Boffa Miskell

Assessment of Effects on Marine Ecology

Reconsenting of Port Tauranga Capital and Maintenance Dredging

23 July 2026



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Executive Summary

Port of Tauranga Limited ('POTL') is preparing an application for renewal of resource consents for maintenance and capital dredging in the southern basin of Te Awanui / Tauranga Harbour.

The proposed capital dredging will involve the removal and deposition of c. 0.8Mm^3 and 2.3 Mm^3 (including the Stella Passage dredging deposition) of seabed material respectively, whereas the annual maintenance dredging will involve the removal and deposition of up to 250,000m^3 per annum averaged over 10 years (**Figure 1** and **Figure 2** respectively).

The areas of marine ecology covered in this assessment include seabed soft sediment (channel and adjacent to existing wharves), hardshore (reefs, wharves, and riprap), Te Paritaha pipi bed and sediment quality, estuary and seagrass adjacent to Whareroa marae, reef and soft sediment kaimoana, relocated boulder habitat from Tanea Reef, marine vegetation, fish, invasive species and the disposal field (including Motuotau subtidal reef).

The primary marine ecological effects from the Project include dredging increasing concentration of suspended sediment (TSS) (primarily from overflow discharge from the dredge) the deposition of sediment on soft sediment and rocky reef habitats and the mortality of benthic invertebrates within the dredging area and disposal area.

de Lange (2025) states the excavation of the seabed sediment are dependent on the production rate of the dredge and the type of dredge used. A Trailer Suction Dredge (TSD) will be used for most dredging, with the Back Hoe Dredge (BHD) used in areas that are difficult to use a TSD. de Lange (2025) states that capital dredging predominantly involves uncontaminated sediment.

Numerical modelling indicates that most of the suspended sediment generated during dredging is deposited on the seabed within the 600m mixing zone. The modelling also states that when there are strong tidal currents turbulence could mix the small TSHD near-bed plume into surface waters, causing TSS to be elevated outside of the mixing zone. de Lange (2025) identified that this surface water turbulence has not been observed during historical dredging at the POTL.

Modelling indicates that using a TSS ecological threshold concentration of 70 mg/l[2] that Bridge Marina, Whareroa Marae estuary foreshore would not be exposed to sediment plumes exceeding the threshold. Modelling states that Te Paritaha did receive TSS above the threshold concentration but only for one or two days during a 62-day simulation. Therefore, modelling

[2] pipi condition has been shown to be affected at 75mg/l exposure for 13 days (Hewitt et al., 2001).

indicates no effects on sensitive taxa, such as pipi (*Paphies australis*) are expected.

de Lange (2025) state that a precautionary approach to minimising TSS at ecological sensitive areas could include excavating during restricted tidal conditions, operate with no overflow (if excavated sediment has high proportion of fines) or use green valve technology[3].

At the dredge spoil disposal site (H1 and H2) **(Figure 3**) are non-dispersive deep water sites, with modelling confirming sediment being deposited with 100m radius of the release point, confined to the disposal area.

The modelling also shows, consistent with before and after observations of previous capital dredging, that there are no detectable changes to tidal characteristics and tidal velocities beyond the immediate area of the dredged channels (de Lange, 2025).

The assessment of effects on marine ecological values has been undertaken at the Southern Harbour scale in addition to the impact site scale (**Figure 4**).

Modelling was also undertaken to assess the impact of the 2015/2016 capital dredging on tidal currents. The modelling identified that current velocities increased within part of the lower western channel following the capital dredging in 2015/2016. This was a consequence of shoaling (creation of shallower water areas) decreasing the channel cross-sectional area. The shoaling appears to have been due to erosion of Panepane (**Figure 5**) by changed storm wave conditions due to lowering of the ebb tidal delta swash platform during a higher incidence of La Niña conditions over the last decade, which increased the sediment transport into the harbour (de Lange, 2025).

Effects on marine mammals is covered by McConnell (2025), effect of marine biosecurity (Very Low) (Fletcher, 2025) and effects caused by underwater noise on marine ecological values (Pine, 2025) are Low.

All effects on marine ecological values are either a Low or Very Low level of effect at both the southern Te Awanui and dredge/disposal area assessment scales. Dredging management is proposed to minimise TSS. Ongoing monitoring of Te Paritaha pipi bed, Motuotau Reef and invasive species on rocky/hard shore should continue.

[3] 'green valve' environmental dredging technique developed for TSHDs reduces turbidity caused by overflow during the dredging process.

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1.0 Introduction and Proposal

The Proposal comprises capital dredging to facilitate the safe passage and navigation of large cargo ships into and out of Tauranga Harbour, ongoing maintenance dredging of all of the channels and berthing areas used by vessels transiting to and from the Port in order to maintain design depths and disposal of the dredged material. The Proposal is to complete the planned capital dredging activities that were consented in 2013, with Stage 1 of the capital dredging to deepen and widen the channel being completed in 2016. This dredging allowed deeper draft vessels to safely navigate the shipping channel. At that time (2016), the Port only dredged the amount required to meet shipping demands in order to minimise dredging. A contract for the second stage of the capital dredging has been awarded and expected to be undertaken from late 2025. This will allow larger container vessels that are currently restricted to high tide to transit at both low and high tide (**Figure 1**).

Dredging has been ongoing at the Port since the 1970s. The current resource consents for maintenance dredging were also issued in 2013 and expire in June of 2027. It is expected that maintenance dredging will likely continue to be undertaken in much the same way as it is currently done. The Proposal is to conduct maintenance dredging as and where needed in all of the channels and turning areas that are used by vessels accessing and leaving the Port.

Port of Tauranga Limited ('POTL') is preparing an application for renewal of resource consents for maintenance and capital dredging in the southern basin of Te Awanui / Tauranga Harbour. The existing resource consents (RC65806 and RC65807, which expire in June 2027) were granted in 2013 and authorise four activities within the coastal marine area (CMA):

1. The disturbance of the seabed by capital dredging
2. The disturbance of the seabed by maintenance dredging
3. The deposition of the dredged material to areas of the CMA
4. The removal of some of the dredging material from the CMA

POTL seeks to retain the ability to maintenance dredge (typically conducted annually) and complete aspects of the capital dredging that is authorised by the existing resource consent but have yet to be undertaken. It is proposed that the capital dredging will occur within the existing shipping channels and consist of the following:

- deepening the approach to berth 1 (approximately 3m)
- deepening an area of the Passing Lane to smooth the entrance corner (approximately 7m)
- deepening of the existing Sitting Basins (depths vary from 1m to 7m)

1.1 Capital Dredging

1.1.1 Deepening

The existing consent allows the Port to dredge to 16.0 metres below chart datum inside the harbour, and 17.4 metres below chart datum outside the harbour. Stage 1 of the capital

dredging (completed in 2016) deepened the channel to 14.5 metres inside the harbour and 15.8 metres below chart datum outside the harbour. Stage 2, due to commence in late 2025, will complete the deepening in the main shipping channel and the widening for the swinging basin. The Port is applying to dredge the existing basins alongside the wharves, as well as the approach to berth 1, both of which will only be required to be dredged once the respective wharves are upgraded or replaced in the future.

An additional area of deepening, of approximately 2,786 m^2, will also be included in the application. This work is in the existing passing lane of the entrance channel and will effectively widen the channel by 19 metres. The purpose of this modification is to smooth the corner and enhance navigational safety.

1.1.2 Widening

The existing consent allows the Port to create a swinging or turning basin off the northern end of Sulphur Point (adjacent to the Port's container terminal) and this will be completed in stage 2 of the capital dredging due to commence in late 2025. The swinging basin will give the space required to safely turn a large container vessel when there is already a vessel on the northernmost berth of the terminal. The Port has reviewed the size of the swinging basin and has reduced it in width by 93 metres compared with the existing consent.

1.1.3 Volume of material to be dredged and deposited offshore

The existing consent allows up to 15 million m^3 of capital dredging to be deposited in the deposition grounds. In stage 1, the Port dredged and deposited approximately 6 million cubic metres of material. Stage 2 is expected to involve a similar quantity. To complete the remaining required dredging (including the volume from the Stella Passage Development), the Port needs to dredge and deposit the balance of 2.5 million m^3 (**Figure 1**).

1.2 Maintenance dredging

Most ports require maintenance dredging and, without the maintenance dredging, shipping channels infill and become shallower. Port of Tauranga wishes to continue its current level of maintenance dredging. The existing consents allow up to 185,000 m^3 to be dredged on average every year. However, increases in storm activity due to climate change mean that more dredging is required to maintain the shipping channels than in previous years. Therefore, the Port wishes to increase the allowable annual volume to 250,000 m^3. Although the current average is below the consent limits, in 2024 and 2025 the Port experienced significant infill, challenging the 185,000 m^3 limit in order to clear the channel (**Figure 2).**

POTL are requesting maintenance dredging increase from 185,000 to 250,000 m^3 averaged over 10 years, with a cap of 350,000 m^3 in any year.

1.3 Deposition Sites

The existing consent includes multiple sites for the deposition of dredged material offshore (**Figure 3**).

1.3.1 Offshore

The existing offshore deposition ground is in water 20 to 30 metres deep. It is divided into two sections - the deeper half is used for more silty material (Site H2, **Figure 3**), while the shallower half is used for sandy material (Site H1, **Figure 3**). The site has been used since the 1970s and expanded several times to now encompass 900 hectares. The Port wishes to retain the existing site.

1.3.2 Nearshore

The nearshore deposition sites are used for premium, clean sand dredged from the harbour entrance channel. The material is rapidly dispersed under natural wave and swell action. This natural process keeps the sand dune system healthy and provides a buffer from erosion (Sites A, B and C, **Figure 3**). Dredged sand is also brought ashore and stored in stockpiles where it can be used to replenish harbour beaches, such as Pilot Bay (Site F, **Figure 3**).

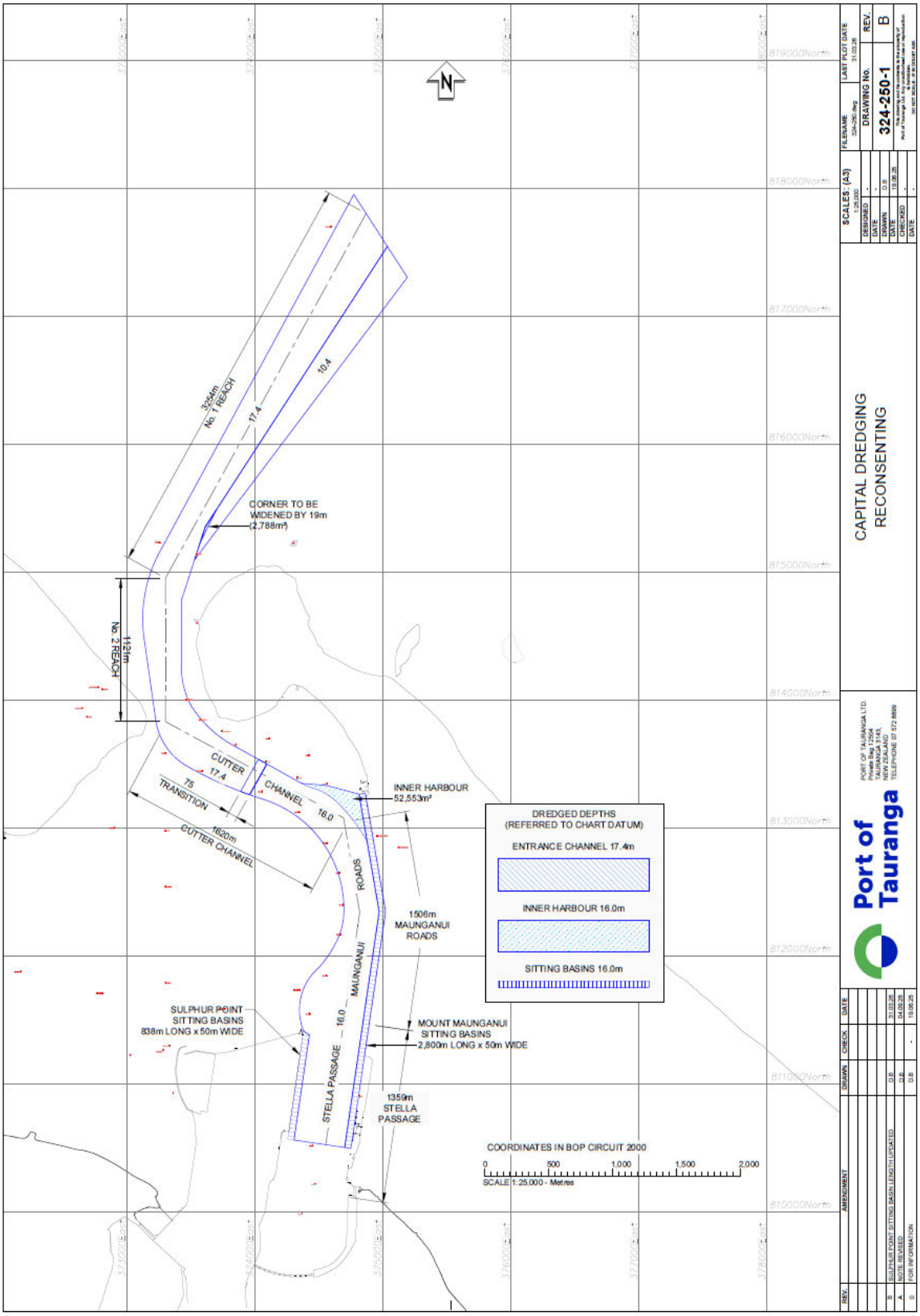


Figure 1: Proposed Capital Dredging

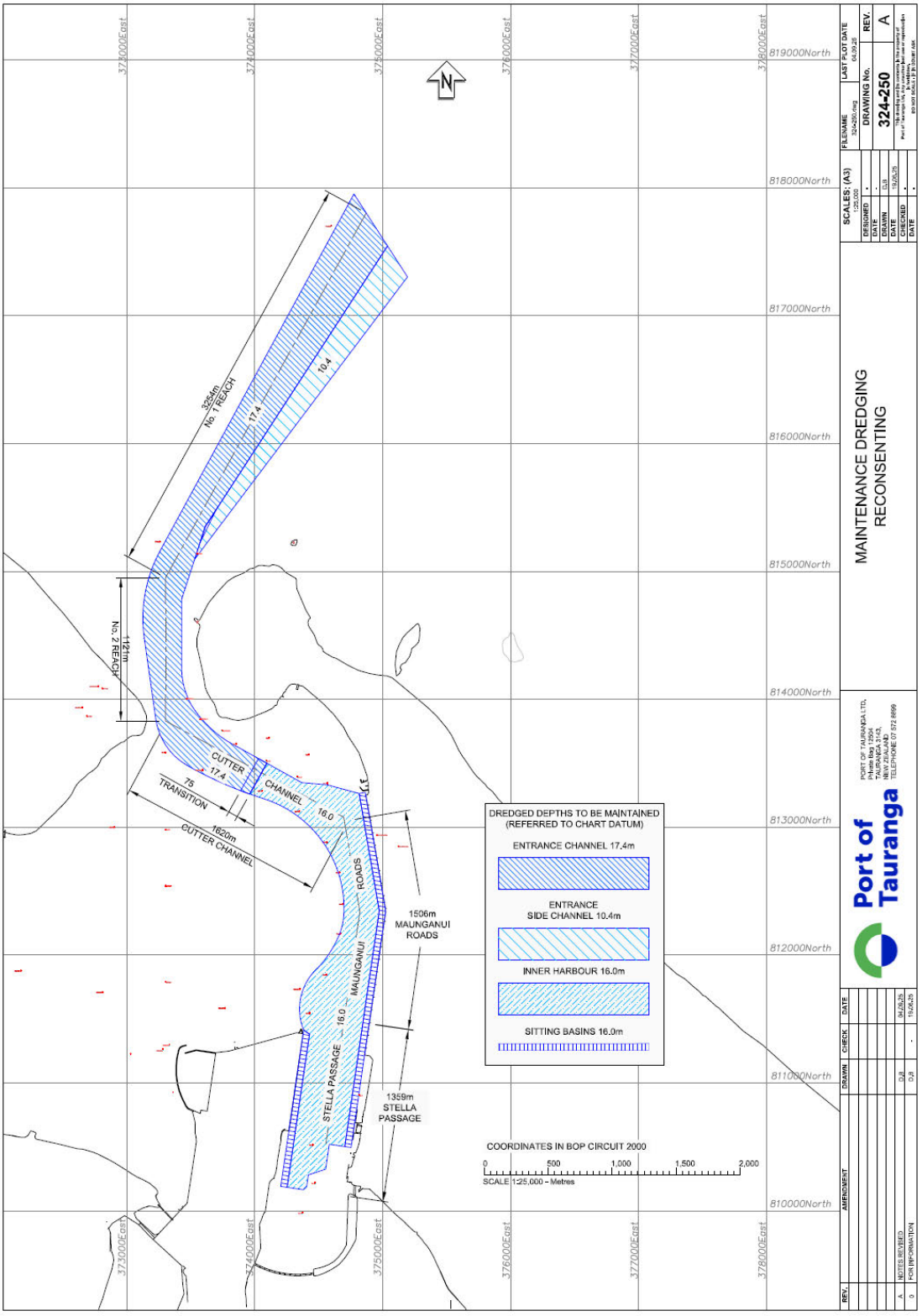


Figure 2: Proposed Maintenance Dredging

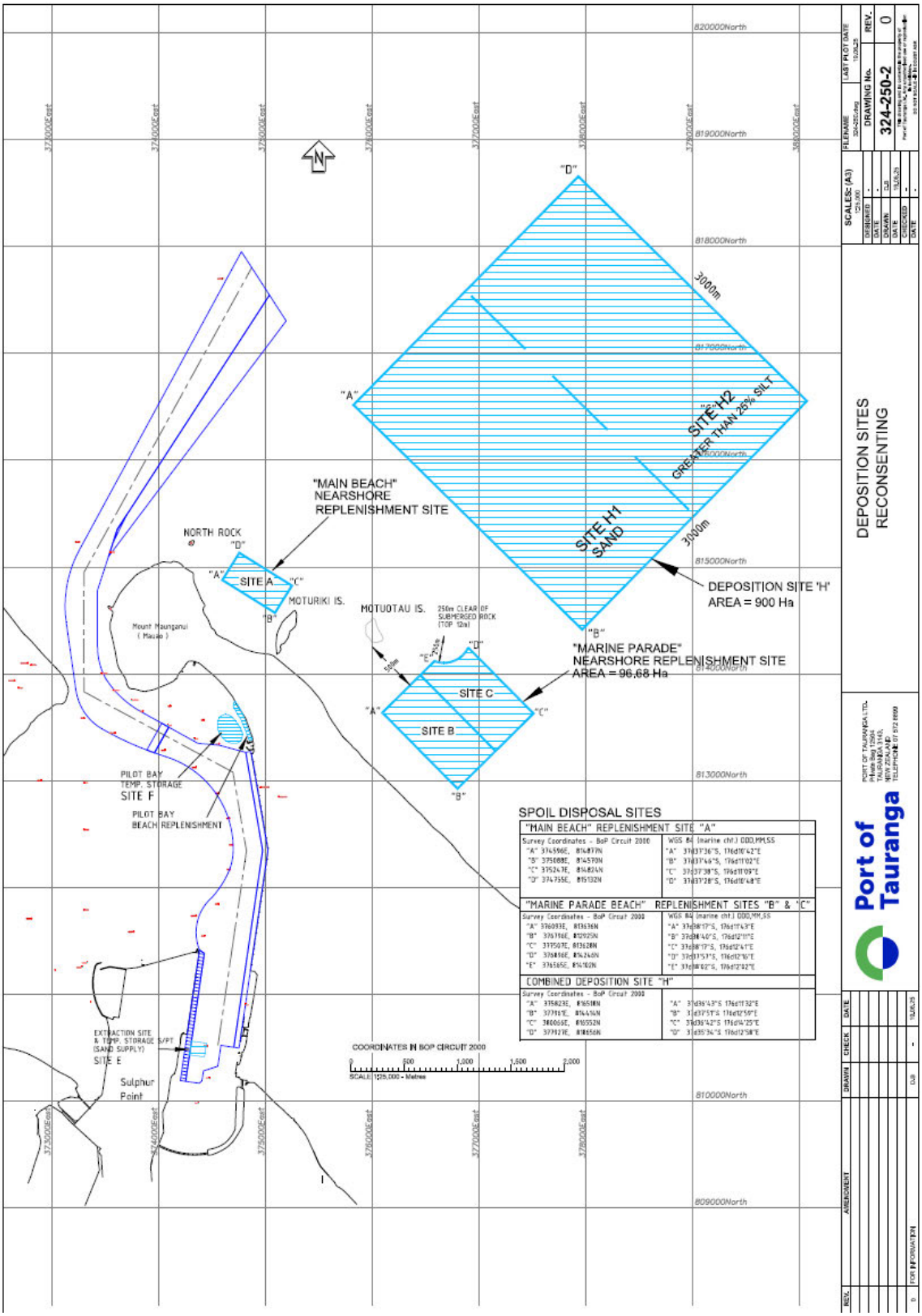


Figure 3: Deposition Sites

2.0 Spatial Extent / Scale of Assessment

This assessment considers the proposed project effects at the Reconsenting of Capital and Maintenance Dredging project scale and the southern harbour scale (**Figure 4**) containing the POTL and adjacent significant ecological sites (e.g. Te Paritaha pipi bed and the seagrass beds adjacent to Whareroa marae, along the Ōtūmoetai shoreline and within the wider Waipu Estuary). The "southern harbour" is not mapped by any authority, but for the purposes of this assessment the southern harbour area has arbitrarily mapped as approximately **3,530 Ha.** The southern harbour area mapped is approximately 16 % of the whole Te Awanui / Tauranga Harbour (**21,800 Ha**).

The classification of the existing marine ecological data (Section 4) and the assessment of ecological effects if this proposal (Section 7) have been based on the Reconsenting of Capital and Maintenance Dredging project scale and the southern harbour scale.

The extent of the Reconsenting of Capital and Maintenance Dredging project works comprises:

- Capital dredging
- Maintenance dredging
- Disposal of dredged material

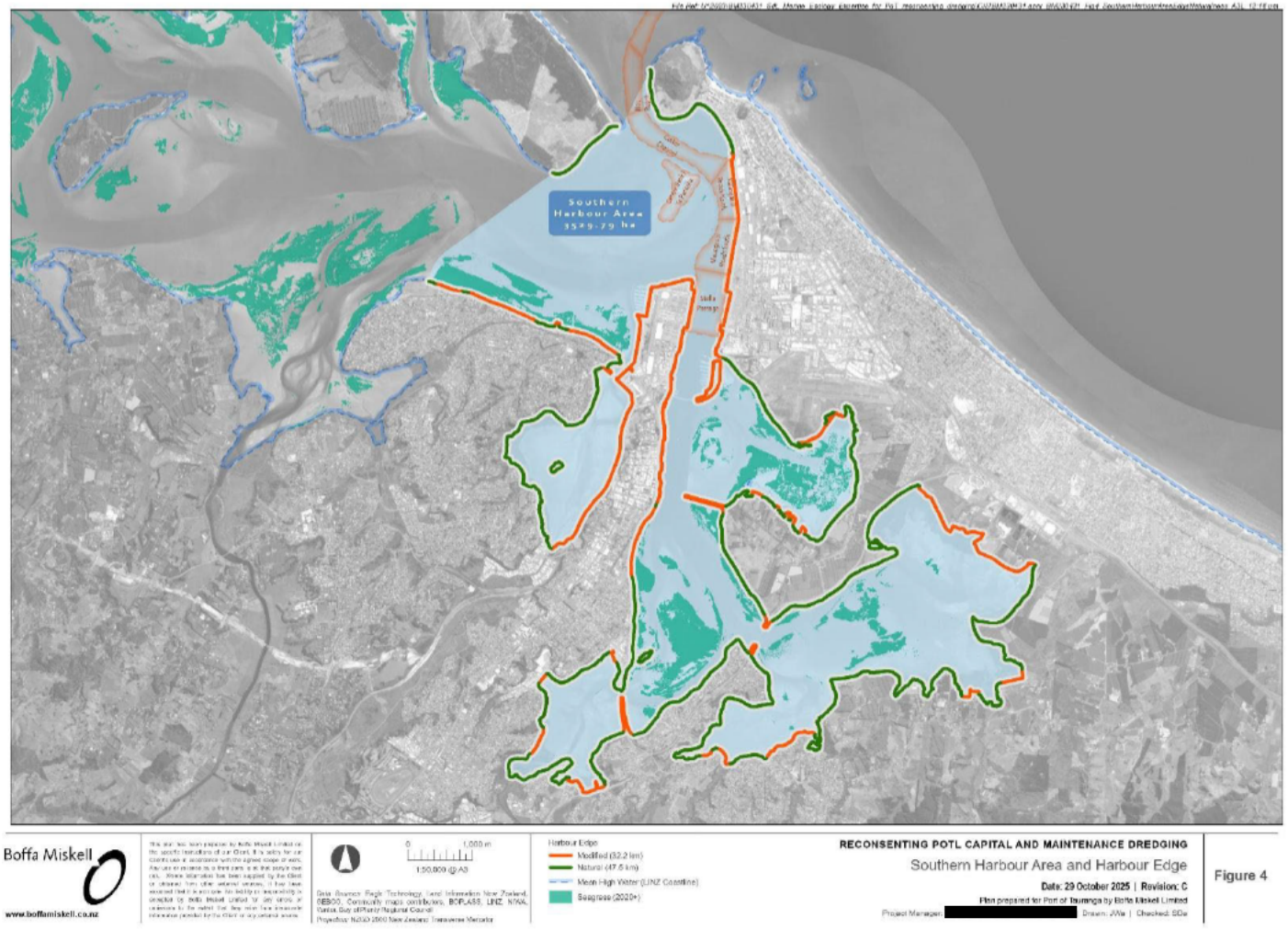


Figure 4: Southern Harbour Area Scale

3.0 Scope of the report

The scope of this report is to assess the effects of Port of Tauranga (POTL) capital and maintenance dredging in the southern basin of Te Awanui (**Figure 4**). There have been a large number of marine ecology studies carried out in the southern basin of Te Awanui related to the Port of Tauranga over the previous two decades.

This report summarises the most recent data (including reports/evidence from the POTL 2010 Environment Court hearing, the 1991/1992 dredging and disposal surveys, the 2023 Stella Passage Environment Court hearing, Bay of Plenty Regional Council monitoring data, and recent marine surveys carried out by Boffa Miskell Ltd for POTL to inform my assessment of the existing marine ecological values (**Figure 5**).

The areas of marine ecology covered in this assessment include seabed soft sediment (channel and adjacent to existing wharves), hardshore (reefs, wharves, and riprap), Te Paritaha pipi bed and sediment, reef and soft sediment kaimoana, relocated boulder habitat from Tanea Reef, marine vegetation, fish, invasive species and the disposal field (including the adjacent Motuotau subtidal reef) (**Figure 5**).

Other experts relied on this assessment are as follows:

- Water Quality (Dr Mike Stewart),
- Sediment Plume (Dr Willem de Lange),
- Operational Noise effects – (Dr Matt Pines - underwater noise),
- Marine Mammals – (Dr Helen McConnell), and
- Marine Biosecurity – (Dr Lauren Fletcher).

I have read and agree to comply with the Code of Conduct for Expert Witnesses as set out in the Environment Court Consolidated Practice Note 2023.

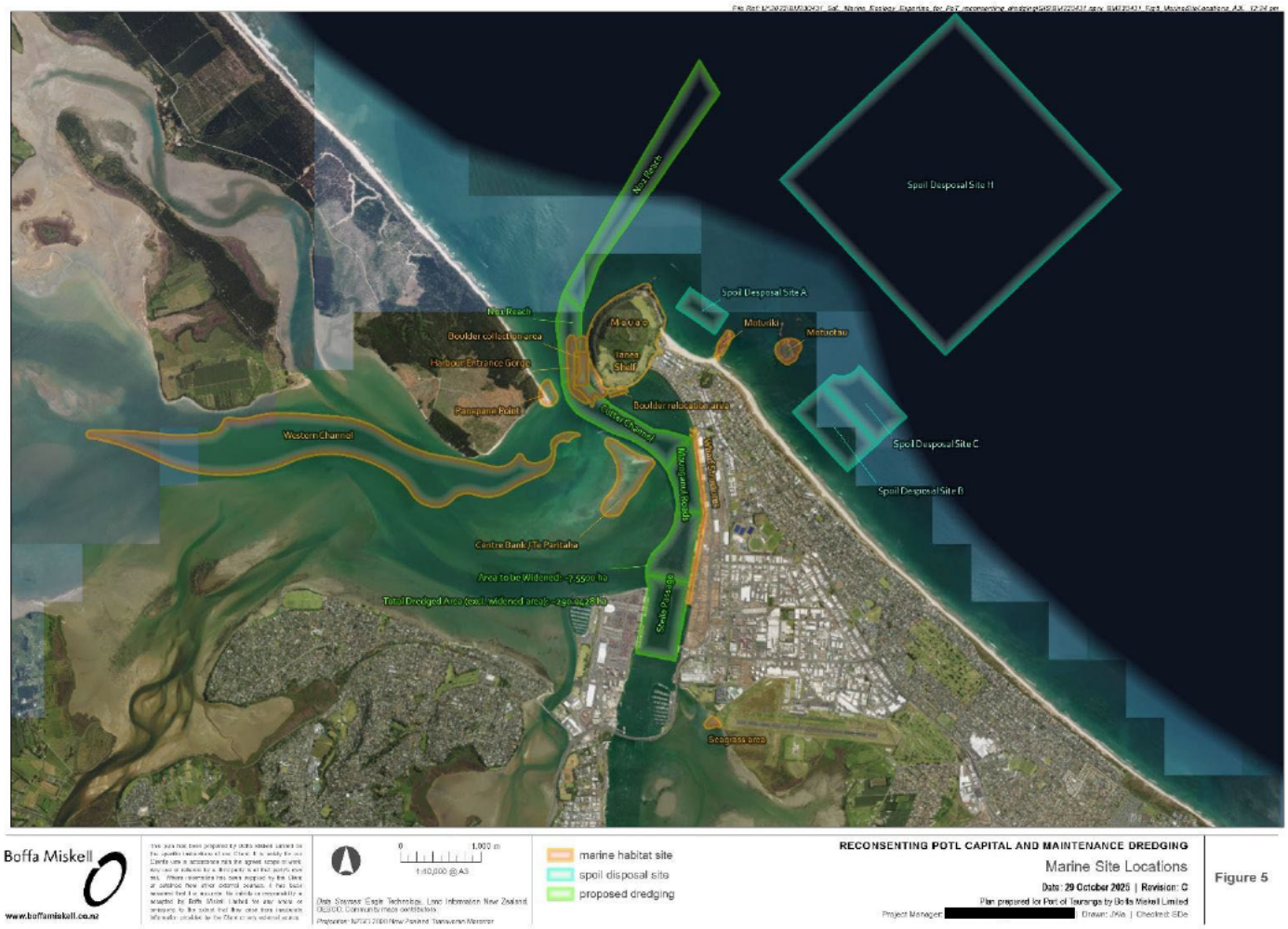


Figure 5: Map of marine sites of interest

4.0 Existing Marine Ecology Data/Information

4.1 Marine habitats and species within the southern basin of Te Awanui

The seabed and shores of the western Bay of Plenty are predominantly soft sediment (sand) with rocky reef comprising approximately only 5% of the coastline (Graeme, 1995).

