overflowing’ in the inner harbour, in order to avoid redepositing fine silts that have been dredged elsewhere back into the inner harbour. Given less trips will be required, using a larger dredge also reduces potential interaction with marine megafauna.

Mobilisation of dredge plant and associated equipment will be carried out in accordance with the requirements of TasPorts through its contract with the dredging contractor(s) undertaking the dredging program, the requirements of the SDP and TasPorts’ standards, procedures and regulations for the Port.

5 Existing Environment

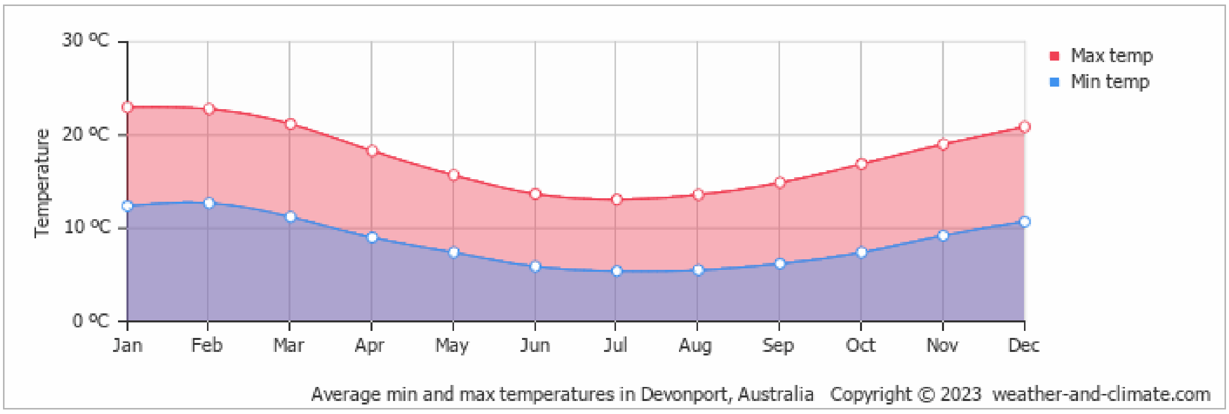
The Port of Devonport is an existing working port within the Mersey River and is already highly modified from its natural state and subject to a range of existing anthropogenic influences. A summary of key environmental, social, cultural, and economic values is outlined in this section, within the context of the maintenance dredging and disposal activities. This information has been drawn from previous studies and studies undertaken to support the 10-year SDP application. The focus is on values that are considered important or notable at a national, regional, or local level.

5.1 Existing Physical Environment

The marine environment has been classified into bioregions which reflect how physical processes have influenced the distribution of ecosystems and biodiversity over scales of 100 – 1,000 km (mesoscales). The waters within Port limits and the Dredge Spoil Disposal Ground (DSDG) overlap the Boags mesoscale bioregion. This bioregion has a sheltered open coastline, protected from high ocean waves, but is still partly exposed to westerly winds.

5.1.1 Climate

Devonport has a temperate climate (Classification: Cfb), with the warmest month as January, the coldest month as August and the wettest month as July. Rainfall is expected to trend towards heavier events interspersed by longer dry periods. The average minimum and maximum temperatures and precipitation are provided in Figure 5.1.



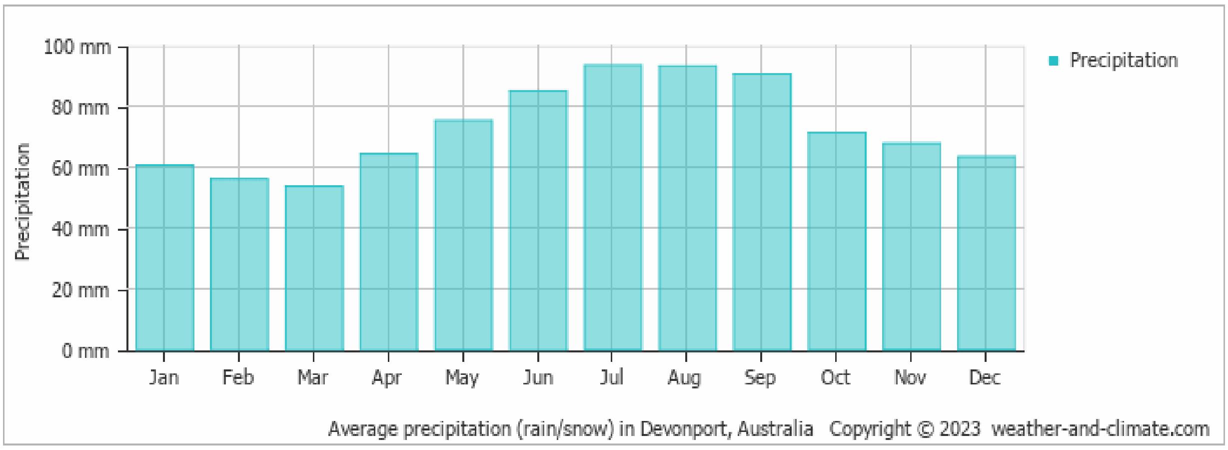
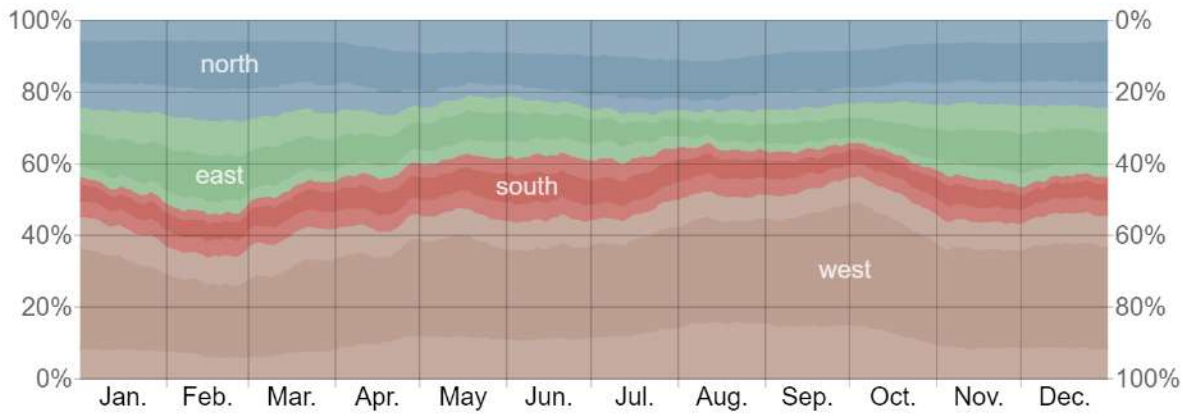


Figure 5.1 Devonport climate ranges

The predominant average hourly wind direction in Devonport is from the west throughout the year, and the calmest month of the year is February, with an average hourly wind speed of 14.1 km/hr. The monthly mean wind direction for Devonport is provided in Figure 5.2.



Source: weatherspark.com

Figure 5.2 Percentage of hours in which the mean wind direction is from each of the wind directions

The warmest water temperature is in February with an average around 17.1°C. The coldest month is September with an average water temperature of 12.4°C. The monthly minimum and maximum water temperatures are provided in Figure 5.3.

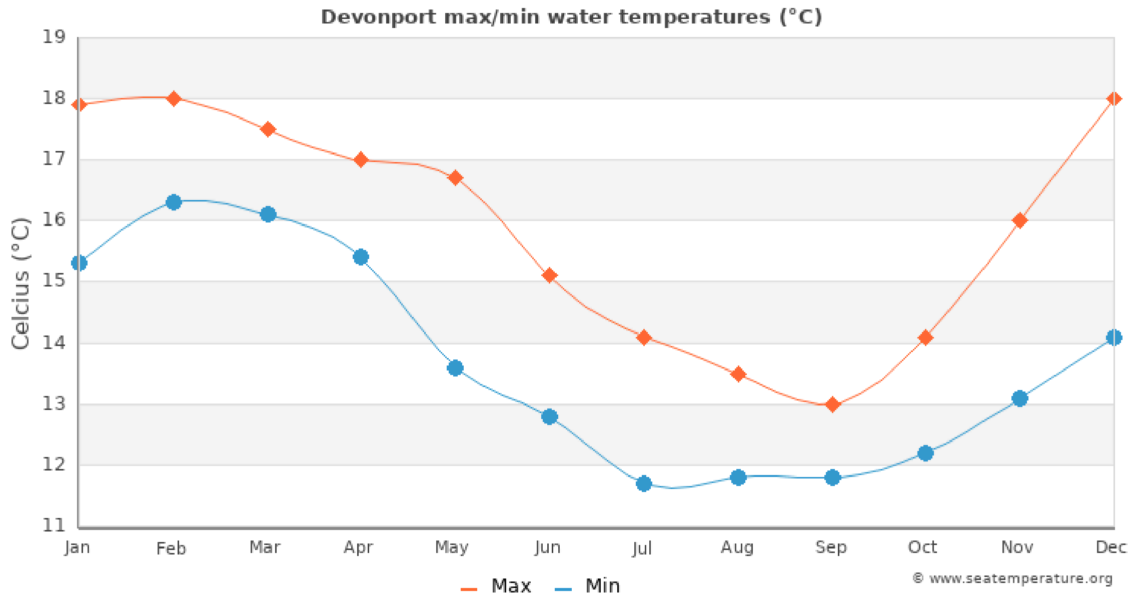


Figure 5.3 Devonport maximum and minimum water temperatures

5.1.2 Tides, Currents and Waves

Water in the Port of Devonport is influenced by tidal intrusion and river flow. The tidal regime at Devonport is semi-diurnal meaning that there are two high and two low tides in a 24-hour period. There is a maximum tidal range (difference between HAT and LAT) of 3.7 m, a typical range of 2.6 m during spring tides and 2.0 m during neap tides. Under most river flow conditions and different states of the tide, the river is vertically stratified, with freshwater layers sitting above a marine salt wedge. During flood events, freshwater flows dominate the river, with strong currents throughout the river and the freshwater influence extending up to kilometres from the mouth into the marine environment.

5.1.3 Bathymetry

The Port is located within the Mersey River basin, with Port (entrance channel and inner harbour) design depths ranging from 6.7 m to 10.5 m.

A hydrographic survey was completed at the DSDG in January 2024, with depth ranging from approximately 49 m to 54 m lowest astronomical tide (LAT; Figure 5.4).

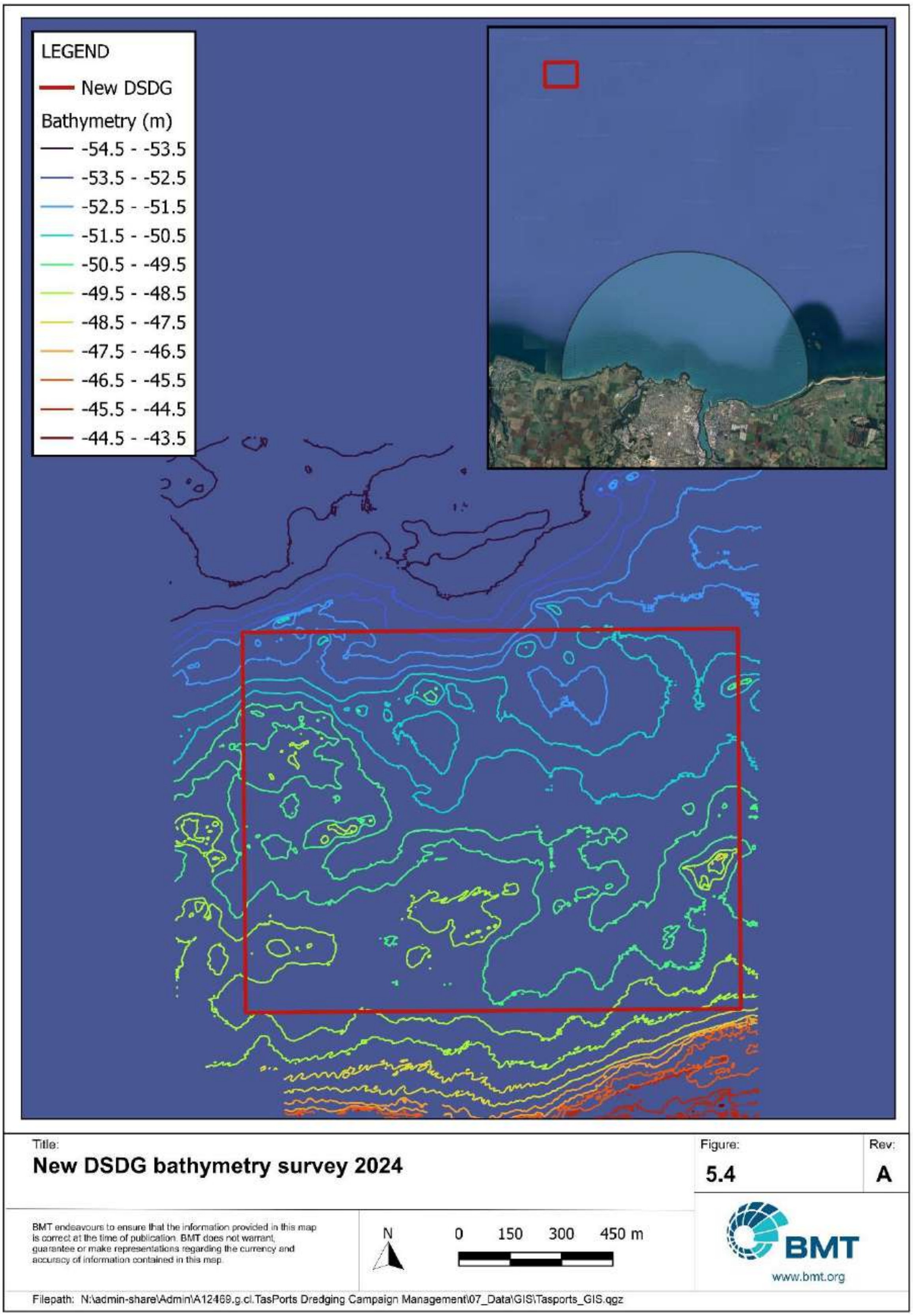


Figure 5.4 DSDG bathymetry survey 2024

5.1.4 Sediment Quality

Port of Devonport

A sediment sampling and analysis program of the Port was undertaken in June 2023, in accordance with the (DCCEEW) approved Sampling and Analysis Plan (SAP; Marine Solutions 2023a) to provide current sediment quality data for the maintenance dredge material. The findings of the sediment quality investigation are documented in the Sampling and Analysis Plan Implementation Report (SAPIR; BMT 2023a).

The physical properties of sediment types varied slightly among dredge locations. Sediments in the entrance channel and bend and inner harbour were both dominated by sand (0.06 – 2.0 mm), but the inner harbour had a higher proportion of fines material (<2 µm – 60 µm). There appeared to be no distinct spatial variation across sites within each area.

The results of the chemical analysis of the sediments were compared to the guideline values provided in the NAGD. The results showed that the 95% upper confidence limit (UCL) of the mean concentration of all the contaminants were below NAGD screening levels except for nickel. Nickel typically occurs in naturally high concentrations in Australian sediments, and nickel concentrations have historically been elevated within the maintenance dredge material. However, Phase III elutriate testing was undertaken and indicated that the concentration of nickel in water was well below the ANZG (2018) default guideline values for 99% species protection.

It is expected that the maintenance dredge material for the Port will largely comprise sediments deposited by the eastern and western transport of coastal material in the channel, and sediment of fine material transported downstream from the Mersey River and deposited in the inner harbour. Therefore, it should be relatively similar to maintenance dredge material derived from the current maintenance dredge areas, i.e. suitable for unconfined ocean disposal. As per guidance from the NAGD, sediment sampling and analysis programs will be undertaken every 5-years to provide current sediment quality data for maintenance dredge material.

DSDG

A sediment sampling and analysis program of the DSDG was undertaken in November 2023 and March 2024 in accordance with the (DCCEEW) approved SAP (BMT 2023b) to provide current sediment quality data for the site. The findings of the sediment quality investigation are documented in the DSDG SAPIR (BMT 2025).

Sediment particle size was generally consistent across the 10 sampling locations within the DSDG. Sediments at the DSDG were dominated by sand (0.06 – 2.0 mm), accounting for 71 - 80 % of material across the 10 sites. In addition, fines material (<2 µm – 60 µm) contributed <1 – 26 %, with gravel (>2 mm) accounting for 2 - 6 %. This demonstrated that sediment at the disposal ground is similar to the material to be received from the Port (i.e. like for like).

Concentrations of contaminants measured in sediment samples were compared to screening levels values provided in Table 2 of the NAGD, or ANZG (2018) sediment quality default guideline values (DGVs), where values have been updated. Results indicated no anthropogenic contamination present (e.g. TRH, PAH, BTEX and organotins). Only one sample had arsenic detected slightly above (20.2 mg/kg) the NAGD screening level (20 mg/kg). Exceedances of arsenic have been largely attributed to naturally occurring levels of this metal in the marine sediments of Australia.

Investigations and monitoring of the previous DSDG site has shown that there is rapid mixing of placed and natural sediments such that the dredge material becomes indistinguishable from the 'natural' seabed over time. These processes are expected to continue at the new site.

5.1.5 Water Quality

Port of Devonport

The Port of Devonport is a temperate estuarine port that is subjected to periodic inundation by freshwater, mainly during winter months. The Port is within the drainage system of the Mersey River catchment (approximately 1,900 km^2), where the Mersey River drains more than 90% of the catchment. The Mersey River at the Port is a moderately degraded estuarine environment (Edgar et al. 1999). The water of the Port is exchanged daily through strong tidal flushing. Background turbidity, particularly on outgoing tides, result from suspended sediment derived from the catchment or resuspended from mudflats in the upper reaches of the estuary. The sedimentation rate in the inner harbour is related to the river flow volumes through the catchment area and is much lower under lower flow regimes. Periodic flood events turn the water of the Port completely fresh and deposit large volumes of sediment in the Port. However, vertical thermal and salinity stratification are typically non-existent to very weak in the adjacent coastal waters to the north of Devonport.

The catchment land used upstream of Devonport is predominantly agricultural and forestry. There are no significant sources of industrial effluent or municipal wastewater discharged into the river. Devonport and Latrobe treated sewage is discharged into the ocean at Pardoe. The western port-side is not fully sewered (main sewer higher than port areas) and there are four septic tanks present.

Water Quality Baseline data

Several water quality investigations have been undertaken at the Port of Devonport. In general, results have indicated:

- Salinity is influenced by freshwater input (local rainfall and river flow). Cooler freshwater is evident in surface layers, with the depth of the freshwater layer decreasing towards the mouth of the Mersey River.
- pH fluctuates in response to rainfall events but largely remains around 8.1, indicative of oceanic seawater.
- Dissolved oxygen levels are high throughout the water column and fluctuate slightly in response to rain events.
- There is a diurnal signal in turbidity measurements, with a variation of about 2.5 – 5 NTU[1] over a tidal cycle.
  - Elevated turbidity levels tend to coincide with an outgoing tide, indicating that a key source of turbidity is due to an upstream source (i.e. from the Mersey River).
  - Turbidity rarely exceeds 10 NTU.
  - During low-rainfall conditions turbidity does not appear to be strongly correlated to river discharge. River flow generally closely correlates with rainfall in timing and magnitude.
  - Turbidity recorded during a flood event in October 2022 had measurements exceeding 1,000 NTU.

DSDG

Water quality measurements were undertaken in November 2023 and March 2024 to provide baseline data for the site and at reference locations. The findings of the investigation are documented in the Devonport Spoil Ground Baseline Marine Surveys Report (Elgin 2024). Results indicated that marine waters at the proposed DSDG were characterised as near neutral pH (median 8.3), clear with low

[1] Nephelometric Turbidity Units (NTU) which measures the amount of light scattered at right angles to an incident light beam by particles present in a sample.

turbidity (median 0.1 NTU), high dissolved oxygen (median 100% saturation) and saline (median 35.2 psu). Water quality conditions at the proposed DSDG and reference locations were similar based on the data collected, despite being measured at different time periods.

5.2 Introduced Marine Species

The Port of Devonport was the first port in Australia to be surveyed for marine pests by CSIRO's Centre for Research on Introduced Marine Pests (CRIMP) in 1995 and 1996, where 11 introduced marine species were identified as being present (CRIMP 1996). Biosecurity Tasmania currently recognise 20 different marine pest species present within the Port of Devonport, and the northern Pacific seastar (*Asterias amurensis*) was recently detected in the Port based on environmental DNA in a survey conducted by the Marine Biosecurity Unit of the Department of Agriculture and Water Resources.

No pest species have been identified at B1E, B2E and B3E (see Figure 3.2), although the introduced Pacific oyster (*Crassostrea gigas*) and cryptogenic hydroids were common. The greatest number of pest species have been found at B1W. In an introduced marine species (IMS) survey completed in June 2023 (winter), only the sedimentary fanworm (*Euchone limnicola*) and the east Asian bivalve (*Theora lubrica*) were recorded in the Port. An additional survey was undertaken in November 2024 (spring/summer) and recorded *E. limnicola and T. lubrica* again as well as one individual Pie crust crab (*Metacarcinus novaezelandiae*) in the entrance channel. A Granular Sea star (*Uniophora granifera*) was also noted (native species), but given the visibility at that time, this was not a positive identification, as this species can be commonly confused with the Northern Pacific Sea star (*Asterias amurensis*), a highly invasive species.

Of the introduced species detected in the Port, the majority are estuarine species. During periodic flooding of the Mersey River, the increased freshwater flow prevents the intrusion of the saltwater tidal wedge and the water in the Port of Devonport is fresh for several days. This helps to control populations of marine pests by physically removing individuals and washing them out to sea.

The continual dredging program in the Port may have had a major impact on the survival and spread of introduced species in the Port, by limiting the establishment and spread of epifauna and infauna species within the Port area (CRIMP 1996). The potential for these organisms to be transported and survive in a deep-water environment outside the Port (e.g. DSDG) is unlikely (CRIMP 1996).

5.3 Environmental Receptors

5.3.1 Marine Habitats

The environmental receptors that will be exposed to potential impacts from the maintenance dredging works are those adjacent to the Port, which include giant kelp and seagrass beds.

- Giant kelp is regarded as the nearest sensitive marine flora receptor and was present at the mouth of the Mersey River in April and September 2015, was absent in 2016 but was present again in 2021 and 2023 assessments. When present the kelp is in 0 – 2 m of water which means the community does not qualify as a threatened ecological community under the EPBC Act[2].
- The nearest seagrass communities consist of *Amphibolis antarctica*, growing on mixed sand and cobble substrate, combined with a mix of macroalgae and epiphytes. They occur to the east and west of the Port. Seagrass and epiphytes have been surveyed several times at four locations, with the farthest location ~8 km from the Port entrance. In May 2023, all three seagrass beds to the east of the Port entrance recorded high percentage cover and appeared healthy, with low to moderate

[2] Giant Kelp Marine Forests of South East Australia ecological community is defined as: if giant kelp plants are present and they form a closed or semi-closed canopy at or below the surface and the water is 8 metres or deeper.

epiphyte overgrowth. Temporal variation in seagrass cover at the three sites is evident when comparing to previous surveys conducted.

- There are no wetlands of international importance (Ramsar) sites within the vicinity of the Port.

No habitats were identified within the DSDG (Elgin 2024).

Habitats that are relevant to this LTMMP (i.e. those that could potentially be impacted by maintenance dredging) are shown in Figure 7.2.

5.3.2 Benthic Communities

Dredging and disposal activities in 2015 identified areas that may have previously supported commercial scallops (*Pecten fumatus*). These historical scallop beds are located ~10 km northeast of the Port entrance and ~14 km southeast of the new DSDG (see Figure 7.2). Field surveys were conducted in May 2023 and again in March 2024, finding densities of commercial and queen scallops extremely low on all transects, with doughboy scallops the only species consistently observed.

Sediment characteristics (e.g. grain-size median, silt and clay content, organic matter content, pollutants, etc.) are major drivers of macrofauna community composition and structure. The Port dredging areas are characterised by sandy/silty bottoms which harbour relatively poor benthic communities.

Clumps of macro algae and sessile fauna including sponges, ascidians, and bryozoans were occasionally observed in the DSDG, but only provided sparse habitat within the survey area. Fingers of low-profile reef were encountered to the south and southeast of the DSDG, which extended for up to 100 m, interspersed with patches of sand and gravel. These areas of reef were densely colonised by sessile fauna, including several large sponge morphologies, soft corals, ascidians, and bryozoans (Elgin 2024).

5.3.3 Marine Protected Areas

There are no marine protected areas in the vicinity of the Port or DSDG, with the closest being the Boags Australian Marine Park, ~125 km northwest of the DSDG.

5.3.4 Protected Marine Species

The waters around the Port and DSDG provide potential habitat for a number of marine fauna species of conservation or economic importance. Threatened and or migratory fauna that potentially occur in the vicinity of the Port of Devonport and the DSDG were determined using the EPBC Act Protected Matters Search Tool (PMST). The results identified 58 listed threatened and/or migratory species as potentially occurring within a 5 km radius of the Port and/or DSDG (see Table 5.1; Annex A).

Note: solely freshwater species, terrestrial mammals and communities that are listed in the reports have been excluded from this assessment, as they are not considered to be impacted by the dredging works.

Table 5.1 Listed threatened and/or migratory species potentially occurring in within 5 km of the Port and/or DSDG

Common Name	Species Name	EPBC Act Status	TSP Act Status	Site
Marine Mammals				
Southern right whale	*Eubalaena australis*	Endangered, Migratory	Endangered	Port, DSDG
Blue whale	*Balaenoptera musculus*	Endangered, Migratory	Endangered	Port, DSDG
Humpback whale	*Megaptera novaeangliae*	Migratory	Endangered	Port, DSDG
Dusky dolphin	*Lagenorhynchus obscurus*	Migratory		Port, DSDG
Killer whale	*Orcinus orca*	Migratory		Port, DSDG
Pygmy right whale	*Caperea marginata*	Migratory		Port, DSDG
Fin whale	*Balaenoptera physalus*	Vulnerable, Migratory	Vulnerable	DSDG
Sei whale	*Balaenoptera borealis*	Vulnerable, Migratory		DSDG
Birds				
Eastern curlew	*Numenius madagascariensis*	Critically Endangered, Migratory	Endangered	Port, DSDG
Curlew sandpiper	*Calidris ferruginea*	Critically Endangered, Migratory		Port, DSDG
Grey-headed albatross	*Thalassarche chrysostoma*	Endangered, Migratory	Endangered	Port, DSDG
Southern giant petrel	*Macronectes giganteus*	Endangered, Migratory	Vulnerable	Port, DSDG
Northern royal albatross	*Diomedea sanfordi*	Endangered, Migratory		Port, DSDG
Shy albatross	*Thalassarche cauta*	Endangered, Migratory	Vulnerable	Port, DSDG
Red knot	*Calidris canutus*	Endangered, Migratory		Port, DSDG
Gould's petrel	*Pterodroma leucoptera leucoptera*	Endangered		Port, DSDG
Australasian bittern	*Botaurus poiciloptilus*	Endangered		Port

Common Name	Species Name	EPBC Act Status	TSP Act Status	Site
Tasmanian azure kingfisher	*Aquila audax fleayi*	Endangered	Endangered	Port
Fairy prion (southern)	*Pachyptila turtur subantarctica*	Vulnerable	Endangered	Port, DSDG
Black-browed albatross	*Thalassarche melanophris*	Vulnerable, Migratory	Endangered	Port, DSDG
White-bellied storm-petrel	*Fregetta grallaria grallaria*	Vulnerable		Port, DSDG
Northern giant petrel	*Macronectes halli*	Vulnerable, Migratory	Rare	Port, DSDG
Gibson's albatross	*Diomedea antipodensis gibsoni*	Vulnerable		Port, DSDG
Indian yellow-nosed albatross	*Thalassarche carteri*	Vulnerable, Migratory		Port, DSDG
White-capped albatross	*Thalassarche steadi*	Vulnerable, Migratory		Port, DSDG
Salvin's albatross	*Thalassarche salvini*	Vulnerable, Migratory		Port, DSDG
Buller's albatross	*Thalassarche bulleri*	Vulnerable, Migratory		Port, DSDG
Northern Buller's albatross	*Thalassarche bulleri platei*	Vulnerable		Port, DSDG
Nunivak bar-tailed godwit	*Limosa lapponica baueri*	Vulnerable		Port
Blue petrel	*Halobaena caerulea*	Vulnerable	Vulnerable	Port, DSDG
Sooty albatross	*Phoebetria fusca*	Vulnerable, Migratory	Rare	Port, DSDG
Wandering albatross	*Diomedea exulans*	Vulnerable, Migratory	Endangered	Port, DSDG
Southern royal albatross	*Diomedea epomophora*	Vulnerable, Migratory		Port, DSDG
Campbell albatross	*Thalassarche impavida*	Vulnerable, Migratory		Port, DSDG
Australian fairy tern	*Sternula nereis nereis*	Vulnerable	Vulnerable	Port, DSDG
Antipodean albatross	*Diomedea antipodensis*	Vulnerable, Migratory		Port, DSDG
Eastern hooded plover	*Thinornis cucullatus cucullatus*	Vulnerable		Port
Common sandpiper	*Actitis hypoleucos*	Migratory		Port, DSDG
Common greenshank	*Tringa nebularia*	Migratory		Port

Common Name	Species Name	EPBC Act Status	TSP Act Status	Site
Greater crested tern	*Thalasseus bergii*	Migratory		Port
Little tern	*Sternula albifrons*	Migratory		Port
Ruddy turnstone	*Arenaria interpres*	Migratory		Port
Sharp-tailed sandpiper	*Calidris acuminata*	Migratory		Port, DSDG
Caspian tern	*Hydroprogne caspia*	Migratory		Port
Sooty shearwater	*Ardenna grisea*	Migratory		Port, DSDG
Latham's snipe	*Gallinago hardwickii*	Migratory		Port
Flesh-footed shearwater	*Ardenna carneipes*	Migratory		Port, DSDG
Pectoral sandpiper	*Calidris melanotos*	Migratory		Port, DSDG
Bar-tailed godwit	*Limosa lapponica*	Migratory		Port
Fish, Sharks and Crustaceans				
Blue warehou	*Seriolella brama*	Conservation Dependent		Port, DSDG
Southern bluefin tuna	*Thunnus maccoyii*	Conservation Dependent		Port, DSDG
Australian grayling	*Prototroctes maraena*	Vulnerable	Vulnerable	Port, DSDG
Eastern dwarf galaxias	*Galaxiella pusilla*	Vulnerable	Vulnerable	Port
School shark	*Galeorhinus galeus*	Conservation Dependent		Port, DSDG
White shark	*Carcharodon carcharias*	Vulnerable	Vulnerable	Port, DSDG
Porbeagle	*Lamna nasus*	Migratory		Port, DSDG
Giant freshwater crayfish	*Astacopsis gouldi*	Vulnerable		Port
Reptiles				
Green turtle	*Chelonia mydas*	Vulnerable, Migratory	Vulnerable	Port, DSDG

Biologically Important Areas
A BIA is an area that provides important habitat for the survival of a species i.e. breeding, foraging, migration or distribution area. BIAs are not defined under the EPBC Act but are designated for marine species protected under the EPBC Act. Protected marine species include species listed nationally as marine, threatened, migratory, and all cetaceans. BIAs are designed to assist decision-making under the EPBC Act. Identified BIAs (including those for species that are not threatened or migratory) that spatially overlap the Port and DSDG (with a 5 km buffer) are presented in Table 5.2.

Table 5.2 BIAs overlapping the Port and/or DSDG

Common Name (Species)	Behaviour	Port + 5 km buffer	DSDG + 5 km buffer
Cetaceans			
Pygmy blue whale (*Balaenoptera musculus brevicauda*)	Distribution	✓	✓
	Foraging	✓	✓
Southern right whale (*Eubalaena australis*)	Reproduction	✓	
	Migration	✓	✓
Sharks			
White shark (*Carcharodon carcharias*)	Distribution (low density)	✓	✓
	Distribution		✓
	Known distribution	✓	✓
Birds			
Short-tailed shearwater (*Ardenna tenuirostris*)	Breeding	✓	
	Foraging	✓	✓
Wandering albatross (*Diomedea exulans*)	Foraging	✓	✓
Little penguin (*Eudyptula minor*)	Breeding	✓	
	Foraging	✓	✓
White-faced storm-petrel (*Pelagodroma marina*)	Foraging	✓	✓
Common diving-petrel (*Pelecanoides urinatrix*)	Foraging	✓	✓
Black-faced cormorant (*Phalacrocorax fuscescens*)	Breeding	✓	
	Foraging	✓	✓
Bullers albatross (*Thalassarche bulleri*)	Foraging	✓	✓
Shy albatross (*Thalassarche cauta cauta*)	Foraging likely	✓	✓
Indian yellow-nosed albatross	Foraging	✓	✓

Common Name (Species)	Behaviour	Port + 5 km buffer	DSDG + 5 km buffer
(*Thalassarche chlororhynchos bassi*)			
Black-browed albatross (*Thalassarche melanophris*)	Foraging	✓	✓
Campbell albatross (*Thalassarche melanophris impavida*)	Foraging	✓	✓

5.4 Social, Economic and Heritage Values

5.4.1 Fisheries and Recreation

The waters surrounding the Port are used for both recreational and commercial fishing. Whitebait (consisting of Tasmanian whitebaits and Australian grayling) are recreationally targeted by fishers, with fishing permitted from 1 October until 11 November. There are no aquaculture leases, marine farming licences or marine farming zones within or nearby to the Port or DSDG.

Devonport City Council's Living City Waterfront precinct project plans to connect the city with the river through a series of developments including parkland, hotel and pathways. Most public parklands are located closest to the mouth of the river extending along the foreshore and esplanade. There are several residential properties near the port (<50 m). The Port is visible and audible to many residents on both sides of the river.

The Mersey Yacht Club is immediately adjacent to the Port on the eastern shore and the Devonport Regatta is an annual event held on paranaple/Mersey River. There are no known recreational swimming spots along the margins of the estuary within the vicinity of the port; with the closest likely swimming and surfing location being near the mouth of the estuary at Shipwrecks Beach and East Devonport Beach, with the Surf Life Saving Club located near Bluff Beach.

5.4.2 Economic Values

The Devonport City region has a population of approximately 26,937 with an economy comprised largely of industrial, retail, health, and community services as well as agriculture, tourism and forestry in the surrounding regions. The city is also home to the ferry link to Melbourne which operates from the Port of Devonport along with other various shipping services (Australian Bureau of Statistics, 2022).

The port itself handles bulk wheat, grain, cement, and containerised goods outbound and fuels, fertilizer and containerised goods inbound. The port provides berths and loading facilities for a small range of commercial fishing and recreational vessels. Bulk goods and fuel (mostly gas) loading facilities are located on the western berths, while ferries and container vessels load and unload at the eastern berths (see Table 3.1).

5.4.3 Cultural Heritage Places and Values

A search of the Underwater Cultural Heritage database on the 09 May 2024 identified two known shipwrecks near the Port entrance and maintenance dredging footprint, the Agnew (ID no. 6840) and the Hope (ID no. 7258), with other shipwrecks located further offshore (see Figure 7.2). No Shipwrecks were identified near the DSDG. There is a potential for additional previously unknown shipwrecks to be present within the DSDG. All shipwrecks are protected by the *Underwater Cultural Heritage Act 2018*.

A search of the Aboriginal Heritage Register did not identify any underwater Aboriginal cultural heritage values within the Port area or DSDG. However, there remains a potential for Aboriginal cultural heritage values to be present within the Commonwealth marine area. If present, these values are protected by the *Underwater Cultural Heritage Act 2018*.

6 Dredge Spoil Disposal Ground

Alternatives to sea disposal were assessed in the context of risk to financial, environmental, social and human health factors. Eleven options were considered and 10 assessed, with 'not dredging' the Port of Devonport considered an unfeasible alternative to ocean disposal and would result in risk to navigational safety. The report on alternative options considered and assessment outcomes is available in Annex B.

As outlined in Annex B, there are no appropriate or practical alternatives to the use of an offshore DSDG for the volume and frequency of maintenance dredging material that will be generated over the next 10-year term for the Port of Devonport.

Due to stakeholder concerns with the previously used DSDG, an assessment was undertaken to identify a new alternative. When identifying a preferred new DSDG, several criteria were considered, as outlined in the NAGD:

Environmental

- Whether a location had potential to resuspend once placed, and the potential impacts this might have on long term water quality.
- Whether there are sensitive ecological receptors and/or heritage values that may be impacted by placement activity in both the short and long term.
- Whether the substrate at the placement site was similar to the material being received (i.e. like for like).
- Whether there would be a significant impact to the benthic environment at the placement site.

Social

- Whether placement would have an adverse impact on existing commercial fisheries values.
- Whether placement would have impacts to visual amenity and tourism.

Economic / Logistics

- Whether there was sufficient capacity available at the site.
- Whether placement would have impacts to vessel navigation.
- The proximity of the site to the dredge area (i.e. further distance lengthens the travel distance for dredge vessels and consequently the length of the dredge program).

The full ecological assessment that has been undertaken to justify the selection of this new site and its suitability and is included as part of the SDP application. An overview of the key characteristics of the maintenance dredging spoil ground is provided below.

6.1 DSDG (2025 – onwards) Site and Characteristics

A new DSDG (2025-onwards) has been identified and is shown in Figure 6.1. This figure shows the location of the disused DSDGs (1993-1999 and 2000-2015), and the new DSDG site. Details of the site are shown in Figure 6.2 with further information about the characteristics of the site provided in Table 6.1 and in the sub-sections below.

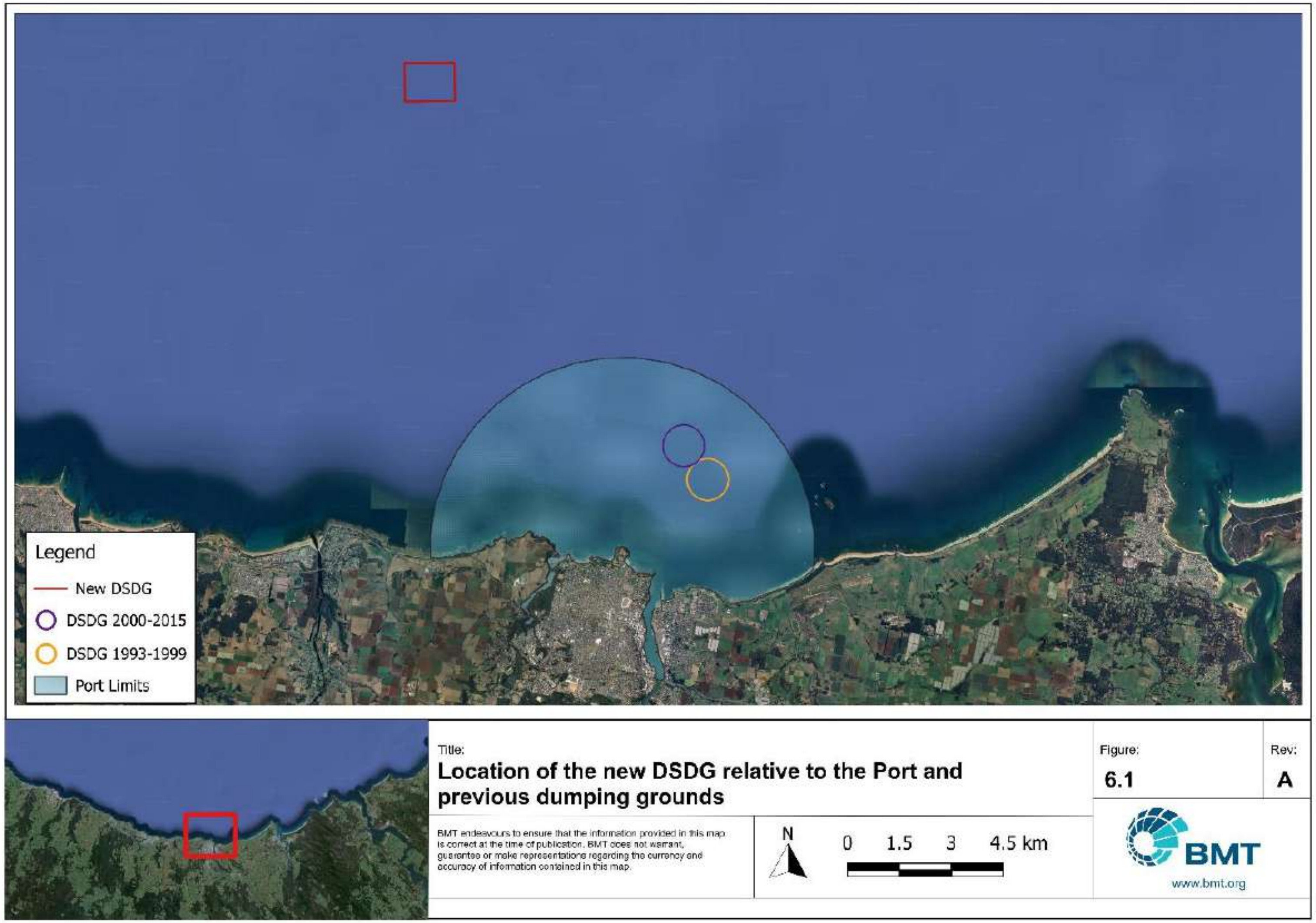


Figure 6.1 Location of the new DSDG relative to the Port and previous dumping grounds

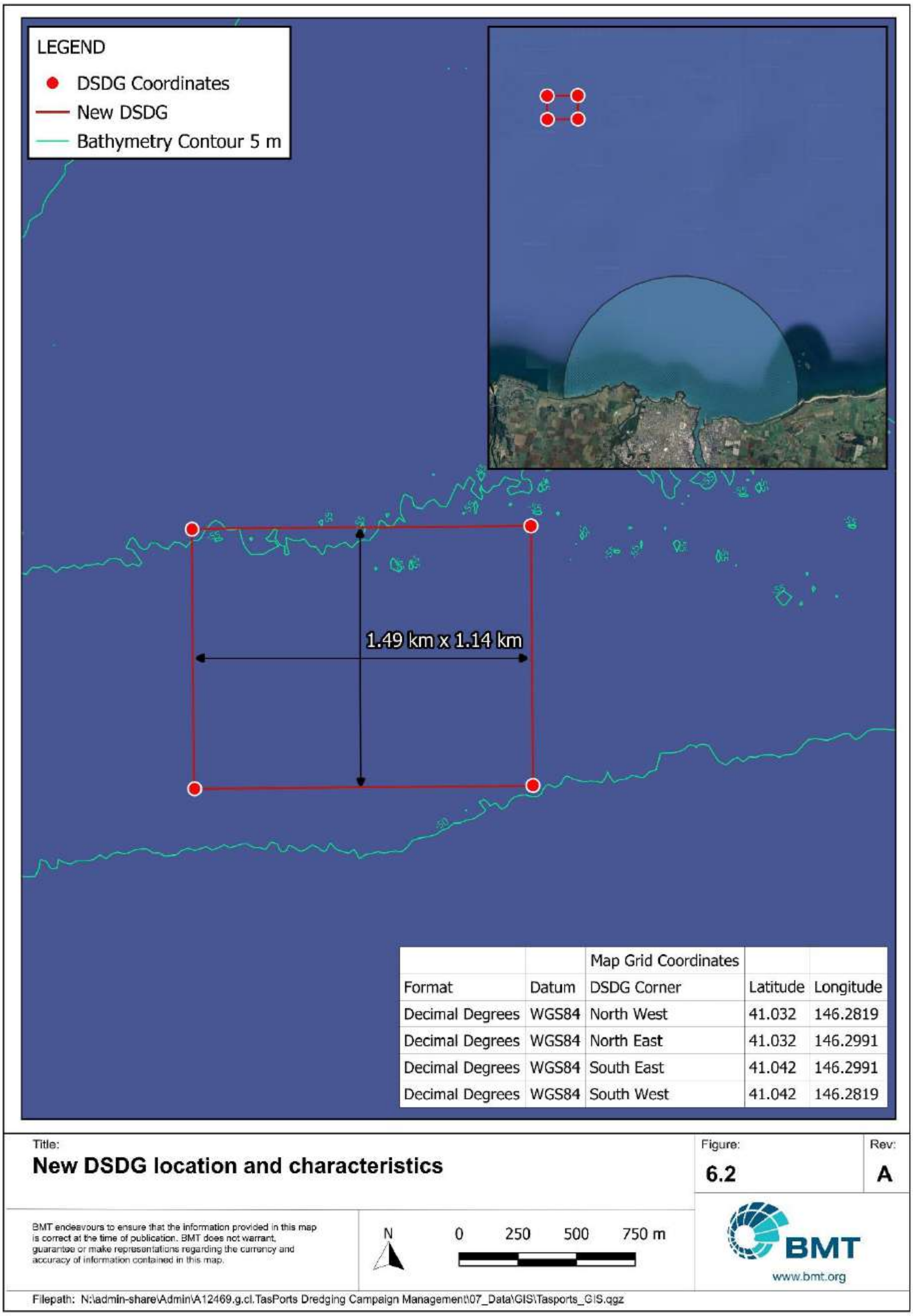


Figure 6.2 New DSDG location and characteristics

Table 6.1 DSDG (2025-onwards) description

<table>
<tr><th>Characteristic</th><th>Description</th></tr>
<tr><td>Location</td><td>The site is situated ~ 8 km outside the port limits, and ~ 15 km north-northwest from the entrance channel to the Port of Devonport. The DSDG is within Commonwealth Australian marine waters and therefore subject to a Sea Dumping Permit.
<table>
<tr><th>Corner</th><th>Easting</th><th>Northing</th><th>Latitude</th><th>Longitude</th></tr>
<tr><td>NW</td><td>439641</td><td>5457433</td><td>-41.032°S</td><td>146.2819°E</td></tr>
<tr><td>NE</td><td>441089</td><td>5457433</td><td>-41.032°S</td><td>146.2991°E</td></tr>
<tr><td>SE</td><td>441089</td><td>5456334</td><td>-41.042°S</td><td>146.2991°E</td></tr>
<tr><td>SW</td><td>439641</td><td>5456334</td><td>-41.042°S</td><td>146.2819°E</td></tr>
</table></td></tr>
<tr><td>Area</td><td>It is rectangular in shape with a surface area of ~1.69 km^2</td></tr>
<tr><td>Depth</td><td>The depth of the DSDG is approximately 49-54 m LAT (significantly deeper than the old DSDG)</td></tr>
<tr><td>Distance to Receptors</td><td>In terms of the distance of the DSDG to notable features and sensitive receptors the following apply:
• Distance from DSDG to the western most identified scallop bed – ~14.3 km.
• Distance from DSDG to identified kelp bed at channel entrance to the Port – ~15 km.
• Distance from DSDG to closest identified seagrass bed located at Lilico – ~12.7 km.</td></tr>
</table>

6.2 Justification for New DSDG Location

The justification for selection of the DSDG site location for the period beyond 2025 is outlined in the sub-sections below.

6.2.1 Maritime Navigation

The new DSDG site is located outside Port limits, but will not impact on shipping lanes, entry to the Port from existing shipping lane(s) or on existing anchorage areas.

6.2.2 Turbidity Impacts to Sensitive Receptors

As shown in Figure 7.2 the new DSDG site will be significantly separated from and buffered from sensitive receptors that could be affected by temporary plumes and sedimentation processes during disposal. This includes seagrass meadows on either side of the Port entrance channel and along the coast and historical scallop beds to the east. Ecological surveys in 2023 and 2024 were undertaken at locations outside the DSDG to characterise surrounding substrate. Fingers of low-profile reef were encountered to the south and southeast of the DSDG, which extended for up to 100 m, interspersed with patches of sand and gravel. Areas of reef were densely colonised by sessile fauna, including several large sponge morphologies, soft corals, ascidians, and bryozoans. Complex reef habitat was not observed within the proposed DSDG area.

Turbidity during dredging and disposal has been modelled as shown in the plume modelling report in Annex C of this LTTMP and summarised in Section 7. These modelled plume extents and the baseline ecological surveys confirm there are no sensitive receptors in the zone of impact from dredge spoil disposal at the DSDG.

6.2.3 Retentiveness and Long-term Resuspension

Modelling confirms that the new DSDG will be highly retentive and reduce any sediment loss, following placement, into the ambient water quality environment, including during extreme wave events. Further information about the modelling results of remobilisation of sediments are also contained in Annex C.

6.2.4 Fisheries

The DSDG is not reported or known to be utilised by commercial or recreational fisheries. Several Commonwealth-managed and State-managed commercial fisheries overlap the new DSDG location. However, it is not a critical area based on a review of data and consultation with fishers (e.g. TACC members).

Recently, recreational bluefin tuna fishing has become more popular off northern Tasmania, in deeper waters offshore Devonport. After consultation with the peak body for Tasmanian recreational sea fishers (the Tasmanian Association for Recreational Fishing (TARFish)) their current understanding is that recreational fishing in the area is centred along a seamount ridge to the east of the new DSDG.

During consultation, TARFish indicated it was not aware of any significant fisher concerns with the location of the DSDG for use beyond 2024 but supported plume monitoring being conducted during the dredging campaign to validate the hydrodynamic modelling impact results.

6.2.5 Amenity and Tourism

The new DSDG represents a further offshore location. This area is not regularly used for recreation or commercial tourism purposes. In terms of visual amenity, dredge spoil disposal is not expected to impact on the visual amenity of other marine and coastal uses or users owing to the large buffers between the site and the neighbouring shorelines.

6.2.6 Benthic Communities

Following ecological surveys undertaken in 2023 and 2024, the seabed at the DSDG was found to be relatively flat and featureless, consisting of silty sands. The DSDG was not an area of high productivity, with an infauna community representative of communities common in soft sediment habitat at 50 m depth. Epibenthos, including ephemeral low-density macroalgal communities were also present. Fingers of low-profile reef were identified to the south and southeast of the DSDG, outside the zone of impact (Elgin 2024).

Any large areas of natural hard substrate that could form a basis for fish aggregation have been avoided from the DSDG footprint. Surveys of demersal fish assemblages in the area recorded 16 different species, with none listed as threatened. Given the lack of habitat features, and low density of benthic communities, the site is considered to be suitable for disposal activities.

6.2.7 Marine Fauna

The DSDG overlaps biologically important areas (BIAs) for southern right whales (migration), pygmy blue whales (distribution and foraging) and the white shark (distribution). These species may be temporarily disturbed within their BIAs during disposal activities. However, given that seabed disturbance will be very limited and only impacting the designated DSDG for short periods of time, it is unlikely that activities will cause any adverse effects to the large spatial extent of the area of occupancy for these species or habitats that are critical to their survival.

Any interaction with these species will be managed under the proposed environmental management measures (refer Section 9 of this LTMMP) and vessel environmental management plans (EMPs).

6.2.8 Bathymetry / Capacity

The DSDG is anticipated to be retentive (Annex C) with little movement of sediment outside the modelled impact areas. Given the deeper offshore site and water depths (Figure 5.4), it is predicted that there will be adequate capacity at the DSDG for at least 10+ years of spoil disposal. The anticipated change in level after disposal of 1,974,000 m^3 over the 10-year period would be approximately 1.5 m.

6.2.9 Economics / Logistics

There are no unduly restrictive logistical or economic/cost impacts on TasPorts from operating a deeper DSDG compared to the past sites. The longer sailing times associated with disposal by the TSHD at the new DSDG are not expected to significantly increase the overall duration of maintenance dredging campaigns.

The Port has a sound knowledge of sea state conditions in the general vicinity of the area and have demonstrated effective practices for managing placement operations in this environment (ensuring placement occurs within the defined boundaries, avoiding interaction with marine megafauna and other vessels and activities, etc.). Learnings from the management of the previous site can be applied to the DSDG in this context.

6.2.10 Conclusion

Following adoption of monitoring and management measures, use of the offshore disposal area presents minimal risk of significant environmental impacts and is considered suitable for the proposed maintenance dredging campaigns. The site is preferred as it:

- Has sufficient capacity to enable disposal until at least 2035.
- Does not pose navigational hazards to vessels.
- Is retentive, reducing potential long term water quality impacts.
- Has a similar substrate to the dredge material (i.e. like for like).
- Is not in proximity to any sensitive receptors (i.e. seagrass meadows, scallop beds).
- Does not support any significant benthic communities or habitat for marine megafauna.
- Does not pose impacts to commercial, recreational fishing or tourism operations.

7 Dredge Plume Modelling and Impact Assessment

TasPorts commissioned GHD Pty Ltd to undertake numerical dredge plume modelling to assess the potential impacts of the proposed maintenance dredging operations on water quality, and potential sedimentation impacts to the local area (refer Annex C). Modelling was used to predict the extent, intensity, and persistence of dredge-generated sediment plumes and the extent, severity and duration of resultant indirect impacts to benthic habitats. The use of three-dimensional (3D) hydrodynamic and sediment plume modelling is considered international best practice. The modelling has been used to inform decision-making and risk assessments about the location of the new DSDG (refer to Section 6) and the Adaptive Monitoring and Management Plan (see Annex D).

The modelled hydrodynamics, waves, and sediment transport are influenced by various boundary condition inputs derived from targeted data recordings, regional models and global models which represent the following forcing:

- Water levels
- Waves
- Wind
- Currents
- Temperature and salinity
- Heat exchange
- River discharge.

7.1 Model Validation

Hydrodynamic model calibration principally considers the ability of the model to predict both water levels and currents over multiple tidal cycles and a range of wind conditions. The hydrodynamic and wave models were verified against available measurements of water levels, waves and current speeds, and were deemed appropriate to provide the metocean conditions for the particle modelling simulations.

7.2 Impact Assessment

The calibrated and validated numerical models were then applied to assess the potential impact of maintenance dredging activities by considering several scenarios related to the anticipated plume generation, dispersion, settling and re-suspension of dredge-related sediments. The dredge scenario simulated in this study was considered a worst-case scenario. Given the relatively modest dredge volumes for this project, adopting a single worst-case scenario to define an upper bound to the dredging impact areas is considered reasonable, in lieu of running additional best-case and likely-case scenarios.

The magnitude, extent, and duration of impacts were directly assessed by simultaneously simulating both the ambient and dredging related contributions to suspended sediment in the water column. Using these results, so-called ‘zones of impact’ have been developed for dredging and dredge spoil disposal. The zones of impact consider:

- The potential increase to turbidity caused by the dredging activities.
- The natural variability in turbidity generated by normal coastal processes, often referred to as the ‘background turbidity’ caused by the resuspension of seabed sediments by the wind, wave and current action.
- The tolerance of ecological receptors such as scallops and seagrass.

This method is conceptually illustrated in Figure 7.1 and was originally promoted by the Western Australian Environmental Protection Agency (WA EPA 2021). It is recognised as ‘leading practice’ for dredging environmental assessment in Australia.

The zones adopted for the current assessment included the following:

- Zone of High Impact (ZoHI) = is the area where serious damage to benthic communities is predicted or where impacts are considered to be irreversible. The term serious damage means ‘damage to benthic communities and/or their habitats that is effectively irreversible or where any recovery, if possible, would be unlikely to occur for at least 5 years’. Areas within and immediately adjacent to proposed dredge and disposal sites are typically ZoHI.

- Zone of Low to Moderate Impact (ZoMI) = is the area within which predicted impacts on benthic organisms are sub-lethal, and/or the impacts are recoverable within a period of 5 years following completion of the dredging activities. This zone abuts, and lies immediately outside of, the ZoHI. The outer boundary of this zone is coincident with the inner boundary of the next zone, the Zone of Influence.

- Zone of Influence (ZoI) = is the area within which changes in environmental quality associated with dredge plumes are predicted and anticipated during the dredging operations, but where these changes would not result in a detectible impact on benthic biota (e.g. a reduction in biomass). These areas can be large, but at any point in time the dredge plumes are likely to be restricted to a relatively small portion of the ZoI.

The zones and their ‘recovery’ time frames represent a means for comparing the likelihood that significant, detectable impact to sensitive receptors could occur.

The assessed zones of impact associated with maintenance dredging are shown in Figure 7.2.

