

## **TARANAKI VTM PROJECT**

### **RESPONSES ON BEHALF OF TRANS-TASMAN RESOURCES LIMITED TO REQUEST FOR INFORMATION DATED 14 JANUARY 2026, FOR ANY COMMENTS ON THE PAUL TAYLOR (2026) REPORT**

**19 January 2026**

1. This response addresses the request dated 14 January 2026 for any comments TTR wishes to make on the report by Paul Taylor “Review of information on finfish and fisheries relevant to the Taranaki VTM project” (Taylor (2026)). The response has been compiled by Dr MacDiarmid, Mr Humpheson, Dr Mitchell, Mr Faithfull, and counsel for TTR. Where appropriate, headings from Taylor (2026) have been replicated for ease of cross-referencing.

#### **GENERAL COMMENTS**

2. Before turning to specifics, we make the general observation that Taylor (2026) does not include in its review a key TTR report evaluating the effects of elevated SSC and decreased light on fish according to standard evaluation criteria. Nor does it include 2025 expert evidence on updated published information about the impacts of mining-related underwater noise on New Zealand fish species, effects on primary productivity, impacts on rocky reefs, impacts on fishing, and impacts on and recovery of seafloor communities in the mining areas.
3. This oversight is unfortunate as Taylor (2026) concludes that key effects pathways are not fully anchored to exposure thresholds, and evidence of species and habitat sensitivity, and some important uncertainties remain unresolved.
4. TTR submits that this detailed information has been made available to the Expert Panel, outlines below where this information can be found and submits that the key uncertainties raised by Taylor (2026) can—and should—be set aside.

#### **POTENTIAL EFFECTS OF THE MINING ON FINFISH**

##### **Statements about effects on fish in the application document**

5. Taylor (2026) at page 4 refers to TTR’s statement in the Executive Summary of its Application document that “The scientific data collated to inform the project demonstrated that the overall effects on fish species and populations will generally be no more than minor, and that there will be no effect on either the abundance or health of the commercial or recreational fisheries in the STB”. Taylor (2026) concludes this statement is not supported to the level of confidence implied, because key effects pathways are not fully anchored to

exposure thresholds, and evidence of species and habitat sensitivity, and some important uncertainties remain unresolved.

6. We disagree and reiterate that on the basis of the extensive reviews of the international literature on this topic carried out by Lowe (2013)<sup>1</sup> and Page (2014)<sup>2</sup>, TTR used highly conservative sensitivity thresholds of 2mg per litre as the lowest suspended sediment concentration (SSC) avoided by pelagic fish and 3mg per litre as the lowest SSC avoided by demersal fish. Maps of the median and 99<sup>th</sup> percentile distributions of SSC at the 2 mg per litre threshold were then used by MacDiarmid et al. (2024)<sup>3</sup> to infer areas which fish may avoid and where fishing could be impacted.
7. We also note that Taylor (2026) did not include in its review the report undertaken for TTR “Assessment of the scale of marine ecological effects of seabed mining in the South Taranaki Bight” by MacDiarmid, Thompson and Grieve (2015)<sup>4</sup> including effects of elevated SSC and decreased light on fish. Specifically, the effects taken into account by MacDiarmid et al. (2015) were:
  - (a) clogging of respiratory and feeding structures of marine organisms,
  - (b) avoidance of the discharge area by mobile species and
  - (c) reduced availability of prey due to either reduced underwater visibility or reduction in prey numbers or biomass.
8. MacDiarmid et al. (2015) provides species by species assessments of these effects for 31 commercial, recreational and/or customary marine fish species, as well as 23 fished marine invertebrates. The effects or consequences of the proposed mining activities were evaluated for each component of the ecosystem being considered and scored using a standardised set of prepared consequence descriptions, ranging from negligible to catastrophic. These take into account the proportion of habitat relevant to the species or group in question affected by mining activities, the severity of the impact on the population, community, or habitat, and the recovery period once the impact ceases. These standard

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<sup>1</sup> Lowe, M.L. (2013). Factors affecting the habitat usage of estuarine juvenile fish in northern New Zealand. Doctor of Philosophy in Marine Science. University of Auckland, Auckland: 238.

<sup>2</sup> Page, M. (2014). Effects of total suspended solids on marine fish: pelagic, demersal and bottom fish species avoidance of TSS on the Chatham Rise. NIWA Client Report No: WLG2014-7, 25 p.

<sup>3</sup> MacDiarmid, A., MacGibbon, D., Anderson, O. (2024). South Taranaki Bight Fishing: 1 October 2007 - 30 September 2023. NIWA Client Report No. 2024053WN, prepared for TTR, 37 p.

<sup>4</sup> MacDiarmid A, Thompson D, Grieve J (2015). Assessment of the scale of marine ecological effects of seabed mining in the South Taranaki Bight: Zooplankton, fish, kai moana, sea birds, and marine mammals. NIWA Client Report No:WLG2015-13, 105 p.

descriptions were previously used by MacDiarmid et al. (2014)<sup>5</sup> to assess the environmental risk of discharges of sediment during prospecting and exploration for seabed minerals, including iron sands.

