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Memo

From	Dr Terry Hume
To	Todd Whitaker, Planner-Director, Planning Works M: 021 676 377 todd@planningworks.co.nz
CC	Dr Shane Kelly, Coast & Catchment Ltd shane@coastandcatchment.co.nz
Date	19 September 2023
Subject	GDC Hearing – Eastland Port – Twin Berth project: Review of adequacy of assessments and information relating to coastal physical processes
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GDC Hearing – Eastland Port – Twin Berth project: Review of adequacy of assessments and information relating to coastal physical processes

Introduction

Brief introduction, experience and qualifications

My name is Terry Martyn Hume. I am a Director of Hume Consulting Ltd which I established in 2015. Prior to that I was employed by the National Institute of Water and Atmosphere Research (NIWA) from 1992 to 2014 where I was a Principal Scientist in Coastal Geomorphology and National Projects Manager.

I have a BSC in geology from the University of Auckland and a MSc (Hons) and DPhil in Earth Sciences from the University of Waikato. I am a member of the Royal Society of New Zealand, a Life Member of the NZ Coastal Society, an Honorary Associate Professor (Environmental Sciences) at the University of Auckland, and an Honorary Lecturer (Earth Sciences) at the University of Waikato. I have been certified as an RMA Hearings Commissioner (2006 - 2019). I have worked on projects as a team member, project manager and project director. I have undertaken environmental research and consulting for government departments, local authorities and private companies and led NIWA's coastal and estuarine research programmes and science teams. I have more than 40 years' experience as a scientist and consultant. I have authored or co-authored over 80 publications in refereed journals and over 150 technical reports for various clients.

I have expert knowledge as a marine geologist, coastal geomorphologist and coastal oceanographer. I have experience in applying numerical models to inform the understanding of coastal processes. Because of my role in NIWA as a Principal Scientist and Project Director I undertook technical reviews and evaluations of work by other specialists where models were used. Of particular relevance to my role as an expert witness in this matter are the following:

- Port of Nelson dredging and spoil disposal. Assessment of sedimentation in Nelson Haven and of the effects of capital dredging and marine disposal at the Port of Napier to advise maintenance and capital dredging operations.
- Port of Napier dredging and spoil disposal. Assessment of the effects of capital dredging and disposal at the offshore dump ground, and stormwater runoff from reclamation areas at the Port of Napier; advise the RMA consenting process.

- Reviews of technical reports relating to the potential effects on coastal processes of the proposed deepening of the Wellington Harbour entrance shipping channel for Greater Wellington Regional Council.
- Reviews of technical reports related to coastal physical processes for consent hearings for Port of Napier hearing expansion, dredging and disposal and beach nourishment.
- Participation in a 3-year-long study of surf breaks of national and regional significance and preparing guidelines for their management for MBIE.

I made a site visit to EPL on 1 September 2022 where I undertook a tour along with other experts for Council guided by Council and EPL staff.

Code of Conduct statement

I have read and complied with the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2014 in preparing this report. 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 evidence.

Executive summary

Statement of key issues, whether you are satisfied with the scope and assessment /reporting by applicant, Conclusions on effects and any key matters for consent conditions.

The key issues are the potential effects on the CMA with respect to coastal physical processes as they relate to:

- Capital and maintenance dredging and the reclamation and breakwater upgrade.
- Construction of reclamation, Wharf 8 extension and outer breakwater.
- Proposed port works on surfbreaks of National and Regional importance.

Capital and maintenance dredging and the reclamation and breakwater upgrade

The MetOcean Solutions report summarises extensive investigations of the implications for coastal processes of the changes in the seabed topography as a result of the proposed dredging and disposal. This includes consideration of the actual and potential effects of the works on wave climate and currents, sediment transport and surf breaks. This is a comprehensive piece of work underpinned by historical studies of processes, a good understanding of coastal processes and application of appropriate numerical modelling techniques. The work feeds valuable results into both the Construction and Surfbreaks assessments. Assessment of effects is systematic and discovers only less than minor effects and recommends mitigations where practical. The range of recommended mitigation measures and monitoring actions for the impact of the capital and maintenance dredging and disposal look reasonable. There are no gaps in the work.

