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MARINE NATURAL VALUES ASSESSMENT FOR THE PROPOSED GORDON JETTY UPGRADE

GORDON, TASMANIA

prepared for

Justin Foster

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Version	Contributor/s	Date reviewed	Reviewed by	Notes
1	L. Harrison	28/08/2024	K. MacAdie	
2	L. Harrison	18/11/2024	K. Burgess	V2 added seabed levelling analysis
3	L. Harrison			V3 added Gunn's screw shell targeted survey

Cover photo: Gordon Boat ramp/ walkway, Gordon, lutruwita/ Tasmania (https://mast.tas.gov.au/facility/gordon-boat-ramp-walkway/, 2020).

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Executive Summary

Marine Solutions was engaged by MAST to conduct a marine Natural Values Assessment (NVA) for the proposed re-establishment of the Gordon Jetty in Gordon, Tasmania. The works include demolition of the existing jetty and construction of a new rock abutment and jetty. The project will also involve excavation of sediment adjacent to the boat ramp and jetty facility to maximise vessel accessibility. The assessment will provide supplementary information for a Reserve Activity Assessment (RAA) submission.

The NVA is produced in accordance with the Guidelines for Natural Values Surveys -Estuarine Marine Development Proposals (NCH 2020). The assessment included a desktop review and field survey of natural values, utilising government tools including the Natural Values Atlas and the EPBC Protected Matters Search Tool.

Twelve threatened marine species and one threatened marine community were identified as possibly occurring or known to occur within 5000 m of the project area. There are verified records of six of these species within a 5000 m radius of the site footprint. Spotted handfish was the only species outlined to likely occur (within their potential range), requiring habitat characterisation to determine risk mitigation protocols.

A field investigation with subtidal surveys, sediment analysis and bathymetry mapping followed. No critical habitats for spotted handfish species recruitment were found, signifying negligible impact to spotted handfish and risk mitigation unnecessary. No threatened or protected species were observed during the surveys. Introduced species observed included the Pacific oyster and Mediterranean blue mussel. These findings were similar to observations in the 2012 Ecological Assessment Report conducted by Marine Solutions, indicating minimal impact from the previous boat ramp upgrade project.

Particle size is fine and silty, presenting a greater risk of resuspension. However, the bioavailability and toxicity risk is deemed low, with no exceedances of the ANZG guidelines for sediment

contamination. Sediment samples also fell below the Information Bulletin 105 maximum total concentrations for Level 1 Fill Material, permitting disposal as solid inert landfill (EPA 2018). Excavation works will not present risk to release of toxic sulphides due to the absence of ASS/ PASS. Disposal options for excavated material include seabed levelling or disposal offsite with council approval.

In summary, the risks to the immediate and surrounding marine ecological assemblages are deemed low. However, the following mitigation strategies have been recommended to reduce any impact of the development on potential sensitive marine receptors in the area:

- Where possible, existing rock abutment boulders should remain in similar positions to reduce any potential loss of habitat;
- It is advised that substrate disturbance be kept to a minimum with unnecessary movement prevented by confining dredging to minimum necessary area and depth to meet objectives to mitigate the risk of sediment plumes;
- Seabed levelling should be conducted during a low outgoing tide and/or with an offshore wind to reduce the risk of turbidity increase;
- Sediment plumes during the excavation phase should be visually monitored, and should the plume extend beyond the expected extent then weather conditions should be reviewed and if necessary, works be halted until more suitable conditions occur. In the case that the plume extends uncontrollably beyond the expected footprint, a silt curtain should be installed to capture silt and minimise impact from sediment resuspension;
- Ensure all machinery and equipment is locally sourced to ensure there is not an accidental introduction of non-native species. Before deployment, inspect and clean all equipment to remove any sediment, vegetation, or organisms to prevent the accidental harbouring of invasive species;
- The site footprint should be monitored for marine mammals prior to and during construction activities with mitigation approaches for noise-generating activities required if sightings occur;

- In the unlikely event that a marine mammal is observed within 300 m of the development, any noise-creating construction should be ceased until the mammal has left the area. A slow start-up of works activities is recommended to avoid causing unnecessary shock and to allow mammals to vacate the area.

Given the adoption of proposed impact mitigating strategies, there are minimal foreseeable marine ecological contraventions in the proposed works.

1 Introduction

1.1 Proposal Brief

Marine Solutions was invited by Justin Foster from MAST to conduct a marine Natural Values Assessment (NVA) for a proposed re-established Gordon Jetty (Figure 1). The proposed new jetty will rebuild the recently vandalised structure and promote safety for its frequent users. The works will involve the demolition of the existing jetty and construction of a new rock abutment and jetty.

Sediment removal around the berthing face and adjacent boat ramp is also required due to sediment accumulation, impacting access to both structures. It is likely that this sediment would either be disposed of offsite or dragged into deeper water by seabed levelling methods. Levelling of the seabed will be attained by moving sediment to deep water by raking or scraping with an excavator bucket. Deepening the berthing and loading/ unloading region will enhance accessibility opportunities at the jetty and boat ramp facility at all tidal ranges.

The Australian dredging guidelines stipulate that a minimum of six sampling locations are required for an expected dredge volume of less than 10,000 m3. The site is expected to dredge a maximum volume of 500 m3, thereby six sample locations are required to test for sediment quality. The presence of Acid Sulfate Soils (ASS) will be tested to inform whether an ASS management plan is necessary for the proposed dredging site. There is a low chance of ASS presence identified in the intertidal zone close to the site footprint (ListMap 2024).

The NVA will characterise natural marine ecological values at the site (using both desktop and field-based methods) and provide advice for environmental risk mitigation. The NVA will be conducted in accordance with the Guidelines for Natural Values Surveys -Estuarine Marine Development Proposals (NCH 2020). This will also include bathymetry mapping to explore depth contours.

An RAA submission is required due to site location residing within Central Channel Marine Conservation Area, with inclusive documents to support submission.

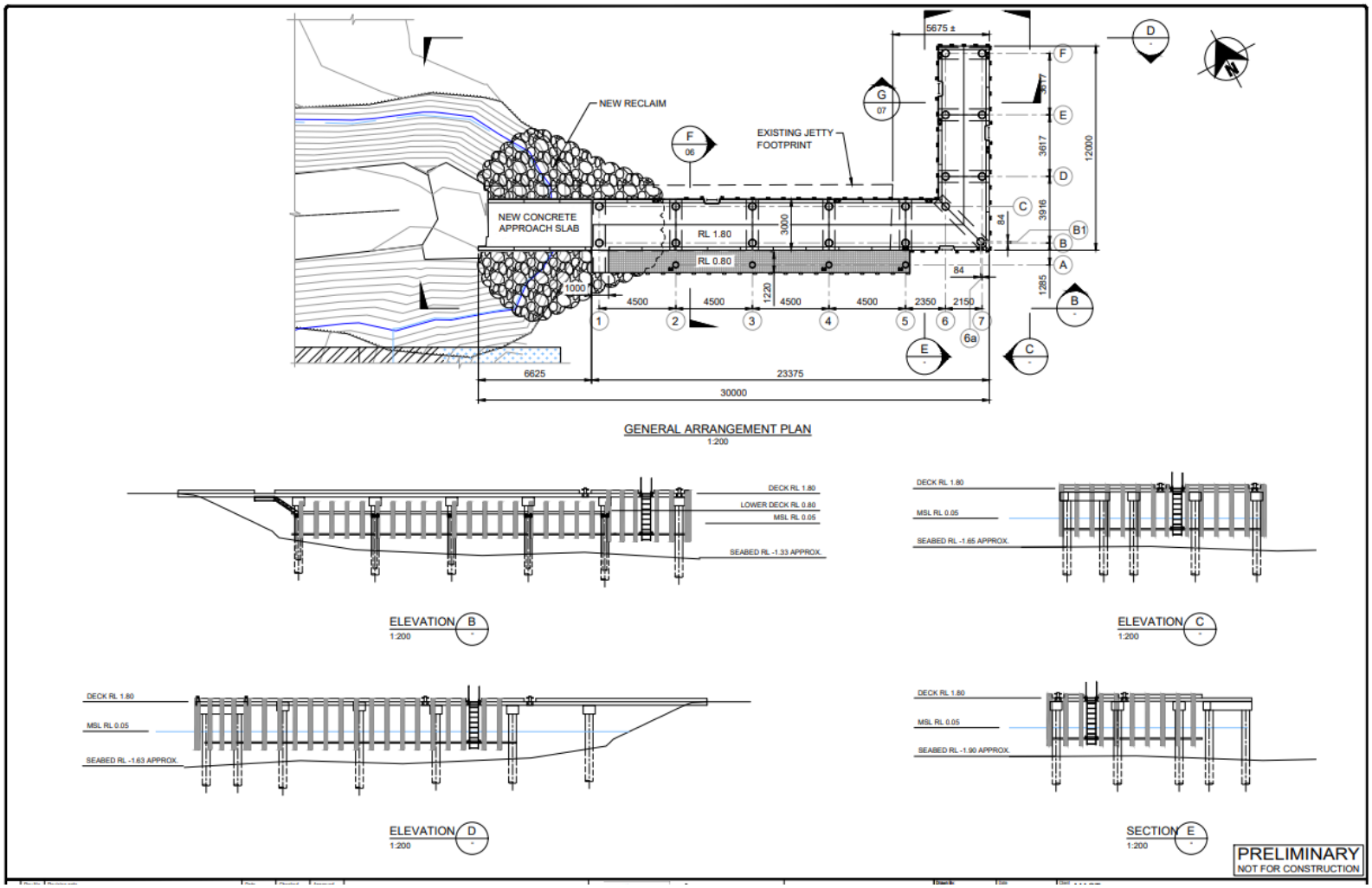


Figure 1. Preliminary construction footprint for Gordon jetty upgrade (image source: MAST 2024)

1.2 Purpose and Scope

The purpose of this report is to provide an understanding of the local natural ecological values and mitigate the environmental risks associated with the proposed development.

The scope of this report extends to a detailed summarization of available information regarding natural values and ecology of the area. Please note that the scope does not extend to terrestrial ecology.

Specifically, the project includes the following:

- Desktop based characterisation and search for threatened and protected species,
- Field work
    - Bathymetry Survey
    - Underwater Video Survey
    - Targeted surveys for threatened and protected species (if required)
    - Sediment analysis, including
        - Sediment contaminants
        - Particle size analysis
        - Acid Sulfate Soils (ASS) (if required)
        - Sediment settlement analysis
- Laboratory testing
- Data analysis, reporting and recommendations.

1.3 Study Area

Gordon is a small coastal town located directly south of Hobart, adjoining to the D'Entrecasteaux Channel. The jetty is located south of the town centre, connected to the boat ramp built in 2012 (Figure 2). The D'Entrecasteaux Channel is a popular destination for boating activities, and the Gordon jetty is frequently used by recreational and commercial vessel operators. The existing jetty was built in 1961, and there was a proposed replacement for a new boat ramp and jetty in 2012. Due to funding constraints, the full jetty upgrade did not occur, however there has been ongoing works to support upkeep of the structure. In September 2023, a fire burnt down half of the jetty, destroying the 'L' structure, and thereby limiting accessibility for its frequent users. The study area is within the Central Channel Marine Conservation Area managed by Tasmania Parks and Wildlife. The project will also require consent from Crown and Kingsborough Council.

