MEMO	
Attention	Todd Whittaker
From:	Shane Kelly
CC	Cristal Bennett, Paul Murphy, Sophie Ovenden
Date:	14 September 2023
Regarding	Eastland Port Ltd: Twin Berths Project — Assessment of marine ecology and water quality effects.

COAST & CATCHMENT
ENVIRONMENTAL CONSULTANTS

BACKGROUND

Eastland Port Ltd have applied for resource consents to enable Stage 2 of their Twin Berths project. I have been engaged by Gisborne District Council to provide an independent review of the marine ecological and water quality elements of the application. Background details of relevance to marine ecology and water quality were provided in the AEE that accompanied the consent and associated technical assessments.

EXPERTISE AND EXPERIENCE

I have a diverse range of research experience, with a strong emphasis on applied science, environmental assessment, marine conservation, and resource management. I completed my PhD on marine reserves and spiny lobster/crayfish (*Jasus edwardsii*) ecology at the University of Auckland, and then spent my early career studying mussel recruitment processes, reef ecology and sponge aquaculture during two post-doctoral fellowships.

For 5 ½ years I was Project Leader/Principal Advisor in Environmental Research and Monitoring at the Auckland Regional Council (ARC). In this capacity I managed major research, monitoring, and strategic regional projects. These included State of the Environment monitoring programmes for water quality, sediment quality and ecosystem health. I was a key technical advisor on major urban infrastructure programmes and supported regulatory, planning and biosecurity teams. I provided input to policy and plan development, major consents, and associated hearings and appeals. I also conducted surveys of invasive marine pests and provided technical advice on their management.

In 2008 I established Coast and Catchment Ltd, and since that time have provided technical advice on the effects of numerous coastal and landuse activities. Among other things, I have assessed and advised port and wharf operators, and local and regional councils on impacts related to dredging, port and wharf development and associated discharges. I designed and reported on the harbour monitoring programme for New Zealand's largest wastewater treatment plant at Mangere, and I am regularly commissioned to assess, monitor and/or advise on the effects of other wastewater plants. I have also provided technical advice on city-wide urban stormwater management and catchment planning in Wellington, Auckland and Napier, and have been the lead author of five 'State of the Hauraki Gulf' reports.

In addition, my work has included the assessment of environmental values and issues in multiple harbours and estuaries, and provision of effects assessments and technical advice on: water and sediment quality; ecological impacts of a variety of coastal developments; aquaculture development and regulation; industrial discharges; and, pollution spills.

I am also a certified independent hearing commissioner. Examples of relevant hearings that I have sat on include applications to: abandon the Rena shipwreck; redevelop the Wellington Interislander ferry terminal; and for dredging and redevelopment associated with the highly contaminated Calwell slipway in Port Nelson.

CODE OF CONDUCT

I confirm that I have read the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note (2023). I agree to comply with the Code of Conduct in presenting this report and any evidence at the hearing. The opinions and assessment within this report are within my area of expertise, except where I have stated my reliance on other identified information or evidence.

EXECUTIVE SUMMARY

This independent review considers relevant material on marine ecology and water quality, and:

- identifies proposed activities of relevance to marine ecology and water quality;
- summarises marine ecological and water quality values in the areas potentially affected;
- summarises the potential effects of the proposed activities and considers their significance for marine ecology and water quality;
- makes recommendations on conditions of consent.

In general, sufficient information has been provided in the assessment of environmental effects, associated technical reports and response to a request for further information to determine most of the likely effects of the proposed activities. There is also a substantial level of agreement between the conclusions of the Applicant’s technical experts and myself. However, I disagree on several matters.

Proposed activities with the potential to adversely affect marine ecology and water quality include dredging and disposal, reclamation, and the reconfiguration of Wharf 8 and the outer breakwater. Habitats and ecological communities that will be directly affected include:

- sediment habitats within the port basin, port navigation channel (PNC), offshore spoil disposal ground (OSDG), and within the proposed reclamation areas;
- those that have been created or developed on port structures, particularly the outer breakwater,
- natural reef in the reclamation and PNC.

Habitats surrounding those areas may also be indirectly affected.

Key matters that are not in contention are as follows::

- The ecological values of the sediment dwelling benthic community in the inner to mid harbour are considered to be low.
- Subtidal parts of the inner breakwater and intertidal parts of the outer breakwater have low ecological values.
- The quality of dredged sediments is of minor concern.

- Soft sediment habitats inside and adjacent to the reclamation footprint have low–medium ecological values.
- The ecological values of sediment dwelling community in the PNC is low–medium for the inner section and medium–high for the outer section.
- Reef habitat within the PNC is of low ecological value, but reefs either side of the PNC have moderate–high ecological value.
- The sediment dwelling community of the OSDG is moderately diverse and characterised by common taxa.
- The direct ecological effects of the proposed dredging in the port basin and PNC are likely to be low/minor.
- Water quality standards for the natural colour and clarity of the water will not be met in the port basin and PNC. Such effects are likely to be intermittent and short-term but will be sustained during the period of dredging.
- There should be there no adverse water quality effects relating to the mobilisation of heavy metals.
- With appropriate sediment controls the risk of adverse, offsite ecological or water quality effects from reclamation construction is low.
- The likely ecological effect of reclamation will be very low–low.
- The medium to long-term subtidal ecological effects of reconfiguring the outer breakwater are considered to be low. However, in my opinion short-term (potentially lasting several years) ecological effects will be significant within the construction footprint, with lower-level effects on some species (such as crayfish) likely to extend beyond that area.
- The ecological effects of the Wharf 8 extension are likely to be negligible (because the features affected have negligible ecological values). However, I believe the proposed development provides an opportunity to improve the ecological values of the wharf and inner breakwater.
- An improvement in the quality of stormwater discharges from the southern log yard is anticipated, and effects on coastal water quality are expected to be reduced. Stormwater from the reclamation areas is expected to be of a similar quality.
- I consider the assessment, recommendations, and conclusions related to the assessment of marine mammals to be reasonable, and if consent is granted, I support the inclusion of consent conditions that require the recommended mitigation measures to be implemented.

Matters in contention include:

- Inferences about the mortality of juvenile crayfish in the port being exacerbated due to sub-optimal environmental conditions does not appear consistent with available data. In my opinion, the inference should be given little weight unless supporting, empirical evidence can be provided. Having said that, I do not consider the effects of the proposed activities on juvenile crayfish to be substantial issue of concern.
- The Applicant's expert suggests that disposal operations associated with the proposed dredging operations will be the same, or very similar to, those undertaken currently in respect of: equipment used; the volume and characteristics of sediment released; and the duration and frequency of each disposal event. I note that disposal volumes being sought in this consent application are much greater than those previously deposited. The types of material also differ. Therefore, past monitoring results cannot be relied upon to predict future outcomes. If consent is granted, I recommend conditions require higher frequency monitoring surveys (e.g., annual) to be carried out initially. These could

potentially be reduced to current frequencies once capital dredging is complete, maintenance volumes settle, and their effects have been quantified.

- I disagree with the basis of the assessment of biosecurity matters, and with the conclusion that the biosecurity risk of dredging and disposal is low. I consider the biosecurity risk of the proposed activities to be high, and if consent is granted, I recommend the inclusion of a comprehensive set of biosecurity conditions. I note that despite the Applicant's technical adviser's (Mr. Poynter) conclusion that the biosecurity risk of dredging and disposal is low, he agrees that biosecurity risks will require comprehensive conditions, such as those proposed for Wharf One[1].

Finally, I defer comment regarding effects on kai moana until information from mana whenua becomes available.

SCOPE OF THIS REVIEW

This review considers relevant material on marine ecology and water quality provided in the AEE (particularly Appendix M (Poynter 2022)), and additional information provided in response to a s92 request for further information (Ahern & Davis 2023). Where necessary I have also considered, and present, other relevant material which I have used to contextualise specific matters and help form my conclusions. Together, I believe that sufficient information is provided to determine most of the likely effects of the proposed activities, but I have also highlighted key issues where uncertainty remains.