9. The MacDiarmid et al. (2015) review of the spatial and foraging ecology of the key fauna occurring in the South Taranaki Bight (STB) identified that for all but one fish species, there should be negligible effects of mining 50Mt per annum according to standard evaluation criteria. This is principally because the scale of the mined area and the areas of elevated SSC are small compared to the area used by the populations of these species. Consequently, they are likely to be displaced from or experience a decrease in prey abundance or availability over a very small part of their distribution. For coastal kaimoana species, the proposed mining activity should not add significantly to the levels of suspended sediments currently experienced inshore in frequently turbid waters.
10. MacDiarmid et al. (2015) concluded one species, eagle ray, may be affected to a moderate extent as about 8% of its core area of distribution (>50% occurrence) in the STB overlaps with the area of SSC elevated above 3 mg/l due to mining activities.
11. We also note that the material reviewed by Taylor (2026) does not include expert evidence including that provided by MacDiarmid (dated 13 October 2025) who provided updated information about the impacts of mining-related underwater noise on New Zealand fish species, effects of mining elevated SSC on primary productivity and on rocky reefs, impacts on fishing, and impacts on and recovery of seafloor communities in the mining areas. We draw the Expert Panel's attention to this information in the sections below as we respond to specific comments made in Taylor (2026).

## Noise

12. Taylor (2026) contends that there is no substantive discussion provided by TTR regarding the effects of ongoing operational underwater noise on fish. However, the evidence provided by MacDiarmid (13 October 2025) included updated published information about vocalisations by New Zealand fish species and their sensitivity to underwater noise and concluded:
  - (a) Given the sensitivity of fish, it is likely there could be masking of individual fish calls in the near vicinity of the iron sand recovery operations.

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<sup>5</sup> MacDiarmid, A.; Boschen, R.; Bowden, D.; Clark, M.; Hadfield, M.; Lamarche, G.; Nodder, S.; Pinkerton, M.; Thompson, D. (2014). Environmental risk assessment of discharges of sediment during prospecting and exploration for seabed minerals. NIWA Client Report No: WLG2013-66, 53 p.

- (b) However, in the case of the PPA, the movement of fish away from the areas of SSC above 2mg/l should mean few fish remain in close proximity to the mining noise generation sources thereby reducing the risk of individuals from being exposed long-term to damaging levels of sound.
  - (c) From a population perspective, given that the known principal sound producing or responsive fish in the project area are mobile and widely distributed, the effects of underwater sound produced during iron sand recovery operations on their populations in the STB is likely to be negligible.
13. Below we provide a broader analysis of the likely effects of underwater noise from TTR activities on marine fish (physical injury both temporary and permanent, and behavioural) and reference relevant industry guidance on underwater noise thresholds for fish. Taylor (2026) does not rely on this best practice guidance and instead concentrates on unrelated literature (effects on fish from seismic surveys) rather than the likely noise characteristics of TTR's activities. We refute the suggestion that the noise generated by TTR's proposed mining operations will have similar far-field effects to seismic airguns in the studies that Taylor (2026) quoted. As well as seismic airguns being completely dissimilar to the noise characteristics from the proposed mining activities, we note that the far-field inferences drawn in the cited report by Slotte et al. (2004)<sup>6</sup> are particularly weak given there was no noticeable effect of the noise source on the near-field horizontal distribution of fish.

### *Background*

14. Typically, fish sense sound via particle motion in the inner ear which is detected from sound induced motions in the fish's body. The detection of sound pressure is restricted to those fish which have air filled swim bladders; however, particle motion (induced by sound) can be detected by fish without swim bladders. Underwater noise can affect fish in several ways, including:<sup>7</sup>
- (a) behavioural responses,
  - (b) masking,
  - (c) stress and physiological responses,

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<sup>6</sup> See paragraph 27 and footnote 10 of Taylor (2026).

<sup>7</sup> Popper, A. N., Hawkins, A. D., Fay, R. R., Mann, D. A., Bartol, S., Carlson, T. J., Tavolga, W. A. (2014). ASA S3 s-1C1. 4 TR-2014, *Sound exposure guidelines for fishes and sea turtles: A technical report prepared by ANSI-accredited standards committee S3 s-1C1 and registered with ANSI*. New York, NY: Springer. Table S4.

- (d) hearing loss and damage to auditory tissues,
  - (e) structural and cellular damage of non-auditory tissues and total mortality,
  - (f) impairment of lateral line functions and
  - (g) particle motion based effects on eggs and larvae.
15. Underwater noise is generally categorised according to whether it is impulsive or continuous. Impulsive sounds can be generated by seismic surveys, impact piling or use of underwater explosives, etc. Continuous noise can include the noise generated by shipping, dredging, etc.
16. The noise generated by TTR's activities will be continuous in nature (though not constant). Although an impulsive "pinger" will be used for positioning it will be highly localised and will not generate high intensity impulsive sources of similar magnitude to piling, seismic surveys or the like. For the purposes of this response, only the effects of continuous noise have been considered.

#### *Criteria*

17. There is limited scientific evidence regarding the effects of sound on fish. Data exist for only ~100 of the more than 32,000 recorded fish species<sup>8</sup>. The evidence that is available tends to focus on impulsive noise sources associated with construction projects, specifically those involving impact piling (impulsive noise sources). There is a paucity of scientific data relating to noise sources which are continuous in nature, specifically dredging which is akin to TTR's proposed use of a seabed crawler.
18. Current best practice criteria for injury are those contained in the American National Standards Institute (ANSI) publication, ASA S3/SC1.4 TR-2014 (Popper et al., 2014).<sup>9</sup> These guidelines set out criteria for injury due to different sources of noise. The criteria include a mixture of indices including SEL, rms and peak sound pressure levels. Numerical thresholds are included for impulsive sound sources. For continuous sound sources, qualitative risks are categorised in relative terms as "high", "moderate" or "low" at three distances from the source: "near" (i.e. in the tens of metres), "intermediate" (i.e. in the hundreds of metres) or "far" (i.e. in the thousands of metres). These qualitative criteria do not differentiate between exposures to different sound levels and therefore all

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<sup>8</sup> Popper, A. N., Hawkins, A. D, An overview of fish bioacoustics and the impacts of anthropogenic sounds on fishes, *Journal of Fish Biology* 2019; 1-22. 2019.