Figure 2. Map showing location and the extended footprint of the study area for jetty upgrade. A) Location of Gordon in the context of the southern Tasmanian inlet and B) the development footprint.

2 Desktop-Based Assessment of Aquatic Sensitive Receptors

2.1 Threatened and Protected Species/Ecological Communities

There are a number of marine species listed as threatened that may occur in the vicinity of the proposed development. Threatened species are protected under the *Threatened Species Protection* (*TSP*) *Act 1995* (Tasmanian state legislation) and/or the *Environment Protection and Biodiversity Conservation (EPBC) Act 1999* (EPBC) (Australian Government legislation).

Under the *TSP Act*, no listed species is allowed to be collected, disturbed, damaged or destroyed without a permit. Under the *EPBC Act*, any action with significant impact on a listed threatened species and/or community is prohibited without approval (Section 18 and 18A).

In addition to threatened species legislation, the *Fisheries (General and Fees) Regulations 2006* under the *Living Marine Resources Management Act 1995* (LMRMA) prohibits the taking/possession of a number of marine species, including Syngnathids (seahorses, seadragons and pipehorses), handfish, threefin blennies, limpets/false limpets of three superfamilies, and five species of shark. Additional species are protected by the schedules of the *Wildlife (General) Regulations 2010* (Regulations under the *Nature Conservation Act 2002*), under which a person must not take, buy, sell or have possession of any protected wildlife or any product of any protected wildlife without a permit.

Threatened species that could potentially occur within the vicinity of the study area are discussed in greater detail in this section.

2.1.1 Methods

The EPBC Protected Matters Search Tool (PMST) is a tool managed by the Department of Climate Change, Energy, Environment and Water (DCCEEW) to help determine whether Matters of National Environmental Significance (MNES) or other matters protected by the *EPBC Act* are likely to occur in a given area of interest. The PMST was used to identify protected matters relating the study area, with a buffer of 500 m and 5000 m (DCCEEW 2024). The summary report is provided in Appendix 1.

NRE Tas's Natural Values Atlas was then consulted to identify any verified records of threatened species occurring within the proposed development area (NRE Tas 2024a).

Findings have then been used to determine species for which targeted field surveys are warranted.

2.1.2 Results

In a search of the Natural Values Atlas (NRE Tas 2024a) and EPBC Protected Matters Search Tool (PMST) (DCCEEW 2024), twelve threatened marine species and one threatened marine community were identified as possibly occurring or known to occur within the area. There are verified records of six of these species within a 5000 m radius of the study area (NRE Tas 2024a) (Table 1).

On the basis of this desktop-based assessment, it has been determined that subtidal habitat characterisation is required for spotted handfish. Spotted handfish were identified as likely to occur (within the potential range), according to the Natural Values Atlas (NRE Tas 2024a). As a result, a habitat characterisation survey is required, in accordance with the Guidelines for Natural Values Surveys -Estuarine Marine Development Proposals (NCH 2020). Part of the habitat characterisation involves determining whether the area contains suitable substrate structure or complexity for the attachment of handfish egg masses. The surveys are transect-based, and since the site is <0.5 ha, it should aim to cover the entire site (NCH 2020). The subtidal habitat characterisation carries out this requirement (Section 3).

Targeted surveys for Gunn's screw shell (*Gazameda Gunnii)* were also conducted in accordance with the Guidelines for Natural Values Surveys (NCH 2020). Given that the site is less than 1 ha, three initial benthic samples are required to assess the species' occurrence.

Table 1. Summary of threatened and protected species, and migratory species, identified in a desktop-based assessment. Note that the scope does not extend to terrestrial or avian biota.

	Scientific Name	Common Name	Presence likelihood as per EPBC PMST *	Verified record? as per Tasmanian NVA**	Tas TSP Act Threatened Category	EPBC Act Threatened Category	EPBC Listed Migratory?
Community	*n/a*	Giant kelp Marine Forests of South East Australia	Community *may* occur within 500m the area	No	N*ot listed*	Endangered	n/a
Invertebrates	*Parvulastra vivipara*	Live-bearing seastar	Species or species habitat *may* occur within 500 m	No	Endangered	Vulnerable	No
Fish & Elasmobranchs	*Prototroctes maraena*	Australian grayling	Species or species habitat *likely* to occur within 500 m	No - within 5000 m based on range boundaries	Vulnerable	Vulnerable	No
	Seriolella brama	Blue warehou	Species or species habitat *known* to occur within 500 m	Yes – within 5000m	*Not listed*	Conservation Dependent	No
	Thymichthys politus	Red handfish	Species or species habitat *may* occur within 500 m	No	Endangered	Critically Endangered	No
	Brachionichthus hirsutus	Spotted handfish	Species or species habitat *likely* to occur within 500 m	Yes – within 5000 m	Endangered	Critically Endangered	No
	Galeorhinus galeus	School Shark	Species or species habitat *may* occur within 500 m	No	*Not listed*	Conservation Dependent	No

	Scientific Name	Common Name	Presence likelihood as per EPBC PMST *	Verified record? as per Tasmanian NVA**	Tas TSP Act Threatened Category	EPBC Act Threatened Category	EPBC Listed Migratory?
	Lamna nasus	Porbeagle	Species or species habitat *likely* to occur within 500 m	No	*Not listed*	*Not listed*	Yes
	Carcharodon carcharias	Great white shark	Species or species habitat *known* to occur within 500 m	No	Vulnerable	Vulnerable	Yes
Mammals	*Balaenoptera musculus*	Blue whale	Species or species habitat *likely* to occur within 500 m	No	Endangered	Endangered	Yes
	Caperea marginata	Pygmy right whale	Foraging, feeding or related behaviour *may* occur within area	No	*Not listed*	*Not listed*	Yes
	Eubalaena australis	Southern right whale	Breeding *known* to occur within 500 m	Yes – within 5000 m	Endangered	Endangered	Yes
	Megaptera novaeangliae	Humpback whale	Species or species habitat *likely* to occur within 500 m	Yes – within 5000m	Endangered	*Not listed*	Yes
	Lagenorhynchus obscurus	Dusky dolphin	Species or species habitat *may* occur within 500 m	No	*Not listed*	*Not listed*	Yes
	Mirounga leonina	Southern elephant seal	Not identified by PMST	Yes – within 5000 m	Endangered	Vulnerable	No
	Arctocephalus forsteri	New Zealand fur seal	Not identified by PMST	Yes – within 5000 m	Rare	*Not listed*	*Not listed*

* Notes presence categorization of EPBC PMST (DCCEEW 2024)

** Verified records as per Tasmanian Government Natural Values Atlas (NRE Tas 2024a). Note that the NVA does not document records of migratory species that are not threatened

2.1.2.1 Giant Kelp Forests of South East Australia

Community Background

Giant Kelp Forests of South East Australia (GKFSEA) were added to federal legislation as a threatened ecological community in August 2012. The progressive decline of these forests has been the most noticeable in Tasmanian waters and is attributed to changing oceanographic conditions, including rising sea surface temperatures and changes to the East Australian Current (DSEWPC 2012). The key species that forms this community is Giant Kelp (*Macrocystis pyrifera*), a fast-growing species of brown macroalgae that grows on rocky reefs in cold temperate waters off south-east Australia. The vertical structure provided by Giant Kelp increases local biodiversity by creating habitat for numerous marine species (DSEWPC 2012). There are several criteria that must be met for a community to be classified as the threatened community GKFSEA (TSSC 2012):

1. *M. pyrifera* plants that form a marine forest with a canopy forming at or below the water surface;
2. *M. pyrifera* plants growing at a depth typically greater than eight metres below sea level;
3. A rocky substratum for *M. pyrifera* plants to attach to;
4. A diversity of marine species on the seafloor, in the understorey and throughout the water column. For example, other marine flora such as seaweeds and marine fauna including fish, molluscs (sea snails), bryozoans (lace corals), polychaetes (worms), crustaceans (crabs, isopods, amphipods), echinoderms (sea urchins, seastars) and sponges;
5. Cold water with mean sea surface temperature currently known to be between 5 °C and 20 °C;
6. Locations that receive moderate wave exposure; and
7. Distribution restricted to waters off the coast of Tasmania particularly in the Bruny, Freycinet and Davey bioregions, but also the Boags and, Flinders, Otway and Franklin bioregions, the coast of South Australia in the Otway, and Coorong bioregions as far west as Margaret Bock Reef, and the coast of Victoria in the Otway, Flinders, Central Victoria and Twofold Shelf bioregions as far east as Gabo Island.

Site Occurrence

The EPBC PMST report identified that the GKFSEA may occur within 500 m of the proposed activity; however, it is very unlikely for this threatened community to occur within this region, as environmental conditions do not meet Criteria 1, 2, 3, 4 and Criteria 7. The nearest known extant stand of Giant Kelp to the study area occurs over 7 km away off Bruny Island (ListMap 2024). Overall, the threatened community GKFSEA does not occur in the vicinity of the project.

Potential Impacts

Given the distance of any known kelp forests from the project site (i.e., approximately 7 km away), the risk of impacts of the proposed project on this threatened community is deemed negligible. The project is not expected to have significant direct or indirect impacts on GKFSEA.

2.1.2.2 Tasmanian Live-bearing Seastar

Species Background

The live-bearing seastar *Parvulastra vivipara* (formerly *Patiriella vivipara*) is a small (~15mm diameter) pentagonal orange sea star endemic to south-east Tasmania. The population is severely fragmented; thirteen distinct, small and isolated sub-populations are known to have occurred in the past (Prestedge 2001). Recognised threats to the species include competition with the introduced Regular seastar (*Patiriella regularis*), predation by the introduced Northern Pacific seastar (*Asterias amurensis*), and habitat modification and destruction (e.g. sewage discharge, urban encroachment) (DSEWPC 2024).

Site Occurrence

The live-bearing seastar has only been recorded at a small number of locations in south-east Tasmania. The only reports of the live-bearing seastar in the D'Entrecasteaux Channel are unconfirmed and there has been no verified sightings within 5000 m of the Gordon site footprint and therefore occurrence at this site is highly unlikely.

Potential Impacts

Habitat disturbance is a major threat for the live-bearing seastar, however this project is not expected to interfere with the intertidal zone and therefore will not directly or indirectly impact the habitat of the species. Potential impact is therefore deemed negligible.

2.1.2.3 Australian Grayling

Species Background

The Australian grayling (*Prototroctes maraena*) is a medium-sized, slender, silver fish native to Tasmania and southeast mainland Australia. Migrating between fresh and marine waters, the Australian grayling is considered diadromous, though the majority of their lives are spent in freshwater and adults live and spawn in fresh water. Timing of spawning varies but is typically in late summer in Tasmania, with larvae transported to the sea via stream and river currents, before returning as migrating juveniles approximately 4 to 6 months later (Backhouse et al. 2008a, b., Bryant and Jackson 1999).