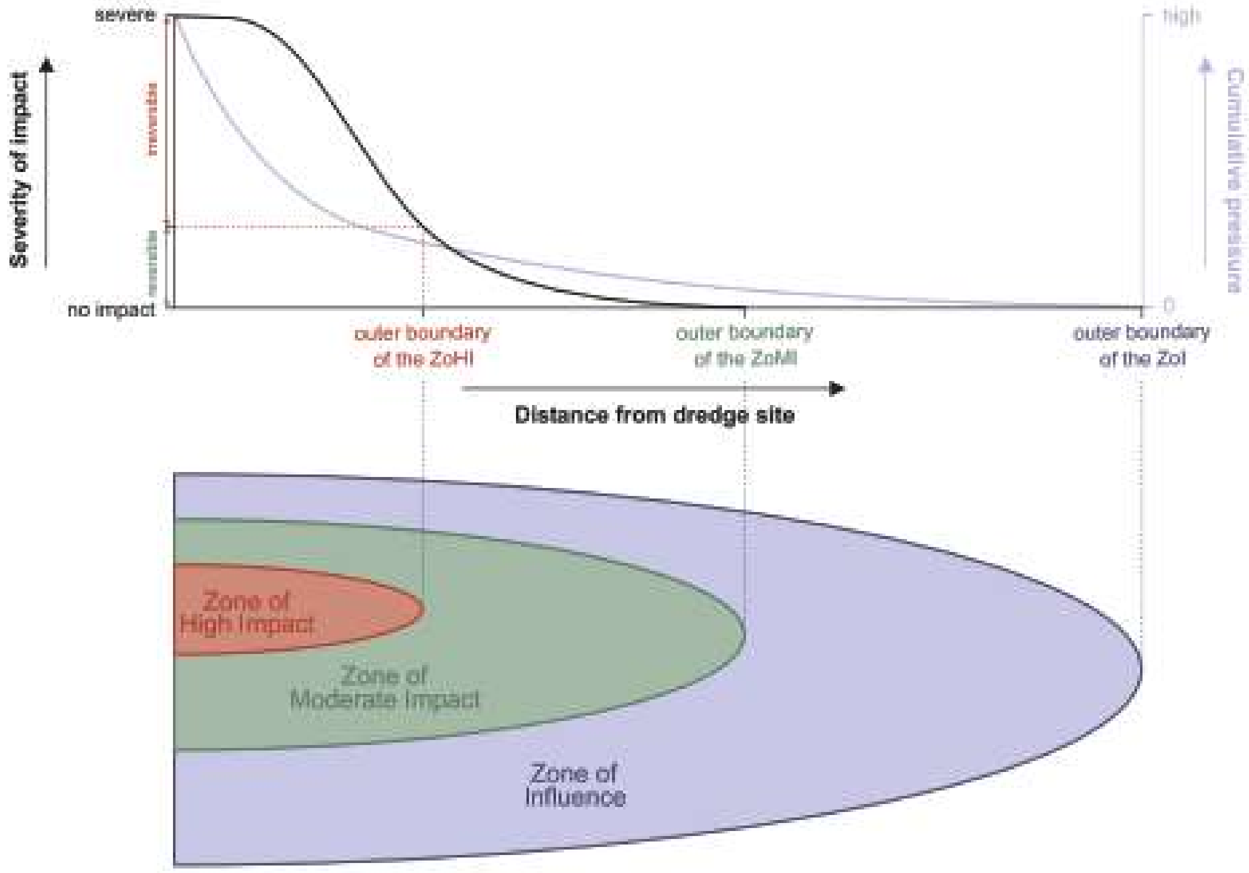


Figure 7.1 Schematic representation of impact zones (WA EPA 2021)

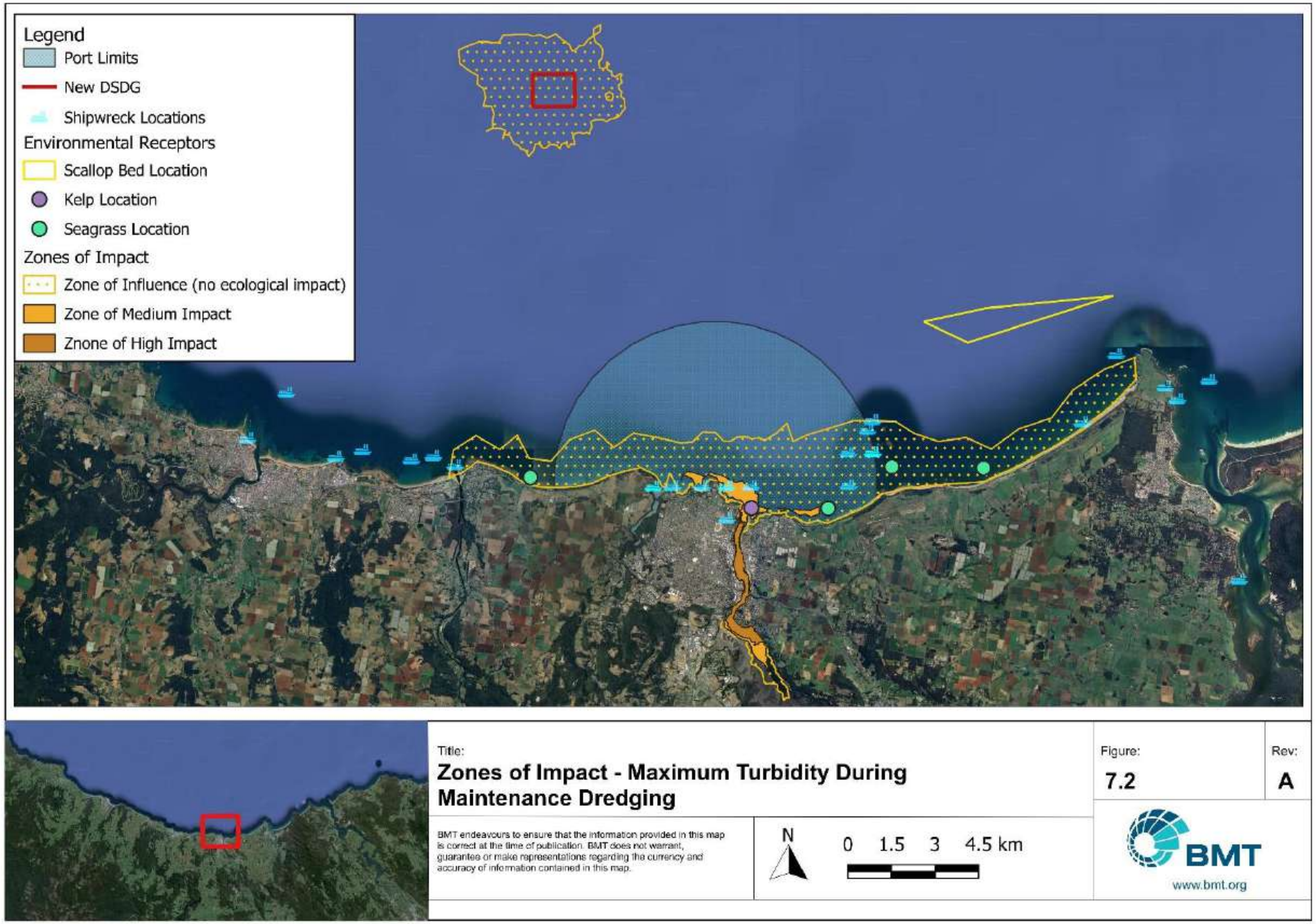


Figure 7.2 Zones of Impact – Maximum Turbidity During Maintenance Dredging

The zones of impact results indicate the following:

- Due to the negligible deposition of fine sediments predicted, the impact zones are entirely the result of suspended sediment plumes generated by the dredging and disposal activities.
- The ZoI is predicted to extend ~10 km east, ~14 km west and ~3 km offshore from Devonport, ~4 km upstream to the tidal flats in the upper Mersey River estuary, and ~2.5 km surrounding disposal ground. The ZoI does not extend to the historical commercial scallop beds.
- The ZoMI is predicted to extend ~2.25 km east, ~2.5 km west and ~3 km upstream from Devonport. The ZoMI is not predicted to overlap the nearest seagrass habitat at ~2.75 km east of the Entrance Channel (ZoMI edge is ~500 m from the habitat location). There is no predicted ZoMI at the DSDG resulting from the offshore disposal of dredge spoil.
- The ZoHI is predicted to be localised primarily within the boundaries of the dredging areas, and up to ~2.25 km upstream from the Port. It is noted however that the entirety of the dredged areas and the DSDG should be considered within the ZoHI, regardless of the modelling outputs (that only simulate fine sediments), since the seabed at these locations will be permanently disrupted from the dredging and disposal activities.
- The DSDG is considered to be a retentive zone whereby the significant majority of sediments disposed are likely to remain deposited at the seabed.

The modelling report utilised to inform this section was independently peer reviewed for technical assurance. The modelling report is available in Annex C.

8 Potential Impacts

A detailed assessment of the projected physical, chemical and biological impacts on the spoil ground and surrounding areas has been undertaken in support of TasPorts' 10-year SDP application. This information has not been repeated in full in this LTMMP. However, an overview of the potential impacts that may result as a consequence of the dredging and disposal activities is provided below. Relevant management strategies for the project are also described in Section 9.

8.1 Seabed and Sensitive Receptor Disturbance

Removal/Entrainment

Dredging usually results in a decrease of species richness and abundance by removal and/or entrainment of fauna. However, soft-sediment benthic infauna usually displays a high potential for (re)colonisation after removal (de Montaudouin et al. 2023). Benthic fauna and demersal fish that are associated strongly with bottom substrates are more at risk from entrainment than highly mobile species (Todd et al. 2015). However, literature indicates that entrainment of adult fish and many shellfish species, has minimal population level effects (Todd et al. 2015). Given the relatively low diversity of benthic communities in the Port (Marine Solution 2023b), negligible impact is expected.

In general, regularly disturbed habitats characterised by fine sands and fast-growing opportunistic species are affected less, and recover quicker, than stable habitats monopolised by coarse gravels and slow-growing sessile fauna and flora (Todd et al. 2015).

Sedimentation

Sedimentation from disposal of dredged material was modelled (refer Annex C for details). Results demonstrated that dispersal of sediment and therefore sedimentation outside of the offshore disposal ground was very limited with only changes in environmental quality associated with dredge plumes expected (site is retentive). Epibenthic communities in and around the DSDG are sparse, and no high value scallop beds are known to occur. On this basis, and considering the site is predicted to be retentive, no major impacts to epibenthic communities are expected.

Sedimentation can also alter infauna biodiversity and community structure. During benthic infauna field sampling in the DSDG and reference locations in 2023 and 2024, a total of 68 and 49 taxa were recorded respectively, with crustaceans dominating all samples. The infauna assemblage reported in this study may be considered typical of soft sediment habitat of fine to medium grained sands at 50 m depth. (Elgin 2024).

Modelling predicted sediment deposition thicknesses of less than 0.05 mm outside of the immediate dredge locations. Neither the nearest seagrass communities nor the historical commercial scallop beds were predicted to be impacted. An Adaptive Monitoring and Management Plan (AMMP) will be implemented during maintenance dredging campaigns, to reduce the risks of sedimentation impacts on sensitive receptors (see Annex D).

Exposure to Contaminants

As discussed in Section 5.1.3, recent sediment quality investigations have shown that the maintenance dredge material is suitable for unconfined ocean disposal. Furthermore, chemical testing of sediment within the spoil ground showed that levels of contamination were below NAGD screening levels except for one sample with a slightly elevated arsenic concentration (see Section 5.1.4).

Sediment sampling of the maintenance dredge material within the Port and at the DSDG will be undertaken to confirm contamination levels and support maintenance dredge campaigns. Details of the proposed sampling frequency are outlined in Table 9.1.

8.2 Water Quality

Turbidity

The primary indirect impact of increased water column turbidity is the associated reduction in photosynthetically available light to benthic primary producers (Erftemeijer & Lewis 2006). Resulting impacts can be short or long-term in nature, depending on the period and intensity of shading. The capacity of seagrasses to cope with episodes of light deprivation from overlying turbid waters may not only depend on the absolute quantity of light they receive and the duration over which it is reduced, but also on how the light deprivation varies through time, for example, the temporal separation (frequency) of pulsed turbidity events (Statton et al. 2017).

Increased sediment suspension (i.e. turbidity) can increase the concentration of sediment being collected by benthic filter feeders (e.g. scallops), diluting food particles and damaging feeding apparatus resulting in a reduction in growth and potentially death, depending on the species. High turbidity from suspended sediment also erodes fish gills and has been shown to affect feeding in riverine fish species (e.g. Australian grayling). Impacts can be reduced by implementing temporal restrictions on dredging activity, known as environmental windows, which ensure activity is restricted at critical times (e.g. Australian grayling migration).

An environmental advantage of using a TSHD is that the suction-head draws most of the fine materials (silts and clays) into the suction pipe, with consequently a low percentage of fines escaping during dredging. Further, as the hopper fills, water is collected from the surface of the hopper and is discharged well below the water line below the keel of the vessel (‘overflow dredging’). With discharges occurring below the water line, the dispersal of material within the upper portion of the water column will be reduced. However, overflow dredging will only occur under the conditions specified in the SDP, to reduce potential turbidity impacts. Management measures that will be implemented during maintenance dredging campaigns are outlined in Section 9.10.

Numerical modelling has been undertaken to assess turbidity generated by dredging and disposal activities (see Section 7 and Annex C). An AMMP will be implemented during maintenance dredging campaigns, to reduce the risks of turbidity impacts on sensitive receptors (see Annex D).

In the longer-term, the stability of dredged sediment placed within the offshore DSDG was assessed over a range of conditions, including extreme wave events, and results demonstrated that it is anticipated to be stable with minimal resuspension.

Exposure to Contaminants

Concentrations of total metals and tested organic parameters in dredge area sediments sampled in June 2023 were below relevant NAGD screening levels except for nickel. Elutriate testing to determine the potential release of nickel in the water column during disposal was well below the ANZG (2018) default guideline values for 99% species protection and therefore not at a level of concern to impact water quality. Therefore, indicating that sediments were suitable for unconfined ocean disposal and that the risk of release of contaminants into the water column is minimal.

If routine sediment sampling results show potential contaminant concentrations are significantly higher than historical concentrations recorded in the Port and exceed relevant guidelines, the requirement to undertake water quality monitoring during maintenance dredging will be assessed.

Waste Management

Vessels will generate sewage, grey water, putrescible waste, bilge, cooling water and brine that will require discharge to the marine environment. During dredging activities, these discharges have the potential to impact water quality, plankton and marine fauna. All routine discharges will comply with relevant MARPOL legislation and AMSA Marine Orders to reduce the risks of impacts to the marine environment (see Section 9.13).

8.3 Marine Fauna Collision

There is a potential risk of marina fauna collision from the presence of vessels, equipment and machinery during the Port of Devonport maintenance dredging campaigns. Potential impacts of marine fauna collision incidences may include death, injury, adverse behavioural and physiological changes, and reduced body condition and/or immune function to individual fauna. Active monitoring and management measures will be implemented during maintenance dredging campaigns, outlined Section 9.11, to minimise the risk of potential marina fauna collision.

8.4 Noise Emissions

Noise generated by dredging has the potential to disturb marine fauna, causing temporary or long-term avoidance of an area. In addition, vessel noise comprises a combination of continuous noise generated by engine and machinery noise, and modulated broadband noise produced by propeller rotation and cavitation. Whales and other marine species may be impacted by the noise generated by vessels, causing behavioural changes (i.e. resting, swimming times and breathing patterns, communications). Based on known hearing sensitivities, the temporary duration of maintenance dredging campaigns, and the management and mitigation measures that will be implemented during maintenance dredging campaigns as outlined in Section 9.11, it is unlikely that the underwater noise will have a significant impact on any marine fauna likely to be in the area.

In addition, noise generated by dredging activities at night has the potential to disturb the Devonport community. Management and mitigation measures that will be implemented during maintenance dredging campaigns are outlined in Section 9.14.

8.5 Light Emissions

Vessels will have external lighting to facilitate navigation and safe operations. Impacts of lighting can include disruption to community (i.e. nuisance nighttime lighting), behaviour and orientation of light sensitive marine fauna (e.g. seabirds) and light glow may attract light-sensitive species (e.g. seabirds and fish), in turn affecting predator-prey dynamics. The risk of impacts is considered low given the management and mitigation measures that will be implemented during maintenance dredging campaigns as outlined in Section 9.11.

8.6 Atmospheric Emissions

Atmospheric emissions will be generated through the use of combustible engines, compressors, generators and equipment onboard vessels. These emissions will consist of greenhouse gases (GHG), principally CO_2, but also non-GHG pollutants such as sulphur oxides (SOx) and nitrogen oxides (NOx). Discharges to the atmosphere may include contaminants including volatile organic compounds (VOCs), aromatic hydrocarbons, sulphur-containing compounds, heavy metals and particulate matter (e.g. soot).

Atmospheric emissions from vessels during dredging activities have the potential to result in localised changes in air quality and subsequent exposure of sensitive receptors to air pollutants. Atmospheric emissions also have the potential to contribute to regional, national and global GHG emissions. However, a range of existing standard controls that when implemented are considered to manage the impacts and risks from atmospheric emissions (see Section 9.15).

8.7 Introduced Marine Species

The arrival of machinery at the dredging and disposal areas may potentially introduce non-native IMS from other areas, thereby disrupting the local ecosystem. IMS may be transported between sites within ballast water, on vessel hulls (i.e. biofouling) and in sediments during the dredging activities. The risk of transferring IMS to the Port during maintenance dredging campaigns is considered medium, and to the DSDG is considered low due to the management and mitigation measures that will be implemented as outlined in Section 9.12. Environmental conditions at the spoil ground are different from those at the Port. So, if transported, the potential for these organisms to survive in a deep-water environment outside the Port (e.g. DSDG) is unlikely.

8.8 Spills

Vessels utilise and store a variety of fuels, oils, lubricants and other chemicals. These substances can have lethal and sub-lethal effects on organisms and can persist in the environment for long periods of time. A worst-case scenario would be an uncontrolled release from a vessel collision, but minor leaks could also occur through equipment failure, leaks etc.

Oil pollution risk management encompasses preparedness and response arrangements to ensure that oil pollution response control measures can be implemented in a timely manner. TasPorts is the Control Agency for Primary Port Waters and maintains contingency plans for these areas. In addition, TasPorts delivers operational assistance as a Control Agency where required (and as TasPorts operational demands allow) to ensure Tasmania has operational capability for oil spills within Tasmanian State Waters extending outside Port limits.

In addition, standard chemical storage, handling and maintenance procedures ensure the risks from spills are reduced. Management and mitigation measures that will be implemented during maintenance dredging campaigns are outlined in Section 9.13.

8.9 Coastal Processes

Maintenance dredging campaigns are not anticipated to impact on the coastal processes of the Mersey River. The offshore disposal area is expected to be retentive (Annex C), therefore, sand/silt is unlikely to provide a significant offshore ‘source’ of sediments that might eventually contribute to coastal sediment transport or migrate back onshore. It is anticipated that the dredged area will naturally infill as sediment moves due to the eastern and western transport of coastal material being deposited into the channel, and settlement of fine material in the inner harbour that is transported downstream from the Mersey River, as has taken place following previous maintenance dredging campaigns at the Port. Therefore, impacts to coastal processes are not anticipated to require monitoring or management.

9 Environmental Monitoring and Management Framework

9.1 Overview of Approach

TasPorts has in place a framework for management and monitoring as part of their EMS, which refers to the Project EMP (i.e. this LTMMP) for specific direction on the management and monitoring approach. This includes a process for responding to findings as they arise, and then for actions where there is a need to carry out monitoring of dredging operations. This will be supported by a campaign-specific AMMP (see Annex D) and Contractor EMP.

TasPorts will oversee the implementation of the monitoring and management plan, with each component being undertaken by appropriately qualified staff and marine scientists.

Overall, the monitoring and management plan is made up of a combination of regular ambient monitoring (long-term monitoring) and individual dredging event related monitoring determined by the information needed for each campaign.

The monitoring approach documented in Table 9.1 aims to:

- Assess the long-term ambient environmental health of the Port and nearby sensitive receptors
- Detect any impacts from maintenance dredging, both immediately after dredging campaigns and over time (impact monitoring)
- Collect data that will be used to drive continual improvement (all monitoring).

These aims will be met through the implementation of a tiered approach to monitoring. Results from the monitoring program will be used to inform the relevant stages of the dredging management framework.

The management options above give rise to the monitoring elements that are considered suitable for implementation to ensure the condition of the environment in and around the port is understood and checked periodically and impacts are minimised and managed. Table 9.1 sets out the approach to monitoring under this LTMMP for the period between 2025 and 2035. The approach takes into account the results of previous surveys and monitoring as well as ongoing discussions with the TACC.

Table 9.1 Long-term monitoring approach for 2025-2035

Monitoring Component	Impact Hypothesis	Activity	Description	Timing
Sediment Quality	Disposal of dredged material will not contain contaminated material that could impact the marine environment	Disposal	Sediment sampling and analysis in accordance with approved Sampling and Analysis Plans (SAPs) and comparison of levels to screening limits outlined in NAGD	Every 5-yrs
Water Quality	Sediments generated during dredging and placement do not subsequently reach sensitive areas in amounts that would be harmful to the ecological value and amenity of the area	Dredging and Disposal	Visual water quality monitoring adjacent to loading and disposal activities	Each dredging campaign
			Adaptive turbidity monitoring near sensitive receptors and reference site(s) to inform management actions (if required), as per the AMMP	Each dredging campaign
Benthic Habitat and Communities	Maintenance dredging activities do not result in impact to sensitive receptors. And The deposited material does not result in long term changes to benthic communities outside the DSDG.	Dredging	Port baseline surveys	Every 5-yrs
		Disposal	Benthic fauna and flora surveys and particle size analysis at sites within and adjacent to DSDG	Each dredging campaign
			Pre and post surveys of identified scallop beds to the east of the Port	Each dredging campaign
Hydrographic Survey	Sediment accumulation does not result in navigational hazards within the Port	Dredging	Hydrographic survey of the Port	Every 6 months
	The deposited material does not result in navigation hazards within and adjacent to the DSDG	Disposal	Hydrographic survey of the DSDG	Each dredging campaign
				Within one month of the completion of all dumping activities authorised under the SDP
Marine Pests	Maintenance dredging does not result in the introduction of marine pests into new environments within the Port area or DSDG	Dredging and Disposal	Surveys of the DSDG location, and dredge areas to verify status of marine pests within the Port	Every 5-yrs

Environmental objectives, or management goals were developed to provide a framework against which the environmental performance of the proposed dredging can be measured (Table 9.2).

Table 9.2 Environmental factors and performance objectives that may be influenced by maintenance dredging

Factor	Performance Objective
Benthic Habitat	To minimise disturbance or physical damage to benthic habitats during dredging and disposal activities
Water and Sediment Quality	Protection of the environmental values of water and marine ecological habitats To protect marine fauna so that biological diversity and ecological integrity are maintained
Marine Fauna	To protect marine fauna so that biological diversity and ecological integrity are maintained
Biosecurity	To protect benthic communities and marine fauna so that biological diversity and ecological integrity is maintained To ensure risk of translocation of organisms in hopper and ballast water or on the hull of a dredge vessel is minimised and harmful marine pests are not imported to the Ports of Devonport or Bass Strait
Spill and Waste Management	To protect benthic communities and marine fauna so that biological diversity and ecological integrity is maintained To minimise the release of potential contaminants to the environment
Amenity	To protect the amenity and minimise nuisance on surrounding sensitive receivers.
Air Quality	To minimise the release of air contaminants and carbon emissions to the environment
Coastal Processes	To minimise the effects on coastal processes
Cultural Heritage	To ensure dredging operations do not disturb/destroy items of cultural significance and meet Duty of Care obligations

9.2 Scope

This Section contains the following:

- The approvals under which maintenance dredging is to be undertaken
- Roles and responsibilities for each maintenance dredge campaign
- How appropriate dredge equipment is selected
- Procedures for planning each campaign
- Performance objectives for maintenance dredging campaigns
- Operational practices to be undertaken during maintenance dredging to minimise environmental impacts
- Adaptive management approaches to be undertaken to ensure continual improvement in dredging practices.

9.3 Objectives

Section 1.2 of this document outlines the overarching objectives of this LTMMP. The environmental management objectives relevant to each individual maintenance dredging and disposal campaign are as follows:

- Ensure there are no significant long-term changes in the health of (and no net loss of) high ecological value sensitive receptors such as scallop beds and seagrass meadows.
- Ensure appropriate marine ecological condition monitoring is undertaken to inform adaptive management actions that aim to minimise or avoid impacts to marine ecological components, process, and services.
- Ensure direct impacts are confined to the dredge-loading site (dredged footprint) and within the offshore DSDG, and that any impacts outside of these footprints are short-term and reversible.
- Ensure compliance with applicable approvals for the conduct of the activity, this LTMMP, and commitments therein.
- Ensure continued improvements in the management and monitoring of maintenance dredging over the term of the LTMMP, including the opportunities for the inputs of technical advice from the TACC (representative of the stakeholder inputs for the region) are considered and reflected in review and updates to the LTMMP over its life.

9.4 Planning

Planning for each maintenance campaign is undertaken using the following general approach and sequencing:

- Identification of Port navigation needs through hydrographic survey, risks, and broad sediment management approaches within the allowable permit limits – this includes consultation with the appointed TACC.
- Dredging program design, execution, and control i.e. timing, duration, location and volumes required, guided by bathymetry surveys just prior to the campaign.
- Management Measures – a range of options are undertaken during the campaign to minimise environmental impacts, such as adherence to management plans and contractual requirements for dredging providers.
- Monitoring – to gauge the effectiveness of operation and management actions during maintenance dredging and respond through adaptive management of the maintenance activity.

All elements of the above framework, including consultation, monitoring and supporting studies, aid in the design of each dredging campaign, along with port specific dredging procedures and guidelines, which have informed and are incorporated into the dredge contract and work methods.

9.5 Consultation

As outlined in Section 2 of this document, TasPorts consult with the TACC to ensure local marine resource knowledge and stakeholder issues are appropriately managed as part of campaign planning. Members of the TACC include state government department representatives, environmental groups, and community and Traditional Owners representatives.

TasPorts will review the LTMMP if there are any changes to the dredging, disposal or monitoring activities. Notification and where necessary, consultation with the TACC will be undertaken for any modifications to the LTMMP. Any substantiative modifications to the LTMMP will be submitted to DCCEEW for approval, in line with the conditions of the SDP.

9.6 Approvals

All maintenance dredging activities are to be undertaken in accordance with the SDP.

9.7 Notifications

During each dredging campaign, the following notifications are required:

- Prior to dredging:
  - Notice to Mariners (NtM) and Harbour Master instructions.
  - Notify the Environmental Protection Authority (EPA) Tasmania of scheduled maintenance dredging campaigns 72 hours prior to commencement.
  - Notify the Tasmania Parks and Wildlife Service (Property Services) of scheduled maintenance dredging campaigns 72 hours prior to commencement.
  - A Public Notice (local press) will be issued two weeks prior to dredging commencement.
  - Notify all TACC members, Port Users and Customers advising of the project works, with a direct link to the web page to ensure they have 24/7 access to information, including project progress updates.
  - Press release on TasPorts webpage, and electronic media platforms e.g. LinkedIn, Facebook and Instagram.
- During dredging:
  - TasPorts will be updating its established Dredging web page with regular project updates.
  - Water quality monitoring results to public via TasPorts dredging web page.
  - Quarterly advice to port users through TasPorts' established 'Port Users Group'.
  - Updates to the TasPorts TACC through scheduled meetings.

9.8 General Management

Table 9.3 Environmental management plan for general monitoring and management

Performance Objective(s)	Environmental harm is not caused except where specifically permitted by a condition of an approval		
Performance Indicator(s)	No reportable incidents of environmental harm during maintenance dredging		
Task	Action	Responsibility	Timing
Management	Dredging and disposal will only occur in approved areas (as per Sea Dumping Permit)	Dredging Contractor	During dredging activities
	The Dredge Contractor shall ensure all environmental management measures included in this document are reflected in their vessel-specific EMP.	Dredging Contractor	Prior to dredging activities
	Vessels will be fitted with lights, signals, AIS and navigation and communications equipment, as required by the *Navigation Act 2012*.	Dredging Contractor	Prior to and during dredging activities
	A Marine Coordination Plan will be developed	Dredging Contractor	Prior to dredging activities
	A Notice to Mariners & Harbour Master Instruction will be generated	TasPorts	Prior to dredging activities
Monitoring and Reporting	Disposal position logs including details of the timing and position will be maintained, including the path of each dumping run	Dredging Contractor	During dredging activities
	A record will be maintained of sites where dredging is carried out (specifying the boundaries of the dredging area by GPS coordinates) and the volume of material removed from each site (to the nearest m^3).	Dredging Contractor	During dredging activities
	Any exceptions to the EMP will be reported to TasPorts Programme Manager – Dredging & Hydrographic Survey within 24 hours of the exception being identified. Emergency incidents must be reported immediately.	Dredging Contractor	As required

9.9 Benthic Habitat

Table 9.4 Environmental management plan for benthic habitats

Performance Objective(s)	To minimise disturbance or physical damage to benthic habitats during dredging and disposal activities		
Performance Indicator(s)	No direct disturbance outside approved dredging footprint and designated spoil ground		
Task	Action	Responsibility	Timing
Management	DSDG surveys (bathymetric and camera) prior to each dredging campaign will be undertaken to verify no sensitive habitats within perimeter	TasPorts	Prior to dredging activities
	If dredge plume modelling indicates any environmental receptors will be located within the ZoMI, those receptors will be surveyed prior to the dredging campaign. These receptors include, but are not limited to: • Seagrass bed (s) • Kelp bed • Historical scallop bed These surveys will also include reference locations and any additional receptors, if identified.	TasPorts	Prior to dredging activities
	Equivalent post-dredge surveys be undertaken (including reference sites to assess potential impacts).	TasPorts	Post-dredging activities
	Dredging will only occur within nominated footprint	Dredging Contractor	During dredging activities
	Sediment disposal will only occur within the designated DSDG area	Dredging Contractor	During dredging activities
	Dredge hopper will only be washed within boundaries of the designated spoil ground.	Dredging Contractor	During dredging activities
Monitoring and Reporting	Disposal position logs including details of the timing and position will be maintained	Dredging Contractor	During dredging activities

Performance Objective(s)	To minimise disturbance or physical damage to benthic habitats during dredging and disposal activities		
Performance Indicator(s)	No direct disturbance outside approved dredging footprint and designated spoil ground		
Task	Action	Responsibility	Timing
	Any exceptions to the Contractor Dredging EMP will be reported to TasPorts Programme Manager -Dredging & Hydrographic Survey within 24 hours of the exception being identified. Emergency incidents must be reported immediately.	Dredging Contractor	As required

9.10 Water and Sediment Quality

Table 9.5 Environmental management plan for water and sediment quality

Performance Objective(s)	Protection of the environmental values of water and marine ecological habitats To protect marine fauna so that biological diversity and ecological integrity are maintained		
Performance Indicator(s)	No exceedance of environmental impact thresholds (refer to Annex D) during turbidity monitoring Maintain current (within 5 years old) marine sediment quality data over the life of the SDP.		
Task	Action	Responsibility	Timing
Management	Undertake marine sediment sampling and analysis in accordance with the approved SAPs to ensure information basis remains current (at least every 5 years)	TasPorts	Every 5 years
	Undertake dredge plume dispersion modelling to determine potential zones of impact	TasPorts	Prior to dredging activities
	Develop or review Adaptive Monitoring and Management Plan (AMMP; Annex D) • Define and/or monitor baseline conditions • Define and/or review environmental impact thresholds for assessing impacts to water quality and important benthic habitats (e.g. seagrass) • Define and/or review triggers for adaptive management	TasPorts	Prior to dredging activities

Performance Objective(s)	Protection of the environmental values of water and marine ecological habitats To protect marine fauna so that biological diversity and ecological integrity are maintained		
Performance Indicator(s)	No exceedance of environmental impact thresholds (refer to Annex D) during turbidity monitoring Maintain current (within 5 years old) marine sediment quality data over the life of the SDP.		
Task	Action	Responsibility	Timing
	A monitoring program for turbidity during maintenance dredging and disposal will be implemented to confirm predicted impacts during all dredging campaigns	TasPorts	During dredging activities
	No overflow dredging will be permitted within the Inner Harbour	Dredging Contractor	During dredging activities
	Data and outcomes of monitoring will be reviewed and any corrective actions or additional adaptive management will be addressed	TasPorts	During and post-dredging activities
Recording and Reporting	SAP and SAPIR will be reviewed by suitably qualified person	TasPorts	Every 5 years
	Vessel operational logs and QA/QC documentation will be maintained	Dredging Contractor	During dredging activities
	Refer to the Adaptive Monitoring and Management Plan (AMMP), Annex D of this LTMMP for details of the proposed water quality monitoring program and reporting	TasPorts	During and post-dredging activities

9.11 Marine Fauna

There is a low probability of impacts to marine megafauna during operation of dredging plant and equipment, and during transit between dredge site and the DSDG. Direct physical impact to marine fauna from collision with the TSHD is unlikely as the vessel will be moving at low speeds. Most fauna that may be encountered (dolphins and whales) are generally able to avoid slow moving vessels. For the purposes of this LTMMP, the term 'marine megafauna' includes marine mammals, elasmobranchs, penguins and turtles. Specific management actions to be implemented are detailed in Table 9.6.

Table 9.6 Environmental management plan for marine fauna

Performance Objective(s)	To protect marine fauna so that biological diversity and ecological integrity are maintained		
Performance Indicator(s)	No injury or death to any marine megafauna		
Task	Action	Responsibility	Timing
Management	Dredge vessel will have at least one suitably qualified marine fauna observer (MFO) on duty on at least one vessel adjacent to or in the monitoring zone[3] at least 30 minutes prior to, and throughout, any dumping activities.	Dredging Contractor	Throughout activity
	Before beginning dredging and dumping activities, the MFO scans the entire monitoring zone, using binoculars from a high observation platform, for the presence of any marine species within the monitoring zone at least once every 30 minutes, commencing at least 30 minutes prior to, and continuing throughout, any dumping activities.	Dredging Contractor	Prior to and throughout dredging activities
	Watch for marine fauna during dredging, transit and dredge spoil placement will be maintained.	Dredging Contractor	Throughout activity
	If any marine species is/are sighted in the 'monitoring zone', dumping activities must not commence, or if dumping activities have already commenced, they must pause as soon as safe and practicable to do so, until either: • 30 minutes after the time when the last marine species has left the monitoring zone of its own accord, or 30 minutes have elapsed since the last sighting. • the vessel has moved to another area of the disposal site where no marine species are within the monitoring zone of the vessel's new location.	Dredging Contractor	Throughout activity

[3] Refers to the area within a 300 m radius of the vessel

Performance Objective(s)	To protect marine fauna so that biological diversity and ecological integrity are maintained		
Performance Indicator(s)	No injury or death to any marine megafauna		
Task	Action	Responsibility	Timing
	Unnecessary light sources not required for safe operation of the dredge will be minimised to reduce impacts of light on fauna.	Dredging Contractor	Throughout activity
Recording and Reporting	Records of MFO training	Dredging Contractor	Prior to and throughout Project
	A log detailing all marine species observations within the monitoring zone[3] (during daylight operations only) shall be maintained. Observations and mitigation measures will be recorded on the TasPorts MFO form.	Dredging Contractor	Throughout activity
	Any incident involving injury or death to any marine megafauna will be immediately reported to TasPorts Programme Manager - Dredging and Hydrographic Survey and Manager – Environment and Sustainability.	Dredging Contractor	As soon as practicable after an incident is observed, but within 12 hours
	DCCEEW and NRE Tas (Parks and Wildlife Service) will be notified of any incidents involving the dredging or dumping activities that result in injury or death to any marine megafauna.	TasPorts Manager – Environment and Sustainability	Within 48 hours from the time that the incident occurred.

9.12 Biosecurity

Table 9.7 Environmental management plan for introduced marine species

Performance Objective(s)	To protect benthic communities and marine fauna so that biological diversity and ecological integrity is maintained To ensure risk of translocation of organisms in hopper and ballast water or on the hull of a dredge vessel is minimised and harmful marine pests are not imported to the Ports of Devonport or Bass Strait		
Performance Indicator(s)	Zero establishment of introduced marine pests from dredging and spoil disposal activities		
Task	Action	Responsibility	Timing
Management	A vessel risk assessment/inspection will be submitted to TasPorts for all dredging and support vessels prior to entering Port of Devonport waters	Dredging Contractor	Prior to dredging activities
	All vessels will have a ballast water management plan and ballast water exchanges will be in accordance with IMO requirements and the *Biosecurity Act 2015*.	Dredging Contractor	Prior to and during dredging activities
	Any international dredger contracted to undertake maintenance dredging within the Port of Devonport will be subject to an underwater inspection to determine the presence of any marine pests.	TasPorts Programme Manager Dredging & Hydrographic Survey	Prior to dredging activities
	Seasonal introduced marine species (IMS) surveys (spring/summer and autumn/winter) will be undertaken of the dredge areas.	TasPorts	Every 5 years
	Surveys of the DSDG location will be undertaken to verify status of marine pests	TasPorts	Every 5 years
	Benthic habitat post-dredge surveys (see Section 9.9.) will also assess IMS at DSDG.	TasPorts	Post-dredging activities
Recording and Reporting	Documentation including antifoul certificates and risk assessment/inspection reports.	Dredging Contractor	Prior to dredging activities

9.13 Spill and Waste Management

Table 9.8 Environmental management plan for spill and waste management

Performance Objective(s)	To protect benthic communities and marine fauna so that biological diversity and ecological integrity is maintained To minimise the release of potential contaminants to the environment		
Performance Indicator(s)	No discharges of chemicals or hydrocarbons to the marine environment No unauthorised discharges of wastes to the marine environment		
Task	Action	Responsibility	Timing
Management	Vessels will comply with MARPOL 73/78 Annex V, including: • Garbage Management Plan on board • Records of all waste to be disposed of or recycled • Placards to notify of disposal requirements.	Dredging Contractor	Prior to and during dredging activities
	Bins will be available for the segregation of waste in accordance with the vessel Garbage Management Plan and bins will be fitted with lids for waste with potential to be wind-blown	Dredging Contractor	Prior to and during dredging activities
	Controlled waste shall be disposed of onshore via licenced controlled waste contractor, and waste tracking sheets to be retained.	Dredging Contractor	Prior to and during dredging activities
	Sewage will be managed in accordance with MARPOL Annex IV and AMSA Marine Order 96 (as appropriate to vessel class): • A valid International Sewage Pollution Prevention (ISPP) Certificate, as required by vessel class • A MARPOL-approved sewage treatment plant (STP) • A sewage holding tank sized appropriately to contain all generated waste (black and grey water) • Comminuted/disinfected sewage is only discharged when ≥3 nm from land and while vessel is moving > 4 knots • Sewage that has not been comminuted/disinfected is only discharged when ≥12 nm from land and while vessel is moving >4 knots.	Dredging Contractor	Prior to and during dredging activities

Performance Objective(s)	To protect benthic communities and marine fauna so that biological diversity and ecological integrity is maintained To minimise the release of potential contaminants to the environment		
Performance Indicator(s)	No discharges of chemicals or hydrocarbons to the marine environment No unauthorised discharges of wastes to the marine environment		
Task	Action	Responsibility	Timing
	Vessels will comply with Marine Order 91 – Marine Pollution Prevention – Oil (as appropriate to vessel class): • Machinery space bilge/ oily water will pass through a MARPOL-approved oily water separator (OWS) to reduce oil-in-water content to <15 ppm prior to discharge while en-route (but not within port limits). • Where the oil-in-water content exceeds 15 ppm, the oily water is contained on-board and disposed of at a licensed onshore facility or to a carrier licensed to receive waste.	Dredging Contractor	Prior to and during dredging activities
	Undertake reporting and response protocols (e.g. SOPEP)	Dredging Contractor	Prior to and during dredging activities
	The locations of spill response kits will be clearly indicated on all vessels, and all crew will be familiar with spill response procedures	Dredging Contractor	Prior to and during dredging activities
	Adherence to chemical management procedures. Biodegradable hydrocarbons/chemicals will be used if possible	Dredging Contractor	During dredging activities
	Ensure vessels are equipped with sufficient low-pressure alarms and shutdown systems to minimise hydrocarbon loss to the marine environment in the event of a hydraulic hose failure	Dredging Contractor	Prior to and during dredging activities
	Hydrocarbon and chemical storage areas are bunded or secondarily contained.	Dredging Contractor	Prior to and during dredging activities
	Obtain a TasPorts bunkering permit (if required)	Dredging Contractor	During dredging activities
Recording and Reporting	Garbage Record Book including waste delivery receipts for all discharges to shore.	Dredging Contractor	Prior to and during dredging activities

Performance Objective(s)	To protect benthic communities and marine fauna so that biological diversity and ecological integrity is maintained To minimise the release of potential contaminants to the environment		
Performance Indicator(s)	No discharges of chemicals or hydrocarbons to the marine environment No unauthorised discharges of wastes to the marine environment		
Task	Action	Responsibility	Timing
	• Valid ISPP (as applicable) • MARPOL-approved STP	Dredging Contractor	Prior to dredging activities
	Oil Record Book	Dredging Contractor	Prior to and during dredging activities
	Vessel logs demonstrate that all sewage discharges are compliant with MARPOL Annex IV and AMSA Marine Order 96.	Dredging Contractor	Prior to and during dredging activities
	Records of SOPEP training and exercises	Dredging Contractor	Prior to and during dredging activities
	Any incident of discharge (e.g. uncontrolled or unauthorised) of solid or liquid wastes to the marine environment (irrespective of quantity / volume) shall be immediately reported to TasPorts Harbour Master and Vessel Traffic Services. The Contract Superintendent and TasPorts Programme Manager – Dredging & Hydrographic Survey will also be notified.	Dredging Contractor	Immediately (within 48 hrs)
	A documented incident report on any solid or waste spill incident shall be submitted to TasPorts Programme Manager Dredging & Hydrographic Survey.	Dredging Contractor	Within 12 hours of a reportable incident

9.14 Amenity

Table 9.9 Environmental management plan for amenity

Performance Objective(s)	To protect the amenity and minimise nuisance on surrounding sensitive receivers		
Performance Indicator(s)	No complaints received from the Devonport community during maintenance dredging		
Task	Action	Responsibility	Timing
Management	Stakeholder consultation will be undertaken	TasPorts	Prior to and during dredging activities
	Engines and equipment on board the dredge will be properly maintained and in good working order.	Dredging Contractor	Prior to dredging activities
	All equipment on board the dredge will be maintained and operated in a safe and efficient manner.	Dredging Contractor	Prior to and during dredging activities
	All non-essential maintenance will be undertaken during day-light hours.	Dredging Contractor	During dredging activities
	Any noise emissions will be compliant with the requirements of the TasPorts Environmental Standard – Noise (DOC/18/25112)	Dredging Contractor	During dredging activities
	Dredging will be avoided during peak periods of recreational use (e.g. Devonport Regatta)	TasPorts	Prior to dredging activities
Recording and Reporting	Vessel Planned Maintenance System will be up-to-date	Dredging Contractor	Prior to and during dredging activities
	Any noise complaints will be investigated immediately, and remedial action taken (if required).	TasPorts	During dredging activities

9.15 Air Quality

Table 9.10 Environmental management plan for air quality

Performance Objective(s)	To minimise the release of air contaminants to the environment		
Performance Indicator(s)	Compliance with relevant standards		
Task	Action	Responsibility	Timing
Management	Vessels will be compliant with MARPOL 73/78 Annex VI (Prevention of Air Pollution) and Marine Order 97: • Use of 'low sulphur' diesel (≤ 0.5% m/m). • Vessels comply with the requirements for ozone depleting substances. • Fuel usage measured, recorded and reported.	Dredging Contractor	Prior to dredging activities
	Combustion equipment will be maintained in accordance with the Planned Maintenance System (PMS)	Dredging Contractor	Prior to and during dredging activities
	Fuel use will be measured, recorded and reported for vessels	Dredging Contractor	During dredging activities
Recording and Reporting	Bunker receipts	Dredging Contractor	Prior to and during dredging activities
	Daily operations reports including fuel use quantities	Dredging Contractor	During dredging activities
	Vessel Planned Maintenance System will be up-to-date	Dredging Contractor	Prior to and during dredging activities

9.16 Coastal Processes

Table 9.11 Environmental management plan for coastal processes

Performance Objective(s)	To minimise the effects on coastal processes		
Performance Indicator(s)	No substantial changes in bathymetry and associated metocean conditions or sediment transport regime		
Task	Action	Responsibility	Timing
Management	Dredging and disposal must only occur in approved areas (as per SDP)	Dredging Contractor	During dredging activities
	Dredge plume dispersion modelling will be undertaken	TasPorts	Prior to dredging activities
	The Dredging Contractor will ensure that each load of dredged material is dumped at a different location within the spoil ground so that the dumped material is distributed evenly.	Dredging Contractor	During dredging activities
	Hydrographic surveys of the Port and DSDG will be undertaken	TasPorts	Prior to and post-dredging activities
Recording and Reporting	Log of dredging and disposal positions	Dredging Contractor	During dredging activities
	Survey depths submitted to the Australian Hydrographic Office (AHO)	TasPorts	Prior to and post-dredging activities

9.17 Cultural Heritage

Table 9.12 Environmental management plan for cultural heritage

Performance Objective(s)	To ensure dredging operations do not disturb/destroy items of cultural significance and meet Duty of Care obligations		
Performance Indicator(s)	No items of cultural significance damaged or disturbed during maintenance dredging		
Task	Action	Responsibility	Timing
Management	Dredging must only occur in approved areas (as per SDP) and only to design depths	Dredging Contractor	During dredging activities
	A desktop assessment will be undertaken prior to each dredging campaign	TasPorts	Prior to dredging activities
	Stakeholder consultation will be undertaken prior to each dredging campaign	TasPorts	Prior to dredging activities
	Dredge contractors will be made aware of cultural heritage places or items	TasPorts	Prior to dredging activities
Recording and Reporting	Any cultural heritage items found will be reported to TasPorts Manager – Environment & Sustainability, who will engage with appropriate cultural heritage regulator on the nature of the find and appropriate protection procedures.	Dredging Contractor	During dredging activities

9.18 Adaptive Management

Adaptive management provides for continuous monitoring, evaluation and adjustment of management response measures based on real-time monitoring and environmental conditions (Figure 9.1). Based on an understanding of acceptable environmental conditions and thresholds for impact, a series of response levels (triggers) can be established and then monitored to ensure that conditions that may produce environmental harm are avoided or ceased before impacts occur.

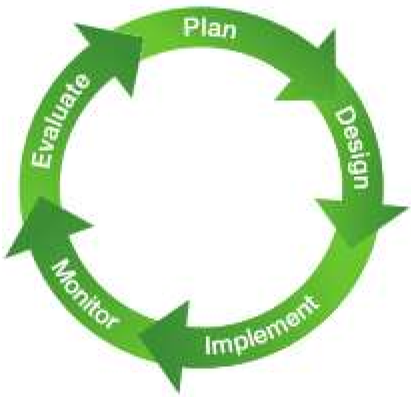


Figure 9.1 Adaptive management cycle (CEDA 2015)

The dredging monitoring and management framework is outlined in Section 9. The program is focused on real time collection and analysis of data to detect impending environmental harm and undertake corrective action where necessary.

The adaptive monitoring and management program will focus on effectively managing environmental aspects related to turbidity and environmental receptors. Responses to turbidity monitoring results will be required if trigger events occur (i.e. adaptive management). The nature of the response is scaled according to the level of environmental risk. The Adaptive Monitoring and Management Plan (AMMP) is provided in Annex D.

In relation to this LTMMP, TasPorts is committed to:

- Implementing the environmental management and monitoring actions outlined in Section 9 during the first round of dredging planned for 2025/26, targeting a total volume of 474,000 m^3 of sediment to be removed from Inner Harbour and Entrance Channel.
- Evaluating the results of the first round of monitoring during the dredging planned for 2025/26 against the environmental objectives and outcomes in accordance with the timings and frequencies described in Section 9.
- Adjusting monitoring or management actions to subsequent years of dredging (2026 to 2035, in which the total volume removed may be up to 1,500,000 m^3), if required, to meet the environmental protection management or outcomes defined in Section 9.

10 Roles and Responsibilities

Roles and responsibilities for the implementation of the commitments outlined in the LTMMP (this document) are summarised in Table 10.1. The dredging contractor(s) is responsible for the organisation of the environmental management including appropriate staffing of the dredge in accordance with TasPorts contract conditions, the LTMMP and the SDP.

Table 10.1 Roles and responsibilities

Role	Responsibility	Reports to
TasPorts Programme Manager - Dredging & Hydrographic Survey	• Overall responsibility for implementation of the LTMMP. • Overall responsibility for compliance with relevant legislation, standards and guidelines. • Ensures dredging activities are conducted in an efficient and safe manner. • Dredge contractor management and main point of contact.	TasPorts Group Executive Major Projects, Assets and Technical Services
TasPorts Manager - Environment and Sustainability	• Overall responsibility for environmental approvals, monitoring and reporting. • Responsible for notifying DCCEEW for any non-compliances with the SDP. • Responsible for providing advice on compliance with relevant legislation, standards and guidelines. • Responsible for undertaking audits to ensure compliance with the SDP and this LTMMP.	TasPorts Group Executive Major Projects, Assets and Technical Services
TasPorts Senior Advisor Communications - Projects	• Manages stakeholder and engagement activities • Prepares communication flyers, information and documentation to be dispersed to the community	TasPorts Head of Corporate Affairs
Dredge Contractor(s)	• Develops and implements an operational environmental management plan (EMP) consistent with and aligned to this LTMMP. • Ensures employees are adequately trained in-line with the requirements of this LTMMP. • Responsibility to ensure activities are carried out in compliance with legislative requirements. • Compliance and reporting with the requirements of the LTMMP, SDP and contract with TasPorts. • Ensures that all equipment is adequately maintained and properly operated to minimise risk of environmental or safety incident.	TasPorts Programme Manager - Dredging & Hydrographic Survey
Project Personnel	• Comply with the requirements within this LTMMP. • Always exercise a Duty of Care to the environment. • Notify their authorised delegate of environmental incidents as soon as practicable.	Designated Manager

11 Performance Review

11.1 Reporting and Record Keeping

Pre-dredging program, TasPorts will:

- Undertake a bathymetric survey of the Port to determine the areas and volumes required for dredging
- Undertake surveys of the DSDG and known sensitive marine receptors
- Commission dredge plume dispersion modelling to determine potential zones of impact
- Update the AMMP, if required.

During dredging program, TasPorts (or their contractors) will keep records which detail:

- The times and dates of when each material placement run is commenced and finished
- The position (by GPS) of the vessel at the beginning and end of each placement run with the inclusion of the path of each dredge material relocation run
- The volume of dredge material (in cubic metres) placed for the specific operational period. These records will be retained for audit purposes
- Details of all fuel use during the dredging program
- Detail of any spill of oil, fuel or other potential contaminant, details of remedial action and monitoring instigated as result
- Details of any marine species observations during dredging and dumping activities
- Time and duration of any alterations to the program, including stop work actions, as a result of any environmental mitigation measure.

Post dredging program, TasPorts (or their Contractors) will:

- Undertake a bathymetric survey of the dredged area and DSDG within two months of completion of the dredging campaign
- Continue monitoring as per the LTMMP
- Consider outcomes of the works and above records in the planning for subsequent dredging campaigns.

Reporting under this Plan will involve:

- Reporting to regulatory authorities in accordance with the conditions of statutory authorities relevant to maintenance dredging and disposal:
  - Annual reporting to DCCEEW by 31st January each year (including years in which no sea dumping activities were undertaken) to facilitate annual reporting to the International Maritime Organization.
  - Final annual report (in the same format) on the day of expiry of the permit or upon completion of all dumping activities.
- Regular updates to the TACC on any planned or conducted dredging activities

- Publication (on the TasPorts website) of an annual report detailing:
  - Dredging activity in the past 12 months
  - Results of any environmental monitoring associated with dredging actions
  - Indications of any possible upcoming dredging activities.

11.2 Auditing and Review

This plan is intended to demonstrate commitments to improving the long-term management of maintenance dredging and placement activities. The plan is supported by a range of prior studies and builds on past EMPs for the Port location and in conjunction with a long history of dredge records and campaign specific data.

Audits and inspections will be undertaken to confirm that activities are carried out in line with the defined requirements set out in this LTMMP, approvals, and associated management documents, including performance indicators as audit criteria. Audits and inspections may also include assessing compliance with relevant legislation or other compliance obligations.

The findings and recommendations arising from audits will be recorded in an Action Register (AR) for action and close out. The AR will detail the source of the action (i.e. audit, inspection or other), the action required, target close out date, actual close out date and the person responsible for the action item. This may be developed specifically to each dredging campaign.

This LTMMP will also be reviewed and updated (if necessary) to reflect best practise in environmental management and monitoring prior to each dredge campaign, as per Section 11.5.

11.3 Non-conformance and Corrective Actions

Any environmental non-conformance (e.g. incidents, audit-related non-conformance, complaints, etc.) will be reviewed by TasPorts and it will be established if there are any actions available to reduce the severity or likelihood of re-occurrence. Corrective action(s) to re-establish compliance should be taken as soon as possible.

Reporting to regulatory authorities will be undertaken in accordance with the conditions set out by statutory authorities.

11.4 Contingency Planning

If, at any time during dredging/dumping activities, an environmental incident occurs or environmental risk is identified, TasPorts will implement measures to mitigate the risk or impact. TasPorts will notify DCCEEW within 72 hours of any incident or identified risk, which will include:

- details of the environmental incident and/or environmental risk, including the date, time, and location (GPS co-ordinates)
- the measures taken to minimise or mitigate the environmental risk and/or the impact of the environmental incident following detection
- the success of those measures in addressing the environmental incident and/or environmental risk
- any additional measures proposed to be taken.

It is the responsibility of the Programme Manager - Dredging & Hydrographic Survey that the dredge contractor's vessel complies with the relevant state, national or international standards with respect to seaworthiness, safety and environmental requirements, or any rules or conditions laid down by the certifying classification society and be capable of dumping the dredged material to the spoil ground in accordance with this LTMMP. The safety equipment onboard the vessel must also be in accordance with requirements of the Australian Maritime Safety Authority (AMSA).

11.4.1 Flood Related Dredging

It is anticipated that the total volume that could need to be dredged from the entrance channel and inner harbour every three years may be between 300,000 – 500,000 m^3 depending upon the occurrence of flooding events (see Table 4.3). TasPorts' 10-year maintenance dredging permit application seeks approval for dredging and disposal of up to 1,974,000 m^3, which includes a contingency of up to three flood events over the life of the permit.

As noted in Section 11.1 TasPorts will record the quantities of all material dredged and disposed (in cubic metres) to ensure that the quantities disposed offshore are within the total amount permitted under the SDP. If due to flood related events, TasPorts is approaching the permitted volume of material to be disposed of offshore (i.e. 1,974,000 m^3), a submission will be made to DCCEEW to seek approval to dredge and dispose additional material. TasPorts will seek this approval from DCCEEW when records indicate that the progressive disposal volume is approaching the upper limit.

11.5 Continuous Improvement

The Contractor(s) will have in place mechanisms to review performance and to identify opportunities for improvement. Records will be kept, and reporting will be done according to Contractor(s) procedures for managing documentation. Observations will be detailed in Project reporting to TasPorts.

This LTMMP will be reviewed prior to each maintenance dredging campaign to ensure it is still current and management and monitoring is in keeping with best environmental practice (see Table 11.1). Any material changes will be submitted to DCCEEW for consideration and approval. The TACC will be invited to provide comment on the LTMMP following substantial revisions.

Table 11.1 Review and Continuous Improvement Summary

Item	Review Context	Interval	Key Drivers
LTMMP	• Review maintenance dredging and sea disposal requirements. • Consider monitoring relating to the consequences of placing maintenance dredging material into the marine environment; and the possibility of avoiding or reducing the need for future placing of maintenance dredge material at sea by identifying and assessing the viability of long-term solutions and best environmental outcomes. • To ensure the LTMMP reflects the most up to date understanding of risk, sedimentation processes, options available for sediment management including re-use or disposal, and the management of the impacts of maintenance dredging.	Every dredging campaign or as required by sea dumping permit	• National Assessment Guidelines for Dredging (DEWHA 2009) • Long Term Monitoring and Management Plan Requirements for 10 year Permits to Dump Maintenance Dredge Material at Sea (DSEWPaC 2012)
EMP	• To ensure continual improvement by updating the EMP (Section 9 of this LTMMP) based on the learnings of the previous campaign and ensuring that the EMP reflects the most up to date understanding of risks specific to each campaign. • Ensure that the dredge vessel's EMP reflect the environmental management requirements in this document. • Reviews should consider: - the performance of the previous maintenance dredging campaign and monitoring results - the volume and extent of required maintenance dredging - an environmental risk assessment - updates to scientific research - leading practice management and monitoring techniques.	Every dredging campaign or as required	• Long Term Monitoring and Management Plan Requirements for 10 year Permits to Dump Maintenance Dredge Material at Sea (DSEWPaC 2012)

Item	Review Context	Interval	Key Drivers
Environmental Monitoring	• To ensure that appropriate monitoring and adaptive management is in place • Management review is in place for each campaign based on longer-term commitments made in the LTMMP and campaign specific risks and improvement opportunities are identified through the EMP review process. • The Environmental Monitoring and Management section (Section 9) outlines processes which ensure that risks continue to be actively managed during each campaign.	Every dredging campaign or as required	• Long Term Monitoring and Management Plan Requirements for 10 year Permits to Dump Maintenance Dredge Material at Sea (DSEWPaC 2012)

12 Supporting Information

The technical annexes (A-D) that are listed and described in Table 12.1 form attachments to the main LTMMP. The corresponding chapter number of the LTMMP to which the annex primarily relates is also shown.

