BEFORE AN EXPERT PANEL **FTAA-2504-1048**

UNDER	the Fast Track Approvals Act 2024
IN THE MATTER	of a substantive application for marine consents that would otherwise be applied for under the Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2012
BY	Trans-Tasman Resources Limited

EVIDENCE OF DR MATTHEW PINKERTON ON BEHALF OF TRANS-TASMAN RESOURCES LIMITED IN RESPONSE TO PART OF A REQUEST FOR INFORMATION DATED 28 NOVEMBER 2025

3 December 2025

HOLM | MAJUREY

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Counsel	Morgan Slyfield	[redacted]	[redacted]

INTRODUCTION

Qualifications, experience and code of conduct

1. My name is Matthew Pinkerton.

2. I am a Principal Scientist at the Earth Sciences New Zealand, at the Wellington campus. I have been employed at ESNZ (formerly NIWA) since 2000, following a degree in Engineering from the University of Cambridge (UK), and a MSc and PhD in Oceanography from the University of Southampton (UK). My research expertise covers remote sensing, underwater optics, and ecosystem modelling. I am science leader for ESNZ's core-funded ocean colour remote sensing and food-web modelling projects, with over 100 peer-reviewed publications.

Code of Conduct

3. I have been provided with a copy of the Code of Conduct for Expert Witnesses contained in the Environment Court's Practice Note dated 1 January 2023. I have read and agree to comply with that Code. This evidence is within my area of expertise, except where I state that I am relying upon the specified evidence of another person. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

Involvement in project

4. I was involved in TTR's previous application for marine consents in 2016, as one of the authors of the optical modelling reports prepared in support of that application;[1]

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[1] Pinkerton, M.H.; M. Gall (2015). Optical effects of proposed iron-sand mining in the South Taranaki Bight region. NIWA client report WLG2015-26 rev 2 for Trans-Tasman Resources. Project TTR15301.

Pinkerton, M.H. (2017). Optical effects of proposed iron-sand mining in the South Taranaki Bight region - worst case update. NIWA report 2017089WNrev1. Prepared April 2017 for Trans-Tasman Resources Ltd. Pp 45.

and I provided additional advice to TTR to support the reconsideration process in 2023.

5. For the present application I participated in the expert conferencing on primary productivity on 24 November 2025 and am one of the contributors to the joint witness statement that was produced out of that conferencing exercise.

Scope of evidence

6. My evidence responds to an aspect of the request for information dated 28 November 2025 in respect of carbon flux.

CARBON FLUX

7. As I understand it the source of the reference "up to 40%" reduction in benthic primary production in the Impact Assessment derived from the work done by Dr Cahoon in 2015, which stated:

> "While much of the area [of the Sediment Model Domain] currently viable for colonisation by MPB [microphytobenthos] is only marginally affected, the plume-impacted area immediately east of the mining location is predicted to be impacted by reductions of up to 40% in carbon flux."

8. "Carbon flux to the seabed" refers to the natural delivery of organic matter to the seabed from three sources: (1) as "marine snow" or biological debris which comes mainly from phytoplankton in the water column and then settles to the seabed; (2) by the growth of microphytobenthos (MPB) - tiny photosynthetic organisms in or on the seabed; and (3) by growth of macroalgae ("seaweed"). Sometimes (1) is called "vertical flux" or "particulate organic carbon flux".

9. Only a fraction of the carbon flux to the seabed will be "sequestered" (accumulated in the benthic sediments and stored long-term); most will be released quite quickly back into the water by microbial action and natural disturbance of

the seabed surface material. The proportion of carbon flux to the seabed that is sequestered is not well known for the South Taranaki Bight but is not likely to be unusual compared to other shelf-sea systems.

10. Mining will produce a sediment plume that will reduce light in the water column (reducing phytoplankton growth) and reduce light to the seabed (reducing MPB and macroalgal growth). This shading will reduce carbon flux to the seabed and is expected to reduce carbon sequestration proportionately because the sequestration fraction is unlikely to be affected by the mining.

11. The shading from the plume and consequent changes to primary production, carbon flux to the seabed and carbon sequestration are very variable, depending on the weather and currents. On average, the changes are highest east of the mining site and decrease with distance from the mining.

12. Under the "worst case scenario", Pinkerton (2017) Figure 2-9 shows the average modelled change in water column light and this is taken to be indicative of the projected change in phytoplankton primary production. Pinkerton (2017) Figure 2-12 shows the average modelled change in seabed light, and this indicates the projected change in benthic primary production. (The effect on light at the seabed (Figure 2-12) is much higher than the effect on water column light (Figure 2-9) because much of the sediment occurs low down in the water column.) Combining these changes in the appropriate ratio gives the projected change in carbon flux to the seabed, and the projected change in carbon sequestration.

13. The reduction in carbon flux to the seabed (and consequent reduction in seabed carbon sequestration) is projected to be greater than 40% in the plume area immediately east of the mining site but decrease further away to near zero in the wider South Taranaki Bight. To estimate the overall effect of mining

on primary production, carbon flux to the seabed and carbon sequestration it is appropriate to average or total over the Sediment Model Domain (following Cahoon et al., 2015 [2]).

14. Optical and primary production modelling of phytoplankton and MPB suggests that, under the "worst case scenario" (Pinkerton 2017), the organic carbon flux to the seabed averaged over the Sediment Model Domain is likely to be reduced by 7.7% (mining at site A) and by 5.6% (mining at site B). These values are slightly more accurate than the approximate estimates given in JWS (Primary Production) paragraph 41(b). Primary production by macroalgae is not included in these estimates because no information exists on its biomass or productivity.

15. Using a range of estimates of primary production and sequestration fractions (as neither of these are well known for the South Taranaki Bight), I estimate that the mining will reduce marine carbon sequestration by about 5-11 ktC/y (thousand tonnes of carbon per year). This is equivalent to releasing an additional 0.03–0.05 % of New Zealand's annual gross carbon dioxide emissions per year. Note that this estimate does not include the effect of mining on benthic macroalgae.

Dr Matthew Pinkerton

3 December 2025

[2] Cahoon, L.B.; M.H. Pinkerton; I. Hawes (2015). Effects on primary production of proposed iron-sand mining in the South Taranaki Bight region. Report for Trans-Tasman Resources, Ltd. Pp 30.