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 reconsider a marine consent application by Trans Tasman Resources Limited to undertake iron ore extraction and processing operations offshore in the South Taranaki Bight

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EXPERT EVIDENCE OF DR DAVID THOMPSON ON BEHALF OF TRANS TASMAN RESOURCES LIMITED

19 MAY 2023

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INTRODUCTION

Qualifications and experience

1. My name is David Richard Thompson. I am a seabird ecologist and Group Manager (Coastal Ecology and Fisheries) at the Wellington campus of the National Institute of Water and Atmospheric Research (**NIWA**), where I have been employed since 1998. I was awarded a Bachelor of Science (Hons.) by the University of Liverpool in 1985 and a PhD in Zoology by the University of Glasgow in 1990.

2. I have 33 years (post-PhD) of professional experience in marine biology, particularly seabird ecology. I have research interests and experience in at-sea distributions of seabirds, seabirds as sentinels of marine ecosystems, seabird-fishery interactions and the use of stable isotopes in marine ecology. I have authored over 100 science journal papers, 5 book chapters and over 60 science reports and statements of evidence for a broad range of clients.

3. I previously gave evidence for Trans-Tasman Resources Limited (**TTR**) before a Decision-making Committee (**DMC**) in 2017.

4. My evidence before the 2017 Committee comprised:

   (a) A statement of expert evidence dated 15 December 2016;

   (b) A summary of evidence dated 8 February 2017;

   (c) A joint witness statement of experts in the field of effects on seabirds dated 16 February 2017; and

   (d) Oral evidence on 22 February 2017 (Transcript pages 591-607)

5. I also prepared or contributed to various reports which formed part of TTR's application, which are listed in paragraph 4 of my 15 December 2016 statement.

Code of conduct

6. I confirm that I have read the Code of Conduct for Expert Witnesses as contained in the Environment Court Practice Note dated 1 January 2023. I agree to comply with this 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.

SCOPE OF EVIDENCE

7. I have been asked to review and update my evidence taking into account the decision of the Supreme Court in *Trans-Tasman Resources Ltd v Taranaki-Whanganui Conservation Board and Others* [2021] NZSC 127 (**Supreme Court Decision**).

8. In particular, the Supreme Court identified[1] that the 2017 DMC found:

   (a) the available information showed the presence of a diverse range of seabirds in the South Taranaki Bight (**STB**);

   (b) there had been no systematic and quantitative study of the at-sea distributions and abundance of seabirds in the area; and

   (c) the lack of detailed knowledge about habitats and behaviours of seabirds made it difficult to confidently assess the risks of effects.

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[1] At [119] and [120].

9. I understand the Supreme Court held that in these circumstances the 2017 decision had failed to evaluate and ensure there would be no "material harm" on seabirds from mining discharges, and had failed to favour caution and environmental protection, particularly by applying a condition requiring no adverse effects on some seabirds "at a population level".

10. I have reviewed all the available evidence concerning the potential effects of the proposed mining operations and resulting sedimentation on seabirds in the STB, to assess whether there is any new information since 2017 relevant to this subject matter, and to provide my view whether the grant of consent, with conditions, will avoid material harm on seabirds and will favour caution and environmental protection.

UPDATING EVIDENCE

11. Since my evidence of December 2016, there has been no new or substantive information produced on the abundance and distribution of seabirds and shorebirds in and adjacent to the STB. However, threat classifications (both the New Zealand Threat Classification System (**NZTCS**) and the International Union for Conservation of Nature (**IUCN**) Red List) have been updated, with several taxa being reclassified as a result (Robertson et al. (2021), and see https://www.iucnredlist.org/). The current classifications are presented in Table 1 for seabirds and shorebirds likely to occur within and adjacent to the STB.