Table 12.1 Supporting Information - Technical Reports

Annex Reference	Document Title and Description	Relevant LTMMP Section
A	Protected Matters Search Tool Reports	Section 5.3.4
B	Dredging Options Analysis Report	Section 6
C	Dredge Plume Modelling Report	Section 7
D	Adaptive Monitoring and Management Plan	Section 9

13 References

ANZG (2018). Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Governments and Australian state and territory governments, Canberra, ACT, Australia. https://www.waterquality.gov.au/anz-guidelines.

BMT (2023a). Port of Devonport Maintenance Dredging Sediment Sampling and Analysis Plan Implementation Report. December 2023.

BMT (2023b). Port of Devonport Maintenance Dredging Offshore Disposal Ground Sediment Sampling and Analysis Plan. May 2023 (DCCEEW Approved).

BMT (2025) DSDG Sediment Sampling and Analysis Plan Implementation Report. January 2025.

Butler, I., Patterson, H, Bromhead, D., Galeano, D., Timmiss, T., Woodhams, J. and Curtotti, R. (2023). Fishery status reports 2023, Australian Bureau of Agricultural and Resource Economics and Sciences, Canberra. CC BY 4.0. https://doi.org/10.25814/vgp4-xr81

CEDA (2015). Integrating Adaptive Environmental Management into Dredging Projects. Central Dredging Association Position paper. [Online] Available from: http://www.dredging.org/media/ceda/org/documents/resources/cedaonline/2015-01-ceda_positionpaper-integrating_adaptive_environmental_management_into_dredging_projects.pdf.

CoA (2009). National Assessment Guidelines for Dredging (NAGD). Department of, Sustainability, Environment, Water, Population and Communities (now Department of the Environment and Energy), Commonwealth of Australia, Canberra.

CRIMPS (1996). Introduced Species Survey, Port of Devonport, Tasmania, Centre for Research on Introduced Marine Pests, CSIRO.

de Montaudouin, X., Blanchet, H., Gouillieux, B., Humbert, S., Latry, L., Crovetto, L. and Lavesque, N. (2023). Benthic community impacts from sediment dredging and disposal: A comparison of sampling gear, Marine Pollution Bulletin, Volume 194, Part A, 2023, 115278, ISSN 0025-326X, https://doi.org/10.1016/j.marpolbul.2023.115278.

Edgar, G., Barrett, N. and Graddon, D.J. (1999). A classification of Tasmanian estuaries and assessment of their conservation significance using ecological and physical attributes, population and land use. University of Tasmania. Book. https://hdl.handle.net/102.100.100/539069

Erftemeijer, P.L.A. and Lewis, R.R.R. (2006) Environmental impacts of dredging on seagrasses: A review. Marine Pollution Bulletin 52, 1553–1572

EPA (2021). Technical Guidance – Environmental impact assessment of marine dredging proposals, Environmental Protection Authority, Western Australia.

Marine Solutions (2023a). Port of Devonport – Maintenance Dredging Sediment Sampling and Analysis Plan. May 2023 (DCCEEW Approved).

Marine Solutions (2023b). Introduced marine Species Survey in the Port of Devonport – Technical Report. August 2023.

Statton, J., McMahon, K.M., McCallum, R., Kendrick, G.A. and Lavery, P.S. (2017). Response and recovery of a mixed tropical seagrass assemblage to variation in the frequency and magnitude of light deprivation. Report of Theme 5 - Project 5.5.3 prepared for the Dredging Science Node, Western Australian Marine Science Institution, Perth, Western Australia.

Todd, V.L.J., Todd, I.B., Gardiner, J.C., Morrin, E.C.N., MacPherson, N.A., DiMarzio, N.A. and Thomsen, F. (2015). A review of impacts of marine dredging activities on marine mammals, ICES Journal of Marine Science, Volume 72, Issue 2, January/February 2015, Pages 328–340, https://doi.org/10.1093/icesjms/fsu187

Annex A Protected Matters Search Tool Reports

A.1 Port of Devonport

Australian Government
Department of Climate Change, Energy, the Environment and Water

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 03-Jan-2024

Summary

Matters of National Environment Significance

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

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	4
Listed Threatened Species:	62
Listed Migratory Species:	41

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Lands:	16
Commonwealth Heritage Places:	1
Listed Marine Species:	76
Whales and Other Cetaceans:	10
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

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

State and Territory Reserves:	5
Regional Forest Agreements:	1
Nationally Important Wetlands:	None
EPBC Act Referrals:	9
Key Ecological Features (Marine):	None
Biologically Important Areas:	11
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.
Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text	Buffer Status
Giant Kelp Marine Forests of South East Australia	Endangered	Community may occur within area	In feature area
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area	In buffer area only
Tasmanian Forests and Woodlands dominated by black gum or Brookers gum (Eucalyptus ovata / E. brookeriana)	Critically Endangered	Community likely to occur within area	In feature area
Tasmanian white gum (Eucalyptus viminalis) wet forest	Critically Endangered	Community likely to occur within area	In feature area

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Aquila audax fleayi			
Tasmanian Wedge-tailed Eagle, Wedge-tailed Eagle (Tasmanian) [64435]	Endangered	Breeding likely to occur within area	In feature area
Ardenna grisea			
Sooty Shearwater [82651]	Vulnerable	Species or species habitat may occur within area	In feature area
Botaurus poiciloptilus			
Australasian Bittern [1001]	Endangered	Species or species habitat likely to occur within area	In feature area
Calidris canutus			
Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Ceyx azureus diemenensis Tasmanian Azure Kingfisher [25977]	Endangered	Species or species habitat known to occur within area	In feature area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea antipodensis gibsoni Gibson's Albatross [82270]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
Fregetta grallaria grallaria White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian) [64438]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Lathamus discolor Swift Parrot [744]	Critically Endangered	Breeding known to occur within area	In feature area
Limosa lapponica baueri Nunivak Bar-tailed Godwit, Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Neophema chrysostoma Blue-winged Parrot [726]	Vulnerable	Species or species habitat known to occur within area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Pterodroma leucoptera leucoptera Gould's Petrel, Australian Gould's Petrel [26033]	Endangered	Species or species habitat may occur within area	In feature area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Species or species habitat known to occur within area	In feature area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Thalassarche bulleri platei Northern Buller's Albatross, Pacific Albatross [82273]	Vulnerable	Species or species habitat may occur within area	In feature area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche chrysostoma Grey-headed Albatross [66491]	Endangered	Species or species habitat may occur within area	In feature area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
Thinornis cucullatus cucullatus Eastern Hooded Plover, Eastern Hooded Plover [90381]	Vulnerable	Species or species habitat known to occur within area	In feature area
Tyto novaehollandiae castanops (Tasmanian population) Masked Owl (Tasmanian) [67051]	Vulnerable	Species or species habitat known to occur within area	In feature area
CRUSTACEAN			

Scientific Name	Threatened Category	Presence Text	Buffer Status
Astacopsis gouldi			
Giant Freshwater Crayfish, Tasmanian Giant Freshwater Lobster [64415]	Vulnerable	Species or species habitat known to occur within area	In feature area
Engaeus granulatus			
Central North Burrowing Crayfish [78959]	Endangered	Species or species habitat known to occur within area	In feature area
FISH			
Prototroctes maraena			
Australian Grayling [26179]	Vulnerable	Species or species habitat known to occur within area	In feature area
Seriolella brama			
Blue Warehou [69374]	Conservation Dependent	Species or species habitat known to occur within area	In feature area
Thunnus maccoyii			
Southern Bluefin Tuna [69402]	Conservation Dependent	Species or species habitat likely to occur within area	In feature area
FROG			
Litoria raniformis			
Southern Bell Frog,, Growling Grass Frog, Green and Golden Frog, Warty Swamp Frog, Golden Bell Frog [1828]	Vulnerable	Species or species habitat likely to occur within area	In feature area
MAMMAL			
Balaenoptera musculus			
Blue Whale [36]	Endangered	Species or species habitat likely to occur within area	In feature area
Dasyurus maculatus maculatus (Tasmanian population)			
Spotted-tail Quoll, Spot-tailed Quoll, Tiger Quoll (Tasmanian population) [75183]	Vulnerable	Species or species habitat known to occur within area	In feature area
Dasyurus viverrinus			
Eastern Quoll, Luaner [333]	Endangered	Species or species habitat may occur within area	In feature area
Eubalaena australis			
Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area	In feature area
Perameles gunnii gunnii			
Eastern Barred Bandicoot (Tasmania) [66651]	Vulnerable	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Sarcophilus harrisii Tasmanian Devil [299]	Endangered	Species or species habitat likely to occur within area	In feature area
PLANT			
Caladenia caudata Tailed Spider-orchid [17067]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Caladenia pallida Rosy Spider Orchid, Pale Spider-orchid, Summer Spider-orchid [9604]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Caladenia tonellii Robust Fingers [64861]	Critically Endangered	Species or species habitat likely to occur within area	In buffer area only
Glycine latrobeana Clover Glycine, Purple Clover [13910]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Leucochrysum albicans subsp. tricolor Hoary Sunray, Grassland Paper-daisy [89104]	Endangered	Species or species habitat may occur within area	In buffer area only
Prasophyllum apoxychilum Tapered Leek-orchid [64947]	Endangered	Species or species habitat may occur within area	In feature area
Prasophyllum robustum Robust Leek-orchid [12499]	Critically Endangered	Species or species habitat known to occur within area	In buffer area only
Pterostylis ziegeleri Grassland Greenhood, Cape Portland Greenhood [64971]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Senecio psilocarpus Swamp Fireweed, Smooth-fruited Groundsel [64976]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Thelymitra jonesii Sky-blue Sun-orchid [76352]	Endangered	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Xanthorrhoea bracteata			
Shiny Grasstree [7950]	Endangered	Species or species habitat may occur within area	In feature area
Xerochrysum palustre			
Swamp Everlasting, Swamp Paper Daisy [76215]	Vulnerable	Species or species habitat likely to occur within area	In feature area
REPTILE			
Chelonia mydas			
Green Turtle [1765]	Vulnerable	Species or species habitat may occur within area	In feature area
SHARK			
Carcharodon carcharias			
White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area	In feature area
Galeorhinus galeus			
School Shark, Eastern School Shark, Snapper Shark, Tope, Soupfin Shark [68453]	Conservation Dependent	Species or species habitat may occur within area	In feature area

Listed Migratory Species

[Resource Information]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Apus pacificus			
Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Ardenna carneipes			
Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Species or species habitat likely to occur within area	In feature area
Ardenna grisea			
Sooty Shearwater [82651]	Vulnerable	Species or species habitat may occur within area	In feature area
Diomedea antipodensis			
Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea epomophora			
Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
Hydroprogne caspia Caspian Tern [808]		Breeding known to occur within area	In buffer area only
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Sternula albifrons Little Tern [82849]		Species or species habitat may occur within area	In feature area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area	In feature area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Thalassarche chrysostoma Grey-headed Albatross [66491]	Endangered	Species or species habitat may occur within area	In feature area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
Migratory Marine Species			
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area	In feature area
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour may occur within area	In feature area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area	In feature area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat may occur within area	In feature area
Eubalaena australis as Balaena glacialis australis Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Lagenorhynchus obscurus			
Dusky Dolphin [43]		Species or species habitat may occur within area	In feature area
Lamna nasus			
Porbeagle, Mackerel Shark [83288]		Species or species habitat likely to occur within area	In feature area
Megaptera novaeangliae			
Humpback Whale [38]		Species or species habitat known to occur within area	In feature area
Migratory Terrestrial Species			
Hirundapus caudacutus			
White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area	In feature area
Myiagra cyanoleuca			
Satin Flycatcher [612]		Breeding known to occur within area	In feature area
Migratory Wetlands Species			
Actitis hypoleucos			
Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Arenaria interpres			
Ruddy Turnstone [872]		Species or species habitat known to occur within area	In feature area
Calidris acuminata			
Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area	In feature area
Calidris canutus			
Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area	In feature area
Calidris ferruginea			
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Calidris melanotos			
Pectoral Sandpiper [858]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat likely to occur within area	In feature area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat likely to occur within area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Thalasseus bergii Greater Crested Tern [83000]		Breeding known to occur within area	In buffer area only
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area	In feature area

Other Matters Protected by the EPBC Act

Commonwealth Lands [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Commonwealth Land Name	State	Buffer Status
Defence		
Defence - DEVONPORT TRAINING DEPOT [60008]	TAS	In buffer area only
Defence - DEVONPORT TRAINING DEPOT [60011]	TAS	In buffer area only
Defence - DEVONPORT TRAINING DEPOT [60010]	TAS	In buffer area only
Defence - DEVONPORT TRAINING DEPOT [60009]	TAS	In buffer area only
Unknown		
Commonwealth Land - [60184]	TAS	In buffer area only
Commonwealth Land - [60178]	TAS	In feature area
Commonwealth Land - [60179]	TAS	In feature area
Commonwealth Land - [60176]	TAS	In buffer area only
Commonwealth Land - [60181]	TAS	In feature area
Commonwealth Land - [60180]	TAS	In feature area

Commonwealth Land Name	State	Buffer Status
Commonwealth Land - [60172]	TAS	In buffer area only
Commonwealth Land - [60182]	TAS	In buffer area only
Commonwealth Land - [60173]	TAS	In buffer area only
Commonwealth Land - [60183]	TAS	In buffer area only
Commonwealth Land - [60175]	TAS	In buffer area only
Commonwealth Land - [60177]	TAS	In buffer area only

Commonwealth Heritage Places [Resource Information]

Name	State	Status	Buffer Status
Historic			
Mersey Bluff Lighthouse	TAS	Listed place	In buffer area only

Listed Marine Species [Resource Information]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
Ardenna carneipes as Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Species or species habitat likely to occur within area	In feature area
Ardenna grisea as Puffinus griseus Sooty Shearwater [82651]	Vulnerable	Species or species habitat may occur within area	In feature area
Arenaria interpres Ruddy Turnstone [872]		Species or species habitat known to occur within area	In feature area
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area	In feature area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area overfly marine area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area overfly marine area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area	In feature area
Chroicocephalus novaehollandiae as Larus novaehollandiae Silver Gull [82326]		Breeding known to occur within area	In buffer area only
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea antipodensis gibsoni as Diomedea gibsoni Gibson's Albatross [82270]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Eudyptula minor Little Penguin [1085]		Breeding known to occur within area	In buffer area only
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat likely to occur within area overfly marine area	In feature area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Breeding known to occur within area	In feature area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area overfly marine area	In feature area
Hydroprogne caspia as Sterna caspia Caspian Tern [808]		Breeding known to occur within area	In buffer area only
Larus pacificus Pacific Gull [811]		Breeding known to occur within area	In buffer area only
Lathamus discolor Swift Parrot [744]	Critically Endangered	Breeding known to occur within area overfly marine area	In feature area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat likely to occur within area	In feature area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Myiagra cyanoleuca Satin Flycatcher [612]		Breeding known to occur within area overfly marine area	In feature area
Neophema chrysostoma Blue-winged Parrot [726]	Vulnerable	Species or species habitat known to occur within area overfly marine area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat likely to occur within area	In feature area
Phalacrocorax fuscescens Black-faced Cormorant [59660]		Breeding known to occur within area	In buffer area only
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Stercorarius antarcticus as Catharacta skua Brown Skua [85039]		Species or species habitat may occur within area	In buffer area only
Sterna striata White-fronted Tern [799]		Foraging, feeding or related behaviour likely to occur within area	In feature area
Sternula albifrons as Sterna albifrons Little Tern [82849]		Species or species habitat may occur within area	In feature area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area	In feature area
Thalassarche bulleri platei as Thalassarche sp. nov. Northern Buller's Albatross, Pacific Albatross [82273]	Vulnerable	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche chrysostoma Grey-headed Albatross [66491]	Endangered	Species or species habitat may occur within area	In feature area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
Thalasseus bergii as Sterna bergii Greater Crested Tern [83000]		Breeding known to occur within area	In buffer area only
Thinornis cucullatus as Thinornis rubricollis Hooded Plover, Hooded Dotterel [87735]		Species or species habitat known to occur within area overfly marine area	In feature area
Thinornis cucullatus cucullatus as Thinornis rubricollis rubricollis Eastern Hooded Plover, Eastern Hooded Plover [90381]	Vulnerable	Species or species habitat known to occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area overfly marine area	In feature area
Fish			
Heraldia nocturna Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area	In feature area
Hippocampus abdominalis Big-belly Seahorse, Eastern Potbelly Seahorse, New Zealand Potbelly Seahorse [66233]		Species or species habitat may occur within area	In feature area
Hippocampus breviceps Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area	In feature area
Histiogamphelus briggsii Crested Pipefish, Briggs' Crested Pipefish, Briggs' Pipefish [66242]		Species or species habitat may occur within area	In feature area
Histiogamphelus cristatus Rhino Pipefish, Macleay's Crested Pipefish, Ring-back Pipefish [66243]		Species or species habitat may occur within area	In feature area
Hypselognathus rostratus Knifesnout Pipefish, Knife-snouted Pipefish [66245]		Species or species habitat may occur within area	In feature area
Kaupus costatus Deepbody Pipefish, Deep-bodied Pipefish [66246]		Species or species habitat may occur within area	In feature area
Kimblaeus bassensis Trawl Pipefish, Bass Strait Pipefish [66247]		Species or species habitat may occur within area	In feature area
Lissocampus caudalis Australian Smooth Pipefish, Smooth Pipefish [66249]		Species or species habitat may occur within area	In feature area
Lissocampus runa Javelin Pipefish [66251]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area	In feature area
Mitotichthys semistriatus Halfbanded Pipefish [66261]		Species or species habitat may occur within area	In feature area
Mitotichthys tuckeri Tucker's Pipefish [66262]		Species or species habitat may occur within area	In feature area
Notiocampus ruber Red Pipefish [66265]		Species or species habitat may occur within area	In feature area
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area	In feature area
Pugnaso curtirostris Pugnose Pipefish, Pug-nosed Pipefish [66269]		Species or species habitat may occur within area	In feature area
Solegnathus robustus Robust Pipehorse, Robust Spiny Pipehorse [66274]		Species or species habitat may occur within area	In feature area
Solegnathus spinosissimus Spiny Pipehorse, Australian Spiny Pipehorse [66275]		Species or species habitat may occur within area	In feature area
Stigmatopora argus Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area	In feature area
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area	In feature area
Stipecampus cristatus Ringback Pipefish, Ring-backed Pipefish [66278]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Urocampus carinirostris			
Hairy Pipefish [66282]		Species or species habitat may occur within area	In feature area
Vanacampus phillipi			
Port Phillip Pipefish [66284]		Species or species habitat may occur within area	In feature area
Vanacampus poecilolaemus			
Longsnout Pipefish, Australian Long-snout Pipefish, Long-snouted Pipefish [66285]		Species or species habitat may occur within area	In feature area
Mammal			
Arctocephalus forsteri			
Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within area	In feature area
Arctocephalus pusillus			
Australian Fur-seal, Australo-African Fur-seal [21]		Species or species habitat may occur within area	In feature area
Reptile			
Chelonia mydas			
Green Turtle [1765]	Vulnerable	Species or species habitat may occur within area	In feature area

Whales and Other Cetaceans [Resource Information]

Current Scientific Name	Status	Type of Presence	Buffer Status
Mammal			
Balaenoptera acutorostrata			
Minke Whale [33]		Species or species habitat may occur within area	In feature area
Balaenoptera musculus			
Blue Whale [36]	Endangered	Species or species habitat likely to occur within area	In feature area
Caperea marginata			
Pygmy Right Whale [39]		Foraging, feeding or related behaviour may occur within area	In feature area
Delphinus delphis			
Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area	In feature area

Current Scientific Name	Status	Type of Presence	Buffer Status
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area	In feature area
Globicephala macrorhynchus Short-finned Pilot Whale [62]		Species or species habitat may occur within area	In feature area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area	In feature area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area	In feature area
Megaptera novaeangliae Humpback Whale [38]		Species or species habitat known to occur within area	In feature area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area	In feature area

Extra Information

State and Territory Reserves [Resource Information]

Protected Area Name	Reserve Type	State	Buffer Status
Cockers Creek	Conservation Covenant	TAS	In buffer area only
Don Heads	Conservation Area	TAS	In buffer area only
Mersey Bluff	State Reserve	TAS	In buffer area only
Pardoe Northdown	Conservation Area	TAS	In buffer area only
Wright and Egg Islands	Conservation Area	TAS	In buffer area only

Regional Forest Agreements [Resource Information]

Note that all areas with completed RFAs have been included. Please see the associated resource information for specific caveats and use limitations associated with RFA boundary information.

RFA Name	State	Buffer Status
Tasmania RFA	Tasmania	In feature area

EPBC Act Referrals [Resource Information]

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Controlled action				
Construction of NW Homemaker Shopping Centre	2009/4835	Controlled Action	Post-Approval	In buffer area only
Latrobe Levee	2020/8846	Controlled Action	Final PD	In buffer area only
Piping of an open drain and translocation of Burrowing Crayfish	2011/6095	Controlled Action	Post-Approval	In buffer area only
Rural residential subdivision into 13 new allotments	2008/4505	Controlled Action	Post-Approval	In buffer area only
Spreyton Concrete Sleeper Replacement Program	2012/6392	Controlled Action	Post-Approval	In buffer area only
Squibbs Road Drainage Improvements, Spreyton, Tas	2017/7956	Controlled Action	Post-Approval	In buffer area only
Tasmania Natural Gas Project - Stage 2	2001/211	Controlled Action	Post-Approval	In feature area
Water Pipeline	2010/5327	Controlled Action	Post-Approval	In buffer area only
Not controlled action				
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area

Biologically Important Areas

Scientific Name	Behaviour	Presence	Buffer Status
Seabirds			
Ardenna tenuirostris Short-tailed Shearwater [82652]	Breeding	Known to occur	In buffer area only
Ardenna tenuirostris Short-tailed Shearwater [82652]	Foraging	Known to occur	In feature area
Eudyptula minor Little Penguin [1085]	Breeding	Known to occur	In buffer area only
Eudyptula minor Little Penguin [1085]	Foraging	Known to occur	In feature area
Pelagodroma marina White-faced Storm-petrel [1016]	Foraging	Known to occur	In feature area

Scientific Name	Behaviour	Presence	Buffer Status
Pelecanoides urinatrix Common Diving-petrel [1018]	Foraging	Known to occur	In feature area
Phalacrocorax fuscescens Black-faced Cormorant [59660]	Breeding	Known to occur	In buffer area only
Phalacrocorax fuscescens Black-faced Cormorant [59660]	Foraging	Known to occur	In feature area
Thalassarche cauta cauta Shy Albatross [82345]	Foraging likely	Likely to occur	In feature area
Whales			
Balaenoptera musculus brevicauda Pygmy Blue Whale [81317]	Distribution	Known to occur	In feature area
Balaenoptera musculus brevicauda Pygmy Blue Whale [81317]	Foraging	Likely to be present	In feature area

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

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

Threatened, migratory and marine species

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

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

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

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

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

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

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

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

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

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

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A.2 Dredge Spoil Disposal Ground

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 10-Jan-2024

Summary

Matters of National Environment Significance

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

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	1
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	37
Listed Migratory Species:	35

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Lands:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	59
Whales and Other Cetaceans:	13
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

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

State and Territory Reserves:	None
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	None
Key Ecological Features (Marine):	None
Biologically Important Areas:	15
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Commonwealth Marine Area [Resource Information]

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside a Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area.

Feature Name	Buffer Status
Commonwealth Marine Areas (EPBC Act)	In feature area

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Ardenna grisea Sooty Shearwater [82651]	Vulnerable	Species or species habitat may occur within area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area	In feature area
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat may occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea antipodensis gibsoni Gibson's Albatross [82270]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
Fregetta grallaria grallaria White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian) [64438]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area	In feature area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area	In feature area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat may occur within area	In feature area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Pterodroma leucoptera leucoptera Gould's Petrel, Australian Gould's Petrel [26033]	Endangered	Species or species habitat may occur within area	In feature area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area	In feature area
Thalassarche bulleri platei Northern Buller's Albatross, Pacific Albatross [82273]	Vulnerable	Species or species habitat may occur within area	In feature area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche chrysostoma Grey-headed Albatross [66491]	Endangered	Species or species habitat may occur within area	In feature area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Thalassarche steadi			
White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
FISH			
Prototroctes maraena			
Australian Grayling [26179]	Vulnerable	Species or species habitat may occur within area	In feature area
Seriolella brama			
Blue Warehou [69374]	Conservation Dependent	Species or species habitat known to occur within area	In feature area
Thunnus maccoyii			
Southern Bluefin Tuna [69402]	Conservation Dependent	Species or species habitat likely to occur within area	In feature area
MAMMAL			
Balaenoptera borealis			
Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Balaenoptera musculus			
Blue Whale [36]	Endangered	Species or species habitat likely to occur within area	In feature area
Balaenoptera physalus			
Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Eubalaena australis			
Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area	In feature area
REPTILE			
Chelonia mydas			
Green Turtle [1765]	Vulnerable	Species or species habitat may occur within area	In feature area
SHARK			
Carcharodon carcharias			
White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Galeorhinus galeus			
School Shark, Eastern School Shark, Snapper Shark, Tope, Soupfin Shark [68453]	Conservation Dependent	Species or species habitat may occur within area	In feature area

Listed Migratory Species [Resource Information]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Apus pacificus			
Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Ardenna carneipes			
Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Species or species habitat likely to occur within area	In feature area
Ardenna grisea			
Sooty Shearwater [82651]	Vulnerable	Species or species habitat may occur within area	In feature area
Diomedea antipodensis			
Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea epomophora			
Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea exulans			
Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea sanfordi			
Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
Macronectes giganteus			
Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area	In feature area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche chrysostoma Grey-headed Albatross [66491]	Endangered	Species or species habitat may occur within area	In feature area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area

Migratory Marine Species

Scientific Name	Threatened Category	Presence Text	Buffer Status
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area	In feature area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour may occur within area	In feature area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area	In feature area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat may occur within area	In feature area
Eubalaena australis as Balaena glacialis australis Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area	In feature area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area	In feature area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat likely to occur within area	In feature area
Megaptera novaeangliae Humpback Whale [38]		Species or species habitat known to occur within area	In feature area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Wetlands Species			
Actitis hypoleucos			
Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Calidris acuminata			
Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area	In feature area
Calidris canutus			
Red Knot, Knot [855]	Vulnerable	Species or species habitat may occur within area	In feature area
Calidris ferruginea			
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Calidris melanotos			
Pectoral Sandpiper [858]		Species or species habitat may occur within area	In feature area
Numenius madagascariensis			
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area	In feature area

Other Matters Protected by the EPBC Act

Listed Marine Species

[Resource Information]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos			
Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Apus pacificus			
Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
Ardenna carneipes as Puffinus carneipes			
Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Ardenna grisea as Puffinus griseus Sooty Shearwater [82651]	Vulnerable	Species or species habitat may occur within area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area	In feature area
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat may occur within area overfly marine area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area	In feature area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea antipodensis gibsoni as Diomedea gibsoni Gibson's Albatross [82270]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area	In feature area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area	In feature area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat may occur within area	In feature area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Stercorarius antarcticus as Catharacta skua Brown Skua [85039]		Species or species habitat may occur within area	In feature area
Sterna striata White-fronted Tern [799]		Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area	In feature area
Thalassarche bulleri platei as Thalassarche sp. nov. Northern Buller's Albatross, Pacific Albatross [82273]	Vulnerable	Species or species habitat may occur within area	In feature area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche chrysostoma Grey-headed Albatross [66491]	Endangered	Species or species habitat may occur within area	In feature area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
Fish			
Heraldia nocturna Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area	In feature area
Hippocampus abdominalis Big-belly Seahorse, Eastern Potbelly Seahorse, New Zealand Potbelly Seahorse [66233]		Species or species habitat may occur within area	In feature area
Hippocampus breviceps Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area	In feature area
Hippocampus minotaur Bullneck Seahorse [66705]		Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Histiogamphelus briggsii Crested Pipefish, Briggs' Crested Pipefish, Briggs' Pipefish [66242]		Species or species habitat may occur within area	In feature area
Histiogamphelus cristatus Rhino Pipefish, Macleay's Crested Pipefish, Ring-back Pipefish [66243]		Species or species habitat may occur within area	In feature area
Hypselognathus rostratus Knifesnout Pipefish, Knife-snouted Pipefish [66245]		Species or species habitat may occur within area	In feature area
Kaupus costatus Deepbody Pipefish, Deep-bodied Pipefish [66246]		Species or species habitat may occur within area	In feature area
Kimblaeus bassensis Trawl Pipefish, Bass Strait Pipefish [66247]		Species or species habitat may occur within area	In feature area
Lissocampus caudalis Australian Smooth Pipefish, Smooth Pipefish [66249]		Species or species habitat may occur within area	In feature area
Lissocampus runa Javelin Pipefish [66251]		Species or species habitat may occur within area	In feature area
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area	In feature area
Mitotichthys semistriatus Halfbanded Pipefish [66261]		Species or species habitat may occur within area	In feature area
Mitotichthys tuckeri Tucker's Pipefish [66262]		Species or species habitat may occur within area	In feature area
Notiocampus ruber Red Pipefish [66265]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Phycodurus eques Leafy Seadragon [66267]		Species or species habitat may occur within area	In buffer area only
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area	In feature area
Pugnaso curtirostris Pugnose Pipefish, Pug-nosed Pipefish [66269]		Species or species habitat may occur within area	In feature area
Solegnathus robustus Robust Pipehorse, Robust Spiny Pipehorse [66274]		Species or species habitat may occur within area	In feature area
Solegnathus spinosissimus Spiny Pipehorse, Australian Spiny Pipehorse [66275]		Species or species habitat may occur within area	In feature area
Stigmatopora argus Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area	In feature area
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area	In feature area
Stipecampus cristatus Ringback Pipefish, Ring-backed Pipefish [66278]		Species or species habitat may occur within area	In feature area
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area	In feature area
Vanacampus phillipi Port Phillip Pipefish [66284]		Species or species habitat may occur within area	In feature area
Vanacampus poecilolaemus Longsnout Pipefish, Australian Long-snout Pipefish, Long-snouted Pipefish [66285]		Species or species habitat may occur within area	In feature area
Mammal			

Scientific Name	Threatened Category	Presence Text	Buffer Status
Arctocephalus forsteri Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within area	In feature area
Arctocephalus pusillus Australian Fur-seal, Australo-African Fur-seal [21]		Species or species habitat may occur within area	In feature area
Reptile			
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat may occur within area	In feature area

Whales and Other Cetaceans

[Resource Information]

Current Scientific Name	Status	Type of Presence	Buffer Status
Mammal			
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area	In feature area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area	In feature area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour may occur within area	In feature area
Delphinus delphis Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area	In feature area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area	In feature area

Current Scientific Name	Status	Type of Presence	Buffer Status
Globicephala macrorhynchus Short-finned Pilot Whale [62]		Species or species habitat may occur within area	In feature area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area	In feature area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area	In feature area
Megaptera novaeangliae Humpback Whale [38]		Species or species habitat known to occur within area	In feature area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat likely to occur within area	In feature area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area	In feature area

Extra Information

Biologically Important Areas

Scientific Name	Behaviour	Presence	Buffer Status
Seabirds			
Ardenna tenuirostris Short-tailed Shearwater [82652]	Foraging	Known to occur	In feature area
Diomedea exulans (sensu lato) Wandering Albatross [1073]	Foraging	Known to occur	In feature area
Pelagodroma marina White-faced Storm-petrel [1016]	Foraging	Known to occur	In feature area
Pelecanoides urinatrix Common Diving-petrel [1018]	Foraging	Known to occur	In feature area

Scientific Name	Behaviour	Presence	Buffer Status
Phalacrocorax fuscescens Black-faced Cormorant [59660]	Foraging	Known to occur	In buffer area only
Thalassarche bulleri Bullers Albatross [64460]	Foraging	Known to occur	In feature area
Thalassarche cauta cauta Shy Albatross [82345]	Foraging likely	Likely to occur	In feature area
Thalassarche chlororhynchos bassi Indian Yellow-nosed Albatross [85249]	Foraging	Known to occur	In feature area
Thalassarche melanophris Black-browed Albatross [66472]	Foraging	Known to occur	In feature area
Thalassarche melanophris impavida Campbell Albatross [82449]	Foraging	Known to occur	In feature area
Sharks			
Carcharodon carcharias White Shark [64470]	Distribution	Known to occur	In buffer area only
Carcharodon carcharias White Shark [64470]	Distribution (low density)	Likely to occur	In feature area
Carcharodon carcharias White Shark [64470]	Known distribution	Known to occur	In feature area
Whales			
Balaenoptera musculus brevicauda Pygmy Blue Whale [81317]	Distribution	Known to occur	In feature area
Balaenoptera musculus brevicauda Pygmy Blue Whale [81317]	Foraging	Likely to be present	In feature area

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

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

Threatened, migratory and marine species

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

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

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

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

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

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

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

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

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

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

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Annex B Dredging Options Analysis Report

AW maritime

Port of Devonport Maintenance Dredging

Options Analysis Report

Tasmania Ports Corporation

May 2023

AW Maritime Pty Ltd

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Executive Summary

In March 2023, AW Maritime (AWM) and Tasmania Ports Corporation (TasPorts) held a Multi-Criteria Analysis (MCA) Workshop to determine the preferred option for the Port of Devonport Maintenance Dredging Project. This report summarises and extends the workshop findings and forms part of the AWM handover for the approval process with the consideration of National Assessment Guidelines for Dredging 2009 (NAGD).

The Port of Devonport has a long history with dredging as it accumulates sediments that lead to operational limitations in the port. AWM and TasPorts have conducted a thorough investigation from both current and past data to determine various dredging disposal options including re-use, offshore disposal and land-based disposal. To further support this, AWM developed a list of criteria to ensure the environmental, social and economic impacts of each disposal options are considered. These include environmental factors both on land and in marine water, community perception and reputation, health and safety considerations, economic feasibility as well as long-term dredging and disposal considerations.

The report highlights that among the total of 11 options which have been considered, five were realised or assessed to be impractical and not feasible due to variety of reasons, mainly capacity and accessibility. These five options were primarily focused on different locations for the placement of dredge material onshore.

The workshop methodology and results present a comprehensive evaluation of the disposal options that takes into account all available alternatives to ocean and land disposal. Upon evaluating the MCA Workshop results using weighted evaluation criteria, Option 3, which involves placing dredged material in the newly designated offshore site was identified as the preferred choice for the placement of dredge materials.

The options analysis has been presented to TACC on two occasions. Initially to discuss the MCA methodology dredge options being assessed and criteria, and then to present the outcomes of the MCA workshop. On both occasions, the TACC has showed their full support for the approach used in its assessment.

Key Report Findings

- Eleven options for dredging and disposal were considered
- Preferred option of all dredged material for disposal to a newly established offshore disposal site
- Stakeholders have been consulted and informed throughout the MCA process

Contents

1 Introduction

1.1 Overview

The Port of Devonport is a key entry point into Tasmania for tourists and locals alike, as home to the iconic Spirit of Tasmania, transitioning passengers and vehicles between Tasmania and Victoria. The Port is a major cargo port, with between three to four million tonnes of freight transitioning through the Port each year (TasPorts, Devonport Port Information, 2023). Major commodities transported via Devonport include wheat, grain, cement, fertilisers and fuels[1]. Any disruption to the shipping industry in this port has major financial and logistical implications.

The port is managed by Tasmanian Ports Corporation (TasPorts). The Port of Devonport Maintenance Dredging Project will involve dredging the entrance channel, berths and basin based on an assessment of sedimentation provided by TasPorts. The main purpose of this dredging activity is to eliminate the constraints in the existing shipping channel and improve it for the future safe passage of vessels within the Port.

The purpose of this report to document all options that were considered for long-term dredging and disposal, and the methodology used to compare options and determined the preferred options. AW Maritime (AWM) was engaged by TasPorts to lead the analysis and the development of the Multi-Criteria Analysis (MCA) while considering the National Assessment Guidelines for Dredging 2009 (NAGD).

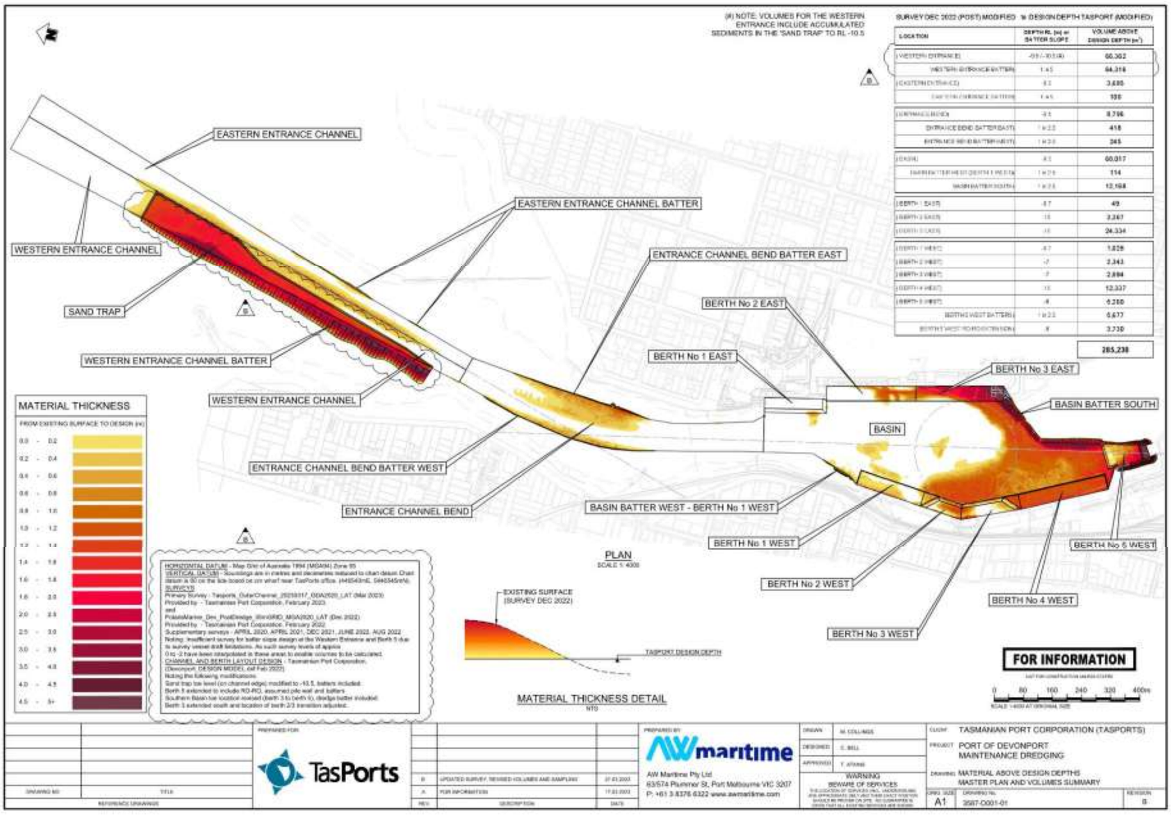

Figure 1. Material Above Design Depth based on December 2022 Survey.

[1] http://www.tasports.com.au/corporate/port_statistics.php

2 Background

2.1 Overview

Due to on-going deposit of silt in the port basin, and sand and cobbles accumulate in the main channel adjacent to the breakwaters, Devonport is being surveyed yearly (TasPorts, 2019). These sediments are estimated to steadily accumulate across the port design footprint at a background rate of around 65,000m^3 per year, but this can be as much as 200,000m^3 when there are severe flood events and wetter years. These figures are based on a literature review of previous siltation studies.

2.2 Dredging History

A literature review of the Port has shown regular and frequent dredging at the Port of Devonport. Table 1 has been prepared by the consultant Marine Solutions to document the dredging history.

Table 1. Dredge volumes in Devonport between 1984 and 2023.

Year	Volume (m^3)
1984 - 85	55,121
1985 - 86	70,083
1986 - 87	63,220
1987 - 88	99,180
1988 - 89	98,480
1989 - 90	96,261
1990 - 91	86,425
1991 - 92	65,739
1992 - 93	47,369
1993 - 94	36,760
1994 - 95	19,905
1995 - 96	32,046
1996 - 97	176,200
1997 - 98	201,400
1998 - 99	55,000
1999 - 00	nil
2000 - 01	nil
2001 - 02	205,865
2002 - 03	7,800
2003 - 04	nil
2004 - 05	200,000
2005 - 2015	nil
2015-16	370,000
2023	45,900 (Quaylink)

In more recent times, seabed levelling has been adopted to relocate sediment in critical areas of the entrance channel, basin and berths. Seabed levelling was undertaken in 2016 and 2019. The recent seabed levelling in 2022 redistributed around 20,000m^3 of material from the high areas to adjacent low areas.

2.3 Project Status

TasPorts has developed strategies for both short term and long-term dredge management for the Port. After accomplishing the short-term strategy in 2022, the focus is now on a long-term dredging management strategy which involves consideration of the environmental impact of dredging and a permit application. There are two Commonwealth legislation documents for the project to consider: *Environment Protection (Sea Dumping) Act 1981 and Environment Protection* and *Biodiversity Conservation (EPBC) Act 1999*.

2.4 Environmental Impact of Dredging

AWM has applied the NAGD 2009 which set outs the framework for the environmental impact assessment and permitting of the ocean disposal of dredged materials. The framework includes:

- Evaluating alternatives to ocean disposal
- Assessing loading and disposal sites
- Assessing potential impacts on the marine environment and other users, and
- Determining management and monitoring requirements.

2.5 Assessment Framework

The assessment framework involves the following steps as outlined in the NAGD 2009. The first step in the assessment framework is to demonstrate that all alternatives to ocean disposal have been evaluated, including the environmental, social, and economic impacts of each disposal option. That is the focus of this report.

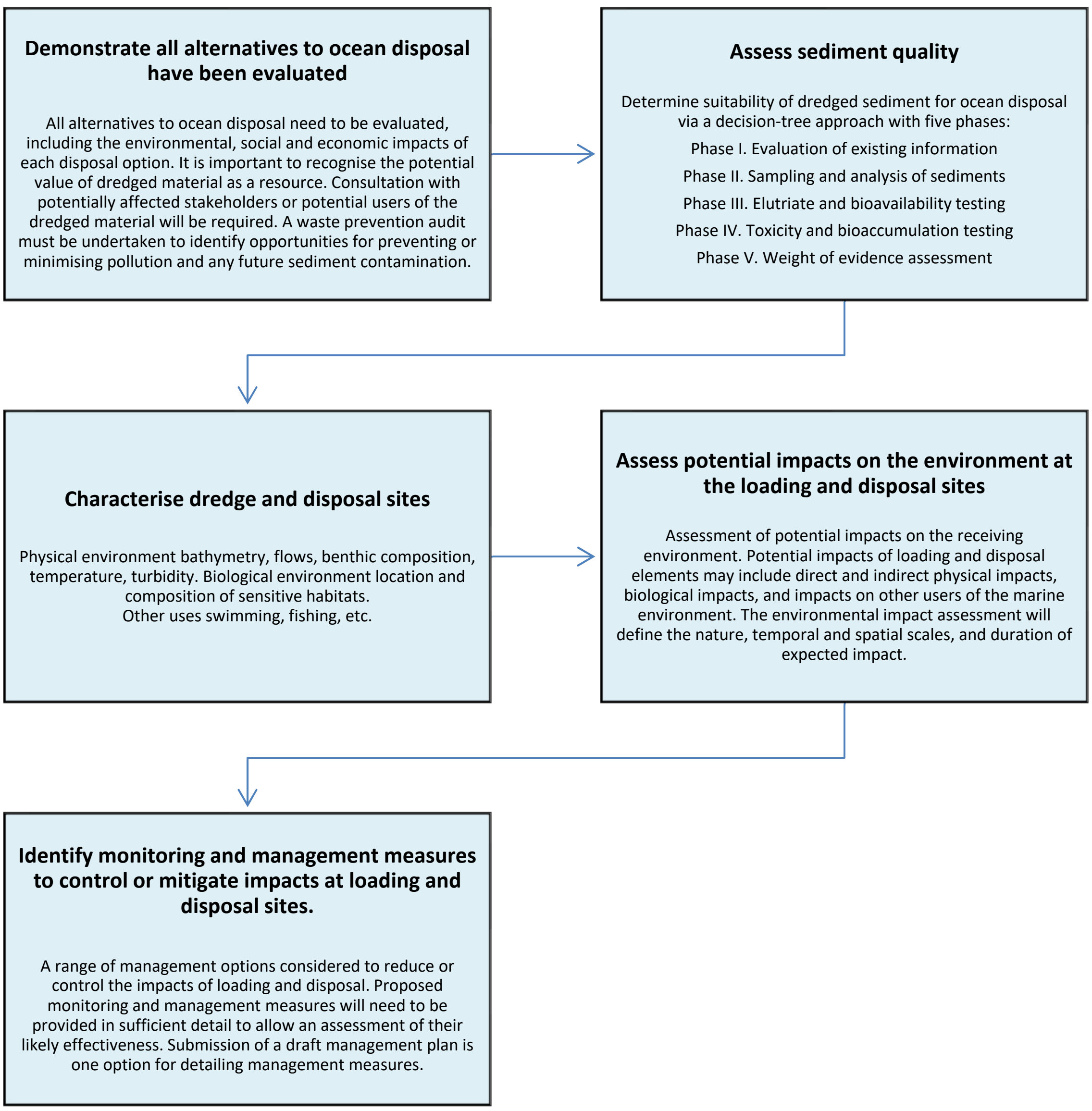

Figure 2. Assessment Framework based on National Assessment Guidelines for Dredging 2009

3 Options Development

3.1 Overview

From a literature review and an analysis of sediment sampling, there are generally two distinct materials to be dredged:

- Material X (Fines Material) which is fine silt and some fine sand originating upstream from the Mersey River from catchment run-off and settling in the port basin.
- Material Y (Sand and Cobble Material) which is fine to medium sand with cobbles up to 30cm diameter being sourced from littoral drift movements along the coast and settling in the port entrance channel.

Figure 3. Dredging Material Types

AWM and TasPorts have worked closely together to develop the options outlined in Table 2. There were ten options originally developed revolving around four main disposal locations. All ten options were feasible at the time of development.

Table 2. Option Analysis

Options	Dredging	Disposal Location
Option 1	No Dredging	n/a
Option 2	Sea Disposal- Material X and Y	Existing Offshore Disposal Site
Option 3	Sea Disposal- Material X and Y	New Offshore Disposal Site
Option 4	Sea Disposal- Material Y	Existing Offshore Disposal Site
	Sea Disposal- Material X	New Offshore Disposal Site
Option 5	Re-use of Material Y	Beach Renourishment Site
	Sea Disposal- Material X	Existing Offshore Disposal Site
Option 6	Re-use of Material Y	Beach Renourishment Site
	Sea Disposal- Material X	New Offshore Disposal Site
Option 7	Re-use of Material Y	Beach Renourishment Site
	Dewatering of Material X	Landfill Disposal
Option 8	Re-use of Material Y	Beach Renourishment Site
	Dewatering of Material X	Onshore (Port)
Option 9	Dewatering and Re-use Material X and Material Y	Onshore (Port)
Option 10	Dewatering of Material X and Material Y	Landfill Disposal
Option 11*	Dewatering of Material X and Material Y	Onshore (Airport)

*Option 11 was added to the options during the MCA process, refer to Section 3.3 for more details.

3.2 Existing Offshore and New Offshore Disposal Site

The existing offshore disposal ground (A) has coordinates of 41º 7.92'S 146º 22.61'E with a radius of 600 metres from the centre. It is approximately 3.9km or 2.1nm away from Devonport and with a 21-25m water depth. It is referred to as the “existing” offshore disposal site as it was used in previous dredging campaigns in 2015, 2005 and 2003. The last major maintenance dredging campaign in 2015 placed 378,452m^3 of sediments in this disposal ground. The site appears to have been predominantly cobble and low relief reef with a small amount of sand. Low profile rock outcrops were sparsely scattered along the transects. No seagrass was observed, and no obvious introduced pest species were apparent. The location of the disposal site is shown in Figure 4 as area A.

The new offshore disposal ground (B) is a square with centroid coordinates at 41°02.150’ S 146°22.03’ E. The corner points are northwest (-41.03099°S,146.35939°E), northeast (-41.03099°S, 146.37472°E), southeast (-41.04222°S, 146.37472°E), and southwest (-41.04222°S, 146.35939°E). The site is approximately 14.4km or 7.8nm from the coastline in 50-55m water depth. The location was chosen by TasPorts based on stakeholder feedback and proximity to the Port. The new offshore site lies within continental shelf of the South-east Marine Region, characterised by a mosaic of rocky reefs and soft sediments. The shelf habitats support a diverse range of species from a broad range of taxonomic groups. The proposed site is located within the Bass Strait Shelf Province. The Coastal and Marine Resources Information System (CAMRIS) Marine Benthic Substrate database classifies this area as sand, silt and gravel with less than 50% mud. The location of the disposal site is shown in Figure 4 as area B.

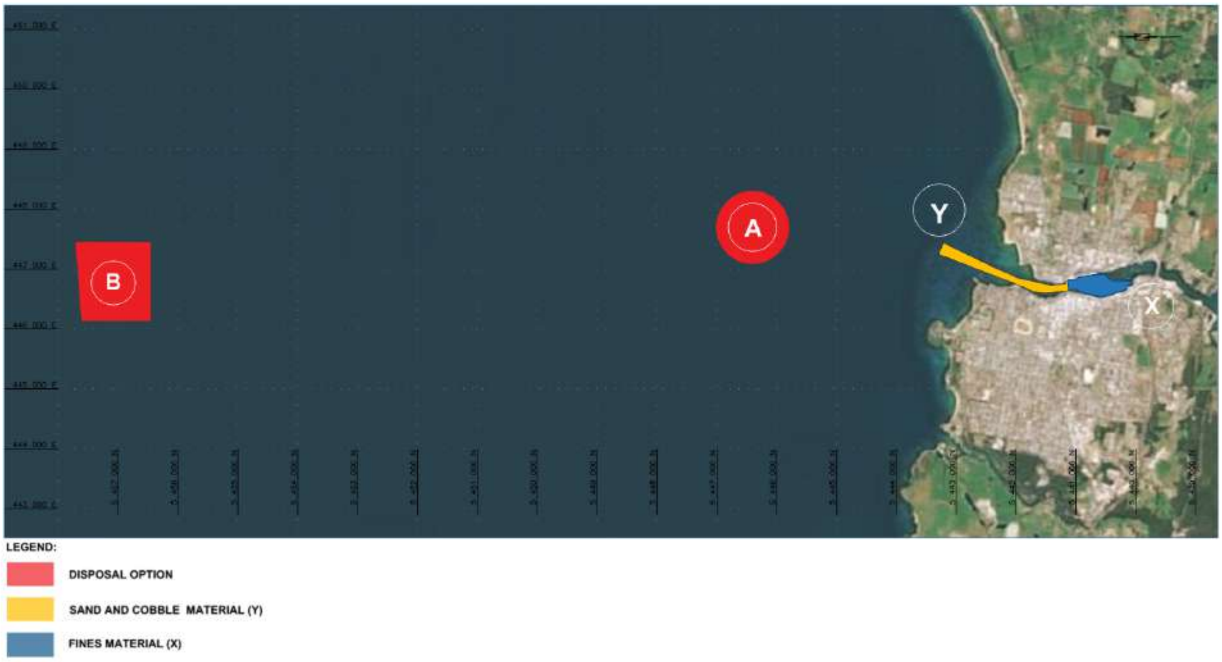

Figure 4. Map showing the locations of Existing Offshore and New Offshore Disposal Sites

3.3 Onshore Disposal

AWM and TasPorts actively looked for opportunities for beneficial re-use of the dredged material which is when the dredged spoil is used for another purpose. Examples for re-use can include beach renourishment, fill material erosion control, agriculture use or environmental enhancement. TasPorts advised there was limited demand for many of these beneficial re-use ideas, but beach renourishment should be considered.

AWM and TasPorts developed four options for onshore disposal:

1. Beneficial Re-use: Beach Renourishment

2. Dewatering and Landfill: TasPorts Land

3. Dewatering and Landfill: Nearby Land (e.g. Caltex Site)

4. Dewatering and Stockpile: Devonport Airport

The details and feasibility of these options are discussed in further detail in the following section.

1. <u>Beneficial Re-use Option: Beach Renourishment</u>

In this option, the sand material (Material Y) would be used for beach renourishment. There is an annual net littoral drift along the Devonport coastline from west to east, therefore the proposed disposal area is east of the port entrance channel at a suitable location with localized erosion, refer to Area C within Figure 5 as an example. This option would keep the sandy material within the coastal system.

Figure 5. Map showing the Beach Renourishment location

However, the feasibility of this option relies heavily on the physical and chemical properties of sediment in question - specifically grain size and contamination levels. Some of the accumulated material in the port entrance channel was moved by seabed levelling operations in late 2022. The operators described that the material was harder to move than expected and visual inspections indicated the material was a mixture of sand and clay. Therefore, Material X may not be considered suitable for re-use for beach renourishment due to its clay components Also in certain instances, within temperate Australian ports, the existence of historical contamination has led to heightened contaminant levels in dredged materials. As a result, these contaminated sediments pose specific challenges when it comes to their management and reuse opportunities which require careful consideration (Ports Australia, 2015). TasPorts also advises that there is no current request for the beach renourishment from stakeholders, therefore the placement of the material on the beach may not be a desirable outcome for local beach management. It was therefore determined that this was not a feasible option to receive the dredged material.

2. <u>Dewatering and Landfill: TasPorts Land</u>

AWM and TasPorts investigated parcels of land within TasPorts management that could be used for dewatering and then landfill disposal. The crown licence areas for TasPorts are shown in Area D within Figure 6. The crown licence covers port waters and, in some areas, extends on the land area adjoining the Port. Much of the alongside land is already committed to berth holders which makes it unfeasible the project.

TasPorts own a parcel of land at 110 Wright Street, East Devonport. Most of this vacant parcel is currently being used for the Quaylink Capital Dredge Project for dewatering and offsite transport and re-use. This site is under contractual control of the Quaylink contractor and in the future will be leased long term to TT-Line. Therefore, it will not be available for dewatering dredge spoil. The area is not feasible for this project as it is currently occupied and quite small for the expected dredge volume from this long-term project over a 10 year duration. It was therefore determined that this was not a feasible option to receive the dredged material.

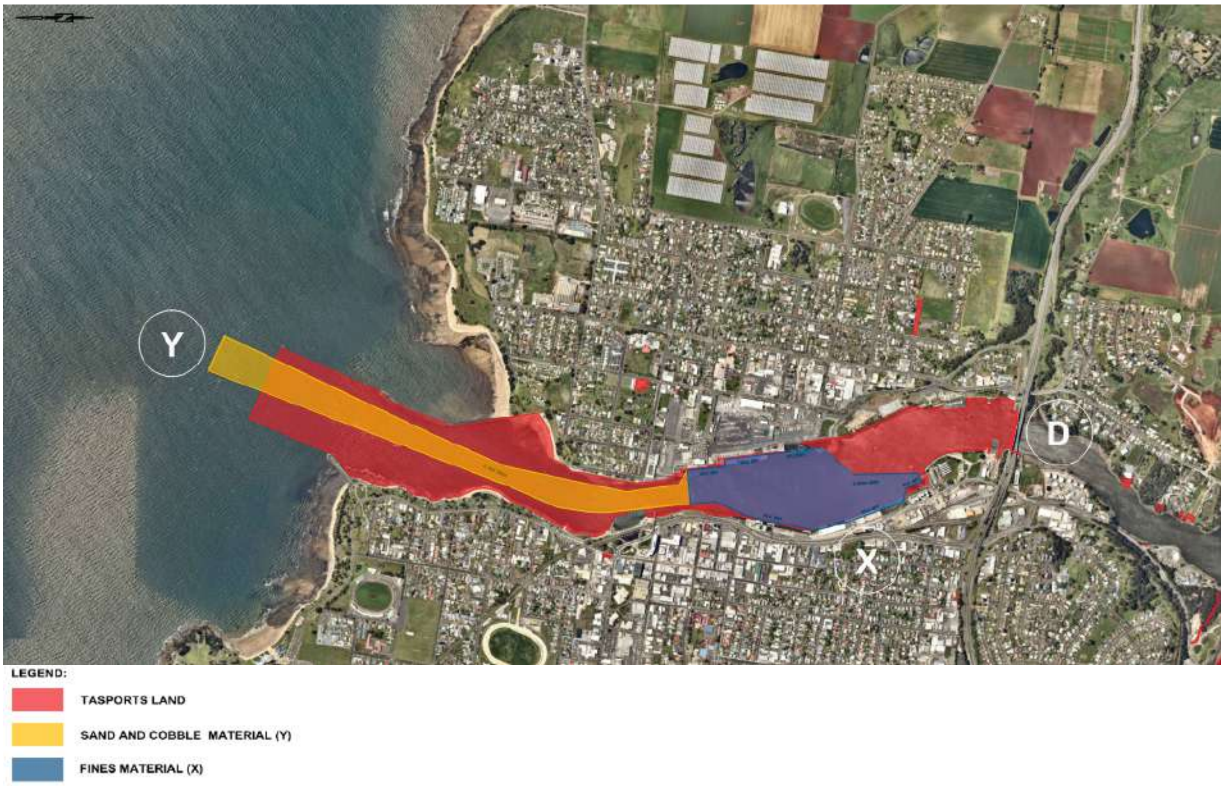

Figure 6. Map showing the TasPorts Land

3. <u>Dewatering and Landfill: Nearby Land (e.g. Caltex site or any other vacant land)</u>

AWM and TasPorts also investigated parcels of land near the Port that could be used for dewatering and then landfill disposal. One site which was considered was the Caltex site south of the Mersey Bridge that is currently vacant and approximately 1 hectare, refer to Area E within Figure 7. The Caltex owned parcel has limited size which limits sustainable dewatering. Further testing would also be required to determine if the site presents a contamination risk to the disposed material. It was therefore determined that this was not a feasible option to receive the dredged material.

