BEFORE THE FAST-TRACK EXPERT PANEL

IN THE MATTER of an application for approvals under section 42 of the Fast-track Approvals Act 2024 ("FTAA")

AND

IN THE MATTER of the application for approvals by Trans-Tasman Resources Limited for the Taranaki VTM Project, a project listed in Schedule 2 of the FTAA

JOINT STATEMENT OF EXPERT WITNESSES:

PRIMARY PRODUCTIVITY

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24 November 2025

INTRODUCTION

1. Expert conferencing on the topic of primary productivity took place online via Microsoft Teams on 24 November 2025.

2. The conference was attended by the following experts:

   (a) Dr Alison MacDiarmid ("AM") (Applicant);
   (b) Dr Matthew Pinkerton ("MP") (Applicant);
   (c) Professor Lawrence Cahoon ("LC") (Applicant) (LC had to leave during question 7.a. LC's responses in this JWS from 7.a. onwards (in red text) are based on his pre-circulated comments, which were subsequently confirmed by LC);
   (d) Dr Becky Shanahan ("BS") (Taranaki / Horizons Regional Councils); and
   (e) Dr Gregory Matthew Barbara ("GB") (Seafood NZ).

3. Steve Mutch (ChanceryGreen) acted as facilitator.

4. Caitlin Todd (ChanceryGreen) assisted the experts to draft the Joint Witness Statement ("JWS").

CODE OF CONDUCT

5. The experts confirm that they have read the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2023 and agree to comply with it. The experts confirm that the issues addressed in this JWS are within their area of expertise, unless stated otherwise.

SCOPE OF STATEMENT

6. In Expert Panel Minute 19 (5 November 2025), the Panel directed experts in primary productivity to conference regarding identified questions, recording matters that are agreed or disagreed and any unresolved matters or uncertainties.

7. The scope of this statement is limited to primary productivity.

8. Appendix D of Panel Minute 19 formed the basis of an agenda for conferencing.

9. In this JWS, we report the outcome of our discussions in relation to each item (below), including by reference to points of agreement, disagreement, and

unresolved matters or uncertainties. Where we are not agreed in relation to any issue, we have set out the nature and basis of that disagreement.

QUESTIONS FROM THE PANEL

1. Baseline Characterisation and Data Adequacy

a. Is the baseline data on primary production sufficient in spatial, temporal, and taxonomic resolution to support robust assessment of potential mining effects?

10. All experts note that there are three kinds of primary productivity in the region: (1) phytoplankton in the water column; (2) microphytobenthos (photosynthetic organisms living on the sediment seafloor) (MPB) on the seabed; and (3) macroalgae (seaweed) on the rocky reefs. All experts agree that we can estimate the relative change in primary productivity from each using changes in light availability, but because we do not know the overall importance of each type of primary producers, it is difficult to estimate the overall (combined) change in total primary production due to mining.

11. All experts agree that in situ information on water column primary production specifically in the proposed mining and plume areas ("study area") is scant, but there is reasonably good information on baseline phytoplankton abundance and optical conditions such as attenuation (from satellite observation).

12. MP states that these satellite data are resolved in space and time and now cover more than 2 decades. MP advises that, at the time of the 2015 optical effects work, the best available data was just 6 years, and this was what was used.

13. All experts note that MPB data was not collected by TTR as this was not practical. All experts agree that the amount of light reaching the seabed can be used as a proxy for first order assumptions about MPB production.

14. All experts note that macroalgae is confined to the rocky reefs (that have a height greater than 2m above the seabed) in the STB but there are no biomass or productivity measures. All experts agree that the amount of light reaching the seabed can be used as a proxy for first order assumptions about macroalgae production.

15. All experts note that they know of no comprehensive specific taxonomic information on phytoplankton, MPB or macroalgae in the STB region. All experts agree that it is not expected that there are rare or unusual species of

phytoplankton, MPB or macroalgae in the region. All experts agree that changes in light could change the taxonomic composition of macroalgae. This can affect the biodiversity associated with these species.

b. Are there any known key areas of high or unique primary production?

16. All experts consider that the STB is impacted by several large-scale, highly variable, physical phenomena that structure the distribution and biomass of phytoplankton. These large-scale physical processes include the Kahurangi/Cape Farewell upwelling plume, tidal mixing, river plumes and surf beach processes.