<sup>9</sup> Above n 7.

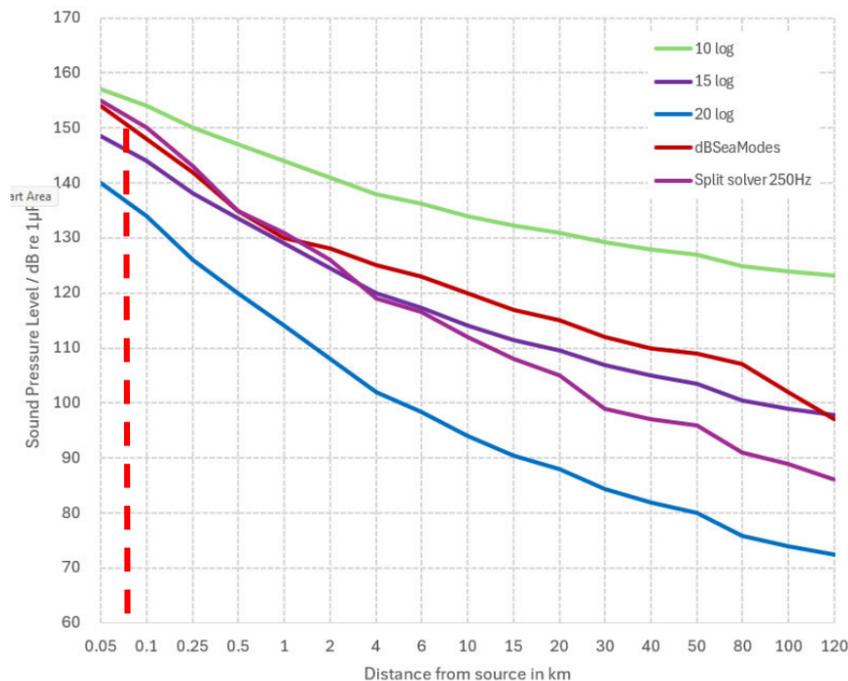
sources of noise, no matter how noisy, would theoretically elicit the same assessment result.

19. In the absence of quantitative thresholds for continuous sound sources in the ANSI guidance, the U.S. National Marine Fisheries Service (NMFS), as well as other U.S. agencies<sup>10</sup>, currently use 150 dB re 1  $\mu$ Pa (rms) as the sound pressure level that may result in the onset of behavioural effects (Hastings, 2002)<sup>11</sup>. Behavioural effects include those responses noted in Taylor (2026), i.e. avoidance, redistribution, altered habitat use, etc.
20. In comparison, injury thresholds (either temporary threshold shift, TTS, or permanent threshold shift/auditory injury, PTS/ADU INJ) due to impulsive sources are significantly greater (at least 33 dB greater).
21. Unlike the criteria developed for marine mammals, both the ANSI injury criteria and the Hastings (2002) behavioural criteria are unweighted. TTR has previously provided unweighted underwater sound levels. Of relevance is Figure 2 of Mr Humpheson's Supplementary Evidence dated 21 November 2025, which is reproduced below. The magenta coloured Split Solver 250Hz distance reduction line shows that at a distance of ~100 m from the IMV and crawler, the unweighted sound pressure level would be 150 dB re 1  $\mu$ Pa. As provided for in the conditions, at 500 m a limit of 135 dB re 1  $\mu$ Pa applies. Therefore, an unweighted sound pressure level of 150 dB re 1  $\mu$ Pa at 100 m is realistic.
22. Based on best practice guidance, behavioural effects are likely to be limited to within 100 m of TTR's activity. This effects zone is considered by TTR to be very small and highly unlikely to adversely affect the behaviour of fish at a measurable level in the vicinity of the activity. The potential to cause avoidance, masking, or redistribution of fish at larger spatial scales is considered very low to negligible. These findings address the primary concerns in Taylor (2026) regarding underwater noise effects on finfish and fisheries.

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<sup>10</sup> [https://wsdot.wa.gov/sites/default/files/2021-10/ENV-FW-FishMM\\_Thresholds.pdf](https://wsdot.wa.gov/sites/default/files/2021-10/ENV-FW-FishMM_Thresholds.pdf)

<sup>11</sup> Hastings, M.C. 2002. Clarification of the Meaning of Sound Pressure Levels and the Known Effects of Sound on Fish. White Paper. August 2002.