Figure 7. Map showing the Caltex site

4. <u>Dewatering and Stockpile: Devonport Airport</u>

Located on Tasmania's Northwest Coast, the Devonport airport land is owned and operated by TasPorts which has a total area of 308 hectares. The Devonport Quaylink Project is currently disposing some of their dredge spoil to airport land to make bund stockpiles. QuayLink has proposed two stockpiles for their material: Stockpile 1 around 14,000m^3 and Stockpile 2 around 19,000m^3. The total stockpiled volume is expected to be around 33,000m^3 for Quaylink.

AWM and TasPorts considered whether a disposal area for dewatering could be established on the southwest part of the Devonport Airport land for this project. The material would then either be used for stockpiling or transferred to landfill. The site is not considered feasible to receive the expected maintenance dredging volumes over the 10-year period. Dewatering may be problematic from an approvals perspective with the airport having a disturbance of potential acid sulphate soils (PASS) overlay and any dewatering on site would be a risk of disturbance of the PASS, refer to Figure 9. Should this stockpile material be placed on land, certain management strategies must be used to prevent impacts on water quality. This can require for a significant logistical effort that is also quite costly (Ports Australia, 2015). The coastal reserve is sensitive environmentally from a flora and fauna perspective - each dredge campaign would require local council permission and EPA permits. It was therefore determined that this was not a feasible option to receive the dredged material.

Figure 8. Map showing the Devonport Airport Land

Figure 9. Map showing the PASS overlay

4 Criteria

To evaluate these options further, AWM developed a MCA tool. The MCA included a list of important criteria to ensure the environmental, social, and economic impacts of each disposal option could be further assessed. There were specific objectives listed for each criterion as shown in Table 3. The AWM and TasPorts project team then undertook a workshop to rank the importance of each criterion relative to another criterion. The ranking is provided within the MCA in Appendix A.

A progress update of the MCA was then presented to stakeholders for endorsement at the Devonport TACC in September 2022. There were no objections forthcoming so the MCA methodology was considered approved.

A scoring system was then developed to enable the assessment of the options with the focus on whether the option met or prevented the objective as shown in Table 3.

Table 3. Criteria for Option Analysis

Criteria	Objectives
Environment - Marine	• Minimise adverse impacts on marine ecosystem sensitive receptors, including but not limited to giant kelp beds, scallop beds • Minimise adverse impacts on listed threatened, migratory and other protected marine fauna
Environment - Other	• Minimise risks to human health (e.g. noise, pollution) • Minimise greenhouse gas emissions • Minimise risks to terrestrial flora and fauna
Community/Reputational Impacts	• Minimise adverse impacts on Devonport community • Minimise adverse impacts on cultural heritage values • Minimise adverse impact on marine ecosystem reliant commercial activities (e.g. commercial and recreational fishing, aquaculture) • Minimise reputational damage to marine ecosystem reliant commercial industry • Maximise TasPorts reputation for environmental best practice
Health & Safety	• Minimise health & safety risks associated with dredging operations
Economic	• Maximise cost efficiency of dredging and dredged material placement • Minimise commercial impacts on TasPorts • Demonstrates sound commercial practice and aligns with TasPorts/the states economic objectives
Long term dredging & disposal	• Maximise the potential capacity of the placement area to accommodate future dredging campaigns

The AWM and TasPorts project teams then undertook a workshop to rank each option and provide a weighting score for each criteria. This was based on a scoring system to determine the importance of one criterion relative to another. The ranking is provided within the MCA in Appendix A. The criteria were ranked from most important to least important:

1. Environment- Marine (27%)
2. Environment- Other (20%)
3. Health & Safety Risks (20%)
4. Economic (17%)
5. Community/Reputational Impacts (10%)
6. Long term dredging and disposal (6%)

Table 4. Scoring system for Option Analysis

Scoring system	
1 to 2	Prevents objective
3 to 4	Against objective
5 to 6	Partially fails objective
7 to 8	Meets objective
9 to 10	Exceeds objective

5 MCA Assessment

5.1 Overview

TasPorts and AWM conducted an MCA Workshop on 7th March 2023 to assess the preferred option(s) and to ensure all alternatives to ocean disposal had been considered. The result of the assessment were presented to the Devonport TACC in March 2023.

5.2 Workshop Attendees

The workshop attendees comprised professionals with different specializations and backgrounds as shown in Table 5. AWM presented a background to the project, the key objectives, the design and disposal options were explained, the criterion and the objectives, and then the scoring system. The attendees were asked to discuss and score Option 1 to Option 6 against each criterion.

A reminder that Option 7 to Option 10, which all contained various land-based disposal options were not considered in this workshop as they are not feasible options. During the workshop, the option for the Airport Land Disposal was raised as Option 11 which was previously discussed in section 3.3.

Table 5. Workshop Attendees

Name	Organisation	Role
Rhys Menadue	TasPorts	Dredge Program Manager
Michel de Vos	TasPorts	General Manager Assets and Technical Services
Mick Wall	TasPorts	Harbour Master
Caroline Lindus	TasPorts	Community and Stakeholder Engagement
Andrew Larsen	TasPorts	Health & Safety
Susan McLeod	TasPorts	Manager Environment & Sustainability
Kathryn Wheatley	TasPorts	Environmental Project Manager
Tom Atkins (apology)	AW Maritime	Engineering
Catherine Bell	AW Maritime	Engineering (Workshop Facilitator)
Angela Gregore	AW Maritime	Engineering

5.3 Workshop Discussion

There was suitable discussion on the merits (or otherwise) of each option from the attendees prior to scoring. The attendees discussed several topics prior to a consensus on scoring. In assessing the options, the following topics that were mentioned and discussed. The scoring is shown in Table 6.

Environment - Marine

- Proximity to the scallop beds
- Proximity to nearshore receptors
- Capacity of disposal area (size and shape)
- Presence of three Seagrass beds
- Presence of one Kelp bed near the entrance of the port
- Proximity of the shipping channel to the disposal area
- Water depth
- Previous use of the disposal area
- Whether the disposal area would be dispersive or retentive
- The use of a sinker line in the delivery of dredged material

Environment - Other

- Greenhouse gas emissions, fuel consumption and its relation to sailing distances.
- The penguins and nesting birds in front of the airport
- Possible noise of pumping cobbles

	• Retaining the sand within the coastal system
Community/Reputational Impacts	• Community expectation to undertake dredging • Previously raised concerns from the TACC • Previously raised issues regarding sediment transport from the existing site to scallops bed (closest transact- 6km and furthest is 12km) • Disinterest from council on beach renourishment • Suitable colour of dredged material
Health & Safety	• Different work methodologies for each option • Public interaction • Weather conditions • Maximum safe operating limit of vessels • Crew transfer • Interaction with maritime traffic and shipping
Economic	• Preliminary cost estimates, • Relative cost of one option in comparison to one another • TasPorts overall budget • Dredge cycle time • Need for land-based equipment, additional surveys and investigations • Pipelines across the seabed • Sailing distances
Long term dredging & disposal	• Disposal area being used multiple times within 10-year period • Capacity of the area to receive the total expected volume • Whether it the disposal area is retentive or dispersive • Wave conditions

Table 6. Workshop Scoring Results for Option 1 to Option 6

	Option 1	**Option 2**	**Option 3**	**Option 4**	**Option 5**	**Option 6**
	No dredging	**Sea disposal**	**Sea disposal**	**Sea disposal**	**Combination**	**Combination**
		Sea disposal - all material disposed at existing disposal site	Sea disposal - all material disposed at new offshore disposal site	Sand & cobble material disposed at existing disposal site & fines disposed at new offshore disposal site	Re-use of sand & cobble material for beach renourishment & offshore disposal of fines at existing disposal site	Re-use of sand & cobble material for beach renourishment & offshore disposal of fines at new offshore disposal site
Environment - Marine	7	7	9	8	7	9
Environment - Other	7	8	6	7	7	6
Community / Reputational Impacts	3	1	9	7	1	5
Health & Safety Risks	7	8	7	8	7	7
Economic	1	10	8	9	8	7
Long term dredging and disposal	1	7	9	8	7	7
Score	**26**	**41**	**48**	**47**	**37**	**41**

5.4 Results

Following the workshop, the weighted criteria were applied against the option scores, which calculated the results of the MCA (higher score indicates the preferred option). Option 3, disposing at the new offshore disposal site, achieved the highest score of 783 points. Option 4 which is a combination of dredge spoil disposing at both the new and existing offshore disposal sites scored 10 points lower than Option 3. Therefore, Option 3 weighted results demonstrate that it is the most suitable option for the disposal of both dredge Material X and Y - where all dredged material will be placed at the new offshore disposal site.

As the preferred option, Option 3 exceeds the objectives in terms of the consideration of marine environment, the community/reputational impact and long- term dredging and disposal criteria. The health and safety risk criteria and economic criteria both meet the objectives for this option. It scored lower in terms of environment-other due to the longer sailing distance, likely contributing to higher emissions of greenhouse gases compared to other options.

Table 7. MCA Weighted Percentage Results

Options	Score	Dredging	Disposal Location
Option 1	520	No Dredging	n/a
Option 2	730	Sea Disposal- Material X and Y	Existing Offshore Disposal
Option 3	**783**	**Sea Disposal- Material X and Y**	**New Offshore Disposal**
Option 4	773	Sea Disposal- Material Y	Existing Offshore Disposal Site
		Sea Disposal- Material X	New Offshore Disposal Site
Option 5	657	Re-use of Material Y	Beach Renourishment Site
		Sea Disposal- Material X	Existing Offshore Disposal Site
Option 6	713	Re-use of Material Y	Beach Renourishment Site
		Sea Disposal- Material X	New Offshore Disposal Site

6 Stakeholders

TasPorts has consulted with potentially affected stakeholders throughout the options analysis process. In September 2022, the TACC were informed of the ten options, the criteria for assessment and the weightings applied to each criterion. There was no objection from the TACC and the TACC were supportive of the transparent process.

Following the MCA workshop and results, the outcome of MCA was presented on the TACC on 20th March 2023. The TACC were happy with the proposal and provided their full support.

7 Conclusion

This option analysis report summarises the key objectives and criteria considered during the workshop for determining the preferred option for the Port of Devonport Maintenance Dredging Project. It outlines the various dredging options evaluated, and recommends a preferred option based on economic, social, and environmental factors. The report provides a comprehensive analysis of the options explored and identifies the benefits and drawbacks of each option. After a thorough analysis, it became apparent that Options 7 through 11 did not align with the project's intended goals due to multiple factors. In the end, the analysis concluded Option 3 with all dredged material to the new offshore disposal site, as the preferred dredging option with detailed justification.

APPENDIX A – Multi-Criteria Analysis Results

Port of Devonport Maintenance Dredging: Options Analysis

Revision F: 08/03/2022

Gray cells automatically calculate

Score each criteria with a 2, 1 or 0 as follows

2	The criterion in the column is more important than the criterion in the row
1	The criterion in the column is of equal importance to the criterion in the row.
0	The criterion in the column is of less importance than the criterion in the row.

CRITERION	CODE	A (Environment - Marine)	B (Environment - Other)	C (Community / Reputational Impacts)	D (Health & Safety Risks)	E (Economic)	F (Long term dredging and disposal)	Weighting % (WEIGHTING)	Ranking No. (RANKING)
Environment - Marine	A		0	1	0	1	0	26.7	1
Environment - Other	B	2		1	0	1	0	20.0	2
Community / Reputational Impacts	C	1	1		2	1	2	10.0	5
Health & Safety Risks	D	2	2	0		0	0	20.0	2
Economic	E	1	1	1	2		0	16.7	4
Long term dredging and disposal	F	2	2	0	2	2		6.7	6
Sum of Scores	**30**	**8**	**6**	**3**	**6**	**5**	**2**	**100**	**-**
Ranking		1	2	5	2	4	6		
Weighting	100	26.7	20.0	10.0	20.0	16.7	6.7		

Score 1 - 10

CRITERION	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9	Option 10	Option 11
		Sea disposal	**Sea disposal**	**Sea disposal**	**Combination**	**Combination**	**Combination**	**Re-use**	**Re-use**	**Land disposal**	**Re-use**
	No dredging	Sea disposal - all material disposed at existing disposal site	Sea disposal - all material disposed at new offshore disposal site	Sand & cobble material disposed at existing disposal site & fines dispose at new offshore disposal site	Re-use of sand & cobble material for beach renourishment & offshore disposal of fines at existing disposal site	Re-use of sand & cobble material for beach renourishment & offshore disposal of fines at new offshore disposal site	Re-use of sand & cobble materialal for beach renourishment & dewatering of fines for land fill disposal	Re-use of sand & cobble material for beach renourishment & dewatering of fines for re-use onshore	Dewatering and re-use of all dredged material onshore near Port	Dewatering and disposal of all dredged material to landfill	Dewatering and re-use of all dredged material onshore at Devonport Airport
Environment - Marine	7	7	9	8	7	9					
Environment - Other	7	8	6	7	7	6					
Community / Reputational Impacts	3	1	9	7	1	5					
Health & Safety Risks	7	8	7	8	7	7					
Economic	1	10	8	9	8	7					
Long term dredging and disposal	1	7	9	8	7	7					
Weighting	26	41	48	47	37	41	0	0	0	0	0

Criteria Definition

Criteria	Objectives
Environment - Marine	- Minimise adverse impacts on marine ecosystem sensitive receptors, including but not limited to giant kelp beds, scallop beds - Minimise adverse impacts on listed threatened, migratory and other protected marine fauna
Environment - Other	- Minimise risks to human health (e.g. noise, pollution) - Minimise greenhouse gas emissions - Minimise risks to terrestial flora and fauna
Community/Reputational Impacts	- Minimise adverse impacts on Devonport community - Minimise adverse impacts on culturual heritage values - Minimise adverse impact on marine ecosystem reliant commercial activities (e.g. commerical and recreational fishing, aquaculture) - Minimise reputational damage to marine ecosystem reliant commerical industry - Maximise TasPorts reputation for environmental best practice
Health & Safety	- Minimise health & safety risks associated with dredging operations
Economic	- Maximise cost efficiency of dredging and dredged material placement - Minimise commercial impacts on Tasports - Demonstrates sound commercial practice and aligns with Tasports/the states economic objectives
Long term dredging & disposal	- Maximise the potential capacity of the placement area to accommodate future dredging campaigns

Scoring system

1 to 2	Prevents objective
3 to 4	Against objective
5 to 6	Partially fails objective
7 to 8	Meets objective
9 to 10	Exceeds objective

Port of Devonport Maintenance Dredging: Options Analysis

Revision F: 08/03/2022

Gray cells automatically calculate

Score each criteria with a 2, 1 or 0 as follows

2	The criterion in the column is more important than the criterion in the row
1	The criterion in the column is of equal importance to the criterion in the row.
0	The criterion in the column is of less importance than the criterion in the row.

CRITERION	CODE	Environment - Marine A	Environment - Other B	Community / Reputational Impacts C	Health & Safety Risks D	Economic E	Long term dredging and disposal F	Weighting % WEIGHTING	Ranking No. RANKING
Environment - Marine	A		0	1	0	1	0	**26.7**	**1**
Environment - Other	B	2		1	0	1	0	**20.0**	**2**
Community / Reputational Impacts	C	1	1		2	1	2	**10.0**	**5**
Health & Safety Risks	D	2	2	0		0	0	**20.0**	**2**
Economic	E	1	1	1	2		0	**16.7**	**4**
Long term dredging and disposal	F	2	2	0	2	2		**6.7**	**6**
Sum of Scores	**30**	**8**	**6**	**3**	**6**	**5**	**2**	**100**	**-**
Ranking		1	2	5	2	4	6		
Weighting	100	26.7	20.0	10.0	20.0	16.7	6.7		

Weighted Score

Criterion	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9	Option 10	Option 11
	No dredging	Sea disposal	Sea disposal	Sea disposal	Combination	Combination	Combination	Re-use	Re-use	Land disposal	Re-use
		Sea disposal - all material disposed at existing disposal site	Sea disposal - all material disposed at new offshore disposal site	Sand & cobble material disposed at existing disposal site & fines dispose at new offshore disposal site	Re-use of sand & cobble material for beach renourishment & offshore disposal of fines at existing disposal site	Re-use of sand & cobble material for beach renourishment & offshore disposal of fines at new offshore disposal site	Re-use of sand & cobble material for beach renourishment & dewatering of fines for land fill disposal	Re-use of sand & cobble material for beach renourishment & dewatering of fines for re-use onshore	Dewatering and re-use of all dredged material onshore near Port	Dewatering and disposal of all dredged material to landfill	Dewatering and re-use of all dredged material onshore at Devonport Airport
Environment - Marine (A)	187	187	240	200	187	240	0	0	0	0	0
Environment - Other (B)	140	160	120	140	140	120	0	0	0	0	0
Community / Reputational Impacts (C)	30	10	90	70	10	50	0	0	0	0	0
Health & Safety Risks (D)	140	160	140	160	140	140	0	0	0	0	0
Economic (E)	17	167	133	150	133	117	0	0	0	0	0
Long term dredging and disposal (F)	7	47	60	53	47	47	0	0	0	0	0
Ranking	6	3	1	2	5	4	7	7	7	7	7
Weighting	**520**	**730**	**783**	**773**	**657**	**713**	**0**	**0**	**0**	**0**	**0**

Criteria Definition

Criteria	Objectives
Environment - Marine	- Minimise adverse impacts on marine ecosystem sensitive receptors, including but not limited to giant kelp beds, scallop beds - Minimise adverse impacts on listed threatened, migratory and other protected marine fauna
Environment - Other	- Minimise risks to human health (e.g. noise, pollution) - Minimise greenhouse gas emissions - Minimise risks to terrestial flora and fauna
Community/Reputational Impacts	- Minimise adverse impacts on Devonport community - Minimise adverse impacts on cultural heritage values - Minimise adverse impact on marine ecosystem reliant commercial activities (e.g. commerical and recreational fishing, aquaculture) - Minimise reputational damage to marine ecosystem reliant commerical industry - Maximise TasPorts reputation for environmental best practice
Health & Safety	- Minimise health & safety risks associated with dredging operations
Economic	- Maximise cost efficiency of dredging and dredged material placement - Minimise commercial impacts on Tasports - Demonstrates sound commercial practice and aligns with Tasports/the states economic objectives
Long term dredging & disposal	- Maximise the potential capacity of the placement area to accommodate future dredging campaigns

Annex C Dredge Plume Modelling Report

Port of Devonport Maintenance Dredging

Dredge Plume Modelling Report

Tasmanian Ports Corporation Pty Ltd

14 August 2024

→ **The Power of Commitment**

Project name	Port of Devonport Dredge Plume Modelling							
Document title	Port of Devonport Maintenance Dredging | Dredge Plume Modelling Report							
Project number	12609440							
File name	12609440-REP-B_Port of Devonport Dredge Plume Modelling Report.docx							
Status Code	Revision	Author	Reviewer		Approved for issue			
			Name	Signature	Name	Signature	Date	
S3	A	L Villaflor	T Sullivan		J. Romero		18/03/24	
S4	0	L Villaflor	T Sullivan		J. Romero		14/08/24	

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Executive Summary

Tasmanian Ports Corporation Pty Ltd (TasPorts) plans to undertake maintenance dredging with a Trailer Suction Hopper Dredger (TSHD) in the Port of Devonport (the Project). GHD Pty Ltd (GHD) was engaged by TasPorts to provide numerical modelling services for the proposed dredging and spoil disposal activity to predict the potential impacts of the dredging-induced suspended sediment concentrations (SSC) and sedimentation on the known environmental receptors in the region.

TasPorts plans to dredge a total volume of 473,043 m^3 of sediments at the Port of Devonport for the dredging campaign that is anticipated to begin in September 2024. Dredging will be undertaken within the Entrance Channel and Inner Harbour with two separate dredging methodologies. The proposed dredge volumes at each location are similar, with 232,188 m^3 at the Entrance Channel and 240,857 m^3 at the Inner Harbour. The proposed duration of dredging for the campaign is 18 weeks, comprising a combined 6.5 weeks at the Entrance Channel and 11.5 weeks at the Inner Harbour. Dredged material will be disposed of at a nominated Dredge Spoil Disposal Ground (DSDG) located approximately 15 km north-northwest of Devonport.

Three-dimensional hydrodynamic and wave modelling was undertaken to provide inputs to a sediment transport model that was utilised to predict the dispersion, deposition and resuspension of fine particles (clay, silt) released to the water column during the dredge program. The models were verified against measured water levels, currents and waves from an offshore site near the DSDG, and for water levels and waves at a second location within the Port of Devonport.

The release rates of fine sediments from the dredging and disposal activities were informed by site-specific sediment sampling undertaken in 2023 and an industry best-practice approach for deriving sediment ‘source terms’ from the TSHD drag-head, overflows from the hopper (within the Entrance Channel only – no overflow to be permitted within the Inner Harbour) and disposal at the DSDG.

On the basis of defined thresholds adopted for this study, the impacts are summarised as follows:

– The Zone of Influence (ZoI), representing an aesthetic threshold where changes in environmental quality are anticipated but unlikely to yield detectable impacts to benthic biota, is predicted to extend ~10 km east, ~14 km west and ~3 km offshore from Devonport, ~4 km upstream to the tidal flats in the upper Mersey River estuary, and ~2.5 km surrounding the disposal ground. The ZoI does not extend to the historical commercial scallop beds.
– The Zone of Moderate Impact (ZoMI), where predicted impacts to benthic organisms are likely but expected to be recoverable within a 5-year period, is predicted to extend ~2.25 km east, ~2.5 km west and ~3 km upstream from Devonport. The ZoMI is not predicted to overlap the nearest seagrass habitat at ~2.75 km east of the Entrance Channel (ZoMI edge is ~500 m from the habitat location). There is no predicted ZoMI at the DSDG resulting from the offshore disposal of dredge spoil.
– The Zone of High Impact (ZoHI), where impacts to benthic organisms are expected to be irreversible, is predicted to be localised primarily within the boundaries of the dredging areas, and up to ~2.25 km upstream from the Port. It is noted however that the entirety of the dredged areas and the DSDG should be considered within the ZoHI, regardless of the modelling outputs (that only simulate fine SSC), since the seabed at these locations will be permanently disrupted from the dredging and disposal activities.

Further, an assessment of simulated bed shear stresses indicates that the DSDG is a retentive zone that is unlikely to result in any significant transport of disposed sediments from the site.

The dredge program is predicted to cause elevated SSC within the Mersey River that may impact upon the migration of the Australian grayling that typically occurs between mid-September to mid-November. Mitigative protocols to reduce these potential impacts during the migration period may include more focussed dredging efforts in the Entrance Channel and reduced dredging within the Inner Harbour to reduce suspended sediment concentrations within the Mersey River.

This report is subject to, and must be read in conjunction with, the limitations set out in section 1.4 and the assumptions and qualifications contained throughout the Report.

Contents

Table index

Figure index

Appendices

1. Introduction

1.1 Background

Tasmanian Ports Corporation Pty Ltd (TasPorts) plans to undertake maintenance dredging with a Trailer Suction Hopper Dredger (TSHD) in the Port of Devonport (the Project). GHD Pty Ltd (GHD) was engaged by TasPorts to provide numerical modelling services for the proposed dredging and spoil disposal activity.

The modelling study includes three-dimensional (3D) hydrodynamic, wave and sediment transport modelling to predict the following:

- The potential impacts of the dredging-induced total fines[1] suspended sediment concentration (SSC) and sedimentation on the known environmental receptors in the region.
- An assessment of whether the proposed spoil ground is likely to be dispersive or retentive.

1.2 Purpose of this report

The purpose of this report is to present the numerical modelling study that was carried out to evaluate the impacts of the proposed dredging and spoil disposal activity at the Project site.

1.3 Scope of work

The scope of the modelling study included the following tasks:

- Establish validated 3D hydrodynamic and 2D wave models to simulate oceanographic processes at the Port of Devonport, Mersey River and coastal marine environment.
- Simulate TSHD dredging with a sediment dispersion model with hydrodynamic and wave modelling results as inputs to predict the dispersion, settling and resuspension of fine sediments within the marine and estuarine environments.
- Develop marine impact thresholds for SSC and deposition that are ecologically relevant for the known environmental receptors in the Project region.
- Map the spatial extent of SSC and sedimentation impacts from the proposed dredging and disposal activity.
- On the basis of simulated bed shear stresses from currents and waves, evaluate whether the proposed spoil ground is likely to be dispersive or retentive in regards to the measured sediment particle sizes of the dredge material to be deposited at this site.

1.4 Limitations

This report: has been prepared by GHD for Tasmanian Ports Corporation Pty Ltd and may only be used and relied on by Tasmanian Ports Corporation Pty Ltd for the purpose agreed between GHD and Tasmanian Ports Corporation Pty Ltd as set out in section 1.2 of this report.

GHD otherwise disclaims responsibility to any person other than Tasmanian Ports Corporation Pty Ltd arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by Tasmanian Ports Corporation Pty Ltd and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond

[1] Fine sediment particles (clay [0-4 µm] and silt [4-63 µm]) can be transported substantive distances by currents prior to settling from the water column and are referred to as SSC here. Sand and larger particles (>63 µm) typically settle from the water column in relative proximity to dredging activities.

the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

GHD has prepared the MIKE model ("Model") for, and for the benefit and sole use of, Tasmanian Ports Corporation Pty Ltd to support the assessment of maintenance dredging impacts and must not be used for any other purpose or by any other person.

The Model is a representation only and does not reflect reality in every aspect. The Model contains simplified assumptions to derive a modelled outcome. The actual variables will inevitably be different to those used to prepare the Model. Accordingly, the outputs of the Model cannot be relied upon to represent actual conditions without due consideration of the inherent and expected inaccuracies. Such considerations are beyond GHD's scope.

The information, data and assumptions ("Inputs") used as inputs into the Model are from publicly available sources or provided by or on behalf of the Tasmanian Ports Corporation Pty Ltd, (including possibly through stakeholder engagements). GHD has not independently verified or checked Inputs beyond its agreed scope of work. GHD's scope of work does not include review or update of the Model as further Inputs becomes available.

The Model is limited by the mathematical rules and assumptions that are set out in the Report or included in the Model and by the software environment in which the Model is developed.

The Model is a customised model and not intended to be amended in any form or extracted to other software for amending. Any change made to the Model, other than by GHD, is undertaken on the express understanding that GHD is not responsible, and has no liability, for the changed Model including any outputs.

2. Project context

2.1 Overview of dredging project

TasPorts plans to dredge a total volume of 473,043 m^3 of sediments at the Port of Devonport for the 2024 dredging campaign. AW Maritime are engaged by TasPorts to carry out dredging with the following methodology:

- Dredging will be undertaken within the Entrance Channel and Inner Harbour with two separate dredging methodologies. The proposed dredge volumes at each location are similar, with 232,188 m^3 at the Entrance Channel and 240,857 m^3 at the Inner Harbour.
- Trailer Suction Hopper Dredger (TSHD) Albatros, shown in Figure 1, is likely to be used for the dredging works. Including standby time and estimated delays to dredging operations (e.g. due to weather), the TSHD is assumed to operate 138 hours per week (i.e. 30 hours per week of down-time on average).
- The proposed duration of dredging for the campaign is 18 weeks, comprising a combined 6.5 weeks at the Entrance Channel and 11.5 weeks at the Inner Harbour. Dredging of the Entrance Channel and Inner Harbour will be progressed in parallel, with both locations likely to be dredged by the TSHD intermittently during each day of the dredge program. The greater total dredging time at the Inner Harbour is due a commitment for no overflow from the TSHD hopper, which reduces the total storage capacity of the TSHD, requiring a greater number of dredge cycles compared to the Entrance Channel dredging (where overflow will be allowed).
- Figure 2 shows the identified locations for dredging wherein the sediments have accumulated above the design depth.
- Dredged material will be disposed of at a nominated Dredge Spoil Disposal Ground (DSDG) located approximately 15 km north-northwest of Devonport.
- The dredging program is currently scheduled to begin in September 2024.

Figure 1 TSHD Albatros
Source: **https://www.dutchdredging.nl/en/equipment/trailing-suction-hopper-dredger/albatros**

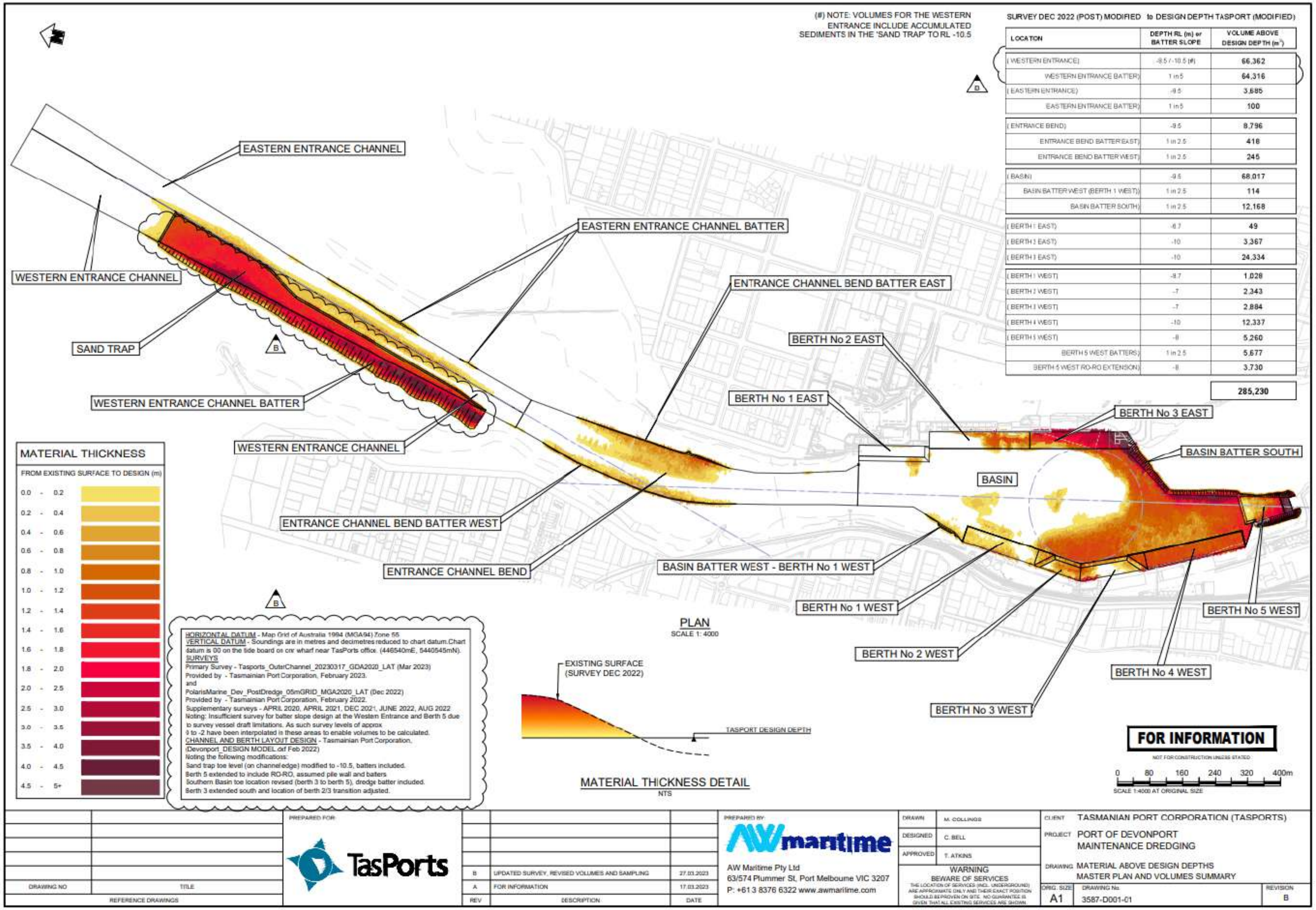


Figure 2 ***Areas to undergo dredging operations (Image provided by TasPorts)***

2.2 Surrounding environment

Figure 3 shows the location of the Port of Devonport in relation to the DSDG, historical commercial scallop beds and seagrass habitats. A seagrass habitat located ~2.75 km east of the Entrance Channel is the nearest sensitive environmental receptor to the dredging activity, while the commercial scallop bed located ~10 km northeast has historical commercial value.

An additional consideration for dredging operations is the migration of the Australian grayling, which move through the estuarine waters of Tasmania as whitebait between mid-September until mid-November while river flows remain relatively low. Australian grayling exposed to elevated turbidity induced by dredging may experience negative ecological effects (e.g. clogging of gills).

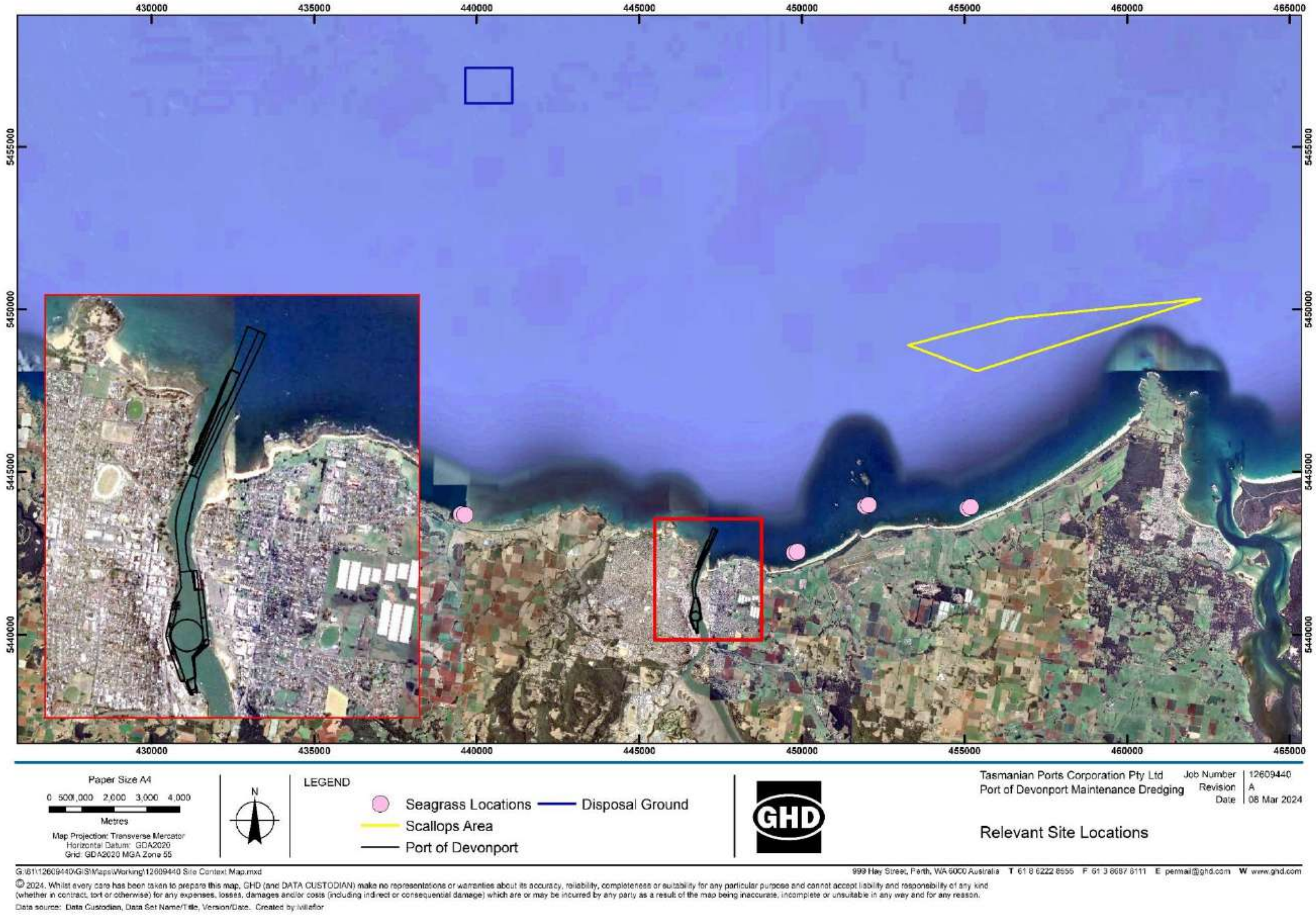


Figure 3 ***Relevant site locations for the project***

3. Inputs and methodology

3.1 Hydrodynamic and wave modelling

3.1.1 Modelling strategy

The objective of the modelling is to determine the potential impacts from the proposed dredging and dredge spoil disposal. The dispersion, settling and resuspension (erosion) of fine sediments in the near-shore environment is determined by factors such as wave climate, water levels and tidal flows. To simulate these key processes, the following numerical models were used:

– The Danish Hydraulic Institute's (DHI's) MIKE Three-Dimensional (3D) Flexible Mesh (FM) Hydrodynamic (HD) model was used to simulate the 3D hydrodynamics that result from tides, winds, the Coriolis force and air pressure variations. The unstructured FM allows maximum flexibility for tailoring grid resolution in the model domain to optimise computational performance by provided high resolution in the areas surrounding the Project site and lower resolution elsewhere, where impacts are unlikely.

– DHI's MIKE FM Spectral Wave (SW) model was used to simulate the growth, transformation, and decay of wind-generated waves and swells in the offshore and nearshore areas.

The following datasets provided boundary conditions for these models:

– Hindcast wave height, period and direction data from the Centre for Australian Weather and Climate Research (CAWCR) wave model (Durrant et al. 2019) were applied at the offshore boundaries of the MIKE FM SW model to incorporate the effect of the offshore swells.

– Spatially and temporally varying simulated winds from the Climate Forecast System Version 2 (CFSv2) at 0.2 degrees resolution (Suranjana et. al. 2014) were applied across the surface of the model domain for both the 3D HD and SW models.

– Hydrodynamic inputs of spatially varying water levels for the HD model were from a combination of astronomical tides from the global tide model TPXO9 (Egbert and Erofeeva, 2002) and non-astronomical water levels from the Hybrid Coordinate Ocean Model (HYCOM) at 1/12° horizontal resolution and 3-hourly temporal resolution (Chassignet et al., 2007). Further, horizontally, vertically and temporally varying currents, temperatures and salinities were applied at the model open boundaries from the HYCOM dataset.

The HD and SW models provide the current and wave inputs to the particle model:

– The MIKE 3 (3D) Mud Transport (MT) model was used to simulate the dispersion, deposition and erosion (re-suspension) of fine sediments released to the water column during the dredging and spoil disposal activities.

The modelling framework is conceptualized in Figure 4.

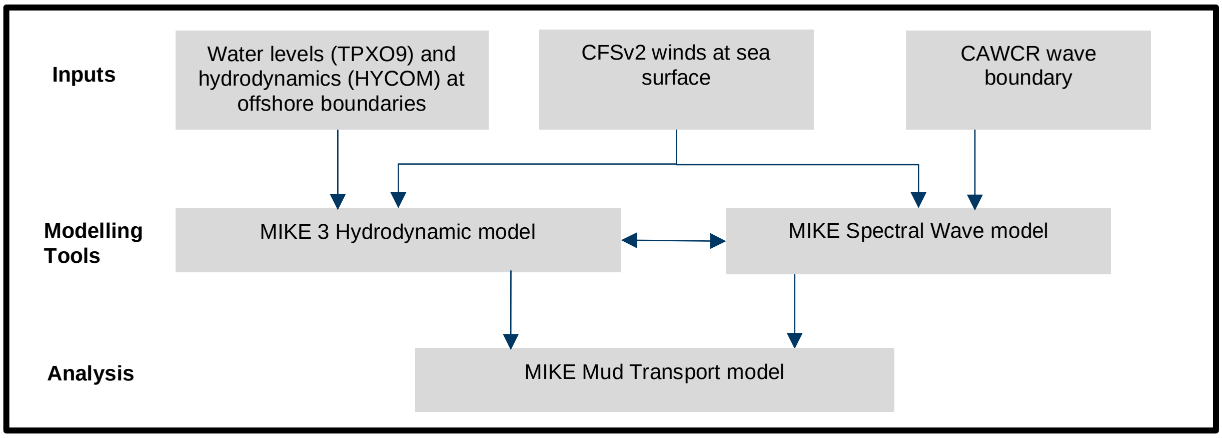


Figure 4 Modelling framework

3.1.2 Model domain

The model domain (Figure 5-Figure 7) covers the Port of Devonport, upstream tidal sections of the Mersey River, and a roughly rectangular section of coastal Bass Strait waters extending approximately 50 km east and west of Devonport and ~30 km offshore.

The model bathymetry was prepared from the following data sources, in order of highest to lowest priority:

- A 0.5 m resolution Digital Elevation Model (August 2023) at the Port of Devonport provided by TasPorts.
- A 1 m resolution survey of the proposed disposal ground provided by TasPorts.
- A 5 m resolution Digital Elevation Model derived from LiDAR data for Australia from Geoscience Australia (2015)
- A 30 m resolution Digital Elevation Model (DEM) of the Bass Strait from Geoscience Australia (Beaman, R.J., 2022)
- Digitised nautical chart bathymetry extracted from the MIKE C-MAP database.

Additionally, a post-dredge model bathymetry was generated (Figure 8) incorporating design dredge depths for the Entrance Channel and Inner Harbour supplied by TasPorts. The post-dredge bathymetry was used to approximate depths within the Port of Devonport toward the latter half of the dredge program, after significant dredging has occurred.

The vertical layers were configured as a combination of dynamic sigma layers in the surface and fixed z-level layers thereafter as follows:

- Three evenly apportioned sigma layers in the surface above -9 m MSL
- Eight z-level layers below the sigma layers of thickness 3, 8, 8, 8, 8, 8, 10 and 10 m thereafter.

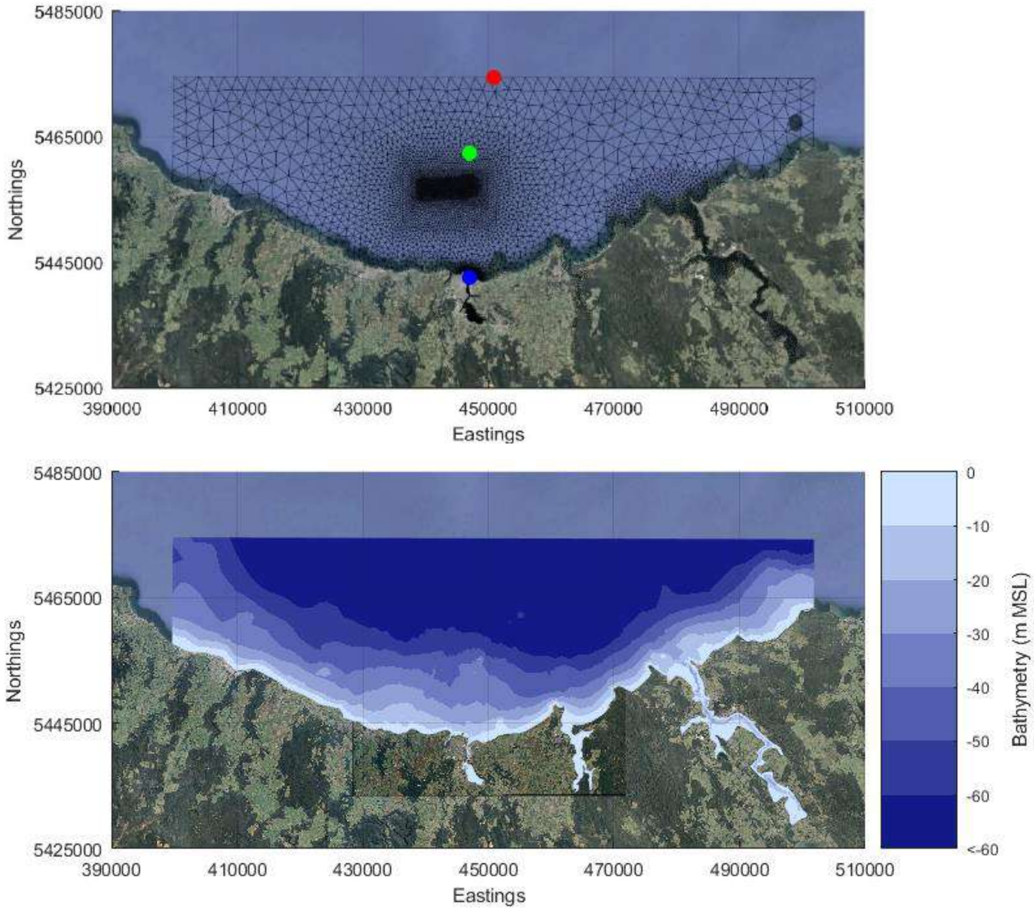


Figure 5 *Model mesh (top) and bathymetry (bottom) of the domain with the blue dot showing the location of the project location*[2]

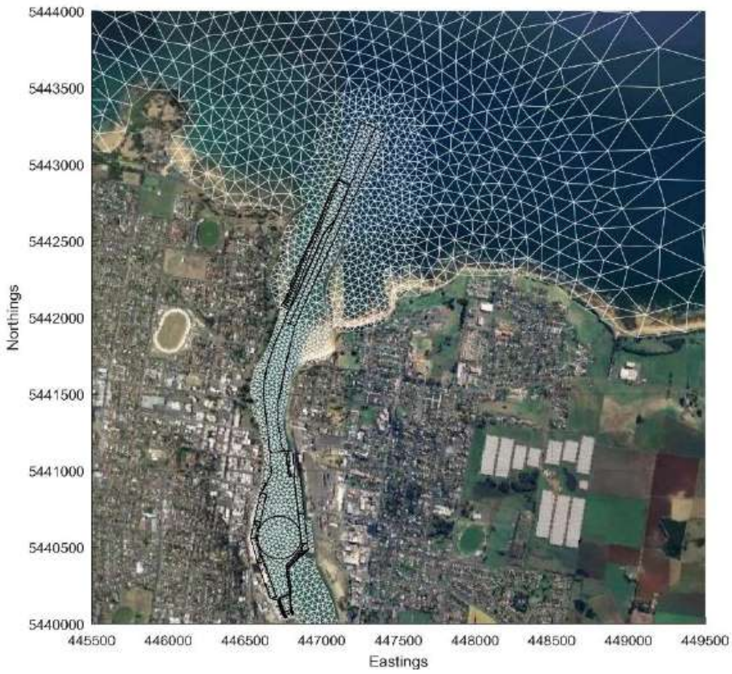


Figure 6 *Model mesh at the Port of Devonport showing the Inner Harbour and Entrance Channel*

[2] The red dot is located at the central node of the northern boundary where example model inputs are presented in sections 3.2.2.2, 3.2.3, 3.2.5 and 3.2.6. The green dot is located within the domain where the example wind model inputs are presented in section 3.2.4.

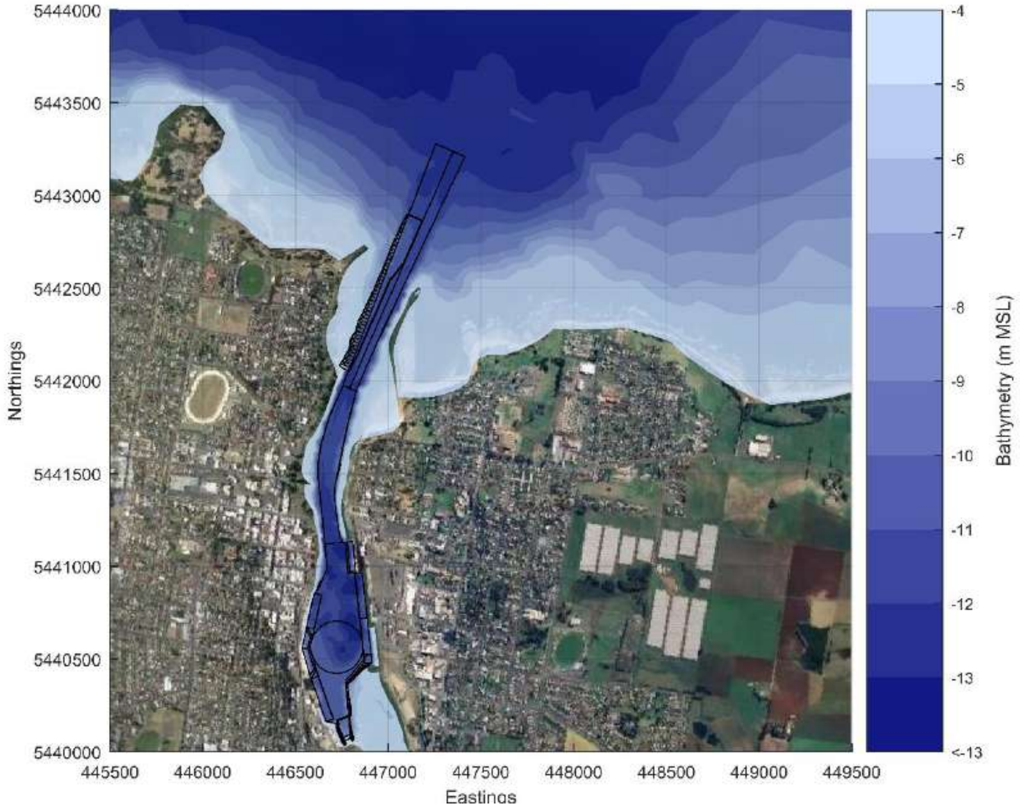


Figure 7 ***Baseline model bathymetry at the Port of Devonport showing the Inner Harbour and Entrance Channel***

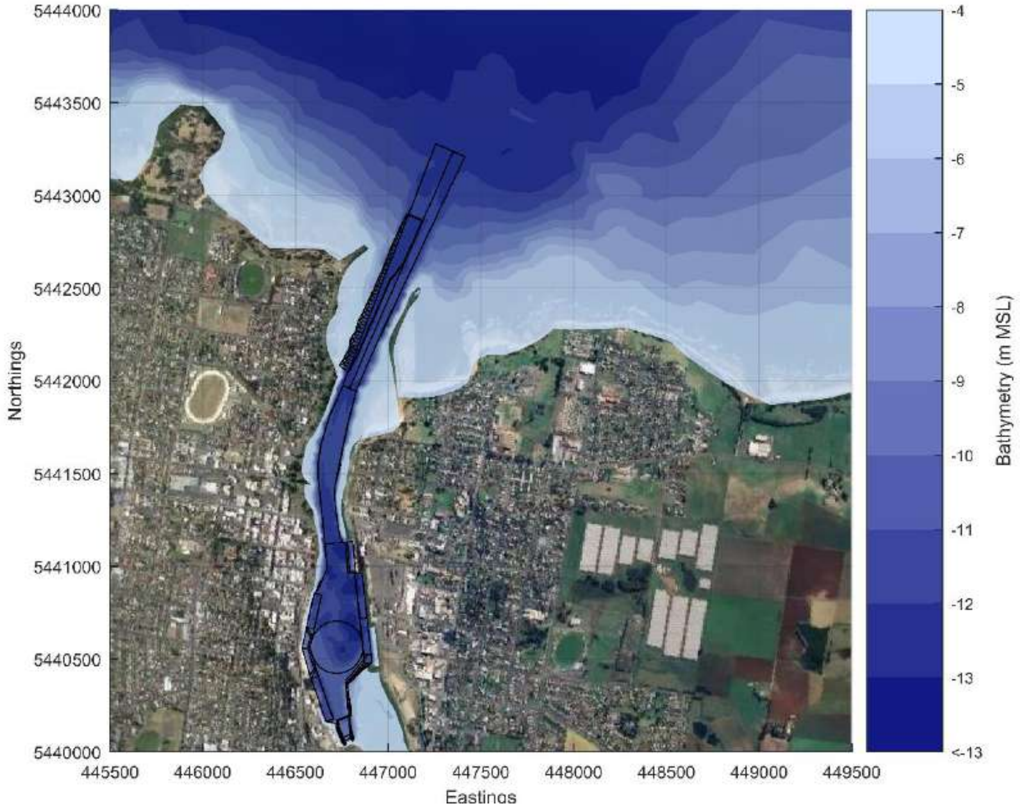


Figure 8 ***Post-dredge model bathymetry at the Port of Devonport showing the Inner Harbour and Entrance Channel***

3.2 Physical data

3.2.1 Observation data

Two met-ocean datasets as detailed in Table 1, with locations shown in Figure 9, were used for model verification purposes. Observation data included water level, current, and wave measurements from TasPorts well as water level, currents and waves from Marine Solutions (2023a).

Table 1 Summary of observation datasets utilised in this study

Site name	Parameters	Date range	Coordinates	Source
Marine Solutions ADCP	Water level, currents, waves	December 2022 – March 2023	41° 2' 9.1644" S 146° 22' 0.9732" E	Marine Solutions (2023a)
TasPorts ADCP	Water level, currents	January 2022	41°10’44.00" S 146°21'54.00" E	TasPorts

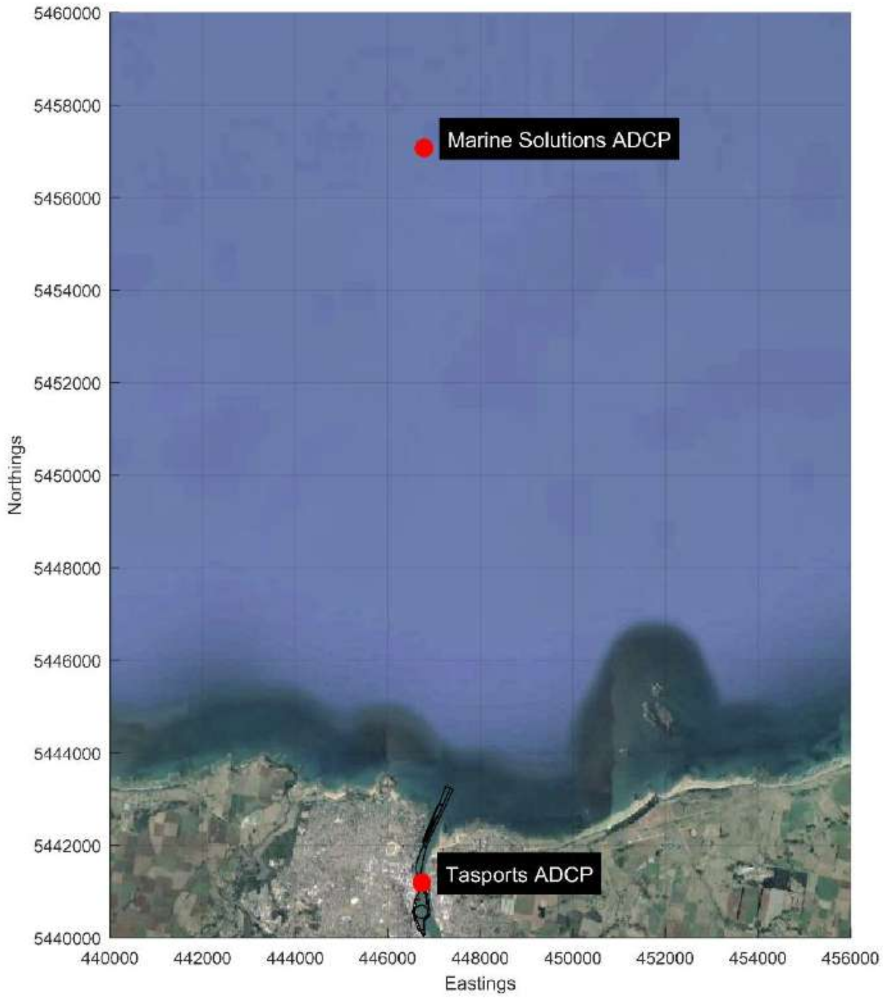


Figure 9 Location of met-ocean observation sites

3.2.2 Water levels

3.2.2.1 Tidal planes

Table 2 outlines the tide levels at Devonport from the Australia National Tide Book (Department of Defence, 2024). Devonport experiences a maximum tidal range (difference between HAT and LAT) of 3.7 m, with a typical range of 2.6 m during spring tides (MHHW minus MLLW) and 2.0 m during neap tides (MLHW minus MHLW).