Leonard et al. (2020) stated that the southern basin of Te Awanui is in good health and the harbour's biodiversity indicates a typical north-eastern New Zealand temperate harbour ecosystem. This report states the marine ecological values of the southern basin of Te Awanui are high (see section 11), based on assessment of flora and fauna previously collected and newly collected data, reports and evidence on rocky reef communities, soft sediment benthic communities, sediment quality, fish, etc that are deemed relevant to the POTL and its activities.

Leonard et al. (2020) stated that the marine species diversity and abundance is characteristic of New Zealand port and harbour organisms and consistent with a temperate New Zealand east coast harbour environment. The marine species assemblages are relatively stable over time despite a number of capital dredging campaigns in the past 10-15 years Leonard et al. (2020).

4.2 Significance of Marine Habitats

Estuaries are recognised as a vulnerable habitat type in New Zealand (Holdaway et al., 2012).

There are many significant marine habitats of indigenous flora and fauna according to the Bay of Plenty Regional Policy Statement (RPS) criteria[4].

Grace (para 167, 2010) assessed the following habitats and areas as "significant habitats of indigenous fauna" according to the criteria in Appendix F, Set 3 of the Bay of Plenty RPS (see Appendix 1) (criteria are included in brackets for each feature) (**Figure 5**):

1. Sandy offshore areas (3.1, 3.8, 3.11, 3.12, 3.17),
2. Rocky Reef of Moturiki and Motuotau (3.1, 3.11, 3.14, 3.17),
3. Margins of Mauao (3.1, 3.11, 3.14, 3.15),
4. Tanea Shelf (3.6),
5. Pilot Bay Relocated Boulder Reef (3.16, 3.17),
6. Harbour Entrance Gorge (3.5, 3.8),
7. Western Channel (3.1, 3.9, 3.10, 3.17),
8. Centre Bank (3.3, 3.5, 3.8, 3.10, 3.11, 3.3, 3.14, 3.15, 3.16, 3.17),

[4] https://atlas.boprc.govt.nz/api/v1/edms/document/A4439678/content

9. Wharf Structures (3.10 with respect to juvenile crayfish),
10. Seagrass Beds (3.1, 3.6).

I have assessed the habitats against the RPS criteria (Appendix 1) and concur with Grace's 2010 significance assessment of the relevant criteria above.

No taxa (nor ecosystem) present in the southern basin of Te Awanui are recognised as Threatened or At Risk or Naturally Uncommon triggering New Zealand Coastal Policy Statement (NZCPS) policy 11 (a) or (b) apart from seagrass (*Zostera muelleri* subsp. *novazelandica*) which is an At Risk (Declining) taxa (de Langee et al., 2013) (which some fish species use as a nursery ground) and marine mammals[5] that are occasionally or seasonally present in the Harbour.

Seagrass is ubiquitous in Te Awanui (occupying 3740 Ha), with areas located adjacent to Whareroa marae, upstream of the Tauranga Harbour bridge, along the Ōtūmoetai shoreline, within the wider Waipu Estuary (see section 10) (**Figure 5**), plus small patches on Te Paritaha.

There are no marine mammal resident in Tauranga Harbour/Te Awanui, but New Zealand fur seals are regular visitors, and bottlenose dolphins and killer whales have an occasional presence despite the high existing levels of shipping traffic in Te Awanui (McConnell, 2025.The habitats within Te Awanui are typical of a working Port in a harbour/estuarine environment. Seagrass, orca and bottlenose dolphins aside, the marine habitats and species are not relevant to considerations of the NZCPS 11 (a) as there are no At Risk or Threatened marine species or ecosystems present.

NZCPS 11 (b) requires the project avoid significant adverse effects and avoid, remedy or mitigate other adverse effects on:

> i) areas of predominantly indigenous vegetation in the coastal environment.

In Te Awanui, seagrass and mangrove forests would trigger this policy.

> ii) habitats in the coastal environment that are important during the vulnerable life stages of indigenous species,

In Te Awanui, sandbank areas for pipi recruitment and settlement and seagrass beds for fish nursery grounds triggers this policy.

> iii) ecosystems and habitats that are only found in the coastal environment and are particularly vulnerable to modification, including estuaries[6], lagoons, coastal wetlands, dunelands, intertidal zones, rocky reef systems, eelgrass and saltmarsh.

The southern basin of Te Awanui contains intertidal areas, rocky reef habitats, seagrass/eelgrass and saltmarsh.

[5] Marine Mammals are excluded from this report and are covered separately by McConnell, 2025. Assessment of Effects: Marine Mammals. Dredging Reconsent Project, Port of Tauranga Ltd.

[6] Vulnerable ecosystem (Holdaway et al., 2012)

iv) habitats of indigenous species in the coastal environment that are important for recreational, commercial, traditional or cultural purposes.

In Te Awanui, the Te Paritaha pipi beds and rocky reefs for kaimoana harvesting are relevant to this policy.

vi) ecological corridors, and areas important for linking or maintaining biological values identified under this policy.

There is evidence of effective ecological corridor functionality in terms of stable ecosystems within the sub estuary systems that feed into and are flushed through Te Awanui

4.3 Marine Habitat Data Summary

Each marine habitat type is discussed in the following sections.

4.3.1 Sandy subtidal areas outside of the harbour

Clark et al. (2018) was the first comprehensive quantitative survey of Tauranga Harbour's subtidal environment since 1990/91. The Tauranga Harbour subtidal environment was found to be in good condition with most sediment physico-chemical parameters lower than national median values. Upper reaches of the estuarine channels tended to have higher mud, organic matter and nutrient concentrations compared to sites closer to the main channels. Metals were highest in the urbanised southern harbour or in areas of high mud deposition. Compared with 1990/91 data, fewer scallops (*Pecten novaezelandiae*) and horse mussels (*Atrina zealandica*) were observed in 2016 and the invasive Asian date mussel (*Arcuatula senhousia*) has become common. Overall, subtidal benthic communities appeared to be healthy with regard to mud and metal impacts (Clark et al., 2018). Most subtidal sites ranked in the lower Benthic Health Model (BHM) groups (for macroinvertebrate community), indicating Tauranga Harbour comprised fairly healthy subtidal communities with a "good" ecological ranking (Clark et al., 2018).

The sandy offshore areas outside of the harbour comprise clean mobile sand and naturally sparse marine fauna (the depauperate benthic invertebrate character of this type of habitat is typical on open sandy beaches).

From intertidal beaches to subtidal (approximately 25-30m depth) sand dollars (*Fellaster zelandiae*) and tuatua (*Paphies subtriangulata*) are commonly found along with sparse assemblages of molluscs, crustaceans, decapods and worms. Tuatua (*Paphies subtriangulata*) are often abundant (subject to their natural variability in space and time) in shallow water at low tide.

Beyond 25-30m depth the benthic habitat becomes more stable and more muddy (Grace, 2010).

4.3.2 Tanea Shelf (Mauao) and the relocated boulder reef

The relocated (from Tanea Shelf) boulder rock site is located inside the harbour (sheltered from the exposed coast (**Figure 6**).

Tanea shelf, located at the base of Mauao / Mount Maunganui, is a subtidal boulder reef that supports a diverse marine community. The reef has experienced a history of modification to reduce its extension into the main shipping channel and to support the use of the Port by larger ships. For the expansion of the Port of Tauranga shipping channel (during previous capital dredging programmes in 1991/1992 & 2015/2016, rock was removed from Tanea Shelf and relocated to an area on the southern side of Mauao near Pilot Bay (**Figure 5** and **Figure 6).**

The remaining subtidal rocky reef of Tanea Shelf supports a diversity of common rocky reef marine species, including kelp forest (*Ecklonia radiata*), anemones, sea squirts, sea stars, crabs, kina *(Evechinus chloroticus)* and kōura / crayfish (*Jasus edwardsii*) (Grace, 2010).

Graeme (1995) assessed the colonisation of the relocated boulders by benthic communities every three months from May 1993 to May 1994, with a final survey in January 1995. Overall, Graeme (1995) found increasing species diversity of the newly formed community with time, with the boulders at the western end of the relocation site developing community diversity and coverage similar to that found on the original Tanea shelf boulders. After 20 months, the relocated boulders were colonised by barnacles, small turfing red algae, and brown large algae. Some sponge species that were present on boulders pre-relocation decreased in percent cover over time, likely either outcompeted by mussels or smothered by sediment. Ascidians were present pre-relocation and maintained coverage throughout the entirety of the surveying period. A variety of motile species was also supported by the newly established habitat (Graeme, 1995).



Figure 6: Relocated Boulders from Tanea Reef

Grace's survey of the relocated boulders in 2010 concluded that the marine reef life had become similar to that expected in a natural reef in this area. On the relocated boulders and in the surrounding habitat, Grace recorded the presence of kelp forests (various species), kina (*Evechinus chloroticus*), snaketail stars (brittle stars) sea cucumbers (*Stichopus mollis*), nudibranchs (Order Nudibranchia), kōura (*J. edwardsii*), hydroids (Phylum Cnidaria), sponges (Phyllum Porifera), sea squirts (ascidians), feather duster worms (Sabellidae, tube worm), red moki (*Cheilodactylus spectabili*), blue cod (*Parapercis colias*), spotty (*Notolabrus celidotus*) and various red algae.

Since the dredging and relocation of part of Tanea shelf, it has been recorded that the remaining section of Tanea shelf is a rich and diverse habitat, which has fully recovered from the disturbance of boulder removal (Grace, 2010). The boulder habitat of Tanea shelf supports kelp forests in the shallower parts, with rich fauna assemblages including sea anemones, sponges, ascidians, crabs, and starfish (Grace, 2010).

Surveys of the flora and faunal communities of the relocated boulders by (Manaaki Te Awanui, 2016) and (Boffa Miskell Ltd, 2023b) revealed that algal diversity increased between 2016 and 2023 but overall percent coverage was similar between years. The invasive kelp *Undaria pinnatifida* was found both in the 2016 and 2023 surveys. There was a reduction in the abundance of brown algae (*Carpophyllum* spp.and *Sargassum sinclairii*) between 1995 (Graeme, 1995) and 2016/2023 (Manaaki Te Awanui, 2016; Boffa Miskell Ltd, 2023b) at the relocated boulder rock, which could be associated with changes in environmental factors such as water depth, temperature, and exposure to water flow.

Fauna observations increased from 11 species in 2016 to 36 in 2023 on the relocated boulders. All species identified during 2016 were also recorded during 2023 monitoring. Diversity and abundance of faunal species was relatively uniform across all transects; this differs to 2016 where the easternmost transect had higher diversity of species compared to the remaining transects which were relatively bare of fauna (Boffa Miskell Ltd, 2023b). It is concluded from the recent data (Boffa Miskell Ltd, 2023b), that the relocated reef comprises a similar range of species compared to Tanea Reef.

In between the boulders at Tanea Shelf the substrate is coarse shelly sand which supports the bivalve Tāwera or morning star shell (*Tāwera spissa*) (Grace, 2010).

The 2025 survey confirms that the relocated boulder reef continues to develop as a patchy, sand-embedded boulder reef system. This represents a shift from the more mixed substrate in 2023 and aligns with the long recognised sediment, flora and fauna documented by Graeme (1995) (Boffa Miskell Ltd, 2025).

4.3.3 Rocky Shores/Reefs of Mauao, Moturiki and Motuotau

The rocky shores of Mauao, Moturiki and Motuotau reefs are wave-exposed, and support kaimoana such as pāua *(Haliotis iris)*, kina, kōura and kūtai (*Perna canaliculus,* green lipped mussel) (Boffa Miskell Ltd, 2023a) and typical rocky shore species found on northeastern New Zealand shores.

The shallow parts of Mauao, Moturiki and Motuotau reefs are dominated by kina (*Evechinus chloroticus*), which graze on marine algae. Kōura (*J. edwarsii*) and kūtai (*P. canaliculus*) are also present. Where the reefs are deeper than approximately 15m, sponges, sea squirts (ascidians), bryozoans, anemones and red seaweeds are common (R. V. Grace, 2010).

Mauao, Moturiki and Motuotau reefs are within the Tauranga Moana Mātaitai Reserve. Annual monitoring of marine taonga species in rocky reef habitats within the Tauranga Moana Mātaitai Reserve is undertaken as part of a collaboration between Port of Tauranga and the Tauranga Moana Iwi Customary Fisheries Trust (TMICFT) (Boffa Miskell Ltd, 2023b) (**Figure 7** and **Figure 8**).

Mauao and Moturiki rocky reef subtidal habitats have been surveyed for presence of taonga species (Boffa Miskell Ltd, 2023a) and Motuotau rocky reef subtidal habitat has been surveyed for ecological values and potential sedimentation from the Port of Tauranga dredge disposal area (Boffa Miskell Ltd, 2023c).

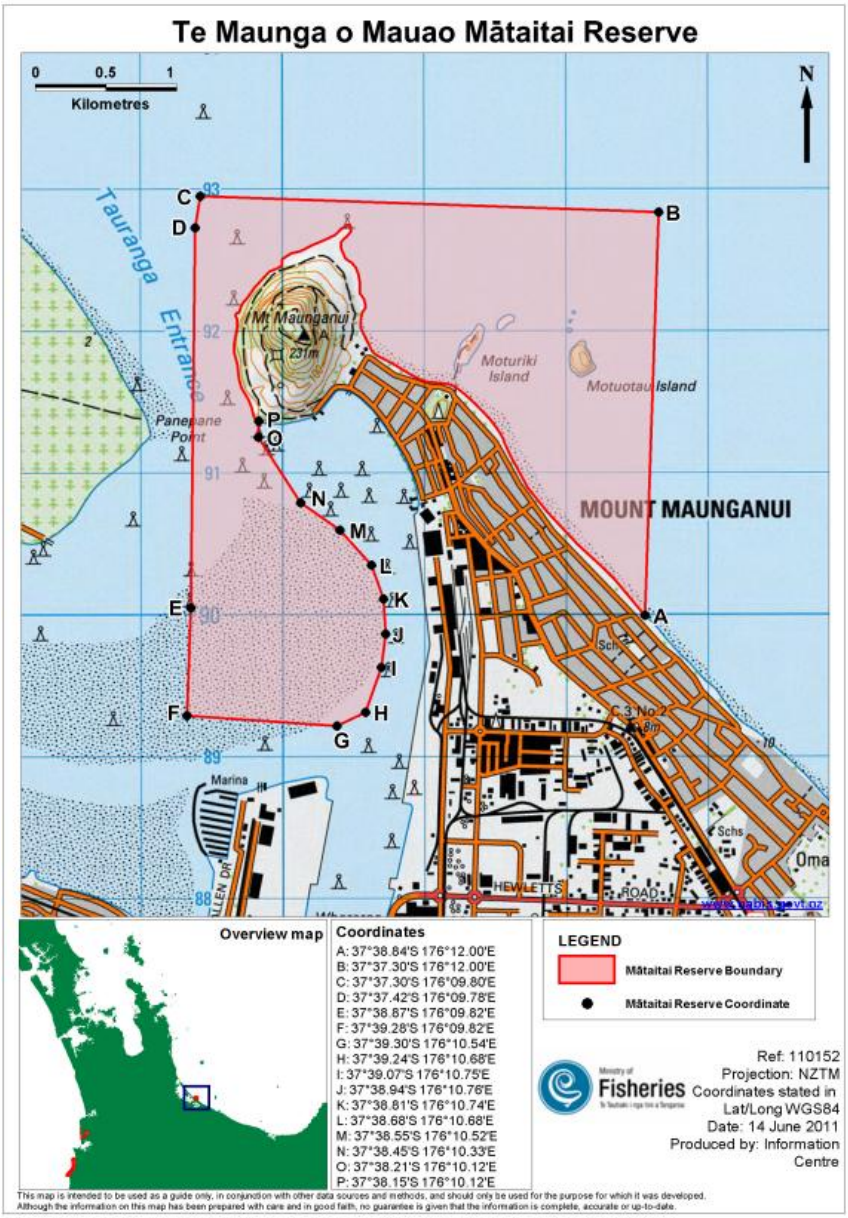


Figure 7: The location of the Te Maunga o Mauao Mātaitai Reserve

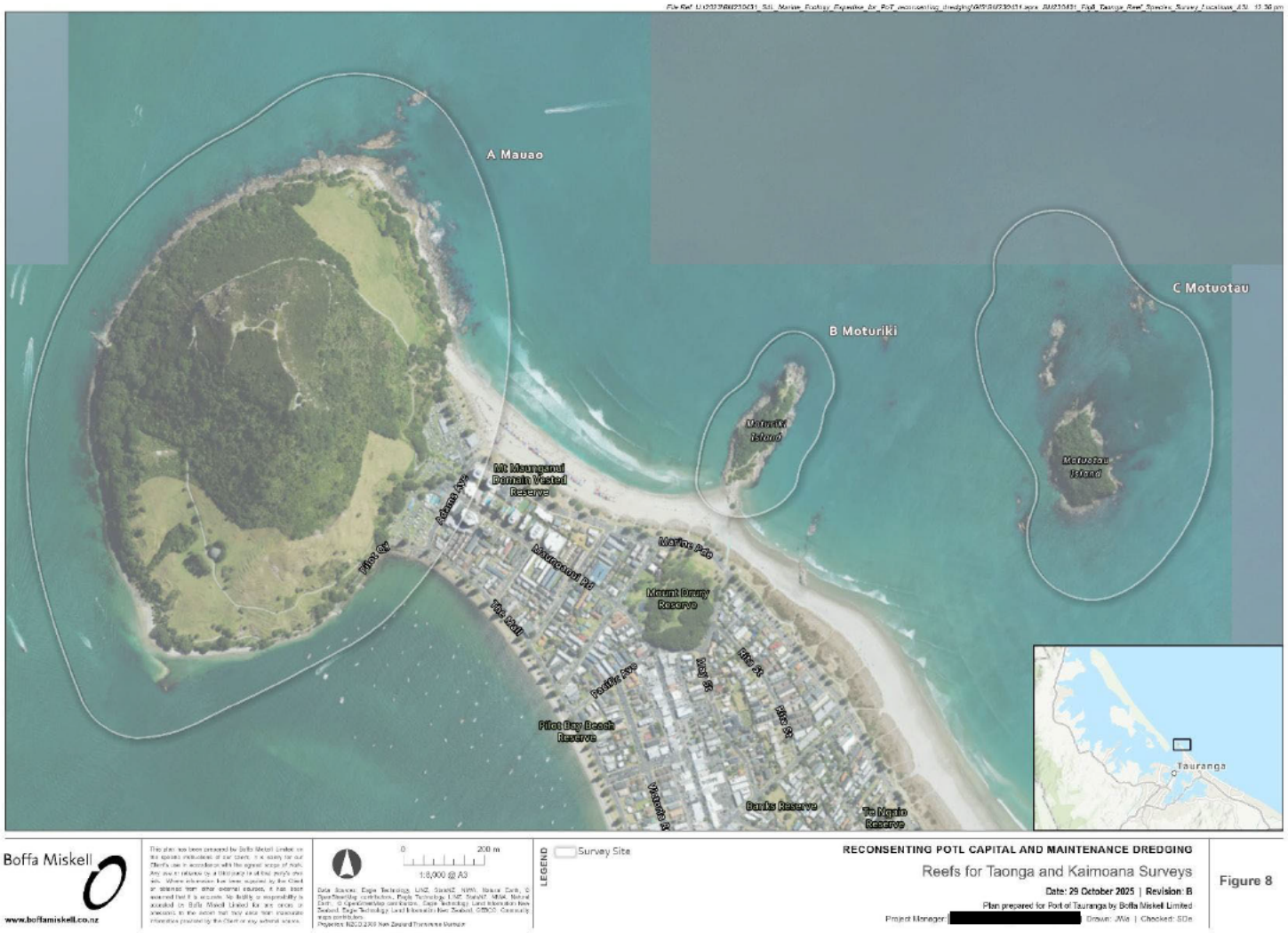


Figure 8: Reefs surveyed for taonga/kaimoana

Kina, pāua, kōura and kūtai were the main taonga species surveyed based on a mātauranga Māori approach[7] (**Table 1**).

Table 1: Tauranga Moana Mātaitai Reserve Surveys 2013-2025.

Baseline (2013) (Paul-Burke et al., 2013)	**Year 1 (2015)** (Paul-Burke & Burke, 2015)	**Year 2 (2016)** (Fairlie et al., 2017)	**Year 3 (2023)** (BML, 2023b)	**Year 4 (2024)** (BML, 2024c)	**Year 5 (2025)** (BML, in prep)
Kina	Kina	Kina	Kina	Kina	Kina
Kūtai	Kūtai	Kūtai	Kūtai	Kūtai	Kūtai
Pāua	Pāua	Pāua	Pāua	Pāua	Pāua
Kōura not surveyed	Kōura	Kōura not surveyed	Kōura	Kōura	Kōura

Average kina abundances within the Tauranga Moana Mātaitai Reserve in 2023 were higher than in the baseline year (2013) but lower than in 2015 (Paul-Burke & Burke, 2015). The 2023 survey showed that the highest abundance of kina was found at Mauao, with an average of 0.63 kina per 1m^2 quadrat, while there was and an average of 0.42 kina per 1m^2 quadrat at Motuotau (Boffa Miskell Ltd, 2023a). Kina abundance in 2024 showed a non-significant decrease compared to 2023 abundance at all sites (Boffa Miskell, 2024c). Comparison of previous kūtai (mussels) abundances between 2013, 2015 and 2023 was made difficult due to different surveying methods being used among surveys periods. Surveys conducted during 2023 revealed high variability in the average of kūtai (between 22 and 111 individuals per 0.25m^2 quadrat) (Boffa Miskell Ltd, 2023a). Previous surveys in 2013, and 2015 and 2016 used quite different survey methods and different sites names compared to the 2023 survey resulting in the data is not statistically comparable. Percentage cover of kūtai increased in 2024 at all sites compared to earlier years (Boffa Miskell, 2024c).

Average pāua abundance per 10-minute timed survey varies across years with an average of 25 for 2023, 20-30 for 2016, 114 for 2015 and 35 for 2013. This indicates a decrease in average pāua abundance for 2023 in comparison to previous years. Pāua abundance showed a decline in abundance in 2024 compared with 2023 data (Boffa Miskell, 2024c).

Kōura was first introduced into the Tauranga Moana Mātaitai Reserve surveys in 2015, with an average abundance of 1.3 kōura per 10-minute timed survey (n = 13). Sampling effort increased in 2023 (n = 165), however, the average abundance of kōura decreased to 0.4 per timed survey (Boffa Miskell Ltd, 2023a). Kōura abundance in 2024 remained generally low but showed a slight increase compared to 2023 abundance at some sites (Boffa Miskell, 2024c).

In summary, kina abundance in 2024 showed a non-significant decrease compared to 2023 abundance at all sites. For kūtai, the percentage cover across survey sites increased in 2024 compared to earlier years. Pāua abundance showed a decline in abundance in 2024 compared with 2023 data. Kōura abundance in 2024 remained generally low but showed a slight increase compared to 2023 abundance at some sites.

[7] Baseline surveys, and therefore the entirety of the Kaimoana Restoration Programme is fundamentally informed by mātauranga Māori whereby semi structured interviews with Tauranga Moana, participating iwi representatives including kaumātua were carried out in 2013 to identify cultural sites of significance in the Tauranga Moana Mātaitai Reserve. Intergenerational mātauranga Māori identified traditional distribution, abundance and sizing of taonga species; kina, kūtai, kōura, pāua and pūpū across all identified sites.

The 2025 monitoring showed that patterns were site-specific rather than uniform across the Mātaitai Reserve. Kina showed continuing softening in abundance at Mauao alongside a rebound at Motuotau from 2022-2025. Kūtai increased in abundance at Mauao, with modest cover at Moturiki and lower cover at Tanea Shelf. Pāua abundance remained low at Mauao. Kōura showed some recovery at Motuotau, while the wharf site abundance remained low and dominated by small individuals. As per previous years, all kaimoana were well within dietary exposure with respect to contaminant concentrations.

Motuotau Reef (the closest reef to disposal sites) has been monitored every few years between 1990 and 2024. The most recent monitoring (November 2024) indicated the reef supported a healthy assemblage of marine organisms that is comparable to other reefs of similar depth, aspect, and exposure along the Bay of Plenty coastline (Boffa Miskell Ltd, 2023c). As in previous surveys, the benthic communities in 2024 were characterised by the presence of large canopy-forming macroalgae along with a diverse understory including sponges, hydroids, mussels, anemones and a wide range of red algae (Boffa Miskell Ltd, 2023c). Many of these reef taxa are known to be highly sensitive to sedimentation. The 2022 and 2024 surveys at Motuotau Reef did not show any change in the structure and diversity of these communities which could be connected to the Port of Tauranga's dredging program, in comparison to previous years surveys (Boffa Miskell Ltd, 2023c and 2025).

4.3.4 Reef and boulder habitat on eastern side of harbour channel adjacent to northern shoreline of Mauao

Following the 2015-2016 dredging, surveys of hard bottom species (primarily sponge and algal communities) were conducted in the reef and boulder habitat on the eastern side of the harbour channel adjacent to the northern shoreline of Mauao (Warren et al., 2016). The boulder and reef habitat were interspersed with medium and coarse sand grain sizes, with no evidence of smothering or burial of organisms.

The survey (at three depths, 15-20m, 15-10m, 10-5m) revealed a diversity of large sponges (characteristic of high current and limited light habitat) and benthic fauna that would have existed prior to the 2015-2016 dredging campaign based on size and maturity of species. Benthic fauna included a range of hydrozoans (including white striped anemones), solitary and colonial tunicates, brittle stars, cushion stars and 11-armed sea stars (*Coscinasterias calamaria*). Algae detected included *E. radiata U. pinnatifida* (invasive species), *Ulva* sp. and small palmate red algae. No uncolonised hard surfaces were detected.

The surveyors (Warren et al., 2016) concluded that the diversity and species composition in 2016 was similar to that detected in 2015 prior to the Port of Tauranga dredging.

4.3.5 Harbour Entrance Gorge

The entrance channel to Te Awanui is approximately 36m deep. The sandy subtidal habitat comprises dead pipi (*Paphies australis)* shells, live adult pipi, hermit crabs and gastropods (Grace, 2010).

Also, see subtidal survey at Panepane Point (section 4.3.7 below).

4.3.6 Western Channel

The subtidal substrate in the Western Channel comprises largely dead pipi shell and sand with live large pipi (Grace, 2010).

As part of the Te Paritaha pipi surveys, a subtidal grid in the Western Channel has been surveyed in 2023. The total number of pipi in the 90 cores collected across this grid in 2023 was 2194, with an estimated average density of 3104 individuals per m^2.

Pipi average size was 29.8 mm across a range between 5 to 70 mm. Close to 65% of the pipi were recruits (<20 mm), 11% were juveniles (20-40 mm), and close to 24% were adults (>40 mm). The size structure of the population is bimodal, with a large cohort of recruits/juveniles and a smaller cohort of adults.

This grid was also resurveyed in March, May and November 2024 & May 2025 (see section 4.3.9).

4.3.7 Panepane Point

Panepane Point (**Figure 5**), an unstable sand spit located in high currents at the southernmost point of Matakana Island, on the northern side of the harbour entrance, has experienced significant accretion as a result of dredging and natural evolutionary changes (de Lange et al., 2015) (**Figure 9**).The mobile sand drops off sharply with depth to the pipi shell benthic habitat with large adult pipi.

The study site for the survey of kaimoana at Panepane Point in 2023 presented extremely challenging variables to consider for subtidal surveys i.e., high tidal velocities, sudden changes in depth, and altered tide times. Drop camera surveys were therefore used as the safest approach to surveying. In addition to this, the health and safety risks associated with this region of the harbour due to very fast currents present potentially problematic cultural/recreational harvesting risks of any kaimoana present (Boffa Miskell Ltd, 2023d).



Figure 9: Location of Panepane Point on Matakana Island

Based on the subtidal surveys carried out by Toi Ohomai on 29 August 2023, no taonga rocky reef species such as kina, kūtai, pūpū, pāua, or koura were identified at the Panepane Point subtidal survey sites. Based on the substrate and significant amount of shell debris present in

the 16m and 20m depth bands, pipi are expected to be present, however, the densities are difficult to determine based on the drop camera images provided. Recreational or cultural harvesting of any pipi from this site would be difficult due to the high current through this subtidal area (Boffa Miskell Ltd, 2023d).

The steep slope of mobile sand plunges from the end of the point, at Panepane Point, to the entrance gorge, where the bottom habitat is shell armoured with large live pipi present.