17. All experts agree that of these, the Kahurangi/Cape Farewell upwelling plume is the best understood in terms of plant nutrient renewal which impacts primary production and dynamics and its downstream impact on the zooplankton in the STB.

18. All experts agree that previous studies show that upwelling in the area of Cape Farewell (at the northwest of the South Island) and at the STB shelf edge can drive phytoplankton production that is higher than background, but this is not what could be termed excessive phytoplankton production.

19. All experts consider that the Manawatu River appears to impact phytoplankton biomass and production near shore. Nutrient recycling on Waitarere Beach, south of the Manawatu River, is probably related to the measured high productivity of surf diatoms.

20. All experts agree that, on high rocky reefs (those sufficiently elevated above the sandy substrate to avoid persistent sand scouring) inshore of the PPA, primary production by macroalgae is a key food source for herbivorous fish and invertebrates, as well as providing habitat complexity (shelter) to a wide range of species. All experts note that Morrison et al., (2022) documented a 'mosaic' of individual offshore reefs with rich biodiversity.[1] These reefs are on a continental shelf that extends far out from shore and differ from the inshore reefs. This distance from shore likely limited the land-based impacts on these reefs and also makes them relatively unique in New Zealand.

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1 Morrison, M., Seaward, K., Bodie, C., Madden, B., Evans, O., Smale, P., Pratt, K., Boyd, B., Richardson, J., Guy, R., McElroy, T., Williams, S., Pallentin, A., & Mackay, K. (2022). *Offshore subtidal rocky reef habitats on Pātea Bank, South Taranaki* (No. 2022229AK). NIWA (Prepared for Taranaki Regional Council).

21. BS notes that annual rates of carbon assimilation of *Ecklonia radiata* forests are on par with the productivity of giant kelp forests in the northeast Pacific and Laminaria forests in the North Atlantic (Blain et al., 2021).[2]

22. All experts state that the true extent of macroalgal contribution to primary production in the STB is unknown as it will depend on the distribution of rocky reefs that support macroalgae that are still be to formally mapped.

23. All experts agree that MPB can be expected to occur in the STB to depths dictated by light availability and their ability for photo-adaption, by nutrient availability and by seabed scouring from wave action and currents. All experts agree that areas of elevated light at the seabed occur further offshore in the STB than is normal in the New Zealand region. This is because of the shallower water associated with the Patea shoal in the offshore areas of the STB.

2. Use of Model Outputs and Scenarios

a. Are the outputs from the sediment distribution and optical effects models (suspended sediment concentration, light attenuation, plume extent) available in a format that you can meaningfully interpret for assessing effects on primary production?

24. AM, MP, and LC consider these outputs are suitable for this purpose as they provide information over the required spatial and temporal scales for assessing effects.

25. GB has reviewed both models and was able to interpret them, but his concern remains that the outputs of the Sediment Plume Model were not "worst-case". BS agrees with this.

b. Does the "worst case" model scenario reflect a worst-case scenario for primary production effects?

26. GB maintains that the "worst-case" sediment modelling was never agreed as worst-case (refer to JWSs from 2017, 2024, and 2025 for Sediment Plume Modelling). The parameters used in the 2017 modelling actually represent a "worse-case" model scenario based on modifications of mining procedures rather

[2] Blain, C. O., Hansen, S. C., & Shears, N. T. (2021). Coastal darkening substantially limits the contribution of kelp to coastal carbon cycles. Global Change Biology, 27, 5547–5563. https://doi.org/10.1111/gcb.15837

than oceanographic conditions. This has implications for other models dependent on the outputs for the Sediment Plume Model.

27. LC notes that these models do not include significant biological removal of suspended fines, a conservative assumption in the modelling period.

28. AM, MP, and LC state that the parameters used in the "worst-case" scenario were selected by the sediment expert working group for the 2017 hearing. The new source terms intermittently increase the amounts of fine sediments released into the water column at the mining site. Given it is these fine particles that predominately impact underwater visibility, AM, MP and LC consider this modelling provides a worse-case scenario (but maybe not a worst-case) for primary production.

29. BS states that there was no assessment of impact on primary production undertaken following the update of the worst-case scenario optical effects modelling.

3. Key Mechanisms Linking Mining Activity to Change in Primary Production

a. What are the main mechanisms by which the proposed mining is expected to affect primary production?