**Figure 2 : Distance reduction relationship between different solutions**

(from Humpheson Supplementary Evidence dated 21 November 2025)

### Habitat degradation/sensitivity

23. Taylor (2026) raises the possibility that elevated SSC impacts fish by degrading fish habitats, including rocky reefs, presumably by impacting on the feeding ability of prey species such as shellfish, sponges and bryozoans thereby making them less abundant as prey to fish.
24. It is pertinent here to repeat Dr MacDiarmid's 13 October 2025 evidence on the ecologically consequential concentrations of suspended sediment on benthic invertebrate fauna. Specifically, she noted that:
  - (a) Filter feeding bivalves, especially those occurring in naturally turbid environments such as those found in the CMA zone (out to 12 NM) of the STB, can compensate efficiently for a decrease in food quality over a wide range of SSC by maintaining an effective pre-ingestive mechanism of selection for organic particulate matter, as well as increasing filtration and rejection rates (Navarro and Widdows 1997)<sup>12</sup>.

<sup>12</sup> Navarro, J.M.; Widdows, J. (1997). Feeding physiology of *Cerastoderma edule* in response to a wide range of seston concentrations. Marine Ecology Progress Series 152: 175–186

- (b) A laboratory experiment has indicated that SSC of 80 mg/l or higher have adverse effects on the condition of the horse mussel *Atrina zelandica* (Ellis et al. 2002)<sup>13</sup>.
- (c) Green-lipped mussels, *Perna canaliculus*, decline in filtration rate only when SSC is above about 1,000 mg/l (Hawkins et al. 1999)<sup>14</sup>. More recently, Brandy et al. (2025)<sup>15</sup> found juvenile mussels were highly resistant to short-term (5 days) and long term (30 days) exposure to SSC up to 1250 mg L<sup>-1</sup>, with no effect on their mortality or nutritional condition but increased shell growth, consistent with previous studies that have found increased bivalve growth with high SSC (Emerson, 1990<sup>16</sup>; Deksheniaks et al., 1993<sup>17</sup>; Colden and Lipcius, 2015<sup>18</sup>)
- (d) The response of two New Zealand invertebrate species (a common cushion sponge *Crella incrustans* and large dog cockle *Tucetona laticostata*, which are both present within the STB) to elevated suspended sediments has been experimentally assessed. Both had high survival rates, and no effect was observed on oxygen consumption following four weeks of exposure to SSCs of up to approximately 700 mg/L. Although sediments had accumulated internally within *C. incrustans*, around a third of sponges had cleared these sediments two weeks after the elevated SSCs were removed.<sup>19,20</sup>

25. We note that the modelled spikes in background plus mining derived SSC on inshore reefs are much lower (by up to 1 or 2 orders of magnitude) than the

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<sup>13</sup> Ellis, J.; Cummings, V.; Hewitt, J.; Thrush, S.; Norkko, A. (2012). Determining effects of suspended sediment on condition of a suspension feeding bivalve (*Atrina zelandica*): results of a survey, a laboratory experiment and a field transplant experiment. *Journal of Experimental Marine Biology and Ecology* 267: 147– 174.

<sup>14</sup> Hawkins, A.J.S.; James, M.R.; Hickman, R.W.; Hatton, S.; Weatherhead M. (1999). Modelling of suspension-feeding and growth in the green-lipped mussel *Perna canaliculus* exposed to natural and experimental variations in seston availability in the Marlborough Sounds, New Zealand. *Marine Ecology Progress Series* 191: 217– 232.

<sup>15</sup> Brandy S. Biggar, Andrew Jeffs, Jenny R. Hillman (2025). Effects of suspended sediment on survival, growth, and nutritional condition of green-lipped mussel spat (*Perna canaliculus*, Gmelin, 1791), *Journal of Experimental Marine Biology and Ecology*, 582, <https://doi.org/10.1016/j.jembe.2024.152074>

<sup>16</sup> Emerson, C.W., (1990). Influence of sediment disturbance and water flow on the growth of the soft-shell clam, *Mya arenaria* L. *Can. J. Fish. Aquat. Sci.* 47, 1655-1663. <https://doi.org/10.1139/f90-189>.

<sup>17</sup> Deksheniaks, M., Hofmann, E., Powell, E., (1993). Environmental effects on the growth and development of eastern oyster, *Crassostrea virginica* (Gmelin, 1791), larvae: a modeling study. *J. Shellfish Res.* 12.

<sup>18</sup> Colden, A.M., Lipcius, R.N., (2015). Lethal and sublethal effects of sediment burial on the eastern oyster *Crassostrea virginica*. *Mar. Ecol. Prog. Ser.* 527, 105–117. <https://doi.org/10.3354/meps11244>

<sup>19</sup> Cummings, V.J., Beaumont, J., Mobilia, V., Bell, J.J., Tracey, D., Clark, M.R., Barr, N. (2020). Responses of a common New Zealand coastal sponge to elevated suspended sediments: indications of resilience. *Marine Environmental Research*, 155: 104886

<sup>20</sup> <https://www.sustainableseaschallenge.co.nz/tools-and-resources/sponges-and-suspended-sediment-on-the-south-coast/>

concentrations reported in the above studies<sup>21</sup> and that the SSC percentile limits identified (Condition 5 and Schedule 2) have been developed to ensure that effects on reef fauna will be negligible and thus of no 'material harm'. Therefore, we conclude that effects on reef fauna and thus on prey species availability to fish will be negligible.