12. The most recent update of the NZTCS as applied to birds (Robertson et al. 2021) included a new and additional "Threatened" category of "Nationally Increasing", bringing the number of "Threatened" categories in the NZTCS to four. These are "Nationally Critical", "Nationally Endangered", "Nationally Vulnerable" and the new category "Nationally

Increasing". The structure of the IUCN Red List remains unchanged and includes three "Threatened" categories: "Critically Endangered", "Endangered" and "Vulnerable".

EVIDENCE ON EXISTING ENVIRONMENT: SEABIRDS AND SHOREBIRDS

13. The STB supports a relatively modest seabird assemblage, in terms of number of species utilising the area, compared to the approximately 162 seabird taxa reported from throughout the New Zealand region, but detailed, systematic and quantitative information on the at-sea distribution of virtually all species is currently lacking for the STB.

14. Nevertheless, based on published information, sightings information publicly available from online sources (for example, the 'eBird' website: see http://ebird.org/content/newzealand/) and unpublished tracking information held by NIWA, Table 1 summarises the seabird assemblage likely to occur in the STB at some time during the year. Taxa have been ranked according to the NZTCS conservation status. This list is not intended to be definitive and additional taxa could occur in the region from time to time.

15. Based on NZTCS classifications, three seabird taxa classified as 'Threatened – Nationally Critical' are likely to occur in the STB (Antipodean albatross, Gibson's albatross and Salvin's albatross), and a further eight Threatened' taxa (either 'Nationally Endangered' or 'Nationally Vulnerable' are also likely to occur in the area (Table 1). Additionally, a further 24 taxa classified as one of four 'At Risk' categories, and two further taxa classified as 'Vulnerable', based on 'Red List' classifications, could also occur in the STB (Table 1).

16. It is possible that seabird taxa listed in Table 1 could occur throughout the STB. This will be especially the case for species of albatross, petrel, shearwater and other small procellariform

seabirds that range widely and occupy relatively large distributions. In contrast, some species (for example, gulls, terns and shags) tend to frequent more coastal habitats.

17. Additionally, the coastal environment bordering the STB supports a range of shorebirds that are unlikely to occur at sea. Based largely on online and publicly available sightings information, Table 1 also summarises shorebird taxa occurring along the coast of the STB, ranked according to their NZTCS conservation status classifications. Based on NZTCS classifications, two shorebird taxa classified as 'Threatened – Nationally Increasing' are likely to occur coastally, adjacent to the STB (wrybill and northern New Zealand dotterel). A further seven taxa classified as one of four 'At Risk' categories also occur in the STB coastal environment (Table 1).

18. The STB does not support large breeding colonies for any species, but a number of coastal estuarine sites are of significant value to coastal, shore, wading, and migratory bird species. These include the Waikirikiri Lagoon, and the Whanganui, Whangaehu, Turakina, Manawatu and Rangitikei river estuaries. For example, the Manawatu estuary is the largest and most important estuary for birds in the southern half of North Island and is one of seven New Zealand sites designated under the Convention on Wetlands of International Importance (also known as the Ramsar Convention, with sites also known as Ramsar sites). Over 90 bird species have been recorded at the site, including northern hemisphere migrants such as bar-tailed godwit and lesser knot, together with New Zealand species such as wrybill, northern New Zealand dotterel, banded dotterel and royal spoonbill.

ASSESSMENT OF POTENTIAL EFFECTS ON SEABIRDS AND SHOREBIRDS

19. Seabirds could potentially be affected by the proposal through: displacement from the mining site (physical

exclusion), reduced foraging efficiency (via increased turbidity from the sediment plume), noise, fuel or oil pollution and through effects of artificial nocturnal lighting.

Displacement

20. Assuming a worst-case scenario, seabirds could be physically excluded from the proposed project area (**PPA**) entirely, and could similarly be unable to exploit the water column below the mining vessel and for an extended area beyond the location of mining. This might come about through a reluctance of seabirds to approach the mining vessel. However, all seabirds exploit relatively large areas and have relatively large distributions and ranges (see paragraphs 30 and 31) relative to the PPA. Furthermore, while seabirds may feed within the PPA from time to time, seabird prey will vary in both space and time, and are as likely to occur outside the PPA as within the PPA. Given the dynamic nature of prey availability, the ability of seabirds to search for prey over relatively large spatial scales and the small area of the PPA relative to the foraging ranges of seabirds, exclusion from the PPA will have a negligible effect on seabirds.