30. All experts agree that the key potential mechanism of the proposed mining operations on primary production is through a reduction in light available for photosynthesis. The sediment plume from mining is likely to reduce primary production by phytoplankton in the water column, by MPB on the seabed, and by macroalgae on reefs, depending on the magnitude of the shading in space and time.

31. All experts agree that photoadaptation by phytoplankton, MPB and macroalgae will mean that changes in primary production will be smaller than changes in light availability. The amount of the photoadaptive offset is hard to predict, so the modelling took the conservative assumption of zero photoadaptation.

32. BS notes that although benthic macroalgae, including *Ecklonia radiata*, can adapt to reduced light and store photosynthetic products, the physiological costs of doing so have not been considered. BS notes that high turbidity reduces *E. radiata* biomass, depth distribution, and productivity (Blain et al., 2021). While *E. radiata* is relatively tolerant of low-light environments, this tolerance comes at the

expense of primary production and increases vulnerability to other stressors such as rising temperatures. BS emphasises that reefs documented by Morisson et al. (2022) demonstrate current water clarity supports *E. radiata* at ~20m depth east of the PPA.

33. BS considers that deposited sediment can hinder spore settlement and regeneration, reducing both primary production and habitat provision if biomass is lost. GB agrees with this.

34. LC notes that the mining activity will yield near-bottom discharges of sediment (primarily fine sand), brine from reverse osmosis (desalination process) backwash, as well as near-surface releases of fresher wash water. The volume of effluents involved in both processes is relatively small compared to advective water transport at the mining site and should have minimal effect on primary production, except very locally.

35. LC states that sediment pore-water entrained in the mining process will contain small quantities of nutrients that will be released into the water column. Nutrient release will support a small increase of localised primary production. LC notes this is unlikely to lead to excessive phytoplankton production.

36. LC notes that none of the materials released by mining will be allochthonous (added from outside the system): all materials (sediments, water, nutrients) will be naturally occurring in situ, minus the iron sand content.

b. What is the expected magnitude and duration of light reduction in key areas, and what is its effect on productivity of pelagic primary producers?

37. All experts agree that changes to primary production occur at different spatial scales [Cahoon et al. (2015) section 2 "Spatial scales of ecosystems"] from localised effects (e.g. close to the mining site, or at particular benthic areas like reefs) to wide-scale effects. Effects of mining on light availability was predicted (1) at the widescale "Sediment Model Domain" (Hadfield 2013, ~half the whole South Taranaki Bight); (2) for particular benthic areas; and (3) alongshore and cross-shore transects, but changes to primary production were only estimated at widescale (1). Changes to primary production at the other scales could be inferred from the changes in light availability.

38. All experts note that three reports summarise the expected magnitude and duration of light reduction in key areas, and its effect on primary producers:

(a) Pinkerton & Gall (2015):[3] Projected changes to light availability due to mining;

(b) Cahoon et al. (2015):[4] Estimate of consequent effects on primary productivity at the broad scale (but did not consider macroalgae); and

(c) Pinkerton (2017):[5] "Worst-case" update to effects on light availability.

39. LC states that changes in primary production owing to modelled changes in light flux owing to mining activity are almost certainly too variable to be statistically identified (in any tractable field campaign). Therefore, LC considers that the question is whether changes in primary production will overwhelm the ability of the system to adapt to these changes.

4. Spatial and Temporal Extent of Predicted Change

a. What is the predicted spatial footprint and temporal pattern of reduced primary production (e.g., area and duration of >10% or 50% decline in productivity for phytoplankton)?

40. The "worst-case" update increased the projected effect of mining on light availability by 50% (water column) and 33% (seabed). The effects on primary productivity are hence likely to increase by ~40% from Cahoon et al. 2015 (Table 3-5 – see **below**) to the "worst-case" model scenario.

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3 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.

4 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.

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

Table 3-5: Predicted changes to optical properties and primary production. ¶Optical properties for estimating effects on primary productivity (PP) by phytoplankton and microphytobenthos (MPB) in the Sediment Model Domain (SMD), part of the South Taranaki Bight (STB).

