Before the Expert Fast-track Panel

FTAA-2511-1150

Under	the Fast-track Approvals Act 2024 (**FTAA**)
And	
In the Matter	of an application for approvals by **MCCALLUM BROTHERS LIMITED** for the Te Ākau Bream Bay Sand Extraction Project located at Te Ākau Bream Bay, Northland

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Joint Statement of Evidence from Richard Reinen-Hamill and Edward Beetham on behalf of McCallum Brothers Limited in Response to Invited Comments

(Coastal Processes)

Dated 12 August 2026

Jeremy Brabant

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Introduction

1. Our names are Richard Anthony Reinen-Hamill and Edward Paul Beetham.

2. Richard is a Technical Director: Coastal Engineering at Tonkin + Taylor, an environmental and engineering consultancy firm. I am a Fellow of Engineering New Zealand and a lifetime member of the New Zealand Coastal Society. I have a BE (Hons) and a ME from the University of Auckland, which included a thesis studying the coastal processes of Mission Bay, Auckland and focussed on transport of sediments under tide and wave conditions. I also have a certificate of competency in multi-hazard risk assessment from the University of Twente. I have more than 38 years' experience as a coastal engineer. In my role as a consulting engineer, I have authored more than 800 technical assessments, design and review reports and I have 15 published papers and have assisted in the preparation of four regional and national guidance notes.

3. From 1990 to 1993 I was a research and project engineer in the Harbours and Coast division of the Specialist Coastal and Hydraulic Consultants, Delft Hydraulics Centre (now named Deltares) in the Netherlands. In this role I developed particular skills in evaluating sediment transport and coastal processes, including the use of physical and numerical models where appropriate. I carried out assessment of the effects of dredged channels and assessed sedimentation rates of harbour and access channels for major harbours in Holland, India and the UK.

4. Since joining Tonkin + Taylor in 1994 I have been responsible for numerous technical and management studies of the effects of changes coastal processes resulting from modifications to the coastal environment. Projects of particular relevance to this present assessment include:

   a. **Mangawhai-Pakiri Sand Extraction Consents:** I was the Project Director for the technical studies and evidence carried out by Tonkin + Taylor for the Department of Conservation for the consent application for the sand extraction and associated discharges in the coastal marine area in the Mnagawhai-Pakiri Embayment.

b. **North Port Eastern Reclamation:** I led the coastal process assessment for the proposed effects of the eastern reclamation at Northport. This included technical assessments, reviews of hydrodynamic studies (completed by others) and a detailed technical effects assessment and presentation of evidence.

c. **Reclamation Crude Shipping Project, Marsden Point NZ**: I led the coastal process assessment for the proposed channel deepening and dredge disposal studies for Refining NZ. This included technical assessments, reviews of hydrodynamic studies (completed by others) and a detailed technical effects assessment and presentation of evidence.

d. **Centreport dredging effects assessment, Wellington, NZ:** Technical reviewer of the hydrodynamic studies (completed by others) and a detailed technical assessment of the effects of proposed channel deepening at the entrance to Wellington Harbour on the shorelines adjacent to the proposal.

e. **Northland Regional Coastal Hazard Assessment, NZ:** Technical reviewer and Project Director for the coastal erosion hazard zone assessment for selected Northland Sites including Marsden Cove, Marsden Point and the open coast from Marsden Point to Ruakaka.

f. **Port of Tauranga Dredging and Spoil Disposal Consent, NZ:** Technical assistance in the field of hydrodynamics and sedimentation with respect for the Port of Tauranga's proposed application to dredge 650,000 cubic metres of sand for part enhancement and ongoing maintenance and disposal in the nearshore, including dispersal and diffusion assessments.

5. Dr Edward Paul Beetham is a Senior Coastal Scientist at Tonkin + Taylor.

6. I hold the following degrees from the University of Auckland:

    a. Bachelor of Science in Physical Geography and Environmental Science (2008).

    b. Bachelor of Science (Honours) in Physical Geography (2009).

    c. Master of Science (First Class Honours) in Coastal Geomorphology (2011).

    d. Doctor of Philosophy (Deans Award) in Coastal Geomorphology (2016).

7. I have 15 years' experience (Post M.Sc) in coastal science research and consulting. I have authored 15 peer reviewed journal articles between 2011 and 2026. After completing a PhD, I worked as a Research Fellow for three years at the University of Auckland, contributing to academic research and lecturing on coastal geomorphology (2016-2018). I have worked as a coastal science consultant for the last seven years (since 2019) at the Auckland T+T office, specialising in coastal hazard, coastal geomorphology, data analysis, wave processes and numerical modelling.

8. Projects of particular relevance to this present assessment include:

    a. **MBIE Shipyard Project:** I am currently assisting in a coastal process effects assessment of the proposed shipyard extension adjacent to Northport.

    b. **Sand extraction in the in-shore, mid-shore and offshore application areas of the Mangawhai-Pākiri Embayment:**

        i. In 2023 I presented evidence in Environment Court in relation to coastal process effects of the McCallum Bros Ltd application for the Department of Conservation.

        ii. In 2022 I supported Dr Shand when he prepared his evidence at the council hearing on in-shore and mid-shore extraction. In this capacity I analysed data, reviewed expert evidence and attended the council hearing (virtually and in person) to listen to coastal process evidence.

iii. In December 2021 I worked on a T+T project commissioned by the Director-General Conservation to inform her original submission on the in-shore and mid-shore applications. I helped review the MBL applications for in-shore and mid-shore extraction, focusing on the coastal processes assessments and assessment of environmental effects. This involved producing a report referred to as T+T (2021) which was appended to Dr Tom Shand's Council Hearing Evidence. This work involved re-analysing all beach profile data available from Auckland Council.

9. Other relevant coastal process experience includes:

a. A multi-year project with Auckland Council to assess and map coastal erosion hazards for the Auckland Region. My role included digitising the shoreline using aerial imagery and LiDAR (e.g. vegetation line, dune toe, cliff toe) for the entire region (including Mangawhai-Pākiri) and mapping areas of coastal erosion and instability.

b. Expert witness for Taharoa Ironsands Ltd regarding coastal process effects of their sand export operation on the Waikato West Coast.

c. Numerous site specific and regional coastal hazard and coastal process assessments in Northland, Auckland, Bay of Plenty, Pauanui, and Hawke's Bay. These projects involve analysis of beach profile data, tide gauge levels, wave climate and wave transformation.

d. A surf break risk assessment for Eastland Port in the context of capital and maintenance dredging of a port entrance channel.

e. As a research student I assisted with undertaking beach profile surveys and data analysis for monitoring of sand islands in the

Kaipara Harbour. This was part of a project that the University of Auckland had to monitor the profiles as part of a resource consent for sand extraction.

Scope of Evidence

10. This joint statement of evidence is provided as part of McCallum Brothers Limited's (**MBL**) response to comments received (from those invited to comment by the Expert Consenting Panel (**Panel**)).