26. We also contest the relevance of the report cited by Taylor (2026) in paragraph 43. This report (Jones, 2025) concerns mining of manganese nodules on the deep abyssal ocean floor where the seafloor habitat is substantially altered by the permanent removal of nodules which are a key habitat for a variety of fauna. In contrast, TTR mining operations aim to remove only the mineral rich component of the iron sands at relatively shallow depths on well-lit and dynamic shelf sand banks. Moreover, an experiment carried out in Wellington Harbour indicated removal of the iron rich component of the sands has no impact on faunal colonisation of the sands (see section 4 in Beaumont, Anderson and MacDiarmid 2013)<sup>22</sup>.
27. We note that in her evidence MacDiarmid (2025) acknowledged that reefs within 2-3 km of the PPA are at the highest risk from the effects of the sediment plume when mining takes place at its northern end as they will be exposed to higher levels of suspended sediments for longer periods. In this regard she noted that TTR has volunteered to survey to a distance of 3 km from the boundary of the PPA to establish the position of all reefs in this at-risk zone and proposed amendments to conditions, and an additional condition, to mitigate harm to reef habitats and species as follows:
  - (a) Add the following words into condition 48 (pre-commencement monitoring): Provide data from multi-beam swath mapping to identify all reef habitat within a distance of 3 km from the boundary of the extraction area.
  - (b) Add the following into the list in condition 55 (Environmental Monitoring and Management Plan (EMMP)): k. Identify whether operational responses are necessary to avoid material harm to any reef habitat identified by the pre-commencement bathymetric survey.
  - (c) Add a new companion condition along the following lines: 30A Extraction operations shall not commence within 3 km of the boundary of the

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<sup>21</sup> See Figure 4 in Expert evidence of Dr. Lawrence Cahoon on behalf of Trans Tasman Resources Limited, 9 December 2016

<sup>22</sup> Beaumont J, Anderson TJ, MacDiarmid AB (2013). Benthic flora and fauna of the Patea Shoals region, South Taranaki Bight. NIWA Client Report No. WLG2012-55 provided TTR, 200 p.

Coastal Marine Area until at least 5 years following the commencement of extraction activities.

28. Locating extraction operations at least 3 km seaward of the CMA boundary for 5 years, means that extraction closer to any potentially sensitive areas (e.g. reefs landward of the mining area in the CMA) would not occur until there was a considerable quantum of monitoring data available, and effects within 3 km of the mining area boundary would not arise.
29. These amendments to conditions were also supported in the planning evidence (Mitchell and Faithfull (2025)). TTR submits that inclusion of the amendments would result in rocky reef habitats in the STB being protected from material harm from the mining discharge, and on this basis the concerns raised by Taylor (2026) in relation to degradation of rocky reef habitats would not eventuate and can be set aside.

### **Plume Induced light reduction**

30. The Taylor (2026) report suggests that SSC plume induced light reductions could impact on fish populations through effects on primary production and through effects on fish visual systems.

#### *Primary production*

31. Regarding the effects of the sediment plume on the ability of macro-algae, as well as other primary producers to undertake photosynthesis, TTR relies on the evidence of Prof. Dr Larry Cahoon<sup>23</sup>, a US based expert in benthic micro-algal ecology of continental shelf ecosystems. Dr Cahoon notes:
  - (a) the resilience of primary producers, including phytoplankton, microphytobenthos and macroalgae (“seaweeds”), to short-term fluctuations in light availability (photo-adaptation) typical in the STB due to the existing sediment impacts in the STB environment as a result of storm and high river runoff events;
  - (b) the likelihood that primary production by phytoplankton in the STB is nutrient-limited, not light limited;
  - (c) that many microalgae may also be capable of heterotrophic production (mostly uptake of dissolved organic material), with this mode of production supplementing or even replacing primary production

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<sup>23</sup> Expert evidence of Dr. Lawrence Cahoon on behalf of Trans-Tasman Resources Limited, 9 December 2016.

(photosynthetic formation of new organic matter), particularly when light is limiting; and

- (d) that macroalgae have the additional advantage of being able to store photosynthetic products in their larger bodies for extended periods of time, enabling them to adapt to quite substantial changes in light availability.
32. Dr Cahoon also notes that while there will be significant and detectable effects on light levels and thus primary production in the plume in the immediate vicinity of the active mining site (<2 km distant), these effects would decrease exponentially with distance from the site of active mining as the presence of the plume will be more intermittent at sites > 2 km from the actual mining site owing to increasing variability in flow vectors with distance from the mining site.
33. Given the relatively small spatial footprint of sand mining activities at any point in time compared to the STB area, and the inherent variability in the physical environment, Dr Cahoon considers that on the scale of the sediment model domain, impacts of mining on primary production would be statistically indistinguishable from natural variability.
34. Dr Cahoon concludes that the impacts on primary production and ecosystem processes dependent on it from this project will be temporally and spatially limited, occurring in an environment where physical disturbance on much greater scales is a normal feature, and well within the adaptive capacity of the primary producer community. He foresees no significant impacts on primary production or ecosystem processes dependent on it at any but very local and temporary scales. He considers the localised elevation in SSC arising from the proposed sand mining activities represents an impact to which continental shelf ecosystems are robustly adapted and from which they recover rapidly.
35. Therefore, TTR submits that primary production in the STB will not be significantly affected by the proposed mining operations and that the concerns raised by Taylor (2026) about SSC plume induced light reductions impacting on fish populations through effects on primary production will not eventuate and can be set aside.