Parameter	Measure	Background	Mining at site A	Mining at site B
Integrated water column light as proportion of surface	SMD mean (m)	5.5	5.4	5.4
	Mean change over SMD (%)		-1.9	-1.6
	Highest point change (%)		-45.5	-26.6
Water column PP	Mean change over SMD (%)		-1.0	-0.8
	Highest point change (%)		-22.7	-13.3
Prop seabed area with light >limit (mol/m²/d)	Area with E>0.04 (% of SMD)	28.6	26.6	26.9
	Area with E>0.4 (% of SMD)	11.2	9.4	9.7
	Change in area with E>0.04 (%)		-6.8	-6.0
	Change in area with E>0.4 (%)		-16.5	-13.8
Light at the seabed	Mean total over SMD (Gmol/d)	3.3	2.5	2.8
	Change in SMD total (%)		-22.8	-15.5
	Highest point change (%)		-95.1	-91.8
Benthic PP (MPB)	Mean change over SMD (%)		-19.3	-13.4
	Highest point change (%)		-80.7	-79.7
Total PP (water column plus benthic) over SMD	Best estimate of change (%)		-1.9	-1.4
	Lower limit of likely change (%)		-1.6	-1.2
	Upper limit of likely change (%)		-2.2	-1.7
Energy flow to seabed, total over SMD	Best estimate of change (%)		-5.8	-4.1
	Lower limit of likely change (%)		-3.1	-2.3
	Upper limit of likely change (%)		-11.9	-8.3

41. MP outlines the main results of the primary production assessment are (primary production by macroalgae is not included in these estimates):

(a) Primary productivity (phytoplankton + MPB) averaged over sediment model domain (SMD) and averaged by year was predicted by Cahoon et al. (2015) to be reduced by mining by 1.9% (mining at site A) and by 1.4% (mining at site B). In the "worst-case" modelling scenario, the reduction in primary productivity is likely to be 2.9% (mining at site A) and 2.1% (mining at site B).

(b) Energy flow to the seabed ecosystem averaged over the SMD was predicted by Cahoon et al. (2015) to be reduced by 5.8% (mining at site A), and by 4.1% (mining at site B). In the "worst-case" modelling scenario, the reduction due to mining is likely to be 8.1% (mining at site A) and by 5.7% (mining at site B).

42. LC considers that the area that might be affected to such an extent (10-50%) is highly unlikely to be very large or persistent in space – certainly no more than 1 km², probably much less, and variable in space as tidal and other flows move and disperse the plume. LC notes that near-bottom discharges of sediment will minimise turbidity effects in the shallower water column, where most primary production will occur.

43. BS states that deposited sediment from mining will be resuspended from wave action and migration of sediment from mining mounds (decades to centuries – Benthic Habitats and Species JWS dated 13 November 2025 and Iain MacDonald's evidence dated 13 October 2025). GB agrees with this.

44. BS highlights that in healthy *Ecklonia radiata* forests, annual carbon production can reach up to five times the forest's biomass. In turbid environments, however, annual production declines to only one to two times the biomass (Blain et al., 2021).

5. Recovery, Resilience, and Ecological Consequences

a. What is the likely recovery trajectory of primary producers following cessation of mining?

45. All experts agree that:

(a) phytoplankton are comprised of fast generation species and their populations are very likely to recover quickly (days) following cessation of mining in any particular part of the proposed mining area;

(b) MPB are likely to recolonise seabed sediments deposited from the mining plume in a few weeks or months; and

(c) macroalgae populations (specifically, *Ecklonia radiata*) will take months to years to recover if significantly impacted.

46. All experts agree that if *Ecklonia radiata* habitats are lost, there is a consequent loss in habitat structure which can impact ecosystem function.

47. AM considers that any impact is highly unlikely given the modelled duration of reduced light events and the capacity of macroalgae to store energy in their large structures. Macroalgal populations on nearshore and inshore reefs in the STB presently occur in an environment with frequent high turbidity events as indicated by the background sediment plume modelling.

48. BS and GB note that mining for 258 days per year for over 20 years should be considered as chronic because it limits the ability of macroalgal populations affected by the sediment plume to recover during periods of no mining. LC agrees with this.

49. BS states that deposited sediment from mining in the pits and mounds in the PPA will be resuspended for years to decades after mining stops which can impact macroalgal primary production recovery. GB agrees with this.

50. LC agrees with paragraph 49 above in principle; however, expects resuspension effects to decline exponentially with distance and with time from the mining operation. GB agrees with this.

b. What are the uncertainties on the resilience of phytoplankton to prolonged turbidity (persistent or repeat discrete events)?