11. We prepared the following material lodged in support of MBL's application:

    a. Report titled Te Ākau Bream Bay Sand Extraction: Coastal Process Effects Assessment dated January 2026 included as Attachment 8 to the MBL Assessment of Environmental Effects.

    b. Responses to the Panel requests for information in separate evidence briefs[1] responding to coastal process matters from Minute 4, Minute 6 and Minute 11.

Code of Conduct

12. Although this is not a hearing before the Environment Court, we confirm that:

    a. We have read and am familiar with the Environment Court's Code of Conduct for Expert Witnesses as specified in the Environment Court's Practice Note 2023 (**Code**); and

    b. The reports referred to above authored by us:

        i. Are within our area of expertise (except where we state that we rely upon the technical reports of other expert witnesses provided in support of the application);

[1] T+T Evidence in response to Minute 4 (14 May 2026), Minute 6 (18 May 2026) and Minute 11 (9 June 2026, yet to be filed)

ii. Have been prepared in accordance with the Code; and

iii. We have not omitted to consider any material facts known to us that might alter or detract from the opinions expressed.

Response to submissions

Summary of submissions

13. There are 24 submissions that include concerns on the potential for adverse effects on the beach and dune system attributed to MBL's proposed sand extraction in Bream Bay[2]. Most raise potential issues and concerns with no further substantiation from technical experts, however some have engaged technical experts to support their comment or have stated expertise in coastal processes[3]. There is also a submission from Northport[4] regarding potential sedimentation impacts that also requires a response.

14. Expert reports on coastal process matters included in submissions are from:
    a. Sian John for Bream Bay Guardians[5].
    b. Sam Morgan for the Department of Conservation[6].
    c. Professor Karin Bryan for Ngātiwai Trust Board and Te Patuharakeke Te Iwi Trust Board[7].
    d. Professor Mark Dickson for Northland Regional Council[8].
    e. André & Robin LaBonté as public submitters (Submission No. 32).

15. We focus our response to the key themes listed below that were common across these submissions and associated expert reports:

    a. Use of the best available information and new LiDAR

    b. State of the existing coast

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[2] Submission Nos 4, 6, 9, 10, 11, 12, 14, 16, 17, 18, 20, 21, 23, 25, 26, 27, 29, 32, 34, 36, 37, 39, 41, 43

[3] Submission Nos 9, 20, 32, 41 and 43

[4] Submission No. 22

[5] Haskoning report dated 21 May 2026 included with Submission No. 20

[6] LDE report dated 19 May 2026 included as Appendix A of Submission No. 41

[7] Statement of evidence from Professor Karin Bryan dated 19 May 2026 included as Appendix 8 of Submission No. 43

[8] Letter reports dated 21 September 2025 and 4 March 2026 included as Attachment 2 of Submission No. 9

c. Whether shoreface bedforms indicate sediment connectivity

d. Depth of closure method and interpretation

e. Modelling approaches and appropriateness of methodology

f. Sediment budget and resource volume

g. Effects of dredging on the seabed within the extraction area

h. Cumulative effects with climate change and other activities

i. Risk to the beach

j. Uncertainty, conditions and monitoring

Theme 1: Use of best available information and new LiDAR

16. Professor Dickson[9] notes that Land Information New Zealand (LINZ) published a new 1 m resolution bathymetric LiDAR dataset for Bream Bay in 2026 (accessible online from 16 February 2026) which was after our report was completed. He contends that this information this should be consulted as part of the application. He also references the work of Kinsela et al. (2016, 2022, 2023) on seafloor ridges in eastern Australia, suggesting bathymetric LiDAR is an important emerging dataset for shoreface characterisation.

17. We acknowledge and welcome the availability of new LINZ bathymetric LiDAR data and note that the LINZ Bream Bay survey was undertaken in March 2025. We have sourced and reviewed this data since the application was lodged and utilised the LiDAR bathymetry to make a comparison between Bream Bay and Pakiri profiles in response to panel comments (Minute 4 included in RFI 1)[10].

18. The new LINZ bathymetric LiDAR data is complementary to the multibeam echosounder (MBES) bathymetry data collected by Discovery Marine Ltd (DML) for the project in April 2024. The LINZ data covers a larger area than was surveyed using MBES for the application (Figure 1). We agree that it is useful to now have a full embayment baseline bathymetry dataset prior to any extraction consent being granted.

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[9] Professor Dickson Letter (4 March 2026) para 4, Page 3
[10] T+T Evidence in response to RFI 1 dated 14 May 2026

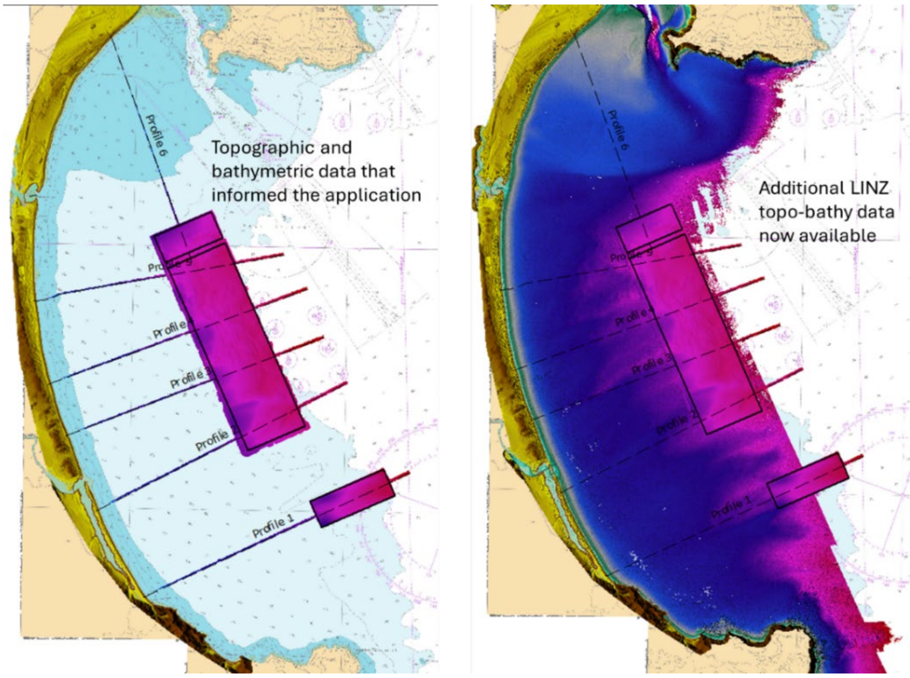

Figure 1: Colourmap showing bathymetry extend as collected for the application (left) and the extent of what is now available with the new LINZ LiDAR (right).

19. We have compared the two surveys. Figure 2 shows a long section through the extraction site with both data sets. The large-scale features including sand waves referred to by Professor Bryan[11] can be seen in the same position and have not materially changed. We confirm that access to and interpretation of the new LINZ LiDAR bathymetry does not change the analysis or results of our assessment[12]. The multibeam data collected for this project, combined with the LiDAR now reviewed, is consistent with our earlier interpretation of the shoreface morphology and the position of the extraction zone relative to the depth of closure.