Table 2 *Tidal table at Devonport*

Tidal plane	Water level (m LAT)	Water level (m MSL)
Highest Astronomical Tide (HAT)	3.7	1.69
Mean Higher High Water (MHHW)	3.3	1.29
Mean Lower High Water (MLHW)	3.0	0.99
Mean Sea Level (MSL)	2.01	0.0
Mean Higher Low Water (MHLW)	1.0	-1.01
Mean Lower Low Water (MLLW)	0.7	-1.31
Lowest Astronomical Tide (LAT)	0.0	-2.01

3.2.2.2 Boundary inputs

Spatially varying water levels for the hydrodynamic and wave model boundaries were from a combination of astronomical tides from the global tide model TPXO9 (Egbert and Erofeeva, 2002) at 30-minute resolution and non-astronomical water levels from the Hybrid Coordinate Ocean Model (HYCOM) at 1/12° horizontal resolution and 3-hourly temporal resolution (Chassignet et al., 2007). A time-series of water levels applied at the offshore boundary (example from the centre node on the northern boundary as shown in Figure 5) is presented in Figure 10.

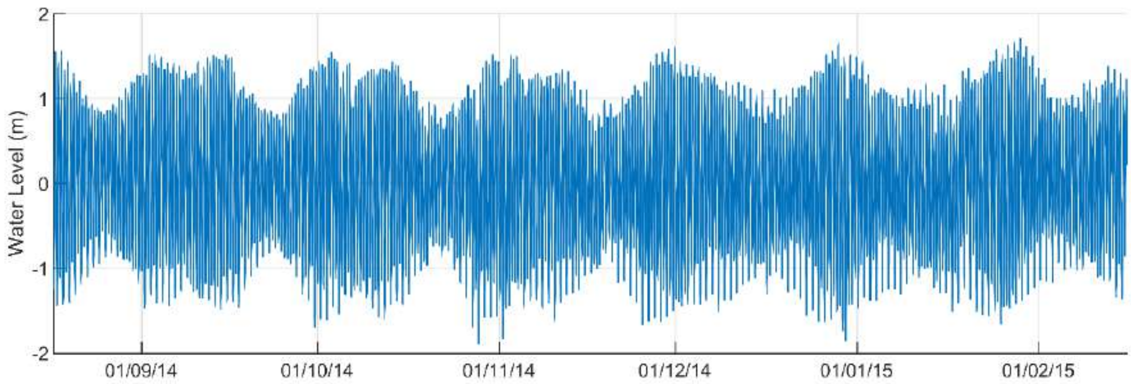


Figure 10 ***Water levels at the middle of the north open boundary from August 2014 to February 2015***

3.2.3 Waves

Spatially varying offshore wave conditions (swell and wind waves) were extracted from the Centre for Australian Weather and Climate Research (CAWCR) wave hindcast aggregated collection dataset (Durrant et al. 2019). The CAWCR wave hindcast was performed with NOAA's WaveWatch III model at a global grid resolution of 0.4 arc degrees. The CAWCR hindcast contains a finer grid (relative to WaveWatch III) for the Australian and South and Central Pacific areas that has been validated with both satellite altimeter observations and in-situ buoy measurements. Wave parameters from the CAWCR hindcast model were applied to the offshore boundaries of the wave model.

Time-series plots of significant wave height, peak wave period and mean wave direction at a central location on the northern boundary of the wave model are provided in Figure 11 to Figure 13.

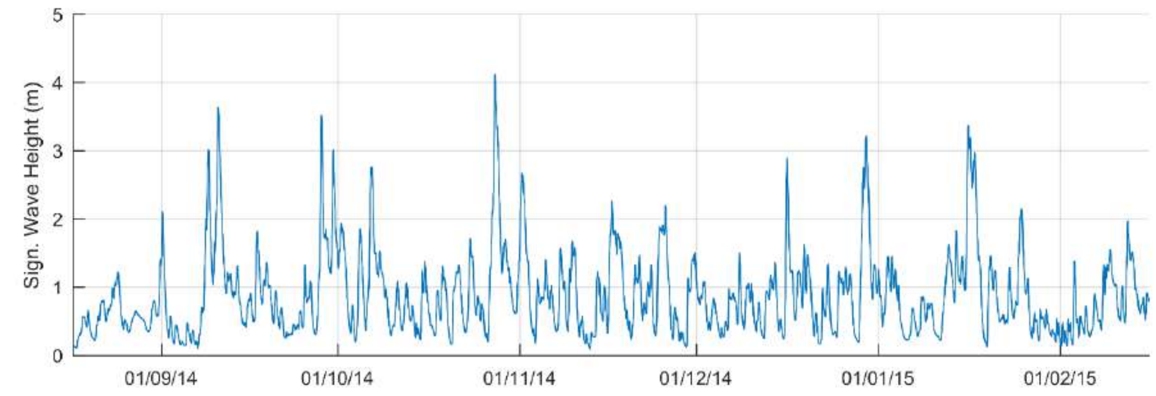


Figure 11 ***Significant wave height at the middle of the north open boundary from August 2014 to February 2015***

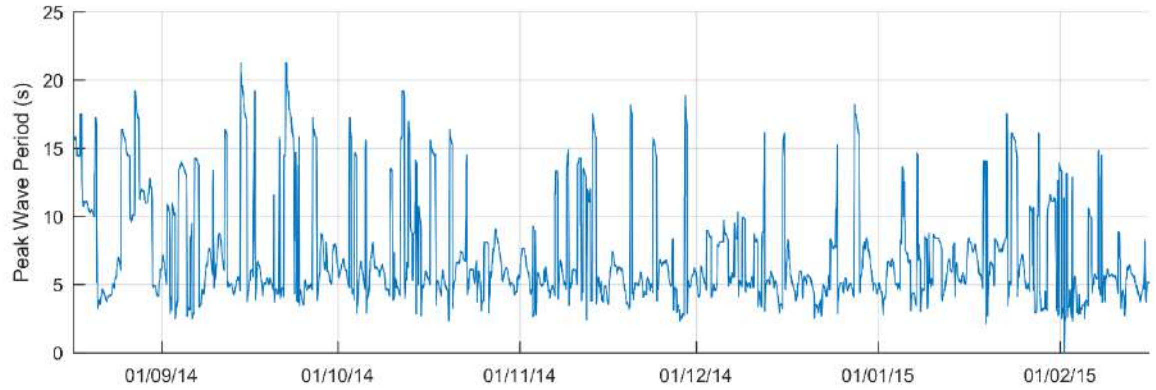


Figure 12 ***Peak wave period at the middle of the north open boundary from August 2014 to February 2015***

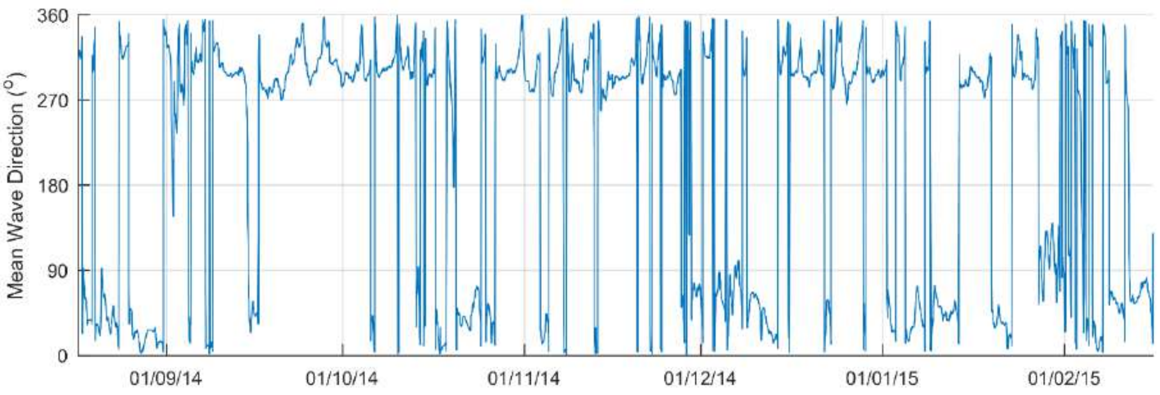


Figure 13 ***Mean wave direction at the middle of the north open boundary from August 2014 to February 2015***

3.2.4 Wind

Winds from the Climate Forecast System Version 2 (CFSv2) by the National Oceanography and Atmospheric Administration (NOAA) National Centers for Environmental Prediction (NCEP) served as temporally (hourly) and spatially (0.2°) varying inputs across the model domain (Suranjana *et al.* 2014). Default parameters for wind drag were adopted in the model. Time-series plots of wind speeds and wind directions extracted from a CFSv2 node (green dot as shown in Figure 5) is presented in Figure 14 and Figure 15, respectively.

Monthly wind rose plots of CFSv2 data from 2012-2022 (inclusive) representative of the coastal area near Devonport illustrate that westerly winds are predominant throughout the year, with a secondary (but significant) easterly component during October-March (Figure 16).

Figure 14 ***Wind speeds extracted from a CFSv2 node in proximity to the Port of Devonport from August 2014 to February 2015***

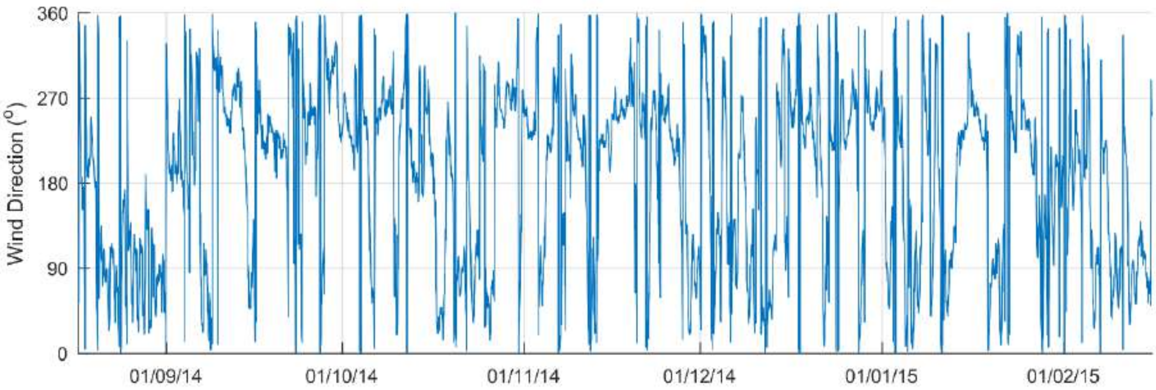


Figure 15 ***Wind directions extracted from a CFSv2 node in proximity to the Port of Devonport from August 2014 to February 2015***

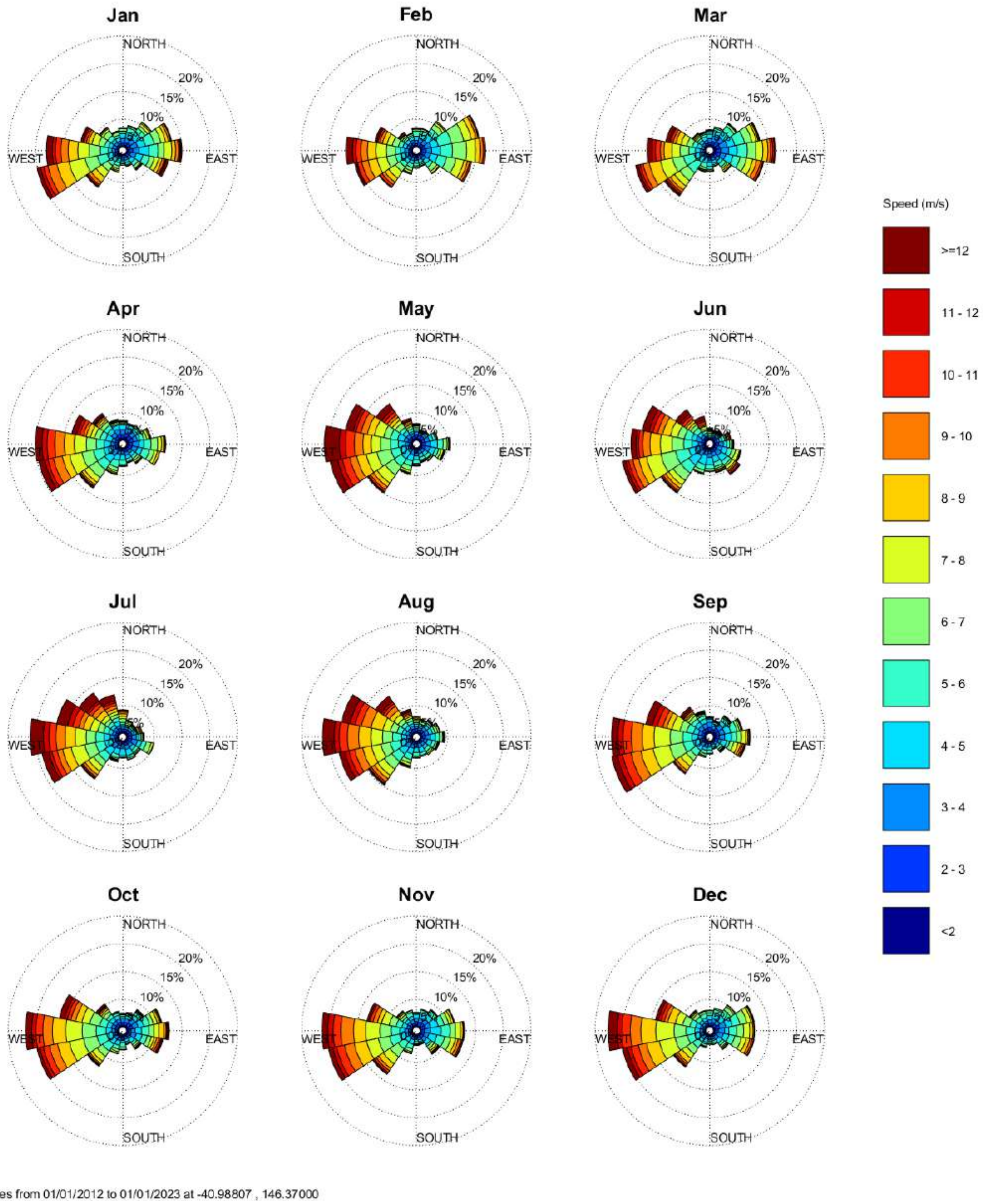


Figure 16 ***Monthly wind roses on the basis of 2012-2022 CFSv2 data in proximity to the Port of Devonport***

3.2.5 Currents

Horizontally, vertically and temporally varying currents applied at the model open boundaries are from the combined oceanographic HYCOM and tidal TPXO9 currents. Time-series plots of depth-varying north-south (V) velocities and east-west (U) velocities applied at the offshore boundary (example from the centre node on the northern boundary as shown in Figure 5) are presented in Figure 17 and Figure 18, respectively.

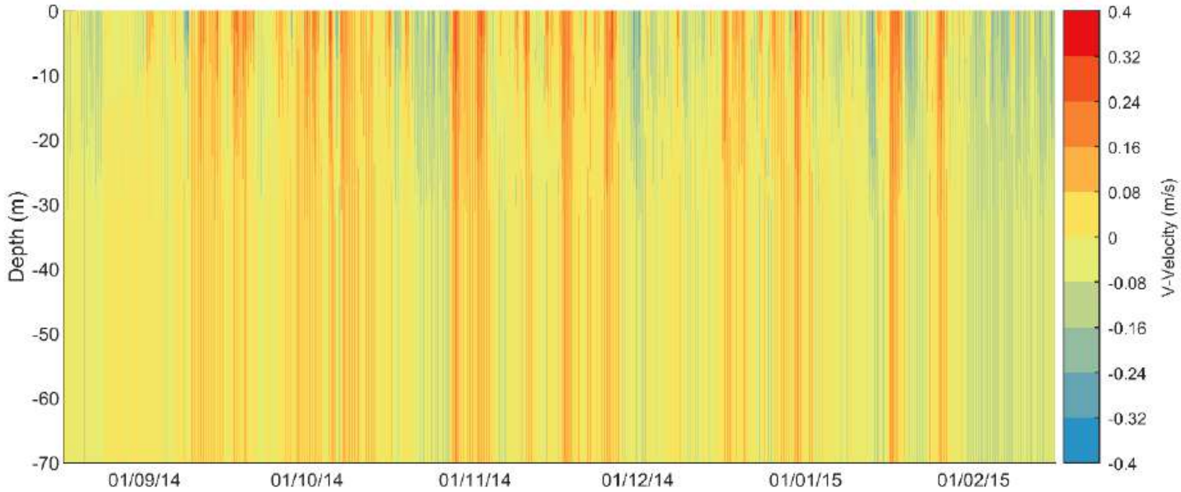


Figure 17 V-currents at the middle of the north open boundary from August 2014 to February 2015

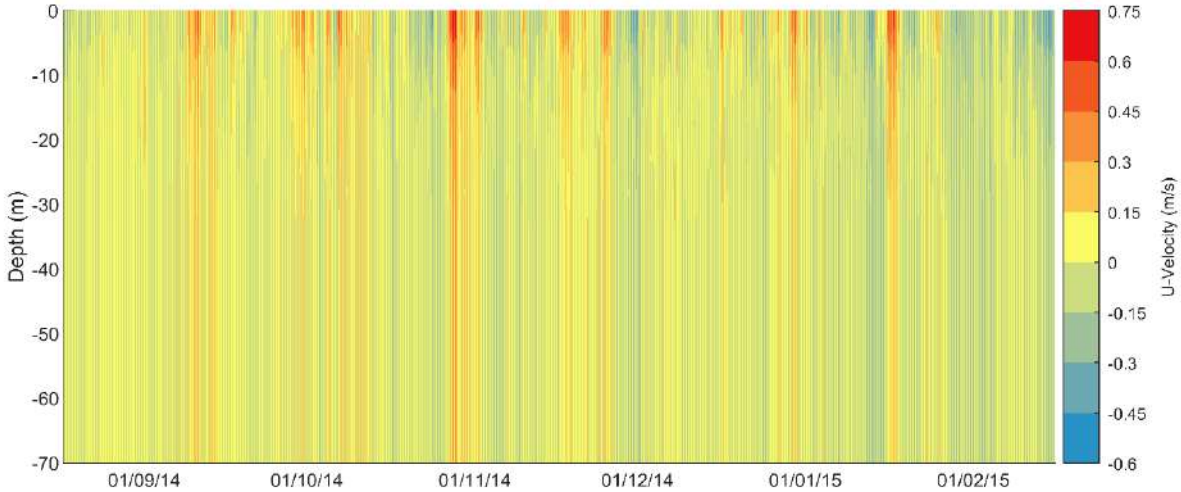


Figure 18 U-currents at the middle of the north open boundary from August 2014 to February 2015

3.2.6 Temperature and salinity

Horizontally, vertically and temporally varying temperature and salinity inputs applied at the model open boundaries were sourced from HYCOM. Time-series plots of temperature and salinity vertical profiles applied at the central node of the northern model boundary are displayed in Figure 19 and Figure 20, respectively.

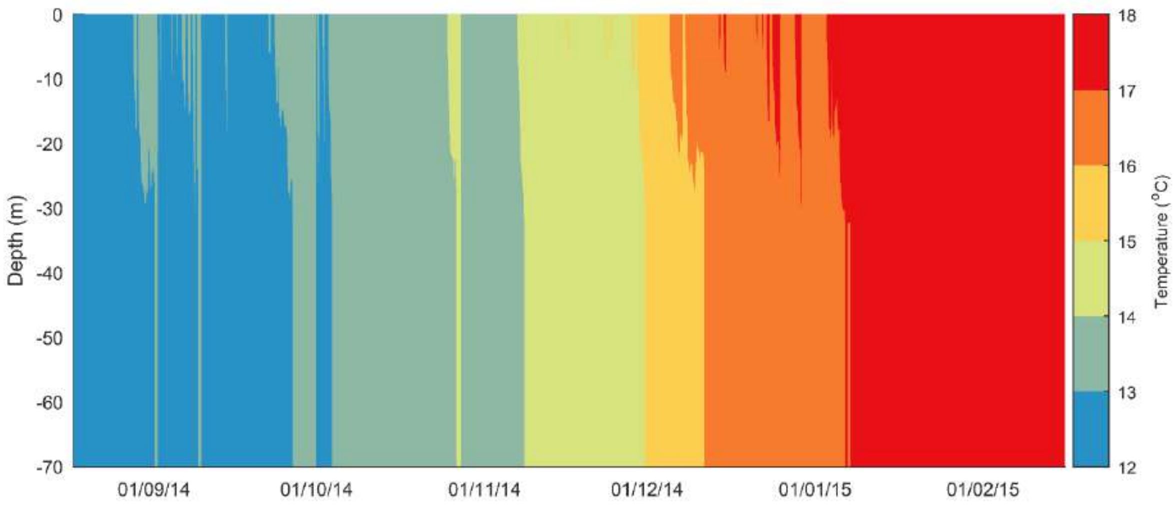


Figure 19 *Temperature at the middle of the north open boundary from August 2014 to February 2015*

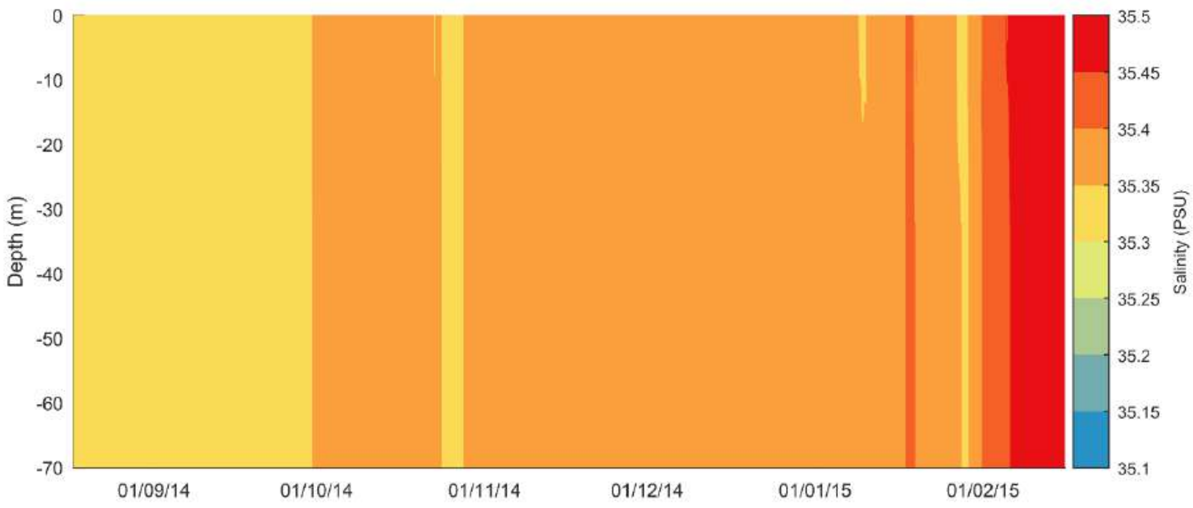


Figure 20 *Salinity at the middle of the north open boundary from August 2014 to February 2015*

3.2.7 Heat exchange parameters

Heat exchange was included in the model configuration to account for the transfer of heat between the water surface and atmosphere via evaporation, convection and solar radiation (longwave and shortwave). The inputs for the heat exchange module were derived from CFSv2 and the parameters included in the modelling were shortwave radiation flux, longwave radiation flux, air temperature and relative humidity.

3.2.8 River discharge

The Mersey River flows into the southernmost extent of the estuary/bay of the port of Devonport. Fifteen-minute discharge data from measurements at the Shale Road hydrology station (site ID 447) was downloaded from the Water Information Web Portal of the Department of Natural Resources and Environment Tasmania (DNRET, 2023). The fifteen-minute measurements from 17 August 2014 to 16 February 2015 served as the model inputs to the 3D hydrodynamic model (Figure 21).

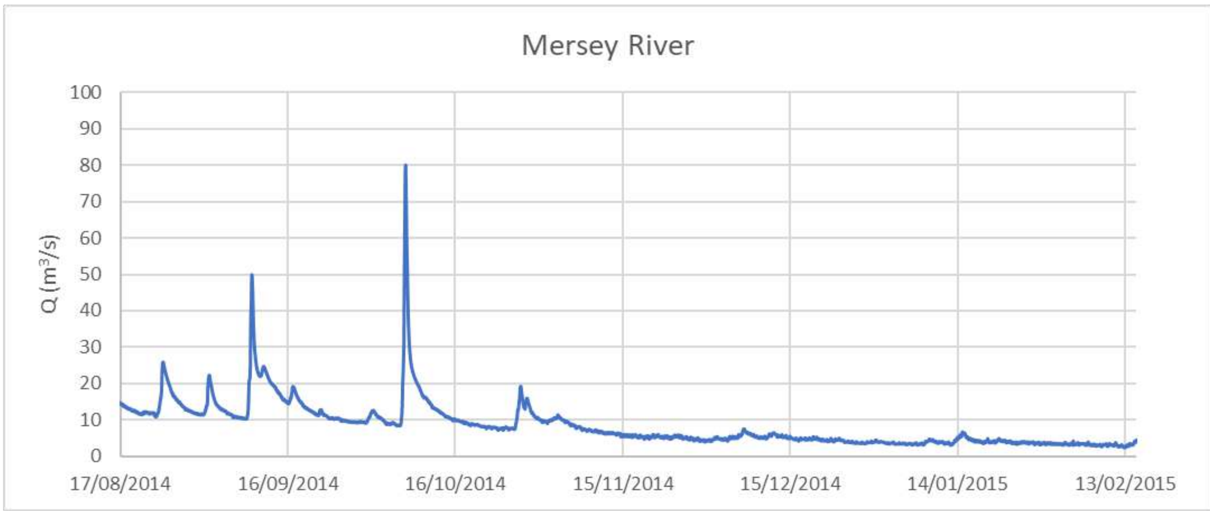


Figure 21 ***Fifteen minute measurements of discharge of the Mersey River at Shale Road (site ID 447) from 17 August 2014 -to 16 February 2015***

3.3 Nomination of representative period

The key hydrodynamic processes potentially influencing the dispersion of sediments from the dredging are currents and waves. The selection of a representative period during which to simulate the dredging activity considered the following factors:

- The likely dredge period, which is currently scheduled to begin in September 2024
- Near-shore currents are primarily tidally influenced. A dredging program spanning 18 weeks will include approximately 9 spring/neap tidal cycles. Any 18-week period is likely to have highly similar tidal dynamics, and therefore tidal variations are not a key consideration in the selection of the simulation period. The secondary influence of winds on near-shore current dynamics will vary seasonally, and between years as well, as is therefore an important consideration.
- Waves are a wind-driven dynamic, with peaks in significant wave height tending to coincide with peaks in wind speed, as indicated by a visual comparison of Figure 11 to Figure 14. Therefore it stands to reason that winds can be used as a proxy for wave conditions in the nomination of a simulation period.

On the basis of the above reasoning, a representative period in which to carry out the simulation of the dredging campaign for the Port of Devonport was selected on the basis of monthly-averaged winds from September to December. CFSv2 wind speed and direction data was analysed over a long-term period spanning 2012-2022 to select a year where wind conditions during September-December are well aligned with the long-term average. The year of 2014 was deemed to be the most representative on the basis of wind speeds (Figure 22) and wind directions (Figure 23). Therefore, September-December 2014 was selected as the representative period for the model simulations.

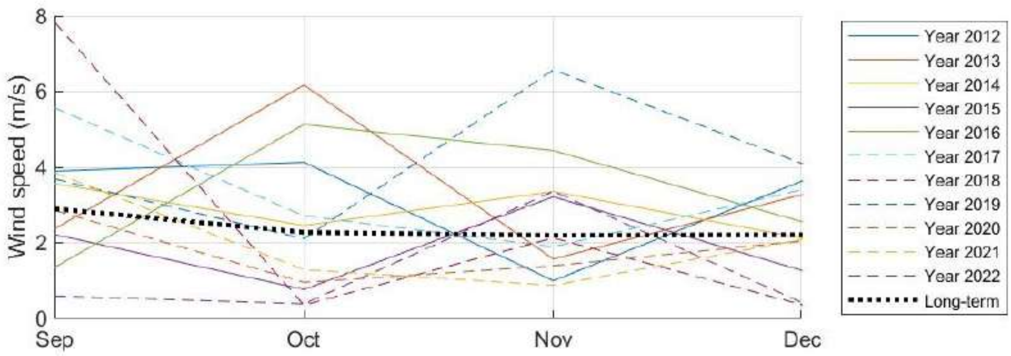


Figure 22 ***Monthly average wind speeds for September to December of 2012-2022 (inclusive) CFSv2 data in proximity to the Port of Devonport***

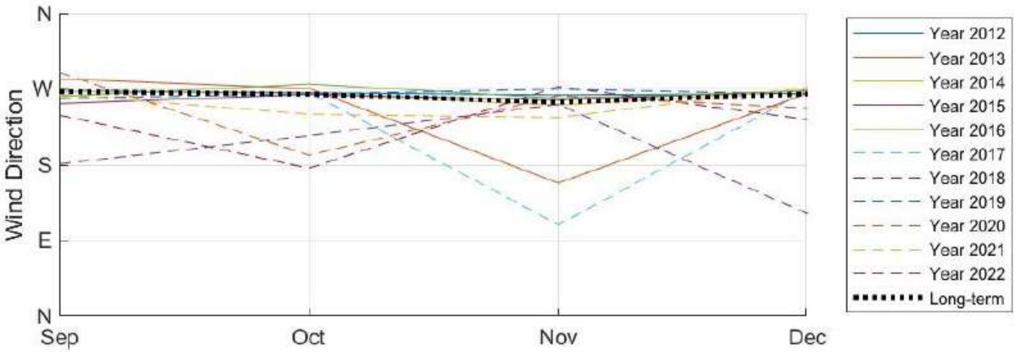


Figure 23 *Monthly averaged wind direction for September to December of 2012-2022 (inclusive) CFSv2 data in proximity to the Port of Devonport*

3.4 Particle modelling

3.4.1 Sediment composition

Sediment properties along the Entrance Channel and the Inner Harbour were measured in June 2023 as summarised in Table 3. Samples were collected from 21 sites within the Entrance Channel and 22 sites within the Inner Harbour. The sediments from both locations are primarily sandy, though the Inner Harbour has accumulated a higher proportion of finer components (clay and silt) compared to the Entrance Channel, likely due to riverine flood events depositing fine material within the deeper pockets of the Inner Harbour.

Table 3 *Average sediment properties from June 2023 sediment cores (Marine Solutions, 2023b)*

Sediments	Moisture Content	Clay	Silt	Sand	Gravel-Cobble
Entrance Channel	34.1%	5.0%	7.4%	85.6%	2.1%
Inner Harbour	45.7%	6.4%	17.1%	72.6%	3.9%

The fines component of the sediments (i.e. clay and silt) that are suspended in the water column during dredging operations can be transported sufficient distance to cause elevated SSC levels and sedimentation at distant locations. On the basis of the recent sediment sampling, ~13% and ~24% of the sediments are comprised of fines in the Entrance Channel and Inner Harbour, respectively (Table 3).

3.4.2 Sediment settling velocities

Sediment settling velocities adopted in the modelling are summarised in Table 4, which have been calculated using empirical relationships from Cheng (1997). The model simulated the fine particles (clay and silt sized fractions) only to predict far-field SSC and deposition, as larger particles settle rapidly out of suspension and deposit on the seabed in close proximity (typically tens of metres) to the dredger/disposal site and therefore do not pose a risk to more distant environmental receptors. Silt can be categorized into four different fractions (very fine silt, fine silt, medium silt, and coarse silt) based on the Wentworth Grain Classification, and to capture the settling behaviour for each fraction, the silt percentage was assumed to be evenly distributed over those four different fractions as these were not included on the provided PSD data.

Table 4 ***Model inputs and measurements of percentages of clay and silt in the fines component of the sediments of the Inner Harbour and Entrance Channel, and settling velocities of fines in simulations.***

Wentworth Grain Classification	Bin mid (µm)	Percentage of fines in Entrance Channel (% volume)	Percentage of fines in Inner Harbour (% volume)	Settling Velocity (cm/s)
Total Clay % (0-2µm)	1	5.0	6.4	0.00005
Very Fine Silt % (2-8µm)	5	1.8	4.3	0.0015
Fine Silt % (8-16µm)	12	1.8	4.3	0.0084
Medium Silt % (16-32µm)	24	1.8	4.3	0.0336
Coarse Silt % (32-63µm)	47.5	1.8	4.3	0.1293

3.4.3 Fluxes of fines during operations

The derivation of sediment source terms for this study has followed the dredging methodology of Becker et al. (2015). The calculation steps and reference sources are outlined in Table 5 and Table 6 and summarised as follows:

– Based on the total dredge volume, duration, and cycle time (including non-operational time) of dredging, the average dredge rates are calculated to be 0.17 m^3/s and 0.19 m^3/s of in situ material (including water entrained within sediment pores) for the Entrance Channel and Inner Harbour, respectively.

– Dredge production rates were determined separately for the Entrance Channel and Inner Harbour, and on the basis of the fines proportions previously described, total fines production rates were calculated.

– Losses from the TSHD drag head were estimated based on the published %FG (far-field source term for percentage of fines generated that contribute to the far-field plume) ranges available in Becker *et al.* (2015). The upper value of the published range for drag is 3%. This was conservatively adopted as the proportion of fines that contribute to a far-field plume generated by the drag head operating at the seabed. This assumption was used for both the Inner Harbour and Entrance Channel.

– Overflow is allowed at the Entrance Channel using the upper value (20%) from the provided range of 0-20% from Becker *et al.* (2015). The overflow is discharged to the surface layer (i.e. upper water column) in the model.

– During the placement or dumping of dredged sediments at the disposal area, Becker (2015) suggested 0-10% can contribute to a far-field plume for hydraulically dredged sediment. The upper end of the range (10%) was adopted.

– The adopted source term for drag head, overflow and placement at the **Entrance Channel** are **1.0 kg/s, 4.7 kg/s** and **16.7 kg/s**.

– For the **Inner Harbour**, overflow during dredging is not allowed. Thus, only two source terms are used for the drag head and placement of **1.8 kg/s** and **25.1 kg/s**. The fines source terms from the Inner Harbour dredging are higher due to the greater proportion of *in-situ* fines in the dredged material at this location compared to the Entrance Channel.

On the basis of the conservative assumptions adopted as outlined above, the dredge scenario simulated in this study is considered a **worst-case scenario**. Given the relatively modest dredge volumes for this project, adopting a single worst-case scenario to define an upper bound to the dredging impact areas is considered reasonable, in lieu of running additional best-case and likely-case scenarios.

Information from the dredging contractor, AW Maritime, was used to derive several of the inputs to the SSC flux calculations. The documentation received is included in Appendix A, while several other inputs were clarified in subsequent consultation between GHD, TasPorts and AW Maritime.

Table 5 Mass flux estimates of dredging operations at the Entrance Channel on basis of methodology of Becker et al (2015

Item	Value	Unit	Source
SEDIMENT CHARACTERISTICS			
Total in situ volume	232,188	m^3	TasPorts
Dry density	1,704	kg/m^3	Marine Solutions (2023b)
Fines percentage	11.68	%	Marine Solutions (2023b)
DREDGE DETAILS			
In situ production (weekly)	35,624	m^3/wk	AW Maritime
Execution period	6.52	wk	AW Maritime
Cycle time	371.5	min	AW Maritime – This includes non-operational time
Loading time	129	min/cycle	AW Maritime
Overflow time	109.48	min/cycle	AW Maritime - No overflow at Inner Harbour
Placement time	10	min/cycle	AW Maritime
No. of cycles	27	/wk	Calculation
KEY MODEL DETAILS			
Total amount of fines	46,199,186	kg	Calculation
In situ production rate	0.17	m^3/s	AW Maritime
DRAG HEAD DETAILS			
Fines per cycle	261,264	kg/cycle	Calculation
Drag head fraction	3	%	Becker (2015) - Upper end of range
Fines to far-field (drag head)	7,838	kg/cycle	Calculation
HOPPER/OVERFLOW DETAILS			
Fines into hopper	253,426	kg/cycle	Calculation
Overflow ratio	84.9	%	Calculation
Settlement factor	25	%	Becker (2015)
Entrapment factor	5	%	Becker (2015)
Fines via overflow	153,243	kg/cycle	Calculation
Fines retained	100,183	kg/cycle	Calculation
Overflow fraction	20	%	Becker (2015) - Upper end of range
Fines to far-field (overflow)	30,649	kg/cycle	Calculation
PLACEMENT DETAILS			
Placement fraction	10	%	Becker (2015) - Upper end of range
Fines to far-field (placement)	10,018	kg/cycle	Calculation
MODEL SOURCE TERMS			
Flux drag head	**1.0**	**kg/s**	Calculation (fines only)
Flux overflow	**4.7**	**kg/s**	Calculation (fines only)
Flux placement	**16.7**	**kg/s**	Calculation (fines only)

Table 6 Mass flux estimates of dredging operations at the Inner Harbour on basis of methodology of Becker et al (2015)

Item	Value	Unit	Source
SEDIMENT CHARACTERISTICS			
Total in situ volume	240,857	m^3	TasPorts
Dry density	1,402	kg/m^3	Marine Solutions (2023b)
Fines percentage	23.11	%	Marine Solutions (2023b)
DREDGE DETAILS			
In situ production (weekly)	20,668	m^3/wk	AW Maritime
Execution period	11.65	wk	AW Maritime
Cycle time	233.4	min	AW Maritime – This includes non-operational time
Loading time	43	min/cycle	AW Maritime
Overflow time	0	min/cycle	AW Maritime - No overflow at Inner Harbour
Placement time	10	min/cycle	AW Maritime
No. of cycles	43	/wk	Calculation
KEY MODEL DETAILS			
Total amount of fines	78,036,699	kg	Calculation
In situ production rate	0.19	m^3/s	AW Maritime
DRAG HEAD DETAILS			
Fines per cycle	155,025	kg/cycle	Calculation
Drag head fraction	3	%	Becker (2015) - Upper end of range
Fines to far-field (drag head)	4,651	kg/cycle	Calculation
HOPPER DETAILS			
Fines into hopper	150,375	kg/cycle	Calculation
Overflow ratio	0.0	%	Calculation
Settlement factor	25	%	Becker (2015)
Entrapment factor	5	%	Becker (2015)
Fines via overflow	0	kg/cycle	Calculation
Fines retained	150,375	kg/cycle	Calculation
Overflow fraction	20	%	Becker (2015) - Upper end of range
Fines to far-field (overflow)	0	kg/cycle	Calculation
PLACEMENT DETAILS			
Placement fraction	10	%	Becker (2015) - Upper end of range
Fines to far-field (placement)	15,037	kg/cycle	Calculation
MODEL SOURCE TERMS			
Flux drag head	**1.8**	**kg/s**	Calculation (fines only)
Flux placement	**25.1**	**kg/s**	Calculation (fines only)

3.4.4 Spatial and temporal configuration of operations

Dredging areas were categorised into two sections: Entrance Channel and Inner Harbour. The total duration of the dredging campaign informed by AW Maritime is approximately 18 weeks, spanning September to January. This duration includes non-operational periods which account for weather delays and other down-time.

The dredging simulations were broken down into two phases wherein the first phase was represented using a baseline mesh and the second phase using a post-dredge mesh. Dedicated hydrodynamic and wave simulations were run for each phase, allowing the impact of the dredged areas on the hydrodynamics to be considered in varying stages as the dredging progresses.

The dredging simulations included stationary sediment sources at each dredging location at the Entrance Channel and Inner Harbour as detailed in Table 7 (showing volume dredged for each location). Figure 24 presents the dredger location for each identified area in Table 7. The disposal source terms were divided across nine locations spread evenly across a 3x3 grid covering the proposed disposal ground.

The hydrodynamic and wave simulations provided the boundary conditions for the construction simulations.

The dredging simulations are summarised as follows:

– The simulation was configured to occur from 1 September–25 January 2014 with approximately 3 weeks additional simulation time after dredging concludes to allow subsequent dispersion and deposition of remaining SSC.
– The first simulation phase assumes an initial dredging-induced SSC of 0 mg/L for the starting condition (i.e. cold start). The next half of the simulation utilises the predicted SSC (dredging-generated) from the end of the previous simulation as the starting condition.
– The total duration of dredging at the Inner Harbor (11.65 weeks) is longer compared to the Entrance Channel (6.52 weeks) since overflow is not allowed at the Inner Harbour hence less sediment volume dredged per cycle.
– One cycle consists of dredging, sailing to and from the disposal ground, disposal, manoeuvring and non-operational time. The setup was configured such that the dredger completed a pattern of two cycles in the Inner Harbour and one cycle at the Entrance channel during the first 70% of the dredging campaign duration. Figure 25 demonstrates the simulated fine sediment source flux for this phase of the dredging. Contribution to the far-field plume only happens during active dredging (via drag-head and overflow source terms) and disposal activities. Figure 26 shows the latter 30% of the dredging campaign for when dredging at the Entrance Channel is complete and the remaining dredging efforts focus only on the Inner Harbour.
– The simulated dredging pattern is an assumed, idealised scenario that has been devised in an attempt to capture as much realism as possible in terms of the intermittent nature of sediment fluxes and the spatial extent of dredging activities. In reality, the dredge program will be adaptive to account for actual conditions on site, and may not be staged exactly in the manner simulated here.

Table 7 Proposed dredge volumes

Location No.	Location	Volume (m^3)	No. of cycles per area
	ENTRANCE CHANNEL		
1	Western Entrance	58,273	44
2	Western Entrance Sand Trap Deepening	35,544	27
33	Batter: Western Entrance	79,466	61
4	Eastern Entrance	10,365	8
-	Batter: Eastern Entrance	366	0
5	Entrance Channel Bend	46,269	35
6	Batter: Entrance Channel East	1,195	1
7	Batter: Entrance Channel West	710	1
	TOTAL	**232,188**	
	INNER HARBOUR		
8	Basin	143,728	300
9	Batter: Basin West near Berth 1 West	379	1
10	Batter: Basin South	14,712	31
-	Berth 1 East	194	0
11	Berth 2 East	4,952	10
12	Berth 3 East	28,912	60
13	Berth 1 West	3,296	7
14	Berth 2 West	3,733	8
15	Berth 3 West	4,974	10
16	Berth 4 West	17,387	36
17	Berth 5 West	7,779	16
18	Berth 5 West Ro-Ro Extension	4,107	9
19	Batter: Berth 5 West	6,704	14
19	**TOTAL**	**240,857**	

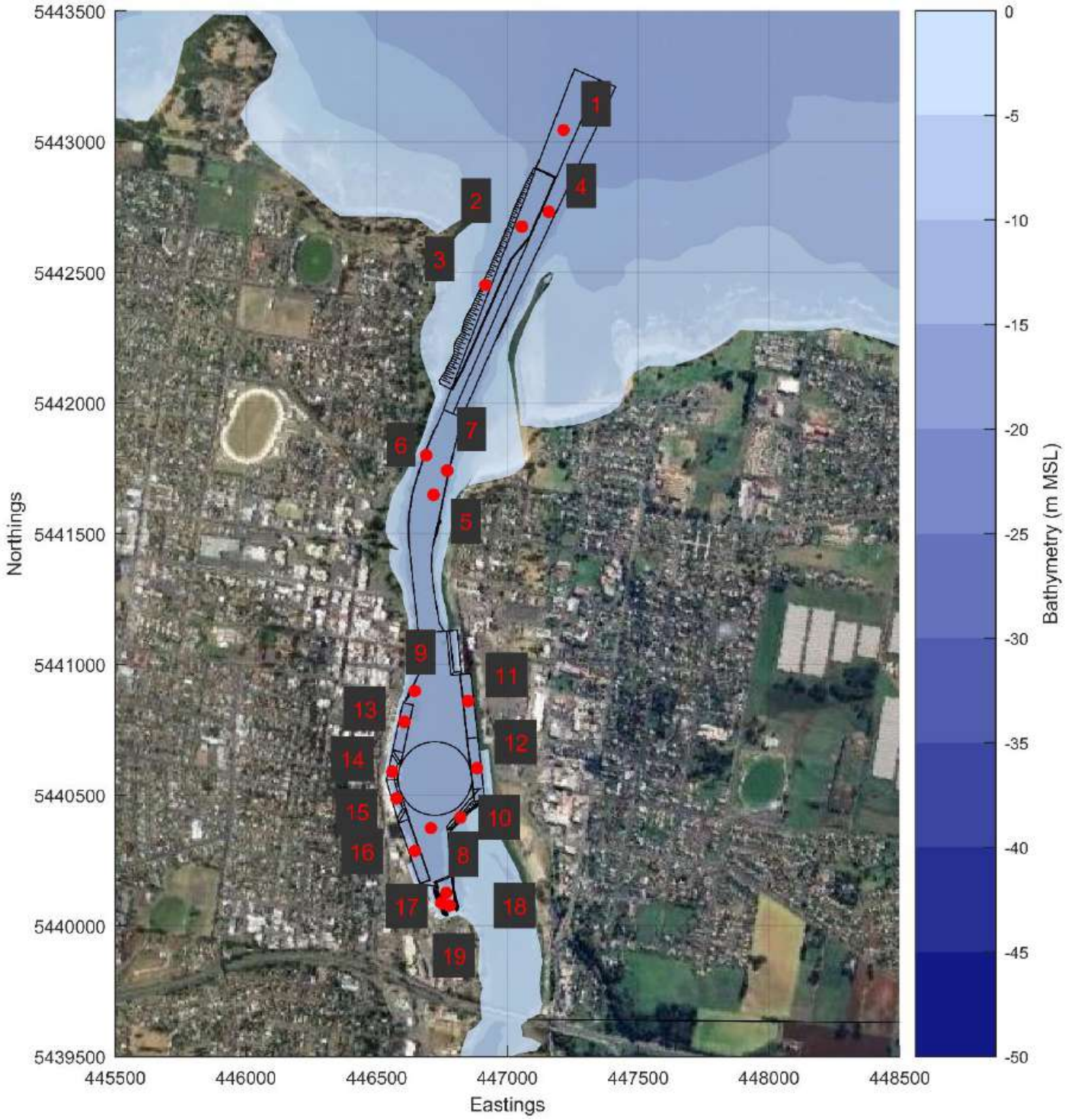


Figure 24 ***Location map of dredged areas summarized in Table 7***

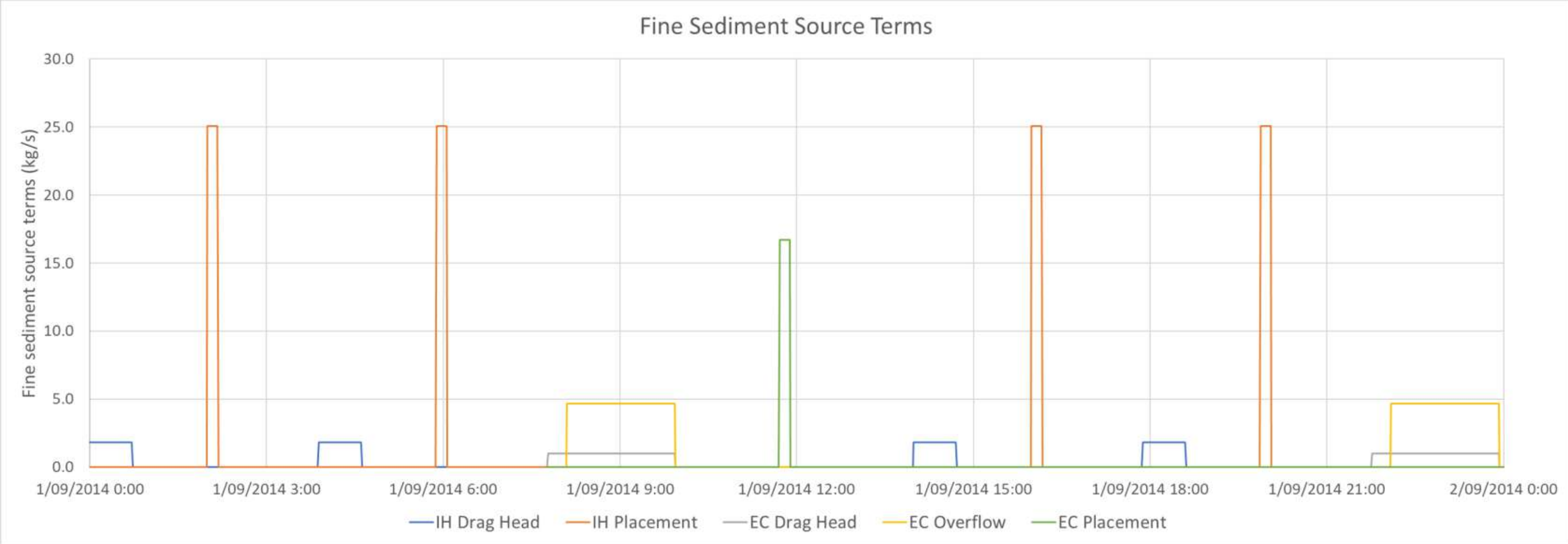


Figure 25 ***Simulated source terms for three dredging cycles composed of two cycles at the Inner Harbour and one cycle at the Entrance Channel***

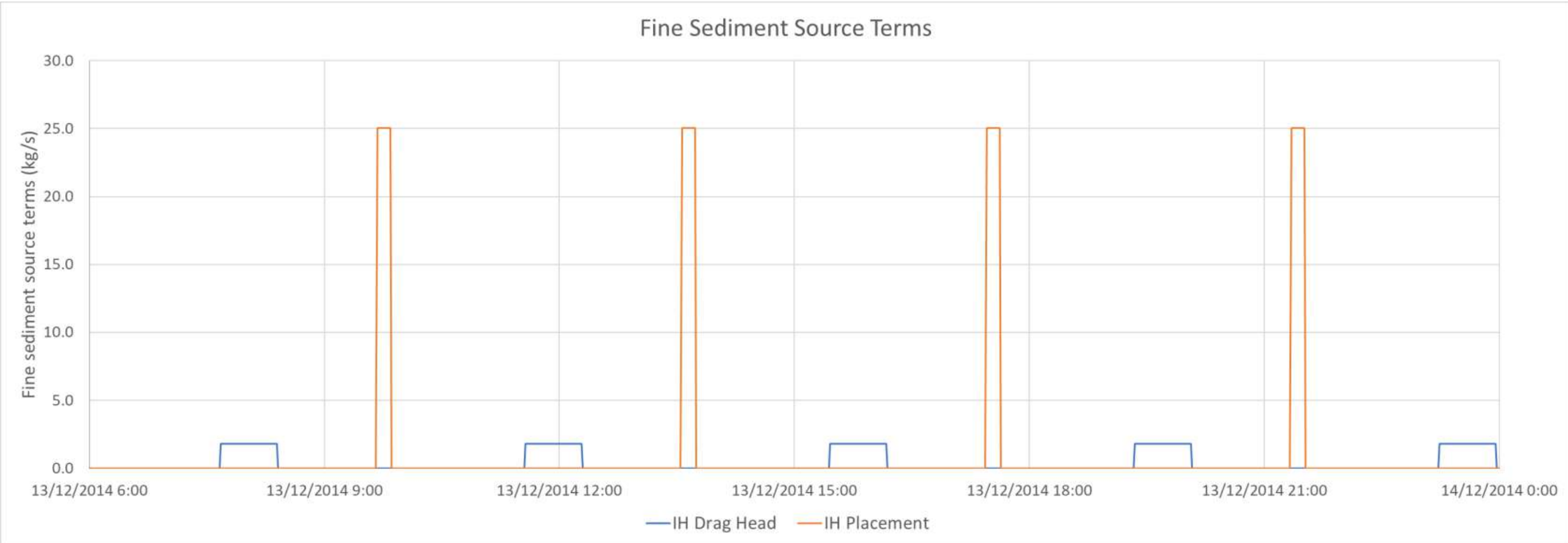


Figure 26 ***Simulated source terms for when dredging is only at the Inner Harbour***

3.5 Impact thresholds

The impact assessment follows the guidance provided in WA EPA (2021), which is informed by the latest science from the Western Australian Marine Science Institute (WAMSI) Dredge Science Node (DSN). Specifically, the guidance recommends establishment of a spatially-based zonation scheme to assess the extent, severity and duration of impacts to benthic habitats associated with proposed dredging activities. WA EPA (2021) provides guidance for defining three zones representing varying degrees of environmental impact, namely:

– **Zone of High Impact (ZoHI)** is the area where serious damage to benthic communities is predicted or where impacts are considered to be irreversible. The term serious damage means '*damage to benthic communities and/or their habitats that is effectively irreversible or where any recovery, if possible, would be unlikely to occur for at least 5 years*'. Areas within and immediately adjacent to proposed dredge and disposal sites are typically ZoHI. The loss of the benthic communities and/or habitats within these zones should be considered irreversible, unless a defensible case for recovery of the impacted benthic communities and habitats can be presented.
– **Zone of Moderate Impact (ZoMI)** is the area within which predicted impacts on benthic organisms are sub-lethal, and/or the impacts are recoverable within a period of 5 years following completion of the dredging activities. This zone abuts, and lies immediately outside of, the ZoHI. The outer boundary of this zone is coincident with the inner boundary of the next zone, the Zone of Influence.
– **Zone of Influence (ZoI)** is the area within which changes in environmental quality associated with dredge plumes are predicted and anticipated during the dredging operations, but where these changes would not result in a detectible impact on benthic biota (e.g. a reduction in biomass). These areas can be large, but at any point in time the dredge plumes are likely to be restricted to a relatively small portion of the ZoI. The outer boundary of the ZoI bounds the composite of all the predicted maximum extents of dredge plumes and represents the point beyond which dredge-generated plumes should not be discernible from background conditions at any stage during the dredging campaign. Furthermore, this provides transparency for the public regarding where visible plumes may be present, albeit only occasionally, if the proposal is implemented.

As outlined in Section 2.2, the nearest known environmental receptor (benthic community) to the dredging operations is a seagrass habitat identified by Marine Solutions (2016), located 2.75 km east of the Entrance Channel. Seagrasses are naturally exposed to a highly variable light environment resulting from natural fluctuations in turbidity, depth and cloud cover. Thus, short term changes in dredging-induced turbidity/suspended sediment concentrations are not expected to significantly impact the environmental health of seagrass communities. Instead, physiological impacts from dredging-induced light reduction are expected over a period of days, and plant/habitat scale impacts are expected over a period of several weeks (Chartrand *et al*. 2016). Deposition of sediment can also cause significant impacts on seagrass health, such as reducing photosynthesis and nutrient exchange (Cabaco *et al*. 2008).

On this basis, GHD have defined ZoHI, ZoMI and ZoI thresholds to establish predicted impact zones for fine suspended sediment concentrations (SSC) and bed deposition (Table 8).

The SSC concentration thresholds are based on published Default Guideline Values (DGVs) for Tasmanian Estuarine Waters (Tasmania EPA, 2021), which are the best available guidelines for the Mersey River system. Tasmania EPA (2021) classifies the Mersey River estuary as a well flushed, slightly to moderately disturbed (SMD) estuary. Turbidity statistics for 125 samples across Tasmanian well flushed, SMD systems indicate a median turbidity of 3.7 NTU (Nephelometric Turbidity Units), and 80th percentile of 6.4 NTU and a 95th percentile of 15.2 NTU. The SSC thresholds in Table 8 were defined in the following manner:

– For the ZoI, an increase of 2 mg/L in SSC over a 1-hour period is considered to represent an aesthetic impact whereby a marginal visual difference in water clarity may be noted.
– For the ZoMI, an increase of 2.7 mg/L SSC is the difference between median turbidity (3.7 NTU) and 80th percentile turbidity (6.4 NTU), if assuming a turbidity-to-SSC conversion of 1:1. The duration for impact to occur is defined as 14 days on the basis of the WA EPA (2021) technical guidance for derivation of seagrass impact thresholds. Therefore, if the median SSC is increased by 2.7 mg/L over any 14-day window, this is considered to represent a moderate impact to seagrass communities.
– For the ZoHI, the SSC threshold was defined in a similar matter to that of the ZoMI, however the difference between median and 95th percentile turbidity was adopted as the high impact threshold. Therefore, if the

median SSC is increased by 10.5 mg/L over any 14-day window, this is considered to represent a high impact to seagrass communities.

