



eCoast Marine Consulting and Research
PO Box 151
Raglan,
New Zealand.
Ph. +64 21 423 224
www.ecoast.co.nz
info@ecoast.co.nz

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Reuben Fraser
Consents Manager
Bay of Plenty Regional Council
6 Rata Street
Mount Maunganui

Dear Reuben,

Re: Disposal of Maintenance Dredge Material and Impacts on Surfing Breaks and Coastal Processes.

Thank you for meeting with Ed Atkin and I to discuss our concerns with respect to the disposal of the Port of Tauranga maintenance dredge material and the associated impacts on the Bay of Plenty's regionally significant surfing breaks and coastal processes. As agreed, we have put together this brief technical memo to outline our concerns and potential ways forward that can be followed to address these concerns for all parties involved. I should also reiterate that in this case we are providing technical assistance for the Surfbreak Protection Society (SPS).

This situation is very similar to the consent renewal for Port Otago's maintenance dredging disposal sites and their capital dredging campaign. After settling with Port Otago out of Court, we/SPS have been involved with the working party to ensure that no detrimental impacts occur at the 2 nationally significant surf breaks inshore of their maintenance dredge disposal sites. In addition, one of the surf breaks, Aramoana, is created by the presence of the large ebb-tidal delta offshore, i.e. as is the case with Matakana Island surf breaks and the Tauranga Harbour ebb-tidal delta. As with the maintenance dredging of Tauranga Harbour, the material that falls into the Otago entrance channel was destined to move along the coast and remain in the littoral system. Therefore disposing of it in the littoral system is required to ensure that coastal processes continue to function as close to naturally as possible. However, if this material is not being put back in to the system (as is occurring to the northwest of the Tauranga Harbour entrance channel, i.e. sediment moving northwestward is not put on the northwestern side, it is put on the southeastern side, or out of the system on the deepwater disposal site), or if it is placed in mounds that negatively impact on surfing wave quality due to the process of refraction, then both the littoral sediment transport system (which includes the beaches) and surfing amenity are being impacted. At Port Otago a series of on-going investigations have been undertaken to determine both the sediment requirements to support the littoral system and identify the impacts on the surf breaks in order to develop an adaptive management plan for the area.

Delegates from SPS and Ed Atkin met with representatives from the Port of Tauranga last month to discuss concerns with dredging and disposal, and the consequent impacts on surf breaks. From this meeting it was evident that the Port was willing to pursue measures to

ensure that the Bay of Plenty's regionally significant surfing breaks are not negatively impacted on due to dredging/disposal. This technical memo has been developed to identify SPS's concerns and how they can be addressed. We believe that the work of Professor Healy that led to the nearshore disposal of dredge material was a very positive step forward in terms of coastal processes. However, that was initiated a long time ago and our understanding of coastal processes and the tools we use to assess them have greatly improved, and we also have a far greater understanding of the impacts that dredge disposal can have on surfing wave quality, with surfing amenity now being recognised in the NZCPS. The primary concerns are:

- 1. There are no nearshore disposal sites to the northwest of the entrance channel.** Because of this, maintenance dredge material is never placed to the west of the entrance channel, nor is there the option to place material on the bar itself. There is a plethora of scientific evidence describing how sand moves both ways along the Bay of Plenty coast (e.g. Harray, 1977; Harray and Healy, 1978; Gibb, 1979; Mead and Black, 1999), and is a net in either direction depending on El Nino/La Nina (moving northwest mostly in El Nino and southeast mostly in La Nina conditions). By not placing dredged sediment that was destined for the northwest side of the channel on that side, a long-term/chronic impact of loss of bar volume and change to morphology is occurring, which will consequently impact on the surfing conditions at Matakana Island. The lack of bypassing material to the northwest may also be linked with the erosion of the island itself, although the information to consider this is not readily available.
- 2. The Port is presently permitted to dispose of maintenance dredge material at the deepwater site.** As described above, sand is actively moving up and down the coast, dumping offshore may remove this material completely from the system and the result will be a deficit. This would have negative impacts on the coast/beaches, and potentially on surfing breaks. This is not best practice coastal management; deepwater sites should be used only for capital dredge disposal.
- 3. Dredged material is not being disposed of in the most effective manner.** While dredge material must remain in the beach system, this can have detrimental impacts on surfing wave quality due to the refraction of waves over disposal mounds which can modify wave height gradients and wave directions (Mead *et al.*, 2003; Mead and Atkin, 2011). However, these processes may be used in a manner that is positive to surf breaks, if some thought and investigations are undertaken to consider what is the best way to dispose in the nearshore to create feeder bars, as has been done at Cronulla (Pitt, 2010) and in the US (Mesa, 1996). In the case of Port Otago, the Heyward dumpsite focusses waves into Murderers surf break and is an important component of the break which requires management to ensure that it is the optimum shape for focussing into Murderers – similar opportunities for the surf breaks around the Mauao may be available.
- 4. No monitoring is being undertaken to consider the impacts of dredge disposal on surfing wave quality at the regionally significant surfing breaks of Matakana Island, Main Beach and Tay Street.** Matakana Island is the Bay of Plenty regions most premiere surf break and should have been listed in schedule 1 of the New Zealand Coastal Policy Statement 2010. Measures to include this break in the NZCPS will be undertaken when the next review of the policy occurs.