[11] Professor Bryan evidence (19 May 2026) paragraph 3.1.15

[12] T+T (2026) Coastal Effects Assessment, Section 5

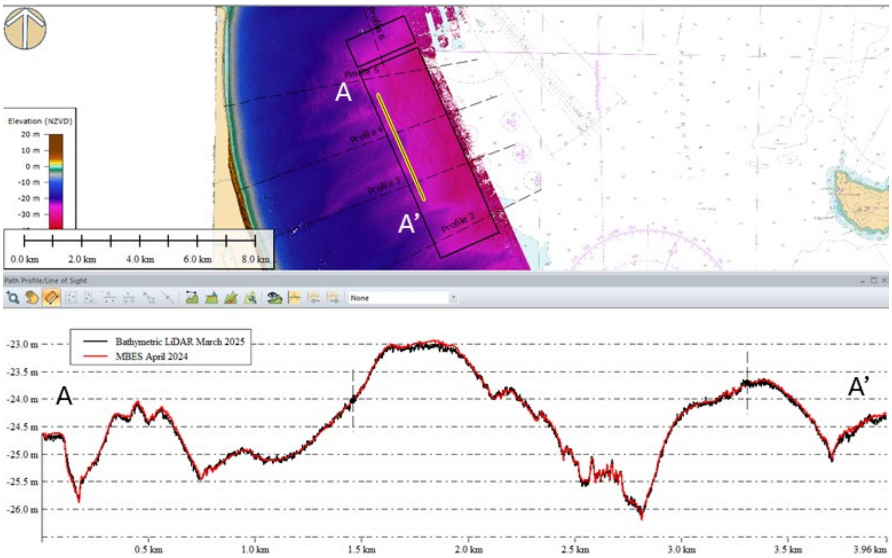

Figure 2: Section through the DML and LINZ bathymetric survey showing seabed features in the same position

Theme 2: State of the existing coast

20. Submitter evidence is that the existing coast is dynamic in response to storms, seasons, and weather patterns. This is outlined by the LaBonté's in their presentation of storm events[13]. Professor Bryan[14] also refers to the NZ Coastal Change Database to assess long term shoreline patterns, identifying an average erosion rate of -0.02 m/yr as well as erosion rates of up to -0.3 m/yr for Te Ākau Bream Bay. As shown in Figure 3.25 of the Coastal Processes Effects Report, there are sections of erosion balanced by sections of accretion across the entire bay with a net slight trend of erosion, although the main areas of erosion are around the more dynamic Waipu and Ruakaka Stream outlets and at the entrance to Whangarei Harbour.

21. André and Robin LaBonté[15] refer to storm erosion events along the Bream Bay coast and note the local communities are already facing hazards from due to storms and climate change, without any extraction occurring. We agree that storms and climate change will continue to impact these coastlines but that this is independent of the extraction application. The LaBonté's observations of erosion and shoreline change is consistent with

[13] Submission by André and Robin LaBonté (25 May 2026) Section 5

[14] Professor Bryan evidence (19 May 2026) paragraph 3.1.5

[15] Submission by André and Robin LaBonté (25 May 2026) Section 5

our report that summarises beach profile information and shoreline change[16].

22. We agree with Professor Bryan[17] that there is a slight net trend towards erosion when averaged across the entire coast and that this indicates the beach is not receiving new sediment. This is consistent with our treatment of the embayment as a closed system. We note that the lack of evidence of accretion on the beach and dunes also challenges the postulation by Professor Dickson that the shoreface may be actively supplying sediment to the beach due to the convex profile shape[18].

Theme 3: Shoreface bedforms and sediment connectivity

23. Professor Dickson[19] draws on an academic paper by Kinsela et al. (2023) to challenge our interpretation of seafloor ridges and convex shoreface sections in the extraction area. Professor Dickson noted that Kinsela et al. interpret similar offshore ridges in eastern Australia as depositional evidence of active sediment transport and onshore-directed flows. Professor Bryan also comments on the presence of sand waves at the extraction area as being unresolved whether these are active or relict[20].

24. Our report acknowledges the presence of bedforms (including sand waves) in the extraction area[21]. The seafloor ridges occur at about 22 to 34 m depth and within this area are ridges with a height above the seafloor of around 2 m and a spacing of about 1.5 km.

25. There are two main hypotheses on the origins of sand ridges (Trowbridge 1995), the first being they are relict features that occupy the shelf as a result of the Holocene transgression[22], and the second being they are in response

[16] T+T (2026) Coastal Effects Assessment, Section 3.10

[17] Professor Bryan evidence (19 May 2026) paragraph 3.1.5

[18] Professor Dickson Letter (4 March 2026) Page 2, para 1

[19] Professor Dickson Letter (4 March 2026) Page 2, last para

[20] Professor Bryan evidence (19 May 2026) paragraph 2.2

[21] T+T (2026) Coastal Effects Assessment, Section 3.4.3

[22] Holocene transgression refers to the increase in mean sea level from approximately 120 m below present levels over a period of time from around 10,000 years ago to 6,500 years ago. (Ota et al., 1988, Age and height distribution of holocene transgressive deposits in eastern North Island, New Zealand -

to present day hydrodynamics and sediment transport on the shelf. The observed bed features do not take the form of storm wave induced shoreface connected ridges (Pendleton et al., 2017) which typically have orientations between 5 to 50 degrees to the shoreline, whereas the Bream Bay features are more shore normal. The area with bedforms within Bream Bay is also in an area with insufficient tidal flows to generate these features in the present day. This is illustrated in Figure 3 which shows the type of bedform that would be typically observed for a range of mean flow conditions and sediment grain size. The site-specific conditions in Bream Bay are indicated with a red circle on the figure and it shows Bream Bay is in a zone of typical low motion to potentially slight ripples and not in a hydrodynamic regime that would result in sand ridges due to tidal flows. Therefore, neither waves nor tidal currents can create the bedforms under present day conditions, supporting our hypothesis that these are more likely relict features and these bedforms are disconnected from the active present day process regime that operates in shallower water close to the beach.

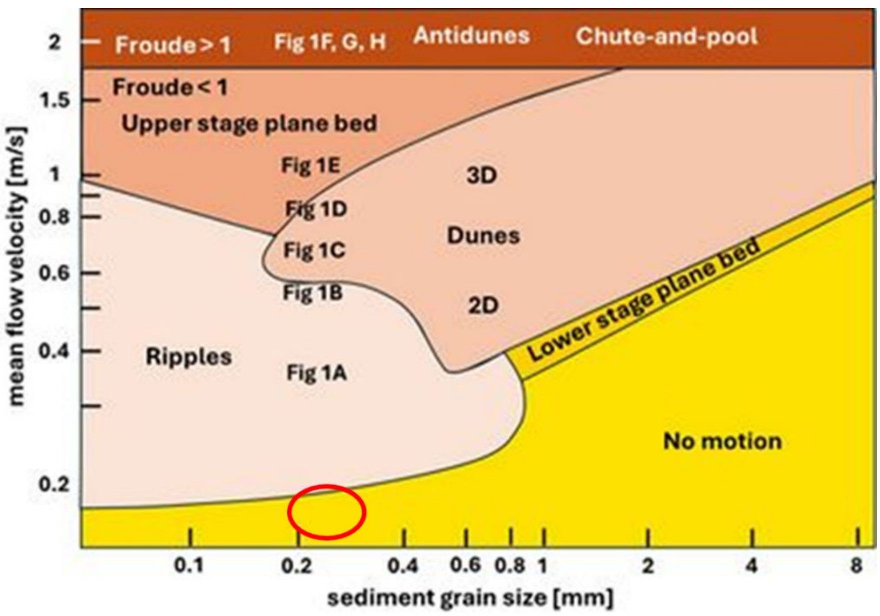

Figure 3: Bedform stability diagram for unidirectional currents (redrawn from Southard and Boguchwai (1990))

ScienceDirect. Over time the shoreline would have been started past Great Barrier Island before reaching the present position. This means the sand extraction area went from being subaerial to being submerged gradually over hundreds or thousands of years.