Site Occurrence

The Australian grayling's life cycle transitions between marine and fresh waters. No streams or rivers are within close vicinity of the jetty and thereby interactions are highly unlikely.

Potential Impacts

Given the site does not interfere with a breeding site or critical migratory route, impacts are deemed negligible.

2.1.2.4 Blue Warehou

Species Background

The blue warehou (*Seriolella brama*) is a mid-sized species of schooling fish often found under jetties, wharves, and moored boats, at depths between 3 and 550m (Bray and Gorman 2011). Larger juveniles congregate in bays and estuaries until they reach 30cm when they are most abundant on the continental shelf further offshore (Gavrilov and Markina 1979; Bruce et al. 2002).

The key threat to blue warehou is fishing mortality. Blue warehou were historically taken as a target species in trawl and gillnet fisheries. The management arrangements outlined in the Stock Rebuilding Strategy for this species (AFMA 2022) are primarily aimed at reducing fishing mortality to minimise the threats to the species' recovery. Environmental variability including climate change is also a recognised but little-understood threat.

Site Occurrence

There have been verified sightings of blue warehou within 5000 m of the site. Therefore, they could dwell within the vicinity of the site footprint.

Potential Impacts

While there is potential for the species to occur in the vicinity of the project, coastal development is not a threatening process for this species. Given that blue warehou are not classified as a Matters of National Environmental Significance (due to conservation dependent status), and that coastal development is not a threatening process for this species, the risk of significant impact of the proposed project to blue warehou is deemed negligible. The project is not likely to have a direct or indirect impact on this species.

2.1.2.5 Red Handfish

Species Background

Red handfish (*Thymichthys politus*) are endemic to south-east Tasmania. Their distribution and populations are small, limited to the coastline of south-eastern Tasmania, and known, modern, populations are limited to only two small locations (Bessel et al. 2024). Given the low number of mature individuals and the extremely limited distribution of the species, areas supporting known populations represent critical habitat to the survival of the species (DoE, 2015). They are highly cryptic, inhabiting temperate coastal reefs less than 6 m deep (though historically this extended to 20 m depth), and are most often observed underneath algal canopies (Last & Gledhill 2009; Edgar et al. 2017). Red handfish move by using their hand-like fins to crawl across the seafloor, with their diet consisting of small crustaceans and polychaete worms (Edgar et al. 1982). Red handfish are

known to have low reproductive and dispersal rates (DoE 2015). Females produce egg masses of varying sizes made up of an estimated 30-60 eggs, all of which are connected by tubules and bound together with associated threads (DoE 2015). Females attach their egg masses to seaweed species including Sargassum, thin red alga, and green alga (*Caulerpa* sp.) in late October and early November. (Bruce et al. 1998; DoE 2015).

Site Occurrence

Red handfish populations are mainly distributed between Marion Bay and Port Arthur and such occurrence of red handfish at the Gordon jetty development is unlikely.

Potential Impacts

The potential risk of impact on the red handfish population is minimal due to the low likelihood of their presence within the vicinity of the proposed development.

2.1.2.6 Spotted Handfish

Species Background

Spotted handfish (*Brachionichthys hirsutus*) are endemic to south-east Tasmania. They were once locally common and widespread from the eastern coast of Tasmania to the D'Entrecasteaux Channel (Last et al. 1983) but declines in numbers, first reported in 1996, lead to concerns about their conservation (Barrett et al 1996). They are listed as Critically Endangered under the EPBC Act (1999) and as Endangered under Tasmania's TSP Act (1995).

Reasons for declines in spotted handfish are probably related to historic and ongoing anthropogenic impacts to their habitats and certain characteristics of their life history. Spotted handfish are camouflaged to match the colour of scallop shell hash and extensive scallop dredging from the 1800s through to the 1940s in the Derwent River and D'Entrecasteaux Channel probably impacted populations from bycatch. Urbanisation, pollution, eutrophication and infrastructure such as moorings may have also had impacts, but the species was still considered common into the 1980s. The introduction of marine pests in the late 1980s and early 1990s, such as the Northern Pacific seastar may have impacted spotted handfish as the seastars consume the Stalked Ascidians which

the fish use as spawning habitat. Declines in other spawning habitat such as seagrasses and *Caulerpa sp*., may also have contributed to reduced breeding success.

A shallow-water, coastal, anglerfish, spotted handfish provide parental care of their eggs until they hatch as fully metamorphosed juvenile fish (Bruce et al 1998). This means there is no dispersing planktonic phase in their life cycle. The advantage of this directly recruiting life history strategy is that young hatch onto the specific, soft sediment habitats that are preferred by the fish (Wong et al 2018). Direct recruitment also avoids the extreme mortality that occur for larval fish while in the plankton, meaning spotted handfish can have relatively high levels of juvenile survival. Like all handfish, spotted handfish prefer to walk across the bottom and lack a swim bladder. Dispersal is low for both adults and juveniles.

Site Occurrence

The jetty upgrade project is within the potential range for spotted handfish with verified sightings within 5000 m of the site (NRE Tas 2024a). Therefore, spotted handfish could be found at the site depending on habitat conditions surrounding the jetty.

Potential Impacts

Spotted handfish are a protected species that are vulnerable to habitat modification and disturbance. As the project is within the potential range of spotted handfish, habitat characterisation around the site must be conducted to identify whether their critical habitat is at risk from the project. Outcomes dependent on habitat characterisation will infer whether the project could impact spotted handfish. The jetty redevelopment footprint is very small with impact localised to the adjacent area and thereby impact on habitat is likely to be low.

2.1.2.7 School Shark

Species Background

The school shark (*Galeorhinus galeus*) is distributed in temperate waters worldwide. In Tasmania, school sharks are common in some coastal embayments. School sharks can reach lengths of 1.8m and undertake a large migration of up to 1400km along the southern coast of Australia (AMFRA,

2024). Threats to school sharks include fishing and habitat degradation of their nursery grounds (DoE, 2024c).

Site Occurrence

Occurrence of school sharks is rare with no verified sightings (NRE Tas, 2024a).

Potential Impacts

It is unlikely that the proposed development would present any risk to school sharks given it is not located within a nursery ground or critical habitat.

2.1.2.8 White Shark

Species Background

White sharks, also known as white pointers and great white sharks, are found throughout temperate and sub-tropical waters. They are a pelagic species, primarily found inside continental shelf waters. White sharks are long-lived with low reproductive rates; these life history characteristics are likely contributors to population declines (DSEWPC 2013).

Site Occurrence

White sharks' habitat is known to occur within 500m of the site's footprint (DCCEEW 2024), however, there has been no verified sightings, and it is very unlikely that white sharks would occur at the site's footprint.

Potential Impacts

The greatest anthropogenic threat to white sharks is commercial fishing rather than shallow coastal development. Therefore, it is unlikely that the proposed development would present any risk to white sharks given that they are highly mobile and can avoid construction works. In addition, the development is unlikely to significantly alter any critical habitat of the white shark.

2.1.2.9 Porbeagle, Mackerel Shark

Species Background

The porbeagle or mackerel shark (*Lamna nasus*) is a wide-ranging shark species that inhabits temperate and subantarctic/subarctic waters. The porbeagle is known to be particularly vulnerable to overfishing. Life history characteristics such as slow growth, late maturation and low fecundity contribute to a low sustainable catch rate for the species. Historically, rapid porbeagle fishery collapses have occurred (Francis et al. 2002). The species continues to be impacted as longline bycatch and by recreational fishing. Coastal development is not recognised as a threat to this species.

The Porbeagle is listed as migratory under the EPBC Act, but is not listed as threatened.

Site Occurrence

The Porbeagle habitat range is quite large, and therefore, species occurrence within the jetty development site is very low.

Potential Impacts

The impact on their breeding, feeding, migration, or resting is negligible due to unlikeliness of occurring near the development area. The project is not expected to have significant direct or indirect impacts on this species given they are not dependent on the region as a critical habitat.

2.1.2.10 Blue Whale

Background

The blue whale *(Balaenoptera musculus)* is the largest oceanic mammal and migrates between Australian waters, Antarctica, Sub-Antarctica and tropical breeding grounds (Indonesian and Pacific waters) (DoE 2024a). Blue whales mature at the age of 7-10 years but can live to up to 90 years (Sears & Perrin 2009). There are still many unknowns about the population size and distribution due to the large areas in which the population aggregates. Blue whales are listed as an endangered species under both relevant federal and state legislation. Major threats to blue whales have stemmed from whaling, overfishing, climate change, noise interference from anthropogenic disturbance and vessel collision (DoE 2024a).

Site Occurrence

Waters around Tasmania are possible foraging areas for the blue whale's migration route. However, they typically migrate on the west coast of Tasmania, making it very rare to observe blue waves in the D'Entrecasteaux Channel (no verified records). Therefore, the occurrence of blue whales within the site's footprint is unlikely. The pier is also situated within the subtidal zone further highlighting this low chance of occurrence as blue whales are generally found in deeper waters.

Potential Impacts

Threats to marine mammals such as the blue whale, include acoustic pollution, entanglement (e.g., marine debris, fishing equipment), ship-strike injury and water quality degradation. It is Marine Solutions understanding that the proposed jetty upgrade will not involve the generation of impulse sound during installation, and therefore noise mitigation would be deemed unnecessary.

2.1.2.11 Humpback Whale

Background

Humpback whales (*Megaptera novaeangliae)* are widely distributed globally and have extensive migratory routes. Several populations spend the summer in Antarctica and then migrate up either the east or west coast of Australia for breeding during winter. They can reach up to 16m long and are mostly characterised by their large flippers (Bryant & Jackson 1999).

Site Occurrence

Humpback whales will generally pass through waterways such as the Derwent Estuary or D'Entrecasteaux Channel to warmer waters north for breeding in September and then migrate back to polar regions. There has been observed sightings within 5000 m of the site footprint (NRE Tas 2024a) and therefore they could be found in waters near the jetty development. However, it would be highly unlikely to find a humpback whale within the jetty footprint as they usually dwell in deeper waters.

Potential Impacts

Impacts to humpback whales include overfishing, entanglement in nets or other marine debris, collision with vessels and noise disturbances. Due to the nature of the development not comprising of any of the identified impacts, the outcomes for humpback whales are deemed minor.

2.1.2.12 Pygmy Right Whale

Background

The Pygmy right whale (*Caperea marginata)* is the smallest baleen whale with limited information known about their movements, breeding and feeding behaviours (DoE 2024b). They mature at approximately 6m long and can be distinguished by the presence of a unique dorsal fin. They are found commonly in temperate and sub-Antarctic waters with sightings observed near Tasmania due to the proximity to the subtropical convergence. Pygmy right whales' greatest threat is entanglement to fishing equipment or other marine debris.

Site Occurrence

Sightings of pygmy right whales are rare and it is unlikely that a pygmy right whale would occur near the site footprint.

Potential Impacts

Given the unlikely occurrence of pygmy right whales, the project is not expected to have any direct or indirect impact on the species.