51. All experts agree that some phytoplankton species can adapt to any prolonged or repeated turbidity effects more quickly than others. Phytoplankton assemblages in frequently perturbed continental shelf ecosystems like the STB are expected to be selected for resilience to such perturbations.

52. All experts agree that there is unlikely to be a change in phytoplankton community structure in the STB due to mining.

6. Cumulative, Food Web, and Ecosystem-Level Impacts

a. What are the likely cumulative or cascading effects of reduced primary production on food webs, including impacts on fish recruitment, higher trophic levels, or ecosystem services in the STB?

53. All experts agree that:

(a) the variability in satellite observed phytoplankton biomass from month to month is relatively high (see https://www.stats.govt.nz/indicators/marine-primary-productivity-data-to-2023/);

(b) light at the seabed is also variable from month to month which will likely affect MPB productivity;

(c) the standing biomass of macroalgae may not change but productivity will respond to changes in light and nutrients;

(d) the ecosystem as a whole in the STB is quite resilient to changes in primary productivity;

(e) mesopelagics (zooplankton, krill, small fish) are unlikely to be substantially affected because they are widely distributed, mobile, and feed in the water column;

(f) the effects on higher trophic species will likely be higher on specialised benthic feeders that have high site fidelity and are resident in the local area of the plume;

(g) species with nursery grounds in the impacted area are also potentially more at risk; and

(h) any affected species could in turn affect their predators.

54. BS and GB note that sediment deposition and increased turbidity are cumulative impacts on benthic macroalgae. BS and GB refer to paragraph 46 above in relation to flow on effects if *Ecklonia radiata* habitats are lost.

55. BS notes that the impacts of climate change (including increased sea surface temperature, marine heatwaves, ocean acidification, and increasing storm events) and fishing are cumulative effects will add to the effects from mining in the affected areas. MP and GB agree with this.

56. BS is not aware of any kina barrens in the area affected by mining, but notes they are an issue elsewhere in New Zealand and could impact on benthic macroalgal habitats in the STB.

7. Critical Uncertainties and Confidence

a. What are the principal sources of uncertainty in predicting effects on primary production caused by the proposed mining activities?

57. All experts agree that the key uncertainties are:

(a) the Sediment Plume Model (the source and quantity of ultra fines);

(b) biological contribution to sediment settling (flocculation);

(c) benthic biostabilisation by microbial films and degree to which worm fields stabilise the sediment;

(d) the Optical Effects Model (reliance on the Sediment Plume Model outputs of the mass-specific inherent optical properties of the ultra-fine sediment);

(e) degree of photoadaptation by primary producers;

(f) coupling between the water column production and the seabed productivity, specifically how much of the primary productivity from the water column ends up in the benthic system; and

(g) the true extent of macroalgal contribution to primary production in the STB.

58. LC considers that one must always approach modelling with some caution, but use of very conservative assumptions and calibration of model results against field data reduce the likelihood of substantial errors, especially errors yielding underestimates of effects. It is more likely that modelling has overestimated effects. Field measurements of primary production demonstrate high variability, so uncertainty is normal.

b. How do these uncertainties affect confidence in the robustness of conclusions about likely effects and effects mitigation and management?

59. GB considers that the uncertainties outlined in the Sediment Plume Model JWS 2025, 2024 and 2017 remain and influence the predictive power of the Optical Model. The effects of the sediment plume are the key driver for determining the levels of impacts and effects on primary productivity.

60. MP and AM consider that the estimate of impact derived from the Optical Model, even with the uncertainty, is sufficiently accurate to rely on to make a decision i.e. is fit for purpose, provided that the Sediment Plume Model can be relied on.

61. MP, AM, and GB consider the condition limiting the total amount of ultra fine particles released (which impact the light environment) is critical. BS agrees in principle; however, this agreement does not negate concerns regarding the ability to adequately assess the project's potential effects prior to potential consenting.

62. BS considers that the existing uncertainties relating to the distribution of reefs and their contribution to total primary productivity mean that there is insufficient evidence to assess the potential impacts of the proposed activity on primary productivity. GB agrees with this.

63. LC has very high confidence that the modelling efforts here have been well conducted and validated.

8. Consequences for Decision-Making and Conditions

a. Where information gaps, disagreement or uncertainty exist, what are the consequences for the application, effects assessment, and decision-making?