This review therefore:

- identifies proposed activities of relevance to marine ecology and water quality;
- summarises marine ecological and water quality values in the areas potentially affected;
- summarises the potential effects of the proposed activities and considers their significance for marine ecology and water quality;
- makes recommendations on conditions of consent.

For clarity, my review does not consider the effects on coastal avifauna or impacts on Māori customary values.

ACTIVITIES RELEVANT TO MARINE ECOLOGY AND WATER QUALITY

Stage 2 of Eastland Port's Twin Berths project involves works that include:

- The extension of the existing Wharf 8 structure involving the construction of a 140 m long structure approximately 130 m into the area currently occupied by the inner breakwater, with reclamations on either side of the existing breakwater totalling around 900 m^2.
- A triangular, Outer Port reclamation involving approximately 8,900 m^2 of the CMA (a platform of 7,000 m^2 plus revetment areas) in the corner between the Southern Log Yard (SLY) and inner breakwater, to provide heavy vehicle access to the Wharf 8 extension.
- Rebuilding of the outer breakwater structure by placing purpose-built concrete armour units (e.g., X-bloc or other proprietary units) of various sizes along the approximately 200 m long structure and concrete capping the top of the refurbished facility. The re-armouring works will be carried out after initial ground stabilisation. Table 8 of the Worley

[1] Letter from Mark Poynter to Marty Bayley regarding Twin Berths: Section 92 review ecology: Outstanding matters. Dated 7 September 2023.

report (Worley 2022b) indicates that the footprint of the proposed breakwater will be 10,700 m^2, c.f. 8,000 m^2 for the existing breakwater (total estimates).

- Providing for stormwater collection and treatment within the newly reclaimed area, and to provide similar stormwater discharge quality for the SLY to that achieved in other parts of the port (by reducing suspended sediment concentrations).
- The deepening of the Port Navigation Channel (PNC) and Vessel Turning Basin (VTB) to accommodate larger Handymax vessels, and ongoing port-wide maintenance dredging. The capital dredging area extends from the western (seaward) end of the PNC to a tug manoeuvring area just past the eastern (inland) end of Wharf 7. A seabed area of approximately 18.46 ha will be affected, with the total volume of capital dredging estimated to involve approximately 140,600 m^3 of material. The depth of capital dredging required will vary from 13.5 m Below Chart Datum (BCD) in the Outer PNC to 7.5 m BCD in part of the VTB. Consent is also being sought to maintenance dredge up to approximately 140,000 m^3 of material per year.
- Disposal of the capital and maintenance dredge material at the existing Offshore Spoil Disposal Ground (OSDG).

SUMMARY OF ECOLOGICAL AND WATER QUALITY VALUES

HARBOUR BASIN AND BREAKWATER

ECOLOGY OF THE HARBOUR BASIN

The harbour basin contains subtidal sediment and hard shore habitats. The latter are mostly human-made, port-related structures.

Descriptions of habitats and communities within the harbour basin are provided in Appendix M of the AEE (Poynter 2022). Poynter (2022) references a 2003[2] survey by NIWA (Inglis et al. 2005) and suggests that at the time of the survey the port environment sustained a relatively diverse assemblage of marine life (compared to other ports), which was predominantly associated with the port structures. I note that a total of 205 taxa were identified during the NIWA survey, including 50 taxa obtained using sediment core sampling (27 taxa from 18 samples) and sled tows (36 taxa). Results of note from the 2003 port survey included:

- The shellfish obtained included the kai moana species: kuku, green-lipped mussels, *Perna canaliculus*, tuangi, cockles *Austrovenus stutchburyi*, and kāeo, Cook's turban, *Cookia sulcata*.
- Thirteen crayfish were caught in fish, crab and starfish traps, but information was not provided on their size.
- A number of potential kai moana fish species were obtained in traps including: yellow eyed mullet (aua, *Aldrichetta forsteri*), jack mackerel (hauture, *Trachurus novaezelandiae*), blue warehou (*Seriolella brama*), tarakihi (*Nemadactylus macropterus*), spotty (paketi, *Notolabrus celidotus*), sweep (hui, *Scorpis lineolata*), snapper (tāmure, *Pagrus auratus*) and school shark (mangō or kapetā, *Galeorhinus australis*).
- The macroalgae assemblage on the wharf piles was distinct from the assemblage obtained from the seafloor in the port basin using sled tows. Twenty-six taxa were

[2] Note the survey was carried out in 2003, but the results were reported in 2005.

obtained from the piles and nine from sled tows. The only species common to both methods was the common kelp, *Ecklonia radiata*.

- one unwanted organism classified under the Biosecurity Act (1994) was obtained: the Asian kelp *Undaria pinnatifida.*

More recently, Poynter (2017a) obtained 15 taxa from three box dredge sediment samples adjacent to the Turning Basin, while 36 sediment dwelling taxa were obtained from eight sediment grab samples in the mid and inner harbour (Ahern 2021a). All the taxa obtained in 2021 were common, with 18 polychaetes, 7 bivalves, 3 amphipod crustaceans, and 9 other taxa collected. It should be noted that methods differed between the NIWA survey and that of Ahern (2021a), with the former using a 1 mm mesh sieve and the later using a 0.5 mm mesh sieve to retain sediment dwelling organisms.

I consider the above information sufficient to characterise the benthic community in the inner to mid Port. I have also carried out checks to confirm that none of the taxa present in the latest survey were listed as Threatened or At Risk species. Overall, Poynter (2022) concluded that the biodiversity of the sediment dwelling benthic community in the inner to mid harbour was limited and the community was of low ecological value. Based on the most recent sampling data, I agree with that conclusion.

In terms of other ecological values, Poynter (2022) notes that habitats adjacent to the dredging areas within the port are mostly human-made and highly impacted by port activities, and in particular, ship movements which generate large pulses of disturbed sediment. A 2017 visual inspection of exposed intertidal substrates beneath Wharf 6 and Wharf 7 (Poynter 2017b) indicated that intertidal habitat and biota beneath them were heavily silted and limited encrusting and sessile biota were present. Despite that, subtidal habitat beneath Wharf 6 and Wharf 7 is known to support relatively large numbers of newly settled and juvenile crayfish, which settle in '*innumerable*' small holes created by burrowing bivalve molluscs that pepper the reef wall (Butler et al. 1999). Habitat beneath the wharves was also reported to be '*covered by encrusting sponges, ascidians, and tunicates*' (Butler et al. 1999). This is consistent with the 2003 NIWA survey (Inglis et al. 2005) which identified 93 taxa growing on piles beneath those wharves.

Section 3.3 of Poynter (2022) includes a discussion of crayfish settlement in the port. In relation to juvenile crayfish he suggests that '*naturally high mortality is likely to be exacerbated in the port environs due to the sub-optimal nature of the settlement habitat. The naturally high sediment regime and at times low salinity, are likely environmental stressors to juvenile crayfish*'. I note that November 1999 counts of juvenile crayfish under Wharf 7 (Booth et al. 2001) included 66 individuals in the one-plus year class and 45 in the two-plus year class. This suggests that juveniles can, and do, survive in the port for extended periods (lobsters would have outgrown the small holes they settle and initially shelter in by year three). I also note that tagging studies have shown that site association is weaker in small crayfish, and that they tend to move further than large crayfish (Kelly & MacDiarmid 2003). I therefore, believe it is possible that crayfish from the port do make an important contribution to populations on surrounding reefs.

The ecological characteristics of the existing outer breakwater were identified through a dive survey, conducted in response to a s92 request for further information (Ahern & Davis 2023). Habitat on the northern (harbour) side of the outer breakwater is described as a near vertical wall of concrete with narrow cracks where the slabs join, dropping down to a jumbled pile of very large slabs and boulders with frequent, very large and deep, caves, cracks, and crevices. The habitat slopes down into the channel with rocks becoming smaller and interspersed with sediment as depth increases. The ecological community was described as typical, with a moderate to high diversity of hard substrate species.