2.1.2.13 Southern Right Whale

Background

Southern right whales (*Eubalaena australis)* are one of Tasmania's rarest and largest mammals (NRE Tas 2020). They can be seen between May and November when migrating north from Tasmania. Some will also stay in Tasmania during the breeding season at their ancestral breeding grounds which were highly populated before whaling became a prominent industry (NRE Tas 2020). The southern right whale population is recovering from whaling with significant resources and efforts

put into monitoring and conserving these threatened species. They are listed as endangered under the EPBC Act and TSP Act.

Site Occurrence

Southern right whales generally prefer to mill in sheltered waters on the east coast of Tasmania (NRE Tas 2020) and are becoming more frequently observed in the D'Entrecasteaux Channel (MAST 2020). Therefore, southern right whales may be observed near Gordon.

Potential Impacts

It is under Marine Solutions understanding that the proposed jetty upgrade will not involve the generation of impulse sound during development and therefore noise mitigation strategies are not relevant. Therefore, it is expected there will be minimal impact to the species.

2.1.2.14 Dusky Dolphin

Background

Dusky dolphins (*Lagenorhynchus obscurus)* occur throughout the Southern hemisphere but have not been well surveyed in Australian waters with few records of their distribution confirmed (DoE 2024d). Sexual maturity is different for males and females with maturity at 7 and 18 years, respectively. They are found in large groups of up to 100 individuals during summer and break up into smaller groups for winter periods. Major threats include pollution, plastic and fishing debris entangling the species and bio-accumulation of toxic substances (DoE 2024d).

Site Occurrence

Dusky dolphins are incredibly rare with few confirmed sightings in Australia. The only record of a dusky dolphin in Tasmania was identified from a photograph with no specimen collected to confirm the species presence (DoE 2024d). Therefore, it is highly unlikely that dusky dolphins would occur at the site.

Potential Impacts

No impacts to the dusky dolphin are expected from the proposed pier development due to no intrusion with critical migratory route or feeding/ foraging sites.

2.1.2.15 Southern Elephant seal

Background

Southern elephant seals (*Mirounga leonina*) are earless seals easily recognisable by their large trunk-like nose and colossal body that can weigh up to 3600 kg (Bryant & Jackson 1999). They historically bred on King Island, but the sealing industry caused significant declines in the population size in the early 19th century. The population is still recovering, and they are rarely seen off Tasmania's coasts. Significant breeding colonies live on Macquarie Island and Heard Island in sub-Antarctic environments. Threats to southern elephant seals include entanglement of fishing gear, marine pollution, disturbance to breeding colonies, overfishing, which impacts their stocks, and deliberate hunting (Bryant & Jackson 1999). Under the *Tasmanian TSP Act*, southern elephant seals are endangered.

Site Occurrence

Verified sightings of southern elephant seals have occurred within 5000 m of the proposed jetty upgrade (NRE Tas 2024a). This sighting occurred recently, suggesting that southern elephant seals could be found in the D'Entrecasteaux Channel and near the jetty upgrade site.

Potential Impacts

Given that the site is not within southern elephant seals breeding grounds or critical habitat, the jetty project at Gordon is believed to pose no significant impacts.

2.1.2.16 New Zealand fur seal

Background

New Zealand fur seals (*Arctocephalus forsteri*) are large seals that were only recently discovered breeding again in Tasmania in the 1980s (TSS 2024). They seem to be recovering well; however, the population size is still significantly smaller than pre-sealing times. The species breeds annually at

established breeding colonies on the southern coast, with pups born November – January. Major threats to New Zealand fur seals are fishing entanglements, disturbance at breeding colonies, climate change, or direct harm (NRE Tas 2024b).

Site Occurrence

Breeding grounds for New Zealand fur seals include the southern coast of Tasmania from Tasman Island to Southwest Cape, and they are found concentrated in these regions over the breeding season (NRE Tas 2024b). Gordon is not a breeding site however, New Zealand fur seals could pass through the site footprint, especially during breeding season when the population numbers increase significantly.

Potential Impacts

Given that the proposed development does not interfere with a breeding site or critical habitat, no significant impacts on the New Zealand fur seal population is expected.

2.2 Migratory Species

Migratory species are those animals that migrate to Australia and its external territories, or pass through or over Australian waters during their annual migrations (DCCEEW 2021).

Listed migratory species[1] protected under international agreements are those listed in the:

- Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention)
- China-Australia Migratory Bird Agreement (CAMBA)
- Japan-Australia Migratory Bird Agreement (JAMBA)
- Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA)

[1] An EPBC-listed migratory species list can be found at http://www.environment.gov.au/cgi-bin/sprat/public/publicshowmigratory.pl

Refer to Table 1 (Marine Mammals) for information pertaining to migratory cetaceans within the vicinity of the project.

Marine mammals are known to occur periodically in the vicinity of the proposed development and as such, acoustic disturbance during construction may particularly affect marine mammals that rely on acoustic cues for social and reproductive behaviours.

To mitigate this risk, the zone should be monitored for marine mammals prior to and during construction activities. A slow start-up of construction works is recommended to avoid causing unnecessary shock to animals and to allow them to vacate the area. Should any marine mammals be sighted within the exclusion zone, construction works should be halted until such time that no marine mammal has been sighted for 30 minutes.

2.3 Invasive Species

Marine pests are introduced into Australian waters and translocated by a variety of vectors (e.g. ballast water, biofouling, aquaculture operations, and ocean current movements). Once introduced, they often thrive as they may lack predators and/or competitors in their new environment (Whitehead 2008). Pests can have a significant impact on human health, fisheries and aquaculture, infrastructure, tourism, biodiversity and ecosystem health.

Seven species have been declared as pests under State legislation[2]. These are:

- Northern Pacific sea star (*Asterias amurensis*),
- European shore crab (*Carcinus maenas*),
- European fan worm (*Sabella spallanzanii*),
- Japanese Wakame (*Undaria pinnatifida*),
- Black striped mussel (*Mytilopsis sallei*),

[2] *Fisheries (General and Fees) Regulations 1996*, *Part 20: Noxious* fish, outlined in the *Living Marine Resources Management Act 1995*

- European Carp (*Cyprinus carpio*), and
- Green algae (*Caulerpa taxifolia*).

Many more are recognised as pests by the National Introduced Marine Pest Information System (NIMPIS) (DCCEEW 2021b).

No introduced pest species were observed at this site throughout surveying, although the study area is within the known range of Northern Pacific seastar *Asterias amurensis* and Japanese Wakame *Undaria pinnatifida*. It should be ensured that no marine species are translocated as a result of vessel/equipment movement, by adopting a thorough cleaning protocol. Existing state legislation provides controls by which to prevent the translocation of marine pest species.

2.4 Other Sensitive Receptors

The site footprint lies within the Central Channel Marine Conservation Area (ListMap 2024) which is located in the D'Entrecasteaux Channel from Bruny Island to mainland Tasmania. Seagrass and seaweed species are prevalent within the channel as well as sediment and current communities. Sensitive receptors defined from Tas Marine Atlas include seagrass communities that are found within proximity of the jetty development (Tasmania's Marine Atlas 2024). There is also a possibility to find reef habitats on the shelf off Gordon (Lucieer & Barrett 2016). Finally, the D'Entrecasteaux Channel is a shark refuge zone.

From these findings, subtidal habitat characterisation to identify whether seagrass communities or rocky reef habitats are present within the site footprint was deemed a suitable provision for exploring environmental risk on these outlined sensitive receptors. The jetty proposal will have negligible impact on the shark refuge zone due to specific site not interfering with critical habitat and small scale of development.

3 Targeted Surveys for *Gazameda gunnii*

3.1 Methods

The sampling protocol for Gunn's screw shell (*Gazameda gunnii*) followed the targeted survey guidelines provided by the Department of Natural Resources and Environment Tasmania. These guidelines indicate that sampling is warranted if the proposed works is occurring in depths between 3 – 80 m, and if the average sediment size exceeds 0.125 mm (NCH 2020). To assess the presence or absence of *G. gunnii*, benthic grab samples were collected by a diver from five sites near the proposed work location on 4 June 2025 (Figure 3). All selected sites were deeper than 3 m and within the anticipated footprint of the seabed levelling activities. The grab samples were collected with a hand corer and filtered through a 2 mm sieve to detect the presence of *G. gunnii*.

Figure 3. Sampling sites for Gunn's screw shells in the Gordon jetty project footprint.

3.2 Results

No Gunn's screw shell was identified in the sampling at Gordon (Table 2). Since no Gunn's screw shell were observed, no further sampling was warranted. There was a heart urchin, and species of annelid worms found during the sampling event (Figure 4). The substrate consisted of bioturbated fine sand.

Table 2. Gunn's screw shell sampling results.

Sample site	G.gunnii count	Notes
Site 1	0	
Site 2	0	Heart urchin
Site 3	0	
Site 4	0	
Site 5	0	Annelid worms

Figure 4. Examples of sediment collected for Gunn's screw shell surveys. Note the presence of the heart urchin in the far-right photo.

4 Habitat Characterisation

4.1 Subtidal Habitat

4.1.1 Methods

A subtidal habitat survey was conducted on 9th August 2024 in the study area to characterise the subtidal habitat area. Seven transects (T1, T2, T3, T4, T5, T6, and T7) were completed using a GoPro attached to a pole to film the habitat seafloor whilst slowly traversing on the vessel (Figure 5). The variety of transects aimed to comprehensively characterise the environment and investigate whether critical handfish habitats are present within the site footprint. T1 and T2 followed the trajectory of the existing jetty structure to understand habitat change with depth. T3 – T7 were conducted perpendicular to the jetty to gather a thorough depiction of key habitat surrounding the project site. Video footage was recorded using a GoPro 5 with Hero Waterproof casing. Video footage was examined with habitat type, species and noteworthy features recorded.

Video footage of subtidal transects is available upon request to Marine Solutions.

