Technical Memorandum

To:	Wayne Coffey	**From:**	Dr Pete Wilson
Company:	Taharoa Ironsands Limited	**SLR Consulting New Zealand Limited**	
cc:		**Date:**	22 June 2026
		Project No.	880.017038.00001

RE: Taharoa Central and Southern Block Mining Marine Ecology Response

My name is Dr Pete Wilson. I am a Principal Consultant at SLR Consulting New Zealand Ltd (SLR). I hold a PhD in marine biogeochemistry from Auckland University of Technology, and Bachelor of Science and Master of Science degrees in chemistry from the University of Waikato.

I have 15 years of experience (including my time as a doctoral candidate) across local government, consulting, and academia. My experience includes resource management, ecological impact assessment, and the design, implementation, analysis, and reporting of environmental monitoring programmes, including regional state of the environment monitoring. I prepare and peer review technical assessments in support of resource consent applications, with a particular focus on water quality and ecological effects associated with wastewater and stormwater discharges to freshwater and marine receiving environments, coastal development, and aquaculture activities, including mussel and finfish farming. I routinely assess environmental effects against relevant national policy statements, national environmental standards, and regional and district planning provisions. I have also prepared and presented expert evidence at council hearings and before the Environment Court.

I prepared the Marine Ecological Impact Assessment (Marine EcIA) attached as Appendix V to Taharoa Ironsand Limited's application for all necessary approvals for the Central and Southern Block Mining Project (Application).

I have been asked to respond to comments provided by parties invited to comment on the Application. Comments were made on the Marine EcIA by the following parties:

- Waikato Regional Council;
- Te Nehenehenui;
- Te Ruunanga o Ngaati Mahuta ki te Hauaauru Charitable Trust; and
- The co-submission from Natasha Willison-Reardon, named applicant for the Marine and Coastal Area (Takutai Moana) Act 2011 application CIV-2017-419- 082-P (rohe moana to Tirua Point), and named applicant for the Marokopa Mātaitai Reserve (Fisheries Notice 2010 No. F567) and Aroa Pou, Co-Chair of Mirumiru Pā ki Marokopa (Mirumiru Pā ki Marokopa).

I address the relevant comments in this memo.

I have read the Expert Witness Code of Conduct set out in the Environment Court Practice Note 2023. I have complied with the Code of Conduct in preparing this memo. The content of this memo is within my area of expertise, and I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

Waikato Regional Council – Coastal Sedimentation

Waikato Regional Council (WRC) has provided a technical memorandum from Dr Michael Townsend in respect of coastal sedimentation (Appendix E – Memo from Dr Michael Townsend – Coastal Sedimentation to WRC's comments). Dr Townsend's memo raises concern about the reliance on modelling and the benthic effects assessment being based on a one-off survey of coastal sediments in the Marine EcIA.

I acknowledge Dr Townsend's comments regarding the uncertainty inherent in any sediment dispersion and deposition modelling exercise. I also acknowledge the divergence identified by the coastal ecology experts in the previous joint witness statement from the 2024 RMA application between the modelling outputs, which predicted very low sediment accumulation near the mooring, and the empirical seabed sediment data, which showed higher mud content near the mooring than at the reference sites. That divergence is a relevant source of uncertainty and should be recognised in interpreting the assessment.

Notwithstanding that uncertainty, the existing seabed condition needs to be interpreted in its current temporal and regional context. Mining operations at Taharoa have been ongoing since 1972, and the offshore ship-loading and dewatering discharge described in the Application forms part of the established operation. The dewatering discharge has occurred for several decades, and the sampled seabed condition near the mooring reflects the current receiving environment following that long period of activity (over 50 years).

The elevated mud content measured near the mooring, relative to the reference sites, is a measurable difference. However, those values should not be interpreted in isolation from the wider west coast sediment regime. The open coast in this area receives substantial catchment-derived suspended sediment inputs. The Coastal Processes Assessment (Appendix Q to the Application) states that "*The application seeks the equivalent of discharging up to 7,500 tonnes of sediment per year from the de-watering plume (Section 2.1.1). This is several orders of magnitude below the combined sediment yield from nearby rivers and harbours of approximately 1,300,000 tonnes per year*".[1] NIWA River Maps[2] estimates long-term suspended sediment loads of approximately 168,752 tonnes/year from the Marokopa River and 21,311 tonnes/year from Kiritehere Stream, approximately 15 km south of Taharoa. Those modelled estimates are derived from the same general national suspended sediment yield modelling framework described by Hicks et al. (2011)[3], which was developed to estimate mean annual suspended sediment loads from New Zealand catchments.