Based on habitat and substrate identified during the 2023 Panepane Point subtidal surveys, there does not appear to be any favourable habitat available for rocky reef taonga species identified in the Kaimoana Restoration Programme.

4.3.8 Stella Passage and Shipping Channel Soft Sediment Benthic Habitat

Stella Passage and the shipping channel (**Figure 5**) has previously been dredged to accommodate ships at Sulphur Point and Mount Maunganui wharves and these areas regularly receive maintenance dredging. The soft sediment marine communities in these areas are in a cyclic pattern of recovery, continually reset with primarily maintenance dredging (Grace, 2010).

(Butler, 1999) surveyed the soft sediment community within the Stella Passage detecting a diverse range of taxa, with bivalves, polychaetes, gastropods and crustaceans being the most abundant taxonomic groups.

Grace (2010) found that the benthic invertebrate community in Stella Passage comprised a representative community structure (dominated by a heterogeneous community of typical polychaete worms, bivalves, amphipods, decapods etc, with no rare or threatened species present).

Leonard et al. (2020) stated that the marine species' diversity and abundance within Stella Passage is characteristic of New Zealand port and harbour organisms are consistent with a temperate New Zealand east coast harbour environment. The marine species assemblages are relatively stable over time despite a number of capital dredging campaigns in the past 10-15 years (Leonard et al. 2020).

Leonard et al., (2020) collected benthic invertebrates from benthic tows in Stella Passage and found an abundant[8] and diverse[9] community with sensitive and tolerant species. Sensitive species included a range of gastropods, nudibranchs, opisthobranchia[10], bivalves, polychaetes, isopods, barnacles, and sea stars. Tolerant species included a range of gastropods, a bivalve, polychaetes, a species of isopod, two decapod species and brittlestars.

The average Shannon Weiner Diversity Index across the 15 benthic tow sites was 2.1, revealing high diversity. Drift and resident (attached) seaweeds were also diverse (Leonard et al., 2020). The data captured by Leonard et al. (2020) compares well with those of Healy et al. (2009) where 85 taxa were recorded from the same area, and of similar species diversity and that of Grace (2010).

[8] Average number of individuals per benthic tow 97, with an average number of taxa of 17

[9] Average Shannon-Wiener Diversity Index 2.3

[10] Bubble shell

Leonard et al. (2020) states that the Stella Passage channel floor is in good health, as it is dominated by sandy grain sizes, with only a few pockets of fine sediments. There is a shallow layer of oxygenated sediment, with some anoxic conditions experienced in eddy areas associated with wharf structures.

Leonard et al. (2020) characterised the Te Awanui channel floor in the Stella Passage as being reflective of a working port seabed, comprising an ecologically productive benthic community with naturally diverse indigenous native infaunal species. Leonard et al. (2020) stated that most benthic habitats within ports in New Zealand are characterised by fine sediment and dominated by low native biodiversity and a high abundance of exotic species presence, whereas Te Awanui presents sandy sediment and predominantly native marine organisms.

It is anticipated in this assessment that there is similarly high natural variability (heterogeneity) and diversity of benthic organisms in the relatively stable soft sediment subtidal benthic community structure within Stella Passage at present.

Battershill (2022) describes the soft sediment subtidal assemblages to be expected of a healthy harbour environment. Battershill (2022b) notes that horse mussel beds and associated flora and fauna are well established in the Stella Passage.

4.3.9 Centre Bank / Te Paritaha

This shellbank is a significant kaimoana collecting ground for pipi (*P. australis*). Subtidal pipi beds are also present in the Western channel and in the main entrance channel. Juvenile pipi settle on the intertidal sand of Te Paritaha and migrate as adults to the subtidal populations. Monitoring of pipi at Te Paritaha has most recently been conducted by POTL in 2016 (Fairlie et al., 2016), 2022 ((Boffa Miskell Ltd, 2023e), 2023 (Boffa Miskell Ltd, 2024a),2024 (Boffa Miskell Ltd, 2024b and 2025c)), and 2025 (Boffa Miskell Ltd, 2025b and 2026).

Te Paritaha and the pipi resource is a taonga to mana whenua. Various witnesses for tāngata whenua (including Te Runganga o Ngāi Te Rangi Iwi Trust, Ngāti Hē and Ngāti Ranginui Incorporated Society and Ngāti Ranginui Fisheries Trust)[11] for other POTL dredging consent hearings have raised concerns about the decline of pipi at Te Paritaha. Many have associated the pipi decline at Te Paritaha to the POTL dredging.

Grace (2010) states that there are substantial subtidal adult pipi beds in the western harbour, in the main entrance channel west of Mauao, and in the harbour entrance gorge.

Fairlie et al. (2016) survey detected a large recruitment of juvenile pipi into the area. Abundance of adult pipi have been stable in the period preceding and following the 2015 dredging campaign, which supports the conclusion that the dredging did not affect pipi populations at Te Paritaha (Fairlie et al., 2016).

Te Paritaha is an area of Significant Cultural Value (ASCV4a, BOPRC Coastal Environment Plan). Schedule 6 states:

> "*Te Paritaha is said to be the source of mauri for all other pipi beds in Te Awanui. (ASCV 4a. BOPRC Coastal Plan). "The role of whānau hapū and iwi as kaitiaki is to*

[11] From Environment Court Decision, March 2024, Stella Passage hearing.

protect the mauri of Paritaha. Mauri in this regard refers to the integrity, form, functioning (including natural biological and ecological processes), resilience, physical and spiritual characteristics & qualities, mana-atua, mana-tangata, tapu life principle, tikanga and kawa practices, connectedness & interdependency and accessibility. This involves ensuring that the full physical extent of the integrity of Paritaha is acknowledged. In this way, the kaimoana that Paritaha supports is also protected".

Data on the abundance of subtidal pipi collected by Ross & Culliford (2018) on the north-west edge of Te Paritaha pre and post the 2015 dredging, showed good recovery of pipi at all depths sampled. Pipi numbers quickly returned to pre-dredge levels, although there was some spatial change in pipi location along the edge of the bank.

Leonard et al. (2020) stated that there is no recent information on the dynamics of pipi beds at Te Paritaha. Subsequently, BML has undertaken intertidal and subtidal pipi surveys at Te Paritaha in 2022, 2023 and 2024 (x 3 surveys) and 2025 (engaged by the POTL). These surveys have covered the areas previously sampled by Fairlie et al. (2016) and by Ross & Culliford (2018) and added new survey sites BML intertidal surveys in 2022 (Boffa Miskell 2023e) (Figure 10) showed that abundances of pipi varied significantly across the area surveyed in the northern half of Te Paritaha. Three sites along the north-eastern portion of the study area had the highest number of pipi averaging 14-18 individuals per core. The lowest abundances of pipi occurred at the southern end of the study area with an average of less than one pipi per core. The majority of the sampling sites averaged 3-7 individuals per core. Most of the pipi were juveniles measuring less than 30 mm in size (indicating a successful recruitment event), except for four adult pipi measuring between 50-58 mm, found on the northernmost point of the area surveyed.

BML carried out subtidal surveys (in conjunction with Toi Ohomai) for pipi along the north-east edge of Te Paritaha in 2022, with transects extending approximately 15m down the main harbour channel (Boffa Miskell Ltd, 2023e). Transect locations and lengths were the same as that in Ross & Culliford (2018). Subtidal pipi abundances varied between and within transects, with the highest number of individuals totalling 274 across forty cores along transect B, and the lowest number of individuals recorded along transect A (2 individuals across forty cores). Density of pipi varied with depth, with higher densities at shallower depths. The average size of pipi was approximately 50 mm, regardless of depth (**Figure 10**).

Further surveys carried out in 2023 (Boffa Miskell Ltd, 2024a) confirmed the patterns observed in 2022, with the intertidal area of Te Paritaha dominated by recruit and juvenile pipi, while larger adult individuals were mostly confined to the subtidal habitat.

In the areas sampled both in 2022 and 2023 (Grid 1 and Transects A, B, C) there was a significant increase in the abundance of recruit and juvenile pipi, which is indicative of large recruitment events occurred between the two sampling events. There were high abundances of recruits and juveniles also in subtidal areas sampled for the first time in 2023, at Grid 2 and Grid 3.

By expanding the surveys to new subtidal areas in 2023 **(Figure 11),** surveys were able to better capture the patchy distribution of large subtidal pipi around Te Paritaha. Grid 3 was the subtidal area with the highest abundance of adults, with an estimated density of 528 individuals > 40 mm per m^2, compared to 51 adults per m^2 at Grid 2 and 186 adults per m^2 in the area encompassed by Transect A, B, C and D.

Comparisons with the results of previous surveys of Te Paritaha by Fairlie et al. (2016) and Ross & Culliford (2018) show a large decline in the abundance of adult pipis between 2016 and 2022, with no sign of recovery in 2023. The studies of Fairlie et al. (2016) and Ross & Culliford (2018) showed that the abundance of large pipi in the early aftermath of the 2015 capital dredging (i.e., in 2016 and 2017) was in line with pre-dredging levels. However large declines must have occurred in the period 2016/2017 – 2022, causing a shift to a population structure dominated by recruits and juveniles.

Similar patterns of natural declining abundances of large individuals have been observed in intertidal populations of both pipi and cockles across the upper North Island (Berkenbusch et al., 2022; Berkenbusch & Hill-Moana, 2023). The reasons for the general decline of large individuals within northern pipi and cockle populations remain unknown, but are likely to include harvesting pressure, changes in the benthic environment (e.g., grain size and topography of the seabed), adverse weather conditions (particularly unusually hot weather), poor water quality, parasites and bacteria (Berkenbusch et al., 2022; Berkenbusch & Hill-Moana, 2023).

The 2023 results did not show significant changes in the physical structure of the benthic environment at Te Paritaha. The soft sediment habitat in 2023 was relatively uniform across the study area, with medium and coarse sand being the dominant grain size fractions. Coarse and medium sand were the dominant grain size fractions also in 2016 (Fairlie et al. 2016), suggesting that there were not large changes in the physical structure of the intertidal benthic habitat coinciding with the decline of adult pipi between 2016 and 2022.

Pollutants in the seabed and the water column are unlikely to be the main drivers of the decline of large pipi at Te Paritaha, as the 2023 surveys found low levels of contaminants both within the sediment and within the pipi as body burden.

While large pipi remain virtually absent in the intertidal area of Te Paritaha, the high recruitment rates observed across the study area in 2023 suggest that healthy aggregations of reproductive individuals are present within Te Awanui.

Species such as pipi are well known for their natural spatial and temporal abundance and size class variability (Hooker, 1995). Repeating the surveys of pipi according to the revised Te Paritaha Monitoring Plan will be key to assessing whether the large wave of recruitment detected in 2023 can translate into increasing abundances of larger individuals at Te Paritaha.

In 2024 sediment, pipi and other kaimoana on Te Paritaha were surveyed on three occasions, in March, May and November 2024. The same survey methodology as that in 2023 was carried out in the 2024 surveys (March, May and November), with the addition of green lipped mussel surveys (c. 300m distance from the boundaries of Grids 2 and 3) (**Figure 11)** on Te Paritaha added in March and May 2024 (mussel being the only other kaimoana species detected on Te Paritaha) (Boffa Miskell, 2024 and 2024a). Mussel bed density, area, and shellfish size formed the surveys. Results from the March 2024 survey indicated no significant changes in sediment contaminants nor pipi body burden contaminants compared data collected in 2023. Results from the May 2024 survey indicated very similar results to March 2024 (Boffa Miskell, 2024 and 2024a).

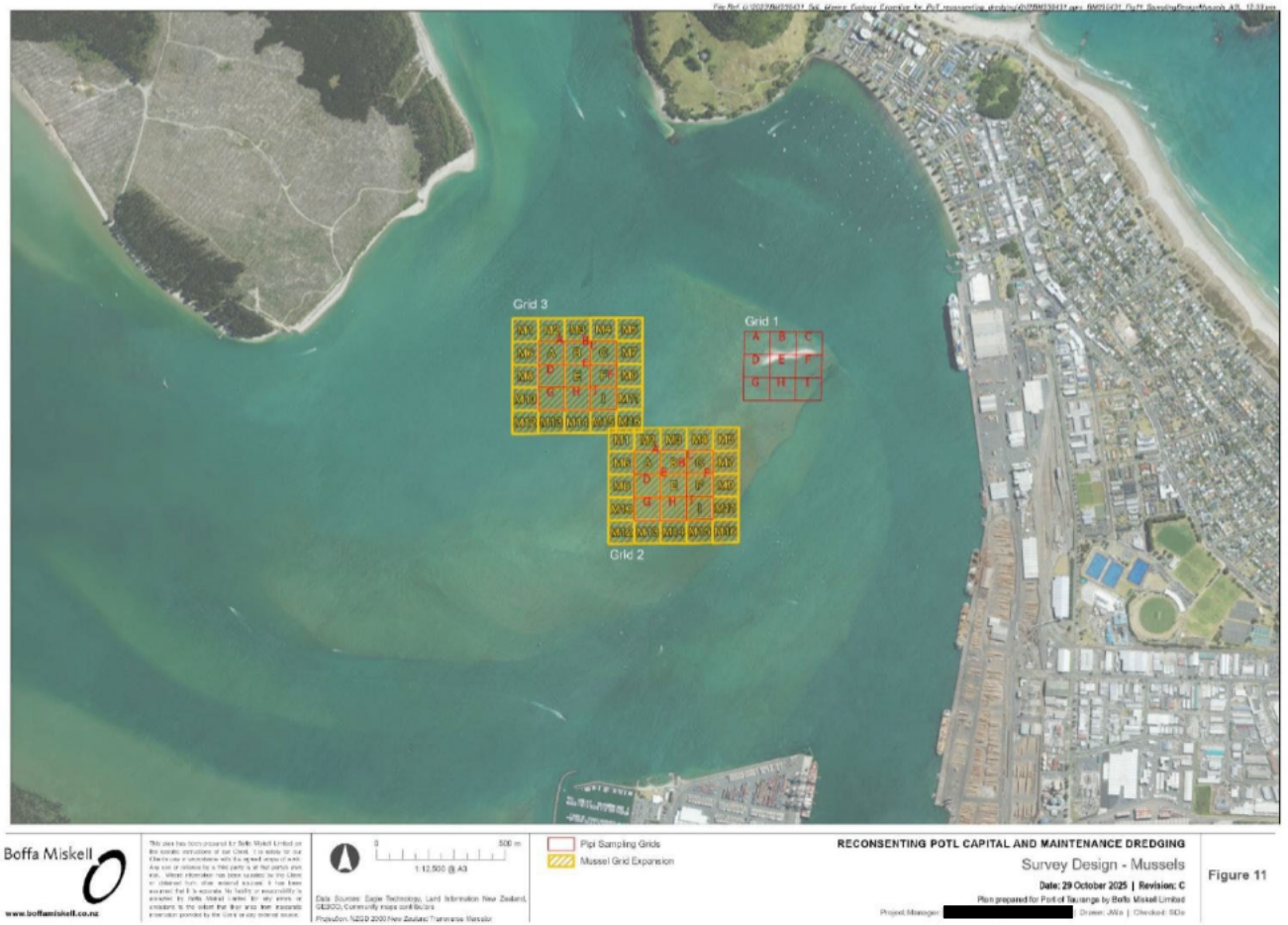


Figure 11: BML Pipi and Mussel Sampling Design 2024.

The November 2024 data showed a lower abundance of intertidal pipi relative to the very high numbers of November 2023. The November 2024 data showed a trend of increasing shell length in the cohort of juveniles which dominated the population (at Grid 1) and higher abundance of adult pipi in comparison to all previous sampling events (Boffa Miskell, 2024a and 2025a) (**Figure 12**).

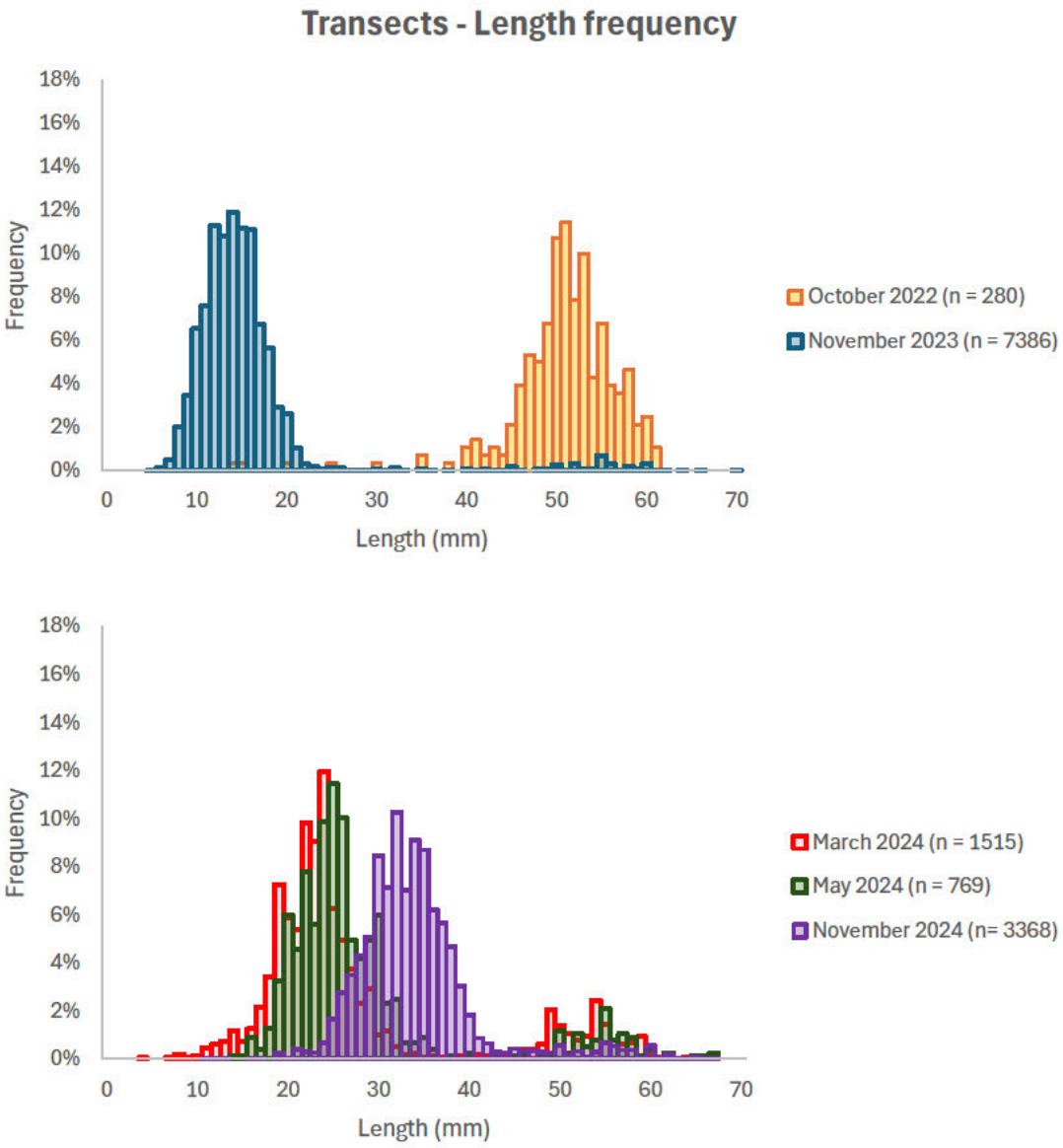
The May 2025 pipi monitoring data aligns with the previous surveys by Boffa Miskell, showing a continued decline in pipi abundance across the three shallow subtidal grids and four subtidal transects since the 2023 recruitment event. The 2025 sampling indicates a consistent and notable increase in the average size of pipi. Juveniles remain the dominant size class, however, there is growing evidence of maturation within the Te Paritaha pipi population, with the proportion of adult individuals increasing across all sites compared to previous survey rounds. Despite this trend, large harvestable pipi remain scarce (**Figure 12**).

Overall, the May and November 2025 survey results suggest the 2023 recruitment event has contributed to a measurable cohort of maturing individuals, supporting the potential recovery of the pipi populations across Te Paritaha. However, the scarcity of harvestable adults continues to remain on trend with broader regional trends observed across the upper North Island. May 2026 surveys have recently been completed, following the same sampling methods and protocols as above (**Figure 12**).

The November 2025 pipi data however, confirms an ongoing trend of increasing size (shell length) but does not show the emergence of a new cohort of recruits (**Figure 12**). The data show abundances of adult pipi returning close to pre-dredging levels for the first time in November 2025, following large spikes in the numbers of recruits and juveniles in 2023 and 2024).

Boffa Miskell's marine ecologists are confident that the patterns in recruitment and growth of pipi is the natural life cycle of pipi (with adult life expectancy of 7-10 years). The decline of adults in 2022-2023, is due to natural life history processes with mortality of that particular adult cohort in 2022/2023, with younger cohorts growing through to adult size in the population over time.

Preliminary results from the intertidal and subtidal surveys of pipi at Te Paritaha in May 2026 revealed adults dominated the community, as expected with the younger cohorts growing through time and forming the adult size class.


Transects - Length frequency
Frequency
18%
16%
14%
12%
10%
8%
6%
4%
2%
0%
0
10
20
30
40
50
60
70
Length (mm)
October 2022 (n = 280)
November 2023 (n = 7386)
Frequency
18%
16%
14%
12%
10%
8%
6%
4%
2%
0%
0
10
20
30
40
50
60
70
Length (mm)
March 2024 (n = 1515)
May 2024 (n = 769)
November 2024 (n= 3368)

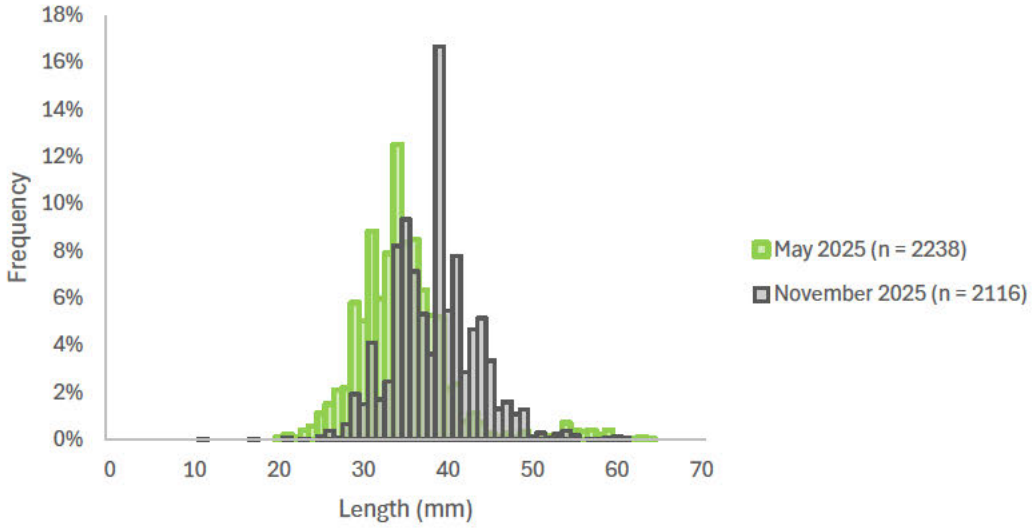


Figure 12: Length-frequency distribution of pipi across the transects between 2023 and 2025. n = number of individuals at each time point.

4.3.9.1 Sediment Chemistry Data 2023 and 2024

Surface sediment (top 2-3 cm) was collected at the four transects and three grids in 2023 and 2024 (Boffa Miskell, 2024a and b and 2025a). Sediment was analysed for heavy metals, polycyclic aromatic hydrocarbons (PAH), polychlorinated biphenyls (PCB) and tri-butyl tin (TBT). The results indicate low concentrations of all contaminants (some heavy metals were above laboratory detection limits), with PAHs, PCBs, and TBT below laboratory detection limits (**Table 2**).

Results from the March, May and November 2024, May 2025 and November 2025 surveys showed similar sediment contaminant[12] and pipi body burden contaminants compared data collected in 2023 (Boffa Miskell Ltd, 2024b, 2024c, 2025a, 2025b).

[12] The heavy metal suite of contaminants was not analysed by error in this survey, with analyses for copper, lead, zinc and PAHs only.

Table 2: Concentration of heavy metals, PAHs, PCBs and tributyl-tin in surface sediment 2023 (see also Figure 11)

Contaminant (mg/kg dw)	Transect A	Transect B	Transect C	Transect D	Grid 1	Grid 2	Grid 3	ANZG DGV
Arsenic	6.0	5.5	5.7	8.0	6.3	5.8	6.6	20
Cadmium	0.005	0.005	0.005	0.005	0.005	0.005	0.005	1.5
Chromium	3.5	2.0	2.1	1.9	2.3	2.3	2.0	80
Copper	0.4	0.2	0.2	0.2	0.23	0.17	0.2	65
Lead	1.62	1.06	1.14	1.17	1.19	1.16	1.1	50
Mercury	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.15
Nickel	0.9	0.6	0.7	0.6	0.6	0.6	0.7	21
Zinc	9.0	6.3	7.1	6.9	7.0	7.13	6.7	200
Total PAHs	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	10
Total PCBs	0.0175	0.0175	0.0175	0.0175	0.0175	0.0175	0.0175	0.034
Tributyltin	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.009

Table 3: Average concentration of heavy metals and PAHs in surface sediment March 2024 see also Figure 11)

Contaminant (mg/kg dw)	Transect A	Transect B	Transect C	Transect D	Grid 1	Grid 2	Grid 3	ANZG DGV
Arsenic	5.3	5.5	5.5	7.8	5.8	5.7	6.8	20
Cadmium	0.005	0.005	0.011	0.005	0.005	0.005	0.005	1.5
Chromium	3.9	2.3	2.5	2.3	2.2	2.5	2.5	80
Copper	0.3	0.3	0.3	0.3	0.27	0.2	0.33	65
Lead	1.77	1.22	1.45	1.26	1.0	1.22	1.36	50
Mercury	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.15
Nickel	0.9	0.7	0.7	0.9	0.8	0.63	0.73	21
Zinc	9.4	7.8	7.6	7.7	6.8	6.87	8.0	200
Total PAHs	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	10

Table 4: Average concentration of heavy metals and PAHs in surface sediment May 2024 (see also Figure 11)

Contaminant (mg/kg dw)	Transect A	Transect B	Transect C	Transect D	Grid 1	Grid 2 Ave A-I	Grid 3 Ave A-I	ANZG DGV
Arsenic	3.8	7.0	6.4	6.5	6.27	6.4	7.0	20
Cadmium	0.005	0.005	0.005	0.005	0.005	0.005	0.005	1.5
Chromium	3.5	2.4	2.8	2.2	2.6	2.7	2.8	80
Copper	0.4	0.3	0.2	0.2	0.3	2.7	0.27	65
Lead	1.59	1.26	1.38	1.31	1.39	1.3	1.26	50
Mercury	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.15
Nickel	0.8	0.8	0.8	0.7	0.87	0.8	0.77	21
Zinc	9.0	8.1	7.8	7.4	8.1	24.4	7.4	200
Total PAHs	0.003	0.003	0.003	0.003	0.05	0.003	0.06	10

Table 5: Average concentration of heavy metals and PAHs in surface sediment November 2024 (see also Figure 11)

Contaminant (mg/kg dw)	Transect A	Transect B	Transect C	Transect D	Grid 1	Grid 2	Grid 3	ANZG DGV
Arsenic	8.1	5.6	6.8	8.0	5.4	4.7	6.13	20
Cadmium	0.011	0.005	0.005	0.011	0.007	0.001	0.01	1.5
Chromium	3.1	2.0	2.9	2.1	2.5	2.9	2.3	80
Copper	0.4	0.2	0.3	0.4	0.27	0.3	0.27	65
Lead	1.55	1.10	1.47	1.44	1.4	1.36	1.4	50
Mercury	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.15
Nickel	0.9	0.6	0.8	0.8	0.67	0.7	0.7	21
Zinc	8.2	6.3	8.1	7.9	7.0	8.0	7.3	200
Total PAHs	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	10

Table 6: Average concentration of heavy metals and PAHs in surface sediment May 2025 (see also Figure 11)

Contaminant (mg/kg dw)	Transect A	Transect B	Transect C	Transect D	Grid 1	Grid 2	Grid 3	ANZG DGV
Arsenic	6.2	5.3	6.8	6.2	6.8	4.9	7.13	20
Cadmium	0.014	0.05	0.05	0.013	0.05	0.05	0.05	1.5
Chromium	2.8	2.1	1.9	2.8	2.5	2.8	2.30	80
Copper	0.3	0.3	0.2	0.3	0.3	0.3	2.3	65
Lead	1.46	1.03	1.07	1.39	1.31	1.3	0.30	50
Mercury	-	-	-	-	0.01	0.01	-	0.15
Nickel	0.8	0.8	0.7	0.8	0.8	0.7	0.73	21
Zinc	8.7	8.7	6.7	8.4	7.9	8.0	7.6	200
Total PAHs	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	10

Table 7: Average concentration of heavy metals and PAHs in surface sediment November 2025 (see also Figure 11)

Contaminant (mg/kg dw)	Transect A	Transect B	Transect C	Transect D	Grid 1	Grid 2	Grid 3	ANZG DGV
Copper	0.4	0.4	0.3	0.3	0.3	0.2	0.27	65
Lead	1.68	1.47	1.37	1.31	1.37	1.21	1.4	50
Zinc	8.7	8.4	8.0	7.9	7.6	7.0	7.6	200
Total PAHs	0.002	0.002	0.002	0.002	0.002	0.002	0.002	10

4.3.9.2 Pipi Chemistry Data

Pipi flesh was collected as composite samples in 2023, 2024 (March, May and November), and 2025 (May and November) from Grids 1, 2 and 3, and Transects A-D (**Figure 11).** At the time of preparing this assessment, the May 2026 surveys were being undertaken.