Visibility during the dive survey was very poor, but five small–medium sized crayfish were observed. Survey notes indicate that there were likely to have been '*many more that couldn't be seen*' (SLR Dive Report, Appendix A, p. 17 of Ahern and Davis (2023)). That observation is consistent with 12 crayfish being caught in drop pots deployed along the outer breakwater over a 2-hour period in February 2021, and 17 crayfish being caught during a similar survey in June 2021 (Poynter 2022). Restrictions on potting and set netting around the port (see Figure 1), coupled with poor visibility for divers (Cole et al. 1997; Ahern & Davis 2023) may provide some protection from fishing. Experience from marine protected areas in New Zealand (Kelly et al. 2000c; Pande et al. 2008; Haggitt & Mead 2009; Freeman et al. 2012; Haggitt & Freeman 2014) suggests that such restrictions could contribute towards, what appears to be, relatively high numbers of crayfish in this area (noting that reliable data on crayfish abundance was not provided). However, I am uncertain about how effectively the restriction is enforced, given that Ahern and Davis (2023) reported observing crayfish pots in the '*Foul Grounds*' area around the PNC.

In contrast, relatively few fish were observed during the dive survey (Ahern & Davis 2023), with two species of triplefin (variable, *Fosterygion varium* and long-finned, *Ruanoho decemdigitatus*), spotties (*Notolabrus celiodotus*), sea perch (*Helicolenus percoides*) and a conger eel (*Conger verreauxi*) recorded. Other biota recorded included a variety of: macroalgae (including *Carpophyllum maschalocarpum*, *Ecklonia radiata*, *Zonaria aureomarginata*, *Anotrichium crinitum, Carpomitra costata*, *Rhodymenia* sp.), and encrusting coralline and red algae); bryozoans; hydroids; sponges (including *Callyspongia ramosa*, *Raspailia topsenti*, *Polymastia* sp., and *Tethya berquistae*); and ascidians. Mobile invertebrates included the sea cucumber *Australostichopus mollis*, Cook's turban *Cookia sulcata*, and the red rock crab *Guinusia chabrus*.

Although existing port structures are human-made, in my opinion the available information indicates they have become an important component of the existing, local reef environment. Taken as a whole, the physical complexity and variation of the hard structures within the port has facilitated the development of subtidal marine communities with moderate, or higher, ecological values. Furthermore, based on my experience in relation to crayfish[3], I believe it is also reasonable to assume that the port structures not only act as a source of juvenile crayfish, but they are also likely to sustain resident adults, who move seasonally between inshore and offshore reef and sediment habitats (crayfish on offshore reefs are discussed later in this memo).

Note that Poynter (2022) concluded that subtidal parts of the inner breakwater had low ecological value, while subtidal sections of the outer breakwater had medium ecological value. He also concluded that intertidal parts of the breakwater and those parts above MHWS had a low ecological value. I agree his conclusion regarding the intertidal zone and inner breakwater, but I regard the subtidal habitat values of the outer breakwater as moderate to high based on the physical complexity of the habitat, partial protection from fishing, variety of sessile species present, likely ecological linkages to surrounding reef habitats, and reported crayfish abundances.

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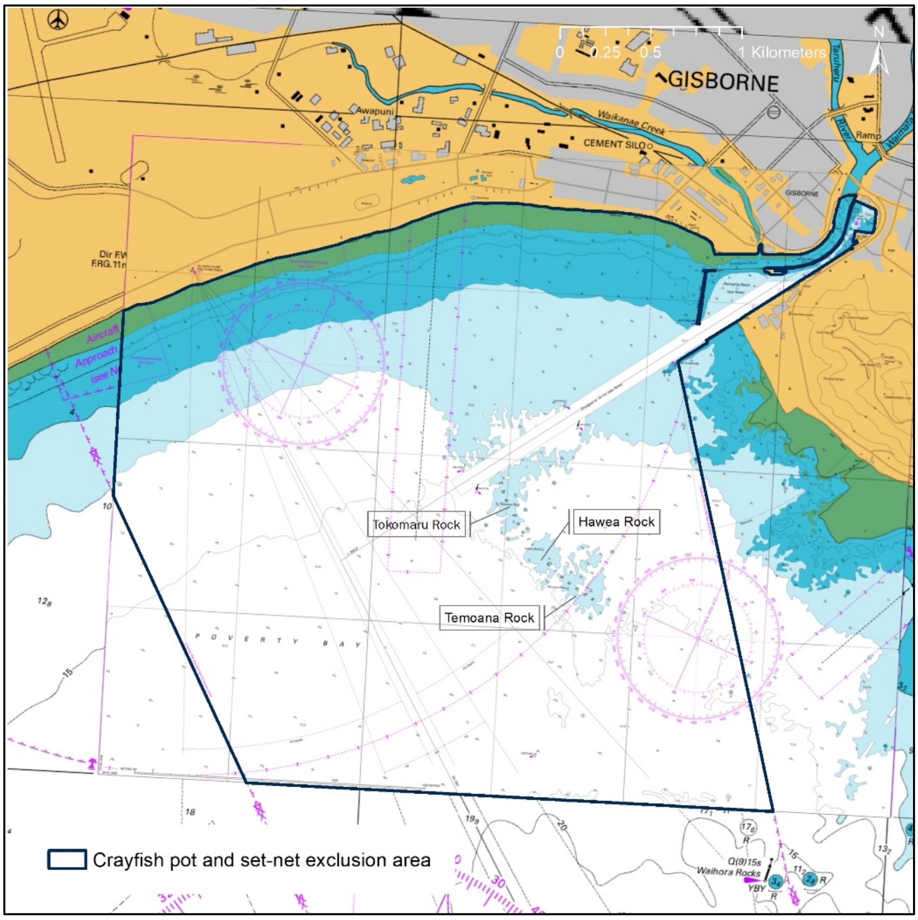
[3] e.g. Kelly 1998; Kelly et al. 1999; Kelly et al. 2000a; Kelly et al. 2000b; Kelly 2001; Kelly & Haggitt 2002; Kelly et al. 2002; Kelly & MacDiarmid 2003; Freeman et al. 2012; MacDiarmid et al. 2013

Poynter (2022) also provides information on recent biosecurity surveys carried out in the harbour, noting that they were mostly focused on the mid and inner harbour areas. At the time of reporting, the latest dive survey (July 2021) had recorded Mediterranean fanworm (*Sabella spallanzanii*), an unwanted organism, on structures and vessels at 32 locations in the sampling area. A slightly earlier (April 2021) survey of Wharf 7, conducted by Eastland, detected additional Mediterranean fanworm on two piles. Poynter (2022) noted that biosecurity surveillance was not carried out for the seabed of the PNC, VTB, berth pockets, or breakwater of the port. No marine pests were observed during the recent survey of the breakwater (Ahern & Davis 2023).

Figure 1: Extent of potting and set net exclusion area.



WATER AND SEDIMENT QUALITY IN THE HARBOUR BASIN

Poynter (2022) highlights that existing water quality in the port, and the adjacent Tūranganui River is influenced by 'clean' coastal water, riverine sediment (particularly during storm events), tug activity that resuspends sediment, and log yard discharges (particularly from the southern log yard).

As noted in my earlier memo dated (dated 4 October 2022), information is provided on water quality of particular relevance to the SC water quality classification for the port area, and in particular, a requirement that '*The natural colour and clarity of the water shall not be changed to a conspicuous extent*'. An aerial photograph of Tūranganui River following a 2017 storm event and commentary indicating that the river has been reported to carry up to 3 to 8 kg/m^3 of sediment during such events is provided (pg. 30 of Poynter (2022)). This is contrasted with suspended solids, turbidity and water clarity data obtained from the port basin following the

2017 storm event. In my opinion, a comparison based on a single storm event is not that useful. In fine weather, sediment plumes in the port basin generated from dredging and ship movements are likely to have the greatest influence on water colour and clarity (as illustrated in Section 3.5.3 of Poynter (2022)). However, in order properly contextualise the relative influences of Port activities on water clarity and colour, data on the frequency, duration, and scale of effects during representative weather and operational conditions in Tūranganui River and the harbour basin would be required.