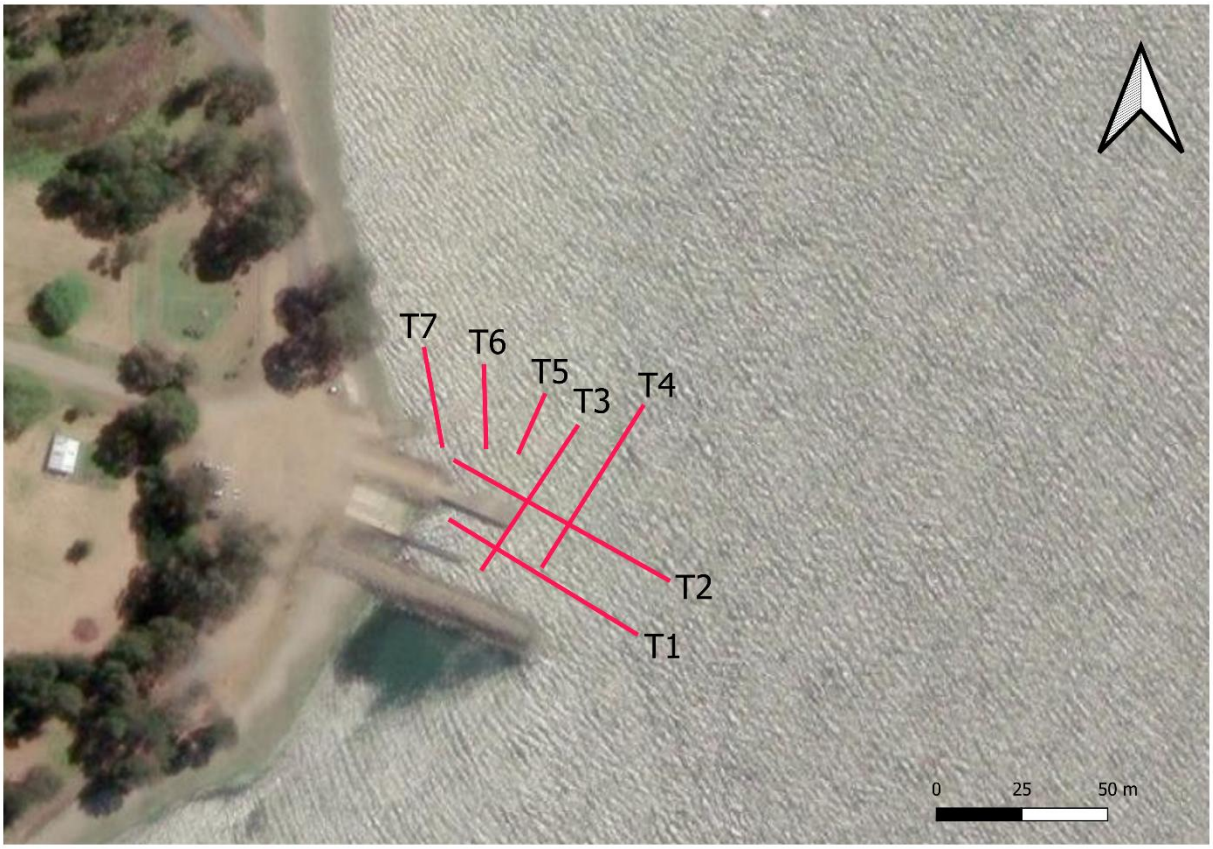


Figure 5. Transects (T1 – T7) conducted for subtidal survey.

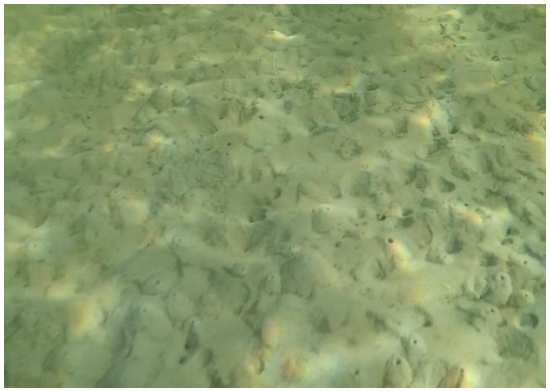
4.1.2 Results

The seafloor was largely composed of heavily bioturbated sand, with rocky boulders present near the jetty structure and rock groyne. Patches of seagrass *Heterozostera tasmanica* with algal epiphytes were observed north and south of the jetty structure. These colonies were observed near the rocky groyne adjacent to the Gordon boat ramp and north of the Gordon jetty close to the rocky abutment. A diverse range of marine algae were found in this region of the site including sea lettuce (*Ulva australis)*, strands of Caulerpa sp. (*Caulerpa trifaria*, *Caulerpa simpliciuscula)* and drifting ephemeral red algae. The jetty pillars also provided habitat for red algae (*Haylmenia kraftii)* and sea lettuce. Refer to Figure 6 for images of habitats and species observed, and Appendix 4 for a list of species observed during the subtidal habitat survey.

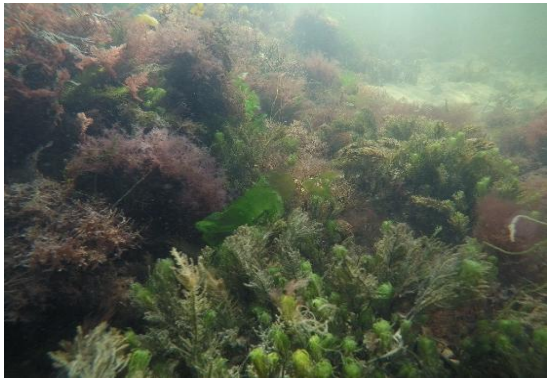
Further from the jetty structure, the dominant habitat was a sandy bioturbated bottom seafloor. There was little growth on the bioturbated seafloor. The zonation of sediment shifted from an intertidal cobble shore to fine bioturbated sandy seafloor with minimal algal growth displayed further into the channel.

In accordance with the Guidelines for Natural Values Surveys -Estuarine Marine Development Proposals (2020), habitat characterisation for spotted handfish habitat was undertaken during these surveys. The habitat consisted of fine, bioturbated sediment, and no suitable structures or habitat complexity (such as ascidians) for handfish egg mass attachment were identified. Given the shallow depth and fine sediment at the proposed development site, it is unlikely that the works would result in the loss of critical habitat.

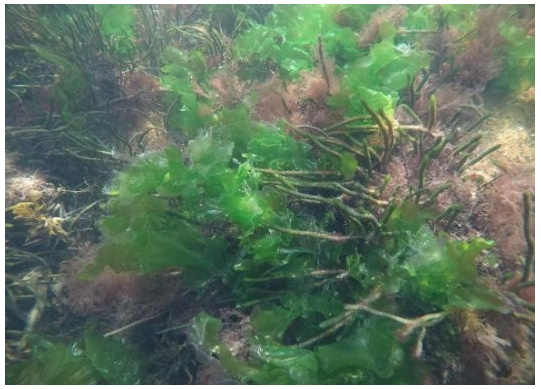
Video footage of subtidal habitat transects is available from Marine Solutions upon request.



Bioturbated sandy bottom

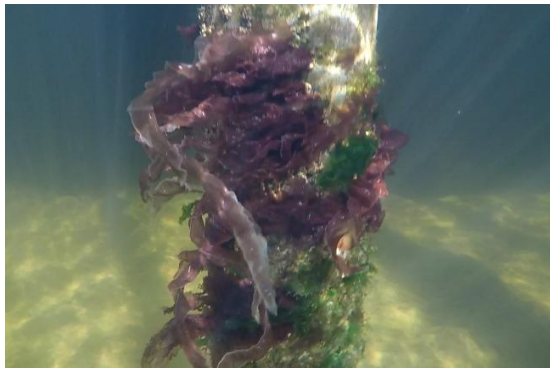


Diverse algae near rock abutment close to shore



Ulva australis, Caulerpa simpliciuscula and *ephemeral red algae*

Seagrass *Heterozostera* covered with epiphytic growth



Algae growth on jetty pillar (*Halymenia kraftii, Ulva australis*)

Pacific oysters and *Ulva australis* on the rock abutment near jetty structure

Figure 6. Examples of habitats and species observed throughout the subtidal habitat survey

5 Sediment Quality

5.1 Contaminants

5.1.1 Methods

Six sediment sample sites (refer to Figure 8 for specific location) were collected for contaminant analysis including metals and total petroleum hydrocarbons (TPH). Samples from sites S1 and S2 were obtained on 9 August 2024 by Marine Solutions personnel in the water collecting sediment grabs from the surface layer. Whilst samples from sites S3, S4, S5, S6 were collected on 31 October 2024 during a second sampling event.

Samples from site S3 and S4 were collected using a vibrocorer to attain sediment samples at a deeper sediment layer by extracting cores. The vibrocorer was deployed using a custom-built frame from the bow of the *Second Solution* vessel. Core samples were retrieved once the vibrocorer had reached maximum penetration or refusal into the sediment. A core catcher was fixed inside the end of the barrel, which retained the sediment as the core was withdrawn from the seabed. The cores were secured in an upright position before the vessel returned to the boat ramp for processing of samples. Cores were extruded into core trays using a plunger, providing a continuous, undisturbed sample of the seabed sediments. The extruded sediment was then photographed, logged and samples of the recovered sediments collected.

Sediment samples were extracted from the core samples and placed into their respective jars. Two samples were collected from S3 for contaminant analysis to distinguish between the slightly different core layers (one from upper layer & one from lower layer). Samples from site S4 contained homogenised upper and lower layers of sediment into one sample jar.

Samples for site S5 and S6 were collected using a Ponar 'Grab' Sampler to extract sediment from the upper layer of the seabed.

Each sample was then placed into laboratory-supplied jars and stored on ice prior to transport to Analytical Services Tasmania (AST). AST has up-to-date accreditation under the National Association of Testing Authorities (NATA), Australia.

Sedimentary contaminants tested included the following:

- Metals (As, Cd, Co, Cr, Cu, Mn, Ni, Pb, Zn, Hg)
- TPH

Laboratory results were compared to the ANZG low and high interim sediment quality guideline values (ANZG 2024) (Table 3) and the Information Bulletin No. 105 (IB 105) for Classification and management of contaminated soil for disposal (EPA Tasmania 2018). IB 105 classifies sediments in accordance with the Environmental Management and Pollution Control (Waste Management) Regulations 2010, to determine whether potentially contaminated soil is suitable to be disposed of as landfill (EPA Tasmania 2018).

5.1.1.1 Observations from vibrocorer

Sediment from site S3 was dark brown whilst site S4 was lighter in colour, both largely exhibiting homogenous residue (Figure 7). There were slightly distinct layers at site S3 with the upper layer demonstrating lighter colour and more sand-like features. Site S3 presented harder refusal than site S4.

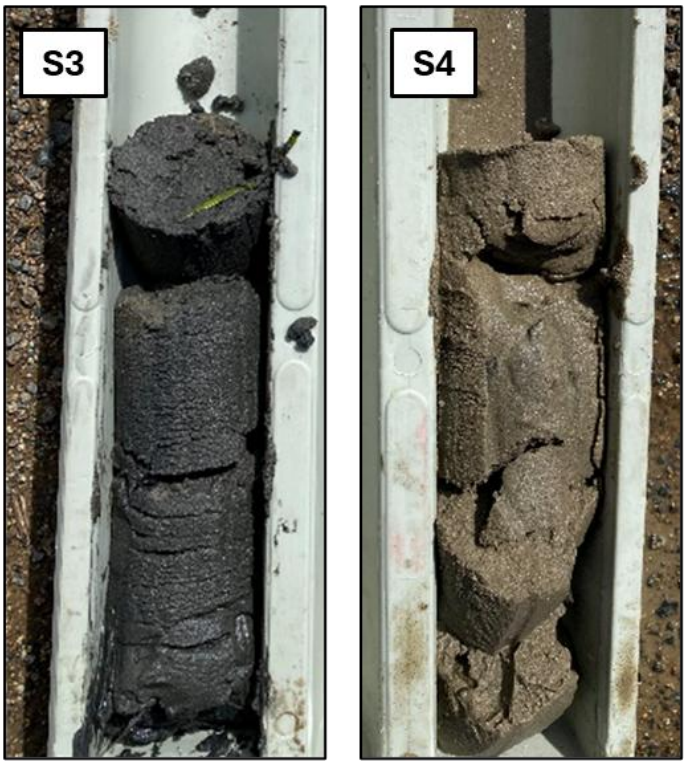


Figure 7. Core samples extracted from the vibrocorer.