In order to address these concerns, the following is recommended:

1. **Sand must be transferred west to maintain the long-term health of the ebb-tidal delta, Matakana Island and the associated surf break.** It is relatively simple to determine where the sand in the channel was heading (northwest or southeast) before it was trapped in the channel, and what proportion should go to the west and what to the east. By utilising the buoy data for the period since the previous dredging programme/survey and the known volume that has accumulated in the entrance channel, the proportion of sediment transport in each direction can be divided between nearshore disposal grounds on the northwest and the southeast sides of the channel. The placement sites and configuration of the placement is a little more complicated to address, and will require consideration of sediment transport potential and pathways, and potential impacts on surfing wave quality and marine ecology. However, a large amount of information is readily available to undertake the necessary numerical modelling to identify best disposal site(s) and mitigate any negative impacts on surfing wave quality. Similar studies were undertaken for the Port Taranaki nearshore dredge disposal/by-passing and are underway at Port Otago.
2. **If there is evidence that material disposed of at the deepwater site is not migrating back into the littoral system, then disposal of maintenance dredge material at the deepwater site should not be permitted at all.** If there is evidence of inshore migration from the deepwater disposal site, then this should be quantified and the volumes of maintenance dredge should be regulated based on this understanding. Quantification of this can be achieved through consideration of time-series bathymetry surveys in combination with numerical modelling.
3. **The capacity to improve surfing wave quality through targeted and designed dredge material disposal can be achieved through a surf science investigation.** Numerical modelling can be applied to assess the impacts of different seabed configurations created by the nearshore disposal of material on wave propagation. To consider surfing wave quality numerical modelling results need to be evaluated with reference to surf science principles. A project of this kind will require monitoring of the nearshore to validate the outcomes.
4. **Monitoring is critical to determine impacts of dredge spoil placement, to actually quantify processes and not be reliant on anecdotal evidence.** In order to quantify any changes to surfing wave quality we must first have a quantified understanding of the existing surfing conditions. The most cost effective monitoring can be done with cameras, supported by bathymetry surveys, numerical modelling and on-line surveys. Again, all of these aspects are being applied at Port Otago.

Together, the above initiatives can be applied to the adaptive management of the beaches and surfing breaks in the area, which are of great significance and importance to the Bay of Plenty Region.

It is understood that the University of Waikato provides technical support for the Port of Tauranga, and I believe that many of these investigations could be undertaken by them. In addition, the dredge disposal sites are coming up for resource consent in approximately 3 years' time. We can further expand the components above into Scopes of Work if this would assist?

Initiating monitoring as soon as possible in order to start collecting information on the regionally significant surfing breaks should be a priority. At present, the Port has a camera available for monitoring the ebb-tidal delta and Matakana Island. However, the difficulty has been gaining permission to site the camera on Mount Maunganui. SPS is currently pursuing permission to site the camera on the Mount. A second camera is also required in the Tay Street area (i.e. inshore of the nearshore disposal site) – when both cameras are operating we will have the basis of a monitoring programme.

Please let me know if you require more information or would like to discuss further.

Yours sincerely



Dr Shaw Mead
Managing Director

cc. Robert Win (Environmental Scientist – Coastal)
Michael Gunson (Surfbreak Protection Society)

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