In relation to near surface seabed sediments, Poynter (2022) states that they are reported to be 80% mud (silt and clay) and 20% sands within the port basin, and 80% sand and 20% mud in the PNC beyond Butlers Wall. Monitoring results for heavy metals at single sites within the Turning Basin, at the port entrance (Butlers Wall), and in the PNC are presented. Apart from mercury concentrations at the Butlers Wall site in 2013[4], the data presented shows that between 2006 and 2021 metal concentrations at those sites were below ANZECC (2000) and ANZG (2018) sediment quality guideline values. Total petroleum hydrocarbons (TPH) are also monitored and are reported to be low and typically below analytical detection.

The deeper seabed material to be removed during capital dredging is reported to include hard rock and 'semi-consolidated' clay, sand and silt, through to 'soft' silty sandy sediments. Poynter (2022) indicates that seabed materials associated with capital dredging in the harbour are for the most part likely to be 'inert' clays, silts, sands and rock. This conclusion is based on the fact that this material has not been exposed to contaminant sources, and the analyses of five composite samples taken from inner harbour borelogs (subsamples were obtained from 0.5 m, 1.0 m and 1.5 m below the seabed surface) (Poynter (2021) memo). I am unsure what Poynter (2022) means by 'inert', but I agree that the deeper seabed materials are unlikely to be contaminated. However, I also note that uncontaminated fine sediments can still generate visible plumes and can still be ecologically harmful.

PROPOSED RECLAMATION AREA AND SOUTHERN SIDE OF THE BREAKWATER

Subtidal ecological values in the proposed reclamation area were initially assessed through a visual survey using a suspended GoPro camera (Poynter 2022). An additional dive survey was carried out in response to a request for further information, which involved:

- the collection of diver observations and photographs at two breakwater sites and one small rocky outcrop within the proposed reclamation area; and,
- the collection of six macrofaunal sediment core samples (three inside and three outside the proposed reclamation area) (Ahern & Davis 2023).

Sediments in, and beside, the reclamation area consisted of hard packed sand with no obvious layering, while hard substrates along the northern side of the port breakwater included a near vertical concrete wall with narrow cracks, dropping down to jumbled blocks, rocks with cracks crevices and holes, and cobble.

Thirty-seven taxa and 462 individuals were obtained from the six macrofaunal sediment core samples. Ahern and Davis (2023) observed that macroinvertebrate taxa collected were not rare or unique, and considered the soft sediment habitat both inside and outside the reclamation

[4] Poynter (2022) notes that this result appears anomalous.

footprint to have low–medium ecological values. Having reviewed the data obtained, I agree with that conclusion.

Visibility on the southern side of the breakwater was poor, but the biota recorded included the brown algae *C. maschalocarpum, E. radiata* and *Z. aureomarginata,* patches of the red algae *Anotrichium crinitum* and small *Rhodymenia sp.*. Encrusting coralline and encrusting red algae often covered the rocky substrate. There were fewer sponges than on the northern side of the breakwater, but encrusting sponges were still present along with the golf ball sponge (*Tethya sp.*), the grey cup sponge *Ecionemia alata,* the boring sponge *Cliona celata*, and an unidentified large yellow spherical sponge. Cook's turban, one green top shell *Coelotrochus viridis*, one crayfish, and a few fish were also observed. The small rocky outcrop within the proposed reclamation area was covered in *C. maschalocarpum, E. radiata, Z. aureomarginata*, and *Cystophora sp*., along with encrusting coralline algae and some small encrusting sponges. Overall, the ecological values of the southern side of the breakwater were considered to be moderate, and those of the outcrop were considered to be low. Based on the information provided, I agree with those conclusions.

The distribution of seagrass along Kaiti Beach was assessed in January 2023. The survey found that seagrass is located approximately 300 m to 1.5 km from the footprint of the proposed Twin Berth Project, but no known seagrass habitat was within the footprint.

PORT NAVIGATION CHANNEL (PNC)

Subtidal habitats in the PNC include sediment (mainly sands (70–80%), silt (10–20%) and clays (10%)), and outcropping rock at the southern end and along the northern boundary. The rocky substrate is part of a wider feature of reef habitat (referred to as 'Foul Grounds' on the marine chart) which extends to the south-east and includes Tokomaru Rock, Hawea Rock and Temoana Rock (Poynter 2022, Figure 1). The initial ecological information provided on these features was based on assessments carried out 20+ years earlier. More detailed, up-to-date information was therefore requested by Council.

An additional dive survey was carried out in response to that request, which involved:

- the collection of diver observations and photographs at one reef site within the PNC (PNC R1), one site on the northern side of the PNC (PNC R2), and two sites on the southern side (PNC R3 and PNC R4); and,
- the collection of five macrofaunal sediment core samples at sites within the PNC (Ahern & Davis 2023).

Diver observations were affected by poor visibility, as noted in the dive record of Reid Forrest for site PNC R4 — '*Visibility very poor at seabed; had to have face hard up against seabed with light on full to see anything at all*' (Appendix A, Ahern & Davis 2023). Despite that, the dive records indicate that habitat complexity and ecological communities on the reef sites adjacent to the PNC vary.

The diver record from the planned 'reef site' within the PNC (PNC R1) indicates that the seabed at that site turned out to be '*~40 mm of soft, muddy sand overlying more consolidated muddy sand*'. Conversely, the record for the nearby 'sediment' site (PNC S1) states that the seabed consisted of '*Hard packed very firm sandy mud or rock overlain by ~10-20 mm of fine sediment*'.

The seabed at:

- PNC R2 consisted of broken rocky low relief reef, with crayfish, small white ascidians, orange sponges, small patches encrusting of coralline algae, and other algae including *Rhodymenia* sp. and two native species of *Caulerpa (C. brownie* and *C. articulata*).
- PNC R3 consisted of undulating rocky low relief reef with rocks and sediment in reef crevices. It had a more abundant and diverse encrusting reef fauna with erect bryozoans, thecate hydroids, a variety of sponges (including *Callyspongia ramosa*, *Raspailia topsenti* and *Tethya berquistae*), ascidians (*Metandrocarpa thilenii* and *Cnemidocarpa* sp.?) red algae (*Rhodymenia* sp.), juvenile crayfish, and a whelk (likely *Muricopsis octogonus*).
- As noted earlier, PNC R4 was subject to very poor visibility but *Caulerpa* sp., *Rhodymenia* sp. and small encrusting sponges were present in images.

Ahern and Davis (2023) conclude that the assemblage of macroflora and fauna on reef either side of the PNC is indicative of a relatively rich and diverse assemblage of species, considering its exposure to high sediment loading, low light conditions, and exposure to storm events. They highlight the presence of crayfish (an important commercial and recreational species), and the number and diversity of sponges within a discrete dive area, including *Raspailia topsenti*[5]. Overall, they conclude that reef habitat within the PNC is of low ecological value, but reefs either side of the PNC have moderate to high ecological value. I agree with those conclusions and also note that those reefs are likely to be ecologically connected to human-made and natural inshore reefs.

In total, 55 taxa and 243 individuals were obtained from the five sediment core samples collected from the PNC, with diversity and abundance increasing from inshore to offshore sampling stations. Ahern and Davis (2023) ranked the ecological values of sediment dwelling taxa as low–medium for the inner section of the PNC, and from medium–high for the outer section. I also agree with that ranking.