Construction of Reclamation, Wharf 8 Extension and Outer Breakwater

Worley identify correctly the potential effects on the CMA as loss of seabed by reclamation and increases in turbidity in the sea resulting from sediment disturbance and dispersion of fine sediments to the CMA during construction activities. They assessed the potential for dispersion of fine sediments generated from construction of the rock core of the revetment by numerical modelling (undertaken by MetOcean Solutions Ltd). Worley propose a suite of appropriate works to mitigate and minimise sediment disturbance and dispersion of fine sediments to the CMA during construction activities including: building the bund around reclamation footprint prior to infilling, letting area self-drain via filtering through the bund revetment, using only clean fill, piling the wharf, and spanning construction over a long time frame. The design of the reclamation and its revetment and breakwater structures has been refined with physical scale wave modelling (undertaken by Manly Hydraulics Laboratory), which considered the full range of ocean water levels that include wave overtopping and the appropriate sea level rise component (2017 MFE Guidance for Local Government and 2022 MFE Interim Guidelines). Worley suggest that monitoring the predicted

sediment discharges is best developed once more detail is known of the construction method and timing, and be part of conditions of consent. There are no gaps in the work.

Surfbreaks

Analysis of the potential impacts of the proposed port works on surfbreaks of National and Regional importance by Tonkin + Taylor is underpinned by appropriate methodology, numerical modelling of the wave climate and good understanding of coastal processes. They use appropriate risk-based analysis and management guidelines outlined in a national guidance document to assess potential effects on surf breaks. The overall finding is sound and that for all breaks (Midway, Waikanae and Waipaoa River mouth), the maximum consequence for individual surfing elements was *minor*, the maximum likelihood was *unlikely* and the overall risk of the proposed activity on surfing is considered *low*. No specific mitigation is deemed necessary. No specific monitoring is proposed although T+T recognise that monitoring proposed by MetOcean relating to the dredging and disposal will be helpful for understanding effects of the proposed works on wave energy and form. There are no gaps in the work.

Review process

I have been engaged by Gisborne District Council to review of technical reports and provide advice on adequacy of assessment and information provided with respect to coastal physical processes. My focus was on:

- Natural hazards
- Coastal processes and surf breaks
- Construction effects
- Operational effects namely - Outer port maintenance dredging and disposal

In particular, I have read and relied on information mainly from the following documents:

- Main Report: 4Sight Consulting 2022. Gisborne Port Twin Berths Project Resource Consent Applications Assessment of Environmental Effects August 2022 Draft v1.0. 272pp. Prepared for Eastland Port Ltd
- Appendix G: Worley 2022. Eastland Port Reclamation, Wharf 8 Extension and Outer Breakwater. Engineering Report for Consent Application. 5 July 2022. 49pp + app.
- Appendix L: MetOcean Solutions 2023. Gisborne Port – Twin Berths Project - Summary of effects of the capital & maintenance dredging and the reclamation & breakwater upgrade. V2.0 March 2023. 49pp + app.
- Appendix U: Tonkin + Taylor 2023. Eastland Port Dredging: Surf Break Risk Assessment. Report prepared for Eastland Port Limited. V4, 24 April 2023. 36pp.
- MetOcean 2022. Gisborne Port – Twin Berths Project. Proposed Monitoring Requirements. Report prepared for Eastland Port Gisborne. September 2022. 12p.

Following my initial review of these documents I raised four items in the s.92 outlined in the letter dated 12th October 2022. They were related to:

- CP1. Sea level rise allowances (Appendix G: Worley)
- CP2. Surf break assessment clarifications (Appendix U: Tonkin + Taylor)
- CP3. Surf break consultation (Appendix U: Tonkin + Taylor)
- CP4. Coastal processes investigations clarifications (Appendix L: MetOcean Solutions).

I received satisfactory information in response to my requests, and the reports were amended where needed accordingly.

Assessment

Outline of key issues

The key issues are the potential effects on the CMA with respect to coastal physical processes as they relate to:

- Capital and maintenance dredging and the reclamation and breakwater upgrade.
- Construction of reclamation, Wharf 8 extension and outer breakwater.
- Proposed port works on surfbreaks of National and Regional importance.

Capital and maintenance dredging and the reclamation and breakwater upgrade

The MetOcean Solutions report summarises extensive investigations of the physical implications of the changes in the seabed as a result of the proposed dredging and deposition. Investigations cover the effects on the waves and sediment transport associated with the capital and maintenance dredging and disposal at the existing offshore disposal site. Numerical modelling investigations undertaken in 2017- 2018 (when a greater volume of capital dredging was proposed) were updated Wave modelling and a sediment plume study was undertaken to understand the impact of the planned reclamation and redevelopment and the potential effects on surfbreaks.