Sediment plume

21. The sediment plume associated with the discharge of de-ored sediment back to the seafloor has the potential to affect seabirds through an increase in water turbidity and a corresponding reduction in foraging efficiency, particularly in visual predators such as shag species and little penguin. In extremely turbid water, prey detection and capture may be impacted to the point where seabirds are ultimately displaced, moving to unaffected or less affected areas.

22. However, sediment plume modelling suggests that mining-derived sediment would contribute a relatively modest amount of material to both the near-surface and near-

bottom sediment load. I rely on Dr Macdonald's evidence that

(a) Suspended sediment concentration (**SSC**) is greatest within a few kilometres of the mining site, and even at the more extreme 99th percentile values, the modelled SSC is within the range of background values (i.e. SSC that is present for reasons other than the mining); and

(b) The magnitude of the plume reduces rapidly with distance from the mining site while the background values increase shoreward from the mining site.

23. Based on this, increases in SSCs resulting from mining-derived material are unlikely to make a substantial difference to the foraging ability of seabirds exploiting prey in the water column.

24. The potential effect of mining-derived sediment on seabirds was perhaps the most notable point of disagreement between experts as recorded in the Joint Statement of Experts in the Field of Effects on Seabirds, dated 16 February 2017. My view remains that the increase in SSCs resulting from mining will be relatively small compared to background SSCs, and coupled with the relatively small area affected by elevated SSCs compared to the relatively large foraging ranges utilised by seabirds (see paragraphs 30-32), mining-derived sediment would be unlikely, therefore, to affect foraging in seabirds. Furthermore, it is my understanding that elevated SSCs may result in some localised and short term displacement of some fish species (as addressed in Dr MacDiarmid's evidence), and to the extent that this occurs, prey available to seabirds would be essentially the same in the presence of the mining-derived sediment.

Noise

25. Noise from mining operations, from the mining vessel itself, and perhaps a surrounding area influenced by operational noise, has the potential to displace birds (it is unlikely that seabirds will be attracted to operational noise). As noted in paragraph 21, seabirds exploit relatively large areas and any displacement through noise will not have a significant effect on any potentially affected species.

Fuel or oil spills

26. Loss of fuel or oil from vessels has the potential to kill and otherwise negatively impact seabirds, both directly and indirectly, depending on the toxicity and volatility of the fuel/oil, and the time and location of the spill in relation to seabird numbers, habitat-use and behaviour, all of which will vary temporally.

27. I addressed the potential effects of a fuel or oil spill in detail in my evidence of December 2016, and my views are unchanged. The unplanned loss of fuel or oil was not identified as an issue of concern in the Joint Witness Statement and, similarly, was not identified as an issue in the 2017 DMC decision.

Lighting

28. TTR's proposed project will entail use of a large (ca. 345 m long) processing vessel that will be permanently moored over the ironsand extraction site offshore. The vessel will be permanently crewed and will be a 24/7 operation requiring deck lighting at night for safe operation. These deck lights, in combination with standard navigational lights, will locally increase the presence of artificial nocturnal lighting posing a theoretical threat to seabirds.

29. While it is well known that artificial nocturnal light attracts many species of seabirds, the majority of diurnally-active seabirds appear not to exhibit marked attraction to artificial light, whereas light can potentially be a problem for nocturnal species. Furthermore, attraction to artificial nocturnal light sources at sea tends to be a problem for seabirds during bad weather (particularly with poor visibility), when the light source is close to breeding colonies and when the light source is directed upwards or outwards, as opposed to downwards.