The Tasmania EPA (2021) DGVs to define ZoMI and ZoHI thresholds for SSC follow the reference site approach of the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, 2018). The reference site approach considers the natural variability of physico-chemical stressors in ambient conditions where derived guideline values are assumed to protect environmental values by maintaining water quality conditions (i.e. only small changes in water quality allowed within the range of natural variability). Best practice for deriving site-specific impact thresholds is to derive biological effects data of habitats at the location. This requires extensive field tests to assess *in-situ* physiological impacts to seagrass habitats from prolonged reductions in light (e.g. by physically shading test species and measuring physiological changes compared to control species). Such assessments are costly and long duration to undertake that are usually prohibitive for typical maintenance dredging campaigns.

The 14-day duration time window to assess the ZoMI and ZoHI concentration thresholds is on the basis of WA EPA (2021), which provides examples for a range of seagrass species including *Cymodocea serrulata* (coverage across Queensland [QLD], Northern Territory [NT] and northern WA), *Halodule uninervis* (coverage across QLD, NT, WA and New South Wales) and *Halophila ovalis* (coverages across all Australian coastal states and territories including Tasmania). The most relevant species in Tasmania (*Halodule uninervis*) has a maximum continuous period of low light (based on rolling 14-day averages) of 3 weeks until the onset of possible effects. This modelling study conservatively assumes that any exceedance of the SSC concentration threshold over14-day period, whether sustained for 3 weeks or not, is considered an impact. This time window of 14 days is relevant to seagrass communities, which are the most proximal, persistent and sensitive receptor. Additional interpretation of the simulated outputs has been presented in Section 6 when considering potential impacts to scallops and Australian grayling.

For deposition thresholds, in the absence of site-specific background datasets, benthic impacts were informed by literature as follows:

– There is no deposition threshold for the ZoI, which is intended to denote aesthetic impacts in terms of water clarity related to SSC plumes.
– For the ZoMI, a deposition thickness of 3 mm at any time during the simulation has been defined based on Bakke *et al.* (2013) to denote the lower bound of potential effects to benthic habitats.
– For the ZoHI, deposition exceeding 10 mm at any time during the simulation has been defined from Smit *et al.* (2018), having the potential to smother 10% of benthic species. This is considered a highly conservative threshold to adopt for a ZoHI, given such an outcome would likely be recoverable in less than 5 years.

Table 8 Summary of threshold criteria

Zone	SSC	Sedimentation
Zone of Influence (ZoI)	Any area where modelled SSC increases by 2 mg/L above ambient over a 1-hour window or more	n/a
Zone of Moderate Impact (ZoMI)	Any area where median modelled SSC > 2.7 mg/L over any 14-day window	Any area that deposition exceeding 3 mm thickness
Zone of High Impact (ZoHI)	Any area where median modelled SSC > 10.5 mg/L over any 14-day window	Any area that deposition exceeding 10 mm thickness

4. Model validation

The performance of the hydrodynamic and wave models was verified via comparison of the model predictions to various measurements of water levels, currents and waves collected within the region as described in Section 3.2.1.

During model development, model calibration was confirmed via comparison of the simulation to the measurements for two different periods: January 2022 and a 3-month period from 16 December 2022-20 March 2023. Data from Tasports ADCP was used for the January 2022 period while Marine Solutions ADCP was used for the December 2022-March 2023 period (Figure 9).

Quantitative measures of model performance were used to confirm model calibration/validation including the index of agreement (IOA) and the mean absolute error (MAE) (Willmott, 1982). These metrics are detailed in Table 9. Willmott *et al.* (1985) suggests that IOA values meaningfully greater than 0.5 represent good model validation with values approaching 1 representing excellent validation.

Table 9 Metrics for evaluating model performance

Metric	Equations[3]
Index of Agreement (IOA). The IOA is a measure of the average differences between predicted and observed values relative to the range of values in the observation dataset. It is bounded between the values of 0 and 1, with values close to 0 describing models with large relative differences (i.e. poor validation) and values close to 1 describing models with small relative differences (i.e. good validation).	$\boldsymbol{IOA} = 1 - \frac{\sum_{i=1}^{n}(P_i - O_i)^2}{\sum_{i=1}^{n}(\lvert P_i - \bar{O}\rvert + \lvert O_i - \bar{O}\rvert)^2}$
Mean Absolute Error (MAE). The measure of general offset between measurements and simulated values.	$\boldsymbol{MAE} = \frac{\sum_{i=1}^{n}\lvert O_i - P_i\rvert}{n}$

It is noted that the quantitative metrics for model performance are designed for comparing data from a linear scale (e.g. current speed) rather than circular scale (e.g. current direction). This is because the averaging equations when applied to directions often yield spurious results (e.g. the average of two directions at 355° and 5°, which are both roughly northward, would yield 180° which is southward). To mitigate this issue, current directions were assessed by calculating IOA and MAE values for the east-west component (U velocity) and north-south component (V velocity) of the currents separately, while time-series and percentile distribution comparisons of current (and wave) directions allow an additional qualitative assessment.

Time-series and percentile distribution comparisons of the simulated versus measured data are presented in Figure 29 to Figure 39.

Based on the quantitative indices and qualitative comparisons of the simulation and measurements, water levels at the offshore ADCP are deemed to be well represented by the model, achieving an excellent IOA score of 0.99, with an MAE of 0.10 m (Table 10). The tidal range is generally well represented by the model.

Comparisons of simulated versus measured current speeds (along with the U and V directional components) for the offshore data record (spanning Dec 2022 to March 2023) generally achieve high to very high IOA scores of 0.63-0.86 (Table 11) with MAE values of 0.03-0.08 m/s. These indicate good model performance based on the quantitative measures of model skill. Additionally, the qualitative comparisons of percentile distribution curves presented in Figure 30 to Figure 35 demonstrate good agreement between the simulated and measured data.

Model validation also considered the measured data from the Devonport station situated at the Port (spanning Jan 2022). Comparisons of simulated versus measured current speeds (along with the U and V directional components) generally achieved high to very high IOA scores of 0.62-0.85 (Table 12) with MAE values of 0.11-0.16 m/s. These metrics indicate that the model reproduces the measured hydrodynamics within the Port with a reasonable degree of accuracy.

[3] P_i = Predicted value at comparison time i; O_i = Observed value at comparison time i; $\bar{O}$ = The mean of the observations during the comparison period, and n = number of comparison measurements.

Comparison between the simulated and observed wave heights at the offshore location yield an excellent IOA score of 0.92 and MAE of 0.15 m, representing strong agreement (Table 10). Comparison of the wave period show good correlation with IOA of 0.62 and MAE of 1.50 s, with most of the swells (Tp >10 s) captured by the model.

In summary, the hydrodynamic and wave models have been verified against available measurements of water levels, waves and current speeds, and are deemed appropriate to provide the met-ocean conditions for the particle modelling simulations described in the following sections.

Table 10 ***Index of agreement and mean absolute errors of simulated water level, significant wave height and peak wave period at the offshore ADCP from Dec 2022 to Mar 2023***

Parameter	IOA	MAE
Water Level (m)	0.99	0.10
Significant Wave Height (m)	0.87	0.30
Peak Wave Period (s)	0.62	1.50

Table 11 ***Index of agreement and mean absolute errors of simulated current speed, u- and v-velocities at near surface, mid-depth and near seafloor at the offshore ADCP from Dec 2022 to Mar 2023***

Depth	Parameter	IOA	MAE
Near Surface (4m)	Current Speed (m/s)	0.71	0.06
	U (east-west) Velocity (m/s)	0.85	0.08
	V (north-south) Velocity (m/s)	0.80	0.05
Mid-Depth (21m)	Current Speed (m/s)	0.74	0.05
	U (east-west) Velocity (m/s)	0.86	0.06
	V (north-south) Velocity (m/s)	0.63	0.03
Near Seafloor (48m)	Current Speed (m/s)	0.72	0.03
	U (east-west) Velocity (m/s)	0.85	0.08
	V (north-south) Velocity (m/s)	0.80	0.05

Table 12 ***Index of agreement and mean absolute errors of simulated current speed, u- and v-velocities at 2m and 6m depth at Devonport station for Jan 2022***

Depth	Parameter	IOA	MAE
2m	Current Speed (m/s)	0.64	0.11
	U (east-west) Velocity (m/s)	0.65	0.11
	V (north-south) Velocity (m/s)	0.84	0.16
6m	Current Speed (m/s)	0.68	0.10
	U (east-west) Velocity (m/s)	0.62	0.13
	V (north-south) Velocity (m/s)	0.85	0.16

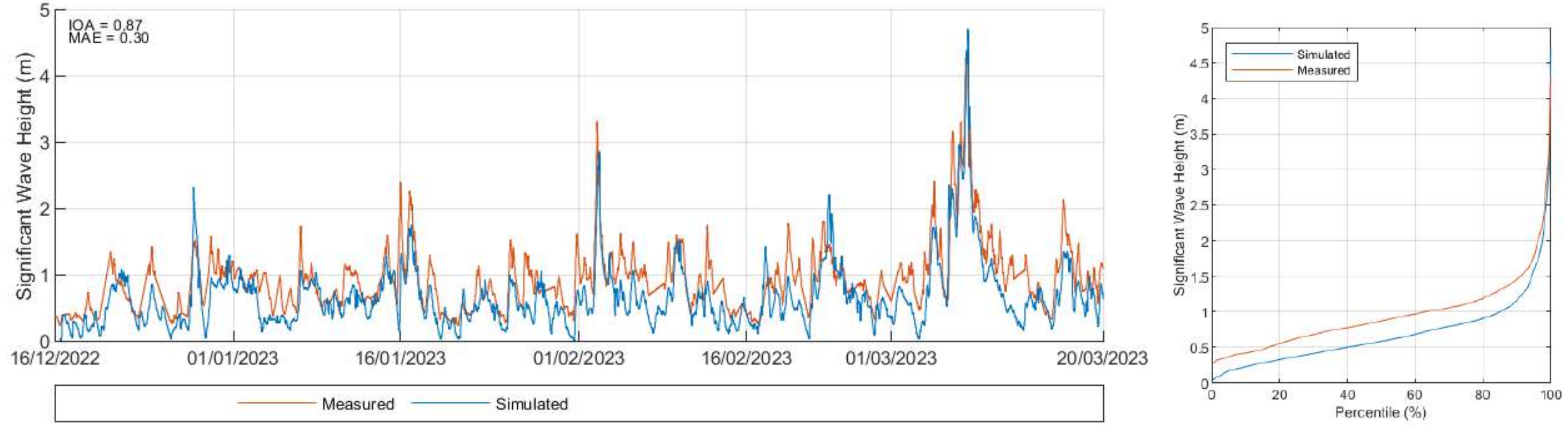


Figure 27 ***Comparison between simulated and measured wave height from Dec 2022 to Mar 2023 at the offshore ADCP (left panel: time-series, right panel: percentile distribution)***

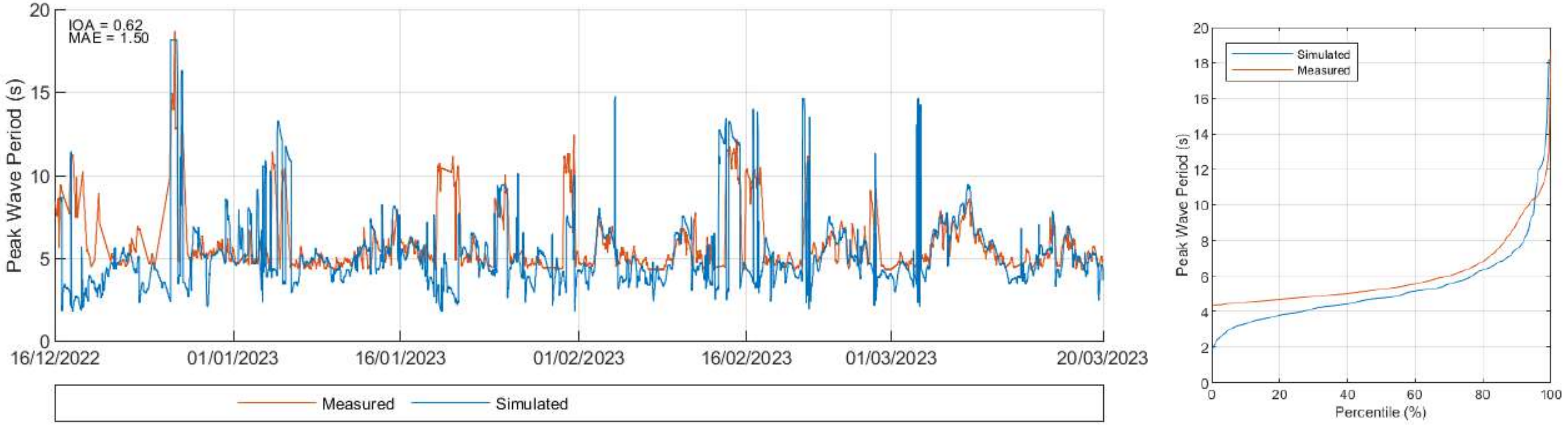


Figure 28 ***Comparison between simulated and measured wave period from Dec 2022 to Mar 2023 at the offshore ADCP (left panel: time-series, right panel: percentile distribution)***

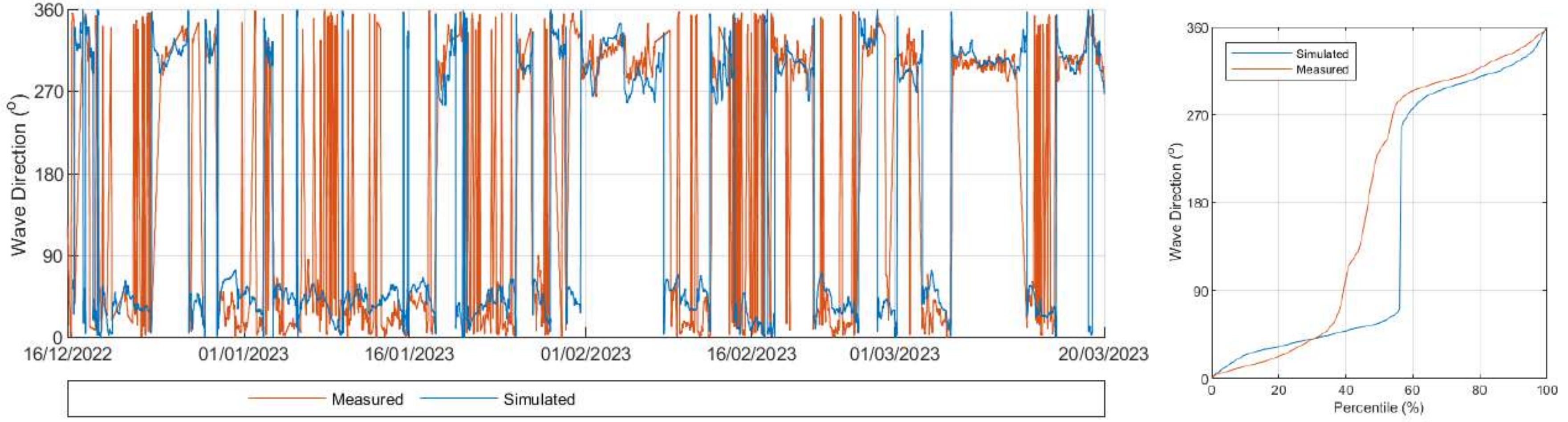
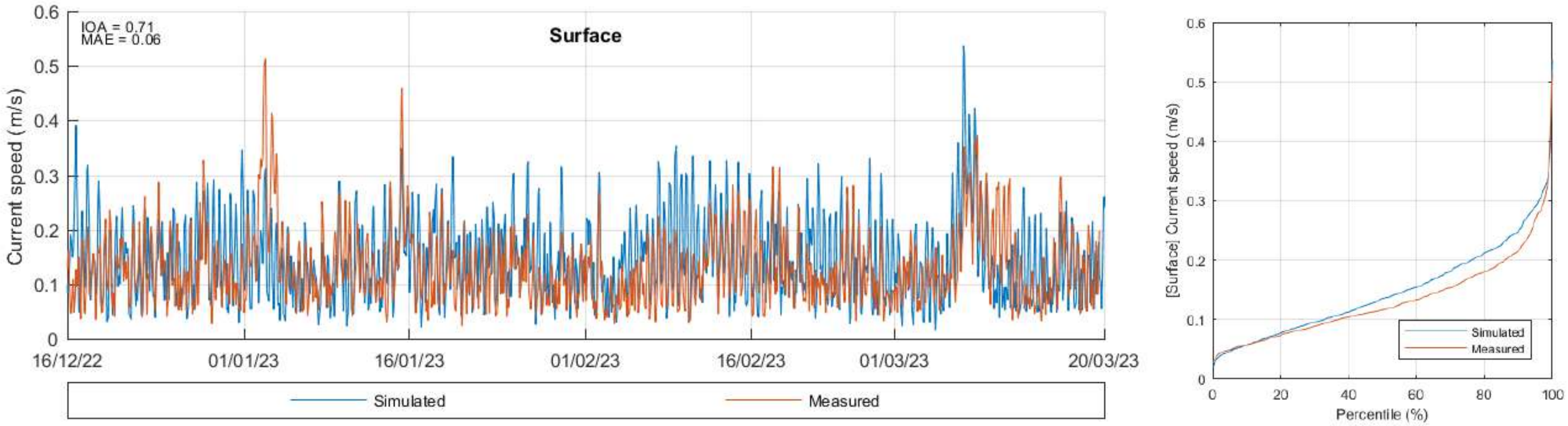


Figure 29 ***Comparison between simulated and measured wave direction from Dec 2022 to Mar 2023 at the offshore ADCP (left panel: time-series, right panel: percentile distribution)***



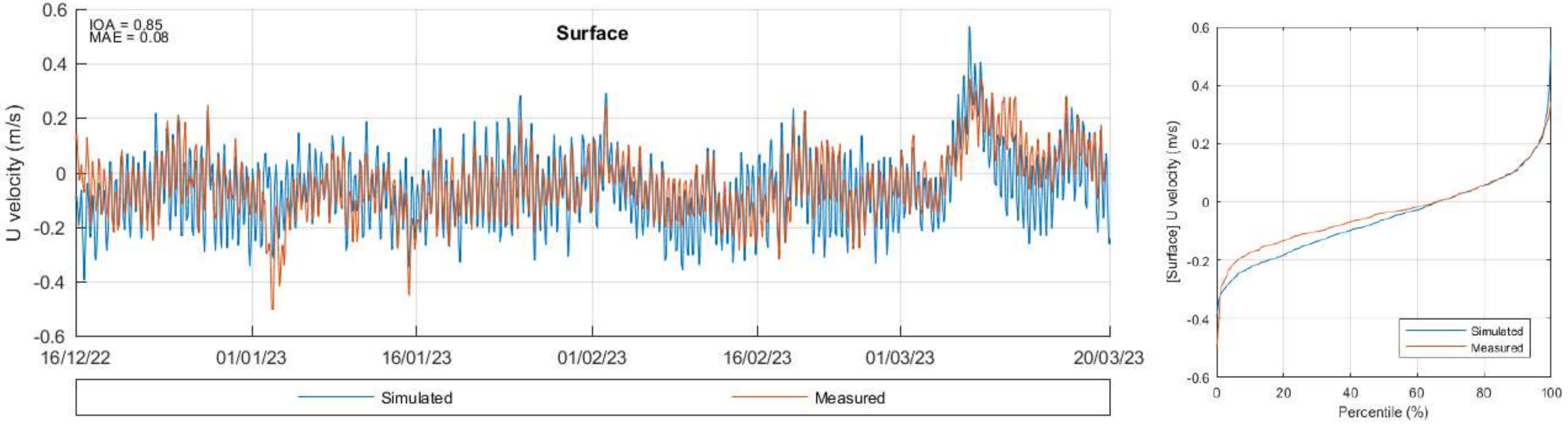
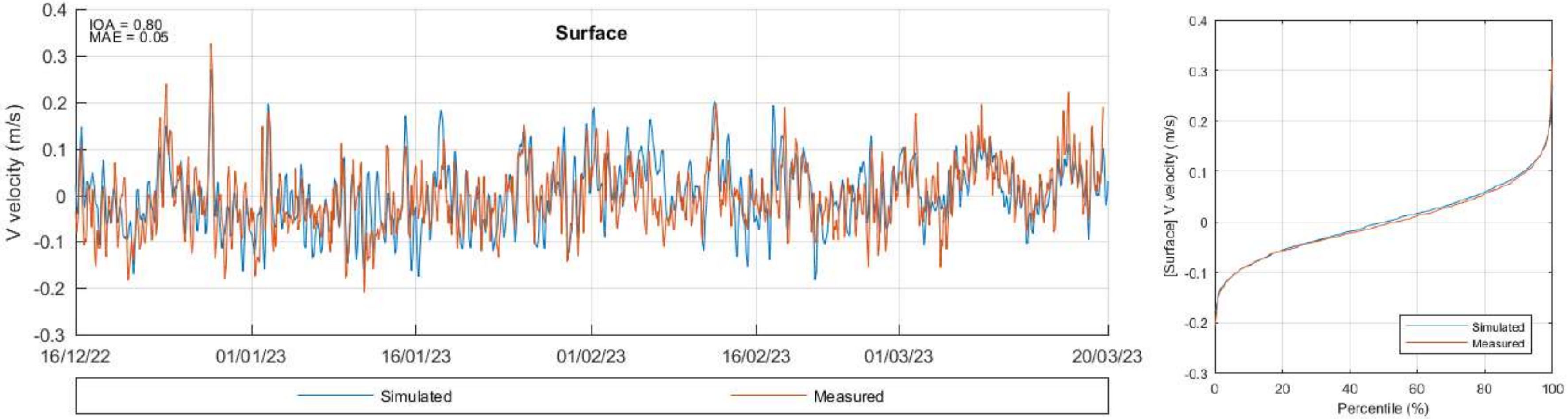


Figure 30 ***Comparison between simulated and measured surface current speed (top) and u- (east-west) velocity (bottom) from Dec 2022 to Mar 2023 at the offshore ADCP (left panel: time-series, right panel: percentile distribution)***



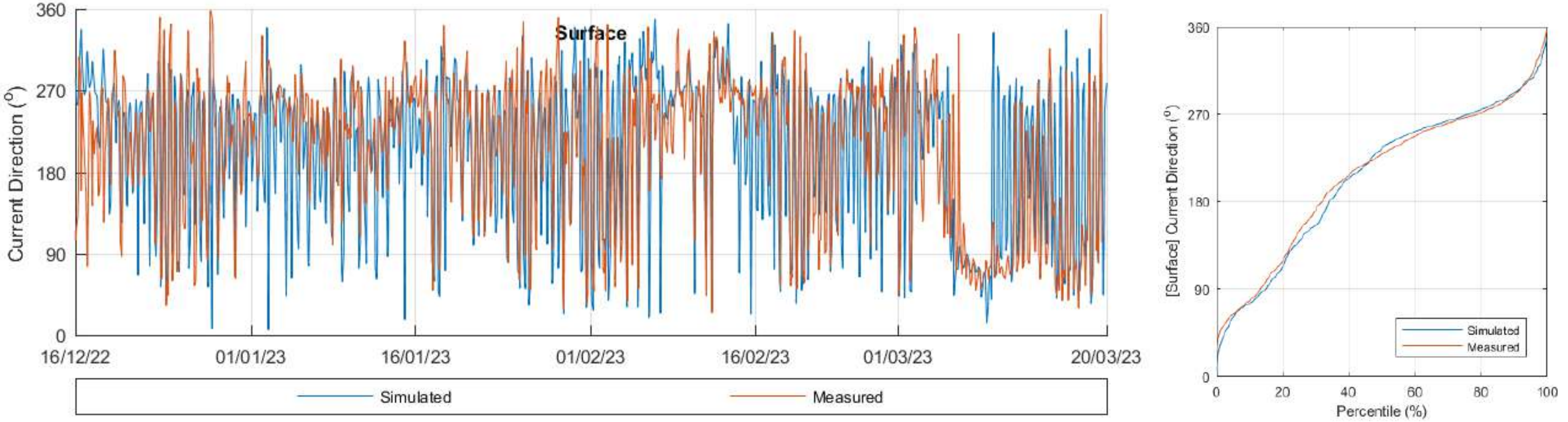
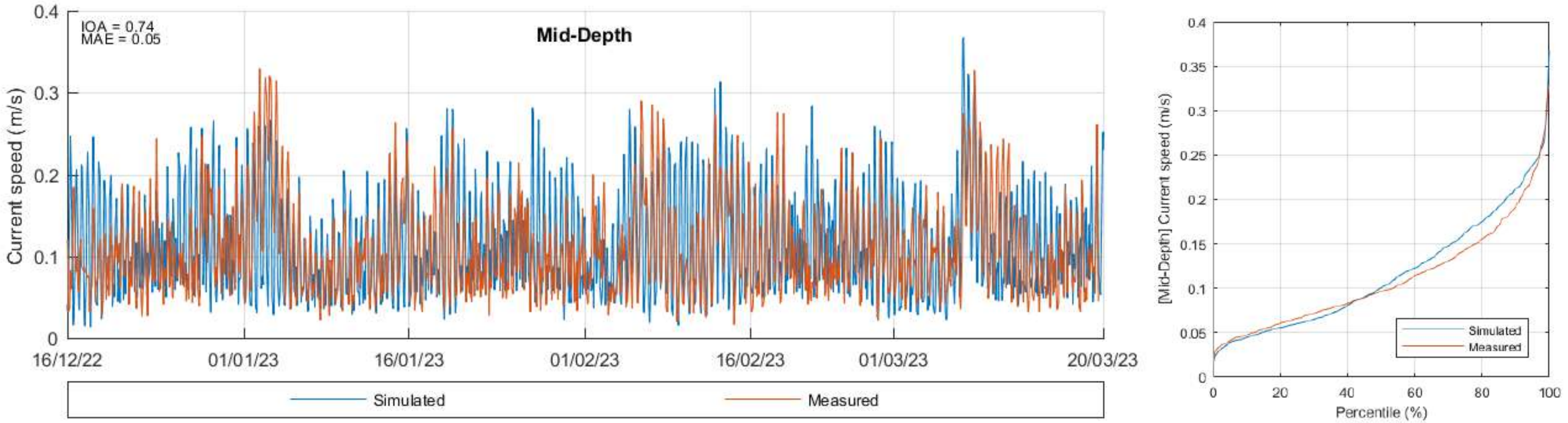


Figure 31 ***Comparison between simulated and measured surface v- (north-south) velocity and current direction (bottom) from Dec 2022 to Mar 2023 at the offshore ADCP (left panel: time-series, right panel: percentile distribution)***



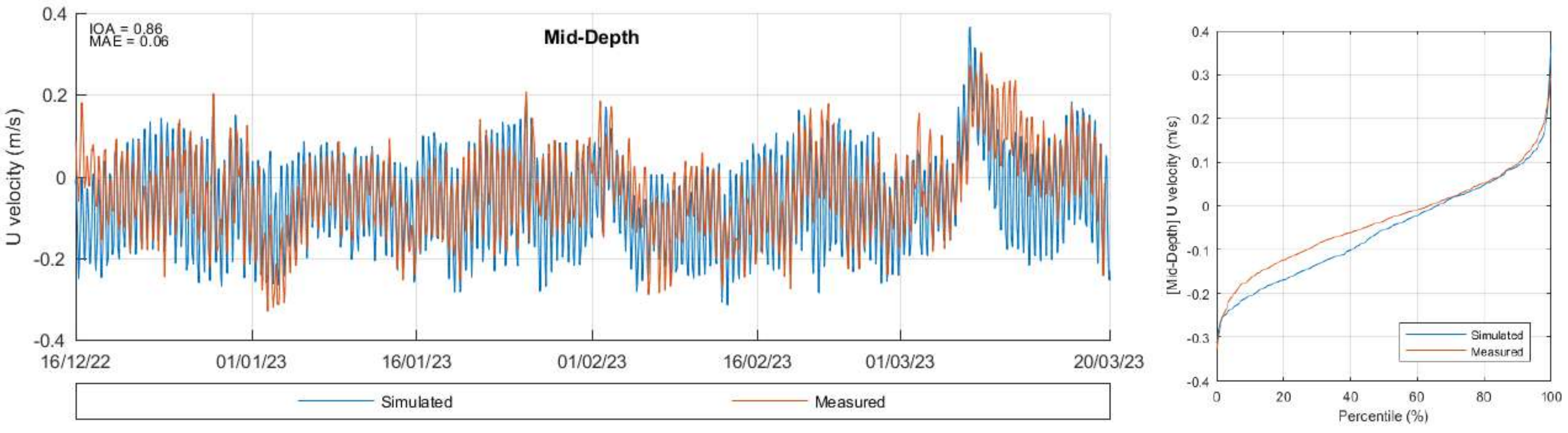
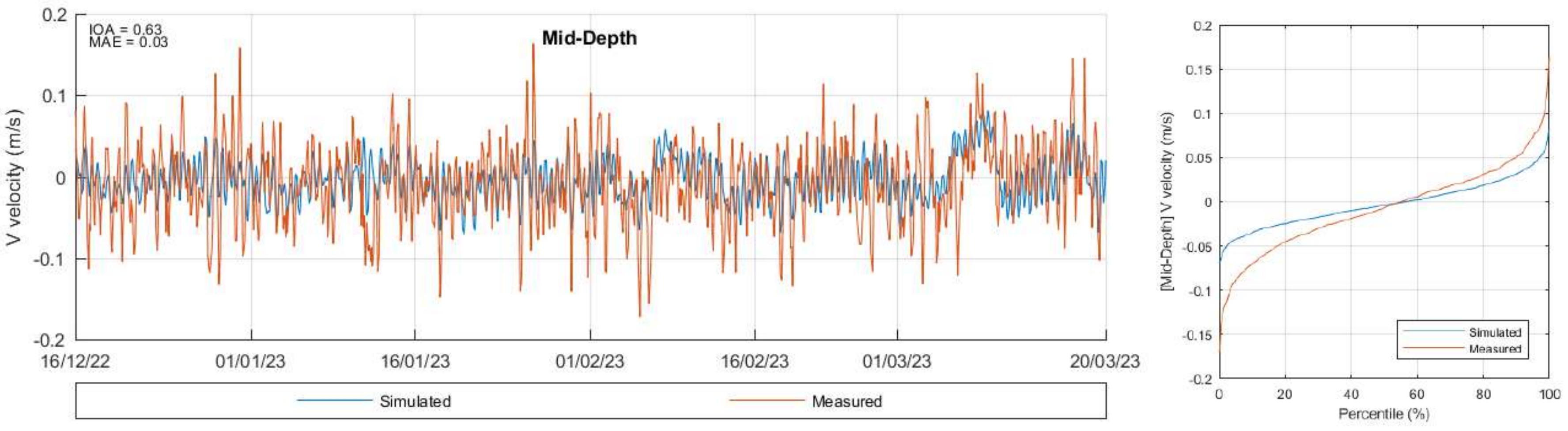


Figure 32 ***Comparison between simulated and measured mid-depth current speed (top) and u- (east-west) velocity (bottom) from Dec 2022 to Mar 2023 at the offshore ADCP (left panel: time-series, right panel: percentile distribution)***



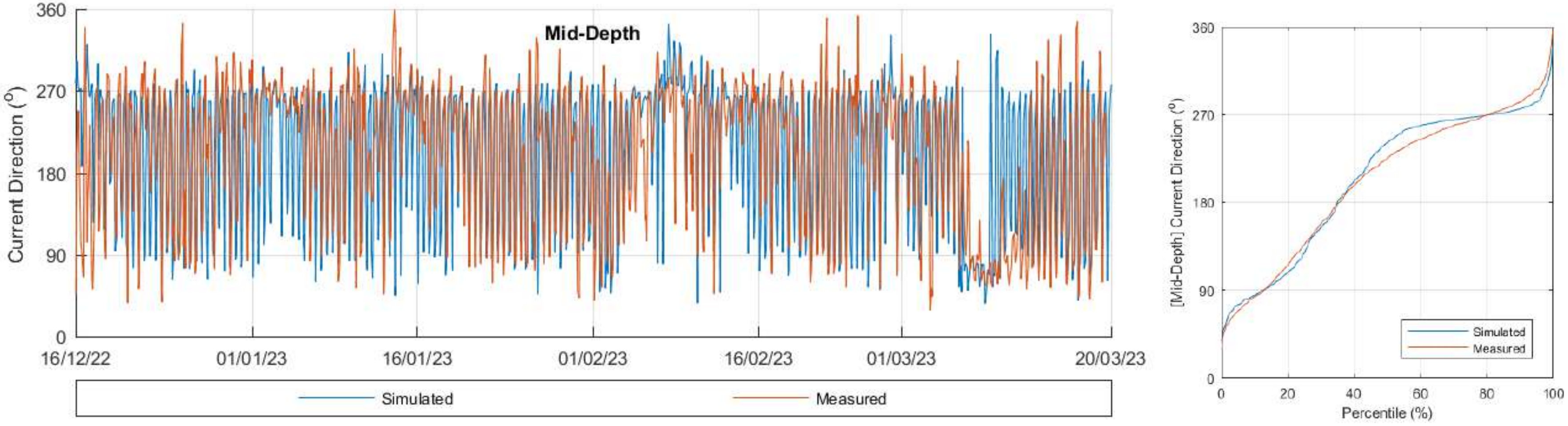
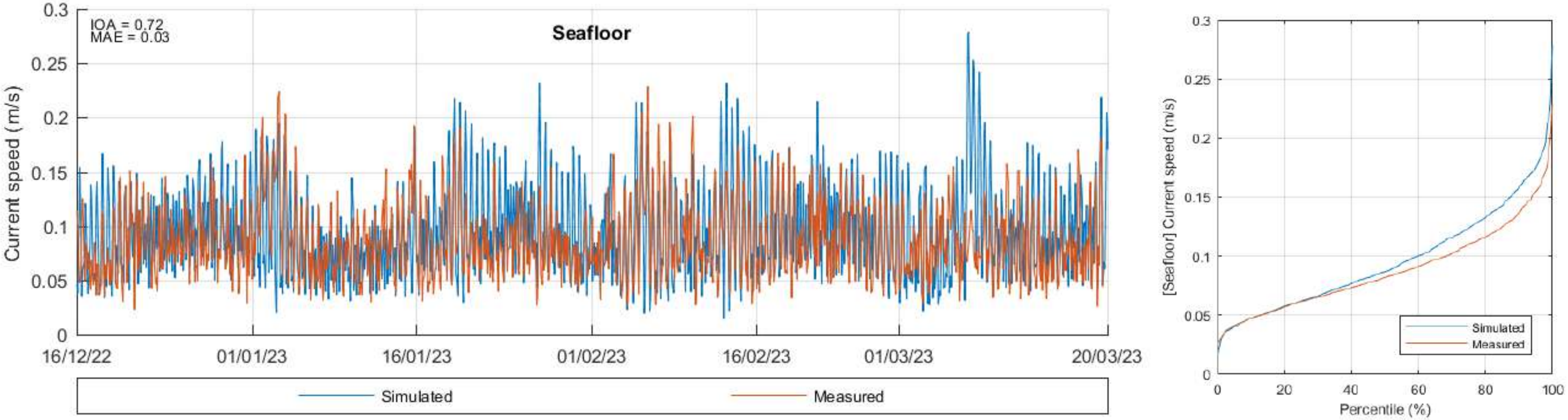


Figure 33 ***Comparison between simulated and measured mid-depth v- (north-south) velocity and current direction (bottom) from Dec 2022 to Mar 2023 at the offshore ADCP (left panel: time-series, right panel: percentile distribution)***



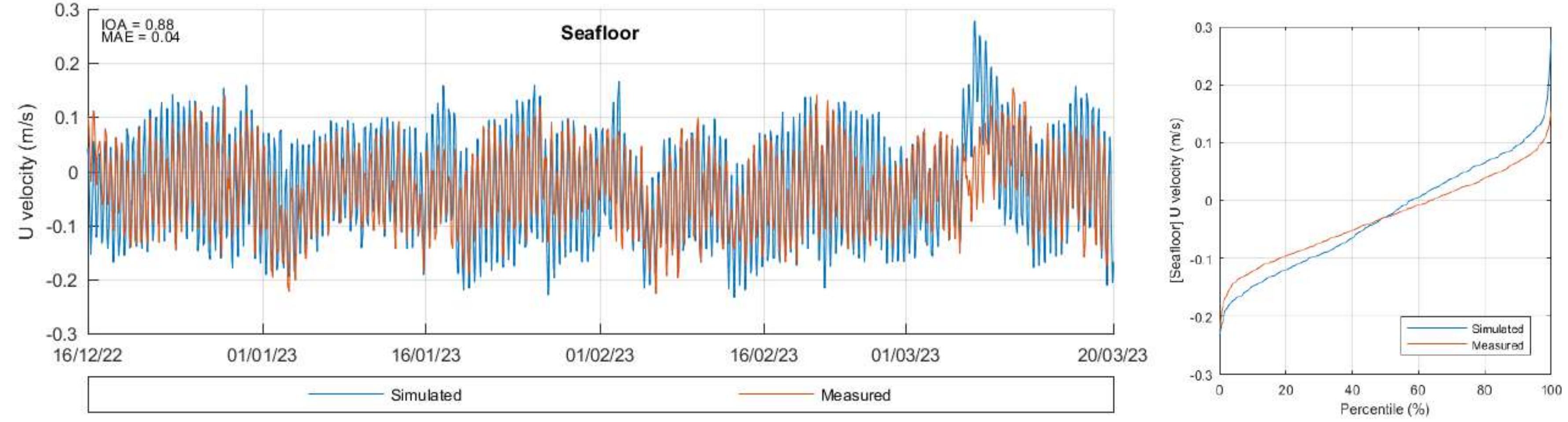
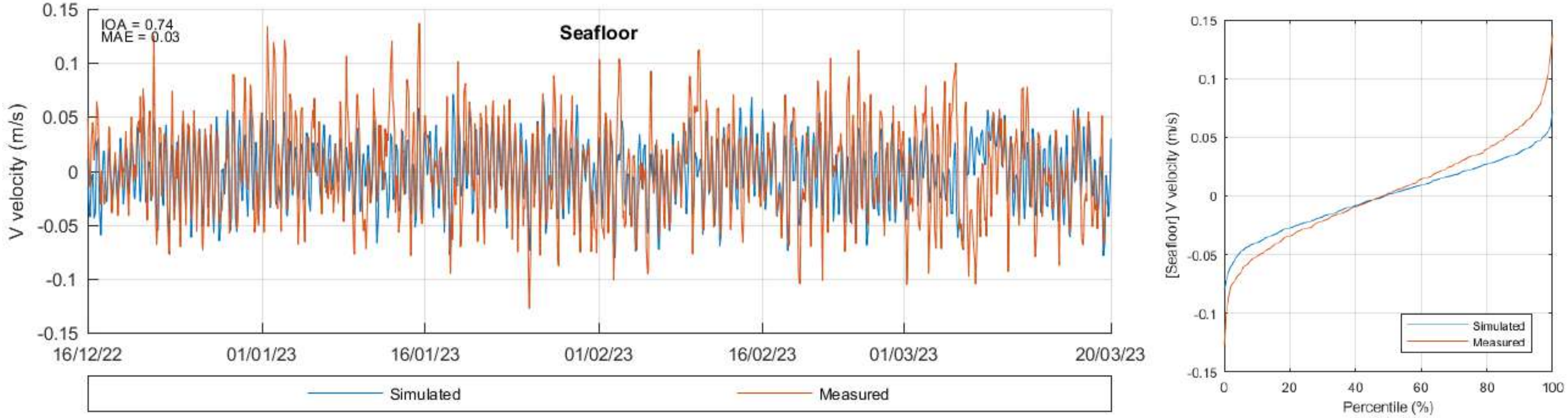


Figure 34 ***Comparison between simulated and measured seafloor current speed (top) and u- (east-west) velocity (bottom) from Dec 2022 to Mar 2023 at the offshore ADCP (left panel: time-series, right panel: percentile distribution)***



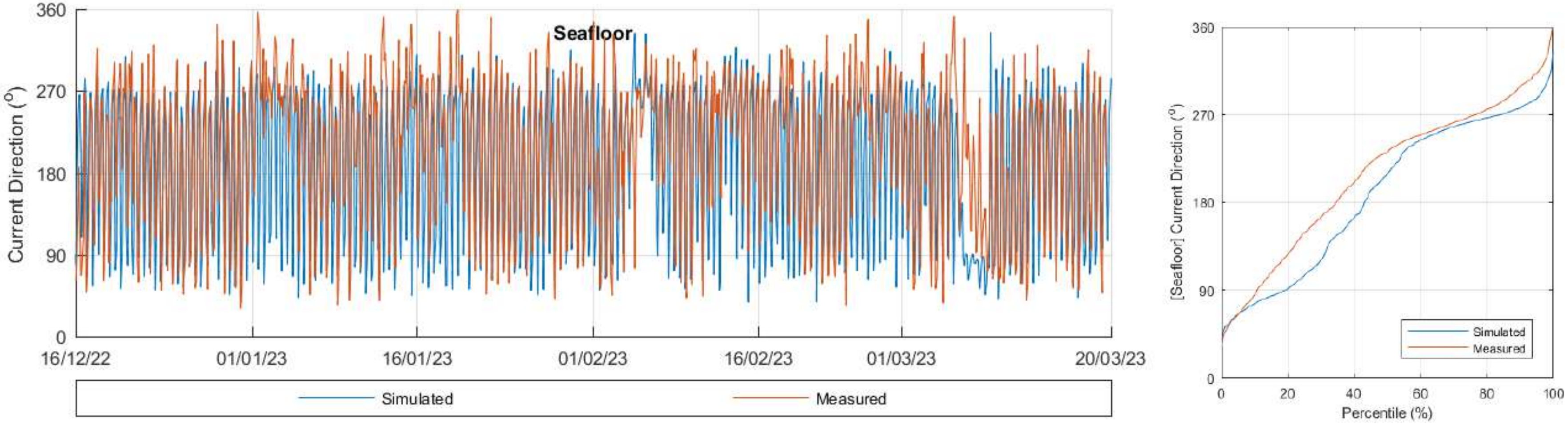
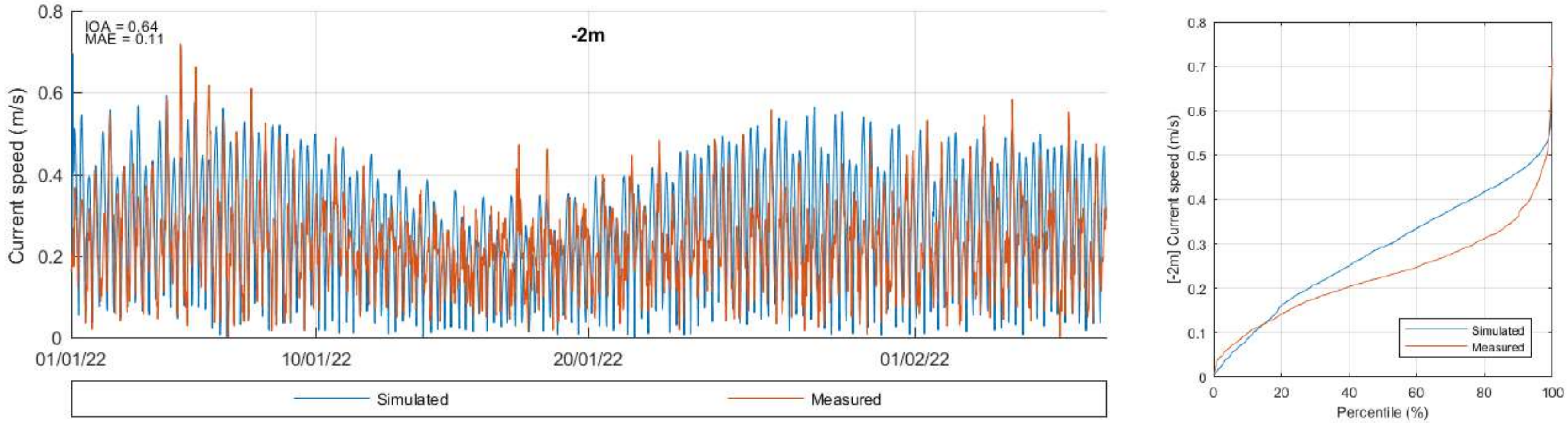


Figure 35 ***Comparison between simulated and measured seafloor v- (north-south) velocity and current direction (bottom) from Dec 2022 to Mar 2023 at the offshore ADCP (left panel: time-series, right panel: percentile distribution)***



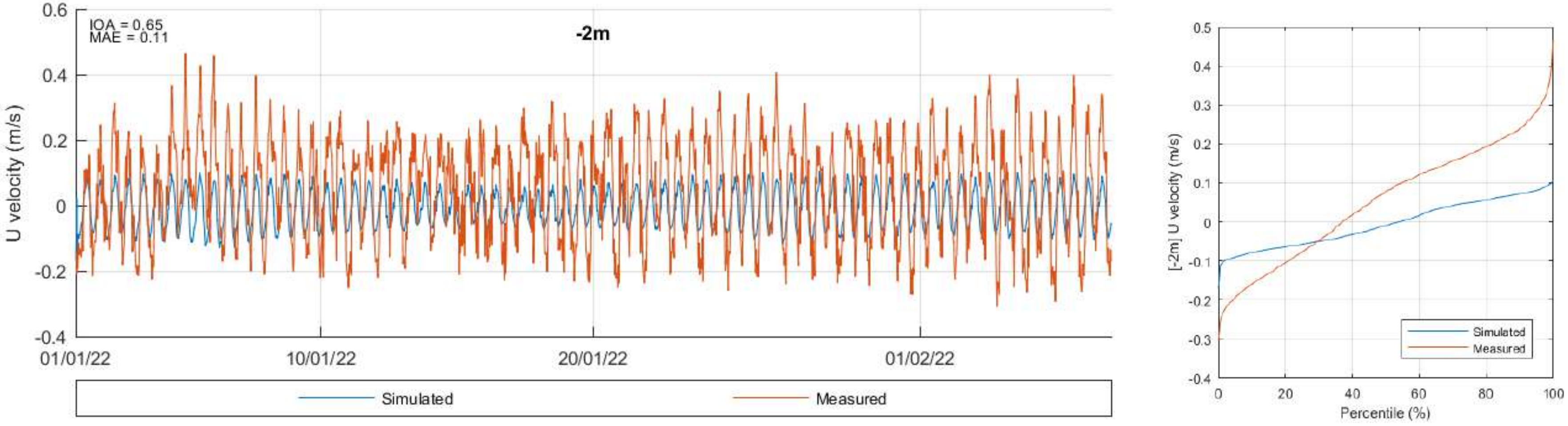
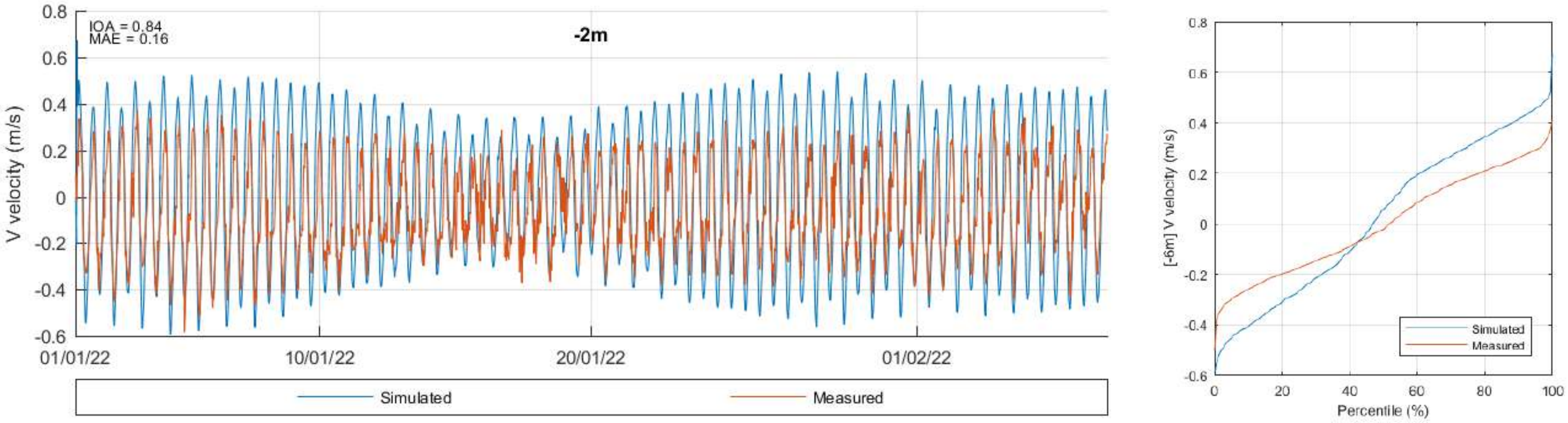


Figure 36 *Comparison between simulated and measured current speed (top) and u- (east-west) velocity (bottom) at 2m depth for Jan 2022 at Devonport station (left panel: time-series, right panel: percentile distribution)*



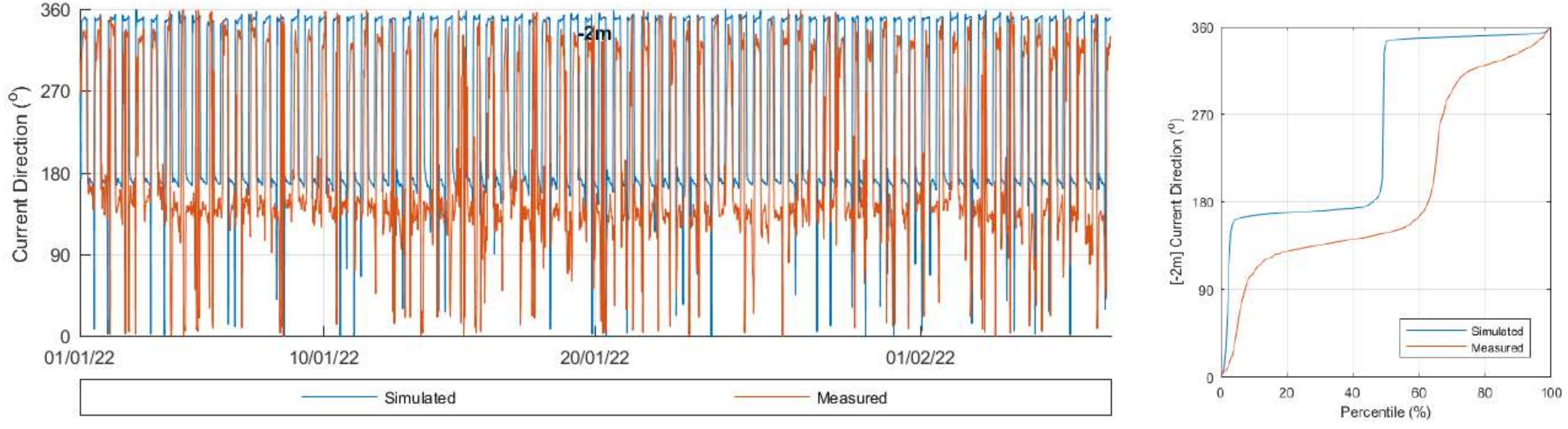
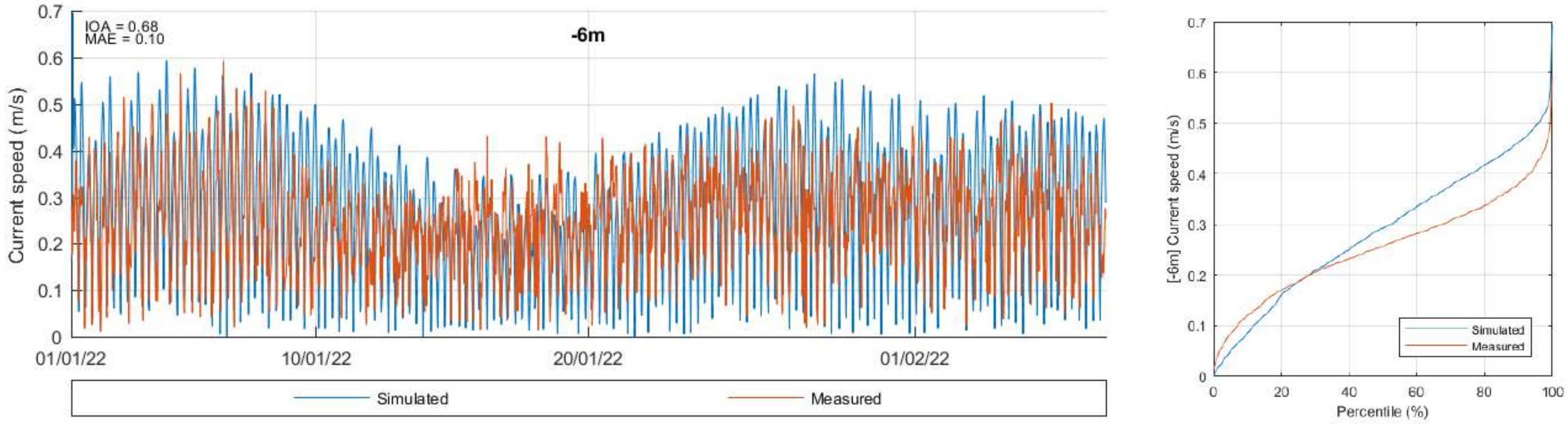


__Figure 37__ ***Comparison between simulated and measured v- (north-south) velocity (top) and current direction at 2m depth for Jan 2022 at Devonport station (left panel: time-series, right panel: percentile distribution)***



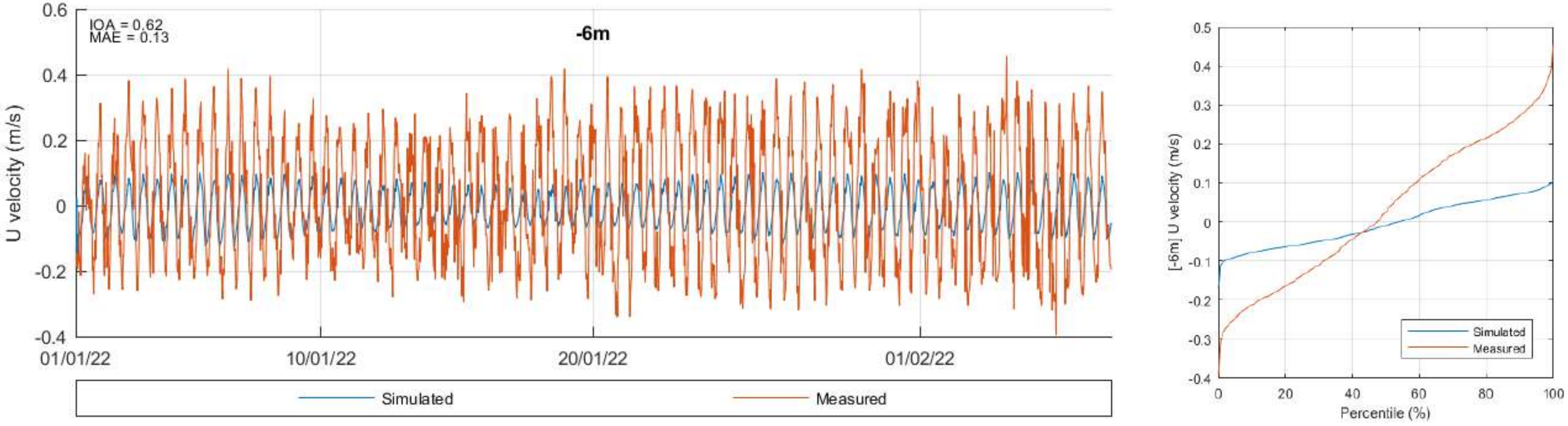
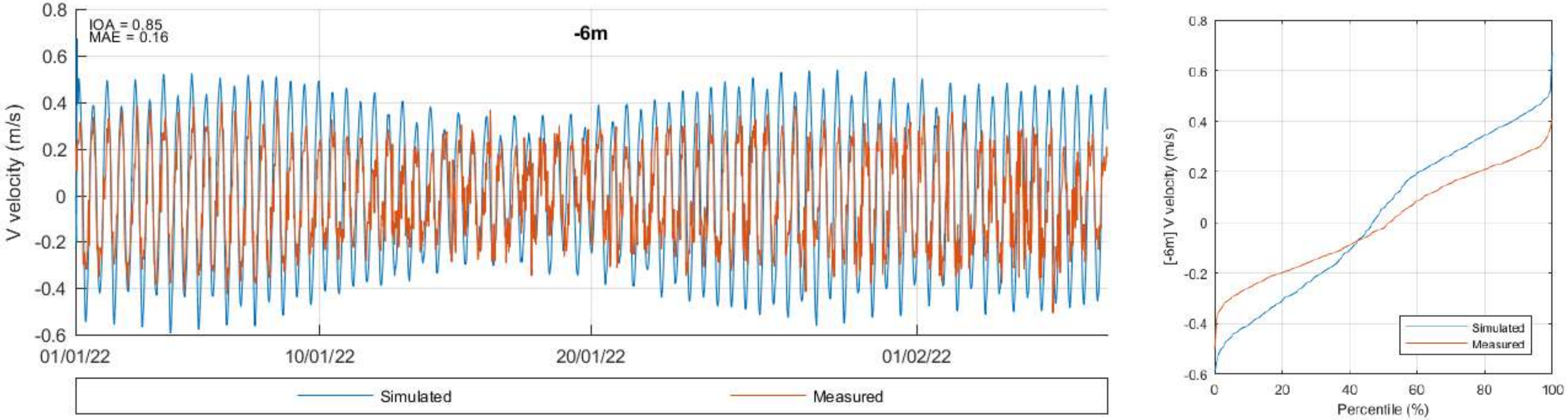


Figure 38 ***Comparison between simulated and measured current speed (top) and u- (east-west) velocity (bottom) at 6m depth for Jan 2022 at Devonport station (left panel: time-series, right panel: percentile distribution)***



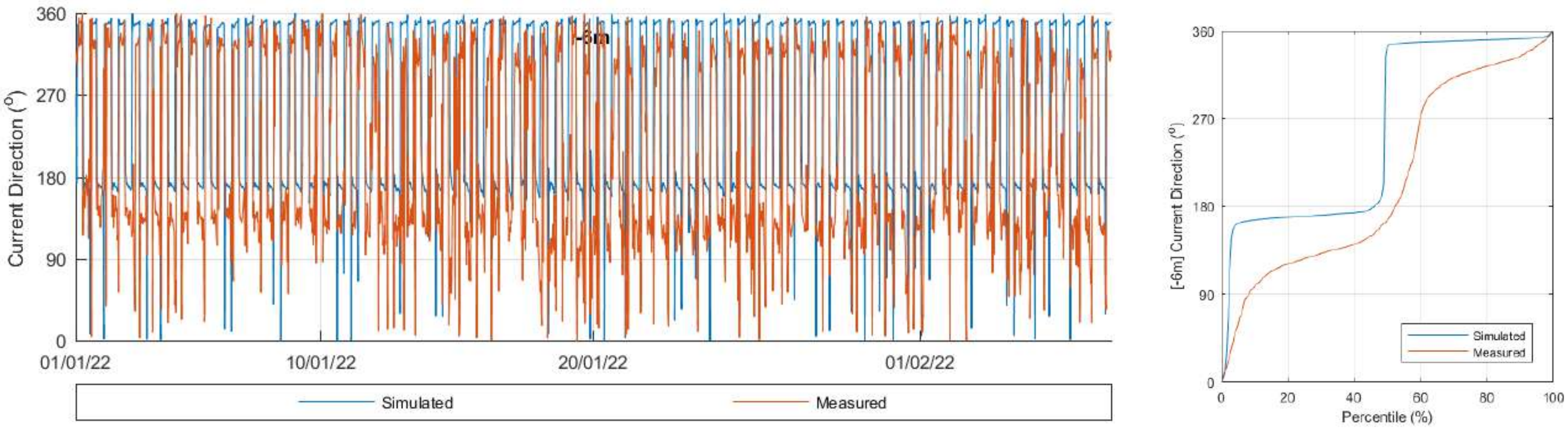


Figure 39 ***Comparison between simulated and measured v- (north-south) velocity (top) and current direction at 6m depth for Jan 2022 at Devonport station (left panel: time-series, right panel: percentile distribution)***

5. Results and Discussion

5.1 SSC

5.1.1 Statistical contours

Statistical contours of dredging-induced SSC (above ambient) throughout the 147 days (including 3 weeks additional simulation time after dredging) are illustrated in the following manner:

- The contours of the 20th, 50th (median), 80th, 95th and 100th percentile (maximum) distributions of the 'maximum' concentrations (at any depth) through the water column are presented in Figure 40 to Figure 42
- For context, the 20th, 50th, 80th and 95th percentile contours represent the areas in which the SSC valued denoted by the contours are exceeded for a cumulative, non-continuous total of approximately 118 days, 74 days, 29 days and 7 days, respectively, while the 100th percentile occurred for a maximum of one model output timestep (30 minutes) only.
- The statistical figures indicate that concentrations of SSC within the coastal marine waters are typically increased by less than 3 mg/L for 95% of the time during dredging. Further, measurable SSC increases (e.g. >1 mg/L) occurred at the DSDG for only ~10% of the time throughout the simulated dredge program, reflecting the short and intermittent nature of disposal events.