Analyses of pipi flesh in 2023, 2024 (March, May and November), May 2025 and November 2025 revealed concentrations of cadmium, lead, mercury, PCBs and PAHs accumulated were below the DGV (
Table 8). The concentration of Polycyclic Aromatic Hydrocarbons (PAHs) was also below laboratory detection limits[13] for all sites.

[13] Where the laboratory result was below the laboratory detection limits(s), we have conservatively used half the detection limit as a positive result in our calculations.

Pipi flesh did exceed the total arsenic maximum level of metal contaminants of the ANZFSC at grids and transects. However, as stated in the paragraph above, the ANZFSC refers to inorganic arsenic which is approximately 10% or less of total arsenic. Therefore, the concentration of inorganic arsenic in shellfish is highly likely to be significantly below ANZFSC maximum concentration of total arsenic.
There is no DGV in the ANZFS for PAHs in food (ANZFC), however, the concentration in pipi flesh in November 2024 was below the sediment DGV and for most sites PAHs were present in very low concentrations and below laboratory detection limits[14]. This is important to note, due to the elevated levels of PAHs observed at Transect D in May 2024 (likely because of a diesel / heavier oil spill that occurred on 20 May 2024). The November 2024, May 2025 and November 2025 results show that the accumulation of PAHs in pipi detected May 2024 has not been long-lasting.

Table 8: Concentrations of contaminants (mg/kg) accumulated within the pipi across all grids and transects where it was possible to collect 30 g of pipi flesh (May 2025). Default guideline values (DGV) are included in each panel.

	Arsenic	Cadmium	Lead	Mercury	Total Polycyclic Aromatic Hydrocarbons[15]
Grid/Transect	ANZFSC = 1 (inorganic arsenic)	ANZFSC = 2	ANZFSC = 2	ANZFSC = 0.5	No ANZFSC value
Grid 1	1.38	0.073	0.002	0.005	0.004
Grid 2	1.32	0.071	0.002	0.005	0.004
Grid 3 A-B-C	1.28	1.13	0.01	0.005	0.005
Grid 3 D-E-F	1.28	0.067	0.01	0.005	0.005
Grid 3 G-H-I	1.5	0.064	0.01	0.01	0.005
Transect B	1.32	0.06	0.02	0.015	0.005
Transect C &D	1.47	0.096	0.002	0.01	0.005

[14] PAHs that were above the laboratory detection limit included benzo[a]anthracene, benzo[a]pyrene (BAP), benzo[b]fluoranthene + benzo[j]fluoranthene, benzo[g,h,i]perylene, benzo[k]fluoranthene, chrysene, dibenzo[a,h]anthracene, fluoranthene, fluorene and pyrene.

[15]BML made an error with the laboratory forms in May 2025 by not requesting total organic carbon to be able to report PAHS as normalised to 1% lipid.

Table 9: Concentrations of contaminants (mg/kg) accumulated within the pipi across all grids and transects where it was possible to collect 30 g of pipi flesh (November 2025). Default guideline values (DGV) are included in each panel.

	Arsenic	Cadmium	Lead	Mercury	Total Polycyclic Aromatic Hydrocarbons
Grid/Transect	ANZFSC = 1 (inorganic arsenic)	ANZFSC = 2	ANZFSC = 2	ANZFSC = 0.5	No ANZFSC value
Grid 1	1.80	0.02	0.02	0.025	0.025
Grid 2	1.73	0.03	0.03	0.009	0.009
Grid 3	1.77	0.35	0.02	0.008	0.008
Transect A	1.65	0.1	0.04	0.016	0.016
Transect B	1.7	0.34	0.03	0.011	0.011
Transect C	1.68	0.2	0.05	0.016	0.016
Transect D	1.83	0.45	0.04	0.007	0.007

4.3.10 Wharf Structures

The wharf structures at Mt Maunganui and Sulphur Point have high marine biodiversity (including a range of anemones, barnacles, sponges, seasquirts and hydroids). This biodiversity is partly due to the rapid currents (bringing nutrients) and the range of light levels on the structures at various depths (Battershill, 2022b). Juvenile crayfish are known to settle in the structures, moving to the harbour entrance and to the offshore reefs when adults.

Wharf pile habitats comprise a 3-dimensional community. Leonard et al. (2020), in their report for the Stella Passage port development, describe the pile communities having variable layer(s) of dead encrusting organisms (*Balanus decorata, Galeolaria hystrix*) and oyster shells (*Saccostrea glomerata*), with a rich diversity of encrusting invertebrates such as sponges, hydrozoans and anthozoans overlying these organisms. Interspersed amongst these species are a large variety of encrusting and mobile worms, gastropods, polychaete worms and other invertebrates. Community composition on the existing wharf piles was diverse with large sponge colonies and mature invertebrate fauna present (Leonard et al. 2020). All pile communities are representative of a complex, healthy estuarine/harbour habitat (Leonard et al., 2020). Pre-dredge and post dredge pile communities were not observed to be different (including sponges) (Leonard et al., 2020). A single specimen of a recently introduced invasive solitary, subtidal ascidian tunicate. (*Styela clava)* was observed on one wharf pile in the Stella Passage assessment. Eighty-eight species have been identified from wharf pile collections indicating a highly biodiverse habitat (Leonard et al., 2020).

4.4 Marine vegetation

4.4.1 Marine Macroalgae / Seaweeds

The hard structures in the harbour, such as existing rocks and concrete sides, support attached species of seaweeds such as *E. radiata*, *Ulva lactuca*, *Ulva* spp, *Codium fragile*, *Hormosira banksii*, *Undaria pinnatifida*[16], *Gracilaria chilensis*, and *Gigartina* species (Leonard et al., 2020). Some drifting species such as *Carpophyllum* spp. and *S. sinclarii* also contribute as potential food sources for grazers.

A study of the algae *H. banksii* in Tauranga Harbour by BOPRC (Crawshaw & Shailer, 2023) revealed an increasing cover in the Tauranga Harbour and is associated with seagrass habitat.

It is unlikely that *H. banksii* expansion is a sign of eutrophication or increased nutrient inputs. The extent of *H banksii* is spatially related to the presence of seagrass in Tauranga Harbour (Crawshaw & Shailer, 2023), where it is likely that the seagrass helps to trap *H. banksii* in place.

4.4.2 Sea Lettuce (Ulva sp.)

Sea lettuce is a naturally occurring green algae that is common in Te Awanui. Sea lettuce blooms are generally greater during spring and summer. Sea lettuce growth is driven by light, temperature and nutrient supply. It is documented that sea lettuce blooms are particularly prevalent in the southern harbour potentially driven by higher inputs of nutrients from rivers and streams (Crawshaw, 2021b).

Blooming macroalgae can have a range of detrimental effects to coastal ecosystems, including reduction in sediment oxygen conditions, displacement of seagrass and physical smothering of benthic organisms. Blooms have decreased since a peak in early 1990s, likely due to reduced nutrients discharged to Te Awanui. Sea lettuce reaches public nuisance levels during summer in a number of locations within the southern harbour (Crawshaw, 2021b).

BOPRC monitors sea lettuce at three sites in Te Awanui annually; being Ongare Point, Otumoetai and Grace Road (Crawshaw, 2021b).

4.4.3 Seagrass (*Zostera muelleri)*

Seagrass is a flowering marine plant located in sheltered coastal and estuary ecosystems. Seagrass provides numerous ecosystem services, including habitat, food and nursery areas for a range of fish species (supporting increased biodiversity). Seagrass is a threatened species (*Zostera muelleri* - At Risk – Declining) (de Lange et al, 2018). The New Zealand Coastal Policy Statement (NZCPS) (2010) requires councils to protect indigenous biodiversity in the coastal environment, and avoid, remedy or mitigate adverse effects on habitats in the marine environment, including seagrass.

Seagrass is located in Te Awanui within the areas influenced by the Port activities adjacent to the Whareroa marae, which is upstream of the Tauranga harbour bridge (**Figure *5*)** and within the Waipu Estuary and along the Ōtūmoetai shoreline. Small patches on Te Paritaha have

[16] Exotic

been observed in recent years. The seagrass beds present in Te Awanui are the largest remaining seagrass beds in the Bay of Plenty[17]. Between 1990 and 2019, Te Awanui experienced an approximately 50% reduction in seagrass area (seagrass decreased in cover from 2,237 ha to 1,184 ha. These significant losses of seagrass extent have been documented across all major Bay of Plenty estuaries over the past 100 years. A range of human induced stressors may contribute to the loss of seagrass, including eutrophication, sedimentation, turbidity, climate change, storm intensity, as well as waterfowl grazing. Recent assessment indicates some recovery of seagrass extent in Tauranga Harbour (including significant areas of subtidal seagrass), whilst declines continue across the smaller estuaries of the Bay of Plenty (Crawshaw et al., 2023).

The key stressors for seagrass requiring management include sediment, nutrients, and the interactive effects of eutrophication (macroalgae growth and limited light availability) (Crawshaw et al., 2023). Seagrass is particularly susceptible to elevated turbidity and the deposition of sediment which can reduce seabed light levels impacting primary production (Bulmer et al., 2018).

Leonard et al. (2020) indicated that, overall, the seagrass beds in Te Awanui are in a healthy condition, with variations in coverage, canopy height, shoot length, leaf count, and photosynthetic health among different locations.

Areas of seagrass are present south of the harbour bridge and offshore from Whareroa marae and numerous areas to the south and south-east (Leonard et al., 2020). This seagrass bed adjacent to Whareroa marae is the closest to the Port and it remains in good condition despite the close proximity to the previous dredging campaigns. This seagrass area has been stable over time, despite a decline in the early 1990s which is a feature of all seagrass in Te Awanui and nationally. Seagrass adjacent to Whareroa marae was not impacted by the 2015-2016 capital dredging campaign (Battershill, 2022a).

Battershill (2022a) surveyed seagrass beds adjacent to Whareroa marae in Waipu Bay and other locations in Te Awanui, concluding the beds adjacent to Whareroa marae were stable (after a decline in 1990s) and in good health. However, seagrass beds at Te Puna seemed to be in better condition due to the geophysical location of the Waipu Bay bed which is towards the harbour entrance, whereas other beds are located further into the upper harbour system.

The recent 2015 capital dredging involved the removal of 784,051 m^3 from Stella Passage by TSHD and a back-hoe dredge (BHD) of similar material to be encountered for the proposed dredging. The dredging controls used in those works were successful in limiting turbidity by limiting dredging to the out-going tide with limited overflow. The dredging controls for the TSHD proposed for this project are no overflow when dredging on the incoming tide and a maximum of 15 minutes on the outgoing tide. This methodology change is required on this campaign to balance the work across the full tidal spectrum and minimise the duration of the dredging campaign. The TSHD will be fitted with a green valve[18] or similar technology to reduce turbidity caused by any overflow. This will enable protection of seagrass beds, especially adjacent to Whareroa marae.

[17] Land, Air, Water Aotearoa (LAWA) - Tauranga Harbour

[18] The 'green valve' environmental dredging technique developed for TSHDs reduces turbidity caused by overflow during the dredging process.

The seagrass beds present in Te Awanui are the largest remaining seagrass beds in the Bay of Plenty[19]. Between 1959 and 2011 34% of seagrass beds were lost (**Figure 13**). Potential stressors to seagrass include suspended sediment, physical disturbance, exotic species (black swan) and loss of habitat (reclamation of the seabed) (BOPRC, 2018/2019).

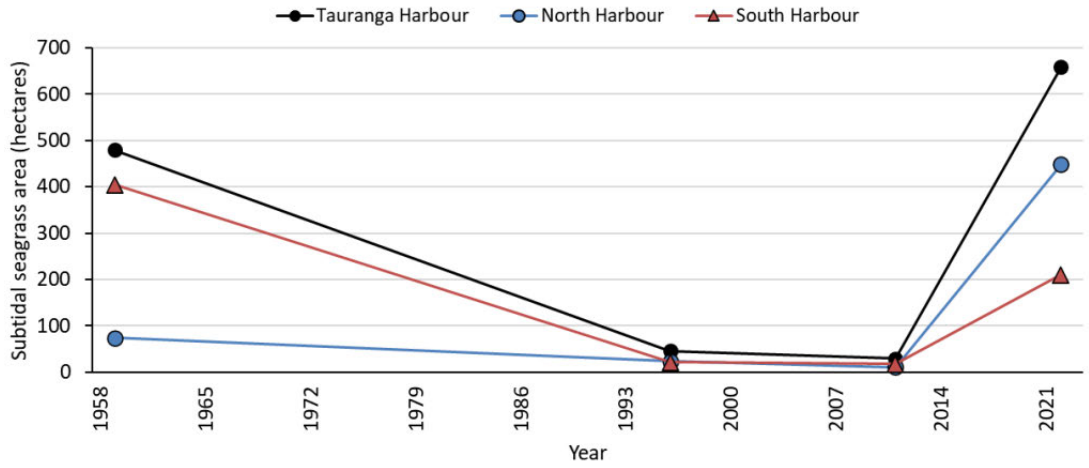


Figure 13: Seagrass area in Tauranga Harbour 1959-2022 (Figure from Crawshaw & Park, 2024)

In 2024, BOPRC report on an increase in seagrass extent in Tauranga Harbour, following decades of declining seagrass health. Seagrass extents in Tauranga Harbour are 3740 ha, with 17.6 % (659 ha) of this being subtidal seagrass which has significantly returned and expanded in the harbour. The analysis of water quality data for Tauranga Harbour freshwater inflows shows that most streams have declining levels of total suspended solids. This indicates improvements in water clarity may be supporting the return and expansion of subtidal seagrass in Tauranga Harbour (Crawshaw & Park, 2024).

Significant loss of seagrass extent has been documented across all major Bay of Plenty estuaries over the past 100 years. These previous declines have been attributed to sediment and nutrient enrichment of the estuaries caused by changes in land use and loss of fresh and saltwater wetlands. Recent assessment indicates some recovery of seagrass extent in Tauranga Harbour (including significant areas of subtidal seagrass), whilst declines continue across the smaller estuaries of the Bay of Plenty (Crawshaw et al., 2023).

Many of the Tauranga Harbour sub-estuaries that receive significant freshwater inflows still have a low proportion of seagrass compared to the 1959 mapped extents. The exceptions are Mangawhai and Te Puna, both of which have higher abundance than 1959 which has been increasing since 1996.

Even with the multitude of information available on stressors to seagrass, there remains gaps in scientific knowledge to fully understand the changing dynamics of seagrass (Crawshaw et al., 2023).

Seagrass in Waipu Bay, including adjacent to Whareroa marae was not impacted during the 2015-2016 dredging campaign (Battershill 2022 and de Lange 2022) and seems to have similar coverage area over time.

[19] Land, Air, Water Aotearoa (LAWA) - Tauranga Harbour

4.5 Fish and other large mobile species

Under water footage (informally collected by POTL in 2011 and 2018 adjacent to the Port wharves at Pilot Bay) revealed a number of mobile species (including fish) such as schools of kingfish (*Seriola lalandi lalandi*), red moki (*Cheilodactylus spectabilis*), yellow moray eel (*Gymnothorax prasinus*), spotty (*Notolabrus celidotus*), triplefin (*Forsterygion lapillum*, *Forsterygion maryannae*, *Grahamina capito* and *Grahamina gymnota*). Other taxa included glass shrimp (*Palaemon affinis*), sea horse (*Hippocampus abdominalis*), lemon nudibranch (*Dendrodoris citrina*), gem nudibranch (*Dendrodoris germacea),* 11 arm star fish (*Coscinasterias calamaria*), cushion star (*Patirella regularis*), short tail sting ray (*Bathytoshia brevicaudata*), octopus (*Macroctopus maorum*), red rock crabs (*Guinusia chabrus*) and crayfish (*J. edwardsii*).

A fish survey using Baited Remote Underwater Video ('BRUV') was conducted at 4 sites in 2018 and 2019 close to the dredging area but at a distance from ship operations. Fish and ray abundance and diversity was examined amongst the four drop sites (Otumoetai Channel, Bridge Marina, Town Reach and Matapihi) (Leonard et al., 2020). In 2019, Leonard et al., detected kahawai (*Arripis trutta*), snapper (*Pagrus auratus*), kingfish and an eagle ray (*Myliobatis tenuicaudatus*) at Otumoetai Channel, parore (*Girella tricuspidata*), kahawai, yellow-eyed mullet (*Aldrichetta forsteri*), trevally (*Pseudocaranx georgianus*) and an eagle ray at Tauranga Bridge Marina, juvenile snapper at Town Reach, and snapper, trevally and eagle ray at Matapihi site. The species diversity was relatively even, with three ray species and eight fish species detected in 2018 compared to 2019 where there was one ray species and nine fish species detected. Fish counts were higher in 2019 compared to 2018, with juvenile snapper dominated the fish counts in 2019 (Leonard, 2020).

The Port area consistently supported species diversity and significant populations of adult fish, particularly kahawai. Species detected in 2019 included eagle ray, snapper, trevally, kingfish, gurnard (*Chelidonichthys kumu*), kahawai, parore, and spotty (*Notolabrus celidotus*) (Leonard et al., 2020).

BOPRC carried out Baited Underwater Video (BUV) survey of fish within reef systems of the Motiti Protection Areas (Astrolabe, Okarapu, Motuhaku, Motunau) and Motiti Island in 2021. The survey identified key species and species richness/diversity metrics compared to reef location, depth and biotic/abiotic factors to investigate species-habitat relationships (Crawshaw, 2022). A total of 33 reef species were identified in the footage, with snapper, red pigfish (*Bodianus unimaculatus*), two-spot demoiselle (*Chromis dispilus*), scarlet wrasse (*Pseudolabrus miles*) and leatherjacket (*Parika scaber***)** being the most common species detected. Fish populations differed significantly across reef locations and water depth, with the highest species richness and diversity at the offshore reefs compared to the unprotected Motiti Island reef sites.

Diadromous fish in Waipu Bay and surrounding estuary include short (*Anguilla australis*) and long fin eel (*Anguilla dieffenbachii*) (At Risk – Declining) (tuna).

In summary, these observations are indicative of a consistent and diverse fish population in Te Awanui, with the port area supporting significant adult fish populations. Recreational fishing is popular, and shark populations suggest a stable pelagic food web (Kellett, 2021)[20].

The active port area provides a suitable habitat for diverse and abundant fish (Leonard et al., 2020). Recreational fishers are often located in the Stella Passage and immediately adjacent to the wharfs/ships indicating suitably sized pelagic and semi-pelagic fish species (Battershill, 2022). Port operations and dredging activity do not appear to influence fish abundance (Battershill, 2022). In his summation of evidence for the Stella Passage POTL Environment Court Hearing, Battershill (2022) stated that the active port area supports suitable habitats for a range of fish species, including recreational target species, which I agree with.

5.0 Water quality

The water quality assessment (Stewart, 2025) characterises the Te Awanui water as having low visual water clarity, but also low turbidity and TSS.

Although nutrient parameters are relatively consistent across the harbour, Tilby Point (Matua) does display consistently higher nitrogen, phosphorus and chlorophyll-a concentrations compared to other sites surveyed in Te Awanui. The Wairoa River is the largest inflow into the harbour and is located close to the Tilby Point sample site. The ecological monitoring programmes show that fine sediments and mud are accumulating faster than background rates within the Harbour. The water quality results at Tilby Point do not appear to capture this with TSS and turbidity generally being low across the Harbour. Bacterial contamination is generally low across the Harbour. These results may be due to the site conditions being shallow and sediment is easily resuspended when windy, as well as the major inflow from the Wairoa River. Ecological data indicates many sites are accumulating fine sediment faster than background levels. However, the water quality results in this part of Te Awanui do not necessarily show this (Zygadlo, 2021).

Water quality monitoring undertaken for this Project shows negligible effects for water temperature, pH, salinity, and dissolved oxygen from dredging and disposal. The contribution of the dredged plume to eutrophication of Te Paritaha water is anticipated to have less than minor effects.

Hydrodynamic modelling of the dredging process undertaken by MetOcean Solutions show that TSS concentrations are highest within a 200m range of the dredging and reduce rapidly outside this zone, with the plume mostly contained within the shipping channels. Spikes in TSS concentrations are rare outside the 200m zone (Stewart, 2025).

The turbidity monitoring undertaken previously by POTL is from the active dredge zone 500m upstream of the dredging vessel (control) and 200m downstream, of which the downstream distance represents the mixing zone. The ANZECC (2000) trigger levels are based on long-term

[20] A research project on bronze whaler shark use of the harbour showed consistent utilisation by significant populations of these sharks over a 3+ year period, suggesting a long-term structure in the pelagic food web associated with the harbour.

monitoring and the effects on turbidity from the dredging campaign are transient. Therefore, comparison with the ANZECC (2000) default trigger level is conservative (Stewart, 2025).

The risk of toxicants entrained in the dredged sediment and leaching into the water column in concentrations above water quality guidelines is extremely low, with the effects on water quality likely to be negligible (Stewart, 2025).

For disposal of dredged sediment, one-off measurements were collected from the four corners and centre at the disposal sites B and C (**Figure 3**). While there were insufficient data for statistical analysis, all parameters were well within applicable water quality guidelines with minimal changes between sites (Stewart, 2025).

6.0 Water Quality for Shellfish Gathering

Five shellfish gathering sites (45%) in the Bay of Plenty region breached both faecal coliform thresholds in the New Zealand Microbiological Guidelines for Recreational Waters and are considered unsafe areas for collecting shellfish for human consumption. These sites are: Tauranga Harbour at Tilby Point, Tauranga Harbour at Anzac Bay, Waihi Estuary at Main Channel, Maketū at Surf Club, and Waiōtahe at Estuary (Dare, 2021; MfE, 2003).

BOPRC collected shellfish from their routine estuary survey sites (Crawshaw, 2021a) confirming shellfish from all Te Awanui sites were within safe standards for human consumption.

7.0 Sediment Grain Size

Leonard et al. (2020) and de Lange (2025) note the dominant benthic sediment grain size in Te Awanui is sand. de Lange (2022) notes fine sediment accumulates in the harbour margins in areas of high sediment supply and low wave activity, otherwise sediments generally contain <5% silt and clay.

Subtidal sediments in Tauranga Harbour, surveyed in 2016 for BOPRC, revealed sandy sediment (67-97% sand grain sizes) with low levels of nutrients (lower than intertidal sediments) and metals concentration. The upper reaches of channels had a higher proportion of mud, organic matter and nutrient concentrations compared to sites close to the main channels (Clark et al., 2018).

Measurements undertaken during maintenance dredging campaigns by the POTL show that sediments within the shipping channel are generally sandy with low silt content (<2.5%) (Stewart, 2025).

8.0 Sediment Quality

The presence of metals in the harbour is likely due to both natural sources and human-derived inflows (Leonard et al., 2020). BOPRC monitor sediment contaminants throughout the region, and in 69 sites in Te Awanui. A five year mean concentration of heavy metals revealed all sites were below the Australian and New Zealand Governments (**ANZG**) default guideline values (**DGVs**) and most sites were graded as Very Good (see table 6, (Crawshaw, 2021a).

Metals were highest in sediment from the urbanised southern harbour. Metal/metalloids and organic toxicant concentrations in Te Paritaha sediment are generally low with most well below applicable Australian and New Zealand Governments (**ANZG**) default guideline values (**DGVs**) (Crawshaw, 2021a) (Stewart, 2025). All metals surveyed for the Stella Passage development were found in concentrations below recommended Default Guideline Values (DGV) as indicated by the Australia and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, 2018) (Leonard et al., 2020).

Contaminants measured in sediments from the shipping channel and sites of importance (e.g. Te Paritaha) and in proximity to the Port to inform this assessment were generally detected in low concentrations, but increasing with proximity to the Port (Stewart, 2025).

Sediment from the proposed dredge sites generally have low toxicity, similar to the receiving environment sites. Therefore, the risk of toxicants being entrained in the dredged sediment and leaching into the water column in concentrations above water quality guidelines is extremely low, with the effects on water quality likely to be negligible (Stewart, 2025).

Seven sites in the channel and one at the main disposal site were surveyed for sediment quality between December 2023 and February 2024 (Stewart, 2025) (**Figure 14**). The results are summarised by Stewart (2025) as follows:

Polychlorinated bi-phenols (PCBs), Tri-butyl tins (TBT) PAHs, and organochlorine pesticides (OCPs) were all below laboratory detection limits, whereas metals were detectable but below the DGV thresholds. Antimony, cadmium, copper, mercury, and silver were below laboratory detection limits at all or most sites and well below applicable ANZG DGVs. Metal concentrations were generally higher at Site 5 (Southern Channel) (**Figure 14**). Total petroleum hydrocarbons (TPH) in sediment samples were well below the ANZG DGV.

Total organic carbon at sites 1-4 (**Figure 14**) was <0.13 g/100g but was higher at site 5 (0.64 g/100g). Site 5 had a high proportion of mud (23%) relative to the other sites (1.4%-2.5%) (**Figure 14**). This higher mud component at Site 5 is likely contributing to the higher toxicant concentrations at this site.

Nutrients in sediments in Tauranga Harbour are generally low, with 85% of sites were graded as “good”. Heavy metals are measured at 65 intertidal sites in Tauranga Harbour annually. Levels of heavy metal contaminants are generally low, with almost two thirds of sites being graded as very “good”. Just over one third of sites were graded as “good”, and no sites were graded as “fair” or “poor”. All sites were well below the Australia and New Zealand guidelines (ANZECC, 2000) interim sediment quality guidelines (now ANZG default trigger guidelines) for the protection of aquatic life (Clark et al., 2018).

The rate of sedimentation in Tauranga Harbour has increased over the years because of population growth, changing land use and soil disturbance related to development. Sedimentation deposition and sedimentation rates are surveyed at 65 sites across Tauranga Harbour. Sediment is accumulating at higher levels than background rates at 59% of the sites BOPRC monitor. At 41% of sites sedimentation rate is graded as very good, 14% as good, 36% as “fair” and 10% as “poor”. Less than half of the monitoring sites for mud deposition were graded as “very good” or “good” (46%). A third of all sites had a mud content that was graded as “poor” (33%) (Clark et al., 2018).

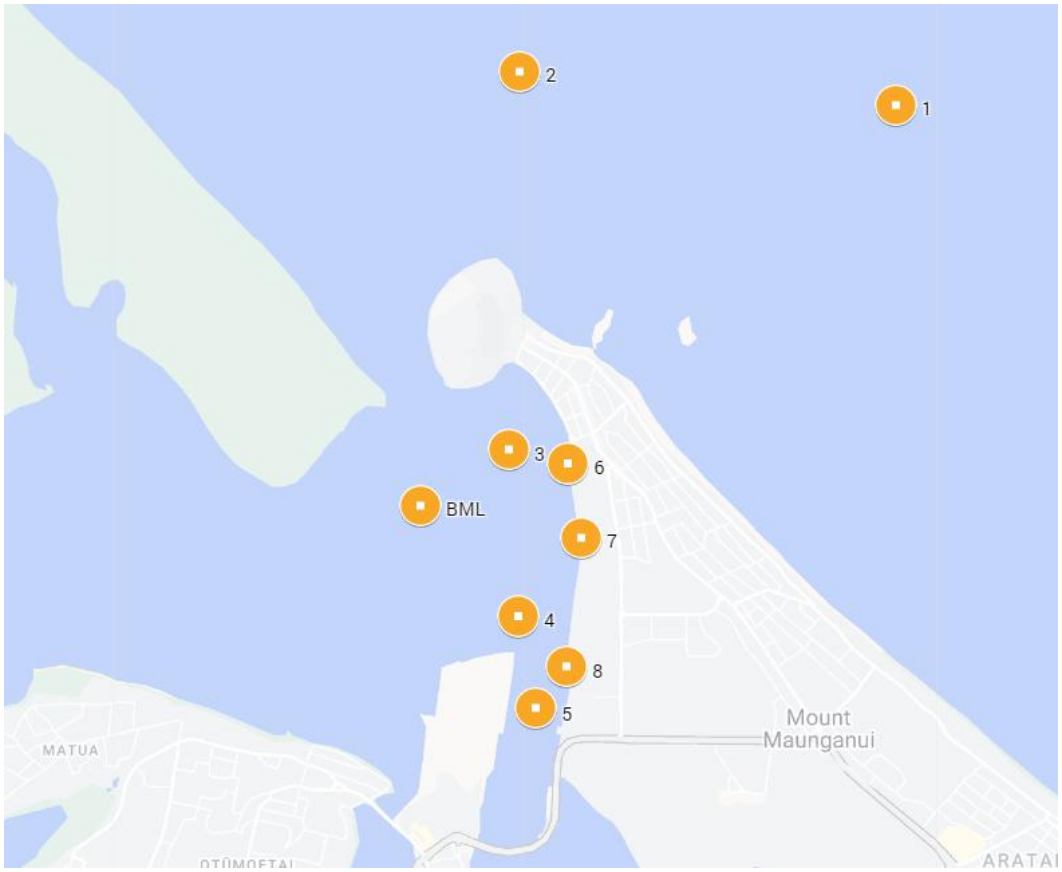


Figure 14: 2024 Surface sediment survey adjacent to the Port (Figure 15 from Stewart 2025).

9.0 Marine Biosecurity

Since 2002, Te Awanui has been included in the government-funded National Marine High Risk Site Surveillance (NMHRSS) programme. This programme implements surveys every 6 months for a selected suite of target non-indigenous species (NIS) at high-risk sites around the country. The NMHRSS programme is designed to detect the presence of five primary target NIS (*Asterias amurensis, Carcinus maenas, Caulerpa taxifolia, Eriocheir sinensis*, and *Potamocorbula amurensis*) and four secondary target NIS (*A. senhousia, Eudistoma elongatum, Sabella spallanzanii*, and *S. clava*). Each High Risk Site is surveyed bi-annually (Woods et al., 2019).

Since the more intensive baseline surveys were completed in 2002 and 2005, four secondary target species have been documented through NMHRSS surveys within Te Awanui (the Asian date mussel *A. senhousia*, the asicidans *Didemnum vexillum* and *S. clava*, and the Mediterranean fanworm *S. spallanzanii*) (Fletcher 2023 POTL memorandum). A single specimen of a recently introduced invasive solitary, subtidal ascidian tunicate (*S. clava)* was observed on one wharf pile in the Stella Passage Marine Ecology Assessment (Leonard et al.,

2020) based on a small area of wharf pile scrapings taken from the east and west of Stella Passage.