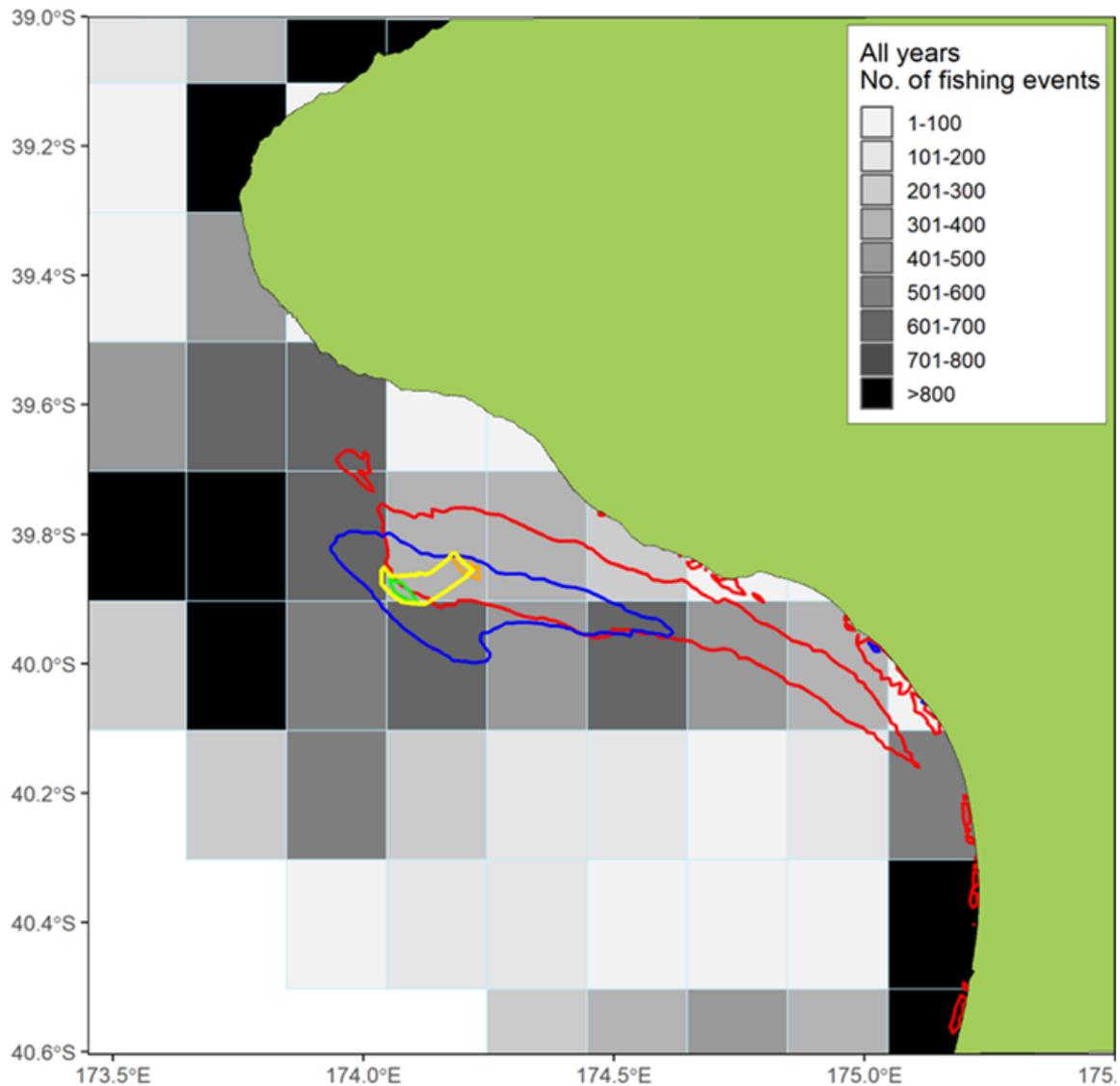
#### *Effects of reduced light on fish visual systems*

36. Of relevance to this discussion is the evaluation of the environmental effects of mining elevated SSC, including the impact of reduced underwater visibility on the availability of prey to fish, undertaken by MacDiarmid et al (2015)<sup>4</sup> described in paragraphs 7-9 above.

37. The key finding of this evaluation relevant to this discussion was that that for all but one fish species, there should be negligible effects of mining 50Mt per annum according to standard evaluation criteria. This is principally because the scale of the mined area and the areas of elevated SSC are small compared to the area used by the populations of these species. Consequently, they are likely to experience a decrease in prey abundance or availability over a very small part of their distribution, specifically within 2-3 km of the active mining site.

#### **POTENTIAL EFFECTS OF THE MINING ON FISHERIES**

38. Taylor (2026) in paragraph 82 warns that the presence of zero or low values in the 2024 NIWA report on fisheries in the STB should not be interpreted as absence of fishing effort without regard to reporting thresholds, confidentiality suppression and changes in fleet behaviour.
39. All these factors were taken into account in the NIWA report. Therefore, the data can be relied upon, particularly the most recent three years when all vessels were required to report catch and effort data.
40. We reject the suggestion by Taylor (2026) in paragraphs 94-98 that the displacement of fish by mining activities could move them over the QMA boundary. The likely displacement is to areas immediately outside the areas of SSC elevated to 2mg per litre or more as detailed in the map below from MacDiarmid et al. (2024) which is well away from the deepwater offshore QMA boundary.