5.1.2 Time series at sensitive receptor sites

Six locations (Figure 43) were defined to assess the SSC at various sensitive receptor sites (four locations for seagrass and two locations for the scallop beds

Time-series plots of SSC at the identified receptor sites for seagrass and scallops are presented in Figure 44 and Figure 45, respectively.

Seagrass location 2, which is the most proximal seagrass habitat to the dredging operations, had the highest predicted dredging-induced SSC of up to ~14 mg/L, though increases above 3 mg/L were generally very short in duration (on the order of hours to ~1 day). The predicted SSC increases at the other seagrass receptor locations were generally below 2 mg/L.

At the scallop bed sites, the predicted SSC increases were generally below 0.5 mg/L, and exceeded only 1 mg/L very briefly (for a maximum of 10 hours) at scallop location 2.

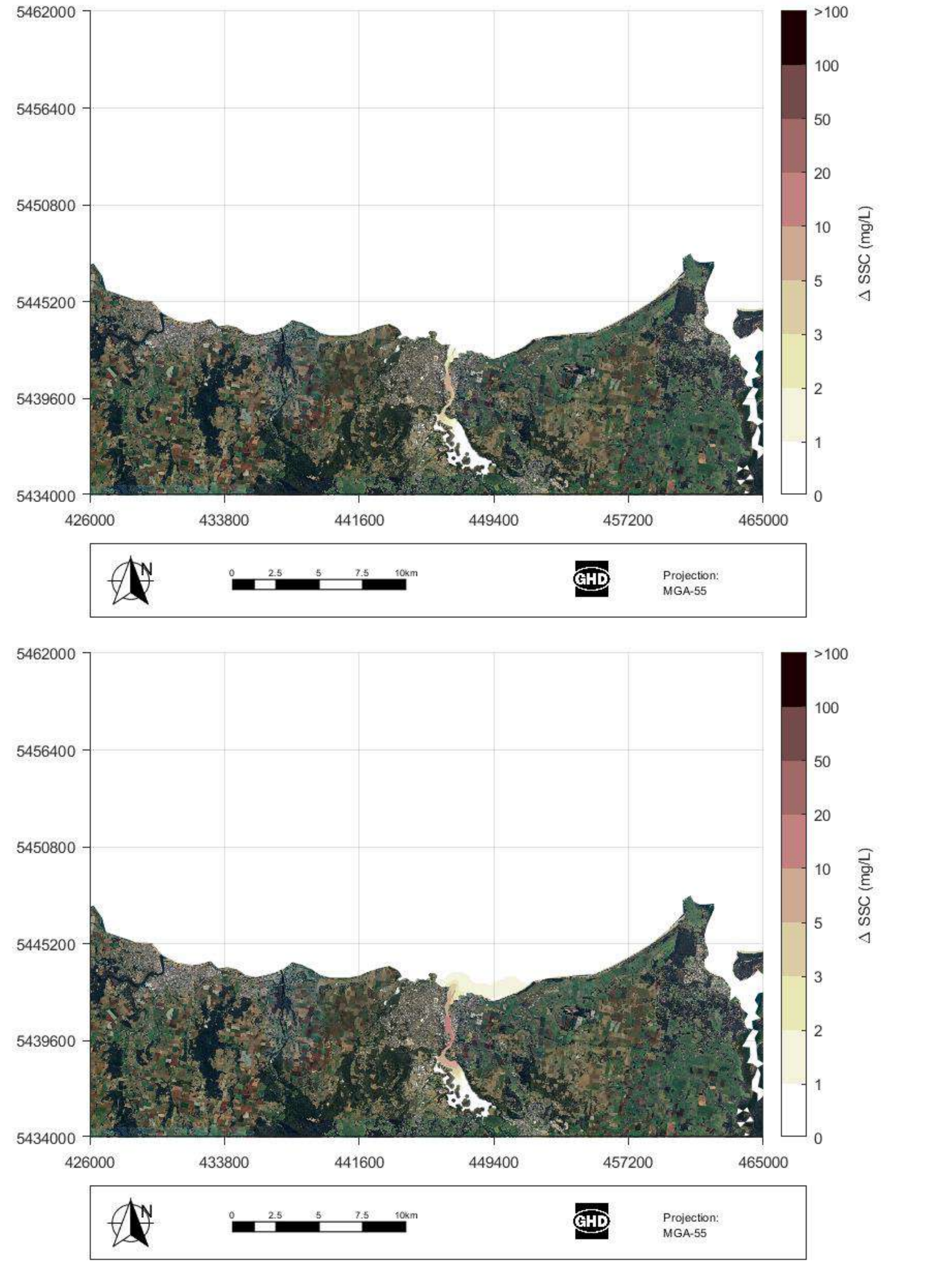


Figure 40 ***Spatial contours of 20th (top) and 50th (bottom) percentile of dredging-induced SSC (above ambient)***

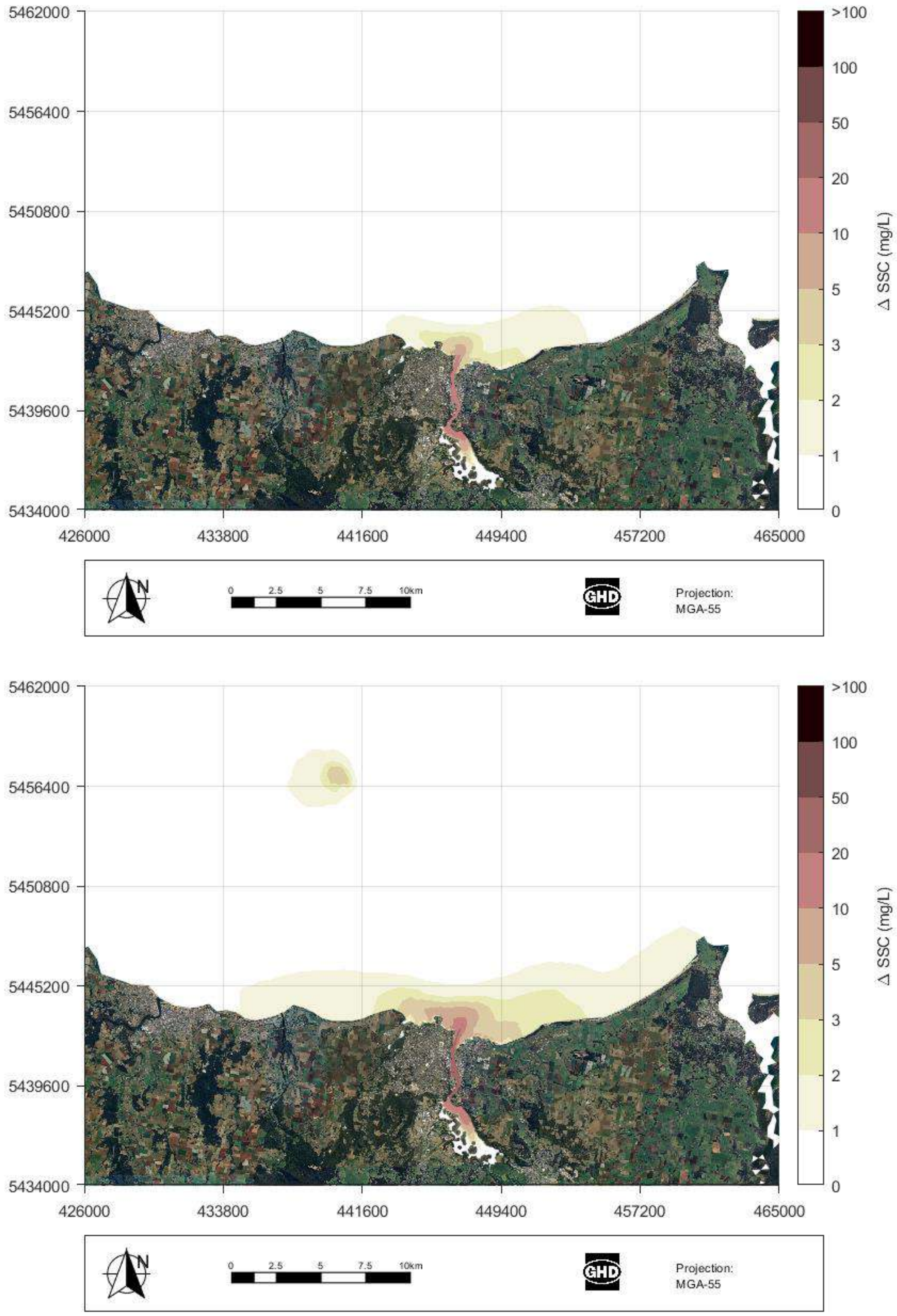


Figure 41 ***Spatial contours of 80th (top) and 95th (bottom) percentile of dredging-induced SSC (above ambient)***

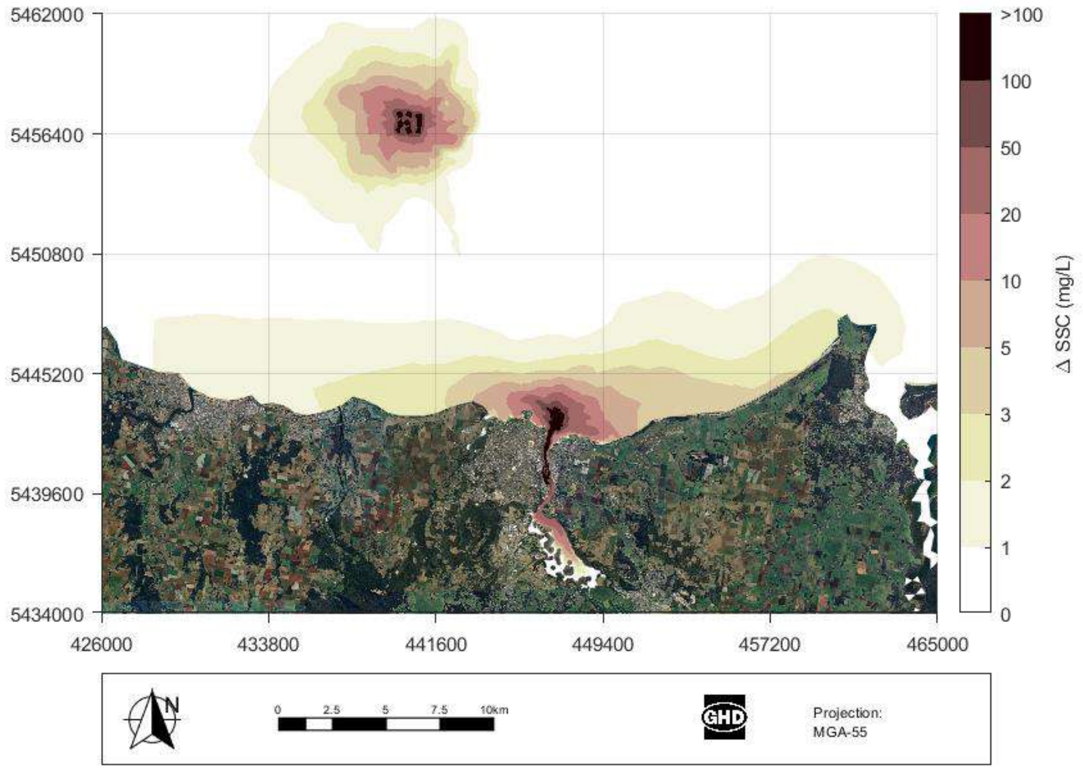


Figure 42 ***Spatial contours of maximum (100th percentile) of dredging-induced SSC (above ambient)***

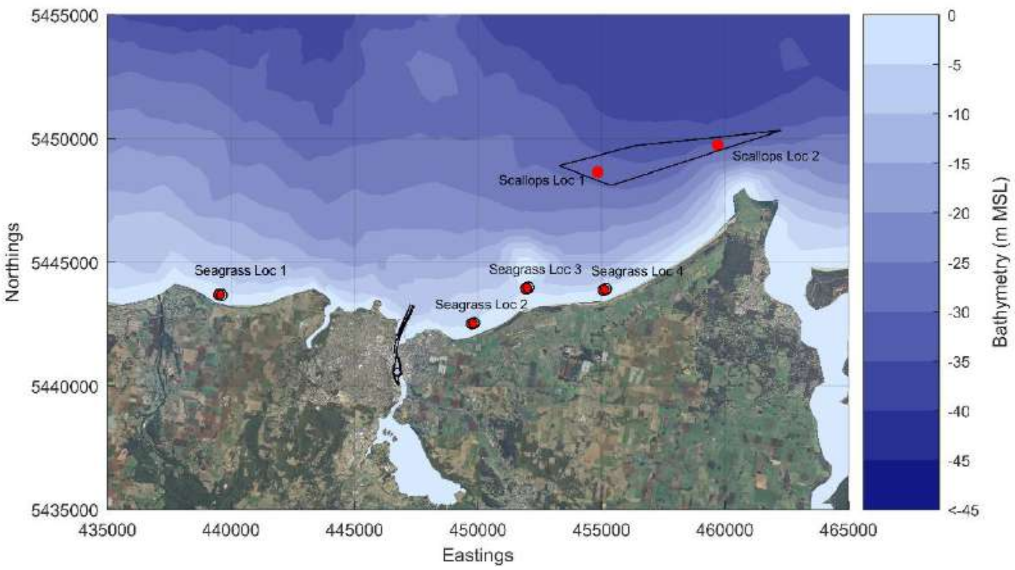


Figure 43 ***Location of time series extraction points at sensitive receptor sites***

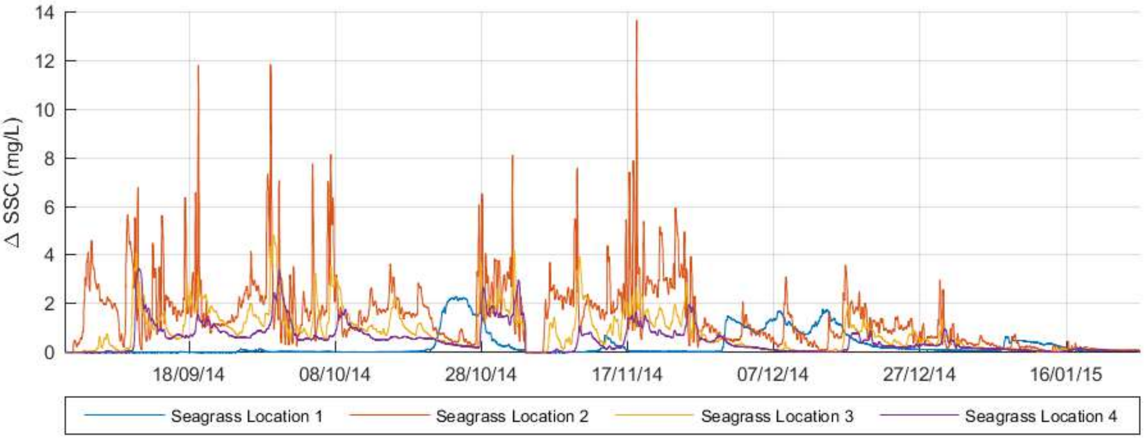


Figure 44 *Time-series plot for SSC at seagrass locations*

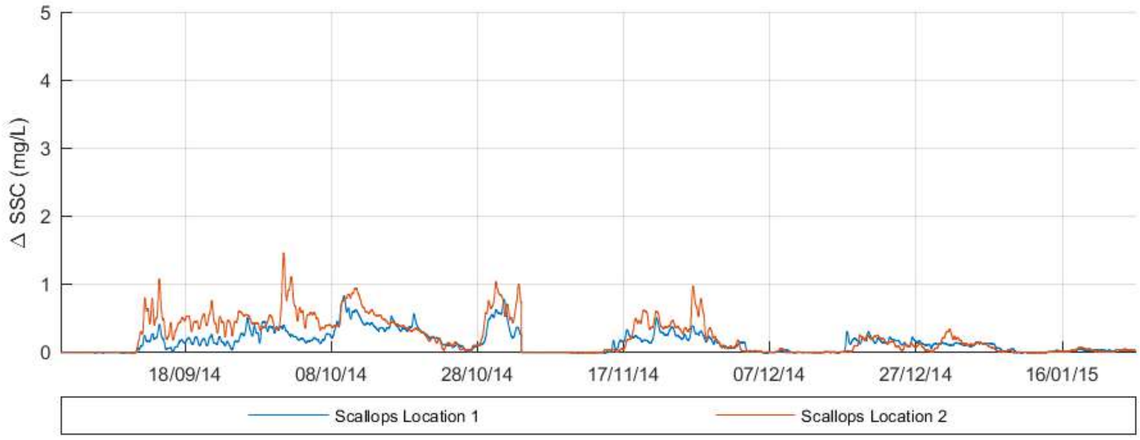


Figure 45 *Time-series plot for SSC at scallop locations*

5.2 Deposition

Spatial contours of dredging-induced maximum (100th percentile) deposition thicknesses throughout the 147-day simulation are presented in Figure 46.

Deposition is generally predicted to be negligible for the simulated fine sediments, indicating a high degree of remobilisation of any deposited silts and clays. Predicted deposition thicknesses were less than 0.05 mm throughout the model domain, except immediately surrounding the simulated dredge locations where deposition of fine sediments contributed up to 1 mm.

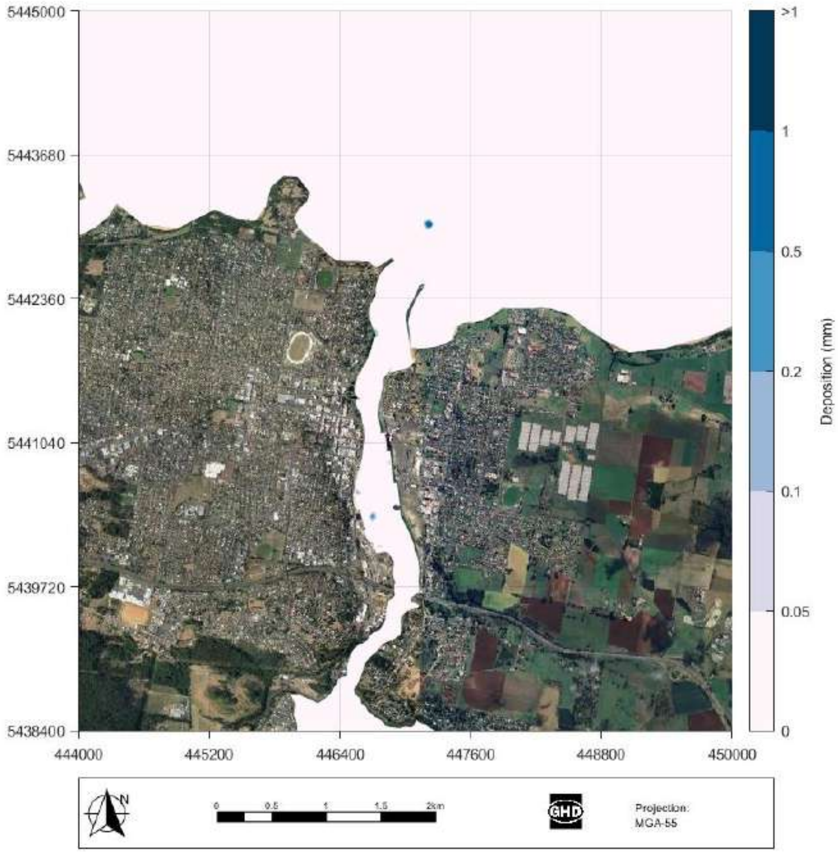


Figure 46 Spatial contours of maximum (100th percentile) deposition thickness

5.3 Impact assessment

The spatial extents of the ZoI, ZoMI and ZoHI are presented at two different scales in Figure 47 and Figure 48. Due to the negligible deposition of fine sediments predicted, the impact zones are entirely the result of suspended sediment plumes generated by the dredging and disposal activities.

On the basis of the impact thresholds adopted for these zones, as summarised in Section 3.5, the impacts from dredging are summarised as follows:

- The ZoI is predicted to extend ~10 km east, ~14 km west and ~3 km offshore from Devonport, ~4 km upstream to the tidal flats in the upper Mersey River estuary, and ~2.5 km surrounding disposal ground. The ZoI does not extend to the historical commercial scallop beds.
- The ZoMI is predicted to extend ~2.25 km east, ~2.5 km west and ~3 km upstream from Devonport. The ZoMI is not predicted to overlap the nearest seagrass habitat at ~2.75 km east of the Entrance Channel (ZoMI edge is ~500 m from the habitat location).
- The ZoHI is predicted to be localised primarily within the boundaries of the dredging areas, and up to ~2.25 km upstream from the Port. It is noted however that the entirety of the dredged areas and the DSDG should be considered within the ZoHI, regardless of the modelling outputs (that only simulate fine sediments), since the seabed at these locations will be permanently disrupted from the dredging and disposal activities.

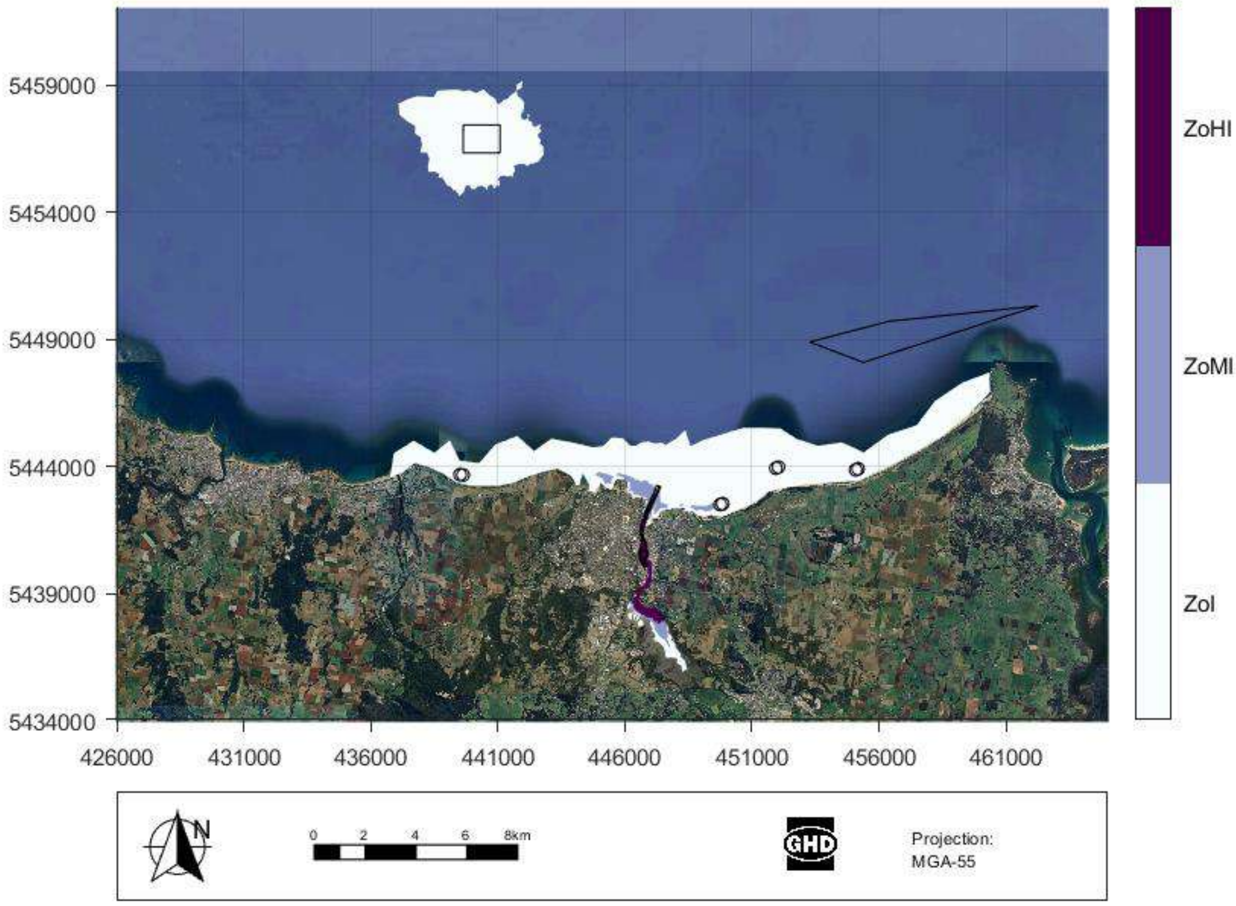


Figure 47 Spatial extents of ZoI, ZoMI and ZoHI predicted for the dredge program showing port boundaries, DSDG (rectangle), commercial scallop area (polygon to the east) and seagrass habitats (circles)

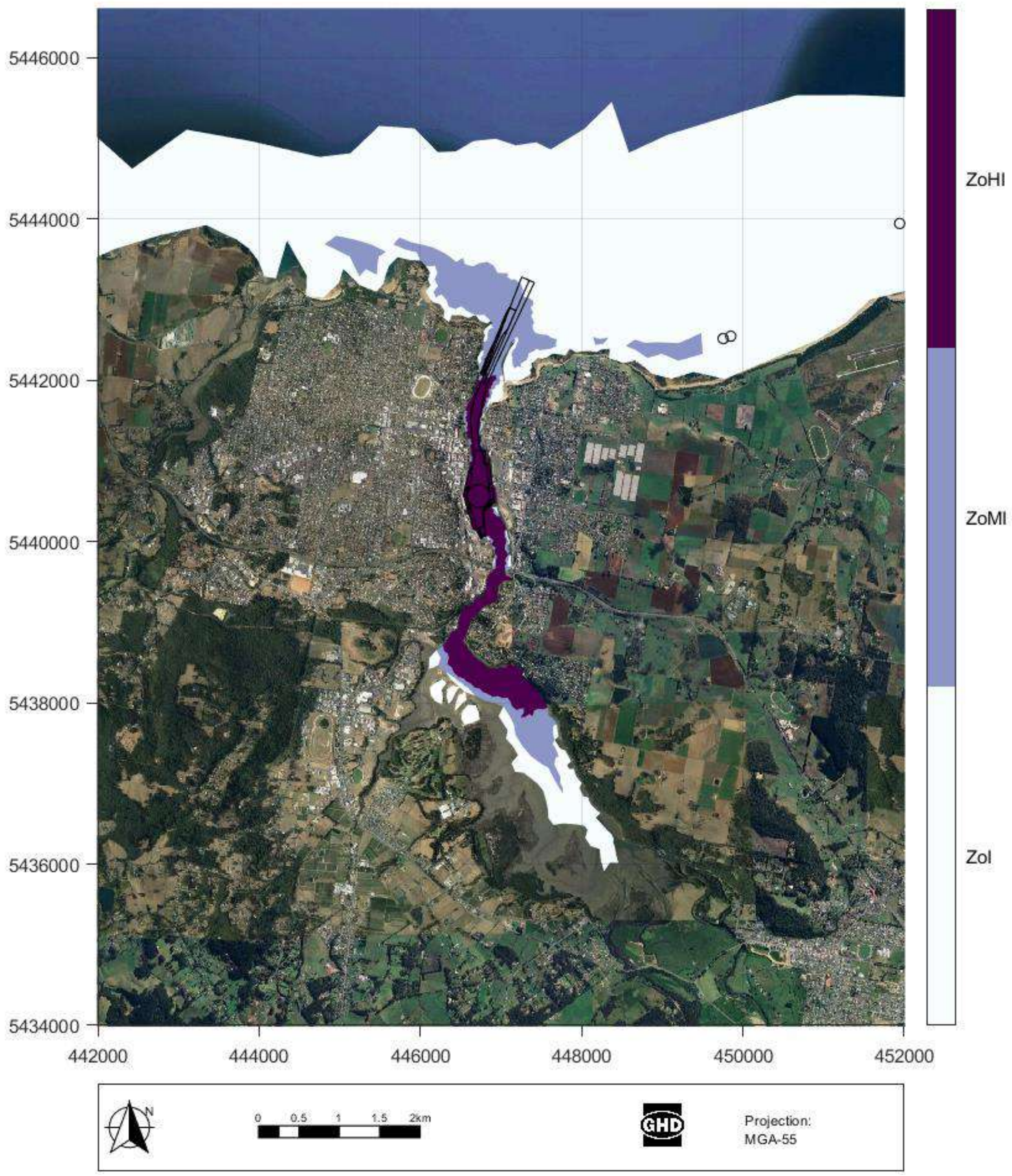


Figure 48 ***As Figure 47, focusing on the Port and Mersey River estuary***

5.4 Shear stresses at spoil ground

Statistical contours of bed shear stresses at the disposal site for the 95th and 100th percentiles are presented in Figure 49.

Predicted bed shear stresses at the spoil ground are generally low due to the site being located offshore (depths greater than 50 m), where stresses from wave activity on the seabed are reduced compared to shallower areas. Modelled bed shear stresses were less than 0.1 N/m^2 for about 95% of the time and reached up to a maximum value of 0.3 N/m^2.

The simulation period included some extreme wave events of significant wave heights up to ~4 m at the offshore boundary (Figure 11), which is approximately equivalent to 99th percentile wave heights for the region as simulated over a 40-year period by Liu *et al.* (2022). The simulation period therefore includes some representative energetic conditions and is considered reliable for predicting the upper range of bed shear stresses likely to occur at the DSDG.

A percentile distribution of simulated bed shear stresses at the centre of the DSDG is presented in Figure 50, and compared with critical shear stresses (minimum shear stress to induce erosion of sediment particles) for various sediment classes (fine silt, very fine sand and coarse sand). The critical shear stress values for the particle classes are from Berenbrock and Tranmer (2008). The data indicate that mobilisation of silty sediments may occur for less than 5% of the time (i.e. upper 5% of bed shear stresses), while sand-sized particles (very fine to coarse sand ranging from 63 µm to 1 mm in diameter) are only likely to be mobilised for less than 1% of the time (i.e. upper 1% of bed shear stresses that occur only during highly energetic storm events). Particles sand-sized or larger comprise 82% of the total dredged sediments disposed that will be disposed of at the DSDG, therefore mobilisation of the majority of sediments is unlikely. On this basis, the DSDG is considered to be a retentive zone whereby the significant majority of sediments disposed are likely to remain deposited at the seabed.

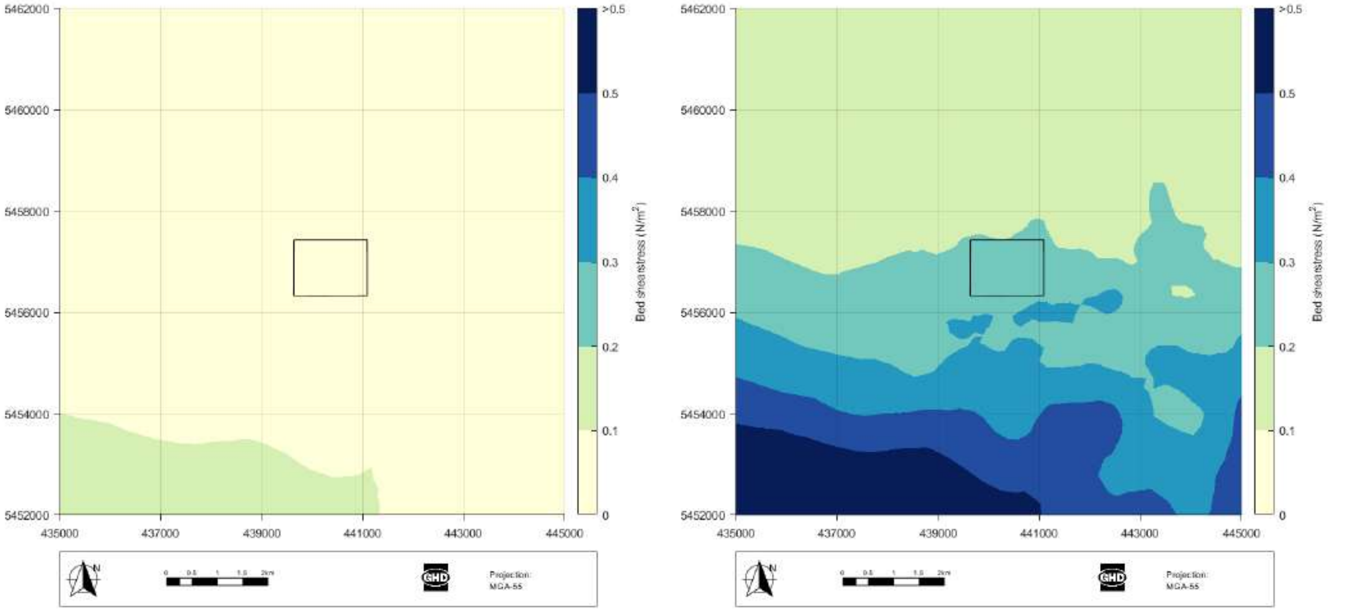


Figure 49 ***Spatial contours of 95th (left) and 100th (right) percentile of bed shear stress at the DSDG***

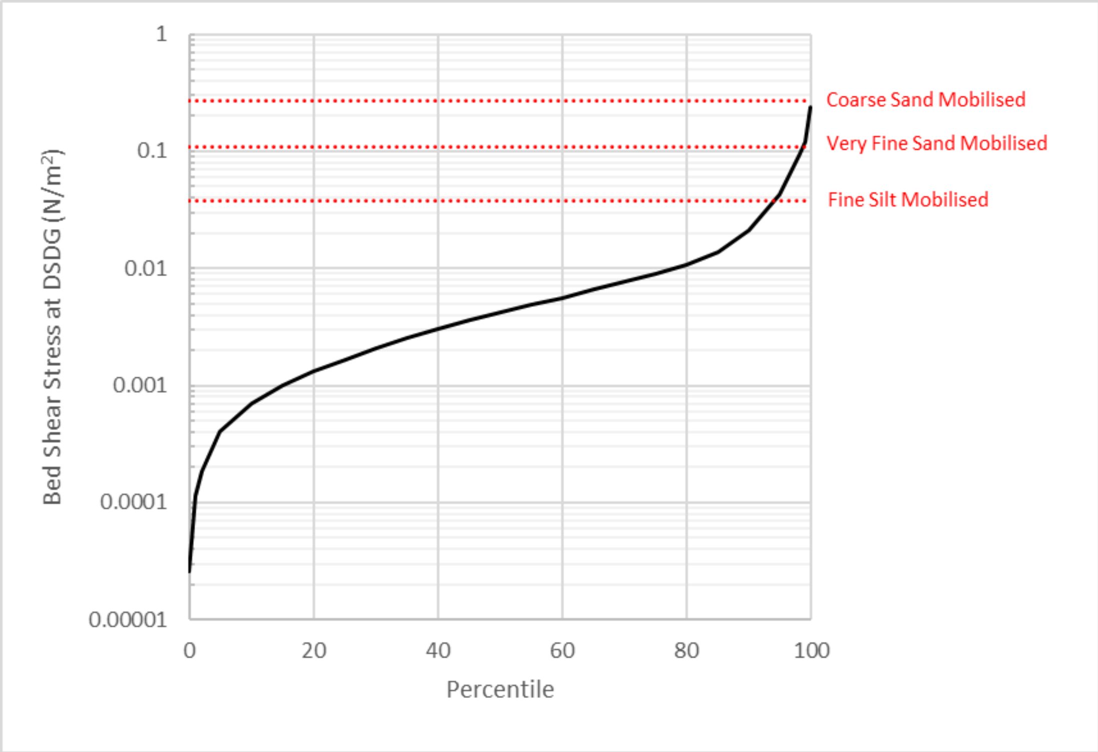


Figure 50 ***Percentile distribution of predicted bed shear stresses (black) and comparison to critical shear stresses for mobilisation of fine silt, very fine sand and coarse sand (red)***

5.5 Salinity Profile

Salinity profiles along a transect extending from upstream Mersey River to the ocean (Figure 51) were extracted to demonstrate the spatial and vertical variability in salinity along the transect. An example profile is presented in Figure 52 from 7 October 2014, shortly after a significant Mersey River peak flow event of 80 m^3/s. The profile demonstrates a degree of vertical salinity stratification is predicted, with differences of ~1 PSU between surface and bottom waters within the deeper sections of the estuary at the Port (between IP10 to IP14). Further, spatial (horizontal) salinity variations during this time ranged from ~31.5 PSU upstream to ~35 PSU at the open ocean.

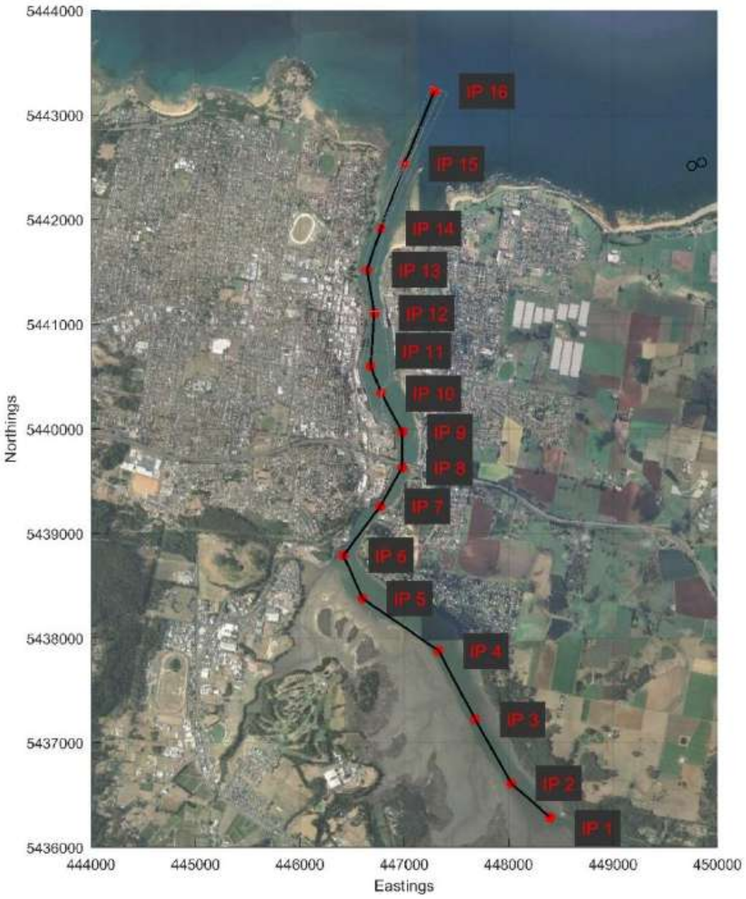


Figure 51 Profile point locations

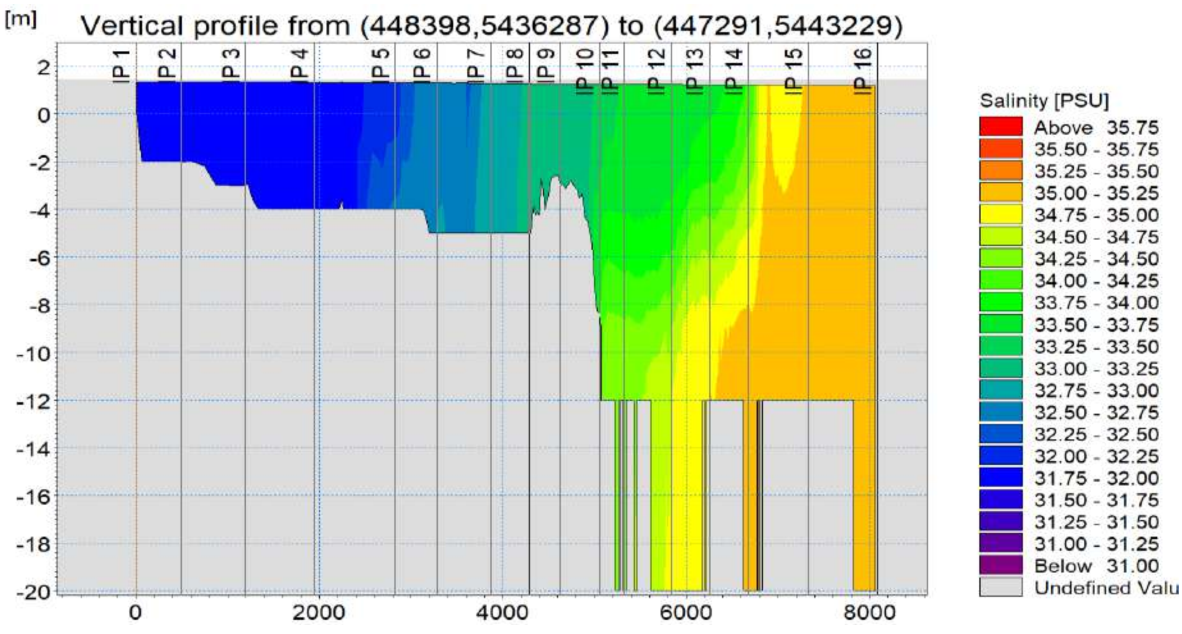


Figure 52 Salinity Profile along Mersey River on 07 October 2014 13:00

6. Conclusions

6.1 Effect on seagrass

The most proximal seagrass beds are located 2.75 km east of the Entrance Channel, beyond the eastern-most extent of the ZoMI (2.25 km east). Hence, it is unlikely that seagrass beds will undergo any impacts from chronically elevated turbidity from the proposed dredging activities.

6.2 Effect on commercial scallop beds

The commercial scallop beds are located ~10 km east-northeast of the port of Devonport. The proposed dredging activities are not predicted to generate any material effect on this potential receptor in terms of SSC or sedimentation.

6.3 Effect on Australian grayling

Australian grayling are likely to move through the port as whitebait between mid-September until mid-November while the river remains below flood levels. Increases in SSC of 10 mg/L or greater within the Mersey River are predicted to be commonplace (i.e. occurring ~80% of the time) during the dredging program. It is therefore possible that juvenile Australian grayling may be affected (risk clogging of gills) by the dredging operations that are currently anticipated to span September to December 2024. Mitigative protocols to reduce these potential impacts during the migration period may include more focussed dredging efforts in the Entrance Channel and reduced dredging within the Inner Harbour to reduced suspended sediment concentrations within the Mersey River. Adaptive management of the dredging as informed by frequent or real-time environmental monitoring should be utilised to manage potential impacts to Australian grayling migration.

6.4 Mobilisation of spoil

The DSDG is predicted to be a retentive zone for spoil disposal on the basis of simulated bed shear stresses. Mobilisation of the largely sand-sized particles disposed of at the DSDG is unlikely to occur except under rare and short-duration storm events that occur for less than 1% of the time.

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Appendix A

AW Maritime Dredging Information

AW maritime CALCULATIONS

Client	TasPorts	Job no	AWM3587	Sheet	2 of 10
Project	Devonport Maintenance Dredging	Calcs by	C. Bell	Date	27/03/2023
Subject	TSHD Production Estimate - Revision H	Checked By	T. Atkins	Date	-

Dredging Volumes

Based on latest December 2022 survey

	Design Depth RL (m)	Design Volume (m3)	Surface area (m2)	Overdredging Volume (m3)	Accretion to December 2023 (m3)	Gross Volume (m3)
Western Entrance	-9.5	30,818	54,910	27,455	-	58,273
Western Entrance Sand Trap Deepening	-10.5	35,544	-	-	-	35,544
Batter: Western Entrance	*1:5*	*64,316*	*30,300*	*15,150*	-	*79,466*
Eastern Entrance	-9.5	3,685	13,360	6,680	-	10,365
Batter: Eastern Entrance	*1:5*	*100*	*531*	*266*	-	*366*
Entrance Channel Bend	-9.5	8,796	24,946	12,473	25,000	46,269
Batter: Entrance Channel East	1:2.5	418	1,554	777	-	1,195
Batter: Entrance Channel West	1:2.5	245	929	465	-	710
Basin	-9.5	68,017	71,422	35,711	40,000	143,728
Batter: Basin West near Berth 1 West	1:2.5	114	530	265	-	379
Batter: Basin South	1:2.5	12,168	5,088	2,544	-	14,712
Berth 1 East	-6.7	49	290	145		194
Berth 2 East	-10.0	3,367	3,170	1,585		4,952
Berth 3 East	-10.0	24,334	9,155	4,578		28,912
Berth 1 West	-9.7	1,028	4,536	2,268		3,296
Berth 2 West	-7.0	2,343	2,780	1,390		3,733
Berth 3 West	-7.0	2,884	4,179	2,090		4,974
Berth 4 West	-10.0	12,337	10,100	5,050		17,387
Berth 5 West	-8.0	5,260	5,038	2,519		7,779
Berth 5 West Ro-Ro Extension	-8.0	3,730	754	377	-	4,107
Batter: Berth 5 West	1:2.5	5,677	2,054	1,027	-	6,704
		285,230	**245,626**	**122,813**	**65,000**	**473,043**

Forecast Dredging Volumes (5 years duration) for approvals purposes only.

Dredging campaign 2023/24		473,043
Accretion annual (5 years)		325,000
Accretion flood event		200,000
1x dredging campaign overdredge allowance		122,813
	Total	**1,120,856**

	TSHD Balder R	TSHD Modi R	TSHD Brisbane	TSHD Albatros	TSHD Tommy Norton
Hopper (m3)	**6,000**	**1,393**	**2,860**	**1,860**	**650**
Cycle Time Inner Harbour					
Dredging (mins)	28	50	19	43	34
Turning (mins)	15	15	15	15	15
Sailing time loaded (mins)	42	62	44	60	89
Dumping (mins)	10	10	10	10	10
Maneuvring (mins)	10	10	10	10	10
Saling time empty (mins)	44	65	48	60	99
Total cycle time (mins)	149	212	146	198	256
Cycle Time Entrance Channel					
Dredging (mins)	49	191	68	129	70
Turning (mins)	15	45	25	45	25
Sailing time loaded (mins)	42	62	44	60	62
Dumping (mins)	10	10	10	10	10
Maneuvring (mins)	5	5	5	5	5
Saling time empty (mins)	44	65	48	60	69
Total cycle time (mins)	165	378	200	309	241

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Annex D Adaptive Monitoring and Management Plan

Port of Devonport Adaptive Monitoring and Management Plan

Customer	TasPorts
Project	003273
Deliverable	001
Version	07
	22 August 2025

Document Control

Document Identification

Title	Port of Devonport Adaptive Monitoring and Management Plan
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Author	Federico Pastorelli
Checked By	Darren Richardson, Tobias Probst
Certified By	Darren Richardson
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Project Manager	Federico Pastorelli

Amendment Record

The Amendment Record below records the history and issue status of this document.

Version	Version Date	Distribution	Record
01	15 April 2024	TasPorts	Draft Report V01
02	21 May 2024	TasPorts	Draft Report V02
03	05 July 2024	TasPorts	Draft Report V03
04	05 August 2024	TasPorts	Final Report V01
05	30 August 2024	TasPorts	Final Report V02
06	18 December 2024	TasPorts	Final Report V03
07	22 August 2025	TasPorts	Final Report V04

Acknowledgement of Country

The project team would like to acknowledge the traditional custodians of the land upon which we operate. We pay our respects to their Elders past, present and emerging.

We acknowledge Aboriginal people as Australia's First Peoples and as the Traditional Owners and custodians of the land and water on which we rely.

We recognise and value the ongoing contribution of Aboriginal people and communities to Australian life and how this enriches us. We embrace the spirit of reconciliation, working towards the equality of outcomes and ensuring an equal voice.

1 Introduction

The Port of Devonport, herein referred to as ''the Port'', is located in the township of Devonport, on the north coast of Tasmania. The Port is owned and managed by the Tasmanian Ports Corporation Pty Ltd (TasPorts) who is responsible for maintaining navigable port depths and pilotage. The Port spans to both sides of the Mersey River encompassing 30 ha of port land and 105 ha of port water and it is adjoined by industrial, commercial, and residential developments on both sides of the river.

The Port of Devonport precinct services a passenger and vehicles ferry freight between Tasmania and Victoria. Furthermore, the Port is also a major cargo port for Tasmania with a yearly freight throughput of between three and four million tonnes. Bulk imports transiting through the Port include materials such as fuel, cement, fertiliser, and grain. Berths and loading facilities for a small range of commercial fishing and recreation vessels are also present (TasPorts 2023).

The Port and in particular navigation channel infrastructure is divided into two major functional areas: the Entrance Channel and bend, herein referred to as "the Entrance Channel'', and the Inner Harbour which includes a swing basin and seven working berths (Figure 1.1,TasPorts 2023). In order to maintain navigable port depths within these areas ensuring minimum channel depths and in turn safe passage for all vessels, TasPorts undertakes ongoing maintenance dredging in regular campaigns.

1.1 Scope

The present Adaptive Monitoring and Management Plan (AMMP) has been developed and tailored to support and effectively manage environmental aspects related to turbidity for upcoming maintenance dredging campaigns at the Port.

The first campaign that will be managed under this AMMP is scheduled for 2025/2026 and will target accumulation areas throughout the Entrance Channel and the Inner Harbour (Section 1) which will be collectively referred to as the "dredge area''.

This AMMP is addressed and applies to all TasPorts employees, principal contractors such as dredge operator, regulators, and unless otherwise specified, to any other worker engaged to undertake works related to Port maintenance dredging activities. All aspects related to the environmental management and monitoring of identified sensitive receptors undertaken before, during, and after the maintenance dredging works are covered in this document. For ease of consultation this document has been divided into two main parts:

- Section 2: covering management aspects relating to water quality monitoring; and
- Section 3: covering adaptive monitoring aspects including adaptive management measures.

This AMMP supports and should be read in conjunction with the following:

- Port of Devonport Maintenance Dredging Long-Term Monitoring and Management Plan (LTMMP) 2025-2035 (BMT 2025);
- Sea Dumping Permit; and
- Dredge Contractor Operational Environmental Management Plan (EMP).

The present AMMP will be reviewed and updated before each maintenance dredging campaign to implement any changes or learnings from past campaigns or as required and deemed appropriate by TasPorts (Section 2).

1.2 Activity Description

The first Port of Devonport maintenance dredging campaign that will be undertaken under this AMMP is scheduled for 2025/2026 when TasPorts plans to remove a total volume of sediments of 473,043 m^3 (figure subject to latest survey data) from the maintenance dredge area of the Port. In particular, 232,188 m^3 will be removed from the Entrance Channel and 240,857 m^3 from the Inner Harbour.

A Trailer Suction Hopper Dredger (TSHD) will be contracted to undertake the works. The TSHD is assumed to operate approximately 138 hrs per week with 30 hrs of down-time, achieving weekly production rates of 35,624 m^3/wk in the Entrance Channel and 20,668 m^3/wk in the Inner Harbour. Therefore, the total duration of the 2025/2026 Port of Devonport maintenance dredging campaign is estimated to be up to 18 weeks, including a total of 6.5 weeks at the Entrance Channel and 11.5 weeks at the Inner Harbour.

The greater total dredging time at the Inner Harbour reflects TasPorts' commitment that no overflow from the TSHD will occur in this area. While this minimises turbidity plumes, it also reduces the effective storage capacity of the TSHD, requiring more dredge cycles compared with the Entrance Channel, where overflow is permitted, subject to conditions of the Sea Dumping Permit. Dredging operations will be undertaken intermittently each day to appropriately manage the activity and the potential for turbidity in the receiving environment.

Dredged material will be disposed of at the nominated Dredge Spoil Disposal Ground (DSDG) located approximately 15 km north-northwest of Devonport.

1.3 Receiving Environment Attributes

Port of Devonport maintenance dredging activities will be undertaken in the dredge area extending from the lower Mersey River estuary to coastal waters in front of the estuary mouth respectively. Moreover, dredge material will be disposed at the DSDG located in offshore waters 15 km north-northwest of Devonport (Figure 1.1).

The following section presents information and data on the Mersey River catchment and in particular the abovementioned areas where Port of Devonport maintenance dredging activities will take place. It is important to highlight receiving environment characteristics to formulate accurate impact assessment considerations, identify sensitive receptors and implement appropriate monitoring and management actions.

Figure 1.1 Port of Devonport Entrance Channel and Inner Harbour

1.3.2 Mersey River Overview

The Mersey Estuary is a large mesotidal estuary classified by the Tasmania Environment Protection Authority (Tasmania EPA 2021b) as a well flushed and a Slightly to Moderately Disturbed (SMD) ecosystem. The Mersey River estuary has also been described as extensively modified and a wave dominated estuary (NLWRA 2002).

At low tide the upper and mid Mersey River estuary consist of extensive mudflats whilst the lower estuary shoreline, where Devonport township and port infrastructure are situated, is predominantly characterised by artificial rock walls. The lower estuary is also the deepest, due to port and shipping channel infrastructure, with water depths over 10 m whilst in the mid and upper estuary depths at low tide range from approximately 2 to 5 m (Murphy *et al.* 2003).