Dredge vessels arriving from overseas or from outside the Bay of Plenty region are the primary biosecurity risk associated with the proposed activities (Fletcher, 2025). In particular, elevated risk occurs if the vessels' region of origin has marine NIS of concern not currently present within the Bay of Plenty, and if risk mitigation measures have not been implemented for these vessels prior to their passage to POTL.

Dredge spoil disposal can also act as a pathway for the inadvertent transfer of marine NIS from the dredge location to the spoil disposal grounds. The majority of NIS established within Tauranga Harbour are sessile filter-feeding invertebrates (e.g. sponges, hydroids, bryozoans, ascidians) and seaweed species that primarily colonise hard substrates. There is likely to be a lack of suitable habitats for these taxa at the disposal grounds. The fanworm *S. spallanzanii* presents a specific risk that may warrant additional safeguards (e.g. pre-dredging surveillance).

The proposed dredging activities within Tauranga Harbour are likely to present an incremental change in marine biosecurity risk over the existing situation, primarily associated with vessel movements and dredge spoil disposal. POTL proposes to manage all biosecurity risks in an integrated way through the development and implementation of a comprehensive biosecurity management plan (BMP) (Fletcher, 2025).

Fletcher (2025) concludes that if the proposed mitigation measures above are implemented appropriately, the residual marine biosecurity risk is expected to be negligible.

As stated above, the risk of transfer of exotic invasive species from the dredging for this Project will be managed by existing surveillance programs and likely increased invasive species surveillance at the time of any proposed dredging and disposal would further mitigate this risk.

The reef benthic communities at Motuotau Island exhibited stability, diversity, and structural complexity, comparable to other reefs in the area. The 2022 and 2024 surveys did not find any changes in the community structure that could be attributed to the Port of Tauranga's dredging activities, nor did earlier surveys (Boffa Miskell Ltd, 2023c).

At offshore, deep-water locations where dredge deposition has occurred in previous dredging campaigns and deposition is proposed for the current reconsenting, suitable habitat does not exist for invasive sessile invertebrate organisms.

10.0 Disposal areas

Dredged sediment is currently deposited offshore in soft sediment habitats in accordance with resource consents (**Figure 3**). Since 1990, a monitoring program has been in place to assess the impacts of dredge spoil dumping on the nearest subtidal rocky reef communities (Motuotau Island) (c. 1.28km to the west of Motuotau Island is disposal site D, and 500m to the southwest are disposal sites B and C (for Marine Parade Replenishment).

The main effect at disposal sites on marine ecological values is the smothering of existing soft sediment benthic invertebrate communities. The existing invertebrates perish beneath deposited sediment. However, the newly placed dredge spoil will be recolonised by similar species with the resultant community in 1-3 years being similar.

Blom et al. (1993) surveyed the soft sediment dredging disposal area (similar to disposal areas B and C in **Figure 3**) (five sites - stations 3, 5, 6, 8, and 9) and control sites (to the south east of the disposal site) (station 12) for benthic marine invertebrate community pre-dredging (1991) and post-dredging (1992) (**Figure 15**). The results indicated high variability between and within stations, thought to reflect the natural variability of the heterogeneous clumped communities, resulting in site specific differences. Blom et al. (1993) found that the control site (station 12) and disposal site (station 6) had similar abundance pre and post dredging for bivalve and polychaete, but amphipods showed significant decline in abundance (**Figure *15***). Station 5 (middle of the disposal area) showed the greatest community changes pre and post dredging. However, sediments at the disposal site were aerobic enabling recruitment of juvenile bivalves (nine weeks after dredge disposal) between the pre-dredging and post-dredging surveys. Pipi was also present at the disposal site during the post-dredging survey, indicating that pipi had been translocated to the disposal site (in dredge material) and survived.

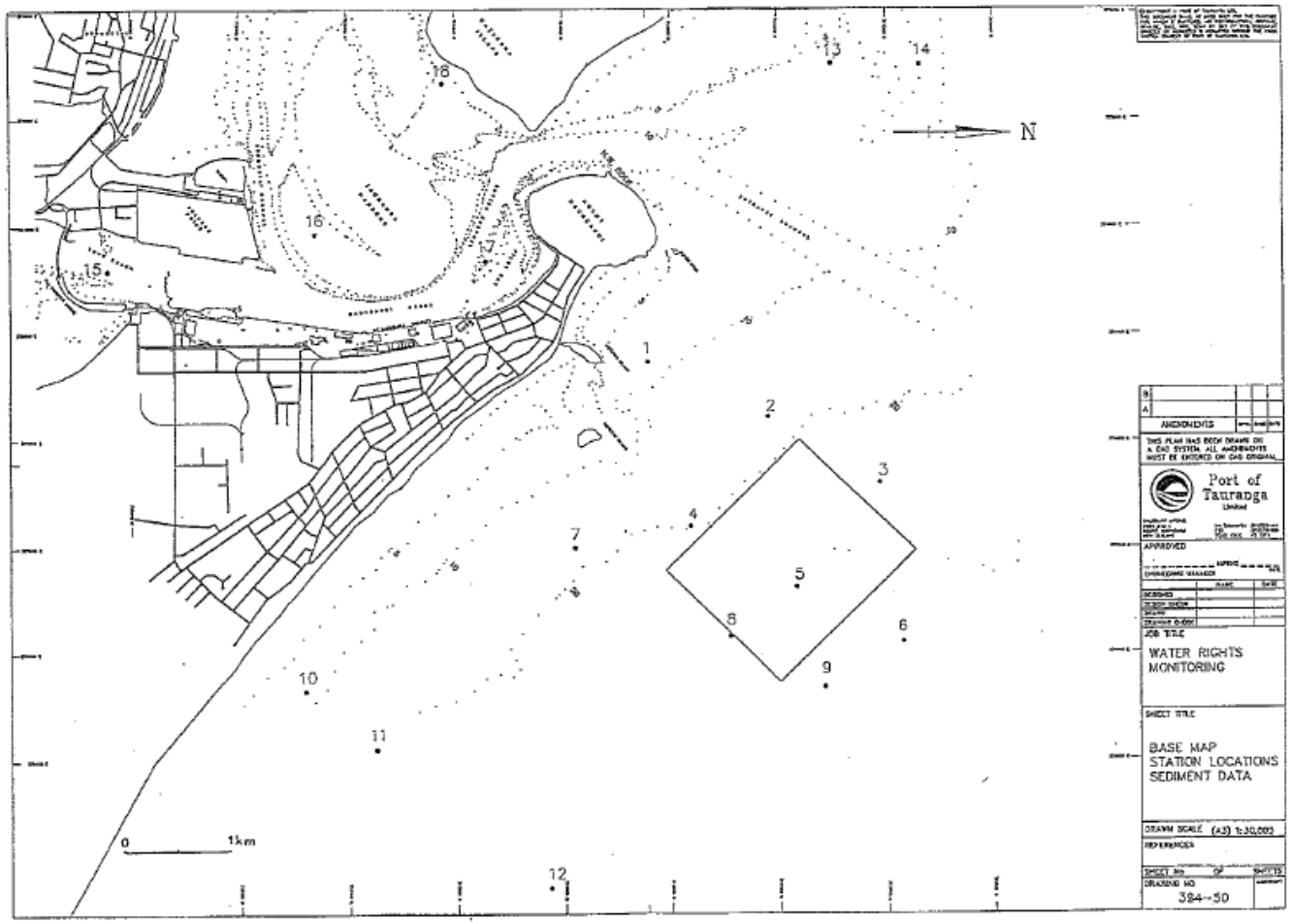


Figure 1. Biological monitoring station locations, showing 3 transects with stations 1-9 across the water right area (black outline), and a control transect with stations 10-12 to the south east. Stations 13-18 are sited in or near the harbour.

Figure 15: Survey sites within disposal site and control sites (from Blom et al., 2003)

10.1 Benthic invertebrate monitoring adjacent to Disposal Site H1

The POTL carried out benthic invertebrate community monitoring at two sites adjacent to the H1 disposal sites (site 2 and 7) in July 2025, required to be surveyed prior to next phase of the existing consented capital dredging is carried out (as a condition of consent). The methodology proposed was consistent with the method of (Grace & Blom, 1992) where baseline and post-dredging biological marine ecology monitoring was carried out (

Figure *16*).

Grace (1992) found the variation in samples was high within sites (among replicates) and between sites (Grace sampled 18 sites). An alternative to the slider sampler used by Grace (1992) is to collect 10 (11cm diameter cores to 10cm depth) per replicate[21] (which is the same sample volume as the slider - approximately 0.1m^2). Ten cores within the five[13] replicate stations within each of the two sites were collected adjacent to each other (c. 0.5m apart) in areas of soft sediment habitat (see replicate stations in blue and red squares above.

A 0.5mm mesh bag was attached to the upper end of each core, and once the core was dug out and removed from the substrate, the contents of the core were contained in the mesh bag. The ten bags of sediment cores (forming one composite replicate) were brought to the surface, where they were be sieved as per below and organisms combined to form one replicate for each sieve size.

The samples were sieved using 6mm, 2mm and 1mm mesh sieves (as per Grace, 1992), and each sieved component preserved and later analysed by an aquatic taxonomy expert for species and counts.

The diversity and abundance results were statistically analysed, compared to Grace and Blom (1992), using an unbalanced statistical design, and submitted to POTL and BOPRC as an interim report by 22 December 2025 (Boffa Miskell, 2025c).

[21] It is my opinion, based on the data collected by Grace and Blom (1992) that ten replicates (of 0.1m^2) per site is excessive replication. I consider five replicates would be sufficient to assess the biodiversity and variability and compare to the Grace and Blom (1992) samples. Five replicates (10 cores per replicate or one slider sample per replicate) per site would involve 50 core samples or 5 slider samples per site.

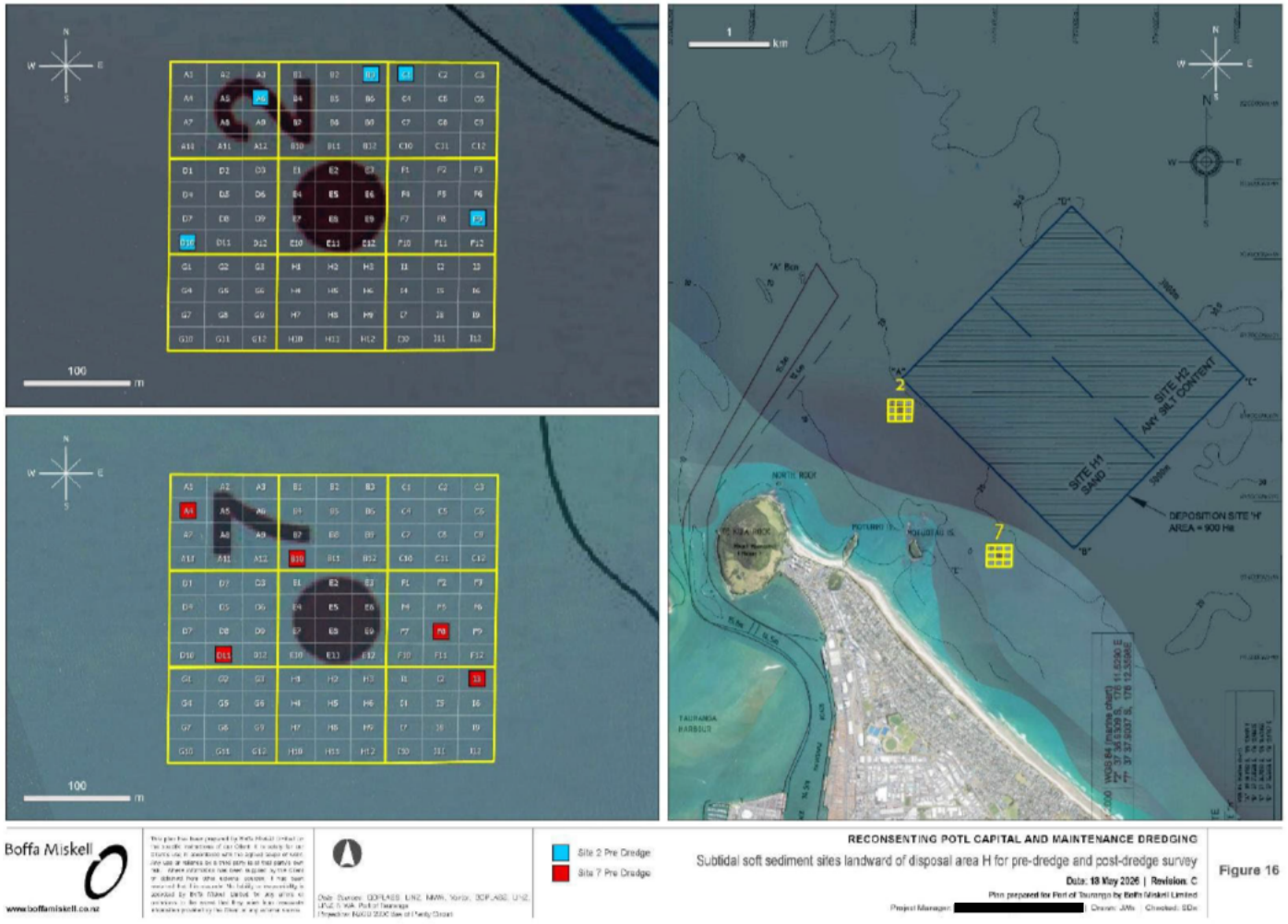


Figure 16: Pre-disposal subtidal soft sediment stations (2 and 7) landward of disposal area H.

The data from Grace and Blom (1992) for the 6mm or 4mm sieve mesh sizes was not attached to their report (only 1mm data was provided for Stations 2 and 7) and it was not clear whether the data was collected and not reported on or whether it was not collected at all. However, in the 2025 data we do have the 2mm and 6mm data in addition to the 1mm data. The 2mm data, in terms of range of species, is not particularly different to the 1mm data, however the 6mm data indicated an abundance of bivalves not detected in the 1mm size fraction, primarily morning start shell (*T. spissa*) which had an average abundance of 157 per replicate at station 2 (closest to disposal site H1) and 27 per replicate at station 7. These values are considerably higher than those recorded by Grace and Blom (1992) at two nearby stations before the spoil disposal began (average of 10 individuals per sample at Station 5 and average of less than one individuals per sample at Station 6).

Tawera spp. individuals occupy fine to coarse sand and light gravel substrates just below the sediment surface. *Tawera* spp. depth range is typically just below the low tide mark down to approximately 200m depth. The presence/dominance of the bivalve *Tawera* spp. at stations 2 and 7 (particularly station 2) indicates that the invertebrate community has not been impacted by smothering from dredge disposal moved from the H disposal area by coastal processes.

These data form a robust basis for monitoring benthic community composition post capital dredging disposal in 2025/2026. Repeat surveys will be undertaken at station 2 and 7 at the same time of year upon completion of the capital dredging disposal, in order to determine if any significant differences have occurred in benthic community composition landward of disposal site H (benthic invertebrate replicate core samples will be sieved to 1mm and 6mm in order to capture the abundance of bivalves).

11.0 Marine Ecology Assessment Methodology.

The approach used to undertake this assessment is in line with the EIANZ guidelines for undertaking ecological impact assessments Roper-Lindsay et al., *Ecological Impact Assessment (EcIA). EIANZ Guidelines for Use in New Zealand: Terrestrial and Freshwater Ecosystems*., whereby ecological values (**Table 5**) are assigned (**Table 10** and **Table 11**), and the magnitude of effects identified (**Table 12**), in order to help determine the overall level of effect of the proposal (**Table 13**).

The marine ecological values described in this report are based on criteria that range from negligible to very high (**Table 10** and **Table 11**).

According to Roper-Lindsay et al. (2018), the overall level of effect can then be used to guide the extent and nature of the ecological management response required:

- Very high adverse effects require a net biodiversity gain[22] (the comparative RMA language is significant adverse effects)
- High and moderate adverse effects require no net loss of biodiversity values (the comparative RMA language is between “significant” adverse effects and “minor” adverse effects)

[22] Though when ecological compensation is required because biodiversity offsetting is not possible, the principles of no-net-loss or net-gain do not apply (Maseyk et al., 2018).

- Low and very low effects are not typically of ecological concern. If effects are assessed taking impact management developed during Project shaping into consideration, then it is essential that prescribed impact management is carried out to ensure low or very low effects (the comparative RMA language is between "less than minor" adverse effects and "de minimus" adverse effects).

Very recently (November 2024), guidelines/criteria for the assessment of marine ecological values have been developed and are now published on the EIANZ website. The marine guidelines have involved Dr De Luca as lead collaborator and have drawn on the approach used in Dr De Luca's previous expert witness evidence for Board of Inquiry and Environment Court consenting processes for major infrastructure Projects.

To fully understand the effects of the proposal, this assessment has been undertaken at two spatial scales, being the Reconsenting of Capital and Maintenance Dredging scale and the southern Te Awanui (Tauranga Harbour) scale. This assessment involves investigating effects of the proposal in relation to two different spatial scales and considering the different ecological context and values of Reconsenting of Capital and Maintenance Dredging versus the entire Southern Harbour and describing how these ecological values will/will not be impacted.

Table 10: Qualitative and quantitative fine scale attributes for assigning ecological values for rocky/hardshore benthic habitats

ECOLOGICAL VALUE	ATTRIBUTE
VERY HIGH	Rocky/artificial substrate abundant, providing very high topographic complexity
	Very low sediment cover on rocky substrate
	Very high diversity and abundance of sessile benthic organisms for the habitat type
	Very high diversity and abundance of mobile macroinvertebrates for the habitat type
	Sessile and mobile benthic organisms comprise many sensitive taxa. Invasive, opportunistic and/or disturbance tolerant species largely absent or low abundance.
	Biogenic habitat formations (e.g., perennial algal canopies, shellfish aggregations) have very large spatial extent and very low patchiness
	Very high diversity and abundance of fish[23] for the habitat type
	Threatened or At Risk marine species[2] present and may be abundant
	Large areas of threatened ecosystem type present
	Habitat unmodified
	Water quality contaminant concentrations typically at or better than ANZG 99% species protection level and/or scored as 'Excellent' on a recognised Water Quality Index (WQI).
HIGH	Rocky/artificial substrate abundant, providing high topographic complexity
	Low sediment cover on rocky substrate
	High diversity and abundance of sessile benthic organisms for the habitat type
	High diversity and abundance of mobile macroinvertebrates for the habitat type

[23] Species of fish and other large fauna can be separated into individual values assessment, depending on the scale of the activity and the species present.

ECOLOGICAL VALUE	ATTRIBUTE
	Sessile and mobile benthic organisms comprise many sensitive taxa. Invasive, opportunistic and/or disturbance tolerant species largely absent
	Biogenic habitat formations (e.g., perennial algal canopies, shellfish aggregations) have large spatial extent and low patchiness
	High diversity and abundance of fish for the habitat type
	Threatened or At Risk marine species[2] present
	Threatened ecosystem type present
	Limited habitat modification
	Water column contaminant concentrations typically between ANZWQG 95% and 99% species protection levels and/or scored as 'Good' on a recognised WQI
MODERATE	Rocky/artificial substrate provides moderate topographic complexity
	Moderate sediment cover on rocky substrate
	Moderate diversity and abundance of sessile benthic organisms for the habitat type
	Moderate diversity and abundance of mobile macroinvertebrates for the habitat type
	Sessile and mobile benthic organisms comprise both tolerant and sensitive taxa
	Biogenic habitat formations (e.g., perennial algal canopies, shellfish aggregations) have moderate spatial extent and moderate patchiness
	Moderate diversity and abundance of fish for the habitat type
	Few Threatened or At Risk marine species[2] present
	Few Threatened ecosystems present
	Moderate habitat modification
	Water column contaminant concentrations typically between ANZWQG 90% and 95% species protection levels and/or scored as 'Fair' on a recognised WQI
LOW	Rocky/artificial substrate provides limited topographic complexity
	High sediment cover on rocky substrate
	Low diversity and abundance of sessile benthic organisms for the habitat type, but high cover of opportunistic macroalgae possible
	Low diversity and abundance of mobile macroinvertebrates for the habitat type
	Sessile and mobile benthic organisms comprise mostly invasive, opportunistic and disturbance-tolerant taxa, with very few sensitive taxa present
	Biogenic habitat formations (e.g., perennial algal canopies, shellfish aggregations) absent, but biogenic habitat formers may be present in low abundance
	Low diversity and abundance of fish for the habitat type
	No Threatened or At Risk marine[2] species present
	No Threatened ecosystem type present
	High habitat modification
	Water column contaminant concentrations typically between ANZWQG 80% and 90% species protection levels and/or scored as 'Marginal' on a recognised WQI
NEGLIGIBLE	Rocky/artificial substrate sparse, providing limited topographic complexity
	Rocky substrate smothered by sediment
	Very low diversity and abundance of sessile benthic organisms for the habitat type

ECOLOGICAL VALUE	ATTRIBUTE
	Very low diversity and abundance of mobile macroinvertebrates for the habitat type
	Sessile and mobile benthic organisms comprise only invasive, opportunistic and disturbance-tolerant taxa, with no sensitive taxa present
	Biogenic habitat formations (e.g., perennial algal canopies, shellfish aggregations) absent
	Very low diversity and abundance of fish for the habitat type[24]
	No Threatened or At Risk marine species[25] present
	No Threatened ecosystem[26] type present
	Very High habitat modification
	Water column contaminant concentrations typically at or worse than ANZWQG 80% species protection levels and/or scored as 'Poor' on a recognised WQI

Table 11: Qualitative and quantitative fine scale attributes for assigning ecological values for soft sediment benthic habitats[27]

ECOLOGICAL VALUE	ATTRIBUTE
VERY HIGH	Benthic invertebrate community typically has very high diversity, species richness and abundance for the habitat type
	Benthic invertebrate community is dominated by taxa that are sensitive to organic enrichment, contaminants and mud e.g. rated as 'Excellent' using the Auckland Council (AC) or National Benthic Health Model (BHM)[28] or similar index
	Invasive opportunistic and disturbance tolerant species absent[29]
	Marine sediments typically comprise < 20% silt and clay grain sizes[30] (mud) or rated as 'Excellent' using the AC BHMmud or similar index
	Surface sediment oxygenated to >5 cm depth[31] with no anoxic sediment present
	Annual average sedimentation rates typically less than 1 mm above background levels [32]

[24] Species of fish and other large fauna can be separated into individual values assessment, depending on the scale of the activity and the species present.

[25] Marine mammals and coastal birds have been excluded as a characteristic of marine habitats as separate specialist experts in marine mammals and coastal birds should be engaged. Marine mammals and coastal birds can form part of the characteristics around presence of 'Threatened' or 'At Risk' species when supported by a relevant experts. For this project see McConnell (2025) and Bennet (2025).

[26] As per (Holdaway et al., 2012) for this parameter in all levels of ecological value.

[27] Methodologies and considerations for measuring a number of these attributes can be found within the "National Estuary Monitoring Protocol" and "Managing Upstream" project reports. Go to https://environment.govt.nz/publications/ to search for the latest versions.

[28] Hewitt, J E., Lohrer, A M and Townsend, M (2012). Health of estuarine soft-sediment habitats: continued testing and refinement of state of the environment indicators. Prepared by NIWA for Auckland Council. Auckland Council technical report, TR2012/012

[29] https://www.marinebiosecurity.org.nz/

[30] Silt and clay percentage of sediment adjusted to be consistent with BHMud Model

[31] Robertson, B.M, Stevens, L., Robertson, B., Zeldis, J., Green, M., Madarasz-Smith, A., Plew, D., Storey, R., Oliver, M. 2016. NZ Estuary Trophic Index Screening Tool 2. Determining Monitoring Indicators and Assessing Estuary Trophic State. Prepared for Envirolink Tools Project: Estuarine Trophic Index, MBIE/NIWA Contract No: C01X1420. 68p.

[32] Townsend and Lohrer (2015). ANZECC Guidance for Estuary Sedimentation. Prepared for Ministry for the Environment by NIWA

ECOLOGICAL VALUE	ATTRIBUTE
	Contaminant concentrations in surface sediment significantly below DGV and AC ERC-Orange effects threshold concentrations[33].
	Contaminant concentrations in shellfish at or below natural background levels or not above conservative laboratory detection limits
	Water column contaminant concentrations typically at or better than ANZWQG 99% species protection level and/or scored as 'Excellent' on a recognised Water Quality Index (WQI)[34]
	Fish community typically has very high diversity, species richness and abundance[35]
	Native estuarine vegetation or macroalgae community intact and provides significant habitat for native fauna
HIGH	Benthic invertebrate community typically has high diversity, species richness and abundance for the habitat type
	Benthic invertebrate community contains many taxa that are sensitive to organic enrichment, contaminants and mud. E.g. rated as 'Good' using the AC or National BHM or similar index
	Invasive opportunistic and/or disturbance tolerant species largely absent
	Marine sediments typically comprise <40% silt and clay grain sizes or rated as 'Good' using the AC BHMmud or a similar index
	Surface sediment oxygenated up to 5cm depth
	Annual average sedimentation rates typically less than 2 mm above background levels
	Contaminant concentrations in surface sediment rarely exceed DGV concentrations and AC ERC-Orange effects threshold concentrations.
	Where shellfish are present, flesh has contaminant concentrations close to natural background levels or not above conservative laboratory detection limits
	Water column contaminant concentrations typically between ANZWQG 95% and 99% species protection levels and/or scored as 'Good' on a recognised WQI
	Fish community typically has high diversity, species richness and abundance
	Native estuarine vegetation or macroalgae community dominated by native species and provides high quality habitat for native fauna
	Nuisance phytoplankton or macroalgal blooms may occur infrequently at a limited spatial scale
	Threatened or At Risk marine species present
	Threatened ecosystem types present
	Physical habitat largely unmodified
MODERATE	Benthic invertebrate community typically has moderate species richness, diversity and abundance for the habitat type
	Benthic invertebrate community has taxa both tolerant and sensitive to organic enrichment, contaminants and mud present E.g. rated as 'Fair' using the AC or National BHM or similar index
	Few invasive opportunistic and/or disturbance tolerant species present
	Marine sediments typically comprise less than <60% silt and clay grain sizes or rated as 'Fair' using the AC BHMmud or similar index
	Shallow depth of oxygenated surface sediment to 1-2 cm depth
	Annual average sedimentation rates typically less than 5 mm above background

[33] ANZG (2018) Default Guideline Value concentrations, or Auckland Council's Environmental Response Criteria contaminant threshold concentrations (Auckland Regional Council TP168, 2004)

[34] E.g., Ingley, R (2021). Coastal and estuarine water quality state and trends in Tāmaki Makaurau / Auckland 2010-2019. State of the environment reporting. Auckland Council technical report, TR2021/02.

[35] https://www.mpi.govt.nz/legal/legislation-standards-and-reviews/fisheries-legislation/maps-of-nz-fisheries/

ECOLOGICAL VALUE	ATTRIBUTE
	levels
	Contaminant concentrations in surface sediment generally below DGV and AC ERC-Red effects threshold concentrations[36]
	Where shellfish are present, flesh has low to moderate contaminant concentrations present compared to natural background levels
	Water column contaminant concentrations typically between ANZWQG 90% and 95% species protection levels and/or scored as 'Fair' on a recognised WQI
	Fish community typically has moderate species richness, diversity and abundance
	Native estuarine vegetation and macroalgae community dominated by native species and provides moderate habitat for native fauna
	Nuisance phytoplankton or macroalgal blooms may occur sporadically over a moderate spatial scale
	Few Threatened or At Risk marine species present
	Few Threatened ecosystems present
	Physical habitat moderately modified
LOW	Benthic invertebrate community degraded with low species richness, diversity and abundance for the habitat type
	Benthic invertebrate community dominated by organic enrichment tolerant, contaminant tolerant and mud tolerant organisms with few/no sensitive taxa present e.g. rated as 'Marginal' using the AC or National BHM or similar index
	Invasive, opportunistic and/or disturbance-tolerant species dominant
	Marine sediments dominated by silt and clay grain sizes (>60%) or rated as 'Marginal' using the AC BHMmud or similar index
	Surface sediment predominantly anoxic (lacking oxygen)
	Annual average sedimentation rates typically less than 10 mm above background levels
	Elevated contaminant concentrations in surface sediment, between ANZG Default Guideline Values (DGV) and GV-High effects threshold concentrations
	Where shellfish are present, flesh has moderate contaminant concentrations present compared to natural background levels
	Water column contaminant concentrations typically between ANZWQG 80% and 90% species protection levels and/or scored as 'Marginal' on a recognised WQI
	Fish community depleted with low species richness, diversity and abundance
	Native estuarine vegetation and/or macroalgae community provides minimal/limited habitat for native fauna.
	Nuisance phytoplankton or macroalgal blooms may occur commonly over a moderate scale
	No Threatened or At Risk marine species present
	No Threatened ecosystem present
NEGLIGIBLE	Physical habitat highly modified
	Benthic invertebrate community dominated by organic enrichment tolerant, contaminant tolerant, and mud tolerant organisms with no sensitive taxa present. E.g. rated as 'Poor' using the Auckland Council or National[37] Benthic Health Models or similar indices
	Invasive, opportunistic and disturbance tolerant species highly dominant

[36] Auckland Council's Environmental Response Criteria contaminant threshold concentrations (Auckland Regional Council TP168, 2004).

[37] D.E. Clark, J.E. Hewitt, C.A. Pilditch, J.I. Ellis (2020). The development of a national approach to monitoring estuarine health based on multivariate analysis. Marine Pollution Bulletin, Volume 150.