OFFSHORE SPOIL DISPOSAL GROUND (OSDG)

Poynter (2022) describes the physical characteristic of the seabed in the OSDG, which has been used since 2003. Six seabed samples obtained in 2019 indicated that very fine sand is the dominant sediment fraction (Bone 2019). Apart from nickel, metal concentrations in the sediments were below their respective ANZG (2018) default guideline values (DVGs), and total organic carbon concentrations were low.

Benthic monitoring has been carried out at approximately 5-year intervals, with the most recent sampling event occurring in 2020. Sampling stations are located inside and outside the OSDG, and on the edge of the OSDG. In 2020, a total of 74 grab samples were obtained from those areas and analysed for benthic infaunal macroinvertebrates. From those samples a total of 86 taxa were identified, with samples taken from inside the OSDG having fewer taxa and individuals than the other areas. However, general community composition in the three areas was similar (Ahern 2021b; Poynter 2022). Overall, Ahern (2021b) concluded that in 2020, the benthic infauna was moderately diverse and characterised by common taxa. I agree with that conclusion.

ASSESSMENT OF ECOLOGICAL AND WATER QUALITY EFFECTS

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[5] Ahern and Davis (2023) suggest Gisborne is potentially at the southern extent of its range, but I note it has also been found in Kaikoura, Marlborough Sounds, Mernoo Bank, and Doubtful Sound, Fiordland Kelly 2022.

Ecological and water quality effects were assessed by Poynter (2022) using: a first principles process; and, by applying an adapted version of the EIANZ (2018) guidelines for ecological assessments[6], coupled with a matrix developed by Dr Sharon De Luca of Boffa Miskell, for ranking ecological values of estuary sites.

In my earlier memo (dated 4 October 2022) I highlighted that ecological assessments using first principles need to be informed by good data, backed by research and a thorough understanding of the topic being considered. I had concerns about the adequacy of some of the information provided in the initial assessment (Poynter 2022) and whether it was sufficient to support all of the report's conclusions. Further information was therefore sought to obtain robust, up-to-date information on the characteristics and values of the marine species and systems that could be directly or indirectly affected by the proposed activities, and to contextualise the significance of potential effects. The matters of concern have largely been addressed by the additional survey results and information provided in the s92 response (Ahern & Davis 2023).

In my opinion, the key effects of potential concern in relation to marine ecological and water quality values can be broadly categorised as:

- ecological effects associated with the direct physical disturbance of the seabed during dredging;
- ecological and water quality effects associated with the mobilisation of sediment and contaminants during dredging and construction activities;
- ecological effects associated with the disturbance and loss of marine communities associated with existing port structures, and their subsequent recovery through the recolonisation of replacement structures;
- ecological effects associated with the loss of marine communities and habitat beneath the proposed reclamation areas and structures;
- water quality effects of stormwater upgrades;
- ecological effects associated with sediment deposition within the OSDG;
- ecological effects associated with mobilising and/or transporting marine pests to and/or from the harbour during dredging and construction.

EFFECTS OF DIRECT PHYSICAL DISTURBANCE OF THE SEABED DURING DREDGING

Capital and maintenance dredging will have direct physical impacts on the sedimentary habitats and communities of the harbour basin and PNC, and rocky substrates in the outer PNC. Poynter (2022) notes that the only area within the proposed dredging footprint that has not been previously capital dredged is an approximately 1300 m^2 zone to be excavated to create the new Wharf 8 berth pocket. He also indicates that rocky substrates in the PNC are likely to be removed by breaking them up with rippers and raking of the fractured material beyond the channel. However, Worley (2022a) stated that the dredged material would be disposed of in the OSDG. I support the disposal of dredged reef material in the OSDG, as it avoids impacts on reefs with moderate–high ecological values surrounding the PNC.

Capital and maintenance dredging can be expected to disturb, remove, injure and/or kill benthic biota in the areas affected. However, Ahern and Davis (2023) highlight that benthic species in

[6] Because the EIANZ (2018) guidelines do not provide criteria for marine habitats.

the PNC had life history traits that allow for fast breeding and rapid colonisation. As noted earlier, the ecological values of sediment dwelling taxa are considered to be:

- low in the harbour basin;
- low–medium for the inner section of the PNC; and,
- medium–high for the outer section of the PNC.

The ecological values of the previously dredged rocky substrates within the PNC were also assessed as low.

Sediments in the harbour basin and inner PNC are regularly disturbed through existing maintenance dredging activities. Ahern and Davis (2023) indicate that on average, dredging took place on 95 days per year between 2020 and 2023, and that sedimentation in the inner PNC accounts for over 50% of all maintenance dredging volume. Based on this, they state that it is understandable that the area supports a soft sediment community with the lowest ecological value in the PNC. In terms of the outer PNC, Ahern and Davis (2023) expected similar habitat conditions and ecological values to reestablish once capital dredging ceased, as the frequency of maintenance dredging was expected to be similar to current levels. Overall, they conclude that the magnitude of effect on the PNC will be negligible–low. Similarly, Poynter (2022) considered the effects of dredging to be minor.

Based on the history of dredging, the evaluation of existing ecological values, the effects being localised to the areas directly affected, and potential for rapid recolonisation, I agree that the direct ecological effects of the proposed dredging are likely to be low/minor.

MOBILISATION OF SEDIMENT AND CONTAMINANTS

Dredging has the potential to cause offsite effects by mobilising seabed sediment and contaminants. Poynter (2022) addresses the visual effects of sediment mobilisation, and in summary concluded:

- The potential for elevated turbidity from dredging by the Port's trailed suction hopper dredge extends throughout most of the vessel turning basin and parts of the inner harbour during such operations, with the intensity of effect dependent, to some extent, on background water quality at the time. The SC water quality standard (d) that '*The natural colour and clarity of the water shall not be changed to a conspicuous extent*', may not be met at times. Such effects are likely to be intermittent and short-term but will be sustained during the period of dredging.
- After allowing for reasonable mixing, the above water quality standard should be met in the same areas for dredging by a back-hoe dredge.
- Based on the results of elutriate testing there will be no adverse water quality affect relating to mobilisation of heavy metals.
- The SB water quality standard (d) that '*The natural colour and clarity of the water shall not be changed to a conspicuous extent*', which applies to the PNC and adjacent areas will not be met during the dredging of the channel.
- Water quality standard (e) '*The water shall not be rendered unsuitable for bathing by the presence of contaminants*' that applies to SB classified waters can be met, although the likelihood of any recreational bathing in or adjacent to the PNC is presumably low.

- The SA Water Quality standard applies to nearshore areas, including the Kaiti Reef system. Modelling suggests that any intermittent dredging sediment plumes impinging on this area, would be at sufficiently low concentrations to meet the standard.

Based on the information provided, I agree with the above conclusions.

I also note that some features may also be sensitive to the offsite deposition of sediment in dredging plumes (e.g., seagrass and low lying offshore reefs with moderate–high ecological values). The assessment provides little detail on this matter. However, checks against past model predictions of dredging related suspended solids concentrations suggest little or no overlap between dredging plumes with markedly elevated suspended sediment concentrations, and sensitive habitats (Metocean Solutions 2019). Ecologically significant deposition depths within sensitive habitats therefore appear unlikely.

Poynter (2022) also indicates that sediment could also be released during the proposed reclamations, but notes that discharges from the reclamation can be managed during construction. I agree and consider that the risk of offsite ecological or water quality adverse effects from reclamation construction is low provided that appropriate sediment controls are implemented (discussed in the coastal processes review of Dr Terry Hume).

DISTURBANCE AND LOSS OF MARINE COMMUNITIES ASSOCIATED WITH EXISTING PORT STRUCTURES

Table 5 of the AEE provides summaries of the extents of land, intertidal and subtidal habitats affected by the redevelopment of the outer breakwater. Poynter (2022) indicated that, in relation to the outer breakwater:

- Most of the existing habitat and its associated ecology will be destroyed at the time of construction, and around 2700 m^2 of, what is thought to be soft sediment habitat, will also be smothered on the northern side of the breakwater.
- Recolonisation of the new concrete armouring will begin as soon as it is put in place and values will progressively be restored over the construction period (up to 24 months), with a similar reef community to the existing one developing over time.
- Crayfish will recolonise the new structure.
- Overall effects are likely to be at least neutral and possibly positive.