Major developments in the Mersey and its catchment include:

- Damming and a number of diversions to other catchments for hydroelectricity generation;
- Extensive agricultural activities such as grazing, piggeries, dairying and commercial cropping; and
- Several small quarries, landfills and other industries such as cement works.

These developments and activities have resulted in deterioration of habitats and water quality, the latter appearing to gradually worsen downstream despite dilution from various tributaries (Natural Heritage Trust 2001). Edgar *et al.* (1999) reported the Mersey River system to have a severely impacted estuarine catchment area.

1.3.3 Water Quality

The water quality of the Mersey River estuary and its catchment has been subject to a limited number of studies. Key data sources examined in this report are as follows:

- TasPorts water quality monitoring programs. TasPorts conducted water quality monitoring in the lower estuary in preparation to Devonport maintenance and capital dredging works of the Port. In particular, turbidity measurements were collected in June 2016 and in January and February 2020 for three (3) weeks (Marine Solutions 2016 and 2021).
- Tasmania EPA (2021a) water quality monitoring program. Tasmania EPA conducted a water quality monitoring program in the Mersey River estuary from which default guideline values (DGVs) were derived (Tasmania EPA 2021a). However, the Tasmania EPA (2021a) monitoring program was undertaken in the mid and upper catchment of the Mersey River and is not representative of the lower Mersey estuary where the Port maintenance dredging activities will be conducted (Section 3.3.3).
- Murphy *et al.* (2003) characterised physical water quality properties of the Mersey River estuary from July 1999 to June 2000. Salinity in the upper estuary increased with depth (surface of 2.9 to 23.8 ppt, near bed of 7.4 to 32.4 ppt), but there was no evidence of halocline formation. There was little difference in salinity with depth in the lower estuary (surface = 34.1 ppt, near bed = 27.9 ppt), indicating it was well mixed. Water temperature exhibited a similar pattern and thus remained generally constant with depth. Temperatures recorded at all sampling sites spanning from the lower to the upper estuary ranged from 9.5 and 19.8 °C. Dissolved oxygen (DO) did not show any consistent pattern and ranged from concentrations of 7.3 to 9.3 mg/L in the lower estuary to 6.8 to 10.5 mg/L in the upper estuary.

There are few water quality data available for Devonport coastal and offshore waters. TasPorts as part of maintenance dredging works has conducted surveys focused mainly on habitat characterisation and assessment (Section1.3.5) as well as dredging plumes studies around the DSDG targeted on turbidity measurements.

Suspended sediment is the key water quality stressor relevant to maintenance dredging activities for the project. Sediment can affect the receiving environment in several ways, most notably reducing the availability of light required by aquatic plants (e.g. seagrass, algae), physiological effects to animals, and smothering of benthic organisms. Turbidity is a surrogate measure of the amount of sediment suspended in the water column. Murphy *et al.* (2003) found that in the Mersey estuary, turbidity ranged from 1.7 to 26.0 NTU with a median value of 5.5 NTU and was generally higher within the upper and mid estuary than at the mouth of the estuary. Previous water quality monitoring commissioned by TasPorts (ERA Planning and Environment 2021) also detected longitudinal gradients in turbidity, which decreased towards the lower estuary and the estuary mouth.

Turbidity displays great variability across multiple temporal scales. At timescales measured in hours, tidal processes are a strong driver of turbidity in the lower and middle estuary. Turbidity during flood tides was generally higher than ebb tides, reflecting catchment inputs and/or resuspended sediments from mudflats in the upper estuary being transported to the ocean. TasPorts (ERA Planning and Environment 2021) found that there was higher turbidity during spring tides than neap tides, reflecting differences in tidal resuspension of fine sediment. Moreover, high flow events (especially May to August) and higher wave action over winter resulted in seasonal changes to turbidity (Marine Solutions and Aquenal 2016; Consulting Environmental Engineers 2020).

Previous studies found chlorophyll *a* values to be generally low throughout the estuary with a median of 0.5 µg/L whilst nutrients were found in medium to high concentrations. In particular, nitrogen species nitrite (NO_2-) and nitrate (NO_3-) concentrations were medium to very high throughout the sampling program with a median value of 31 µg/L and a maximum value of 507 µg/L. Orthophosphate (PO_4^{3}-) concentrations consistently ranged between, 4 to 20 µg/L (Murphy *et al*. 2003).

1.3.4 Sediment Characteristics

Sediment within the Port of Devonport have been regularly characterised to inform maintenance dredging activities and dredge material disposal in line with the National Assessment Guidelines for Dredging (NAGD 2009).

Implementation of the approved sediment sampling and analysis plan (SAP) conducted in 2023 showed that generally sediment physical characteristics varied slightly throughout the dredge area and were dominated by sand (0.06 mm – 2.0 mm). However, the Inner Harbour had a higher proportion of fines (<2 µm – 60 µm) (BMT 2023). The sediments within the Port dredge area were found to be suitable for unconfined ocean disposal as chemical analyses showed:

- Metals and metalloids – the upper 95% confidence limits (95% UCL) of the mean of most metals/metalloids were below NAGD screening levels. The exception was nickel, which triggered Phase III elutriate testing as per NAGD. Nickel concentrations in elutriates were below the Australian and New Zealand Water Quality Guidelines (ANZG 2018) DGV for 99% marine species protection and thus were not a concern; and

- Concentrations of organic contaminants such as total petroleum hydrocarbons (TPHs), organotins, organochlorine pesticides and polychlorinated biphenyls were either below laboratory limit of reporting (LOR) or below respective NAGD screening levels.

Considering the results from the latest SAP, sediments within the Port of Devonport dredge area pose a low level of geochemical risk from disturbance associated with maintenance dredging activities.

1.3.5 Sensitive Receptors

As part of maintenance dredging environmental management, TasPorts undertake regular surveys in areas adjacent to the Port to assess sensitive receptors presence and condition. These surveys have reported the presence of giant kelp (*Macrocystis pyrifera*) at the mouth of the Mersey River, several seagrass meadows along the coast to the east and west of the mouth of the Mersey and a historical scallop bed to the northeast (Figure 1.2).

Giant kelp intermittently occurs at the mouth of the Mersey River in approximately two (2) m of water. Its condition has been oscillating throughout the years with the latest survey reporting the bed was mostly characterised by small plants forming a patchy subsurface canopy (Elgin Associates 2023). Considering latest and historical data and condition patterns the kelp present at the mouth of the Mersey River appears to be a small ephemeral bed showing rapid growth and die back trends as typical of kelp beds in shallow Tasmania waters which are particularly affected by wave action and fluctuating nutrient levels from river output (Elgin Associates 2023). Moreover, whilst giant kelp marine forests of Southeast Australia are listed as a threatened ecological community, to qualify as a protected community the plants must form a closed or semi-closed canopy at or below the surface in water eight (8) m deep or deeper. Therefore, the protected status does not apply to the giant kelp bed present at the Port. Furthermore, due to this habitat displaying notable condition variability, ephemeral nature, and overall small size it will not be considered a sensitive receptor as part of this document.

Seagrass meadows at Pardoe, Horseshoe, and Northdown, to the east of the mouth of the Mersey River (Figure 1.2) were last surveyed in 2023 and found to be dense beds of *Amphibolis antarctica,* growing on mixed sand and cobble substrate. All sites appeared to be healthy, actively growing beds, combined with a mix of macroalgae and epiphytes (Elgin Associates 2023). Seagrass cover was variable, both within and between the three sites, with the substantially higher cover recorded at the Horseshoe site. The latter showed significantly higher percentage cover in 2023 compared to 2015, with the other two locations also showed increased cover compared to between 2015, and 2016 surveys where a decrease in cover was recorded (Elgin Associates 2023). After consultation with the Department of Climate Change, Energy, the Environment and Water (DCCEEW), it was determined that the seagrass site at Lillico, west of the Mersey River, was unlikely to be impacted given its distance from the Port and DSDG and therefore it was not surveyed in 2023.

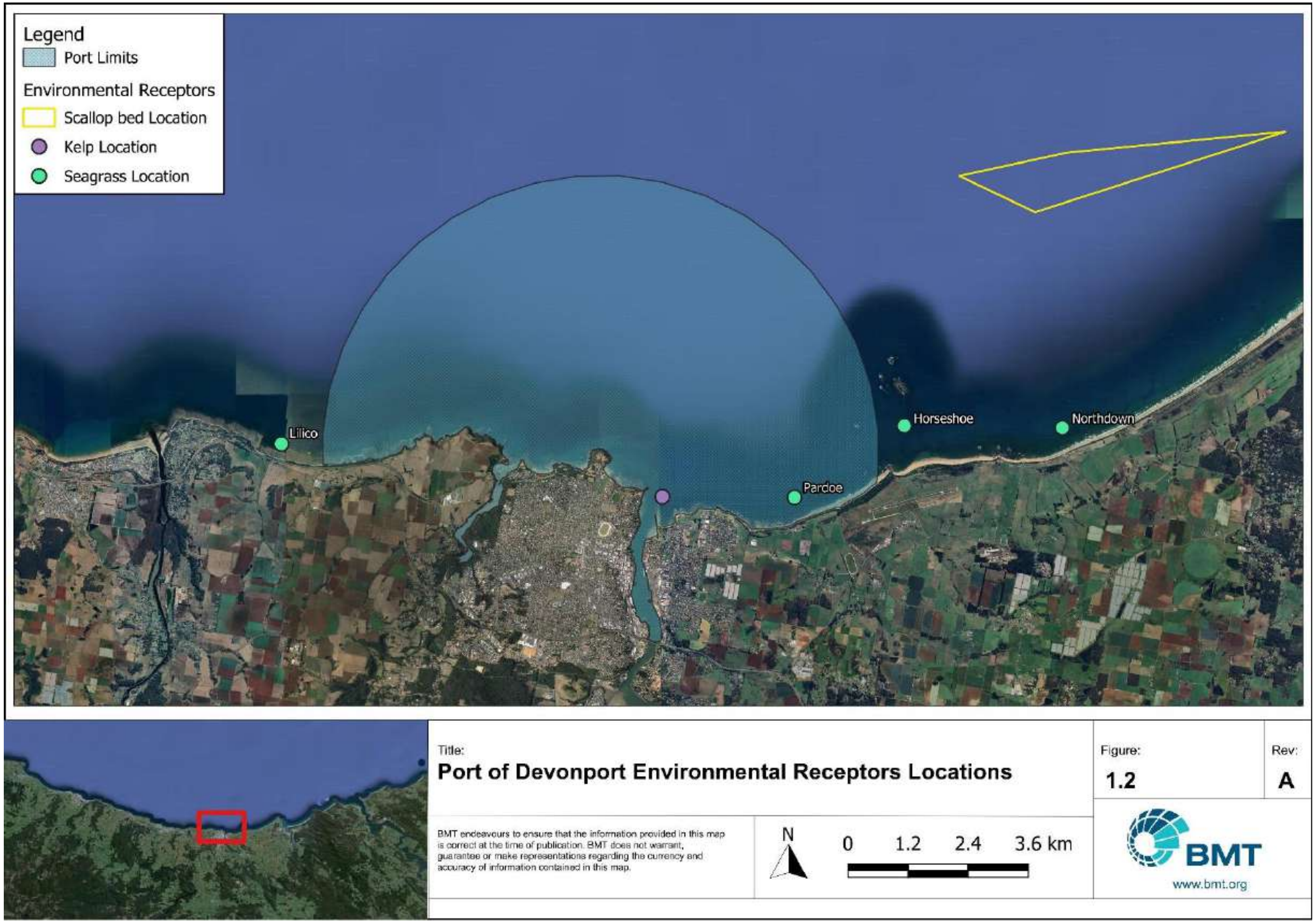

Figure 1.2 Port of Devonport environmental receptors locations

The historical scallop bed to the northeast of the Port has been populated by the commercial Southern scallop species (*Pecten fumatus*) and the non-commercial species doughboy (*Chlamys asperrimus).* This scallop bed has had highly variable population levels since 2015 with the latest survey conducted in 2024 showing very low densities of commercial scallops and with doughboy scallops being the most abundant species.

Seagrass and scallop sensitive receptors can be affected by turbid plumes and resulting decrease in light levels and/or direct smothering, turbidity will be the crucial parameter to be monitored to ensure maintenance dredging activities do not affect these receptors (Section 3.3).

1.3.6 Megafauna

Megafauna observations within the Port are common with seals frequently observed in the Port waters and around berths. Moreover, a number of megafauna species listed as vulnerable or endangered under both the Environment Protection and Biodiversity Conservation (EPBC) Act and Tasmania Threatened Species Protection (TSP) Act have the potential to occur within Port limits and at the DSDG. These include the Southern right whale (*Eubalaena australis*), Humpback whale (*Megaptera novaeangliae*), Blue whale (*Balaenoptera musculus*), Great white shark (*Carcharodon carcharias*), and Green turtle (*Chelonia mydas*). Turtles are not usually present in waters cooler than 20 °C and no recent sightings within 10 km of the Port have been recorded. The rest of the species have also not been sighted within 10 km of the Port except for humpback and southern right whales which have been recorded within 5 km and 500 m of the Port respectively (ERA Planning and Environment 2021).

Therefore, apart from seals it is unlikely for megafauna species to be found within the Port and DSDG. Despite that the abovementioned species are unlikely to interact with dredging activities, this aspect will be appropriately managed to avoid any potential impact (Refer to LTMMP, BMT 2025).

1.3.7 Fish and Macroinvertebrates

Several freshwater species such as the eastern dwarf galaxias (*Galaxiella pusilla*), giant freshwater crayfish (*Astacopsis gouldi*), and central north burrowing crayfish (*Engaeus granulatus*) occur in the Mersey River. However, these are not expected to occur in the lower reaches of the Mersey River and within reach of tidal influence.

The Australian grayling (*Prototroctes maraena*), which is listed as vulnerable under both Tasmanian and Commonwealth legislation, is present in the Mersey River catchment (ERA Planning and Environment 2021). This species has a diadromous lifecycle, inhabiting freshwater streams as adults and migrating to coastal seas as larvae. Therefore, this species is highly likely to migrate transiting through the Port as whitebait between mid-September until mid-November while the river remains below flood levels (ERA Planning and Environment 2021). The response of this species to turbidity has not been experimentally measured. It has been conservatively assumed that this species may be sensitive to turbidity. Appropriate measures will be put into place with a suitable water quality monitoring location deployed in the upper Mersey Estuary (Section 3.3).

2 Water Quality Management

2.1 Objectives

The following sections provide a detailed description of the management measures that will be implemented during Port of Devonport maintenance dredging activities. These measures are tailored to changes in water quality, particularly turbidity, as described in Section 2. Turbidity will be the key parameter that will be monitored and will determine implementation of adaptive management measures.

The below sections are intended as working management practices to be used in the day-to-day maintenance dredging operations ensuring environmental best practice and compliance with applicable permits and legislations.

Specific objectives of the following sections are:

- Comply with regulatory and permit requirements;
- Highlight roles and responsibilities;
- Establish contingency plans and emergency procedures;
- Ensure all involved parties such as dredge contractor(s) are briefed and aware of the legislative and requirements associated to the works;
- Ensure appropriate mechanisms are in place to respond to complaints relating to turbid plumes and disturbance of visual amenity as well as turbidity exceedances and records are kept; and
- Establish mechanisms to ensure periodical reviews of the environmental performance and continual improvement related to this document.

2.2 Environmental Legislation and Regulatory Context

Port of Devonport maintenance dredging activities are aligned with high level policies and guidelines and are regulated under Commonwealth and Tasmanian government laws.

All applicable high-level policies and guidelines as well as relevant legislations are summarised and described in the Port of Devonport Maintenance Dredging LTMMP (BMT 2025).

Moreover, water quality monitoring will be undertaken in line with relevant guidelines and methodologies (Section 3).

2.3 Roles and Responsibilities

TasPorts staff and dredge contractor are responsible for ensuring compliance with this AMMP and associated documentation such as the LTMMP.

Specific roles and responsibilities related to this AMMP are highlighted in Table 2.1.

Table 2.1 Roles and responsibilities under this AMMP

Role	Responsibility	Reports to
TasPorts Programme Manager - Dredging & Hydrographic Survey	• Overall responsibility for implementation of the AMMP. • Overall responsibility for compliance with relevant legislation, standards and guidelines. • Ensures dredging activities are conducted in an efficient and safe manner. • Dredge contractor management and main point of contact.	TasPorts Group Executive Major Projects, Assets and Technical Services
TasPorts Manager - Environment and Sustainability	• Overall responsibility for environmental standards, monitoring, reporting and approvals. • Responsible for notifying DCCEEW for any water quality exceedances and non-compliances with the sea dumping permit and LTMMP. • Responsible for providing advice on compliance with relevant legislation, standards and guidelines. • Responsible for undertaking audits to ensure compliance with this AMMP and alignment with the related Sea Dumping Permit (SDP) and LTMMP.	TasPorts Group Executive Major Projects, Assets and Technical Services
TasPorts Senior Advisor Communications - Projects	• Manages stakeholder and engagement activities such as the Technical Advisory and Consultative Committee (TACC). • Prepares communication flyers, information and documentation to be dispersed to the community.	TasPorts Head of Corporate Affairs
Dredge Contractor(s)	• Develops and implements an operational EMP consistent with and aligned to this AMMP and related LTMMP. • Ensures employees are adequately trained in-line with the requirements of this AMMP. • Responsibility to ensure activities are carried out in compliance with legislative requirements. • Responsibility to record necessary information during maintenance dredging activities as detailed in this AMMP. • Compliance and reporting with the requirements of this AMMP, related LTMMP, SDP and contract with TasPorts. • Ensures that all equipment is adequately maintained and properly operated to minimise risk of environmental or safety incident.	TasPorts Programme Manager - Dredging & Hydrographic Survey
Project Personnel	• Comply with the requirements within this AMMP. • Always exercise a duty of care to the environment. • Notify their authorised delegate of environmental incidents as soon as practicable.	Designated Manager

2.4 Training

TasPorts will ensure that the dredge contractor(s) will be appropriately briefed and trained in the requirements of this AMMP and associated regulatory and permit obligations. Moreover, the dredge contractor(s) will be responsible for providing adequate training and inductions for all applicable staff in the requirements of the AMMP, TasPorts approvals, general environmental duty and permit compliance. Where relevant, TasPorts may set specific training requirements for the dredge contractor(s) and their staff.

2.5 Incidents and Complaints

Any incident and complaint received by TasPorts and/or the dredge contractor pertaining water quality, in particular turbidity (e.g. observations of plumes impacting visual amenity values), will be dealt with by the following:

- TasPorts will be responsible to undertake any investigation as per principles described in Section 3.3.4 and implement any adaptive management measures in consultation with the dredge contractor. Following investigations, TasPorts will also undertake any reporting to regulators as appropriate and required (Section 2.7).
- The dredge contractor will be responsible to cooperate with TasPorts by supplying any necessary information and records such as details of dredging activities, volumes and type of material dredged and visual plume observation records. The dredge contractor will cooperate with TasPorts in any of the abovementioned investigations following directions from TasPorts and implementing the required changes in dredging activities to rectify potential increase in turbidity (Section 3.3.4).

Any complaints received are to be recorded in a central Health and Safety and Environment (HSE) incident management register maintained by TasPorts Safety department. The register must be operated and maintained in line with TasPorts systems and processes including the environmental management system (EMS) and include the following information:

- Time, date, name and contact details of the complaint;
- Reasons for the complaint;
- Any investigations undertaken;
- Conclusions formed; and
- Any management actions taken.

The dredge contractor will also be required to develop a complaints procedure in consultation with TasPorts including provisions for responding to and/or resolving minor complaints regarding turbid plumes and disruption of visual amenity and for reporting all complaints to TasPorts for documentation in the complaints register. In this instance the dredge contractor is required to:

- Notify the TasPorts 'Programme Manager Dredging & Hydrographic Survey' and 'Manager - Environment and Sustainability' verbally, immediately after occurrence of the incident and complaint; and
- Written notification within 24 hours of occurrence of incident or complaint to the above-mentioned TasPorts managers.

2.6 Audits and Inspections

TasPorts might undertake internal audits and inspections to confirm that maintenance dredging activities and related water quality monitoring are carried out in accordance with the requirements set out in this AMMP and relevant approvals and permits.

Audits will be initiated and undertaken by the TasPorts Manager - Environment and Sustainability (Table 2.1) or by a suitably qualified auditor nominated by the latter. Audit reports will be provided to regulators as and if/when required. If requested by a regulatory agency, nominees of the relevant agency will be afforded access to witness, inspect, examine or audit any part of the dredging operations and water quality monitoring.

Periodical inspections will also be carried out by TasPorts with related records along with any corrective or improvement actions arising from inspections or audits entered into the TasPorts management system.

2.7 Reporting and Records

All records required by this AMMP, particularly relating to water quality monitoring program results and potential investigations, and associated approvals and permits must be retained by TasPorts for the life of the SDP.

Where records are created by the dredge contractor, they must be handed over to TasPorts during or before the completion of works, as required. As part of the operational EMP, the dredge contractor will develop logs where observations of any maintenance dredging generated turbid plume will be recorded. These observations will be taken and logged every hour including the following details:

- Dredge position;
- Type of material dredged; and
- Turbid plume direction, estimated length (in meters) and colour.

As detailed in Section 3.3.4, exceedances of nominated turbidity triggers will be investigated and, if appropriate, reported in accordance with the conditions of statutory authorities relevant to maintenance dredging and disposal.

2.8 Review

This AMMP will be reviewed prior to each maintenance dredging campaign or as required to address and improve upon any of the following:

- Findings of audits and inspections;
- Changes in relevant approvals and permits;
- Identification of new sensitive receptors; and
- Incident and/or complaint investigations and their findings, particularly regarding turbidity.

The review process will ensure the document remains current, relevant and accurate. Revisions will be kept as new versions in the TasPorts electronic document management system and will be communicated to all relevant TasPorts employees, contractors, stakeholders and administering authorities, and submitted for approval by the authorities where required.

2.9 Communication and Consultation

As per roles and responsibilities (Section 2.3 and Table 2.1), the TasPorts 'Programme Manager - Dredging & Hydrographic Survey' is the main point of contact with the dredge contractor and supported by the TasPorts Manager - Environment and Sustainability to achieve compliance with this AMMP, associated LTMMP and permits. Daily interactions will occur between TasPorts and the dredge contractor with meetings held as required to track progress and discuss environmental issues including water quality adaptive management measurements. TasPorts is the main point of contact for external parties, however the dredge contractor will initiate emergency response calls, incident and complaint notifications to TasPorts (Section 2.5), investigations and reporting for works under their contract scope and the scope of their operational EMP. The dredge contractor will initiate emergency response calls for any matters outside of their scope of works in the event that TasPorts main point of contact is unavailable.

Consultation objectives and related stakeholder consultation process of this AMMP are as per Port of Devonport Maintenance Dredging LTMMP (BMT 2025). Relevant to this AMMP, the TACC will be consulted regarding development and implementation of the water quality monitoring program (Section 3). Water quality monitoring results of maintenance dredging campaigns will be presented at TACC meetings held post maintenance dredging campaigns with any feedback and improvements implemented as appropriate in the next campaign. Final maintenance dredging environmental monitoring reports detailing water quality monitoring results and analysis of water quality, in particular, turbidity patterns will also be shared with the TACC.

3 Monitoring Procedure

3.1 Objectives

Impact to water quality by means of increased turbidity is an environmental risk to the local receiving environment and sensitive receptors. Dredging activities have the capacity to increase turbidity levels potentially resulting in environmental harm. Therefore, turbidity is an important parameter to measure during dredging operations.

Monitoring under this AMMP has been designed to maintain compliance with relevant permit and approvals (Section 1.1 and 2.2) by implementing an appropriate environmental monitoring program. The latter was designed considering sensitive receptors, impact assessment and plume modelling outputs (Section 3.2), ensuring that the frequency as well as spatial and temporal extent of the monitoring is appropriate. This and management actions that will be implemented based on monitoring result thresholds will ensure any potential impact on the receiving environment and sensitive receptors is identified, assessed, prevented or minimised.

The performance of monitoring will be measured through audits as well as reviews, inspections, incidents and complaints investigations as well as reporting (Section 2.5 and 2.7).

3.2 Plume Modelling and Zones of Impact

As per government guidelines and best practice, modelling of Port of Devonport maintenance dredging generated plumes was undertaken to establish a spatially based zonation scheme to assess the potential resulting extent, severity and duration of impacts to the receiving environment and sensitive receptors. Methodology and outputs of this work are summarised below - for full report refer to GHD (2024).

To simulate key environmental processes within the model domain which included the Port of Devonport, upstream tidal section of the Mersey River and a 50 km x 30 km rectangular section of coastal Bass Strait waters, a range of factors were incorporated into the model. These comprised hydro and sediment dynamics, tides, waves, winds, physical chemical parameters and dredge operation related parameters. Different dredging simulations within the abovementioned domain were run for 147 days with three (3) additional weeks of simulation following dredging operations conclusion to allow for subsequent dispersion and deposition of remaining total suspended solids (TSS). It is important to consider that conservative assumptions were adopted in these simulations and thus modelling outputs are to be considered worst case scenarios (GHD 2024).

Impacts to turbidity from maintenance dredging activities were compared to threshold values derived from Tasmanian Estuarine Waters DGVs (Tasmania EPA 2021a) assessing impacts to water quality and sensitive receptors with the results of the analysis presented as zones of impact as defined by the Western Australia (WA) EPA (2021):

- Zone of High Impact (ZoHI): in this area impacts to the receiving environment are considered irreversible. The term ''irreversible'' is defined as damage to a certain sensitive receptor and the lack of capacity for it to return or recover to a state resembling that prior to being impacted within a timeframe of five (5) years or less. The ZoHI is the dredging footprint and areas immediately adjacent to it;
- Zone of Moderate Impact (ZoMI): impacts on this area are sublethal and reversible within five (5) years of dredging activities completion. The ZoMI lies adjacent to the ZoHI; and

- Zone of Influence (ZoI): in this area changes to the receiving environment and in particular water quality are expected during dredging operations, however these would not results in any detectible impacts to sensitive receptors. The resulting ZoI from modelling outputs can be large, however at any point in time the dredge plumes are likely to be restricted to a relatively small portion of the ZoI.

As simulations showed, deposition of fine sediments was predicted to be negligeable, and the derived impact zones were the result of suspended sediment plumes generated by dredging and disposal activities only. Modelling outputs show the ZoHI is localised to a very small portion of the Outer Channel and the whole Inner Harbour extending to part of the upper estuary. The ZoMI is also relatively localised to part of the upper estuary and some patches to the east and west of the estuary mouth whilst the ZoI, which is the most sizeable zone, fills the remainder of the upper estuary and spans extensive coastal areas to the to the east and west of the estuary mouth. A segregated and relatively small ZoI is also present around the DSDG (Figure 3.1). The latter is predicted to be retentive with mobilisation of sediments unlikely to occur except under rare and short duration storm events. Moreover, it is important to note that while extensive, the ZoI represents an area where visible plumes may be present, but no ecological impacts are predicted.

GHD (2024) concluded that seagrass meadows are unlikely to be impacted from Port of Devonport maintenance dredging activities as there is no overlap with the eastern-most extent of the ZoMI. The historical scallop bed is also remote from any possible effects of dredging or disposal activities. The only sensitive receptor that may be influenced by maintenance dredging activities at the Port is the Australian grayling during the migration period (Section 1.3.7) as modelling outputs show suspended sediment concentration (SSC) increases of 10 mg/L and above within the Mersey River occurring approximately 80% of the time during dredging activities.

3.3 Water Quality Monitoring

The monitoring program was designed accordingly to protect the receiving environment and sensitive receptors, as well as consideration of stakeholder concerns.

Water quality monitoring of the Port maintenance dredging activities will commence at least two (2) weeks prior to the activity start, it will continue throughout dredging works and it will conclude no earlier than two (2) weeks post dredging works completion.

Telemetry water quality monitoring and in-situ grab sampling will be undertaken following appropriate guidelines and methodologies such as:

- Standards Australia (1998) Water quality - Sampling Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples

- ANZG (2018a) field sampling program.

3.3.1 Telemetry Water Quality Monitoring Locations

Water quality monitoring sites have been selected at strategic locations to ensure potential impacts of maintenance dredging activities to the receiving environment and sensitive receptors are proactively identified, assessed, prevented or minimised. Water quality monitoring locations span from within the ZoMI to within and adjacent the ZoI and remote from any zone of impact (Figure 3.1).

As part of this water quality monitoring regime, turbidity is the key parameter affected by maintenance dredging operations which can potentially impact sensitive receptors. Therefore, this parameter will be monitored and assessed for compliance purposes (Section 2.7) whilst the rest of the standard physico-chemical parameters will be collected as supporting information and utilised in data analysis and trending. In particular, turbidity levels as a rolling median will be assessed for compliance and screened against turbidity triggers from available DGVs (Section 3.3.3).

Site details including approximate deployment coordinates, site purpose and description are detailed in Table 3.1. Note that deployment coordinates are approximate only and might vary slightly (± 200 m) pending final site reconnaissance.

Three (3) types of sites have been included in the monitoring program:

- Test sites: these sites have been placed adjacent to sensitive receptors that occur in the ZoMI or ZoI in order to ensure turbidity remains below trigger levels protecting both habitats and sensitive receptors. Turbidity levels at these sites will be assessed for compliance purposes with adaptive management measures in place to manage potential turbidity elevations.

- Sentinel sites: one site of this type will be located at the boundaries of modelled zones of impact and it will be particularly meaningful as adjacent to the predicted ZoHI to obtain early indications of deviations from predicted plumes extent.

- Reference sites: these sites are outside modelled maintenance dredging plumes zones of impact and thus will be reflective of background conditions. Reference sites have been placed in water types and locations subject to as similar as possible environmental conditions to the test sites. Turbidity at these sites will not be assessed for compliance purposes, however they will be used in investigations should turbidity at test sites exceed triggers, supplying important information to segregate background/environmental conditions turbidity from dredge derived turbidity levels.

3.3.2 Telemetry Water Quality Monitoring Equipment and Parameters

At water quality monitoring locations, standard physico-chemical parameters (temperature, electrical conductivity (EC), pH, turbidity and dissolved oxygen (DO)) will be monitored in real time by appositely modified buoys. These will be equipped with dual multiparameter sondes deployed approximately 0.75 m below the water surface at estuary and coastal sites and approximately 0.75 m above the benthos at offshore sites (Table 3.1). In shallow locations, however, a single sonde may be deployed where dual deployment is not practicable.

The telemetry system on board the water quality buoys will transmit data in near real time. All equipment will be appropriately installed and maintained as per manufacturer recommendations. Water quality measurements will be logged every ten (10) minutes with data transferred to an online platform where it can be visualised, monitored and downloaded. This will allow timely responses and adaptive management actions based on turbidity levels, should they be required (Section 3.3.4). Data will undergo preliminary and automated quality assurance/quality control (QA/QC) on the online platform where data will be displayed on graphs with trigger levels and tables. Automated emails and text messages will be set up to receive alerts when trigger levels are exceeded. Turbidity data will also be downloaded daily and will undergo manual and comprehensive QA/QC.

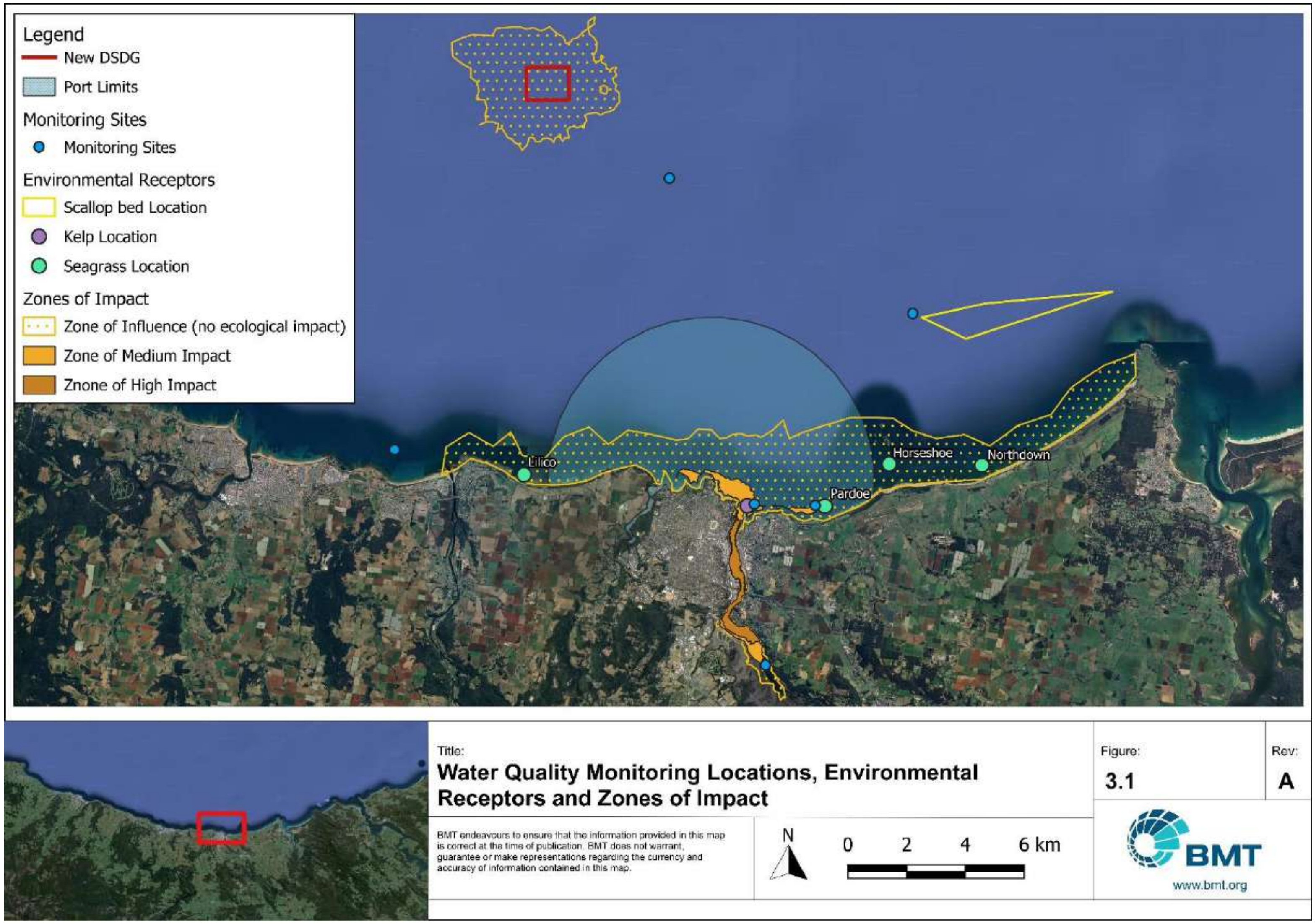

Figure 3.1 Water quality monitoring locations, environmental receptors and zones of impact

Table 3.1 Port of Devonport water quality monitoring locations and related details

Site name	Coordinates (approximate only)	Water type	Treatment	Description
Estuary Mouth	-41.166, 146.373	Lower estuary	Sentinel – near field	At the mouth of the estuary near the kelp bed. Within the ZoMI. This location will be utilised to monitor receiving environment water quality and act as a sentinel site to protect seagrass meadows further east along the cost.
Seagrass	-41.167, 146.398	Coastal	Test – near field	Just to the east of the Pardoe seagrass meadow, within the ZoI.
Offshore	-41.066, 146.339	Offshore	Reference	Southeast of the DSDG well outside the ZoI resulting from disposal activities on the area. Representative of offshore conditions.
Scallop	-41.109, 146.438	Offshore	Test – far field	Just to the east of the scallop bed and away from maintenance dredging zone of influence. Representative of offshore conditions.
Forth	-41.149, 146.227	Coastal	Reference	Near the mouth of the Forth and thus representative of coastal conditions potentially affected by river discharges. Just outside the ZoI.
Grayling	-41.215, 146.376	Upper estuary	Test – near field	In the upper estuary, within the ZoI just outside the ZoMI.

Telemetry turbidity data will be corroborated and supported as required (Section 3.3.4) by visual observations of turbid plumes conducted by the dredge contractor at regular intervals and recorded onto appositely developed forms (Section 2.7).

3.3.3 Turbidity triggers

Due to the current lack of suitable baseline data, available turbidity DGVs for Tasmania estuarine and coastal waters were adopted as triggers to manage the Port maintenance dredging activities and are detailed in Table 3.2. DGVs are numerical values, selected from statistics of available data, set to protect or enhance water quality for identified protected environmental values. They apply to key indicators, such as turbidity, and they are numerical benchmarks to which monitoring data are compared to determine if environmental values are protected. In this instance and in line with best practices and related guidelines (Section 3.3), adopted turbidity triggers were DGVs 80th and 95th percentile of available datasets.

It is important to consider and understand the limitations associated to the turbidity percentile triggers adopted from DGVs. These triggers were the best available and whilst somewhat representative, they are not to be considered fully representative of Mersey River estuary and Devonport coastal and offshore waters where the water quality monitoring sites will be located. In fact, lacking local baseline data, turbidity DGVs for sites within the Mersey Estuary (upper and lower) were utilised as triggers.

General DGVs were formulated from datasets collected outside the Mersey Catchment, as also highlighted in Section 1.3.3 (Tasmania EPA 2021a). DGVs adopted for the Grayling site were derived from Table 11 (Summer) of the Default Guideline Values (DGVs) for Aquatic Ecosystems of the Mersey Catchment (Tasmania EPA 2021b). Summer values were selected based on the predicted campaign timeline. DGVs adopted for coastal and offshore sites were, instead derived from data collected at Hebe Reef in front of the Tamar Estuary (Tasmania EPA pers. comm). The Tasmania EPA reviewed what data were available and provided a turbidity level for the coastal area surrounding Devonport. TasPorts is working towards collecting appropriate baseline data from which triggers tailored to each water quality monitoring station can be derived. Turbidity triggers will be updated when this data becomes available and utilised in future Port of Devonport maintenance dredging campaigns.

Turbidity data collected by the telemetered water quality stations will undergo preliminary and automated QA/QC and will be screened against these percentile triggers as rolling medians which is a technique in line with ANZG (2018) principles and widely adopted in dredging projects as the median represents the most robust descriptor of test site data and it allows to account for extremes in data, avoiding false positives or negatives by smoothing out short-term variability so that longer term trends are highlighted.

In particular, at each water quality monitoring site a fifteen (15) and six (6) day daily rolling median of turbidity will be computed. These will be calculated from daily median of the previous fifteen (15) or six (6) days reflecting chronic and acute turbidity levels respectively. These values will be updated on an hourly basis.

Turbidity triggers and rolling medians will work in the following pairings:

- 80th percentile: screened against the 15-day rolling median.
- 95th percentile: screened against the 6-day rolling median.

In order to be proactive and adopt a step-like approach within the adaptive management framework, warning turbidity trigger levels have been determined and will also be adopted. These warning triggers will allow investigations to be undertaken prior to turbidity triggers being reached, and if applicable start implementing actions to protect the receiving environment and sensitive receptors. Warning triggers were set as 10% below the abovementioned triggers and are also detailed in Table 3.2. Different adaptive management actions will be established for when turbidity levels (as rolling medians) exceed the warning or trigger levels specified in Table 3.2. Full details on the adaptive management framework and actions are provided in Section 3.3.4.

3.3.4 Turbidity Adaptive Management

An Adaptive Management Framework using turbidity triggers was developed to ensure appropriate procedures and actions are undertaken in case turbidity rolling median at any of the test telemetered water quality monitoring locations (Table 3.1) increases above respective triggers (Table 3.2).

Turbidity levels above turbidity warning triggers will be investigated at test sites and compared to the control background sites. Adaptive management actions and any external reporting will occur if turbidity elevations were to be considered related to the dredging activities. The adaptive management framework and related steps are described below and summarised in Table 3.3 and Figure 3.2.

Table 3.2 Turbidity triggers and related details to be applied to telemetry water quality monitoring locations

Site name	Treatment	Warning triggers	Turbidity triggers	Data details
Mersey Mouth	Sentinel – near field	N/A	N/A	Data logged every 10 minutes. Near real time turbidity data computed into 15 and 6 day daily rolling median and screened against 80th and 95th percentile triggers respectively
Seagrass	Test – near field	80th percentile 3 NTU 95th percentile 4 NTU	80th percentile 3.3 NTU 95th percentile 4.33 NTU	
Offshore	Reference	N/A	N/A	
Scallop	Test – near field	80th percentile 3 NTU 95th percentile 4 NTU	80th percentile 3.3 NTU 95th percentile 4.33 NTU	
Forth	Reference	N/A	N/A	
Grayling	Test – near field	80th percentile 8.5 NTU 95th percentile 15 NTU	80th percentile 4.9 NTU 95th percentile 16.5 NTU	

Base Level Monitoring – No Adaptive Management Required

Environmental conditions and dredging activities will be monitored as well as turbidity data from the water quality monitoring stations as described in Section 3.3.2. Whilst the 15 and 6-day turbidity rolling medians recorded at test sites remain below warning and turbidity triggers, no investigation or action is required.

Alert Level 1 – Turbidity Levels Above Warning Turbidity Triggers

The turbidity Alert Level 1 is reached when the 15-day and/or the 6-day rolling median increase above respective warning turbidity triggers (Table 3.2) at one (1) or more test sites.

In this instance suitably qualified and experienced (Section 2.3) TasPorts personnel will notify relevant internal stakeholders and initiate Response 1. The latter will commence as soon as reasonable and practicable, but no later than 48 hrs after becoming aware of the elevation and will include:

- Check water quality monitoring equipment for any faults, defects and/or biofouling that might have influenced data collection and quality.
- Check and review dredging activities including area(s) the TSHD has been operating in relation to water quality monitoring sites that have recorded the exceedance(s). Moreover, check dredging activities related data such as production rates, type of sediment currently dredged including any recent changes.
- Contact the dredge operator to obtain all relevant information including latest plume visual observations, their extent and direction and consult dredge logs reviewing plume visual observation data.

- Check for any activity occurring within the Port including any shipping traffic that could be causing or contributing to the increase in turbidity levels.
- Review and analyse turbidity data at the test site(s) that has recorded the exceedance(s) against other test sites and in particular against reference sites which will provide indications on whether the exceedance(s) is localised and due to dredging activities or environmental conditions. Reference sites are, in fact, well outside maintenance dredging zones of impact.
- Review environmental conditions, in particular the ones that can drive turbidity levels upwards in the Mersey Estuary such as spring tides, high rainfall events and freshwater discharges from the Mersey catchment. Cross check these dynamics against appropriate physico-chemical parameters such as decrease in electrical conductivity and increase in pH that can indicate freshwater inputs. These can be corroborated further with by checking Mersey River heights data on the Bureau of Meteorology (BOM).

All elevations and investigations will be appropriately documented and recorded within TasPorts systems together with a briefing explaining the likely causes of elevation in line with Section 2.7. If the investigation suggests that elevation(s) in turbidity rolling median at the test site(s) is predominantly driven by environmental factors no adaptive actions will be taken, dredging activities and water quality monitoring will continue. The investigation will remain open and the Alert Level 1 status will be maintained until rolling median returns below warning trigger, when the status will be switched to base level monitoring.

If, instead, investigations show the causal factors for the elevation above warning trigger of turbidity rolling median at test site(s) is due to dredging activities Response 1 will be implemented. Dredging will continue, however TasPorts and the dredge contractor will communicate and deliberate on the management measures to be implemented to rectify dredging related impacts on turbidity. These measures might include, but will not be limited to the following:

- Relocate dredge to another area within the footprint such as an area distant to that in which the turbidity elevation was recorded and/or where sediments are coarser.
- Alter overflow regime, where applicable. No overflow will occur in the Inner Harbour, to reduce fines being spilled into the receiving environment.
- Modify dredge phasing with respect to tidal conditions, flood or ebb, to allow plumes generated from dredging activities to be transported away from sensitive receptors.
- Implement any opportunistic, feasible and required maintenance or bunkering activities.

Alert Level 1 and Response 1 status will be maintained until the rolling median returns below warning trigger. Here, the status will be switched to base monitoring with dredging resuming normal operations.

Alert Level 2 – Turbidity Levels Above Turbidity Triggers

The turbidity Alert Level 2 is reached when the 15-day and/or the 6-day rolling median increase above respective turbidity triggers (Table 3.2) at one (1) or more test sites. An investigation will be continued by TasPorts from Alert Level 1 or a new one opened and conducted as detailed in the above section. However, in this instance the investigation will commence as soon as reasonable and practicable, but no later than 24 hrs after becoming aware of the elevation.

If the investigation shows elevation in turbidity rolling median is due to environmental conditions the investigation will remain open until turbidity levels decrease below related triggers, however no adaptive actions will be taken, dredging activities and water quality monitoring will continue as per base monitoring.

In the instance the investigation shows that dredging activities are the main causal factor of the increased turbidity levels at test site(s) Response 2 will be implemented. Dredging will continue with TasPorts and the dredge contractor communicating and deliberating on additional management measures to be implemented and/or changes to the measures already implemented as part of Response 1 to rectify dredging related impacts on turbidity following the same principles highlighted in the previous section.

Adaptive management measures that might be considered as part of Response 2 would include what listed in Response 1 and additionally reducing dredge production rates.

Investigation will remain open, adaptive management and Alert Level 2 and Response 2 status will be maintained until the rolling median returns below trigger. Here, the status will be switched to base monitoring with dredging resuming normal operations.

Table 3.3 Investigation and adaptive management actions summary table

Status	Investigation (test sites only)	Potential adaptive management response if investigation shows turbidity increase at test sites is due to the activity
Base Level Monitoring	• None required.	• None required.
Alert Level 1	• Check water quality monitoring equipment for any faults, defects and/or biofouling that might have influenced data collection and quality; • Check and review dredging activities including area(s) the TSHD has been operating in relation to water quality monitoring sites that have recorded the exceedance(s). Moreover, check dredging activities related data such as production rates, type of sediment currently dredged including any recent changes; • Contact the dredge operator to obtain all relevant information including latest plumes visual observations, their extent and direction and consult dredge logs reviewing plumes visual observations data; • Check for any activity occurring within the Port including any shipping traffic that could be causing or contributing to the increase in turbidity levels; • Review and analyse turbidity data at the test site(s) that has recorded the exceedance(s) against other test sites and in particular against reference sites which will provide indications on whether the exceedance(s) is localised and due to dredging activities or environmental conditions. Reference sites are, in fact, well outside maintenance dredging zones of impact; and • Review environmental conditions, in particular the ones that can drive turbidity levels upwards in the Mersey Estuary such as spring tides, high rainfall events and freshwater discharges from the Mersey catchment. Cross check these dynamics against appropriate physico-chemical parameters such as decrease in electrical conductivity and increase in pH that can indicate freshwater inputs. These can be corroborated further with by checking Mersey River heights data on the Bureau of Meteorology (BOM).	• Relocate dredge to other area within the footprint such as an area distant to the area in which the turbidity elevation was recorded and/or where sediments are coarser; • Alter overflow regime, where applicable. No overflow will occur in the Inner Harbour, to reduce fines being spilled into the receiving environment; • Modify dredge phasing with respect to tidal conditions, flood or ebb, to allow plumes generated from dredging activities to be transported away from sensitive receptors; and • Implement any opportunistic, feasible and required maintenance or bunkering activities.

Status	Investigation (test sites only)	Potential adaptive management response if investigation shows turbidity increase at test sites is due to the activity
Alert Level 2	• As above for Alert 1, but investigation must be commenced no later than 24 hrs after becoming aware of the elevation.	• Immediately re-assess adaptive management actions applied as part of Response 1; and • Identify and implement additional suitable dredge management responses including consideration of reduced dredge production rates.

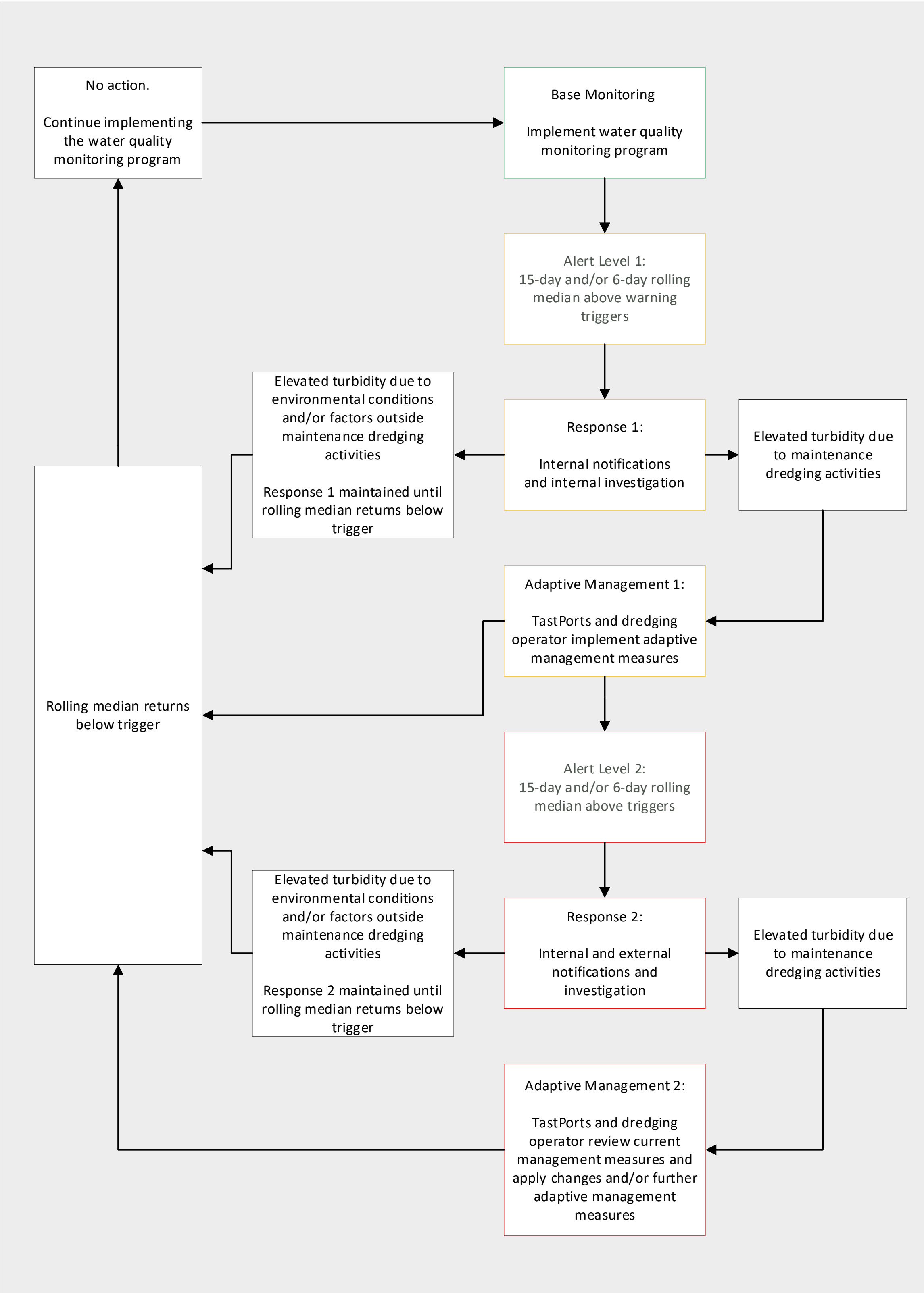

Figure 3.2 Turbidity adaptive management process and steps

3.3.5 Water Quality Grabs

The 2023 approved Port of Devonport SAP showed that sediments within the maintenance dredging footprint are to be considered "probably clean'' as per NADG (2009) definition with no concentrations of the contaminants tested above related thresholds (Section 1.3.4). Despite this there is a low risk and likelihood of sediment bound contaminants being resuspended by maintenance dredging activities and potentially becoming bioavailable and harmful to marine organisms. Therefore, *in-situ* sampling for contaminants will be undertaken to ensure dissolved concentrations of contaminants in the water column remain low. As the Mersey estuary is classified as a SMD estuary (Tasmania EPA 2021b) sampling results will be screened against the 95% DGV for marine species protection with the 99% adopted for elements that are deemed of bioaccumulating nature as per ANZG (2018).

This sampling will be undertaken outside compliance and thus with no reporting or adaptive management measures will be associated with it. However, in case any contaminant is found above related DGVs, TasPorts will undertake reasonable and practicable investigations to determine the potential cause of such elevation.

In-situ water quality sampling will be undertaken at the telemetry water quality monitoring locations (Table 3.1) once each during the pre and post dredge phases; whilst during dredging operations sampling will be undertaken every six (6) weeks and thus up to three (3) times within the estimated total eighteen (18) week dredging campaign.

Samples will be analysed by a National Association of Testing Authorities (NATA) accredited laboratory holding the accreditation for the analyses required. Samples will be analysed for a range of dissolved metal(loid)s, Tributyltin (TBT) and Total Petroleum Hydrocarbons (TPHs) and Polycyclic Aromatic Hydrocarbons (PAHs) detailed in Table 3.4 following contaminants of concern list and 2023 SAP results as well as and trends highlighted by the literature (Section 1.3.3).

Table 3.4 *In-situ* water quality sampling list of contaminants

Analyte	Unit	ANZG (2018) 95% protection of marine species
Aluminium (Al)	µg/L	24
Arsenic (As)	µg/L	-
Cadmium (Cd)	µg/L	0.7*
Chromium (Cr)	µg/L	4.4
Copper (Cu)	µg/L	1.3
Lead (Pb)	µg/L	4.4
Nickel (Ni)	µg/L	70
Silver (Ag)	µg/L	1.4
Zinc (Zn)	µg/L	8
Mercury (Hg)	µg/L	0.1*
TPHs	µg/L	-
PAHs	µg/L	-
TBT	µg Sn/L	0.006

***99% species protection DGV used to account for the bioaccumulating nature of this toxicant**

3.4 Sensitive Receptor Long-term Monitoring and Management Plan

Implementation of TasPorts' LTMMP (BMT 2025), aims to ensure that Devonport maintenance dredging activities are not having an adverse long-term impact on sensitive receptors. The LTMMP aims to:

- Substantiate the predicted plume modelling outputs (Section 3.2) of low levels of impacts to the receiving environment and sensitive receptors by continuing habitat condition monitoring in line with historical surveys (Section 1.3.5).

- In line with Sea Dumping Permit requirements and NAGD (2009), reviewing and implementing a Sampling and Analysis Plan (SAP) every five (5) years to determine physical and chemical characteristics and ascertaining suitability of dredge area sediments for unconfined ocean disposal to the DSDG.

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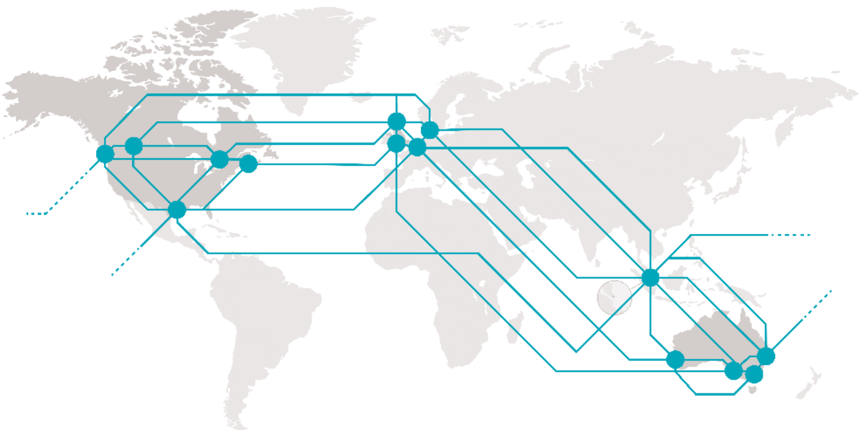

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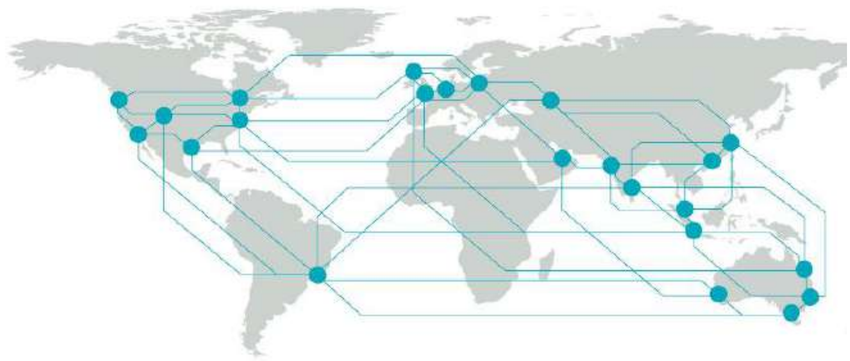

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