Figure 8. Locations of sediment samples extracted for laboratory testing. One sample for particle size analysis and contamination were taken from each site. S3 and S4 (orange points) were collected using a vibrocorer. ASS/PASS testing samples were taken at S1 and S2. Sediment settling tests were conducted using sediment collected at S3, S4, S5 and S6.

5.1.2 Results

Results of sediment contaminant analysis indicated that levels of metals and Total Petroleum Hydrocarbons (TPH) are under ANZG Default Guideline Values trigger values and the IB 105 maximum total concentrations for Level 1 Fill Material (Table 3). The sediment is therefore considered low risk for ecological harm (NAGD 2009).

Table 3. Summary of results of sediment contaminant testing, compared against the ANZECC/ARMCANZ Default Guideline Values trigger values where applicable.

			ANZG Default Guideline Values		IB 105	Results						
		Units	Lower trigger	Upper trigger	Fill material level 1	Site 1	Site 2	Site 3 (TOP)	Site 3 (BOT)	Site 4	Site 5	Site 6
Metals	Arsenic	mg/kg	20	70	20	2	3	2	2	3	3	3
	Cadmium	mg/kg	1.5	10	3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Cobalt	mg/kg	100**	-	100	1	2	2	2	2	2	2
	Chromium	mg/kg	80	370	50	4	5	7	7	6	6	5
	Copper	mg/kg	65	270	100	3	3	4	4	4	4	3
	Manganese	mg/kg	500*	-	500	25	32	36	35	32	35	32
	Nickel	mg/kg	21	52	60	2	3	4	4	3	4	3
	Lead	mg/kg	50	220	300	2	2	3	3	3	3	3
	Zinc	mg/kg	200	410	200	9	10	15	13	11	15	11
	Mercury	mg/kg	1*		1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Total Petroleum Hydrocarbons	TPH C06-C09	mg/kg	-	-	-	<25	<25	<25	<25	<25	<25	<25
	TPH C10-C14	mg/kg	-	-	-	<25	<25	<25	<25	<25	<25	<25
	TPH C15-C28	mg/kg	-	-	-	<100	<100	<100	<100	<100	<100	<100
	TPH C29-C36	mg/kg	-	-	-	<100	<100	<100	<100	<100	<100	<100
	TPH	mg/kg			-	<100	<100	<100	<100	<100	<100	<100

* No ANZG trigger values given for this element so this information is derived from the EPA (2012)

** No ANZG trigger values given for this element so this information is derived from the NEPM (2011)

5.2 Particle Size

5.2.1 Methods

Sediment particle size analysis was conducted at six sites within the development footprint (Figure 8). Particle size samples contained sediment homogenised and distributed into glass jars from each site. Particle size was characterized in-house by a volumetric method, whereby known sediment volumes from each site are rinsed through a sieve stack to separate size fractions (4 mm, 2 mm, 1 mm, 500 µm, 250 µm, 125 µm and 63 µm). This helped characterise the benthic habitats in the area and the potential mobility of the sediment.

5.2.2 Results

Particle size of sediment within the site footprint largely consisted of fine sand particles (0.063 - 0.25mm), demonstrated in Figure 9. Silty sediment was also exhibited in smaller proportions at all sites (<0.63 mm in size). Overall, much of the sediment is heavily bioturbated. The lack of presence of coarser sediment (>0.5 mm) suggests that there is little movement of sediment from currents/ swell.

Particle size is relevant as it relates to the bioavailability of toxicity of contaminants which is influenced by grain size where the contaminant binding compacity decreases with increasing grain size (ANZG 2024). Finer silt sediment is more likely to be mobile during disturbance from construction processes such as excavation and jetty demolition, thereby presenting a greater risk for sediment plumes.

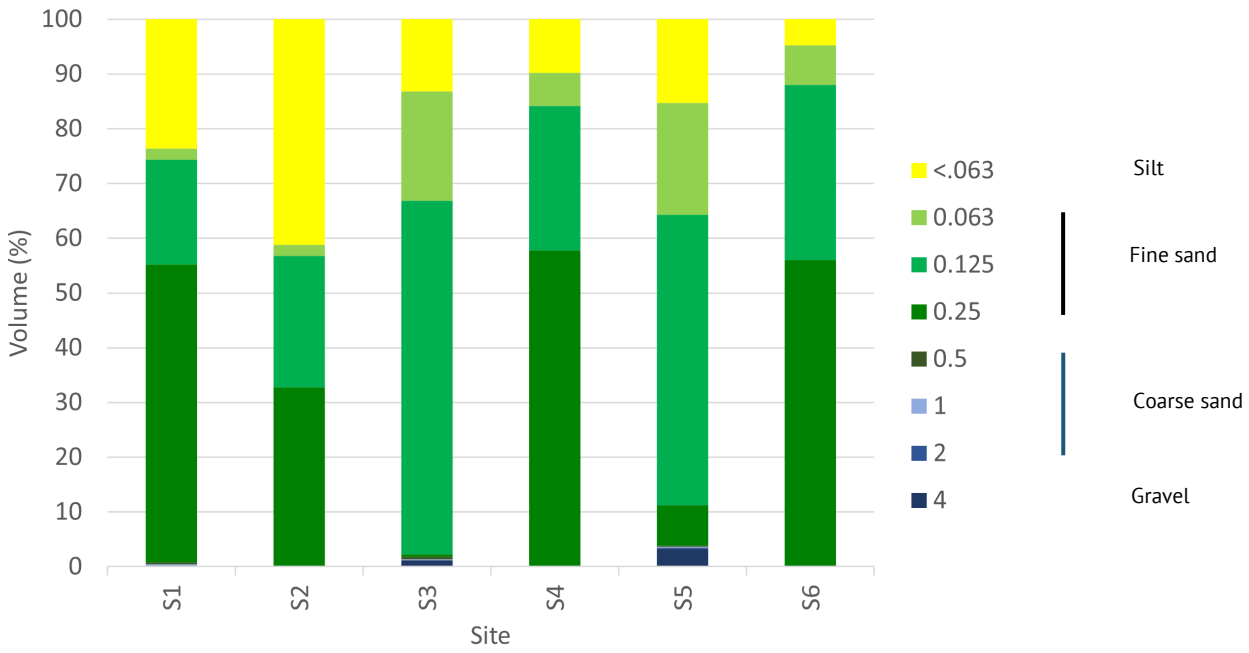


Figure 9. Particle size distribution of sediments measured at six sites at the proposed jetty upgrade project in Gordon.

5.3 Acid Sulfate Soils (ASS)

5.3.1 Background

ASS occur in two main forms: potential acid sulfate soils (PASS), where the pyrite is retained in a reduced state (not oxidised), and actual acid sulfate soils (AASS), where the pyrite is oxidised by exposure to air. The oxidation of ASS results in the formation of sulfuric acid (Thornton 2010), which when released into the environment can have impacts on oxygen availability, water quality and damage sensitive ecosystems (NRE Tas 2024b).

An effective way to test the likely presence and severity of oxidised ASS (AASS) is to examine the soils field pH (pHf) (Sullivan et al. 2018). If the soil has a pHf <4, oxidation of sulfides has probably occurred in the past, indicating that an actual acid sulfate soil (AASS) is present (DPIPWE 2009). However, pHf tests do not account for any sulfide that has not yet been oxidised. In order to test for potential acid sulfate soils (PASS), oxidation with 30% hydrogen peroxide (pH adjusted 4.5 – 5.5)

has to be performed. This is called a pH_{fox} test. Ultimately, both pHf and pH_{fox} tests have to be conducted to determine if AASS or PASS is present. If the test displayed a positive reaction, then it would be appropriate to send samples to the laboratory for further analysis.

5.3.2 Methods

Prior to commencing field work, the field pH meter was calibrated according to manufacturer's instructions, and 30% Hydrogen peroxide (H2O2) solution was adjusted to a pH between 4.5 and 5.5 using a few drops of 0.1M NaOH.

Sediment core samples were collected in approximately 1.5 m of water from locations that may be excavated during the jetty upgrade project. Core samples were taken at two sites (S1 and S2) by personnel in the water (Figure 8). Sub-samples were not taken as there were no distinct layers displayed in the core samples (Figure 10).

Approximately one teaspoon of soil was placed into two glass jars respectively (one testing the field pH (pHf) and the other testing the field pH peroxide (pHfox)). For the pHf tests, a DigiTech pH meter pen was lowered into the jar until the spear point was completely submerged in the sample. Once the reading had stabilized, the pH value was recorded. A pHf reading less than 4 indicates that oxidation of sulfides probably has occurred in the past, which could indicate the presence of acid sulfate soils (DPIPWE 2009). For the pHfox tests, approximately 1 ml of the adjusted 30% Hydrogen peroxide (H2O2) solution was added to the jar. The jar was then left for 15 minutes to allow for a reaction to occur.

The pH meter was lowered into the jar until the spear point was completely submerged in the peroxide mixture. Once the pH reading had stabilized, the pH value was recorded. For the sample to be considered a 'positive field sulfide identification' the following three combinations had to occur (DPIPWE, 2009):

- The pHfox is less than 3
- A significant reaction occurs (extreme/ volcanic)
- The pHfox value is at least one unit below field pH

Samples that meet the criteria above based on the pH results (pHf and pHfox) would then be sent to a laboratory to undergo Chromium Reducible Sulphur (CRS) testing in order to verify whether ASS materials were present or not.

5.3.3 Results

The pHfox and pHf tests did not identify a 'positive field sulfide' reaction, deducting that there is no AASS or PASS present at site (Table 4). This result indicates that a laboratory ASS test is not required for the Gordon jetty upgrade project and there is no risk of toxic sulphide release. Additionally, the sediment would not need to undergo treatment if left to dewater on site.

Table 4. Results of the ASS pH tests.

Core	Time of sampling	Core length (cm)	pH_f	pH_{fox}	Notes
1	15:30	18	7.0	6.6	No visible reaction.
2	15:47	19	7.3	6.6	Very slight bubbling visible.

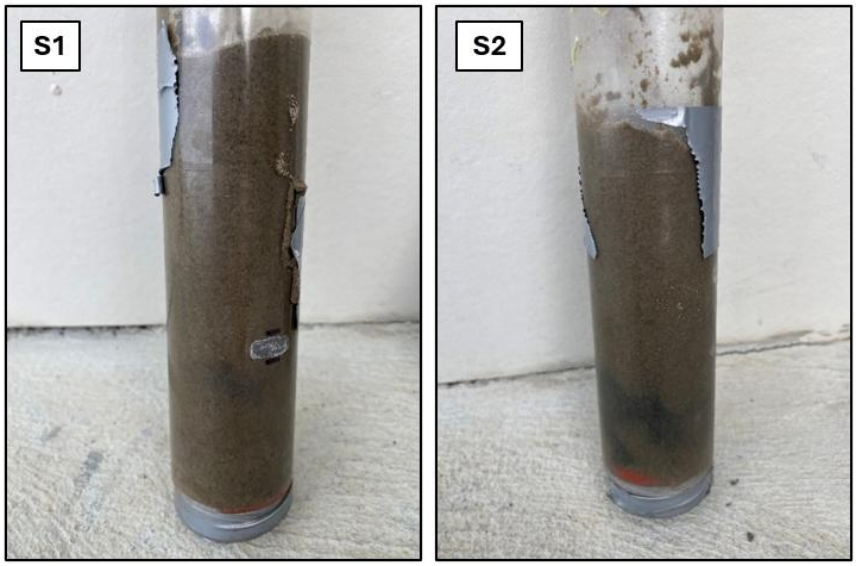


Figure 10. Core samples for pHfox and pHf test to identify ASS/ PASS presence.