26. We acknowledge this is an area of evolving science and that the LINZ LiDAR now available provides an improved basis for future characterisation. As we have discussed earlier, the comparison of both data sets (Figure 2) do not show any movement of these large-scale features over the one-year period between surveys and the hydrodynamic regime is insufficient to form these features in the present day. The new data, as reviewed by us, does not alter this interpretation.

Theme 4: Depth of closure method and interpretation

27. Sian John[23] challenges wave climate inputs used at Bream Bay with reference to values adopted at Pakiri. Wave values used at Pakiri were defined by Hilton and Hesp (1996), who report on the data limitations and uncertainty due to the absence of data available 30 years ago. We have much more confidence in the wave climate at Bream Bay today compared to the earlier data used for Pakiri. As identified in Section 3.8 of the Coastal Process Effects Assessment, the wave conditions used for Bream Bay reflect the specific local metocean conditions at that site, which are different to the earlier assessment on wave conditions made at Pakiri. Bream Bay is an embayed coast with lateral wave shadowing by Bream Head, Bream Tail and the offshore shadowing by the Marotere Islands and Taranga Island (Hen and Chicken Islands). In comparison, Pakiri is not embayed and less influenced by offshore islands so would be expected to receive slightly higher wave energy.

28. Professor Bryan[24] wanted clarification that the DoT calculation was based on calibrated (scaled up) extreme wave conditions. To clarify, we did scale up and applied a conservative calibration factor of 1.4 to make sure extreme wave conditions used in the DoT calculations were suitable for informing sand extraction effects. The range of wave heights that inform the annual DoT calculations at Profile 4 are Hs of 3.8 to 7.8m (unscaled range is Hs of 2.7 to 5.5m).

[23] Sian John Report (21 May 2026) paragraph 19b
[24] Professor Bryan evidence (19 May 2026) paragraph 3.1.13

29. Professor Bryan[25] states that the DoC should have greater emphasis compared to the DoT simply because it is more universally accepted and has been used before at Pakiri. We disagree and reinforce the comments made in Section 2 of our report[26] that the DoT is based on superior physics and does not have the well published[27] empirical limitations as the DoC when applied to embayed coasts like Bream Bay. Professor Bryan acknowledges that the DoC had limitations in her statement[28] that may make it less suitable or at least requiring interpretation with careful judgement. Sian John[29] also mentions limitations to the outer DoC calculation. It is due to these limitations that we put more emphasis on the DoT results when interpreting shoreface limits and effects, applying site specific data and guided by up-to-date literature (Hamon-Kerivel, et al., 2020).

30. Submitters (e.g. Sam Morgan[30] and Professor Bryan[31]) generally recognise that DoC/DoT provides a definition of the seaward limit of significant cross-shore sediment transport on sandy beaches but accept that it is not a definite sediment transport limit. We agree with this characterisation. Our assessment does not treat the DoC/DoT as an absolute transport boundary, but as a practical threshold for functional exchange on management-relevant timescales.

31. We acknowledge and agree with Sam Morgan's interpretation[32] that the proposed extraction is at or seaward of the limit of the shoreface which informs his assessment that likelihood of effects being realised at the beach is low[33].

32. Sam Morgan does suggest an alternative geomorphic interpretation of the closure depth at our Profile 4 based on his interpretation of the profile and sediment texture, as he indicates with a red arrow in his Figure 1. Morgans

[25] Professor Bryan evidence (19 May 2026) paragraph 3.1.8
[26] T+T (2026) Coastal Effects Assessment, Section 3.4.3
[27] A critical review of closure depth theories and uncertainties: implications for shoreline modelling and coastal management
[28] Professor Bryan evidence (19 May 2026) paragraph 3.1.12
[29] Sian John Report (21 May 2026) paragraph 26
[30] Sam Morgan Statement of Advice (19 May 2026) paragraph 45
[31] Professor Bryan evidence (19 May 2026) paragraph 3.1.4
[32] Sam Morgan Statement of Advice (19 May 2026) paragraph 50
[33] Sam Morgan Statement of Advice (19 May 2026) paragraph 51

red arrow points to a depth of -25 mRL at a location 6 km offshore, which is 500 m inside of the proposed sand extraction area. This interpretation is plausible, but not absolute and is not supported by calculations of wave induced bed shear stress that show the DoT is located 3 km offshore at a depth of -22.2 mRL.

33. Sam Morgan indicates that even though extraction as proposed has a low likelihood of effects being realised on the beach, the likelihood could be reduced further by moving the landward boundary to -27 mRL based on the most seaward annual outer DoC point from Profile 4 over the 45-year sensitivity test[34]. It is relevant here to mention that across the 5 analysis profiles we present, the annual sensitivity of the calculated outer DoC position spans a range from 1 km offshore to 6.5 km offshore. At profile 1 (southern control site), the most seaward position is 3 km offshore from the beach. This spread is due to the DoC not being the best method for calculation closure for embayed coasts such as Bream Bay and where the bathymetry does not take the form of a uniform equilibrium profile. For this reason, we found it more appropriate to adopt the DoT method and 45-year average DoC as reference points for classifying the lower shoreface boundary. The proposed extraction area is seaward of both these boundaries.

34. Sian John[35] states that we did not consider exceptional extreme conditions in our assessment. This is an incorrect statement. We utilised a range of extreme conditions, including wave heights up to 7.8 m as part of our assessment. The DoT is based on the 12 hour /year exceeded wave height, which we scaled up and assess each the annual range, which by default includes the largest event in the 45-year record. Therefore, we do assess suitable extreme conditions that may not be experienced over the consent duration.

35. The Le LaBonté's mention that interpretation of grain size data is a good geomorphic indicator of closure depth that is less sensitive compared to

[34] Sam Morgan Statement of Advice (19 May 2026) paragraph 52
[35] Sian John Report (21 May 2026) Paragraph 20

compared to empirical calculations of the depth of closure[36]. We contend that the grain size data supports our conclusions and note that band of coarser sediment is generally present 2 – 3 km offshore which aligns well with the DoT calculations. The more variable grain size within the extraction area are likely a result of this area being below the wave base, indicating mostly relict material that is less wave sorted.