Methodology

The methodology used is important as the modelling also feeds key information into both the Construction and Surfbreaks assessments. The MetOcean study uses a thorough and appropriate methodology involving a suite of appropriate numerical model systems underpinned by a good database and calibration with field data to replicate the key coastal forcing processes.

Earlier work by Black et al. (1997) and Beamsley (2003) provided a sound basis for identifying and understanding the key coastal processes/forcings as: inner continental shelf currents, river discharge, wind upwelling and down-welling, vertical mixing due to salinity and temperature gradient, tidal dynamics and waves.

Bathymetry was adequately resolved by compiling an extensive national and regional bathymetric dataset derived from Electronic Navigation Charts (ENC). These datasets were updated with hydrographic surveys within Eastland Port and its surroundings. Specialist data manipulation tools were used for merging, interpolation and QA of raw bathymetry data when establishing numerical model domains. GEBCO data (Becker et al. 2009) was also used to characterise the deepest areas.

A suite of appropriate numerical model systems was used:

- SWAN to characterise the wave climate, both within and offshore Poverty Bay and a multiple nesting approach to produce a 10-year wave hindcast for Poverty Bay spanning 1996 to 2005. Measured wave data over years 2007 and 2008 was used to calibrate and validate the numerical model.
- ROMS for hydrodynamic modelling of water levels/currents used ROMS to recreate a 10-year regional hindcast, and the unstructured-grid SCHISM model was nested within ROMS to increase the available resolution and more accurately account for complex topographical features (rocky reef etc.) in shallow areas.
- Delft 3D for morphological models to set up and run high resolution processes-to simulate flows, waves and sediment transport over Poverty Bay and Eastland Port.
- MOS particle tracking modelling was used to simulate the trajectories of particles released at the dredging and disposal sites. It was reasonable to use the dredge plume modelling undertaken for the 2018 proposed capital dredging, as the 2021 proposed capital dredging covers the same area (i.e., outer shipping channel, swinging basin, etc.) and the same type of sediments.

Morphological response to port and channel deepening
The modelling shows that proposed dredging is expected to have a limited impact on the existing morphodynamics and that changes are likely to be manifested as subtle changes in the hydrodynamics and wave patterns to the north of the navigation channel altering sediment deposition patterns in the vicinity of the channel. No areas of significant erosion/accretion processes are expected.

Morphological response of the shoreline to the disposal of maintenance and capital dredging
Modelling demonstrated that the mound related to the disposal of maintenance dredging sediments (mound height = 0.052 m, disposal volume = 140,000 m^3) and disposal of capital dredging sediments (mound height = 0.049 m, disposal volume = 135,400 m^3) have a negligible effect on the incident wave refraction patterns over and inshore of the disposal site (changes $\pm$0.2% or less). Very localised changes in wave direction occur at the 10-m isobath which are not expected to modify the overall longshore sediment transport patterns and beach shoreline. MetOcean also make the valid point that the predicted changes are far less that that due to natural changes inshore at Waipaoa River where bar and beach morphology change frequently due to waves and river discharge. Importantly, between 71% and 80% of the disposal mound associated with the simulated capital dredging volume of 135,400 m^3 is expected to be eroded, leaving the mound less tall and having even less effect on the wave climate.

Dispersal from the disposal site
Modelling shows that the silt fraction is transported mostly NW, SE and SW of the disposal ground, with only a small amount of deposition to the NE of the bay. The very fine sand particles are expected to migrate south and SW with sediment expected to move to depths of 12– 24 m within the 1-year simulated period. No sediment from the disposal mound is expected over the adjacent beach areas.

Effect of port reclamation on waves
For the extreme wave conditions simulated the effects are significant but local. The significant wave heights are in general 8- 10% larger with the new reclamation in place, reaching up to a 10-20% increase for the wave conditions simulated. For higher water levels (Figure 4.12), the same offshore conditions produced an overall increase in wave height of 15%, and up to 25% locally. The increases in wave height are allowed for in engineering design by way of mitigation.