The high loading of catchment-derived sediment into the west coast is also consistent with the regional seabed sediment mapping of Bostock et al. (2019)[4], which compiled more than 23,000 continental shelf sediment samples into the nzSEABED dataset and mapped percent of mud, sand, gravel and carbonate around New Zealand. Figure 2 of that paper indicates a mud-enriched area on the west coast, south of Taharoa, broadly adjacent to the Marokopa/Kiritehere coast, whereas a comparable mud enrichment is not apparent to the north between Kawhia and Aotea Harbours (Figure 1).

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[1] Appendix Q: Coastal Processes Assessment, at page 16.

[2] National Institute of Water and Atmospheric Research (NIWA). (n.d.). NZ River Maps. https://shiny.niwa.co.nz/nzrivermaps/

[3] Hicks, D.M., Shankar, U., McKerchar, A.I., Basher, L., Lynn, I., Page, M., Jessen, M. (2011). Suspended Sediment Yields from New Zealand Rivers. *Journal of Hydrology (New Zealand)* 50: 81-142

[4] Bostock, H. C., Jenkins, C., Mackay, K., Carter, L., Nodder, S. D., Orpin, A. R., Pallentin, A., & Wysoczanski, R. (2019). Distribution of surficial sediments in the ocean around New Zealand/Aotearoa. Part B: continental shelf. *New Zealand Journal of Geology and Geophysics*, 62(1), 24–45.

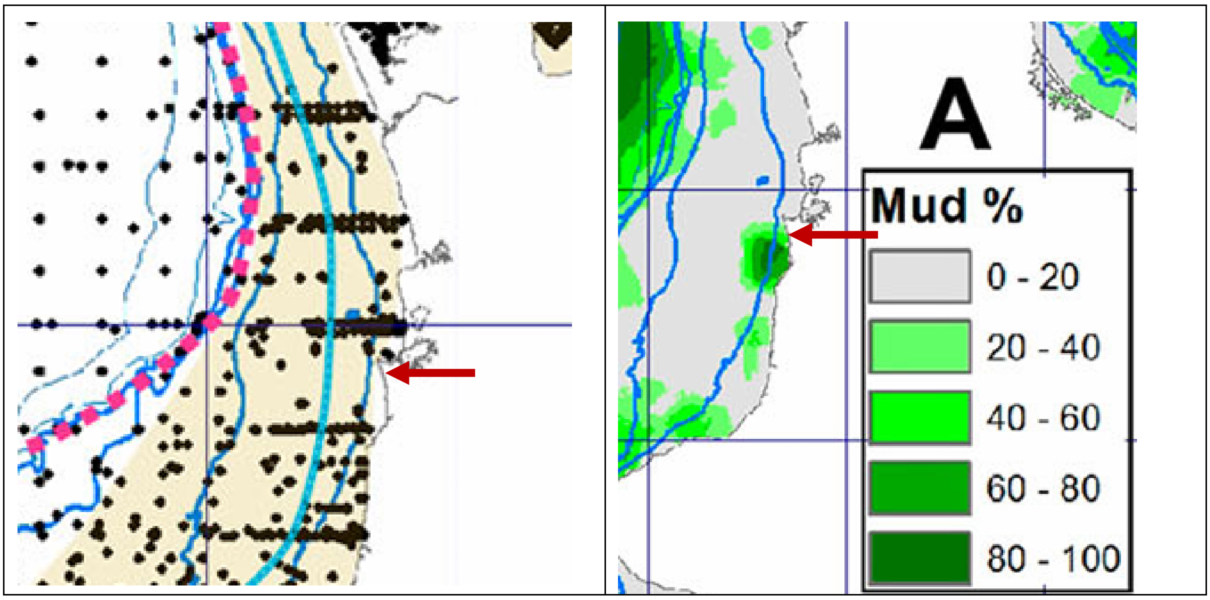

Figure 1: Extracts from Bostock et al. (2019) Figure 1 (left) showing the sediment stations included, and Figure 2 (right) showing the 1km-gridded surficial sediment mud content. The red arrow in each picture shows the approximate location of the Taharoa mine.

In my opinion, this information does not negate the need to assess the Taharoa dewatering discharge; rather, it places that discharge in context. The Port of Taharoa is located within a naturally energetic open-coast system that is exposed to substantial river-derived suspended sediment loads. The coastal processes assessment also describes sediment transport on this part of the central west coast as being mainly northwards along the continental shelf, with river-derived fine sediment capable of settling nearshore, being resuspended by waves, and then being transported by mean circulation, tides and storm-driven processes.

I concluded in the Marine EcIA that the measured differences in sediment characteristics near the mooring had not resulted in significant adverse effects on the benthic macrofaunal community.[5] Species richness and diversity near the mooring were similar to the southern reference site, and sediment metal concentrations were well below ANZG default guideline values.[6]

I agree that further spatial and temporal sampling would provide more information on the distribution and variability of mud content in the receiving environment. However, in this case, the one-off sampling was undertaken in an environment that has already been exposed to the dewatering discharge over a period of several decades and any material adverse changes to the benthic environment due to sediment deposition from the discharges would be expected to have been evident in the sampling results if they had occurred. In my opinion, the sampling provides a sufficient basis for assessing the current state of the seabed and the ecological implications of the existing discharge regime and has not shown conditions that are near ecological thresholds or that would warrant concern.