36. Professor Dickson[37] suggested that the 'Morphodynamic Depth of Closure' (MODC) would be 'interesting to calculate' for Bream Bay based on a research paper by Kinsela et al., (2020) who apply the method of Ortiz and Ashton (2016) to a site at Illawarra, New South Wales, Australia. This is discussed by Dickson as an alternative to the DoC/DoT.

37. We have not calculated the MDOC for Bream Bay for two reasons that we expanded on below. Firstly, comparing the wave heights between Illawarra and Bream Bay indicates significant differences that means transposing the MDOC form that site to Bream Bay (as presented by Professor Dickson) is misleading. Secondly, the MDOC method has had some academic application but was not adopted in as a preferred definition of the lower shoreface in the Hamon-Kerivel (2020), review which identified the DoT as the better metric for the lower shoreface boundary.

38. To compare the wave climates between the Illawarra and Bream Bay sites, we sourced wave climate data for Illawarra at the 30 m depth contour from the NSW nearshore wave tool[38], providing hourly data from 1980 to 2023, a period of 43 years to compare the sites exposure to Bream Bay. The data shows the mean significant wave height at Illawarra is 1.34 m with a peak wave period of 9.6 s. In comparison, the mean offshore significant wave height at Bream Bay is 0.85 m with a peak wave period of 9.0 s. This is a significant difference when it comes to sediment transport, as in simple terms, the wave induced bed shear stress is proportional to the square of the near-bed orbital velocity which scales with wave height. This means the shear stress increases exponentially as the waves get larger.

[36] Submission by André and Robin LaBonté (25 May 2026) paragraph 4.13.
[37] Professor Dickson Letter (4 March 2026) Page 4
[38] https://nearshore.waves.nsw.gov.au/home/about

39. The other significant difference that would influence the MDOC is the distribution of typically larger wave heights in New South Wales. This is visualised in Figure 4 which shows wave heights between 1 – 2 m are much more frequent at Illawarra compared to Bream Bay. This is best illustrated by the exceedance of a 1 m wave height, which occurs for 70% of the time at Illawarra and only 30% of the time at Bream Bay. Wave heights exceeding 2 – 3 m area also much more common at Illawarra, with both sites having conditions that rarely exceed 4 m (Figure 4).

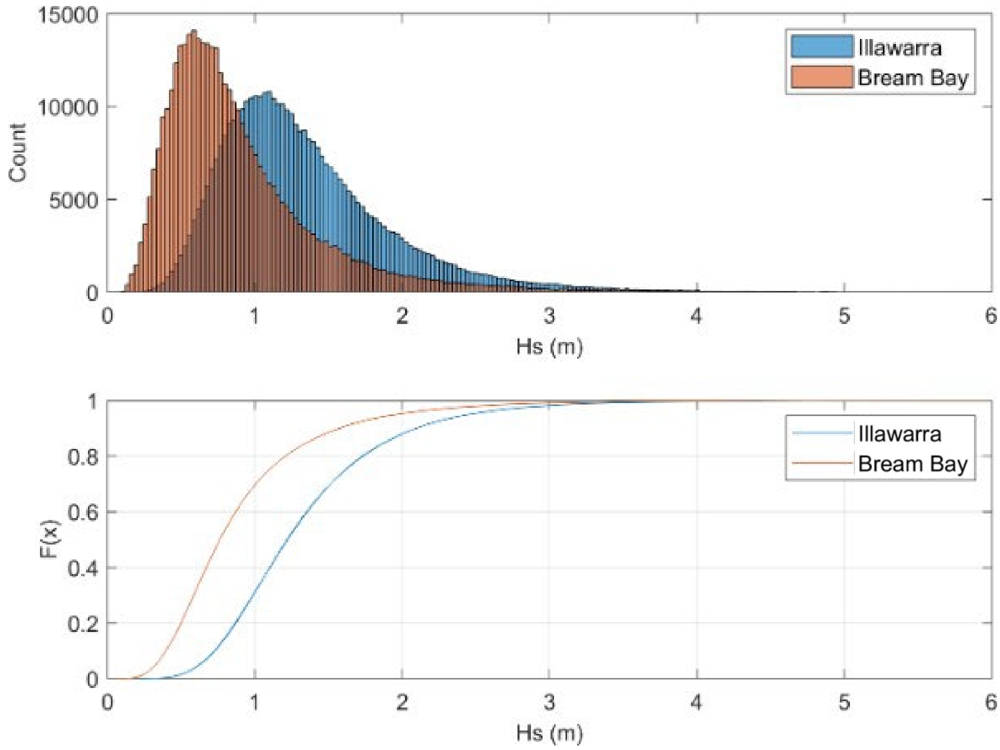

Figure 4: Comparison of wave climate at Illawarra and Bream Bay

40. The MDOC method uses 'morphodynamic wave climate' parameters that describe the wave climate affecting the evolution of the shoreface profile. They use the wave height, H to the fifth power (i.e. H^5) which reflect that for both shallow-water assumptions and linear Airy wave theory cross-shore sediment flux is weighted by wave orbital velocity to the fifth power, as is the magnitude of their diffusivity term using a wave power weighting of H^5 as required by the MDOC. It is evident that any wave height value less than 1 will result in a significantly lower wave height for those waves. For example, the mean significant wave height for Bream Bay of 0.855 m to the fifth power is 0.44 while the mean significant wave height for Illawara of 1.35 is 4.32, around a 10-fold difference in sediment flux for the two

locations. Given 70% of the Bream Bay waves are less than 1 m and only 30% of the Illawarra wave are less than 1, this means that there will be a significant difference in the morphological wave climate between the two sites and a shallower morphological depth at Bream Bay.

41. Professor Dickson speculates[39] that the MDOC method based on data from a site in Australia with higher wave energy and a different profile might mean that sand extraction at Bream Bay is better informed by the 45-year maximum outer depth of closure calculation, rather than the 45-year average outer depth of closure calculation or DoT. This is not supported by our site-specific evidence and applied methods. Based on our example of the large different in H^5 values for the median wave heights discussed above, it suggests the range of MDOC values is likely to be landward of the proposed extraction area.

42. There are also important differences in the shoreface profile at Illawarra and Bream Bay which do not favour the application of the MDOC, which is based on assumptions of morphology equilibrium and a concave beach and offshore profile. The Illawarra profile transitions from the beach with a relatively uniform slope to a depth of 40 m which is located 3 km offshore, much more similar to the Pakiri Beach profile. In comparison, the shelf profile at Bream Bay means a depth of 40 m is not reached until more than 10 km offshore.

43. Therefore, it is not reasonable to transpose the MDOC from Illawarra to Bream Bay as Professor Dickson has done. Given the assumptions associated with the MDOC and our existing application of the more appropriate DoT method, we have not progressed to calculating the MDOC for Bream Bay.