Ahern and Davis (2023) assessed the values of the outer breakwater as medium with the potential effects ranked as low. I consider the subtidal habitat and biota along the outer breakwater to have moderate–high ecological values. Despite that, I generally agree with the conclusions regarding medium to long-term effects.

In my opinion, short-term effects will be significant within the construction footprint. Lower-level effects on some species are likely to extend beyond that area. For instance, adult crayfish have a high site fidelity, with a home range that includes one or more inshore sites, where they spend long periods (and commonly occupy specific dens), and offshore areas of reef and sand that they utilise seasonally (Kelly 1999, 2001). Available information does not permit the magnitude of those short-term effects on crayfish, or other similarly mobile species, to be determined with certainty, but they are probably in the low–moderate range.

In terms of the Wharf 8 extension, Poynter (2022) notes that the extension will affect a small area of marine habitat on the northern side of the inner breakwater, with a largely like-for-like replacement of a feature that has '*negligible habitat or biota value*'. I agree with that conclusion, but note the development presents an opportunity to enhance the degraded habitat and biota values of the wharf by creating features such as living seawalls (see Figure 2).

On the southern side, the affected area of the inner breakwater is within the proposed reclamation. Effects of the reclamation are discussed below.

Figure 2: Examples of options considered in the redevelopment of the Wellington Ferry Terminal (taken from De Luca 2022).

Figure 50: Examples of retrofitted living seawalls.

LOSS OF MARINE COMMUNITIES AND HABITAT FROM RECLAMATION AREAS

Poynter (2022) indicates that the existing intertidal zone within the proposed reclamation area is effectively located on the existing southern log yard seawall and does not include any significant area of natural reef substrate. He notes that the subtidal seabed to be lost to reclamation is shallow, exposed to high wave energy, likely to have mobile and unstable sediments, and unlikely to host significant benthic biota.

Poynter (2022) also concludes that the severe wave climate is likely to limit the biota associated with the isolated subtidal patch reef within the reclamation revetment footprint. I disagree, with the basis for that conclusion and note that many species are adapted to, and thrive in, strong wave conditions. Poynter (2022) also highlights that fact elsewhere in his report[7], where in relation to nearby Kaiti Reef, he states that it contains diverse substrates in very good habitat condition, with marine communities that are likely to be of high ecological value. This is attributed to '*the dominating influence of the high wave energy over the Kaiti Reef*'.

Having said that, I agree with the overall conclusions of Poynter (2022) and Ahern and Davis (2023). The latter highlighted that reclamation would result in the total loss of soft sediment habitat within the immediate construction footprint, but noted that effects will be negligible in relation to the population or range of taxa in the benthic macroinvertebrate community, and that they expect similar communities to be present in the extensive shallow soft sediment habitat of Poverty Bay. Overall, Ahern and Davis (2023) ranked the likely ecological effect as very low–low.

[7] Last paragraph page 22

WATER QUALITY EFFECTS OF STORMWATER UPGRADES

Having reviewed the proposed stormwater upgrades, I expect an improvement in the quality of stormwater discharges from the southern log yard, and effects on coastal water quality to be substantially reduced. I expect stormwater from the reclamation areas to be of a similar high quality.

ECOLOGICAL AND SEDIMENT QUALITY EFFECTS OF DEPOSITION IN THE OSDG

Worley (2022a) indicate that on average 72,800 m³ per annum was dredged for maintenance purposes and disposed of in the OSDG between 2003 and 2019. However, annual volumes varied considerably, ranging between 16,500 m³ to 138,200 m³ per annum. Worley (2022a) suggest this is predominantly due to climatic events. However, I note that the peaks in annual dredging volume coincided with years when significant volumes of capital dredging occurred under a short-term coastal permit issued for a five-year period in June 2009 by the Minister of Conservation (AEE Section 4.5.2). Capital dredging under that permit, included:

- 21,000 m³ removed from the PNC in in 2009; and,
- 32,000 m³ removed from the vessel turning basin in 2011.

Annual maintenance dredging volumes have been below the reported average in four of the five years since the expiry of that permit.

Despite that, the annual volume for maintenance dredging being sought through consent is slightly higher than the maximum dredging volume recorded when capital dredging was occurring. Worley (2022a) states that they expect the long-term annual average to be around 70,000 m³ to 80,000 m³, but recommend an annual maintenance dredging allowance of 140,000 m³ to allow for annual spikes in deposition caused by the inter-annual variability of storm events, and for some localised catch-up dredging of the VTB.

In addition, consent is also being sought for an additional 140,600 m³ of capital dredging, which includes around 23,000 m³ of rock. All material will be deposited in the OSDG.

Sampling indicates that seafloor sediments within the OSDG are dominated by the very fine sand sediment fraction, and apart from nickel, metal concentrations in the sediments are below their respective ANZG (2018) default guideline values (DVGs). Total organic carbon concentrations are also low.

Poynter (2022) indicates that the '*dredge spoil disposal operations associated with the proposed dredging operations will be the same or very similar to those undertaken currently in respect of equipment used, the volume and characteristics of sediment released; duration and frequency of each disposal event*'. I note that based on the information provided above, it seems highly questionable whether dredging volumes and frequencies can be safely assumed to be the same, or very similar, to those currently occurring. Capital dredging will also lead to the disposal of large volumes of rock and sandier material.

Poynter (2022) goes on to highlight that benthic macroinvertebrate monitoring indicates that changes since 1996 have been minimal, and that the impacts of past disposal do not appear to be significant. I agree with those conclusions, but note that disposal volumes being sought in this consent are much greater than those previously deposited. The types of material also differ. As such, the potential for disposal to alter the characteristics of benthic habitat and benthic community composition within the OSDG is greater.

I therefore recommend that if consent is granted, ecological monitoring of the OSDG continues and that sediment grain size be included in the list of parameters required to be properly analysed (rather than simply recording observations as occurred in 2020 (Ahern 2021b)). Sediment grain size is a key determinant of habitat quality and benthic community composition.

In my opinion, a staged approach should also be taken to monitoring, with a higher survey frequency (e.g., annually) being carried out initially. The frequency could potentially be reduced once capital dredging is complete, maintenance volumes settle, and their effects have been quantified. Consent conditions would need to provide for that and should also ensure that other data obtained from the OSDG, such as disposal volumes and placement, hydrographical survey data, and sediment characteristics are included in the ecological data analyses, and the interpretation and reporting of ecological monitoring results.

Poynter (2022) also concludes that it is inevitable that the SA (d) water quality standard that requires '*the natural colour and clarity of the water shall not be changed to a conspicuous extent*' will be breached for a short period over a localised area during disposal of material at the OSDG. He indicates that the OSDG is well removed from locations of public view and that localised changes are unlikely to be conspicuous. The intermittent nature of the discharges, and the allowance in previous and present consents for the water to clear within 6 hours after each dumping episode is also highlighted. I agree that the water quality standard will be breached and that Poynter (2022) presents relevant considerations on this matter.

POTENTIAL RISK OF TRANSFERRING MARINE PESTS

Invasive marine pests are recognised as a serious threat to the New Zealand's coastal marine ecosystem and economy (MacDiarmid et al. 2012, Soliman & Inglis 2018). Ports are key points of entry for marine pests. They also aid their proliferation and spread by providing habitat for populations to establish, grow and disperse to new areas through vessel movements and natural or human-mediated pathways.

Marine (and other) 'pests' and 'unwanted organisms' are managed in accordance with the Biosecurity Act (1993). Unwanted organisms are defined under the Act as ones that a chief technical officer believes are '*capable or potentially capable of causing unwanted harm to any natural and physical resources or human health*'. Pests are defined as '*an organism specified as a pest in a pest management plan*'.