ECOLOGICAL VALUE	ATTRIBUTE
	Marine sediments dominated by silt and clay grain sizes (>80%) or rated as 'Poor' using a BHMmud or similar index
	Surface sediment anoxic (lacking oxygen)
	Annual average sedimentation rates typically greater than 10 mm above background levels
	Elevated contaminant concentrations in surface sediment, above ANZG Guideline Values – High (GV-High) effects threshold concentrations[38]
	Where shellfish are present, flesh has moderate-high contaminant concentrations Present compared to natural background levels
	Water column contaminant concentrations typically at or worse than ANZWQG 80% species protection levels and/or scored as 'Poor' on a recognised WQI
	Fish community depleted with very low species richness, diversity and abundance[39]
	Native estuarine vegetation or macroalgae absent or so sparse as to provide very limited ecological value
	Nuisance phytoplankton or macroalgal blooms may occur frequently over a large spatial scale
	No Threatened or At Risk marine species present[40]
	No Threatened ecosystems present
	Physical habitat extremely modified

Table 12: Criteria for describing magnitude of effect (Roper-Lindsay et al., 2018).

MAGNITUDE	DESCRIPTION
VERY HIGH	Total loss of, or very major alteration, to key elements/ features of the baseline conditions such that the post development character/ composition/ attributes will be fundamentally changed and may be lost from the site altogether; AND/OR Loss of a very high proportion of the known population or range of the element / feature.
HIGH	Major loss or major alteration to key elements/ features of the existing baseline conditions such that the post-development character, composition and/or attributes will be fundamentally changed; AND/OR Loss of a high proportion of the known population or range of the element / feature.
MODERATE	Loss or alteration to one or more key elements/features of the existing baseline conditions, such that post-development character, composition and/or attributes will be partially changed; AND/OR Loss of a moderate proportion of the known population or range of the element / feature.
LOW	Minor shift away from baseline conditions. Change arising from the loss/alteration will be discernible, but underlying character, composition and/or attributes of the existing baseline condition will be similar to pre-development circumstances/patterns; AND/OR

[38] ANZG (2018) Australian and New Zealand Guidelines for Freshwater and Marine Water Quality (replaced previous ANZECC guidelines)

[39] Species of fish and other large fauna can be separated into individual values assessment, depending on the scale of the activity and the species present

[40] Marine mammals and coastal birds have been excluded as a characteristic of marine habitats as separate specialist experts in marine mammals and coastal birds should be engaged. Marine mammals and coastal birds can form part of the characteristics around presence of 'Threatened' or 'At Risk' species when supported by relevant experts

MAGNITUDE	DESCRIPTION
	Having a minor effect on the known population or range of the element / feature.
NEGLIGIBLE	Very slight change from existing baseline condition. Change barely distinguishable, approximating to the "no change" situation; AND/OR Having a negligible effect on the known population or range of the element / feature.

Table 13: Based on the criteria for describing the level of effect (Roper-Lindsay et al., 2018)

LEVEL OF EFFECT		ECOLOGICAL AND / OR CONSERVATION VALUE				
		Very High	High	Moderate	Low	Negligible
MAGNITUDE	Very High	Very High	Very High	High	Moderate	Low
	High	Very High	Very High	Moderate	Low	Very Low
	Moderate	High	High	Moderate	Low	Very Low
	Low	Moderate	Low	Low	Very Low	Very Low
	Negligible	Low	Very Low	Very Low	Very Low	Very Low
	Positive	Net gain	Net gain	Net gain	Net gain	Net gain

12.0 Assessment of Marine Ecological Values

The ecological values of the marine environment within the dredging and disposal areas and the Southern Te Awanui are overall assessed as High (**Table 10** and **Table 11**), based on the following criteria relevant to the Project.

Table 14: Assessment of Existing Hard Shore Marine Ecology against the relevant criteria (Table 10)

Ecological Value	Criteria / Characteristic	Data Summary (with reference to Section 3.0)
LOW (Dredge and Disposal areas) AND MODERATE (Southern harbour)	Physical habitat highly modified[41] (Dredge and Disposal Areas). Physical habitat moderately modified (Southern Harbour)	The dredge and disposal and southern harbour physical habitat has been highly modified by various activities and infrastructure, with the harbour bridge to the south, causeway to the east, marina to the southwest, Sulphur Point reclamation and wharves to the south, Mount Maunganui reclamations and wharves to the north and the dredged shipping channel. The wider southern harbour can be considered modified due to the existing and historic dredging, wharf construction, sedimentation and there being only around 60 % of natural coastal edge remaining (**Figure 4**)
MODERATE (Dredge and Disposal Areas) AND HIGH	Hard shore habitat comprises wharf piles primarily plus reclamation revetments[42] (Dredge and Disposal Areas). and Rocky shores of Mauão (Southern Harbour)	The physical habitat has been highly modified by various activities and infrastructure, with the harbour bridge to the south, causeway to the west, marina to the southeast, Sulphur Point reclamation to the south, Mount Maunganui reclamations to the north and the dredged shipping channel.

[41] The shipping channel, dredge and disposal areas have been highly modified by various activities and infrastructure, with the harbour bridge to the south, causeway to the east, marina to the southeast, Mount Maunganui wharves to the east and Sulphur Point reclamation to the west.

Ecological Value	Criteria / Characteristic	Data Summary (with reference to Section 3.0)
(Southern harbour)		The wider southern harbour can be considered modified due to the existing and historic dredging, sedimentation and there being only around 60 % of natural coastal edge remaining (Figure 4). Wharf piles are artificial but provide habitat for a range of sessile and encrusting species. Mauao rocky shores contain a range of rocky shore sessile and encrusting species as well as mobile benthic organisms.
MODERATE (Dredge and Disposal Areas and Southern Harbour)	Few invasive opportunistic and/or disturbance tolerant species present[43].	The asicidans *Didemnum vexillum* and *Styela clava,* and the Mediterranean fanworm *Sabella spallanzanii* are present on hard structures in the wider harbour.
	Water column contaminant concentrations typically between ANZWQG 90% and 95% species protection levels and/or scored as 'Fair' on a recognised WQI[44].	Water quality data revealed metal/metalloid estuarine water concentrations were low and below ANZG 99% marine DGV (Crawshaw, 2021).
	High diversity and abundance of fish for the habitat type.	The wharf structures at Mt Maunganui and Sulphur Point have high marine biodiversity (including a range of anemones, barnacles, sponges, sea squirts and hydroids). All pile communities are representative of a complex, healthy estuarine/harbour habitat.
HIGH (Dredge and Disposal Areas and Southern Harbour)	High diversity and abundance of fish for the habitat type	There is a consistent and diverse fish population in Te Awanui, with the port area supporting significant juvenile and adult fish populations, including eagle ray, snapper, trevally, kingfish, gurnard, kahawai, parore, and spotty.
	Native estuarine vegetation or macroalgae community dominated by native species and provides high quality habitat for native fauna[45].	The hard structures in the harbour, such as existing rocks and concrete sides, support attached species of macroalgae such as *E. radiata*, *U. lactuca*, *Ulva* spp, *C. fragile*, *H. banksii*, *U. pinnatifida*[46], *Gracilaria chilensis*, and *Gigartina* species.

[44] See Water Quality section 5.0

[45] See Marine Vegetation section 4.4.1

[46] Exotic

Ecological Value	Criteria / Characteristic	Data Summary (with reference to Section 3.0)
		Macroalgae are not a dominant habitat feature in the Stella Passage area (but macroalgae is present within adjacent rocky reef habitats). Stella Passage marine environment primarily consists of soft sediment benthic habitat and hard structures such as wharf piles. The rapid water flow does not encourage macroalgae to proliferate in the soft sediment Stella Passage compared to reefs in the outer harbour.

Table 15: Assessment of Existing Soft Sediment Marine Ecology against the relevant criteria (Table 11)

Ecological Value	Criteria / Characteristic	Data Summary (with reference to Section 3.0)
LOW (Dredge and Disposal Areas) AND MODERATE (Southern harbour)	Physical habitat highly modified[47] (dredge and disposal areas). Physical habitat moderately modified (Southern Harbour)	The Stella Passage physical habitat has been highly modified by various activities and infrastructure, with the harbour bridge to the south, causeway to the east, marina to the southeast, Sulphur Point reclamation to the south, Mount Maunganui reclamations to the north and the dredged shipping channel. The wider southern harbour can be considered modified due to the existing and historic dredging, sedimentation and there being only around 60 % of natural coastal edge remaining (**Figure 4**).
MODERATE (Dredge and Disposal Areas and Southern Harbour)	Few invasive opportunistic and/or disturbance tolerant species present.	The Asian date mussel *A. senhousia*, the asicidans *D. vexillum* and *S. clava,* and the Mediterranean fanworm *S. spallanzanii* are present in the wider harbour.
	Water column contaminant concentrations typically between ANZWQG 90% and 95% species protection levels and/or scored as 'Fair' on a recognised WQI[48].	Water quality data revealed metal/metalloid estuarine water concentrations were low and below ANZG 99% marine DGV (Crawshaw, 2021). Sediment from the proposed development soft sediment sites generally have low contaminant concentrations, similar to the wider receiving environment sites. Therefore,

[47] The shipping channel has been highly modified by various activities and infrastructure, with the harbour bridge to the south, causeway to the east, marina to the southeast, Sulphur Point reclamation to the west and the dredged shipping channel to the north

[48] See Water Quality section 5.0

Ecological Value	Criteria / Characteristic	Data Summary (with reference to Section 3.0)
		the risk of toxicants being entrained in the dredged sediment and leaching into the water column in concentrations above water quality guidelines is very low.
	Few Threatened ecosystems present[49].	Estuaries are classified as vulnerable ecosystem A2(c) short term decline in ecological function. (Holdaway et al., 2012).
HIGH (Dredge and Disposal Areas and Southern Harbour)	Benthic soft sediment[50] and hard shore[51] community typically has high diversity species richness and abundance[52], for the habitat type.	Soft Shore The soft sediment marine communities are in a cyclic pattern of recovery, continually reset with primarily maintenance dredging. The Te Awanui channel floor as being reflective of a working port seabed, comprising an ecologically productive benthic community with naturally diverse indigenous native infaunal species. The average Shannon Weiner Diversity Index across the 15 soft sediment benthic tow sites was 2.3, indicating high diversity.
	Benthic invertebrate community contains many taxa that are sensitive to organic enrichment, contaminants and mud[50].	Benthic invertebrates collected from benthic tows in the shipping channel detected an abundant[53] and diverse[54] community of both sensitive and tolerant species.
	Fish community typically has high diversity, species richness and abundance.	Leonard (2020) provides fish diversity and abundance at various sites in the Southern Te Awanui and the Port area. There is a consistent and diverse fish population in Te Awanui, with the port area supporting significant juvenile and adult fish populations, including eagle ray, snapper, trevally, kingfish, gurnard, kahawai, parore, and spotty.
	Marine sediments typically comprise <40% silt and clay grain sizes[55]	The dominant benthic sediment grain size in Te Awanui is sand with some fine sediment accumulating in harbour margins in areas of high sediment supply and low wave activity, otherwise sediments generally contain <5% silt and clay.

[49] (Holdaway et al., 2012) – estuaries classified as vulnerable A2(c) short term decline in ecological function.

[50] See Benthic Soft Shore Habitat sections 4.2.8 and 4.2.9

[51] See Rocky Shores/Reefs of Mauao, Moturiki and Motuotau (section 3.4) and Sessile organisms on wharf structures (sections 2 and 4.3.3).

[52] Benthic Soft Shore Habitat sections 4.2.8 and 4.2.9, and Sessile organisms on wharf structures section 4.2.9.

[53] Average number of individuals per benthic tow 97, with an average number of taxa of 17

[54] Average Shannon-Wiener Diversity Index 2.3

[55] See Sediment Grain Size section 3.6

Ecological Value	Criteria / Characteristic	Data Summary (with reference to Section 3.0)
	Contaminant concentrations in surface sediment rarely exceed DGV concentrations[56]	All metal concentrations in sediment were found to be below recommended Default Guideline Values (DGV) (ANZG, 2018)
	Where shellfish are present, flesh has contaminant concentrations close to natural background levels or not above conservative laboratory detection limits[57].	Shellfish flesh (pipi) toxicant concentrations are low and well within safe consumption limits.
	Native estuarine vegetation or macroalgae community dominated by native species and provides high quality habitat for native fauna[58].	The hard structures in the harbour, such as existing natural rocks, wharf piles and concrete shore edges, support attached species of macroalgae such as *E. radiata*, *U. lactuca*, *Ulva* spp, *C. fragile*, *H. banksii*, *U. pinnatifida*[59], *G. chilensis*, and *Gigartina* species. The rapid water flow does not encourage macroalgae to proliferate in the Stella Passage compared to reefs in the outer harbour.

Overall, given the dominance of HIGH and MODERATE ecological value criteria (for both hard and soft shores), along with a few LOW value ecological criteria, on balance, I have conservatively assessed the marine ecological values within the areas potentially affected by the proposed and the wider Southern Harbour to have **HIGH** ecological values[60].

[56] See Sediment Quality section 4.7

[57] See Pipi Chemistry Data 2023 and 2024 section 4.2.9.2

[58] See Marine Vegetation section 4.3

[59] Exotic

[60] Assessed at the Stella Passage and Southern Te Awanui spatial scales.

13.0 Marine Effects Assessment

13.1 Main marine ecological effects

The primary marine ecological effects from the proposed capital and maintenance dredging[61] are increased concentration of suspended sediment (TSS) (including potentially contaminated sediment), the deposition of sediment on soft sediment and rocky reef habitats and the mortality of benthic invertebrates within the dredging area and disposal area.

13.1.1 Coastal Processes

de Lange has provided a detailed assessment of coastal processes/hydrodynamic effects of the project (de Lange, 2025).

de Lange (2025) states that the impacts on coastal processes during the post-dredging phase are predominantly determined by the changes made to the morphology (mostly of the tidal channels), and the subsequent morphodynamics response, which involves an interactive system of changing currents and morphology.

de Lange (2025) states that dredging can change:

- "the tidal range by changing the friction and/or constrictions affecting the movement of the tide, which changes the water slope. Increasing tidal range increases current velocities, and vice versa;
- the duration of flood and ebb flow, which also changes the water slope. Decreasing duration of either ebb or flood flow increases current velocities, and vice versa;
- the wetted cross-sectional area of the channels. Decreasing cross-sectional area increases current velocities, and vice versa".

Whilst there may be an alteration to current velocity from dredging, based on review of work carried out by Mullarney & de Lange (2018) and de Lange (2025) the effects of dredging on channel stability, Te Paritaha and other coastal processes are considered to be **Very Low**.

13.1.2 Suspended Sediment

Average natural turbidity in Te Awanui was found to be <5 Nephelometric Turbidity Unit (NTU) in all parts of the harbour where dredging may occur. The largest natural turbidity events occurred around 10% of the time during rare extreme rainfall events with the duration being between 20-30 hours (Bryan et al, 2013).

Stewart (2025) states Te Awanui has high water clarity and low turbidity and TSS. Increased turbidity from dredging and disposal due to resuspension of fine silt particles in the benthic sediment can lead to physical degradation of the water quality and physical effects on biota through smothering and/or light attenuation (for example on seagrass and shellfish). This risk is reflected in the current consent conditions which are primarily designed to monitor and control

[61] In areas where previous capital and maintenance dredging has been undertaken

turbidity (through managing suspended solids release into the receiving environment) (Stewart, 2025).

Stewart (2025) reports that data provided by POTL on turbidity data collected during maintenance dredging campaigns from October 2015 to July 2022 (n=160) showed a statistically significant difference for turbidity upstream and downstream of the dredge. Downstream of the dredge for 93% of the time there was no exceedance of the ANZECC (2000) default trigger level of 10 NTU. Further, for the less stringent level 1 management response (Bryan et al., 2014) of 15 NTU (time weighted average), 97% of the time there was no exceedance. Therefore, although there is a significant difference between upstream and downstream turbidity during the maintenance dredging, the occurrence of trigger values is infrequent. Dr Stewart considers the that when NTU was above ANZECC (2000) guidelines (7% of the time), the turbidity was transient and effects on water quality were minor.

Modelling and field observations suggests that TSS reaches background concentration before any affected flow reaches the boundary of the mixing zone, based on observation, an array of suspended sediment sensors, and spot sampling. de Lange (2025) concluded that the turbidity event associated with the dredging would have similar or lower effects than that from natural processes that occur in the harbour.

de Lange (2025) states that the primary cause of increased turbidity during dredging are a near bed plume generated by the draghead as it excavates the seabed and a surface plume generated by overflow from the dredge hopper.

Increased turbidity from dredging due to resuspension of fine silt particles in the benthic sediment can lead to physical degradation of the water quality and physical effects on biota through smothering and/or light attenuation (for example on seagrass and shellfish). This risk is reflected in the current consent conditions which are primarily designed to monitor and control turbidity.

The modelling (Montaño, 2024) shows that the potential for adverse impacts from the dredge plume is dependent on the distance between the dredge and the areas of concern. This modelling is an absolute worst case as the dredging proposed has been significantly reduced after this modelling was carried out. For a BHD the 200 m mixing zone is sufficient to avoid adverse impacts (strictly the suspended sediment concentrations are always well below 75 $mg.l^{-1}$). For a TSHD with no overflow, the 200 m mixing zone distance is also sufficient, while with overflow the 600 m mixing zone is sufficient (de Lange, 2025).

Based on the assessment of sediment plume by de Lange (2025), it is concluded that any elevated TSS or turbidity will occur within the mixing zone and that there will be no more than minor effects outside of the mixing zone.

Previous dredge campaigns have shown that sediment resuspension is likely to be moderate in extent, not above baseline turbidity or TSS, and of short duration.

Effects of TSS on marine organisms

Pipis can only feed efficiently at very low suspended sediment concentrations. Pipis have a low tolerance level to turbidity (Teaioro, 1999). The laboratory results of Teaioro (1999) concluded that as there were no dead bivalves reported during their experiments, even though pipi were exposed to suspended sediment for eight hours, this indicates that these bivalves can recover from periodic exposure to elevated turbidity for short periods. Since resuspended sediment caused by dredging operations typically remains in the water column for less than eight hours (Coppede Cussioli, 2018, Montaño, 2024). it can be assumed that these bivalves can fully recover after being exposed to this duration of exposure to resuspended sediment.

75 g/m^3 exposure for >13 days (Hewitt et al., 2001) is the threshold used for pipi in this assessment. The modelled TSS concentration is below the threshold for ecological effects on pipi and the duration of exposure is temporary/short term duration. Modelling by Montaño (2024) shows that the extent of surface and seabed plumes at Te Paritaha is zero or negligible (one occasion during 130 days of modelling reached 0.2 mg/L (or 200 g/m^3) [62]during the largest spring tide modelled at peak high tide, which is above the effects threshold of 75 g/m^3 if the exposure period is greater than 13 days (Hewitt et al., 2001). However, the modelled exposure period was significantly shorter duration (only 10-20 minutes)[63].

Modelling identified that the 75 g/m^3 threshold for pipi was exceeded once at the Te Paritaha site during the La Niña summer conditions modelled and once in the winter conditions at site L5 and L6 (towards the outer harbour). All modelling plots of mean and 90% percentile plumes of near-bed and surface suspended sediment show the plumes following the channels (Western Channel, Cutter Channel, and Maunganui Roads), suspended transporting sediment away from Te Paritaha (Montaño (2024)). Montaño (2024) also noted that there were no periods of consecutive exceedances, and it is extremely unlikely that any surface plume extending onto Te Paritaha remains present during the following ebb tide. Thus, the one exceedance of 75 mg/m^3 predicted by the modelling did not persist longer than c.8 hours, which is well below the > 13 days threshold duration (Hewitt et al., 2001).

The results of Montaño (2024) indicate that the additional suspended sediment due to dredging is unlikely to boost ambient levels above the threshold level for pipi under normal weather conditions. This is especially the case with the reduced dredging volumes sought by the reconsenting.

The main effect on water quality is the immediate increase in turbidity experienced during physical dredging operations. Due to the physical disturbance of the dredge on the seabed, there will be some immediate effect on the channel floor benthos in the dredge area and down current. However, hydrodynamic and geomorphological studies suggest that no long-term adverse effects are expected (de Lange 2025, de Lange 2023, Mullarney & de Lange, 2018).

There are few published studies on how estuarine and marine fish respond to total suspended solids (TSS) and less is known about behavioural thresholds. In situations where concentrations of TSS are not lethal, pelagic, demersal and benthic fish are likely to avoid (swim away from) the area with elevated TSS (NIWA, 2014). Avoidance of the sediment plume by pelagic,

[62] 1g/L is 1000 g/m^3

[63] Pers comm. Willem de Lange 20/01/2024.

demersal and mobile benthic species is likely to occur where concentrations of TSS are predicted to reach 100 mg/L (NIWA, 2014).

Therefore, the adverse effects on benthic invertebrates at this exposure concentration and time frame are expected to be negligible.

The TSS concentration and duration of exposure from dredging for this project is below the avoidance threshold of 100 mg/L for fish and below 75 mg/L for pipi and as such fish and pipi will not be adversely affected.

For completeness, in summary, the water quality monitoring undertaken as part of the water quality assessment by Stewart (2025) shows negligible effects from dredging and disposal on water temperature, pH, salinity, and dissolved oxygen (DO) and the coastal processes assessment (de Lange, 2025) with respect to TSS.

With high ecological values, and a magnitude of assessment of **Low** (**Table 12**), the level of the effect of TSS is **Low** (**Table 13**) at both scales.

13.1.3 Sediment Disposal Effects

de Lange (2025) describes the currently consented disposal sites (A, B, C, D, G, H1, H2) according to the types of sediment texture at Section 4 of his assessment. Sites D and H1 are consented for the disposal of sandy sediment with <25% fine content (silt and clay; also referred to as mud) and sites G and H2 are consented for the disposal of sandy sediment with >25% fine content.

de Lange describes that all analyses of sediment dredged from the port area indicate that potential contamination is associated with fines (clay mostly) that can absorb pollutants. de Lange (2025) notes there is an issue that the guidelines used to assess some contaminants, particularly heavy metals, do not account for sediments that naturally have elevated levels (mostly because they based on international guidelines from countries with different underlying geology). Due to the way the guidelines are implemented, dredged sediment that has an identical composition to natural sediment in the disposal site is deemed to be contaminated with potential adverse effects primarily because sediment was relocated by dredge. The same sediment moved there by natural processes is not considered contaminated. This is an issue for the volcanic sediments that are predominant in the Bay of Plenty, and it mostly affects sand-sized sediment (e.g. arsenic is naturally occurring in volcanic sediments in the Bay of Plenty).

de Lange (2025) states that limited monitoring indicates that the adverse effects of the disposal are limited to the disposal sites (mixing zones) for A, B, C, D and H1. Outside the defined boundaries, sediment from dispersive disposal sites is inter-mixed with sediment naturally moving within the coastal zone. Close to shore the sediment movement is active (moving 50%-100% of the time in response to wave action), while at the deeper sites, the sediment may only move for a few days per year, to a few days per decade further offshore in response to storm conditions.

de Lange (2025) states that there is limited movement of the dredged material deposited in sites D, G, H1 and H2, but there appears to be some reworking of the surficial sediment, with no evidence of dispersion from the sites.

With high ecological values, and a magnitude of assessment of **Low** (**Table 12**), the level of the effect of sediment disposal is **Low** (**Table 13**) at both scales.

13.1.4 Sediment deposition from TSS

The benthic community in the area for deposition of dredge spoil has been monitored previously (Blom et al.,1993, Cole & Foster, 1995). These previous studies have concluded that the soft sediment benthic invertebrate communities are variable between sites and replicates (Blom et al., 1993) which is typical of benthic soft sediment habitats.

Smothering of marine biota by sediment is a potential effect related to the deposition of suspended sediment particles arising from the action of the dredge and deposition of dredge spoil. ANZG (2018) provide a DGV of 2mm sediment accumulation per year above the natural annual sedimentation rate for the specific estuary, or part of the estuary. It is expected that effects of sedimentation will be negligible with the controls (Stewart, 2025) in place to minimise TSS beyond the mixing zone (Stewart, 2025; de Lange, 2025).

During disposal of dredge spoil, resuspended sediment could be deposited on the benthic habitat of the dredge spoil area and surrounding habitats. Dredge spoil has the potential to disperse from the soft sediment disposal site and deposit on nearby subtidal reef communities. Reef benthic communities at Motuotau Island (the closest subtidal reef adjacent to the disposal area) exhibits stability, diversity, and structural complexity, comparable to other reefs in the area. The 2022 and 2024 surveys of Motuotau Island did not find any changes in the community structure that could be attributed to the Port of Tauranga's dredging activities, nor did earlier surveys (Boffa Miskell Ltd, 2025b).

With high ecological values, and a magnitude of assessment of **Low** (**Table 12)** the level of the effect of sediment deposition from TSS is **Low** (**Table 13**) at both scales.

13.1.5 Contaminant resuspension - dredging and disposal

Chemical analyses of the sediments that are likely to be dredged and disturbed during the proposed campaign show that metal, PAHs, and OCs concentrations are below Australia and New Zealand Guidelines (ANZG) Default Guideline Value (DGV) concentrations of concern. These concentrations have remained below DGV for a number of years (based on extensive review provided by de Lange, 2025).

Therefore, overall, there would be negligible contamination of water quality due to low concentrations of contaminants in disturbed sediments, even during dredging activity (Stewart, 2025). Given the high degree of water flow and exchange/replacement on each tide, the longer-term effects on water quality from sediment bound contaminants are likely to be negligible.

The risk of deposition of suspended contaminated sediment from the dredging activity and disposal activity has a magnitude of assessment of **Very Low** (**Table 12**), the level of the effect of contaminant resuspension is **Very Low** (**Table 13**) at both scales.

13.1.6 Benthic habitat disturbance/mortality and recovery

The proposed capital and maintenance dredging will occur over 290 ha of previously dredged areas. The benthic invertebrate community which comprises a representative community structure (dominated by a heterogeneous community of typical polychaete worms, bivalves, amphipods, decapods etc, with no rare or threatened species present) (Grace, 2010) that is within the dredge areas will suffer complete mortality from the mechanical dredge process.

Butler (1999) surveyed the soft sediment community in Stella Passage detecting diverse and abundant benthic communities within Stella Passage. Additional soft sediment surveys by Butler (1999) designed to examine the effects of dredging included surveys within an area of benthos to be dredged under maintenance dredging (by the POTL) in addition to control sites which were not dredged. Butler (1999) found that after 18 days most taxonomic groups had recovered in abundance, suggesting a rapid recovery process of relatively fast-growing species. Community composition after 18 days had not yet recovered to pre-dredging assemblages (Grace, 2010).

Blom et al., (1993) surveyed the soft sediment dredging disposal area (similar to disposal areas B and C) and control sites (to the southeast of the disposal site) for benthic marine invertebrate community pre-dredging (1991) and post-dredging (1992) (**Figure 15).** The results indicated high variability between and within stations, thought to reflect the natural variability of the heterogeneous clumped communities, resulting in site specific differences.

We anticipate that there is similarly high natural variability (heterogeneity) in the benthic community structure in the harbour channel proposed to be dredged and sediment disposed of again in the current Project.

Battershill (2022a) stated that there was no difference in the diversity and relative abundance of channel floor benthic species at sites in the Stella Passage previously dredged compared to nearby areas that have not been dredged to any extent. Battershill (2022a) expected that newly dredged areas will be rapidly colonised[64] through natural processes of recolonisation and rehabilitation by populations of benthic species from the adjacent channel floor habitat due to high level of ecosystem connectivity with areas outside of the proposed dredging area (including harbour/estuary and open sea), adequate supply of propagules from existing benthic organisms and high current flow assisting dispersion of larvae (Watson, 2016).

Battershill (2022a) states that the species assemblages, diversity and abundance in Te Awanui are relatively stable, despite a number of capital dredge campaigns in the past. The benthic community in the areas that have previously been dredged (for example as part of the 2016/2017 capital dredging campaign), will be removed again through the Project and the natural processes of recolonisation and rehabilitation will be reset and begin again (occurring over a likely 1-3 years to return community composition similar to pre-dredging).

Some immediate effects on the channel floor benthos and down current of dredging sites will occur due to physical disturbance and removal of sediment (and associated biota) caused by the dredge and subsequent fall-out of sediment and shell debris. This effect is limited in extent (to the area to be dredged) (de Lange, 2025) and temporary, with recovery of soft sediment

[64] Para 67, Battershill 2022.

benthic habitat occurring over short time frames (1-3 years as a result of larvae of appropriate species in close proximity and aided by recruitment in high current regimes) (Battershill, 2022a).

The studies of Blom et al. (1993), Butler (1999) and pre and post dredging and observations by Battershill (2022a) suggest that benthic community recovery will occur within 1-3 years of dredging. Recovery pathways are anticipated to involve a gradual reintroduction of the original species pool typically via spillover of species in adjacent habitats that have not been impacted, in addition to the processes of larval dispersal, settlement and recruitment. Battershill (2022a) concluded that recovery of soft sediment benthic habitats in dredged areas is likely to be rapid, which I agree with.

Lundquist et al. (2010) stated that recovery of benthic communities is influenced by the degree of neighbourhood community connectivity which defines a benthic community's ability to persist in the face of disturbance. With respect to the proposed dredge areas for the current Project, the surrounding non-dredge areas provide the rapid recovery due to community connectivity, a pool for spill-over effects, and larvae for settlement and recruitment in colonisation.

Surveillance of hard substrates adjacent to disposal areas for invasive marine species and sedimentation effects has occurred (e.g. Motuotau reef is surveyed approximately every two years and have shown no impact from the previous disposal events).

As has been evidenced from past dredging campaigns, the effects on filter feeding organisms (e.g. smothering of gills from resuspended fine sediments) which comprise the larger proportion of benthic species in the proposed reconsenting area will be minor and short term. Filter feeding species present are already somewhat influenced by fine sediment smothering events from storm runoff and these species have behavioural mechanisms to counter for temporary elevated suspended sediment. Effects on Te Paritaha pipi beds has been assessed as a low level of effect due to suspended sediment being almost entirely below effects thresholds.

The disturbance and mortality of soft sediment benthic invertebrates, with high ecological values, and a **Low** magnitude of effect (**Table 12**), the level of the effect is **Low** (**Table 13**) at both assessment scales.