30. While it is possible that the vessel's lights may attract nocturnal seabird species, the remoteness of the PPA from major seabird breeding colonies and standard mitigation protocols, as detailed in TTR's draft Seabird Effects Mitigation and Management Plan (**SEMMP**) should ensure the impact from this effect on seabirds will be less than minor. Mitigation measures include, but are not limited to, minimising the use of nocturnal light as far as is practicable, directing or shielding light sources to minimise light spill from the vessel and ensuring all windows and port holes are covered at night by blinds to prevent light emanating).

Scale of effects with respect to seabirds

31. Seabirds generally, but particularly albatrosses and closely related species, operate at relatively large scales. When breeding, foraging trips of hundreds to thousands of kilometres are typical, and it follows therefore that at the population level seabirds are able to exploit marine resources over vast areas, perhaps for the widest-ranging taxa in the order of millions of square kilometres.

32. Even for coastal species that tend not to range as widely as the procellariform taxa (albatrosses and their allies), individuals will likely utilise in the order of thousands of square kilometres during the breeding season. For example, consider

a little penguin breeding along the coast adjacent to the STB: assuming a foraging range of 40 km, and also assuming an individual penguin then exploits a semi-circular area out from its breeding site, then an area of over 2500 km^2 could be utilised.

33. Based on the worst-case modelling, the average spatial extent of surface and near-bottom median SSC above 2 mg/L due to mining is 78.55 km^2 (Dr MacDiarmid's supplementary evidence). Even assuming little penguins avoid this area completely, the 'lost' area only represents approximately 3% of the area a little penguin could exploit. It should also be noted that the SSC of 2 mg/L is a relatively low threshold, but the lowest SSC found to be avoided by pelagic fish (see Dr MacDiarmid's evidence) – it is possible that little penguins could still forage successfully in water with this SSC level. Comparing the 78.55 km^2 area with a SSC of 2 mg/l with the much larger areas that can be exploited by pelagic, flying seabirds, it is clear that even removing the affected area completely will have a negligible effect.

2017 DECISION

34. At paragraph 579 of the 2017 DMC's decision, it is noted that "there is a lack of detailed knowledge about habitats and behaviour of seabirds in the STB" and further that "It is difficult to confidently assess the risks or effects at the scale of the Patea Shoals or the mining site itself". While it is the case that detailed, fine-scale information about how seabirds utilise the PPA and wider STB, and how this varies temporally, is unavailable for most species, it is nevertheless my view that sufficient information is available on the scale and magnitude of likely effects and on the scale at which seabirds interact with their environment to be confident that the impact on seabirds will be less than minor.

CONDITIONS

35. Appendix 2 to the Marine Consent Decision on TTR's application details the Marine Consent Conditions. Several of these conditions are relevant to seabirds.

36. Condition 9 comprises two parts. Part a notes that 'There shall be no adverse effects at a population level of seabird species that utilise the South Taranaki Bight that are classified under the New Zealand Threat Classification System as "Nationally Endangered", "Nationally Critical" or "Nationally Vulnerable" or classified as "Endangered" or "Vulnerable" in the International Union for the Conservation of Nature "Red List"'. Part b notes that 'Adverse effects on seabirds, including but not limited to effects arising from:

    i. Lighting (including the Integrated Mining Vessel, Floating Storage and Offloading Vessel);

    ii. Spills; and

    iii. The effect of sediment in the water column on diving birds that forage visually

    shall be mitigated, and where practicable avoided'.

37. It is my opinion, for all the reasons summarised above and covered in my 2017 evidence, that the proposed mining operation will not adversely affect any of the relevant seabird species at a population level. However, that is not dependent on a condition expressing that requirement — it is an outcome of the limited potential for effects, and the various forms of mitigation that will result from other conditions (e.g. limits on discharge of sediment, limits on lighting, and measures to address any potential spills). In my view, part a of Condition 9 expresses the outcome as if it will be able to be proved that no population level effect has occurred, and this is not only

challenging, but misleading about what is currently scientifically possible.