Three marine pests are classified in Gisborne District Council's Regional Pest Management Plan (RPMP): the clubbed tunicate *Styela clava*, Mediterranean fanworm *Sabella spallanzannii*, and wakame (Japanese kelp) *Undaria pinnatifida*. Mediterranean fanworm and wakame have already been found in Gisborne port (see Stuart (2003) and Inglis et al. (2005) for records of wakame). Note that Poynter (2022) incorrectly states that of these three species, only Mediterranean fanworm has been reported at Gisborne port. The RPMP therefore seeks to exclude the clubbed tunicate, eradicate Mediterranean fanworm, and contain the spread of wakame.

A key regulatory tool in achieving these objectives is s52 the Biosecurity Act (1993), which states that no person shall knowingly communicate, cause to be communicated, release, cause to be released, or otherwise spread any pest or unwanted organism except in a narrow set of specified circumstances:

a) in the course of and in accordance with a pest management plan;
b) as provided in an emergency regulation made under section 150 of the Act;
c) for a scientific purpose carried out with the authority of the Minister; or
d) as permitted either generally or specifically by a chief technical officer.

The risk posed by 'harmful aquatic organisms' is also recognised through Policy 12 of the NZCPS, which directs the inclusion of conditions in resource consents to manage the risk to the coastal environment from their release or spread. Harmful aquatic organisms are defined in the NZCPS as '*Aquatic organisms which, if introduced into coastal water, may adversely affect the environment or biological diversity, pose a threat to human health, or interfere with legitimate use or protection of natural and physical resources in the coastal environment*'. Policy 12 specifically identifies the discharge or disposal of organic material from dredging, and the provision and ongoing maintenance of moorings, marina berths, jetties and wharves as relevant activities in relation to the management of harmful aquatic organisms.

Policy 12 provides a means of directly linking consents issued under the Resource Management Act (1991) with the requirement that '*no person shall <u>knowingly</u> communicate*…..'[8] pests or unwanted organisms under s52 of the Biosecurity Act. Consent conditions provide a key means of:

- Ensuring the consent holder <u>knows</u> whether pests or unwanted organisms are present on, or in, materials, or vessels being moved from place to place.
- Informing the relevant authority if pests or unwanted organisms are present, so that appropriate actions can be taken. Options may include seeking approval under s52.

Importantly, biosecurity management is not a static issue. Nor is it confined to any particular marine pest. New marine pests are regularly arriving in New Zealand and spreading around the country. For example, two recent arrivals are *Caulerpa brachypus* and *C. parvifolia* (together referred to as exotic *Caulerpa*). They were first noticed in New Zealand in June 2021, growing in bays and harbours around Great Barrier Island in the Hauraki Gulf, with another infestation of *C. brachypus* was detected shortly after around Mercury Island. Surveys in 2021 and 2022, estimated that at that time exotic *Caulerpa* covered 48 hectares around Great Barrier Island and 3.2 hectares around Mercury Island, with around 50 tonnes of it washing ashore in Blind Bay at Great Barrier Island during the 2023 cyclone. Exotic *Caulerpa* has subsequently been found growing in the Bay of Islands, and around Kawau and Waiheke Islands in the Hauraki Gulf. At Te Rāwhiti in the Bay of Islands, exotic *Caulerpa* was recently estimated to be patchily distributed over around 200 ha (Suction Dredge Technical Advisory Group 2023).

A controlled area notice has been issued for areas within Great Barrier Island, Great Mercury Island and the Bay of Islands where exotic *Caulerpa* has been found that restricts a variety of activities within the controlled areas. Available information on these two unwanted organisms is still fairly limited. What is known is that they spread rapidly, form vast, dense beds or meadows, and are hard to eradicate or contain. We also know that internationally, closely related species of *Caulerpa* are serious marine pests.

Examples of other, potentially serious marine pests that have arrived in New Zealand in the previous 25 years, include the:

[8] Emphasis added.

- The Asian paddle crab, *Charybdis japonica*;
- The carpet sea squirt *Didemnum vexillum*; and,
- The Australasian droplet tunicate *Eudistoma elongatum*.

The above background information is primarily provided to contextualise the potential biosecurity risks posed by the proposed activities, and to help inform decisions related to the management of those risks.

In relation to the proposed dredging Poynter (2022), highlights that investigations into the occurrence of marine pests in dredged areas are not currently required. He also highlights that they were detected during ecological monitoring of the OSDG in 2014 or 2020. I am not surprised by the latter finding, given that the OSDG covers an area of over 2.5 million m^2, and each survey obtained grab samples from combined areas of <8 m^2. The benthic ecology monitoring was not designed for biosecurity purposes, and is quite simply, not suitable.

Poynter (2022) refers to an investigation for the Channel Deepening Project (CDP) of Lyttleton Port prepared by the Cawthron Institute. Lyttleton Port contained the clubbed tunicate, Mediterranean fanworm, and wakame, but Poynter mainly focuses on the 'risks'[9] associated with Mediterranean fanworm, noting that '*only fanworm has been reported at Gisborne port*'. For background, Mediterranean fanworm is a large (up to 80 cm in length) tube-building polychaete that usually grow on hard surfaces in subtidal habitats such as artificial structures (e.g., vessel hulls, wharves, marine farms), rock and shell, though they are also commonly found in soft sediment habitats, often attached to small pieces of rock, shell or other biota (Fletcher 2014; S. Kelly, pers. obs.; Figure 3*)*. They have a relatively wide tolerance for water depth, occurring in the lower intertidal to around 40 m depth (pers. obs.), and can reach densities of 13 individuals/m^2 over large soft-sediment areas (50 m^2), and up to 300 individuals/m^2 in small patches (< 1 m^2) (Parry et al. 1996). Densities on artificial substrates are often much higher, with up to 1000 individuals/m^2 being recorded (A. Pande, MPI, pers. comm. in Fletcher 2014). Mediterranean fanworm is highly fecund (i.e., produce lots of offspring) with an extended reproductive season in New Zealand, where they are estimated to mature at around 120 mm length (Fletcher 2014). Mediterranean fanworm also has remarkable regenerative capabilities, with fragments cut from their anterior, middle and posterior able to survive and regrow (Licciano et al. 2012).

Note that Poynter (2022) states that '*there are mixed opinions on the potential for fanworm to colonise soft substrates and the associated biosecurity risk*'. I assume this is based on the opinions of people who are unfamiliar with the habitat distribution of this species, as available information makes it clear that Mediterranean fanworm do colonise soft sediment habitats. For instance, another Cawthron Institute report (Fletcher 2014[10]) provides multiple examples of Mediterranean fanworm growing in soft sediment habitats, and even provides density estimates for them in those habitats (as provided above). I can also advise that fanworm commonly occur in soft substrate habitats of the Hauraki Gulf (pers. obs.; see Figure 3).

However, even if Mediterranean fanworm did not occur in soft sediment habitats, the proposed capital dredging involves the disposal of an estimated 23,000 m^3 of rock in the OSDG.

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[9] Risk is a function of the likelihood and potential consequences of an event occurring. Poynter (2022) appears to conflate risk and likelihood, and largely omits consequence.

[10] This report was produced by the Cawthron Institute and provides background information on Mediterranean fan worm to support regional response decisions.

Consequently, it can be reasonably assumed that hard substrates will also be available in the OSDG for them to colonise.

Poynter (2022) also emphasises that the distance between the dredging and disposal areas is very short and that Mediterranean fanworm could naturally spread between the two areas. While true, this does not negate the additional risks of knowingly transferring pests or unwanted organisms, or the associated requirements of the Biosecurity Act (1993) that prohibit such transfers except in specific circumstances. I also note that the same argument could be applied to all pest species and attempts at eradicating or containing them within specific areas.