64. AM, MP, GB and BS refer to their responses to question 7.b. above at paragraphs 59-62.

9. Adequacy of Mitigation and Monitoring

a. Are the proposed conditions on proposed mitigation and monitoring measures suitable and sufficient to avoid, remedy, or mitigate adverse effects on primary production?

65. BS notes for any answers to question 9 that any discussion on consent conditions is to assist the Panel and does not negate concerns regarding the ability to adequately assess the project's potential effects prior to potential consenting.

66. AM, MP, GB, and BS consider that the conditions limiting and monitoring the total production of ultra fines are targeting the greatest uncertainty and the most important factor determining the likely effect of mining on primary production.

67. BS notes that a lack of information about the effects cannot be addressed through conditions because the uncertainty means there is no confidence that such conditions would effectively avoid, remedy, or mitigate those effects.

68. LC states that he is satisfied that the proposed mitigation measures, most notably near-bottom sediment disposal, are highly protective of phytoplankton production. LC has also reviewed the proposed Benthic Ecology Management Plan (BEMP) and is satisfied that, within the bounds of what is tractable in field conditions, there will be sufficient data to inform proper responses.

b. If experts disagree, what alternative or supplementary measures would improve effects management, and to what extent would these reduce uncertainty or risk of significant adverse effects?

69. MP considers that, if preserving benthic primary production (MPB and macroalgae) is agreed to be important, mitigation would likely better focus on preserving periods of clear water (to enable benthic primary production) rather than limiting periods of high suspended sediment concentration, as is presently the focus. BS, AM and GB agree with this.

70. MP, AM, GB and BS agree that variability in the location and movement of the plume means that in situ monitoring of suspended sediment will likely be difficult. Satellite and/or aerial observations will be able to provide wide-area, synoptic information on the scale, intensity and optical effects of the sediment plume, in clear-sky conditions. Remote observation is hence likely to be a cost-effective complement to in situ plume monitoring.

71. MP, AM, GB and BS agree that instrumentation on mobile, autonomous (uncrewed) seacraft should also be considered alongside water sampling, in situ fixed stations and remote sensing for monitoring the plume.

72. BS recommends that turbidity limits be based on measurements rather than modelled or predicted values. BS recommends that irradiance/PAR measurements should be taken at the same time as turbidity measurements and both measured at different depths in the water column. These can help inform ecologically relevant thresholds. GB agrees with this.

73. BS suggests that to monitor water clarity, a suite of real-time turbidity buoys at key sites (e.g., reefs around the PPA, Project Reef, the Traps) should be deployed with trigger values for an operational response. Once trigger values are set from measurements, operational responses can be set for tiered responses as seen in other consents. For example: if the 6-hour level is exceeded then it must be noted internally; if the 12-hour level is exceeded, the EPA must be notified; and if the 24-hour level is exceeded, the operation must stop until water clarity returns to agreed-upon levels. MP and GB agree with this.

74. BS notes that the pre- and post-commencement monitoring had an additional measure to identify whether operational responses are necessary to avoid material harm to reef habitat identified by pre-commencement bathymetric survey at certain sites. BS would like to add key sites identified in the Morrison et al., (2022) report, as well as nursery grounds. GB and MP agree with this.

75. BS, GB, AM and MP agree that sediment accumulation should be monitored at the same sites suggested in paragraph 74 above. This should be measured in both pre-commencement and operational management plans as well as post-mining (for at least 5 years).

10. Advice for interdisciplinary assessment and decision-making

*a. **What advice or caveats should be communicated to other experts (e.g., those assessing fisheries or wider ecosystem health) to ensure that primary production effects and uncertainties are accounted for appropriately in interdisciplinary effects assessments or decision-making?***

76. The experts did not have time to discuss this question at length but refer to the sections above on:

(a) ecological effects (paragraphs 53-56); and

(b) uncertainties (paragraphs 57-63).

77. LC considers that this question is too complex for us as experts considering primary production to address without more information about trophic pathways and something like an ecosystem model around which to frame our responses.

SIGNATURES OF EXPERTS

AB MacDiarmid

Dr Alison MacDiarmid

Matt Pinkerton

Dr Matthew Pinkerton

Professor Lawrence Cahoon

Dr Becky Shanahan

Dr Gregory Matthew Barbara