It is also relevant that the predicted deposition from the dewatering discharge in Kawhia and Aotea Harbours is very low. Those harbours are the receiving environments that would be most susceptible to the long-term accumulation of fine sediments. The Coastal Processes assessment states that "*sediment deposition of up to 0.01 mm (1 grain of 10-micron*

[5] At section 5.5.
[6] At section 5.5.

sediment) could occur in 40 % of Kawhia Harbour, and 13 % of Aotea Harbour [per year][7]" and that the thickness of this deposition is "*so small that this would be unmeasurable and indiscernible*."[8] In contrast, the open coast at Taharoa is a higher-energy environment where fine sediment from both catchment sources and the Taharoa dewatering discharge is more likely to be dispersed and resuspended than accumulated, and no deposition was predicted in the modelling.[9]

Overall, I consider that the effects of the dewatering discharge on the marine receiving environment are low. While I acknowledge the uncertainty identified by Dr Townsend, I do not consider that the measured sediment differences, interpreted in the context of the wider west-coast sediment regime and benthic results, warrant ongoing marine monitoring.

Te Nehenehenui – Numerical Discharge Limits

In Attachment A to Te Nehenehenui's comments, concern is raised that the proposed conditions contain few numerical limits for discharges, and the management of discharge effects is largely dependent on management plans. Te Nehenehenui state its preference is the use of quantified discharge standards, because without numeric limits, enforcement becomes difficult. Te Nehenehenui request the addition of independent monitoring regimes and increased reporting conditions.

In relation to the coastal marine discharges, there are a number of numerical limits and contaminant testing requirements in the proposed consent conditions.

The proposed conditions specify volume limits and testing requirements for both relevant CMA discharges, including:

- Coastal Permit AUTH142035.12.01:
    - Condition 2 requires that discharge ship loading water, including freshwater and fine sediment, must not exceed 75,000 m^3/day;
    - Condition 3 requires that the maximum volume of ship loading water that may be discharged into the CMA during ship loading operations must not exceed 7.5 x 10^6 cubic metres in any 12-month period; and
    - Condition 5 requires that the discharge must be analysed every six months for grain size, clay mineralogy and heavy metal concentrations.
- Coastal Permit AUTH142035.13.01:
    - Condition 2 requires that the stormwater/process wastewater discharge into the CMA must not exceed 32,600 m^3/day;
    - Condition 5 requires that the discharge of stormwater/process wastewater must not result in conspicuous oil, grease, scums or foams after reasonable mixing;
    - Condition 7 requires that before discharge of stormwater into the CMA, a water sample must be collected from the holding pond, and tested for turbidity, pH, heavy metals, and hydrocarbons; and
    - Condition 8 requires that samples from the holding ponds must comply with limits for turbidity/total suspended solids, based on a TSS trigger of 1,280 mg/L.

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[7] Appendix Q: Coastal Processes Assessment, at page 16.
[8] Appendix Q: Coastal Processes Assessment, at page 18.
[9] Appendix Q: Coastal Processes Assessment, at page 19.

In my opinion, these conditions provide sufficient numerical limits for the relevant marine discharge activities. The conditions also require monitoring of the key contaminants of ecological relevance for the receiving environment, namely fine sediment and metals associated with ironsand material. I do not consider that any further amendments to the numerical limits and monitoring conditions are required for the purposes of managing effects.

Te Ruunanga o Ngaati Mahuta ki te Hauaauru Charitable Trust – Cumulative Effects

In Appendix 1: Assessment of the Substantive Application of Te Ruunanga o Ngaati Mahuta ki te Hauaauru's comments, concerns are raised regarding cumulative effects on the coastal marine area, kaimoana values, habitat integrity, and the need to consider effects on a ki uta ki tai basis. These comments are raised under the heading "Coastal Marine Area Effects".

The scope of my assessment was limited to the marine ecological effects of the proposed coastal marine area discharges and structures, including effects on sediments, benthic fauna, fisheries, shellfish, and habitat. It did not assess cultural effects or customary harvest values directly, although those matters may be informed by the assessment of marine ecological effects.