13.1.7 Marine Biosecurity

Dredge vessels arriving from overseas or from outside the Bay of Plenty region are the primary biosecurity risk associated with the proposed activities (Fletcher, 2025). In particular, elevated risk occurs if the vessels' region of origin has marine NIS of concern not currently present within the Bay of Plenty, and if risk mitigation measures have not been implemented for these vessels prior to their passage to POTL.

Dredge spoil disposal can also act as a pathway for the inadvertent transfer of marine NIS from the dredge location to the spoil disposal grounds. The majority of NIS established within Tauranga Harbour are sessile filter-feeding invertebrates (e.g. sponges, hydroids, bryozoans, ascidians) and seaweed species that primarily colonise hard substrates. There is likely to be a lack of suitable habitats for these taxa at the disposal grounds. The fanworm *S. spallanzanii* presents a specific risk that may warrant additional safeguards (e.g. pre-dredging surveillance).

The proposed dredging activities within Tauranga Harbour are likely to present an incremental change in marine biosecurity risk over the existing situation, primarily associated with vessel movements and dredge spoil disposal. POTL proposes to manage all biosecurity risks in an integrated way through the development and implementation of a comprehensive Biosecurity Management Plan (**BMP**) (Fletcher, 2025).

Fletcher (2025) concludes that if the proposed mitigation measures above are implemented appropriately, the residual marine biosecurity risk is expected to be negligible.

With high ecological values, and negligible magnitude of effect (negligible risk), the level of effect of marine invasive species is very low (**Table 13**).

13.1.8 Underwater Noise

Pine (2025) assesses the effect of underwater noise from the dredging and disposal on marine organisms, particularly in relation to marine mammals (which is covered by McConnell (2025)).

Pine (2025) states Policy NS 2 of the Bay of Plenty Regional Coastal Environment Plan is aimed at protecting the natural character of Tauranga Harbour outside the Port Zone. Based on data from the 2023 maintenance dredging campaign and complete AIS record, noise models show that soundscape changes (both daily and monthly) outside the Port Zone will be below 1 dB re 1 µPa, if there is any increase at all. Since the proposal will be using a medium-sized dredge of similar length to the *Albatros*, the effects from the proposal will be similar to the modelling of the 2023 maintenance campaign (Pine, 2025).

Marine Fish

The response to sounds by fish might range from no obvious change in behaviour to temporary displacement from their normal locations. There may be no effects or substantial effects on a population (Popper & Hastings, 2009).

Some species of fish, such as gurnards, produce sound to communicate with each other.

The uncertainty as to effects on fish species is allayed by the fact that the dredging and disposal noise will be localised to an area that is not recognised in the Regional Coastal Plan as an

important fish habitat, will be temporary and will occur in an area where there are not any populations of rare/threatened fish species that could be displaced.

Diadromous fish

Diadromous fish are species that spend part of their lives in freshwater and part in saltwater. Diadromous fish in Waipu Bay and surrounding estuary include short (*Anguilla australis*) and long fin eel (*Anguilla dieffenbachii*) (At Risk – Declining) (tuna).

Shortfin glass and longfin eels migrate into very turbid waters during flood events. High turbidity provides cover for glass eels[65] to migrate during daylight hours rather than just at night. Turbid waters are unlikely to impede the migration of elvers from coastal areas into adult habitat because elvers do not avoid even extremely high turbidity water in experiments. In some situations, migrating elvers appear to be attracted towards turbid tributaries (Schicker et al., 1990).

Tuna heke is the term that describes mature eels that migrate from freshwater habitats to the sea to spawn completing their life cycle. The journey of tuna starts and ends in the Pacific Ocean near Tonga, where researchers have determined is the most likely destination for their migration from New Zealand to their breeding grounds (Otago Museum, 2020[66]). Downstream eel migrations normally occur at night (when piling not occurring) during the dark phases of the moon and are often triggered by high rainfall and floods (i.e. turbid water). There is a pattern in the sequence of seaward migrations with the smallest, shortfin males migrating during February and March, followed by shortfin females in March and April. Longfin males migrate during April, followed by longfin females from late April to June (Schicker et al., 1990).

From this research, it is clear that tuna are tolerant of, and even prefer, turbid water when inhabiting freshwater environments and also migrating to the ocean as part of their life cycle (Schicker et al., 1990). In addition, migration downstream occurs at night, when dredging will not occur. Therefore, avoiding effects on tuna migration from Waipu Bay, through Stella Passage, to the ocean.

Invertebrates

Some invertebrates, such as decapod crustaceans, are reported to be sensitive to low frequency underwater noise (Boeuf & Le Bail, 1999). The invertebrates present in southern Te Awanui (both benthic soft sediment and hard shore species) are ubiquitous and common and any adverse effect on individuals from dredging and disposal noise would not have adverse effect on populations or biodiversity values.

Summary of underwater noise and vibration effects on fish and invertebrates

With respect to fish, we assume fish (including migrating eels from Waipu Estuary) have the ability to move away from noisy environments to avoid effects, whereas there may be very small sub-lethal temporary adverse effects on common sessile invertebrates.

[65] juvenile eel that arrive from the sea at river mouths are known as glass eels, because they are transparent. Between July and December each year, millions arrive from the tropics (Glass eels – Eels – Te Ara Encyclopedia of New Zealand).

[66] The Travels of Tuna: New Zealand's largest migrating fish | Tūhura Otago Museum

With high ecological values, and a magnitude of assessment of **Low** (**Table 12)**, the level of the effect of underwater noise is **Low**[67] (**Table 13**) at both scales.

13.1.9 Cumulative effects

Cumulative effects associated with dredging and disposal of dredging in the Project area are anticipated, including the periodic "resetting" of the subtidal benthic communities followed by a natural pattern of succession/recolonisation in the dredge areas.

The proposed dredging areas, in the same way as previously capital and maintenance dredging by the POTL, will be naturally recolonised by benthic invertebrates in 1-3 years post dredging, with no long term loss of biodiversity.

The existing benthic organisms at the disposal site will perish through smothering but will be naturally recolonised by benthic invertebrates in the coming 1-3 years post disposal, with no long term loss of biodiversity.

With high ecological values, and a magnitude of assessment of **Low** (**Table 12**), the level of the effect of cumulative effects is **Low** (**Table 13**) at both scales.

13.2 Summary of Effects

The magnitude and level of effects of the proposed dredging activities on the marine environment within and adjacent to the proposed dredging and disposal areas are outlined in **Table *16***.

All effects on marine ecological values are assessed either a low or very low level of effect (at both the southern Te Awanui, and dredge/disposal area scales) and there is no necessity for mitigation other than the dredging management proposed to minimise TSS.

[67] Noting McConnell (2025) assesses the effects on marine mammals.

Table 16 Summary of Marine Ecology Effects of the Proposed Reconsenting of Capital and Maintenance Dredging

Effect	Ecological Value	Magnitude of Effect	Level of Effect without mitigation	Mitigation
Dredging of sediment effect on benthic invertebrates in the existing dredge locations – at southern harbour scale and dredge location scale.	High	Low (1-3 years) Very Low (>3 years) (Communities will be reset every time the benthic sediment is dredged. Dredged areas will be recolonised over time in a natural recovery cycle).	Low Very Low **Less than minor.**	Not required.
Dredging of sediment effect on TSS (within the dredge locations).	High	Low and temporary	Low **Less than minor.**	Not required.
Dredging of sediment effect on contaminant availability in sediment (within the dredge locations).	High	Low and temporary	Low **Less than minor.**	Not required.
Dredging of sediment effect on fish (within the	High	Negligible	Very Low	Not required.

dredge and Southern Te Awanui scale).			**Less than minor.**	
Dredging of sediment effect on Te Paritaha pipi (at the Te Paritaha scale).	High	Low	Low **Less than minor.**	Not required.
Deposition of dredge spoil effect on soft sediment benthic invertebrate communities (at the disposal area scale).	High	Low (1-3 years) Very Low (>3 years)	Low Very Low **Less than minor.**	Not required.
Deposition of dredge spoil effect on subtidal reef communities (at the disposal area and adjacent habitat scale).	High	Low	Low **Less than minor.**	Not required.
Effects of dredging and disposal on Invasive Marine species (at the Southern Te Awanui scale).	High	Negligible	Very Low **Less than minor.**	Not required.
Effects of dredging and disposal noise on fish and invertebrate marine	High	Low	Low	Not required.

organisms (excluding marine mammals).			**Less than minor.**	
Cumulative effects of dredging and disposal of dredge spoil.	High	Low (1-3 years) Very Low (>3 years)	Low Very Low **Less than minor.**	Not required.

14.0 Avoidance, remediation and mitigation measures

- Monitor and manage dredging methodology to ensure elevated TSS above effects thresholds occurs only within the mixing zone and TSS is below ecological effects thresholds beyond the mixing zone (especially at Te Paritaha).
- Continue with bi-annual surveys of pipi communities on Te Paritaha.
- Continue two-yearly surveys of reef benthic communities at Motuotau Island adjacent to disposal sites.
- Continue monitoring for invasive species, primarily on hard structures/rocky reef.

15.0 Response to CVR/CVAs

A range of marine ecology matters were raised by hapū through submitted cultural values assessments (CVAs). While the specific framing differed between groups, there is considerable overlap in the issues identified, particularly in relation to Te Paritaha pipi beds, kaimoana abundance, sedimentation effects, cumulative impacts, and monitoring frameworks. The key themes and responses are summarised below.

Ngāti Pūkenga

Ngāti Pūkenga raised concerns regarding independently reviewed marine ecology, perceived gaps in monitoring and consent compliance, and the potential for dredging to mobilise contaminants to adversely affect shellfish resources.

The marine ecology assessment has been subject to internal peer review, including review by senior ecologist at Boffa Miskell and subject to review by BOPRC. Long-term monitoring has been undertaken since 2015 as part of the Kaimoana Restoration Programme including a range of kaimoana species and subsequent annual surveys, demonstrating continuity of monitoring and fulfilment of consent requirements. Available data shows sediment and pipi tissue contaminant concentrations are consistently below relevant guideline values, and hydrodynamic modelling indicates dredge induced suspended sediment plumes are contained to the mixing zone and do not extend to Te Paritaha at ecologically significant levels.

Ngā Pōtiki

Ngā Pōtiki emphasised the need for a mātauranga Māori based monitoring framework and raised concerns regarding the potential for cascading ecological effects from turbidity and sedimentation, as well as underwater noise effects on marine species.

The proposed monitoring framework is acknowledged as an appropriate direction, with the Port currently supporting iwi-led monitoring initiatives (including collaboration with TMICFT), and further development of iwi-specific indicators anticipated, however, further input is required from Ngā Pōtiki as this is outside our area of expertise. de Lange (2025) indicates turbidity, and sedimentation effects are localised and transient, largely confined to the dredging mixing zone, with no evidence of wider cascading ecological effects. Pine (2025) modelling of underwater noise demonstrates changes in noise levels outside the Port Zone are minimal (<1 dB re 1 µPa), with effects temporary, localised, and within the range that mobile species can avoid.

Ngāi Tamarāwaho

Ngāi Tamarāwaho raised concerns regarding cumulative effects of dredging on kaimoana, the resilience and monitoring of pipi populations, the need for restoration of key habitats, potential effects on fish populations, fisheries, and disposal of dredged material, and recommended conditions regarding Te Paritaha and kaimoana monitoring.

The assessment outlines modelled suspended sediment concentrations at Te Paritaha are short-lived, infrequent, and remain well below thresholds associated with adverse ecological effects. Comment on mauri, māhinga kai or mokopuna as this outside our area of expertise. Multi-year monitoring indicates that observed variation in pipi populations is consistent with

natural recruitment and cohort dynamics and is not attributable to dredging. Benthic disturbance associated with dredging and disposal is localised and temporary, with recolonisation typically occurring within 1–3 years, and no evidence of long-term degradation of reef or soft sediment habitats. Fish communities are characterised by high diversity and stability, with no indication of population-level effects. Disposal activities occur in deep, non-dispersive environments, with low contaminant concentrations and negligible biosecurity risk. The current Te Paritaha Monitoring Plan recognises Te Paritaha and taonga and includes detailed pipi size, abundance, density, sediment grain size and pipi flesh quality. It is considered robust and appropriate. This is included as 17.5 of the consent conditions. Species including tuangi, titiko, tupa, patiki and mullet are not affected by proposed POTL operations. Therefore, do not require monitoring under this consent. Other recommendations are outside our area of expertise.

Ngāti Ranginui Fisheries Trust

Ngāti Ranginui Fisheries Trust raised concerns relating to declines in pipi populations, potential noise effects, and the adequacy of mitigation and recovery measures.

Monitoring data indicates pipi populations are dynamic and reflects natural life history processes, including cohort turnover, with recent surveys showing progression toward adult dominated populations. Pine (2025) assessed underwater noise as minor, localised, and temporary, with no population-level impacts anticipated. Given the low magnitude of effects, existing monitoring and management measures considered appropriate, including ongoing sediment and pipi monitoring.

Tauranga Moana Iwi Customary Fisheries Trust (TMICFT)

TMICFT raised concerns regarding potential changes to ecological functioning within Te Awanui, including disruption to fish behaviour and ecological rhythms, disappearance of pipi beds, decline in seafood abundance, and cumulative effects on taonga species, including kōura. Concerns were also expressed regarding the interpretation and integration of monitoring data, including the extent to which existing programmes reflect cultural perspectives.

The assessment identifies no evidence of disruption to ecological function or fish assemblages, with available data from Leonard et al., (2020) indicating fish communities remain diverse and stable. Multi-year monitoring of pipi populations, including at Te Paritaha, demonstrates that observed fluctuations are consistent with natural recruitment and life-cycle dynamics, and are not attributable to dredging activities.

Broader declines in kaimoana abundance are acknowledged; however, data indicates these populations are more appropriately attributed to multiple stressors, including harvesting pressure and wider environmental change, rather than the proposed dredging.

Existing monitoring programmes, undertaken in collaboration with iwi (including TMICFT), provide a robust basis for assessing ecological effects to pipi and other kaimoana species, which we have assessed as low to very low. Ongoing opportunities to further incorporate mātauranga Māori into monitoring frameworks is outside our area of expertise and for POTL to comment on.

Ngāi Tukairangi

Ngāi Tukairangi raised a range of concerns relating to the decline of kaimoana resources, including pipi at Te Paritaha, and broader perceptions of long-term depletion of customary

fisheries within Te Awanui. Concerns were also expressed regarding the effectiveness of the Kaimoana Restoration Programme, changes in marine habitats, and the potential for cumulative effects associated with Port activities. Ngāi Tukairangi further questioned aspects of the assessment approach, including the attribution of observed ecological changes to natural processes, and raised concerns regarding marine pest risks (including fanworm), the sustainability of taonga species and has made recommendations around restoration conditions.

The marine ecology assessment outlines there is no scientific evidence linking observed kaimoana decline to dredging or Port activities, with available data indicating that population changes are consistent with natural variability, lifecycle dynamics, and wider regional drivers such as harvesting pressure and environmental variability.

Monitoring undertaken as part of the Kaimoana Restoration Programme and associated surveys demonstrates that programmes are ongoing and meeting consent requirements and provide a robust dataset to assess ecological trends for kaimoana such as kina, kūtai, koura, pāua and pipi. Consent condition 17.5 is considered appropriate and adequate for the long-term monitoring of pipi size and abundance on Te Paritaha and includes input from iwi and hapū

de Lange (2025) has assessed habitat disturbance associated with dredging and disposal as localised and temporary, with rapid recolonisation of benthic communities and no evidence of long-term degradation of habitat function or ecological values.

Fletcher (2025) addressed concerns regarding marine pest introduction. Consent condition 12.2 outlines the requirements for each vessel to have a biofouling management plan.

While broader concerns regarding kaimoana decline and cumulative environmental change are acknowledged, the assessment concludes that the magnitude of effects attributable to the proposed dredging activities are low to very low and does not materially contribute to the concerns raised.

Waitaha

Waitaha raised concerns relating to the scale and spatial scope of the ecological assessment and the adequacy of monitoring frameworks, reporting, and adaptive management. Concerns emphasised the need for robust ongoing monitoring to detect any unexpected ecological changes.

The assessment has been undertaken at both the Project-specific scale and the wider southern Te Awanui scale, providing a conservative and comprehensive assessment of effects. Proposed dredging methodologies incorporate sediment control measures to minimise suspended sediment generation, however, further comment is appropriate from subject matter expert Willem de Lange. Appropriate water quality monitoring during dredging with an adaptive management framework is proposed, additionally pipi population monitoring including sediment characterisation and Motuotau Reef monitoring is proposed. These measures are considered sufficient to ensure that ecological effects as we have assessed remain low to very low. However, further change to survey design and methodology which has occurred in the past may result in data that cannot be directly compared between rounds, thus, tracking long-term trends will be compromised. As stated above, the current Te Paritaha pipi monitoring is comprehensive and robust and includes pipi size, abundance, flesh analysis (condition) and sediment quality including grain size and contaminants.

16.0 Conclusions

The primary marine ecological effects from the Project include dredging increasing the concentration of suspended sediment (TSS) (including potentially contaminated sediment), the deposition of sediment on soft sediment and rocky reef habitats and the mortality of benthic invertebrates within the dredging area and disposal area.

All effects on marine ecological values are assessed as a **Low** or **Very Low** level of effect at both the southern Te Awanui and the dredge/disposal area scales. There is no requirement for mitigation, other than the dredging management proposed to minimise TSS.

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Appendix 1: Bay of Plenty RPS Appendix F, Set 3. Indigenous vegetation and habitats of indigenous fauna

Representativeness

3.1 Indigenous vegetation or habitat of indigenous fauna contains associations of indigenous species representative, typical or characteristic of the natural diversity of the region or any relevant ecological districts.

Rarity or distinctive features

3.2 Indigenous vegetation or habitat of indigenous fauna supports an indigenous species or associations of indigenous species threatened or rare nationally, regionally or within the relevant ecological district.

3.3 Indigenous vegetation or habitat of indigenous fauna can contribute to the maintenance or recovery of a species threatened or rare nationally, regionally or within the relevant ecological district.

3.4 Indigenous vegetation or habitat of indigenous fauna is distinctive, of restricted occurrence, or at the limits of its natural distribution range, or has developed as a result of factors such as natural geothermal activity, historical cultural practices, altitude, water table, or soil type.

3.5 Indigenous vegetation or habitat of indigenous fauna is one of the largest remaining examples of its type within the region or any relevant ecological district.

3.6 Indigenous vegetation or habitat of indigenous fauna is significantly reduced in area and is degraded but retains key natural ecosystem functions (for example hydrology) and has a high potential for restoration.

Diversity and pattern

3.7 Indigenous vegetation or habitat of indigenous fauna contains a high diversity of indigenous ecosystem or habitat types, or changes in species composition, reflecting the existence of natural features (for example landforms, soil types or hydrology), or communities along an ecological gradient.

Naturalness

3.8 Indigenous vegetation or habitat of indigenous fauna is in a natural state or healthy condition, or is in an original condition.

Ecological context

3.9 Indigenous vegetation or habitat of indigenous fauna contributes to the ecological viability of adjoining natural areas and biological communities, by providing or contributing to an important ecological linkage or network, or providing a buffer from adjacent land uses.

3.10 Indigenous vegetation or habitat of indigenous fauna provides habitat for indigenous species at key stages of their life cycle.

Viability and sustainability

3.11 Indigenous vegetation or habitat of indigenous fauna is of sufficient size and compact shape and has the capacity to maintain its ecological viability over time.

3.12 Indigenous vegetation or habitat of indigenous fauna supports intact habitats and healthy functioning ecosystems.

3.13 Indigenous vegetation or habitat of indigenous fauna is of sufficient size and compact shape to resist changes initiated by external agents.

Māori

3.14 Indigenous vegetation or habitat of indigenous fauna contributes to the relationship of Māori and their culture and traditions with their ancestral lands, water, sites, waahi tapu and other taonga.

(Refer also to set 4 - Māori Culture and Traditions criteria).

Historical

3.15 Indigenous vegetation or habitat of indigenous fauna is known and valued for its connection to the history of the place.

Community association

3.16 Indigenous vegetation or habitat of indigenous fauna is known and valued by the immediate and wider community for its contribution to a sense of place leading to community association with or public esteem for the place, or due to its value for recreation or education.

3.17 Indigenous vegetation or habitat of indigenous fauna is valued for the contribution it is making to research into the Bay of Plenty's or New Zealand's ecosystems.

Appendix 2: Response to CVA concerns.

Ngāti Pūkenga		
Page/Paragraph	**Concern raised**	**Response**
Page 8	The Port's marine ecology has not been independently reviewed.	The marine ecology assessment has been internally peer reviewed by Dr Tommaso Alestra (BML) and BOPRC expert.
Page 8	Port have failed to meet monitoring requirements for seven years.	As discussed in the Marine Ecology Assessment, in 2015, the long term Kaimoana Restoration Programme was established in response to proposed developments by POTLL (Paul-Burke & Burke, 2015). POTL in conjunction with Tauranga Moana Iwi Customary Fisheries Trust has been monitoring kaimoana in the Mātaitai Reserve for many years (2015, 2016, 2023, 2024, 2025 and ongoing annually (Paul-Burke & Burke, 2015, Manaaki Te Awanui Fairlie et al., 2016, Boffa Miskell 2024, 2025 and 2026) (Section 4.3.3 of the Marine Ecology Assessment). The 2025 data (Boffa Miskell, 2026) is the fifth addition to the long-term monitoring programme (excluding the 2013 baseline) and fulfils consent conditions 7 and 7.14 of Coastal Permit 65806. The Tauranga Moana Iwi Customary Fisheries Trust applied a traditional rāhui over three taonga rocky reef species (pāua, kōura and kutai) and within the Mātaitai Reserve with the aim of allowing these species to recover from harvesting pressure. The rāhui is supported by the Port and Dr De Luca. Pipi have been monitored at Te Paritaha (section 4.3.9 of Marine Ecology Assessment) in 2016(Fairlie et al., 2016), (Ross & Culliford, 2018), 2022(Boffa Miskell Ltd, 2022), 2023(Boffa Miskell Limited, 2023),2024 (Boffa Miskell Ltd, 2024a, 2024b, 2025)and 2025 (Boffa Miskell Limited, 2025; Boffa Miskell Ltd et al., 2026). Where monitoring continuity has varied, this reflects agreed programme focus, evolving restoration priorities, resourcing constraints within preferred appointed

		monitoring entities, and unavoidable disruption associated with the COVID 19 pandemic.
Page 29	Plumes from dredging “may include toxic metals”	The sediment within the areas to be dredged and the southern harbour have low levels of contaminants, below marine sediment quality guidelines (sections 8.0 and 13.1.5 of Marine Ecology Assessment).
Page 29	Effect of toxins on shellfish beds.	Elevated TSS from dredging does not extend to Te Paritaha (section 13.1.2 of Marine Ecology Assessment). In addition, as stated above sediment has low levels of contaminants. Pipi flesh on Te Paritaha have been analysed for contaminants six monthly in 2023, 2024 and 2025. Results indicated contaminants were below laboratory detection limits (section 4.3.9.2 of Marine Ecology Assessment).
Ngā Pōtiki		
[80(b)]	Mātauranga Māori monitoring framework incorporating indicators of environmental health.	Ngā Pōtiki seek to develop a mātauranga Māori monitoring framework for the Project. Ngā Pōtiki state that the framework must incorporate Ngā Pōtiki indicators of environmental health. Those indicators listed in paragraph 80 (b) i-v would require Ngā Pōtiki input as they are outside my area of expertise. It is noted that the Port currently works with the TMICFT to monitor rocky shore taonga species within the Tauranga Moana Mātaitai Reserve that was fundamentally informed by mātauranga Māori (Paul-Burke et al., 2013).
[104(b)]	Discussion of a cascade effect of turbidity and sediment changes.	The Marine Ecology Assessment notes that turbidity and sediment movement can influence sediment habitats and benthic communities, feeding behaviour of fish and shellfish, and light affecting seagrass and algae. However, in the case of the Reconsenting of Capital and Maintenance Dredging, turbidity and sediment movement is limited to the mixing zone, with all habitats, flora and fauna beyond the mixing zone unaffected (Marine Ecology Assessment, section 13.1.2).
104(c)	Noise effects on marine species	Ngā Pōtiki note that there are many activities that contribute to underwater noise in Te Awanui.

		The Marine Ecology Assessment (Section 13.1.8) refers to the noise expert, Pine (2025) who states Policy NS 2 of the Bay of Plenty Regional Coastal Environment Plan is aimed at protecting the natural character of Tauranga Harbour outside the Port Zone. Based on data from the 2023 maintenance dredging campaign and complete AIS record, noise models show that soundscape changes (both daily and monthly) outside the Port Zone will be below 1 dB re 1 µPa, if there is any increase at all. The lack of literature as to effects on fish species from underwater noise is allayed by the fact that the dredging and disposal noise localised to an area that is not recognised in the Regional Coastal Plan as an important fish habitat, will be temporary (Marine Ecology Assessment, Section 13.1.8). Section 13.1.8 of the Marine Ecology Assessment states that it is assumed that fish (including migrating eels from Waipu Estuary) have the ability to move away from noisy environments to avoid effects, whereas there may be very small sub-lethal temporary adverse effects on common sessile invertebrates.
Ngāi Tamarāwaho		
10.7	Effect of cumulative disturbances on Kaimoana decline. Any further sediment stress on Te Paritaha is acceptable in a harbour already carrying cumulative disturbance, reduced access, kaimoana decline and loss of cultural confidence.	The exceedance in the numerical modelling of TSS above 70 mg/L for only 10-20 minutes is significantly below the effect threshold of 75 mg/L over 13 days exposure detailed in the literature (Hewitt et al., 2001). This temporary elevated TSS predicted from the numerical modelling on Te Paritaha would have no significant adverse effect on pipi condition. I cannot comment on mauri, māhinga kai nor mokopuna raised by Ngāi Tamarāwaho as these concepts are outside my area of expertise.

10.9	Lack of resilience of pipi beds, robustness of data.	The Marine Ecology Assessment (section 4.3.9) states that the pipi community changes annually due to natural growth, recruitment and mortality processes. These cycles of pipi cohorts are exactly what is expected for the community at Te Paritaha. The pipi data collected is comprehensive and robust and indicates pipi community dynamics are occurring naturally as expected.
12.4	The harbour system that sustains kai and mauri is being further pressured.	The Marine Ecology Assessment concludes there are low-very low levels of effect from the proposed reconsenting of Capital and Maintenance Dredging (section 12, Table 14). The monitoring of pipi on Te Paritaha and rocky reef kaimoana within Tauranga Moana Mātaitai Reserve illustrates the Port's commitments to sustaining marine ecology within the Southern Te Awanui. My expert opinion is that the Port's Capital and Maintenance Dredging does not place further pressure on marine habitats (section 12, Table 14).
12.5	Sustainability of fish species given the dredging impacts.	The Marine Ecology Assessment notes that there are no rare or At-Risk fish species in the Southern Te Awanui (other than long-fin eel in Waipu Bay), but the assessment of the effects of dredging on fish extends far beyond the threat status of fish species. The assessment notes that there is a consistent and diverse sustained fish population in Te Awanui, with the port area supporting significant juvenile and adult fish populations, including eagle ray, snapper, trevally, kingfish, gurnard, kahawai, parore, and spotty (Table 13 and 14). As stated in Section 13.1.2, based on the assessment of sediment plume by de Lange (2025), it is concluded that any elevated TSS will occur within the mixing zone. Avoidance of the sediment plume by pelagic, demersal and mobile benthic/and fish species is likely to occur where concentrations of TSS are predicted to reach 100 mg/L (NIWA, 2014). Effects of elevated TSS from the dredging activity is not anticipated to affect fish in Southern Te Awanui (Table 16).

12.6	Impact of relocated seabed material on benthic life, reef health, marine pests and sediment quality.	The disposal of dredge material at the Spoil Disposal sites occurs largely in deep water non-dispersive offshore environments (Figure 3). The nearest reef to the disposal sites is monitored on a two-yearly basis, with no effects of sedimentation from the discharged dredge spoil. The soft sediment benthic habitat at the disposal sites has been monitored by Blom et al. (1993) which reveals a rapid recolonisation of natural benthic assemblages. Sediment quality with the Southern Te Awanui indicates contaminant concentrations below DGV and/or below laboratory detection (Section 8.0 Marine Ecology Assessment). Therefore, the movement of sediment between locations (dredge sites and disposal sites) does not affect sediment contaminants. Fletcher (2025) concludes that if the proposed mitigation measures she has recommended are implemented appropriately, the residual marine biosecurity risk is expected to be negligible. As stated above, the risk of transfer of exotic invasive species from the dredging for this Project will be managed by existing surveillance programs and likely increased invasive species surveillance at the time of any proposed dredging and disposal would further mitigate this risk.
15.6	Dredging effect on fisheries.	The Marine Ecology Assessment illustrates no adverse effects of the proposed dredging on fisheries (fish and shellfish) within the Southern Te Awanui. Section 13.1.8 of the Marine Ecology Assessment confirms that the Project area is not recognised by the Bay of Plenty Council Regional Coastal Environment Plan as being an important fish habitat, and that there are no rare or threatened fish species present.