Theme 5: Modelling approaches and appropriateness of methodology

44. Sian John[40] and the Parliamentary Commissioner for the Environment[41] raised concerns about the use of theoretical and empirical methods to

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[39] Professor Dickson letter (4 March 2026) Page 5
[40] Sian John Report (21 May 2026) Paragraph 2 point 2
[41] Submission No. 37 Letter (26 May 2026) Page 2

derive the depth of closure and suggest numerical modelling would provide a more robust assessment. We assume that they both refer to 2-dimensional (horizontal) or 3-dimensional numerical modelling, as we used 2 dimensional (vertical) numerical modelling. However, our modelling was done in combination with a range of other methods including sediment grain size analysis, geomorphological analysis and DoC and DoT calculations that were based on the results of our numerical modelling that triangulate and support our findings. The modelling we used are informed by the same formulas that are available in the 2DH or 3DH modelling and we do not agree the more spatial modelling would provide a more robust assessment compared to a multi-channel method that we applied. It is also worth noting that while Sam Morgan comments that more modelling could be done[42], he still finds it appropriate to draw a conclusion through interpretation of geomorphic features and empirical methods.

45. We re-iterate that a confident understanding of effects related to the proposed extraction can be determined without the use of 2DH or 3D-numerical models.

46. As stated in our response to Minute 4[43], the DoC and DoT are different approaches, they are not the only way to assess the various factors to be considered. However, the best practice guides[44] do not specify specific models or approaches but recommend that any method of assessment be scientifically robust, using validated techniques and models as well as being transparent and auditable. In addition, both DoC and DoT methods rely on numerical modelling techniques to provide values for waves and currents. The improvement in wave and current modelling has been significant over the last few decades with calibrated data sets now extending over four decades, increasing the reliability of input data for the methods we adopt.

47. For assessing the risk of beach erosion from offshore dredging, information is required on beach morphology and its relationship to sediment transport over the offshore seabed. This includes assessment of bathymetry, wave,

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[42] Sam Morgan Statement of Advice (19 May 2026) paragraph 49
[43] T+T Evidence in response to RFI 1 dated 14 May 2026
[44] T+T (2026) Coastal Effects Assessment, Section 2.3

tidal current and seabed sediment data to identify the seaward limit of the active beach system. The outer DoC has been the most widely adopted method for defining the seaward limit of the lower shoreface and has been used widely internationally, but as discussed in the report[45] based on the reported findings in recent literature (e.g., Valiente, et al., 2019), has limitations for embayed coasts that make the approach conservative. These limitations are overcome by applying the DoT method which makes use of wave and current information to determine a seaward limit of wave induced sediment transport and accounts for the primarily processes influencing the shoreface profile over the multidecadal timescales.

48. As identified in international guidance documents and recent technical publications, other approaches could include detailed and extensive field observations and/or numerical modelling. However, while current modelling techniques are reasonable for assessing change over periods of minutes to a few years, they are not yet suitable for decadal or longer timescales.

49. The DoT method uses the same underlying sediment transport equations based on wave orbital velocity and shear stress that underpin any numerical modelling approach. We consider the DOT method to be as accurate and more applicable when compared to a numerical model. By undertaking extensive calculations across multiple profiles and years, the DoT method provides a robust assessment without the sensitivity and false sense of numerical precision that would be achieved in a numerical model. Further, sediment transport and morphology modelling of the relevant processes that occur across a spectrum of seconds to multiple decades requires numerical assumptions and simplification that reduce confidence in results. The DoT method represents the relevant physical principals without the trade-offs and assumptions involved in numerical modelling.

[45] T+T (2026) Coastal Effects Assessment, Section 2

Theme 6: Sediment budget and resource volume

50. Sian John[46] mentions that no sediment budget has been undertaken. We have not attempted to calculate a sediment budget for Bream Bay as we have assumed that the embayment is not receiving any geomorphically functional new sediment inputs. Further, the basis of our assessment and the application is that the extraction is occurring seaward of the transport depth, which is not connected to the dynamic beach, dune and surf-zone environment.

51. Professor Bryan expresses a lack of confidence in the sediment resource volume calculations[47]. We re-iterate that our calculations of resource volume are conservative, and are based on:

    a. Only consider Holocene sand <u>outside</u> the depth of closure. This constrains the western extent of the resource boundary.

    b. Tightly constrain the northern, eastern, and southern extent of the resource by defining a boundary at the limit of the vibracore works.

    c. Conservatively estimate the depth of resource by assuming that the base of Holocene is at the bottom of each vibracore. In reality, the depth to older (Pleistocene) sediment is likely beyond the depth tested by most of the vibracores.

    d. 57 vibracores were advanced over the resource area. The vibracores were spaced apart to provide a reasonable level of testing density.

    e. We interpret that one vibracore advanced into Awhitu group sediment at VB20.01 and for that investigation, the depth of resource is constrained by the geological contact at 1.35 m below seabed referred to by Professor Bryan[48] and this depth informed the depth limit of the resource.

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[46] Sian John Report (21 May 2026) Paragraph 2 point 2.
[47] Professor Bryan evidence (19 May 2026) paragraphs 3.3
[48] Professor Bryan evidence (19 May 2026) paragraph 3.3.6

Theme 7: Effects on the seabed within the extraction area

52. The submissions (e.g. Professor Bryan[49]) include concerns about the physical alteration of the seabed within the extraction area and the risk that this could alter hydrodynamic conditions or sediment pathways in ways not accounted for by the DoC framework. This includes Professor Bryans concerns that extraction could affect the potentially mobile large sand waves. We have covered the unlikely potential of mobile sand waves in paragraphs 23 to 28 of this evidence, and this is supported by the overlay of two different years of MBES and LiDAR data showing the seabed features to be unmoved.

53. In terms of seabed form, the drag head used by MBL is a low impact dredge method that draws down a track that is approximately 0.1 m deep and 1.6 m wide and dredge tracks are managed to avoid annual repetition, and it does not dredge down to a fixed level. The drag head with trail over larger bedforms and not cut through or destabilising them.

Theme 8: Cumulative effects with climate change and other activities

54. Sian John[50] notes that climate change is expected to produce more energetic extremes while the mean wave climate may become less energetic, which could affect the effective DoC.

55. We have considered climate change[51] and our assessment of how climate change may alter the DoT/DoC is sufficient for assessing cumulative effects with increasing sea level and higher mean and extreme waves. We have taken a precautionary approach, even though evidence is inconclusive on what the effects of climate change on wave heights will be, with modelling suggesting a reduction in wind speed and less frequent tropical cyclone activity, but potentially more extreme cyclones when they occur. We agree that climate change is a major challenge for coastal communities, but we disagree that the proposed activity will make the Bream Bay coast more vulnerable to climate change.

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[49] Professor Bryan evidence (19 May 2026) paragraphs 3.2
[50] Sian John Report (21 May 2026) Paragraph 19a
[51] T+T (2026) Coastal Effects Assessment, Section 4.2.5 and 5.11

56. Professor Bryan[52], Sian John[53] and the PCE[54] also mention possible cumulative effects with consents gained by Channel Infrastructure for deepening the access channel to their Jetty. We provided the technical support for these consents and conducted detailed assessments and modelling within Bream Bay to consider effects.