Importantly, GDC are still seeking to eradicate Mediterranean fanworm, and the population still appears to be localised to the port, with regular dive inspections and removals apparently maintaining numbers at low levels. Experience has shown that the containment, and the hoped-for eradication, of Mediterranean fanworm would effectively become impossible if the transfer and disposal of dredge spoil led to fanworm colonising the OSDG. In the Waitematā Harbour, diver culls were abandoned only after the population was determined to be too widespread, with elimination efforts in ceasing in Auckland and Lyttleton just over two years after the incursion was first detected (Read et al. 2011). Since then, the Mediterranean fanworm population has expanded to the point where, based on my observations[11], they now appear to be one of the most abundant and widespread large epibiotic (surface dwelling) species in the inner Hauraki Gulf. Similar, patterns of expansion have been reported from Port Phillip Bay in Victoria, Australia (Parry et al. 1996; Cohen et al. 2000). I also note that although elimination efforts have ceased in the Hauraki Gulf, controls seeking to limit the spread of this, and other, pests remain. These include, the requirements of s52 of the Biosecurity Act (1993).

I therefore disagree with the basis of the Poynter (2022) assessment of biosecurity matters, and with his conclusion that the biosecurity risk of dredging and disposal is low. In my opinion, an assessment that is largely based on a single species is fraught, and the conclusion is inconsistent with:

- the fact that ports and marinas are known to be high risk sites for invasive marine pests;
- the potentially serious environmental and economic threat posed by marine pests;
- the recognition of that threat through the provisions of the Biosecurity Act (1993), which prohibits the communication, release or spread of pests and unwanted organisms, except in specific circumstances;
- the recognition that the discharge or disposal of organic material from dredging poses a risk that needs to be managed in relation to spreading harmful aquatic organisms under Policy 12 of the NZCPS;
- the fact that biosecurity management is never a static issue, or confined to any particular species;
- the presence of other high-risk pests elsewhere in New Zealand, which are yet to arrive in Gisborne;
- the relatively high rate of new pests arriving and becoming established in New Zealand; and,

[11] Which include over collecting and analysing well over 100 km of seabed video footage in recent years.

- the 35-year term being sought for maintenance dredging, during which, history indicates is likely to see the arrival of new pests to New Zealand, and the spread of existing pests to Gisborne.

If consent is granted, I therefore recommend the inclusion of consent conditions that require:

1) The preparation of a marine pest management plan (MPMP) developed by a suitably qualified marine ecologist with experience in marine biosecurity surveys, investigations, and/or responses, and in consultation with Biosecurity New Zealand and biosecurity staff at Gisborne Council. The MPMP should include:
    a) A summary of the purpose of the plan and its relationship to the biosecurity requirements of this consent, the Gisborne District Pest Management Plan (if any) and sections 46 and 52 of the Biosecurity Act (1993).
    b) A description of marine pests and unwanted organisms (excluding microbiological species) identified in the Gisborne District Pest Management Plan and classified under the Biosecurity Act (1993).
    c) A description of the key activities and their potential role in introducing, promoting the growth of, and/or facilitating the spread of pest and/or unwanted organisms.
    d) Procedures to ensure activities associated with construction and dredging are undertaken in a manner that avoids the spread of any pest and/or unwanted organisms that are present within the consented works area to surrounding areas.
    e) Procedures for minimising the risk of new marine pests or unwanted organisms being introduced to the Port during the construction works and/or dredging, including requirements for vessel and equipment cleaning, antifouling and inspections.
    f) Staff training to familiarise personnel with the risk posed by any pest or unwanted organism; how to recognise them; and procedures for reporting and responding to their detection.
    g) Details of inspections to be carried out, including timing, locations and survey methods.
    h) Procedures for recording and reporting actions carried out under the MPMP, and sightings of marine pest organisms or unusual marine species.
    i) Triggers and processes for reviewing and certifying updates to the MPMP.
2) Routine biosecurity monitoring of dredged areas and the OSDG, using appropriate methods, <u>or</u> targeted biosecurity assessments based on an event-based protocol. Methods and protocols should be developed in collaboration with biosecurity staff at Gisborne Council.
3) Relevant authorities to be informed if pests or unwanted organisms are present on substrates to be dredged, or new pests or unwanted organisms are detected within the port or OSDG.
4) The reporting of all monitoring and assessment results, including:
    a) a summary of the biosecurity inspection(s) undertaken;
    b) the location and extent of any pest and/or unwanted organisms identified, together with details of any measures taken to remove any such organisms and/or otherwise manage biosecurity risks;
    c) an assessment of residual biosecurity risks posed by pests and/or unwanted organisms in the area of works; and
    d) GPS location of pests and/or unwanted organisms not removed for any reason.

I note that the Eastland Port has agreed to the inclusion of similar conditions as part of its Wharf One consent application. I also note that, despite Mr Poynter's conclusion that the biosecurity risk of dredging and disposal is low, he agrees that biosecurity risks will require comprehensive conditions, such as those proposed for Wharf One[12].

Figure 3: Examples of habitats and structures colonised by Mediterranean fanworm in the Hauraki Gulf (taken from footage and photos obtained by Coast and Catchment). The top three images are from sandy and muddy seafloor habitats, the bottom left is reef habitat, bottom centre is mussel lines, and bottom right is a horse mussel bed in a sediment seafloor habitat.

MARINE MAMMALS

The assessment of the proposed activities on marine mammals provided in Poynter (2022) lacked in detail, so further information on this matter was sought. A response to that request was prepared by Helen McConnell of SLR, and is included as Appendix C in Ahern and Davis (2023). In that response, Ms McConnell:

- identified the marine mammal species that are likely to, or possibly utilise the affected area;
- considered the potential effects of the proposed activities on baleen whales and Hector's dolphins and baleen whales — particularly the effects of noise generated by pile driving;
- recommended the use of bubble curtains, marine mammal observers (MMOs), soft starts and shutdown zones during pile driving;
- recommended *in situ* measurements of actual underwater noise be made to validate the model findings and confirm that the proposed shutdown zones are sufficient to protect marine mammals;

[12] Letter from Mark Poynter to Marty Bayley regarding Twin Berths: Section 92 review ecology: Outstanding matters. Dated 7 September 2023.

- recommended a marine mammal management plan should be developed to establish all operational details associated with the control measures to protect marine mammals;
- assessed the potential behavioural effects arising from dredging, provided recommendations to minimise such effects and concluded that if the recommended measures were implemented, the potential for ecologically significant effects would be low and the magnitude of predicted effects will be minor;
- assessed the masking effects of dredge noise and concluded if the above recommended measures were implemented, the potential for ecologically significant effects would be low and the magnitude of predicted effects will be minor.

Overall, I consider the assessment, recommendations, and conclusions of Ms McConnell to be reasonable. If consent is granted, I would support the inclusion of consent conditions that require the mitigation measures she recommends to be implemented.

EFFECTS ON KAI MOANA

Ahern and Davis (2023) provides a list of key kai moana species from the Rongawhakaata cultural impact assessment (Easton et al. 2022). I have not seen that report, and am unsure about its status, accuracy or completeness. I also note that Ahern and Davis (2023) do not describe how the areas affected by the proposed activities fit within the cultural landscape. Without that information, it is unlikely that the appropriate scale for the assessment of effects on kai moana can be defined. Having said that, I would expect that scales of relevance to mana whenua would be much smaller than those used to define stocks and report catches for fisheries management. From experience, mahinga kai in marine environments are more likely to be at the scales of bays, estuaries, rocks or reef systems, with these sitting within broader rohe moana.

Based on the above, I would prefer to defer comment on effects on kai moana until information from mana whenua is made available.

CONCLUSIONS

Overall, I conclude that sufficient information has been provided in the assessment of environmental effects, associated technical reports and response to a request for further information to determine most of the likely effects of the proposed activities. There is also a substantial level of agreement between the conclusions of the Applicant's technical experts and myself.

While I disagree on some matters, it is my opinion that potential effects relating to them can be managed through appropriate consent conditions.

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