		Section 4.5 of the Marine Ecology Assessment details the fish surveys undertaken in 2018 and 2019, concluding the southern Te Awanui supports a diverse suite of fish and significant populations of adult fish (Leonard, 2020). Battershill (2022a) also concluded that the active port area supports suitable habitat for a range of fish species and that the Port operations and dredging activity do not influence fish abundance. The Marine Ecology Assessment at Table 14 and 15 concludes there is a consistent and diverse fish population in Te Awanui, with the port area support significant juvenile and adult fish populations, include eagle ray, snapper, trevally, kingfish, gurnard, kahawai, parore, spotty and expected diadromous tuna at certain times of the year. Section 13.1.2 of the Marine Ecology Assessment concludes that the TSS from dredging for this project will be below the avoidance threshold for fish of 100 mg/L. In relation to underwater noise, section 13.1.8 of the Marine Ecology Assessment concludes that fish can move away from (avoid) noise. Table 16 of the Marine Ecology Assessment concludes the effect of the project activities on fish will be of a low level.
Page 72 and 73, recommendation 4.1 and 4.2	Te Paritaha Protection Plan and Kaimoana Monitoring	Recommendation 4.1 - I consider the Te Paritaha Monitoring Plan recognises Te Paritaha as a taonga and includes detailed pipi size, abundance, density, sediment grain size and pipi flesh quality. I consider it is robust and appropriate and is included as Condition 17.5 of the draft consent conditions. Other requests in 4.1 are in our opinion are outside our area of expertise. Recommendation 4.2 – Pipi are covered in Te Paritaha Monitoring Plan. Tuangi, titiko, tupa, patiki, mullet and other kai species are not affected by the Proposed

		reconsenting project, therefore there is no need to include these species in the proposed monitoring for this consent. However, iwi-led mātauranga Māori monitoring is enabled by the consent conditions to empower iwi to focus on species of concern.
Ngāti Ranginui Fisheries Trust		
96(d)	Dredging causing pipi decline, North Island trends.	The Marine Ecology Assessment (Section 4.3.9) states that the patterns in pipi recruitment and growth is a natural life history cycle of pipi with adult life expectancy of 7-10 years. Further studies on pipi populations in the upper North Island also showed declining abundances in adult cohorts. The decline of adults in 2022-2023, is due to natural life history processes with mortality of that particular adult cohort in 2022/2023, with younger cohorts growing through to adult size in the population over time (Marine Ecology Assessment, Section 4.3.9). The preliminary results of the data collected at Te Paritaha in May 2026 indicate adult pipi dominate the community, as expected with the younger cohorts growing through time and forming the adult size class (Section 4.3.9).
100(c)	Effects of noise on marine species.	Ngāti Ranginui Fisheries Trust note that dredging noise can affect marine species behaviour, feeding and life functions. It is noted that there are many activities that contribute to underwater noise in Te Awanui. The Marine Ecology Assessment (Section 13.1.8) refers to the noise expert, Pine (2025) who states Policy NS 2 of the Bay of Plenty Regional Coastal Environment Plan is aimed at protecting the natural character of Tauranga Harbour outside the Port Zone. Based on data from the 2023 maintenance dredging campaign and complete AIS record, noise models show that soundscape changes (both daily and

		monthly) outside the Port Zone will be below 1 dB re 1 µPa, if there is any increase at all. The effects on fish species from underwater noise is allayed by the fact that dredging and disposal noise will be localised to an area that is not recognised in the Regional Coastal Plan as an important fish habitat, and will be temporary (Marine Ecology Assessment, Section 13.1.8). Section 13.1.8 of the Marine Ecology Assessment states that it is assumed that fish (including migrating eels from Waipu Estuary) have the ability to move away from noisy environments to avoid effects, whereas there may be very small sub-lethal temporary adverse effects on common sessile invertebrates.
102	Mitigation proposals.	Kaitiaki monitoring of direct impacts on taonga marine from the dredging campaigns is not considered to be necessary, as the potential adverse effects on taonga species are already identified. Research into adult pipi reductions at Te Paritaha is not required. The existing pipi monitoring at Te Paritaha carried out 6 monthly is sufficient to detect natural life history alterations to cohorts and population. I cannot comment on māhinga kai as it is outside my area of expertise.
Tauranga Māori Iwi Customary Fisheries Trust (TMICFT)		
Pg 18	Certain fish species move to ancient ecological rhythms which rely on certain characteristics.	TMICFT identified that where ecological systems become disrupted, maramataka relationships also become disrupted, weakening both ecological understanding and cultural practice. The Marine Ecology Assessment does not include any data regarding disruptions to fish and ecological systems. Effects on fish are assessed as Very Low. The Marine Ecology Assessment acknowledges that there are no rare or At Risk fish species in the Southern Te Awanui (other than long-fin eel in Waipu Bay),

		and that the assessment of the effects of dredging on fish extends far beyond the threat status of fish species. The Marine Ecology Assessment notes that there is a consistent, diverse and sustained fish population in Te Awanui, with the port area supporting significant juvenile and adult fish populations, including eagle ray, snapper, trevally, kingfish, gurnard, kahawai, parore, and spotty (Leonard (2020). Table 13 and 14 of Marine Ecology Assessment). This finding does not suggest any effects on fish ecological rhythms or ecosystems.
Pg 21	Disappearance of pipi beds following dredging.	The Marine Ecology Assessment (Section 4.3.9) states that the patterns in pipi recruitment and growth is a natural life history cycle of pipi (with adult life expectancy of 7-10 years). This means that adult pipi cohorts (on Te Paritaha and wider within Te Awanui) will naturally die in time, being replenished by recruitment events and growth. The decline of adults in 2022-2023, is due to natural life history processes with mortality of that particular adult cohort in 2022/2023, with younger cohorts growing through to adult size in the population over time (Marine Ecology Assessment, Section 4.3.9). This natural decline in adult pipi is not due to dredging. There is no evidence to support that dredging has had any effect on pipi on Te Paritaha. There is significant evidence to support that pipi communities go through natural life cycles of recruitment, growth and death (Marine Ecology Assessment, Section 4.3.9). The preliminary results of the data collected at Te Paritaha in May 2026 indicate adult pipi dominate the community, as expected with the younger cohorts growing through time and forming the adult size class (Section 4.3.9).
Pg 22, 23	Shipping and dredging reducing seafood abundance, building cumulative effects.	TMICFT state that the mauri and health of Tauranga Harbour have significantly declined over approximately the last thirty years, particularly through reductions in seafood abundance associated with [the POTL] shipping and dredging activities. There is no evidence of POTL shipping effects and dredging activities have had any significant adverse effects on seafood abundance or on cumulative effects.

		This purported link between POTL activites and seafood declines is a common concern from iwi/hapu. It is my opinion that these two occurrences are not ecological or scientifically linked, but rather that these events have been recognised as occurring in the same time frame, perhaps leading people to recognise a cause and effect link, which in my opinion is not correct. Section 4.1 of the Marine Ecology Assessment discusses that annual monitoring of marine taonga species (as a component of kaimoana) in rocky reef habits within the Tauranga Moana Mātaitai Reserve is undertaken as part of a collaboration between POTL and the Tauranga Moana Iwi Customary Fisheries Trust (TMICFT). This is further discussed in Appendix 3 to the Marine Ecology Assessment. For POTL, Boffa Miskell Ltd (BML) in association with Toi Ohomai, have surveyed paua, kina, mussels, and crayfish annually in the Reserve from 2022 onwards (Boffa Miskell 2023a, 2024 and 2025). Kaimoana stocks have decreased in size and abundance over the past few years. The decline is considered to be primarily due to harvesting pressure, not as a result of Port-related activities. BML (2025) records that in December 2025, TMICFT placed a customary rāhui over key coastal and harbour areas around Mauao to allow depleted kaimoana to recover. The rāhui (suspending new customary permits for specified species) focuses on kūtai beds between Moturiki and Motuotau and the rocky reef margins around Mauao for pāua and kōura. The TMICFT signalled the rāhui will remain while Mātaitai Reserve bylaws are developed or until the kaitiaki determine the stocks have recovered sufficiently. The community is asked to honour the rāhui across customary, recreational and commercial fishing. The survey results recorded in BML (2025) are consistent with the conditions that prompted the rāhui. At Mauao, pāua remained low following the 2023 and 2024 decline. Kōura also remained low with small mid-sized dominance, and kūtai cover, although improved at some Mauao sites, localised variability was observed across the wider coastline. Together, these data support a

		precautionary, kaitiaki-led approach that prioritises stock rebuilding at Mauao, particularly for pāua, kōura and targeted kūtai beds. Table 10 in Section 7.3 of the Marine Ecology Assessment does not identity any adverse effects on rocky reef organisms nor on pipi on Te Paritaha or cockles adjacent to Whareroa marae (components of kai moana) that are likely to arise from the Project or historic shipping or dredging. As discussed in the Marine Ecology Assessment, in 2015, the long term Kaimoana Restoration Programme was established in response to proposed developments by POTL (Paul-Burke & Burke, 2015). POTL in conjunction with Tauranga Moana Iwi Customary Fisheries Trust has been monitoring kaimoana in the Mātaitai Reserve for many years (2015, 2016, 2023, 2024, 2025 and ongoing annually (Paul-Burke & Burke, 2015, Manaaki Te Awanui Fairlie et al., 2016, Boffa Miskell 2024, 2025 and 2026) (Section 4.3.3 of the Marine Ecology Assessment). The 2025 data (Boffa Miskell, 2026) is the fifth addition to the long-term monitoring programme (excluding the 2013 baseline) and fulfils consent conditions 7 and 7.14 of Coastal Permit 65806. The Tauranga Moana Iwi Customary Fisheries Trust applied a traditional rāhui over three taonga rocky reef species (pāua, kōura and 99bund) and within the Mātaitai Reserve with the aim of allowing these species to recover from harvesting pressure. The rāhui is supported by the Port and Dr De Luca. Pipi have been monitored at Te Paritaha (section 4.3.9 of Marine Ecology Assessment) in 2016 (Fairlie et al., 2016), 2017), Ross & Culliford (2018) 2022 (Boffa Miskell 2023e), 2023 (Boffa Miskell 2024a),2024 (Boffa Miskell 2024b, 2025a) and 2025 (Boffa Miskell Limited, 2025).
Pg 23	Korua population decline, diminished replenishment capacity.	TMICFT state that there are growing concerns around both the decline of the adult kōura fishery and the variability and apparent reduction in puerulus settlement occurring within Tauranga Moana. A related issue raised was the

		long-term resilience and replenishment capacity of these populations, particularly within an already highly modified harbour environment. The reasons for kōura population decline in Te Awanui have not been established. The causes of kōura localised decline in Te Awanui could include a combination of urbanisation, habitat degradation, harvesting pressure, and emerging climate-related stressors. A desktop search of scientific published literature revealed that available research specific to Tauranga Moana indicates that kōura populations are declining, based on a combination of empirical observations, iwi knowledge, and targeted research programmes focused on juvenile recruitment. Although long-term quantitative population datasets are limited, the observed decline is consistent with well-established ecological drivers of kōura abundance in New Zealand, including habitat degradation, declining water quality, and harvesting pressure. These pressures are present within Tauranga Harbour, which is recognised as subject to moderate eutrophication and catchment-derived stressors. Section 4.1 of the Marine Ecology Assessment discusses that annual monitoring of marine taonga species (as a component of kaimoana) in rocky reef habitats within the Tauranga Moana Mātaitai Reserve is undertaken as part of a collaboration between POTL and the Tauranga Moana Iwi Customary Fisheries Trust (TMICFT). For POTL, Boffa Miskell Ltd (BML) in association with Toi Ohomai, have surveyed paua, kina, mussels, and crayfish annually in the Reserve from 2022 onwards (Boffa Miskell 2023a, 2024 and 2025). Kaimoana stocks have decreased in size and abundance over the past few years. The decline is considered to be primarily due to harvesting pressure, not as a result of Port-related activities. BML (2025) records that in December 2025, TMICFT placed a customary rāhui over key coastal and harbour areas around Mauao to allow depleted kaimoana to recover. The rāhui (suspending new customary permits for specified species)

		focuses on kūtai beds between Moturiki and Motuotau and the rocky reef margins around Mauao for pāua and kōura. The TMICFT signalled the rāhui will remain while Mātaitai Reserve bylaws are developed or until the kaitiaki determine the stocks have recovered sufficiently. The community is asked to honour the rāhui across customary, recreational and commercial fishing. The survey results recorded in BML (2025) are consistent with the conditions that prompted the rāhui. At Mauao, pāua remained low following the 2023 and 2024 decline. Kōura also remained low with small mid-sized dominance, and kūtai cover, although improved at some Mauao sites, localised variability was observed across the wider coastline. Together, these data support a precautionary, kaitiaki-led approach that prioritises stock rebuilding at Mauao, particularly for pāua, kōura and targeted kūtai beds. Table 10 in Section 7.3 of the Marine Ecology Assessment does not identity that any adverse effects on rocky reef organisms nor on pipi on Te Paritaha or cockles adjacent to Whareroa marae (components of kai moana) are likely to arise from the Project. The scientific evidence supports a harbour containing a working port that is not significantly degraded (Section 4.1 Marine Ecology Assessment).
Pg 26, 28	Classification of certain species as under pressure.	TMICFT state specific taonga species and locations identified as being under pressure include pipi, tuangi (cockles), kūtai (mussels), kina, pāua, kōura (crayfish), and pātiki (flounder). Kaimoana stocks have decreased in size and abundance over the past few years (Section 4.3.3 Marine Ecology Assessment). The decline is considered to be primarily due to harvesting pressure, not as a result of Port-related activities. The Marine Ecology Assessment does not identify any declines in taonga species or pressure on taonga species that are due to POTL activities.
Pg 33, 34	Range of marine effects from a customary fisheries	TMICFT highlight the continued decline of already depleted customary fisheries resources.

	perspective. Will possibly require Willem's expertise.	The causes of taonga species decline in Te Awanui could include a combination of urbanisation, habitat degradation, harvesting pressure, and emerging climate-related stressors.
Pg 36	Fish work-ups as a negative ecological indicator.	I am not certain that fish work ups are a negative ecological indicator. Literature search revealed that fish work-ups indicate: 1. High prey availability (baitfish) 2. Strong trophic connectivity 3. Productive feeding conditions for higher trophic levels and that they are often treated as: 1. indicators of ecosystem productivity, and 2. proxies for baitfish abundance and predator activity
Ngāi Tukairangi		
Page 16	Loss of kaimoana through POTL development.	As stated above in response to TMICFT. There is no evidence of POTL development has had any significant adverse effects on seafood abundance or on cumulative effects. This purported link between POTL activities and seafood declines is a common concern from iwi/hapu. It is my opinion that these two occurrences are not ecological or scientifically linked, but rather that these events have been recognised as occurring in the same time frame, perhaps leading people to recognise a cause and effect link, which in my opinion is not correct. Section 4.1 of the Marine Ecology Assessment discusses that annual monitoring of marine taonga species (as a component of kaimoana) in rocky reef habitats within the Tauranga Moana Mātaitai Reserve is undertaken as part of a collaboration between POTL and the Tauranga Moana Iwi Customary Fisheries Trust. This is further discussed in Appendix 3 to the Marine Ecology Assessment. For POTL, Boffa Miskell Ltd (BML) in association with Toi Ohomai,

		have surveyed paua, kina, mussels, and crayfish annually in the Reserve from 2022 onwards (Boffa Miskell 2023a, 2024 and 2025). Kaimoana stocks have decreased in size and abundance over the past few years. The decline is considered to be primarily due to harvesting pressure, not as a result of Port-related activities. BML (2025) records that in December 2025, TMICFT placed a customary rāhui over key coastal and harbour areas around Mauao to allow depleted kaimoana to recover. The rāhui (suspending new customary permits for specified species) focuses on kūtai beds between Moturiki and Motuotau and the rocky reef margins around Mauao for pāua and kōura. The TMICFT signalled the rāhui will remain while Mātaitai Reserve bylaws are developed or until the kaitiaki determine the stocks have recovered sufficiently. The community is asked to honour the rāhui across customary, recreational and commercial fishing. The survey results recorded in BML (2025) are consistent with the conditions that prompted the rāhui. At Mauao, pāua remained low following the 2023 and 2024 decline. Kōura also remained low with small mid-sized dominance, and kūtai cover, although improved at some Mauao sites, localised variability was observed across the wider coastline. Together, these data support a precautionary, kaitiaki-led approach that prioritises stock rebuilding at Mauao, particularly for pāua, kōura and targeted kūtai beds. Table 10 in Section 7.3 of the Marine Ecology Assessment does not identity any adverse effects on rocky reef organisms nor on pipi on Te Paritaha or cockles adjacent to Whareroa marae (components of kai moana) that are likely to arise from the Project or historic shipping or dredging. As discussed in the Marine Ecology Assessment, in 2015, the long term Kaimoana Restoration Programme was established in response to proposed developments by POTL (Paul-Burke & Burke, 2015). POTL in conjunction with Tauranga Moana Iwi Customary Fisheries Trust has been monitoring kaimoana in the Mātaitai Reserve for many years (2015, 2016, 2023, 2024, 2025 and ongoing annually (Paul-Burke & Burke, 2015, Manaaki Te

		Awanui Fairlie et al., 2016, Boffa Miskell 2024, 2025 and 2026) (Section 4.3.3 of the Marine Ecology Assessment). The 2025 data (Boffa Miskell, 2026) is the fifth addition to the long-term monitoring programme (excluding the 2013 baseline) and fulfils consent conditions 7 and 7.14 of Coastal Permit 65806. The Tauranga Moana Iwi Customary Fisheries Trust applied a traditional rāhui over three taonga rocky reef species (pāua, kōura and kūtai) and within the Mātaitai Reserve with the aim of allowing these species to recover from harvesting pressure. The rāhui is supported by the Port and Dr De Luca. Pipi have been monitored at Te Paritaha (section 4.3.9 of Marine Ecology Assessment) in 2016 (Fairlie et al., 2016), 2017), Ross & Culliford (2018) 2022 (Boffa Miskell 2023e), 2023 (Boffa Miskell 2024a),2024 (Boffa Miskell 2024b, 2025a) and 2025 (Boffa Miskell Limited, 2025).
Page 17	Level of effects re pipi loss at Paritaha.	The Marine Ecology Assessment (Section 4.3.9) states that the patterns in pipi recruitment and growth is a natural life history cycle of pipi (with adult life expectancy of 7-10 years). The decline of adults in 2022-2023, is due to natural life history processes with mortality of that particular adult cohort in 2022/2023, with younger cohorts growing through to adult size in the population over time (Marine Ecology Assessment, Section 4.3.9). The preliminary results of the data collected at Te Paritaha in May 2026 indicate adult pipi dominate the community, as expected with the younger cohorts growing through time and forming the adult size class (Section 4.3.9).
Page 28	Change in habitat for kaimoana as a result of development.	There is no evidence that POTL activities including dredging have had significant impact on kaimoana habitat in Te Awanui. There is evidence of temporary benthic soft sediment habitat effects from dredging which are restored by natural recolonisation processes over 1-3 post dredging (Section 13.1.6).

Page 36	Discussion about kaimoana not being adequately recognised and provided for.	The monitoring of pipi on Te Paritaha and rocky reef kaimoana within Tauranga Moana Mātaitai Reserve illustrates the Port's commitments to sustaining kaimoana within the Southern Te Awanui.
Page 37	Finite resources of kaimoana not considered	The monitoring of kaimoana pipi on Te Paritaha and rocky reef kaimoana within the Tauranga Moana Mātaitai Reserve involves 6 monthly and annual surveys respectively monitoring size and abundance of kaimoana. These kaimoana species follow natural reproduction cycles (and therefore are not finite with respect to abundance) undertaken in the context of urbanisation, habitat degradation, harvesting pressure, and emerging climate-related stressors.
Page 44 – 45	Critique of the Marine Ecology Assessment.	Ngāi Tukairangi criticise the Marine Ecology Assessment, which didn't include landscape, natural character or culture. Whilst I respect the holistic nature of iwi/hapu perspectives, landscape, natural character or culture are outside my area of expertise, and it would be inappropriate for me to comment on these matters. I restrict my input to the Project to expert marine ecological matters. Ngāi Tukairangi state "the trajectory of incremental depletion – measured in decades, incremented by consent – is well documented in New Zealand's coastal fisheries". New Zealand's fisheries have been subject to overfishing for a number of decades. There is no evidence to indicate POTL activities have caused incremental loss of kaimoana species. I do not consider that the assessment framework underestimates incremental loss of kaimoana (Section 4.3.3)
Page 58 – 59	Anecdotal evidence and comments around	Ngāi Tukairangi state that the titiko, tuangi, ureroa, the channels and drains used by whanau of Ngāi Tukairangi in which to store their kaimoana after it has been

	changes/decline of kaimoana in the harbour.	harvested from mataitai areas have gone. Further stating, an inherent relationship with the moana where the Port is situated. There is no evidence to indicate POTL activities have caused incremental loss of kaimoana species. This purported link between POTL activities and seafood declines is a common concern from iwi/hapu. It is my opinion that these two occurrences are not ecological or scientifically linked, but rather that these events have been recognised as occurring in the same time frame, perhaps leading people to identify a cause and effect link, which in my opinion is not correct.
Page 64	Historical kaimoana depletion and the effect that this project will have.	There is no evidence to indicate POTL activities have caused, or that the reconsenting of Capital and Maintenance dredging will cause, incremental loss of kaimoana species. This purported link between POTL activities and kaimoana declines is a common concern from iwi/hapu. It is my opinion that these two occurrences are not ecological or scientifically linked, but rather that these events have been recognised as occurring in the same time frame, perhaps leading people to identify a cause and effect link, which in my opinion is not correct.
Page 66 – 67	Critique of Marine Ecology Assessment conclusion on effects.	Ngāi Tukairangi state that my verbal assessment (in Forum Three) of the marine ecological effects of Stella Passage Project and the Reconsenting of Capital and Maintenance Dredging Project happening at similar times has a low level of effect, given that for each Project I assessed as low levels of effect on marine ecology. I stand by my assessment and recognise cumulative effects in Section 13.1.9 and Table 16 of the Marine Ecology Assessment.
Page 68	Comment on environmental thresholds that allow for effects to begin.	I disagree that Te Awanui is significantly degraded. I assess the marine ecological values as having High (Table 14 and 15 of Marine Ecology Assessment). Te Awanui has been affected by urbanisation, habitat degradation, harvesting pressure, and emerging climate-related stressors. In addition, other structures within Te Awanui include the POTL, Tauranga Harbour Bridge, Tauranga Marina, coastal edge hardening and reclamation for roading and other infrastructure, and discharges of stormwater, wastewater and

		industrial discharges. Despite all these potential stressors to marine ecological values the ecological values of the Southern Te Awanui are High (Table 14 and 15 of Marine Ecology Assessment).
Page 69	Restoration conditions.	No mitigation measures required in the marine ecology assessment due to level of effect assessed as Very Low – Low without mitigation (Table 14). Condition 17.5 is considered appropriate and adequate for the long-term monitoring of pipi size and abundance on Te Paritaha and includes input from iwi and hapū. POTL have offered a condition providing a contribution of funding towards iwi-led mātauranga monitoring condition empowering iwi to focus on the kind of monitoring they see as important and wish to undertake.
Page 70	Fanworm effects on Paritaha.	The Mediterranean Fanworm (*Sabella spallanzanii*) has been detected in Te Awanui. I am not aware of data indicating the presence on Te Paritaha. *S. spallanzanii* is a high-efficiency suspension feeder. Pipi are also suspension feeders. While there is no direct empirical evidence demonstrating effects of Mediterranean fanworm (S. *spallanzanii*) on pipi populations in Tauranga Harbour, *S. spallanzanii* is an ecosystem engineer that alters soft-sediment habitats and competes with other suspension feeders for food. High densities of *S. spallanzanii* have been shown to modify benthic community composition, nutrient cycling, and plankton availability, all of which are critical determinants of pipi habitat suitability and feeding success. Accordingly, the presence or proliferation of *S. spallanzanii* represents a plausible indirect pressure on pipi populations. Biosecurity risks are covered by Fletcher (2025) (Section 13.1.7 of Marine Ecology Assessment).

		Fletcher (2025) concludes that if the proposed mitigation measures above are implemented appropriately, the residual marine biosecurity risk is expected to be negligible.
Page 71	Taonga species now at unsustainable levels in Mauao reserve.	Section 4.1 of the Marine Ecology Assessment discusses that annual monitoring of marine taonga species (as a component of kaimoana) in rocky reef habitats within the Tauranga Moana Mātaitai Reserve is undertaken as part of a collaboration between POTL and the Tauranga Moana Iwi Customary Fisheries Trust. This is further discussed in Appendix 3 to the Marine Ecology Assessment. For POTL, Boffa Miskell Ltd (BML) in association with Toi Ohomai, have surveyed paua, kina, mussels, and crayfish annually in the Reserve from 2022 onwards (Boffa Miskell 2023a, 2024 and 2025). Kaimoana stocks have decreased in size and abundance over the past few years. The decline is considered to be primarily due to harvesting pressure, not as a result of Port-related activities. BML (2025) records that in December 2025, TMICFT placed a customary rāhui over key coastal and harbour areas around Mauao to allow depleted kaimoana to recover. The rāhui (suspending new customary permits for specified species) focuses on kūtai beds between Moturiki and Motuotau and the rocky reef margins around Mauao for pāua and kōura. The TMICFT signalled the rāhui will remain while Mātaitai Reserve bylaws are developed or until the kaitiaki determine the stocks have recovered sufficiently. The community is asked to honour the rāhui across customary, recreational and commercial fishing. The survey results recorded in BML (2025) are consistent with the conditions that prompted the rāhui. At Mauao, pāua remained low following the 2023 and 2024 decline. Kōura also remained low with small mid-sized dominance, and kūtai cover, although improved at some Mauao sites, localised variability was observed across the wider coastline. Together, these data support a precautionary, kaitiaki-led approach that prioritises stock rebuilding at Mauao, particularly for pāua, kōura and targeted kūtai beds.

		Table 10 in Section 7.3 of the Marine Ecology Assessment does not identity any adverse effects on rocky reef organisms nor on pipi on Te Paritaha or cockles adjacent to Whareroa marae (components of kai moana) that are likely to arise from the Project or historic shipping or dredging. As discussed in the Marine Ecology Assessment, in 2015, the long term Kaimoana Restoration Programme was established in response to proposed developments by POTL (Paul-Burke & Burke, 2015). POTL in conjunction with Tauranga Moana Iwi Customary Fisheries Trust has been monitoring kaimoana in the Mātaitai Reserve for many years (2015, 2016, 2023, 2024, 2025 and ongoing annually (Paul-Burke & Burke, 2015, Manaaki Te Awanui Fairlie et al., 2016, Boffa Miskell 2024, 2025 and 2026) (Section 4.3.3 of the Marine Ecology Assessment). The 2025 data (Boffa Miskell, 2026) is the fifth addition to the long-term monitoring programme (excluding the 2013 baseline) and fulfils consent conditions 7 and 7.14 of Coastal Permit 65806. The Tauranga Moana Iwi Customary Fisheries Trust applied a traditional rāhui over three taonga rocky reef species (pāua, kōura and kutai) and within the Mātaitai Reserve with the aim of allowing these species to recover from harvesting pressure. The rāhui is supported by POTL and Dr De Luca. Pipi have been monitored at Te Paritaha (section 4.3.9 of Marine Ecology Assessment) in 2016 (Fairlie et al., 2016), 2017), Ross & Culliford (2018) 2022 (Boffa Miskell 2023e), 2023 (Boffa Miskell 2024a),2024 (Boffa Miskell 2024b, 2025a) and 2025 (Boffa Miskell Limited, 2025).
Page 74 onwards	Consent Conditions.	Pipi are adequately covered in the current Te Paritaha monitoring program which includes pipi abundance and size counts across seven sites, as well as sediment and flesh contaminants and sediment grain size. POTL are proposing a consent condition including a contribution to an iwi-led mātauranga monitoring program, empowering iwi to focus on species and monitoring they deem important.

Page 86	Critique of Marine Ecology Assessment.	Whilst I respect the holistic nature of iwi/hapu perspectives, landscape, natural character or culture are outside my area of expertise, and it would be inappropriate for me to comment on these matters. I restrict my input to the Project to expert marine ecological matters. I confirm cumulative effects have been assessed (Section 13.1.9).
Waitaha		
3.8	The scale of the marine ecology assessment.	I am comfortable with the two scales I used for my assessment, being the Project site scale and the Southern Te Awanui scale. Whilst I respect the holistic nature of iwi/hapu perspectives, I did not use the whole Te Awanui as an assessment scale as the Southern Te Awanui is a more conservative measure. If my assessment used the entire Te Awanui, then the percentage of marine habitat areas involved in the Project would have been significantly smaller than the Southern Te Awanui.
6.3 and 6.4	Protection/monitoring programme.	Waitaha list a number of required outcomes for protecting and monitoring Te Paritaha (Waitaha Section 6.3 a-h). I will address the required outcomes individually a) The Te Paritaha monitoring design has been modified over many years, with one of the results being that data is difficult to compare directly between monitoring designs. The BML design that is currently used is comprehensive and robust in my opinion. It would be detrimental to the long-term data set to change the monitoring design at this late stage. b) BML and POTL have baseline and ongoing pipi abundance, pipi flesh quality (as a substitute for condition), and recruitment data. An assessment cultural confidence is outside our area of expertise. c) I consider monitoring pipi on Te Paritaha before and after dredging campaigns is very useful. Currently, BML survey pipi every March and November. This frequency will pick up before and after dredging campaigns.

		d) Inclusion of a cultural harvest indicator is outside my area of expertise, however I have included Mātauranga Māori in our pipi surveys (put forward by Kiamaia Ellis). e) Surface sediment grain size monitoring occurs six monthly at Te Paritaha. Surface sediment monitoring would also pick up any sediment deposition of different grain sizes to ambient. f) A consent condition is being included that outlines Te Paritaha survey results will be provided to the SPDAG to ensure they receive the information. g) A trigger for pipi condition is not required as the pipi population is successfully being replenished by natural cycles of recruitment and growth. h) Recommendations for rahui for Te Paritaha is outside my area of expertise. Waitaha list a number of required outcomes for protecting and monitoring marine ecology and habitat (Waitaha Section 6.4 a-e). I will address the required outcomes individually. a) I confirm that monitoring of Te Paritaha, Motuotau Reef and rocky reef taonga species will continue at the same frequency as the past 3-4 years. b) I am happy for Waitaha to participate in interpretation of marine ecology monitoring data. c) I cannot include cultural indicators in the monitoring myself, that would have to be carried out by iwi/hapu. d) I agree that adaptive management processes would be involved should monitoring of marine ecology indicate ecological changes greater than expected.