57. In terms of physical coastal process effects, the works within proposed sand extraction area will not significantly change wave heights or currents. The MetOcean report on surf breaks[55] identified generally little variation in wave height and direction, with localised variations of no more than 0.04 m. With the tidal currents being very low[56] and with the deepening over time, these already low tidal currents could locally decrease due to the greater water depth, although with only a change in level of 0.55 m and this being progressive over time and location, this is unlikely to be measurable.

58. The channel dredging is largely within a more active sediment transport regime, but effects of the deepening on waves and currents in the northern part of Bream Bay were also shown to be small, so the cumulative changes of the channel dredging and the sand extraction area are unlikely to result in an significant or compounding changes to currents, waves or sediment transport.

59. The proposed sand deposition site for the channel dredging is further offshore and in deeper water (around 45 m water depth) than the sand extraction area. The modelled change to tidal currents and waves also showed very small changes from the base case.

60. The channel dredging operation is occurring in a geomorphically separate environment that is not connected to the proposed offshore extraction area. There is no potential for cumulative effects on physical coastal processes.

[52] Professor Bryan evidence (19 May 2026) paragraph 3.3.10
[53] Sian John Report (21 May 2026) Paragraph 6
[54] PCA Letter (26 May 2026) page 4
[55] MOS 2024 Assessment of effects on Surf Breaks at Bream Bay
[56] T+T (2026) Coastal Effects Assessment, Section 3.9

Theme 9: Risk to the beach

61. As summarised in Theme 2 above, the submitters collectively argue that the beach is already in a vulnerable state and that any activity which removes sand from the entire system has the potential to adversely affect the equilibrium that presently exists[57]. All experts except Sam Morgan reject the low-to-negligible effects conclusion as unsupportable. Sam Morgan accepts the overall risk is low but suggests the risk would be even lower if extraction is restricted to depths below -27 mRL at Profile 4, based on his interpretation of our DoC calculations, profile geometry, and sediment characteristics.

62. Professor Bryan[58] contends it the shoreline is already likely to erode into the coastal hazard zone within 35 years even without extraction based on a small existing erosion trend and expected sea level rise, meaning any reduction in sand volume attributed to extraction would compound an already stressed system. Our assessment contends that the extraction area is not in the active beach and shoreface system[59] but is sufficiently decoupled to not cause a risk of beach drawdown.

63. The core risk identified by Professor Bryan[60] is that the shoreface may function as a storm sediment storage area that the beach relies upon for recovery between successive storm events, meaning extraction effects could operate at the event-scale rather than only on gradual decadal timescales. This is not the case at Bream Bay, as the proposed extraction is well offshore of where storm deposits would occur across the upper shoreface (e.g. 1 km from beach) or in extreme cases the lower shoreface (2 – 3 km from the beach).

64. Our coastal process effects report defines the zonation of the shoreface and the processes likely to occur within those particular zones[61]. With regards to storm interaction, sand eroded from dunes during storms is transported

[57] LeBonte evidence (25 May 2026) para 5.8
[58] Professor Bryan evidence (19 May 2026) paragraph 3.1.6
[59] T+T (2026) Coastal Effects Assessment, Section 5.10
[60] Professor Bryan evidence (19 May 2026) paragraph 3.1.9
[61] T+T (2026) Coastal Effects Assessment, Section 2 and specifically Figure 2.1

offshore to form nearshore sand bars in the surf zone and upper shoreface. These are closer to the shore than the proposed extraction area. The risk with nearshore sand extraction is taking material from a storm bar, which would prevent recovery and actively reduce coastal resilience. This is not the case with the Bream Bay proposal as it is seaward of the DoT.

65. Sam Morgan[62] provides a rational risk assessment based on the likelihood of the proposed extraction having an erosive effect on the beach. His assessment is that effects are unlikely to occur and even if they do the magnitude of coastal change would be undetectable above background fluctuations. We agree with this conclusion. None of the other submitters present an alternative magnitude of effect or likelihood.

Theme 10: Managing uncertainty with monitoring and conditions

66. Commentors[63] raise concerns about the level of baseline monitoring in addition to the frequency and spatial extent of ongoing monitoring with respect to consent conditions. In consideration of the submissions received we have updated and clarified the monitoring regime and have developed a new monitoring informed set of triggers and response actions in the EMMP[64] that will be linked to a consent condition for managing and mitigating potential effects. These are matters set out in Condition 37 and the EMMP and we discuss matters in paragraphs below regarding the scale and extent of monitoring that are proportionate to the likely risks and then discuss our refinements to the adaptive management responses set out in Table 1 of the EMMP.

67. As set out in Section 3.2 of the EMMP monitoring of the shoreface and offshore bathymetry will be undertaken to confirm the extraction is not having an adverse effect on coastal processes. This includes monitoring and analysis of bathymetry inside the extraction area, at adjacent control sites, and along six bathymetric profile transects that extend to shore prior to extraction occurring as set out in Appendix B of the EMMP. Reporting is

[62] Sam Morgan Statement of Advice (19 May 2026) paragraph 50
[63] E.g. Sian John Report (21 May) Paragraph 28
[64] Attachment 29 Environmental Monitoring Management Plan (EMMP) for the Te Ākau Bream Bay Sand Extraction Site. Revisions in July 2026 in production.

done prior to excavation being carried out and reported in the Pre-Sand Extraction Assessment Report (PSEAR[65]) and during sand extraction via the Sand Extraction Monitoring Report (SEMR[66]).

68. The LeBonte's believe that six profile lines are insufficient for whether beach erosion is occurring due to offshore sand extraction[67]. These comments appear not to understand that monitoring the seabed immediately landward of the extraction area as we have proposed provides the clearest evidence and signal of potential effects of the proposed extraction, if they occur[68]. This evaluation is across the entire landward edge of the extraction area and not only at six locations. Changes to the seabed, if they manifest as a result of the dredging activity, will first be evidenced at this location. In addition to this area, we have an additional six profiles. These were selected as our assessments have shown that the location of the dredging is sufficiently offshore to have a low to negligible likelihood of impact on the beach. The six profiles that extend towards the shore landward from the buffer area are proportionate to the risk and therefore sufficient to inform the application.

69. Sam Morgan[69] agrees that monitoring of the adjacent seabed immediately landward of the extraction area is the best place to identify effects of the dredging on potential effects on the seabed closer to the shore in the first three years. This is a key aspect of our proposed monitoring to enable early identification of possible issues which will manifest on the seabed immediately adjacent to the dredged area well before affecting shallower areas closer to the coast and the dry beach and dunes.