**Figure 2-1 from MacDiarmid et al. (2024)<sup>3</sup>: The number of fishing events aggregated into 0.2 degree squares for FMA 8 for fishing years 2008–2023. The PPA is shown in yellow, Mining A median SSC area in orange, Mining A 99th percentile SSC area in red, Mining B Median SSC area in green, and Mining B 99th percentile SSC area in blue.**

41. In paragraph 101 Taylor (2026) repeats the error introduced in the Fathom (2025) report when they conflate the sediment modelled domain (SMD) with the area affected by the plume. We stress that only a very small fraction of the catch of school shark (SCH) and rig (SPO) were taken from the areas likely to receive mining-derived SSC elevated above 2mg/l, not the more than 40% of catch assumed by Taylor (2026) and asserted by Fathom (2025).<sup>24</sup>

<sup>24</sup> See TTR’s 12 December 2025 response to Fathom (2025).

## Key Uncertainties

42. Taylor (2026) lists two key uncertainties in the reviewed information, contending in paragraphs 103-105 that:
  - (a) There is a lack of information on spatial variations in the plume which makes it difficult to determine the effects on fish and fish habitats; and
  - (b) There was no information provided regarding the depth of the euphotic zone in the area between the transect relating to mining at Site A and the transect relating to mining at Site B.
  
43. We disagree and suggest that three important sources of information have been overlooked:
  - (a) A video of sediment plume behaviour over the course of 10 months of climate forced modelling has been made available to the Expert Panel and clearly shows the expected spatial variation in the plume over a wide range of tidal, current, wind and wave conditions.
  - (b) Temporal variation in SSC at points of interest selected by parties during expert conferencing and including Graham Bank, the Traps and other locations of interest are reported in MacDonald and Hadfield (2017)<sup>25</sup> and clearly show that peak SSCs are of short duration.
  - (c) Modelled euphotic zone depth over the entire modelling domain, including the area between the “transects”, under a: background (no mining), b: mining at Site A and c: mining at site B is available in Figure 2-2 in Pinkerton (2017)<sup>26</sup>. But note these show a static median view whereas the actual euphotic zone depth will vary dynamically in similar fashion as shown in the video of sediment plume behaviour referred to at (a) above.
  
44. TTR submits that this information dispels the uncertainties that Taylor (2026) considers are “key”, and there is no evidential basis for the Expert Panel to share those concerns.

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<sup>25</sup> Macdonald, H.S and Hadfield, M.G. (2017). South Taranaki Bight Sediment Plume Modelling Worst Case Scenario, 51 p. <https://www.epa.govt.nz/assets/FileAPI/proposal/EEZ000011/Evidence/ac41266d7d/TTR-Appendix-to-HRW-Report.pdf>

<sup>26</sup> Pinkerton, M. (2017). Optical effects of proposed iron sand mining in the South Taranaki Bight region - worst case update. NIWA Client Report No: 2017089WNrev1 prepared for TTR, 45 p.

## DISAGREEMENTS/ CONTESTED EVIDENCE

### Summary of contested position

45. Relevant to this summary of positions by the various parties is the expert evidence presented by MacDiarmid (dated 13 October 2025) who noted that the report by MacDiarmid et al. (2024) provides information about fishing activity in the STB displayed at the finest scale allowed by Fisheries New Zealand to protect the fishing locations of individual fishers. However, it is important to understand that this spatial restriction meant that to calculate the number of fishing events occurring in the PPA, Mining Area A median SSC, and Mining Area B median SSC, MacDiarmid et al. (2024) had to construct bounding boxes of 0.2 degrees around each so as not to violate the release clauses of the data. In all cases the bounding boxes created are substantially larger than the areas the polygons themselves cover, and results in the number of fishing events in each being inflated thus producing outputs that exaggerated fishing activity. On average, this method over-estimated the number of fishing events in the PPA, Mining B median SSC and Mining A median SSC areas by 7.6, 20.2 and 25.4 times respectively (see discussion of this point in MacDiarmid et al. (2024)).
46. The report by MacDiarmid et al. (2024) shows that on average 25 fishing events, mostly set netting in recent years, occur in the PPA each year. Taking into account the 7.6 x inflation factor described above, this reduces the likely number of fishing events in the PPA in any one year to about 3.3 events. Mining will occur in just 5% of the PPA in any one year with fishing excluded from 1 nautical mile radius of the IMV (about 10 km<sup>2</sup>) but allowed to continue in the remainder of the PPA and wider STB (as their quota area provides). **Thus, on average just 0.5 fishing events per year** (or approx. 1 event every 2 years) would be displaced by a few kms to potentially occur elsewhere in the PPA and wider STB (as their quota area provides).
47. Mining will also cause a sediment plume and the report by MacDiarmid et al. (2024) shows that on average 23 to 33 fishing events, mostly set netting in recent years, occur in the Mining B median SSC and Mining A median SSC areas where mining will cause SSC to reach a precautionary level of 2mg/l that may cause displacement of fish to areas of lower SSC. Taking into account the 20.2 x and 25.4 x data inflation factors described above, this reduces the likely average number of fishing events in the Mining B median SSC and Mining A median SSC areas in any one year to between **1.1 and 1.3 events**.
48. Fishery scale impact studies, as suggested by Seafood NZ, are not required to conclude that the economic impact on the fisheries or individual fishers will be negligible at this very low scale of potential displacement of fishing events.

49. It is agreed that the fisheries management closures and gear restrictions as well as the change in mix of species in the STB (potentially a result of climate change) are impacting on the nature of fishing in the STB, but it is submitted these effects far outweigh the demonstrably negligible effects of fishing event displacement due the proposed mining operations.