5.4 Sediment Settlement

5.4.1 Method

Samples for settlement rate analysis were obtained from sites S3, S4, S5 and S6 during the second sampling event. Settlement rate samples contained sediment homogenised and distributed into 200 mL in-house jars from each site. The settlement rate analysis was conducted in the Marine Solutions laboratory on 4 November 2024. For each sediment sample, a measured amount (200 mL) of sediment was mixed with 1 L of water collected from the Gordon site in the D'Entrecasteaux Channel in a large clear glass jar. Each sample was mixed and then vigorously agitated for 15 seconds to ensure thorough mixing. A photo of each sample was then taken at the start (0 hours), 5 minute, 10 minute, 20 minute, 40 minute, 2 hour, 3 hour, 4 hour, 24 hour and 48 hour intervals to determine the rate of settlement. Images were cropped and adjusted for brightness (+40%) to effectively visualise the portion of settled sediment.

5.4.2 Results

All sites demonstrated consistent settlement rates (Figure 11 & Figure 12). This suggests a relatively uniform distribution of current energy at the different locations. A large portion of the sediment in all samples settled in the first 24 hours following agitation. Sediments mobilised during excavation are likely to remain suspended in the water column for 24 hours and could create a plume in the surrounding environment during this time.

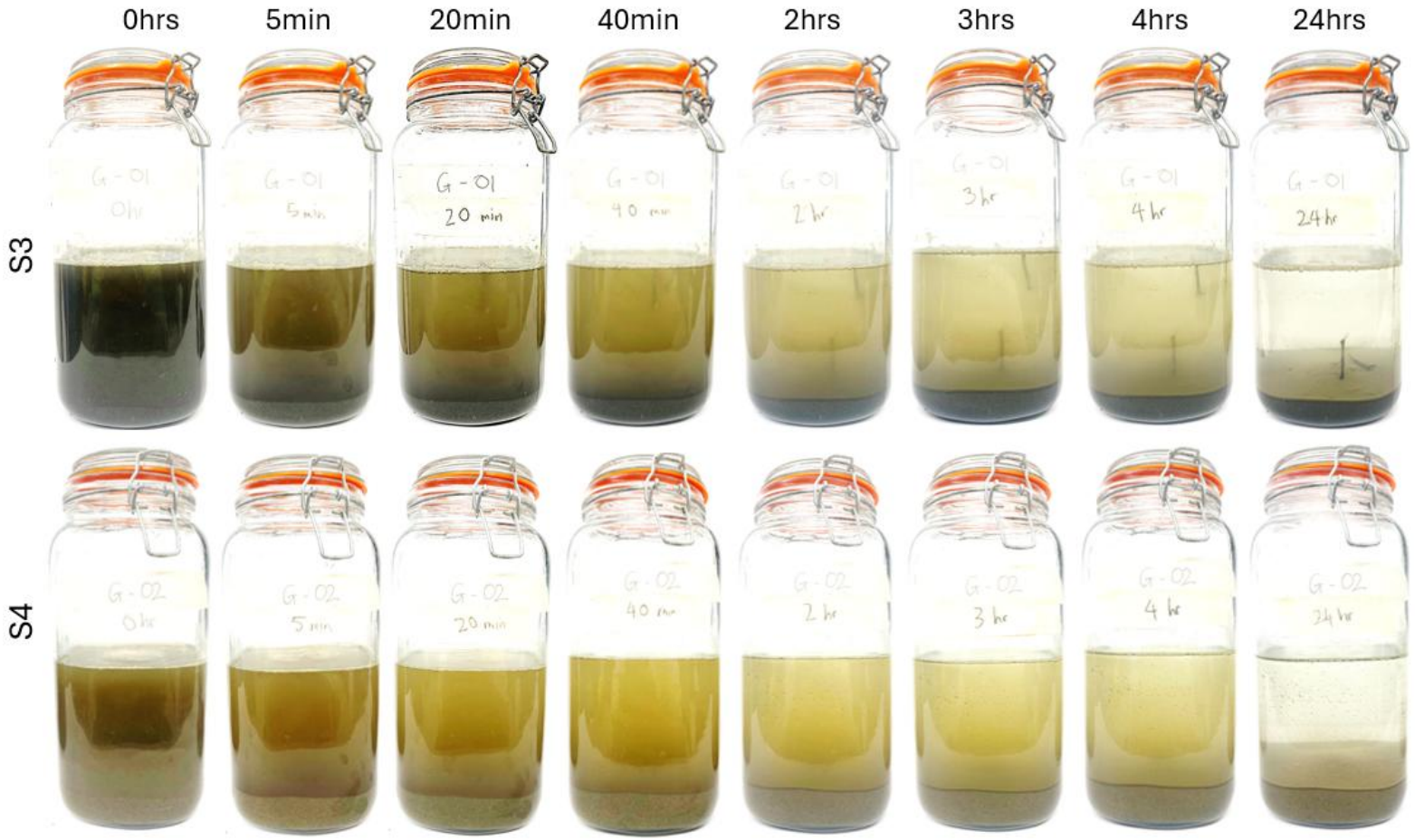


Figure 11. Site S3 and S4 sediment settlement analysis results.

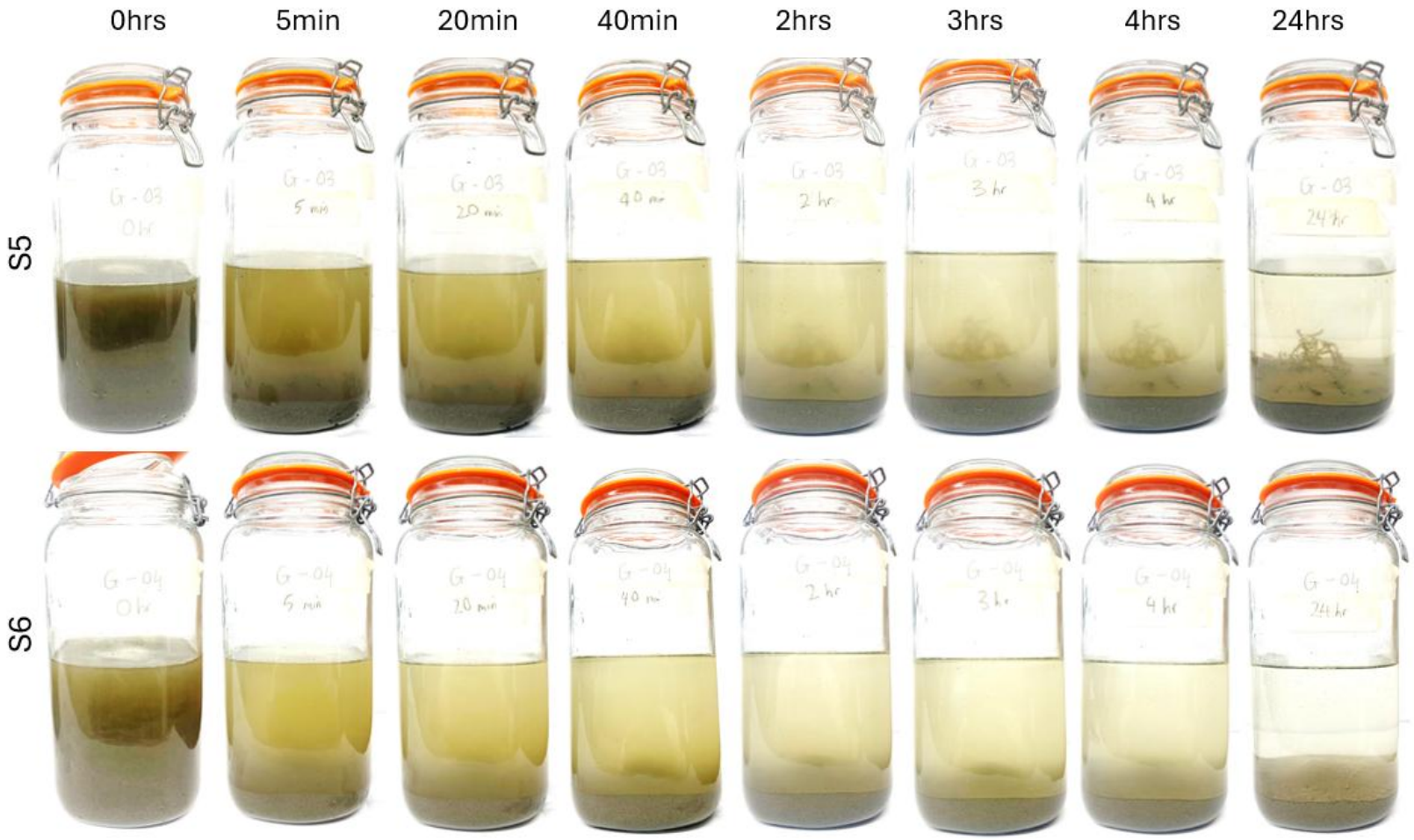


Figure 12. Site S5 and S6 sediment settlement analysis results.

6 Bathymetric Mapping

6.1 Method

Bathymetric mapping was conducted on 9th August guided by the footprint provided by MAST, 2024 (Figure 13). The mapping encompassed an area extending beyond the development area to sufficiently examine seafloor depth contours.

The study area was mapped using a CHIRP enabled broadband sounder Simrad NSS9 evo2 chart plotter, logging GPS positions and water depth each second to a laptop computer. The depths were measured to the nearest tenth of a metre, and tidally and barometrically corrected for Chart datum using Hobart tide charts and observations from the Bureau of Meteorology station of Hobart. The resultant file was interpolated using GIS software Surfer 11.0, creating a bathymetric profile of the area.

Figure 13. Extent mapped from bathymetry based on specific GPS points.

6.2 Results

Depth increased consistently with distance from shore (Figure 14). Water was the shallowest around the current jetty structure and boat ramp (~1.4m) and the deepest water was observed furthest from shore (~6.5m depth 100m from shore). The depth contours are stable, indicating a gradual increase in depth. In general, the gradual increase in depth is typical of the D'Entrecasteaux channel and shows that the boat ramp and rock groyne built in 2012 has not shifted sediment significantly to alter depth. However, there was shallower depth indicated close to rock groyne which is likely due to collection of sediment near this structure.