Potential sediment plumes during reclamation works
MetOcean used a calibrated and validated Delft3D model to estimate the dispersion and fate of sediment plumes potentially generated during the reclamation works. The modelled scenario represents the protection bund partially built, and a source of sediment discharge representing release of fine sediments from the surface of the rocks. The modelling showed the sediment plume showed a very small minor increases in concentration above background near the port, within the port and further out into Poverty Bay. Deposition of the fine sediments was small (1 mm thickness) on the seabed mostly west of the reclamation site, along the southern side of the breakwater, and at the entrance of the port and navigation channel, with higher deposition (2-3 mm thickness) in a narrow band along the southern side of the breakwater.

Effects of breakwater upgrade on local wave climate
Nearshore wave modelling showed that in general the changes observed are confined to the Port's vicinity, with minimal alterations through the rest of the domain.

- The changes in wave height are smaller than 0.1 m near the port and smaller than 0.03 m within the rest of the domain.
- Displacement of the vortices causes an increase of approximately 0.1 m/s in the current flowing westward of the port, and a similar decrease in the nearshore current flowing westwards of Midway Beach.

Overall finding
Effects are less than minor.

Mitigation and monitoring and consent conditions
MetOcean suggest that with respect to the plume the effective suspended solids concentration increase could be mitigated by altering the operating mode (no overflow or use a "green valve") and/or duration of the overflow phase when applicable).

The range of recommended monitoring actions for the impact of the capital and maintenance dredging and disposal (which could also apply to potential impact of the reclamation works) look appropriate in terms of the extent of area covered and frequency of survey (i.e., month and annual). However, monitoring suggested could be more specific in terms of the density of data coverage.

Conditions of consent could recommend using bathymetry survey methodology such as SWATH which provide much more detail than in-line soundings.

Gaps and errors
There were no gaps identified in the assessment.

<u>Eastland Port reclamation, Wharf 8 extension and outer breakwater.</u>
The Worley report documents the concept design of the Wharf 8 Reclamation, revetment and refurbishment of the outer breakwater for consent purposes. My review relates to matters associated with the potential effects on the CMA and primarily sediment effects and how the effects of sea level rise through climate change is accounted for in design of the structures given that the Port area is subject to a range of natural hazards such as storm surge events. Matters outside my area of expertise and out of scope of my review include:

- Geotechnical matters relating to ground conditions and stabilisation and soils engineering.
- Revetment construction and armour sizing.
- Breakwater construction armour sizing.

To enable twin berths at the port, Wharf 8 will need to be extended south by approximately 130 m. To enable truck access to the southern end of this extension, additional reclamation is required. The reclamation footprint below MLWS (loss of seabed) is planned to be 6,250 m^2. The reclamation is bounded and protected by waves and high water levels on its seaward side by a rock revetment. The reclamation would be sealed to accommodate truck traffic and is proposed to comprise granular fill.

Worley identify correctly the potential effects on the CMA as loss of seabed by reclamation and increases in turbidity in the sea resulting from sediment disturbance and dispersion of fine sediments to the CMA during construction activities.

Worley propose a comprehensive range of strategies to mitigate and minimise sediment disturbance and dispersion of fine sediments to the CMA during construction activities as follows.

Reclamation
Worley commissioned numerical modelling (by MetOcean Solutions Ltd) to determine the possible scale of dispersion of fine sediments generated from construction of the rock core of the revetment. They used this work to select appropriate mitigation measures as:

- Building a "bund" around the perimeter of the reclamation area prior to construction to minimise sediment disturbance by wave action and dispersion of fine sediments into the bay during back filling.

- Using a silt curtain or series of silt curtains around the revetment core during construction, or pre-washing fines from the proposed rock-fill to mitigate sediment dispersion from core materials during construction.
- Sorting materials demolished from the existing breakwater on site and to select only material with suitable engineering properties to build of the reclamation.
- Dewatering the area via slow filtering out through the revetment.
- Construction over approximately three years (a long time) so minimising the level of impact on water quality.

Wharf 8 extension
Mitigation to minimise sediment disturbance and dispersion of fine sediments to the CMA during construction activities the following are proposed:

- No land-based earthworks will be required, other than filling the caisson with graded gravel.
- As the wharf extension will be supported on piles, no additional ground stabilisation works will be necessary.
- Piling would likely be undertaken using a "Drill and Drive" technique, whereby steel circular hollow section piles would be driven to refusal, then drilled through the pile to enable further driving of the piles to the ultimate embedment level required.