Cumulative effects are addressed in my assessment.[10] In particular, the effects of the proposed discharges are considered in the context of other catchment-derived sources of sediment and contaminants.[11] My conclusion was that there are unlikely to be adverse cumulative effects on water quality or benthic habitats or fauna from the discharge of up to 75,000m^3 per day of ship loading water and of up to 32,600m^3 per day of process water and stormwater.[12]

The Coastal Processes Assessment also states that the sediment contribution from the dewatering discharge is "*several orders of magnitude below the combined sediment yield from nearby rivers and harbours*".[13] In addition, the dewatering discharge has occurred for several decades. The sediment contaminant data collected near the mooring and at the reference sites incorporates the long-term effects of that discharge to date. My assessment found that sediment metal concentrations were below the ANZG (2018) default guideline values where such values were available,[14] and that the benthic fauna did not indicate significant adverse ecological effects near the mooring.[15]

In relation to shellfish, the open coast at Taharoa is a high-energy environment where fine sediment from both catchment sources and the Taharoa dewatering discharge is more likely to be dispersed and resuspended than accumulated.[16] No deposition was predicted at the open coast shellfish habitat assessed in the modelling. For Kawhia and Aotea Harbours, which are the receiving environments most susceptible to long-term fine-sediment accumulation, predicted deposition from the dewatering discharge is very low. The Coastal Processes Assessment states that "*sediment deposition of up to 0.01 mm (1 grain of 10-micron sediment) could occur in 40 % of Kawhia Harbour, and 13 % of Aotea Harbour [per year]*[17]" and that the thickness of this deposition is "*so small that this would be unmeasurable*

[10] At section 5.3
[11] At section 5.3
[12] At section 5.3
[13] Appendix Q: Coastal Processes Assessment, at page 16.
[14] At section 4.1.1.
[15] At section 5.5.
[16] Appendix Q: Coastal Processes Assessment, at page 20.
[17] Appendix Q: Coastal Processes Assessment, at page 16.

and indiscernible."[18] On that basis, adverse effects on shellfish resulting from the proposed CMA discharges will be 'very low' at most.

Mirumiru Pā ki Marokopa

In the combined table of comments by Natasha Willison-Reardon and Mirumiru Pā ki Marokopa, concerns are raised regarding adverse effects on fish and the potential accumulation of heavy metals, including vanadium through dewatering discharge during shiploading, and process water and stormwater.

The comment raises concerns regarding potential effects on īnanga, tuna, and kahawai. I acknowledge that these species are culturally significant and that they use coastal, estuarine, and/or freshwater habitats at different life stages.

The effects of discharges on fish are addressed in Section 5.4.1 of the Marine EcIA. That assessment considered the potential for the proposed discharges to affect fish through changes in suspended sediment, sediment deposition, and contaminant concentrations. The predicted increases in suspended sediment and seabed deposition are very low (i.e., there is a large amount of mixing), and sediment metal concentrations measured near the mooring were below relevant ANZG default guideline values. On that basis, I concluded that adverse effects on marine fish from the discharges would be low.

The comment also raises concern that vanadium associated with titanomagnetite may accumulate in kaimoana, particularly shellfish, and may therefore present an ecological risk or inform customary harvest concerns.

I have not been able to verify the Miramand and Fowler (1998) citation included in the table as a *Marine Pollution Bulletin* paper.[19] However, I did identify a book chapter by Miramand and Fowler (1998), titled "Bioaccumulation and transfer of vanadium in marine organisms", in *Vanadium in the Environment, Part 1: Chemistry and Biochemistry*.[20] Miramand and Fowler (1998) confirm that vanadium can accumulate in marine organisms, particularly in some specialist taxa and in external tissues of invertebrates. However, they also conclude that vanadium concentrations in most benthic invertebrates are generally low, that uptake into soft tissues is low compared with many other trace metals, and that there is no evidence of biomagnification through marine food chains. Their review identifies uncertainties regarding chronic exposure and some transfer pathways, but it does not support a general conclusion that vanadium discharged to the CMA would necessarily accumulate to significant concentrations in shellfish.

The one-off sediment sampling showed that concentrations of the metals analysed were below relevant ANZG default guideline values. Vanadium was not included in the standard analytical suite; however, given that the metals analysed did not indicate elevated concentrations or accumulation near the discharge, and given the low predicted deposition and absence of significant adverse effects on benthic communities, I would not expect vanadium to show a materially different pattern. On that basis the available evidence and assessed exposure pathways do not indicate that adverse effects on shellfish from vanadium accumulation are expected.

[18] Appendix Q: Coastal Processes Assessment, at page 18.
[19] Referenced as "Miramand, P. and Fowler, S.W. (1998), 'Bioaccumulation of vanadium and other trace metals in organisms collected near a vanadium-rich pelletizing factory', Marine Pollution Bulletin."
[20] Miramand, P., & Fowler, S. W. (1998). Bioaccumulation and transfer of vanadium in marine organisms. In J. O. Nriagu (Ed.), *Vanadium in the Environment. Part 1: Chemistry and Biochemistry*. John Wiley & Sons, pp. 167–197.

Regards,

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