70. However, Sam Morgan would prefer a more conservative condition due to his assessment of the potential consequences[70]. However, his definition of consequence is mostly based on the sensitivity of the beach habitat, not the magnitude or likelihood of effect of the proposed dredging that we have

[65] Section 5 of the EMMP
[66] Section 6 of the EMMP
[67] Le Bonte (25 May 2026) para 6.1
[68] T+T (2026) Coastal Effects Assessment, Section 6.1
[69] Sam Morgan Statement of Advice (19 May 2026) paragraph 64
[70] Sam Morgan Statement of Advice (19 May 2026) paragraph 74

assessed. Morgan proposes that if monitoring indicates successive lowering of the seabed in the landward control area over the first 3 years, the activity should be moved seaward to below the -27 m depth (or maximum outer DoC) and if moved to below -27 m and successive lowering of the lower shoreface conditions continues, Sam Morgan suggests a full review. Our revised EMMP enables this form of adaptive management, guided by monitoring triggers but with the response being closure of landward cells or rows of cells. The extent of cells to be closed is to be proportional to the magnitude of effect and needs to be a recommendation from the SEMR.

71. We support in principle the collection of topographic beach surveys and agree that two yearly photogrammetry (UAV surveys) monitoring data is good practice in New Zealand. Our concern is that creating conditions contingent with changes that may occur on the beach does not directly link to the effects of the proposed dredging. Beach change can also be in response to natural variability whereas any effects attributable to the consent would first be realised on the shoreface, making it the best place to monitor with associated analysis and conditions. So, beach surveys do not directly respond to the likely effects of the proposal.
72. In our opinion, the requirement for Sam Morgans suggested condition for what is considered a low to negligible risk is not proportionate. However, as shown in Table 1 of the EMMP we have provided greater clarity on the response level and required responses to the observed seabed lowering both within the control areas and should seabed lowering extend beyond those control areas. Response measures include recommending closure of the more landward cells and reductions in dredge volumes. During the revision of EMMP while drafting this evidence we have also extended the bathymetric monitoring control area to be a 220 m buffer on the north, west, and south. This is an increase from the 100 m wide area initially proposed and this is to provide more information on the seabed changes in the control areas around the extraction site. Monitoring these control areas adjacent to the extraction area reduces the “noise” from other causative factors of shoreline change that would be measured on the beach and enables a clearer attribution of effects.

74. In addition to the increasing width of the control area from 100 m to 220 m, there are detailed assessment requirements of the bathymetry monitoring, drop camera images, sediment sampling and metocean data covering winds, waves and water levels. These requirements are set out for the PSEAR and SEMP in the EMMP with details of the assessment goals set out in Section 6.2. The monitoring is to be done at a scale and frequency that assists informing whether any changes are attributable to the proposed activity. It is also important that the results of the surveys are assessed to examine the causes of volume loss, considering both the extraction data and natural processes and antecedent storm conditions rather than a lock step shift in dredge location without establishing the cause. However, if there is an effect of the proposed activity, corrective action need be taken, and the actions need to be proportional and informed by monitoring.

75. The submitters[71] raise concerns regarding beach monitoring requirements, including the frequency of beach monitoring and consent conditions tied to observations of erosion. As we have discussed in the previous paragraphs, our view is that monitoring the beach is not the right place to identify effects of sand extraction 5 km offshore. Efforts should focus on adjacent landward seabed which is why we have included the 220 m wide sand control area along the landward, northern and southern edges of the extraction area. This is the right location for the early identification of potential effects of the proposed activity, while the beach system will include other effects making attribution difficult.

76. We agree with Mr Morgan that survey methods should be improved as new technology allows greater data collection at lower cost if accuracy/precision is maintained or improved allowing data to be compatible.

77. A key part of the data collection is how the data collected is used to identify and manage the potential effects of the proposed dredging. We have updated the conditions and the EMMP to more clearly link the possible morphodynamic triggers with the appropriate management response, and this is structured as an adaptive management plan in Table 1 of the EMMP.

[71] E.g. Sam Morgan Statement of Advice (19 May 2026) paragraph 83

78. Table 1 of the EMMP includes response levels, a definition of the response, the thresholds requiring to be met to meet the particular response level and the required response. There are six levels of response, ranging from no adverse effects though to more than minor effects being detected.

79. The definition of more than minor effects is if seabed lowering extends landward beyond the control areas beyond the margin of survey error over progressive surveys of at least two consecutive annual surveys. The response in this situation is a closure of all the landward cells in the vicinity of the occurrence, effectively moving any activity seaward and potentially a reduction in dredge volume and additional surveys and investigations to understand the effects. This response provides certainty that any low likelihood effect that has the potential to extend towards the active beach system is prevented by the seaward movement of the activity.

80. The remaining response levels cover less significant potential outcomes than minor effects. These include minor effects, localised effects, track management and seabed changes in the seaward half of the control areas. For each of these response levels there are clear tests and associated responses which provides certainty to the applicant, the consent authority and interested parties of the structured management approach to ensure effects of the dredged activity are identified and managed.

Northport submission

81. Northport raises a concern regarding sedimentation that reduces the navigable depth within their channel and the potential impact for navigational safety (Northport submission, para 8) and requests a consent condition for monitoring of their access channel and in necessary responding to observed sedimentation (Northport submission, para 10). Based on our assessment of coastal processes, the proposed sand extraction activity is located seaward of zones of sediment transport that could affect the access channel. Similarly, the assessment on surf breaks carried out by MOS (Tables 6.2 and 6.3, Attachment 17 of the AEE) shows a maximum possible change of ±1 cm in surfing conditions at Marsden Point, reflecting no change to the wave climate for more energetic conditions.

Therefore, there is no coastal process basis for suggesting an adverse effect on the Northport access channel that would require a consent condition to monitor or address sedimentation that may occur in the Northport access channel as a result of other coastal processes.

Conclusion

82. In our opinion, the baseline data and assessments are sufficient to inform a decision on the potential coastal process effects of the proposed sand extraction. The new LINZ bathymetric LiDAR data has been reviewed alongside the project MBES data and does not alter our interpretation of the shoreface morphology, seabed features or the position of the proposed extraction area relative to the active beach system.

    The evidence confirms that Te Ākau Bream Bay is a dynamic coastal environment that will continue to respond to storms, seasonal variability and climate change. However, the proposed extraction area is located sufficiently offshore of the beach, dune, surf zone and upper shoreface processes that drive storm erosion and beach recovery. The available geomorphic, sedimentological and hydrodynamic evidence indicates that the extraction area is not functionally connected to the active beach system on management-relevant timescales.

83. We acknowledge the matters raised by submitters regarding depth of closure, shoreface bedforms, modelling approach, sediment budget, cumulative effects, risk to the beach, and monitoring. For the reasons set out in this evidence, we remain of the opinion that the DoT method, supported by DoC calculations, sediment data, bathymetry, geomorphic interpretation and modelling of waves and currents, provides a robust and appropriate basis for assessing the effects of the proposed activity. None of the matters raised in the submissions changes our assessment that the likelihood of adverse effects on the beach and dune system is low to negligible.

84. We also remain of the opinion that the proposed monitoring and revised consent conditions provide an appropriate and proportionate mechanism

for managing residual uncertainty. The focus on monitoring the seabed immediately landward of the extraction area is appropriate because that is where any potential effect of the activity would first be expected to manifest, before any change could propagate into shallower areas closer to the coast. If monitoring identifies effects attributable to the proposed activity, the proposed trigger and response framework provides for corrective action, including closure of cells or cessation of extraction while further review is undertaken.

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12 August 2026

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