## **CONDITIONS ANALYSIS**

50. In responding to the commentary on conditions in Taylor (2026), and consistent with the Mitchell and Faithfull (2025) planning evidence, it is important to clarify that the proposed conditions were deliberately drafted as a precautionary, compliance-based regime, not an adaptive management framework. The Taylor (2026) interpretation appears to conflate baseline monitoring, TRG oversight, and monitoring-triggered responses with adaptive management. As Mitchell and Faithfull (2025) explain, these elements do not amount to adaptive management because the conditions contain fixed, binding and enforceable limits that cannot be adjusted through operational monitoring.
51. The conditions require two years of pre-commencement baseline monitoring, followed by EPA certification, before any extraction may begin. This front-loaded sequencing sets environmental limits in advance and validates them against natural background conditions. It does not allow limits to evolve during the project, which is the hallmark of adaptive management approaches based on “learning while doing.”
52. The SSC limits and other environmental limits provided within the condition set are mandatory and non-negotiable. Exceedance of the thresholds in Condition 5 requires immediate cessation of extraction until compliance is demonstrated to the satisfaction of the EPA. Unlike adaptive management frameworks, there is no discretion to continue operating while mitigation measures are trialled.
53. The Technical Review Group (TRG) provides independent oversight but, as set out in Conditions 60–64 and, as reinforced in the planning evidence, it has no authority to alter the percentile limits set or conditions. Its role is strictly advisory, with certification decisions remaining with the EPA. This governance structure ensures limits remain fixed rather than subject to operational adaptation.
54. Schedule 3 of the proposed conditions reinforces this structure. Any recalculation of the SSC numerical values must reflect natural background conditions only and cannot include extraction-influenced data, preventing the incremental “normalising” of project-derived effects. Any process which results

in updated numerical values therefore cannot weaken environmental protections.

55. For these reasons, the conditions regime cannot properly be characterised as adaptive management. It is a precautionary compliance framework with pre-defined limits, automatic cessation triggers, independent peer review, EPA certification, and rigorous monitoring—ensuring effects remain within conservative and predetermined bounds. Further, these conditions are materially unchanged from the set of conditions that the Supreme Court held did not amount to adaptive management.<sup>27</sup>
56. Turning to the specific concerns raised in Taylor (2026), the conditions already impose strong limits and operational controls that manage sediment plume behaviour, optical effects and underwater noise. SSC limits at sensitive monitoring sites, combined with the operational plume model, keep overall SSC within natural variability ranges. Optical effects are managed through SSC-based limits that provide a reliable operational proxy. Noise controls—including source-level limits, pre-deployment certification, and required verification measurements—ensure behavioural effects on fish are confined to very small spatial scales.
57. The comments in Taylor (2026) regarding “direct causation” at the SSC limits misinterpret the conditions. Precautionary action is not prevented at any stage, and cessation is required only when fixed compliance percentile limits are exceeded.
58. Finally, the suggested effects pathways in Taylor (2026)—such as broad reef impacts, large-scale fish displacement, or cross-boundary movements—are inconsistent with the evidence already before the Expert Panel. As earlier outlined, the scale and spatial extent of predicted effects are substantially smaller than Taylor (2026) suggests.
59. In summary, the conditions provide a robust, precautionary, and enforceable environmental management regime. The concerns raised by Taylor (2026) can be fully addressed within the framework as drafted, and no modifications to the conditions are required.

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<sup>27</sup> *Trans-Tasman Resources Ltd v Taranaki-Whanganui Conservation Board* [2021] NZSC 127, (2021) 23 ELRNZ 47 at [199]-[213] per William Young and Ellen France JJ, [237] per Glazebrook J, [296]-[297] per Williams J and [332] per Winkelmann CJ.

## SUMMARY OF TTR's POSITION

60. It is submitted that TTR's evidence, as outlined in the sections above, has properly accounted for the spatial, temporal, qualitative and quantitative dimensions that are necessarily part of assessing whether any effect on fish or fisheries amounts to 'material harm' (as per the Supreme Court's guidance).
61. TTR has also addressed the matters required to be taken into account when assessing potential effects on fisheries as an 'existing interest',<sup>28</sup> which require the Expert Panel to focus on:
- (a) The relative size of TTR's proposed mining area, which occupies only a fraction of the relevant QMA;
  - (b) The relative size of the actual area of physical displacement, which is much smaller still (being the exclusion zone of approximately 10km<sup>2</sup> around the IMV);
  - (c) The fundamental difference between the mineral resource, which is static, and therefore (along with the geographical limitations of the Minerals Mining Permit) dictates the location of the Project, compared to the fish stock resource, which is mobile and can therefore be caught elsewhere within the QMA.
62. While Taylor (2026) provides a useful summary of the evidence and positions taken by the various parties with an interest in fish and fishing in the STB, TTR considers the Taylor (2026) review was compromised to an extent by not accounting for all the relevant reports and evidence available to the Expert Panel.
63. TTR submits that inclusion of this "unreviewed" information confirms its position that the overall effects of the mining operations on fish species and populations will generally be no more than minor, and that there will be no material effect on either the abundance or health of the commercial or recreational fisheries in the STB. TTR considers the conditions, as proposed to be amended, provide a robust, precautionary and enforceable management regime.

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<sup>28</sup> Consistent with the guidance in s 60 of the Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2014, which is to be taken into account in accordance with clause 6(d) of Schedule 10 of the Fast-track Approvals Act 2024).