Outer Breakwater
Mitigation to minimise sediment disturbance and dispersion of fine sediments to the CMA during construction activities the following are proposed:

- Laboratory tests of the potential breakwater core material designated as "plus 65" quarry run from the Kuri Quarry revealed that it comprises silt-sized particles that could contribute to a plume during construction. As a consequence, for construction of the "knuckle" transition between the Inner and Outer Breakwater, clean graded rock fill would be used.
- The rock fill would be protected with concrete armour units as construction progresses to minimise its exposure to wave action and hence minimise generation of fine sediment.
- Concrete armour units, precast and stored on site, will not generate any significant fines.

In addition, to the above and because any failure in the breakwater build could potentially impact the seabed and result in and increase in turbidity in the CMA, the following construction methodology will serve to ensure the stability of the breakwater build:

- Sub-surface investigations, via boreholes along the alignment of the inner breakwater and geophysical surveys and multibeam echo sounder around the breakwater, were conducted across the site to assess the likely ground conditions.
- The preliminary assessment identified areas of soft sediments requiring an appropriate level of ground improvement to mitigate the stability risks.

Consideration of sea level rise and climate change
Consideration of sea level rise and climate change has been taken into account in the design of the Reclamation, Wharf 8 Extensions and Outer Breakwater upgrade as follows:

- They take into consideration the 2017 MFE Guidance for Local Government "Coastal Hazards and Climate Change". Worley responded to my s.92 request confirming that the design of structures including the Reclamation, Wharf 8 extension, and Outer Breakwater upgrade have considered both the 2017 MFE Guidance for Local Government and the subsequent change in sea level rise reported in the MFE Interim Guidelines (MFE 2022). They confirmed that the change in sea level rise from 0.65 m to 0.7m will not make any material difference to the design parameters used for the project.
- The design of the Reclamation and its revetment and breakwater structures has been refined with physical scale wave modelling undertaken at the Manly Hydraulics Laboratory (Appendix A), which considered the full range of ocean water levels that include the required sea level rise component. The crest level of the revetment has been set to minimise

wave overtopping, and armour layers were designed based on wave conditions that included the sea level rise allowance as stipulated in the Guideline.

Avoidance of natural hazards
The design of the Reclamation, Wharf 8 Extension and Outer Breakwater upgrade has been informed by physical and numerical modelling to avoid or account for natural hazards including: "Extreme" storm surge 0.46 m (Mulgor 2005), Infragravity (IG) wave amplitude 0.25 m (Mulgor 2005) and sea level rise 0.65 m (MFE 2017). Construction methods to avoid natural hazards are:

- Physical scale modelling undertaken in the Manly Hydraulics Laboratory wave basin to study the 3-dimensional variations in the design parameters for the port structures, including wave heights and water levels, to inform the design of the Breakwater head, the knuckle where it adjoins the Inner Breakwater, the form of the Reclamation Revetment, its adjoining to the Inner Breakwater and the angle of wave incidence. The concrete armour units for the Reclamation and Outer Breakwater have been designed to protect the Reclamation Area from erosion due to waves.
- The high porosity of the armour layers, mean that the revetment and Outer Breakwater would absorb rather than reflect wave energy, so the risk that wave reflections from the structures would adversely impact the surrounding coastal environment would be reduced when compared with the existing situation.
- The orientation of the Reclamation area has been carefully considered and designed to be parallel to the incoming wave crests, thus minimising the potential for consequential erosion and accretion in areas outside the works footprint, including at Gisborne City Beach or Kaiti Beach.
- MetOcean Solutions Limited have undertaken a coastal process study involving high-resolution wave transformation modelling that addresses the changes to wave climate expected in the Port as part of this project. They found that wave heights generally become larger in the close vicinity of the reclamation structure (due to reflection) and that there was relatively larger wave energy radiating back to the southern quadrant. In contrast, wave heights are relatively reduced within a band along the southern training wall (Outer Breakwater)

Monitoring
Worley recommended that monitoring of the predicted sediment discharges is best developed once more detail is known of the construction method and timing, taking into account the difficulties with in-situ monitoring in a very exposed marine environment. I consider this is reasonable given that interpretation of data is likely to be confounded by 'background' turbidity generated regular tug/ship movements in the port, flooding events in the adjacent Turanganui River and also wave disturbance of the seabed and resuspension of sediment in front of the reclamation. Worley envisage visual observations based monitoring from land vantage points and directed at ensuring that there is not consistent movement of high concentration sediment plumes towards the more sensitive ecology of the Kaiti reef. It is anticipated that development of an appropriate monitoring strategy can be ensured by way of conditions of consent.

