

**BEFORE THE ENVIRONMENTAL PROTECTION AUTHORITY  
AT WELLINGTON**

**IN THE MATTER**

of the Exclusive Economic Zone and  
Continental Shelf (Environmental Effects)  
Act 2012

**AND**

**IN THE MATTER**

of a decision-making committee  
appointed to hear a marine consent  
application by Trans Tasman Resources  
to undertake iron ore extraction and  
processing operations offshore in the  
South Taranaki Bight

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**EXPERT REBUTTAL EVIDENCE OF MICHAEL DEARNALEY ON BEHALF OF  
TRANS TASMAN RESOURCES LIMITED**

**9 FEBRUARY 2017**

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## **INTRODUCTION**

1. My name is Michael Dearnaley.
2. I prepared Expert Evidence dated 15th December 2016 (First Statement) with respect to these proceedings on behalf of Trans Tasman Resources Limited.
3. My qualifications and experience as a dredging and sediment transport specialist are set out in paragraphs 2 to 4 of my First Statement.
4. I repeat the confirmation given at paragraph 5 of my First Statement that I have read the Code of Conduct for Expert Witnesses and agree to comply with it.
5. The purpose of this Rebuttal Evidence is to respond to matters raised in submitter evidence.
6. In preparing this evidence I have reviewed the following statements of evidence:
  - (a) Joris Jorissen for Fisheries Submitters; and
  - (b) Dougal Greer for Kiwis Against Seabed Mining Incorporated.
7. I also comment upon the non-expert evidence submitted by Karen Pratt.
8. I have been requested to keep my rebuttal to a total of five pages in length and accordingly I have addressed the key points raised in the statements above (as referred to in their conclusions or summary in Ms Pratt's case). Where I do not comment on matters raised in any of the statements of evidence, this should not be taken to be an acceptance of that point.

## **PROPORTION OF SLOWEST SETTLING FINES**

9. In the conclusions to their evidence both Mr Jorissen and Mr Greer raise an issue regarding the proportion of fines settling with the lowest settling velocity considered. They both suggest that the percentage of the most slowly settling fines as proposed by NIWA would be more conservative for use in the plume modelling than the value actually used and would result in a larger plume.
10. I consider that use of the NIWA value would be over conservative. As I state in paragraph 40 of my First Statement the laboratory tests showed that in tests where further fines were added to the settling chamber the most slowly settling fines would participate in further flocculation. I also note in paragraph 40 that the additional effects of biological material are likely to further enhance the formation of flocs and increase the proportion of the mass of fine sediment that settles to the seabed.

## **MODEL ERROR**

11. Mr Greer raises the need for other experts to be able to assess whether there has been an error in the model results. I agree that this is an important point and note that the model results are provided in more detail in terms of resolution of some very small changes in suspended sediment concentrations (SSC) than might normally be the case for precisely this reason – to facilitate the assessment of impact on optical properties by other experts.

## **PREDICTED 99<sup>TH</sup> PERCENTILE SUSPENDED SEDIMENT CONCENTRATIONS**

12. Mr Jorissen claims that the 99<sup>th</sup> percentile predictions of far-field SSC may be an underestimate because variability in the source term is excluded. I consider that representing the full detail of the time varying hydrodynamics over a two year period and maintaining a temporally and spatially constant

source term produces an accurate and realistic assessment of the distribution of SSC.

13. I do not consider the 99<sup>th</sup> percentile predictions would necessarily increase if a time varying source term were to be used. Depending on timing of variation in source term magnitude with respect to the prevailing hydrodynamic conditions the 99<sup>th</sup> percentile values could reduce given the very episodic nature of the predicted time series of SSC (see **Appendix 2** of my First Statement).

### **CHOICE OF MODEL PARAMETERISATION**

14. Mr Greer comments on the selection of model parameters and questions whether they have been sufficiently conservative and whether enough sensitivity testing has been undertaken to explore uncertainty in the model results. I consider that a robust basis has been provided with respect to the source terms and the mechanisms in which they will be generated for use in the plume modelling. I do not consider that further sensitivity testing would materially affect the overall assessment. In my opinion the use of the two year period of hydrodynamics as the basis for analysis of statistical quantities is particularly powerful for understanding variability and the potential footprints of impact.

### **BACKGROUND SEDIMENT CONCENTRATIONS**

15. Mr Greer points out that my reference to background SSC as being “natural” levels is inappropriate because the background levels have already been influenced by anthropogenic activities. I accept this point and am happy to have any reference I make to “natural” suspended sediment concentrations to be considered as “background” suspended sediment concentrations (for example in paragraph 54 of my First Statement).

## **SUBMISSIONS OF MS PRATT**

16. In her written report Ms Pratt has raised 37 issues relating to points covered in my First Statement. In her summary she raises two points. The first is about the overall quantity of the mining and how it compares to dredging projects she has been able to find information about. I note that in paragraph 12 of my First Statement I am alluding to very large dredging projects around the world such as the major reclamation projects completed in the last decade in the United Arab Emirates and Singapore where hundreds of millions of cubic metres of material have been dredged from the sea bed and used to build new land.
17. Ms Pratt also raises concerns over the overall tonnage of fine sediment involved in the project and how this compares with the previous application. The important point to consider in the current assessment process is that some fines will disperse in the very short term as they are released in the process of discharge back to the sea bed. These are considered in the plume modelling. If they have been retained on the seabed and buried within the discharge sands then consideration of their future resuspension is made through the patch modelling I describe in paragraph 81 of my First Statement.

## **CONCLUSIONS**

18. None of the points raised affect the conclusions I have made in my first statement and I am firmly of the opinion that sediment plume has been accurately defined and that the results of the modelling can be used with confidence.

**Michael Dearnaley**

**9 February 2017**

A handwritten signature in black ink, appearing to read 'M.P. Dearnaley', written in a cursive style.