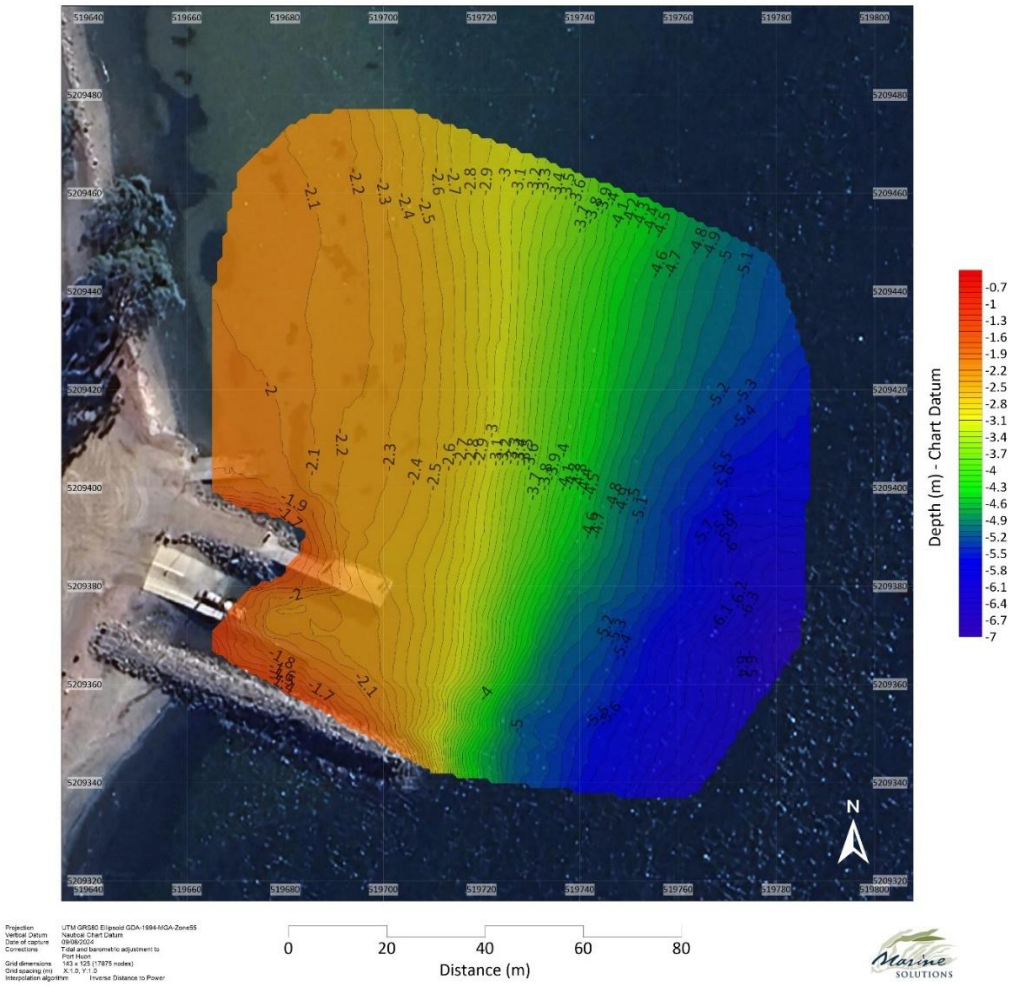


Figure 14. Depth outputs from bathymetry survey at Gordon, 2024.

7 Recommendations & Conclusions

The marine Natural Values Assessment found no major contraventions in the proposed replacement of the Gordon jetty, with ecological investigations indicating environmental risk for the proposed work as low.

Habitat characterisation for spotted handfish recruitment indicated no intrusion on their critical habitats, such as substrate complexity required for egg mass attachment. There were no Gunn's screw shells, which are protected under the *TSP Act*, observed during targeted field surveys.

The seafloor was largely comprised of heavily bioturbated sand with patches of seagrass *Heterozostera tasmanica* and drifting seaweed observed north and south of the jetty structure. Red and green algae species (*Ulva australis, Caulerpa simpliciuscula* etc) were also found closer to shore. The project may cause temporary disturbance to these subtidal habitat assemblages and therefore, where possible, existing rock abutment boulders should remain in similar positions to reduce loss of habitat. It is expected that seagrass beds and algae will reestablish after seabed levelling processes.

The presence of fine and silty particles observed indicates a higher risk of sediment resuspension, movement and downstream contamination during development processes. However, there were no exceedances of the ANZG guidelines for contamination, indicating low risk of toxicity. Excavation works will not present risk to release of toxic sulphides due to the absence of ASS/ PASS. The sediment samples are below the IB 105 maximum total concentrations for Level 1 Fill Material meaning that the dredged material can be used as solid inert landfill (EPA 2018). Disposal options for excavated material include seabed levelling or disposal offsite with council approval.

Adopting the precautionary principle of best practice and minimising disturbance, it is recommended that dredging and excavation be confined to the minimum area and depth necessary to meet project objectives. Additionally, conducting seabed levelling during a low outgoing tide and/or with an offshore wind is advised to help reduce the risk of turbidity increase. Sediment plumes during the excavation phase should be visually monitored, and should the plume extend beyond the expected

extent then weather conditions should be reviewed and if necessary, works be halted until more suitable conditions occur. In the case that the plume extends uncontrollably beyond the anticipated footprint, a silt curtain should be installed to contain suspended sediment and minimise environmental impact.

It is advised that locally sourced machinery is used for all phases of development to mitigate the risk of introducing non-native species or releasing toxic contaminants. Machinery and equipment that has the potential to transport waterborne viruses or invasive species should be disinfected and dried prior to use on site.

Finally, the site footprint should be monitored for marine mammals both prior to and during construction activities. If any marine mammals are sighted within the exclusion zone (a 300 m radius from the site), construction works must be halted until no marine mammals have been observed for at least 30 minutes. In addition, a slow start-up of noise-generating activities is recommended to prevent unnecessary disturbance and to allow animals time to vacate the area.

Overall, the marine Natural Values Assessment found no major ecological contraventions in the proposed development if the appropriate risk management strategies are in place.

7.1 Disposal options for excavated material

Outlined below are options for dredging and disposing of excavated material at the Gordon site.

7.1.1 Seabed levelling

Due to the shallow, near-shore nature of the sediment, an excavator bucket could be used to agitate and scrape the sediment towards the channel during an ebb tide, minimising oxidation of potential sulphides and allowing the natural water flow to redistribute the material. The gradual and consistent increase in depth from distance with shore makes this option viable. It may suspend large quantities of sediment; however, since no exceedances of contamination trigger values were indicated, ecological contraventions are deemed low. Sediment plumes should be visually monitored during seabed levelling processes, and should the plume extend beyond the expected extent, then

weather conditions should be reviewed, and if necessary, works should be halted until more suitable conditions occur. Consultation with the EPA may be required before commencing works.

7.1.2 Disposal offsite

Should dredge spoil be disposed of offsite as landfill, it will need be trucked from the Gordon site to the approved disposal site. The disposal site should be an area devoid of significant natural or cultural values. It must also be ensured that the disposal site is not directly linked to potential drainage pathways connected to any water body. A request to the EPA for disposal must be approved before conducting works.

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9 Appendices

Appendix 1. EPBC Protected Matters Summary

Summary of the *EPBC Act* PMST findings within 5,000 m and 500 m of the project.

	Item	5 km buffer		500 m buffer		Cross-reference Section of this report
		# ID'd by PMST	Incl. # aquatic matters	# ID'd by PMST	Incl. # aquatic matters	
Matters of National Environmental Significance	**World Heritage Properties**	0	0	0	0	N/A
	National Heritage Places	0	0	0	0	N/A
	Wetlands of International Importance	0	0	0	0	N/A
	Great Barrier Reef Marine Park	0	0	0	0	N/A
	Commonwealth Marine Area	0	0	0	0	N/A
	Listed Threatened Ecological Communities	3	1	3	1	Section 2.1
	Listed Threatened Species	60	9	57	9	Section 2.1
	Listed Migratory Species	35	7	35	7	Section 2.2
	Nuclear actions	*Not listed by PMST – none known.*				N/A
	Water resources	*Not listed by PMST – none known.*				N/A
Other Matters Protected by EPBCA	Commonwealth Land	2		0		N/A
	Commonwealth Heritage Places	0		0		N/A
	Listed Marine Species	56		53		N/A
	Whales and Other Cetaceans	9		9		N/A
	Critical Habitats	0		0		N/A
	Commonwealth Reserves Terrestrial	0		0		N/A
	Commonwealth Reserves Marine	0		0		N/A
	Habitat critical to survival of marine turtles	0		0		N/A
Extra Information	State and Territory Reserves	15		2		N/A
	Regional Forest Agreements	1		1		N/A
	Nationally Important Wetlands	0		0		N/A
	EPBC Act Referrals	2		2		N/A
	Key Ecological Features	0		0		N/A
	Biologically Important Areas	7		6		N/A
	Bioregional Assessments	0		0		N/A
	Geological and Bioregional Assessments	0		0		N/A

Appendix 2. Operational Summary

Date	Personnel	Time (start)	Time (end)	Cloud	Rain	Swell	Wind	Tide	Works conducted
9/08/2024	L. Harrison K. MacAdie	10:30	14:30	4	NA	Calm	Northerly <10 knots	High tide	- Bathymetry - Underwater survey - Sediment samples
31/10/2024	L. Harrison J. Watling E. Foster	9:00	12:30	5	NA	Wind chop	South westerly 20knts	Incoming tide	- Vibrocorer - Sediment samples

Appendix 3. GPS Positions of sampling locations

Name	Zone	Easting	Northing	Notes
Transect 1 Start	55G	519736.00	5209345.88	
Transect 1 End	55G	519684.39	5209377.34	
Transect 2 Start	55G	519744.89	5209360.73	
Transect 2 End	55G	519687.21	5209397.21	
Transect 3 Start	55G	519720.10	5209403.45	
Transect 3 End	55G	519692.80	5209364.22	
Transect 4 Start	55G	519738.97	5209413.4	
Transect 4 End	55G	519710.00	5209365.61	
Transect 5 Start	55G	519709.32	5209411.14	
Transect 5 End	55G	519704.75	5209401.94	
Transect 6 Start	55G	519693.53	5209421.07	
Transect 6 End	55G	519693.16	5209406.41	
Transect 7 Start	55G	519676.9	5209424.45	
Transect 7 End	55G	519680.08	5209401.12	
Sediment S1	55G	519687.92	5209388.77	Collected 9/8/2024
Sediment S2	55G	519689.82	5209374.44	*As above.*
Sediment S3	55G	519682.25	5209366.02	Collected 31/10/2024
Sediment S4	55G	519699.76	5209387.29	*As above.*
Sediment S5	55G	519686.89	5209370.01	*As above.*
Sediment S6	55G	519709.36	5209367.28	*As above.*

Appendix 4. Species List

The table below shows all species observed in field investigations on 09/08/24.

	Common Name	Scientific Name	Status notes*
Algae & Seagrasses		*Halymenia kraftii*	
	Sea lettuce	*Ulva australis*	
		Caulerpa trifaria	
		Caulerpa simpliciuscula	
		Ecklonia radiata	
		Cystophora sp.	
		Seagrass Heterozostera	
Invertebrates Molluscs	Pacific oyster	*Crassostrea gigas*	Introduced
	Mediterranean blue mussel	*Mytilus galloprovincialis*	Introduced