Gaps
There are no gaps in the assessment.

<u>Potential impacts of the proposed port works on surfbreaks</u>
Proposals to undertake capital dredging to deepen the port entrance channel, to maintain this deeper level with annual maintenance dredging and to dispose of this material offshore, have the potential to affect surf breaks of National and Regional importance in the project area.

The study uses a thorough and appropriate methodology beginning with an initial screening followed by a detailed assessment of selected surf breaks. The initial screening was based on

information from Peryman (2011), the New Zealand Surfing Guide (Morse and Brunskill 2004) and first-hand experience. T+T identified key surf breaks in the Poverty Bay area, of which six are of Regional or National significance. Surf breaks that could potentially be affected by the project activity were identified as Waikanae Beach (Roberts Road), Midway Beach (The Pipe) and the Waipaoa River mouth (Big River) Surf breaks to the east of the port, including The Cliff (Kaiti Beach), Sponge Bay and Tuamotu Island (The Island) were screened to be low risk because the port works are located outside the swell corridor for these breaks.

The detailed assessments undertaken for the Waikanae, Midway section and Waipaoa breaks were based on identifying the (11) physical elements influencing the use and enjoyment of each surf break, then assessing the impacts of the proposed dredging activity and deposition of material at the dredge disposal ground on these. The methodology relied heavily on the wave modelling undertaken by MetOceans (2017 and 2021) and in particular how the project altered the wave height and angle at the break and consequence of the impact on each element was assessed. A framework outlined in a national guidance document (Atkin et al. 2018) was followed. A risk matrix based on the identified likelihood and consequence was used to identify a risk rating for the surf breaks that exists on a continuum from low to catastrophic.

I agree with the overall findings that for all surf breaks (Midway, Waikanae and Waipaoa River mouth), the maximum consequence for individual surfing elements will be minor, the maximum likelihood was unlikely and the overall risk of the proposed port activity on surfing was identified to be low.

Monitoring
T+T do not recommend any practical mitigation options or monitoring that might form part of consent conditions. However, T+T do comment on the proposed monitoring requirements presented in MetOcean (2021) relating to dredging and disposal stating that: … *No surf break specific monitoring is presented in MetOcean (2012f). Most of the monitoring proposed in MetOcean (2021f) will be helpful for understanding effects of the proposed works on wave energy and form but will be less useful for assessing breaking location and style. However, this is likely appropriate given the influence that incoming wave form has on breaking at Waikanae and Midway Beaches and also given the finding of this assessment that the proposed works pose a low risk of adversely affecting the surf breaks within Poverty Bay.*

Gaps
There are no gaps in the T+T assessment (i.e., no further information is required).

<u>Workshop feedback to the to the water user community</u>
It is relevant to note that in response to my s.92 request, EPL reported that the findings of the MetOcean Solutions coastal processes modelling and report and the Tonkin + Taylor surf break assessment, were presented in a workshop to the water user community. It was intended that there would be feedback to this work that may need clarification or further investigation. It is reported that the community were impressed and comfortable with the work that was undertaken and did not raise anymore matters. Further presentations/workshops to wider audiences to communicate this further, and hear any issues, were offered but not taken up.

<u>Overall assessment of Environmental Effects</u>
I reviewed relevant sections of the Main Report covering environmental effects (4Sight Consulting 2022). I can confirm that information on coastal physical processes, effects on the CMA and mitigation and monitoring, reported in Appendices G, L and U have been appropriately incorporated into the Main Report.

Conclusions

There are no significant issues outstanding or effects within my area of expertise which would not support the granting of consent.

Matters within my area of expertise that are able to be addressed through appropriate conditions of consent include:

- Monitoring at the offshore disposal ground.
- Monitoring of the predicted sediment discharges to the CMA from the construction works.
- Monitoring the effects of dredging and disposal on surfbreaks.

At the time of writing, we await draft conditions of consent to be provided by the applicant before commenting.

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Worley 2022. Eastland Port Reclamation, Wharf 8 Extension and Outer Breakwater. Engineering Report for Consent Application. 5 July 2022. 49pp + App.

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