38. At its simplest, a population level effect would be a decline in a population (i.e., a reduction in the number of individuals comprising that population) between two or more points in time. For seabirds, populations are typically reported as the number of breeding pairs recorded in a particular year or breeding season. Other population metrics could also be used to assess adverse effects (forexample, the rate of survival of breeding adults from one breeding attempt to the next), but these tend to involve more complex data gathering approaches (compared to counting the number of breeding pairs).

39. So, for purposes of illustration, and using perhaps an extreme scenario – suppose the proposed mining activity, over the course of a year, results in the death of a number of individuals of a 'Threatened' seabird species. The question is then whether that level of mortality is sufficient to cause an effect (adverse) at the level of the population of that species? In other words, will that level of mortality result in a decrease in the size of the population? Although not explicitly stated, it could be that paragraph 4 of the draft SEMMP (Thresholds for adverse effects on threatened species) is attempting to address this issue.

40. In order to be able to answer the question posed in paragraph 38, a fully parameterised demographic model would be required for the seabird species. In turn, such a model would require extensive data on: the population size, the rate of survival of breeding adults, the rate of survival of juveniles to adulthood, the age of first recruitment to the breeding population, and information on the productivity of the population (number of chicks fledged per breeding attempt). All of these parameters will vary from year to year, and some

will require several years of data gathering effort. Once constructed, however, the model could be 'tested', in the example outlined in paragraph 38, by raising the level of adult mortality by the number of deaths recorded due to sand mining activities and seeing what effect, if any, this new higher mortality rate had on the population trajectory.

41. There are very few seabird species breeding in Aotearoa New Zealand for which sufficiently robust and comprehensive population models existed at the time of TTR's application, or which exist now, to allow the sort of 'testing' as described in paragraph 39 to be carried out.

42. Furthermore, for other population level parameters it will be uniformly difficult/impossible to say whether the proposed activity is the cause of any change in those parameters. For example, assuming suitable data existed, a decrease in adult survival could be detected. Such a decrease could result from a reduction in seabird prey availability. Insufficient food could reduce a bird's body condition to the point where mortality increased, and overall adult survival would decrease. However, there are many reasons why adult mortality might increase that are entirely unrelated to the proposed activity.

43. For these reasons I would support a refinement that removes the reference in condition 9 to "population level", and refers simply to avoidance of adverse effects on the relevant species.

44. Additionally, based on updated "Threatened" categories in the NZTCS as outlined in paragraph 11, part a of condition 9 should be updated to "There shall be no adverse effects on seabird species that are classified under the NZTCS or under the IUCN Red List as "Threatened".

45. Condition 48 outlines the Pre-commencement Environmental Monitoring Plan, which includes the provision for a minimum

of two years monitoring of seabirds. Such monitoring should ideally take the form of a structured and systematic boat-based survey, following well-established protocols to record seabird occurrence, that covers an area encompassing not only the PPA but a substantial additional area beyond the PPA allowing seabird use of the PPA to be placed in a regional context. The survey should be repeated at least four times per year to capture temporal variation in seabird use of the PPA specifically, and the STB more generally. In my view this should be sufficient to establish seabird species occurrence within the STB, species abundances and how these vary in both space and time.

46. It is appropriate that pre-commencement monitoring take place as close to the start of mining as possible as this will ensure the most relevant and representative data with which to incorporate into a before-after mining comparison. If data from a seabird monitoring programme in 2016 or earlier were used for this purpose it is possible that such data would not reflect the current seabird assemblage utilising the STB.

47. Overall, the conditions and associated plans mentioned in paragraphs 34-44 provide adequate safeguards for the protection of seabirds. However, I would suggest that condition 9, and in particular the requirement to demonstrate a lack of an adverse effect at the population level, will be extremely difficult to implement for the majority of seabird taxa.

CONCLUSIONS

48. The seabird assemblage utilising the proposed mining area and adjacent areas in the STB, and how this might vary seasonally, remains to be quantified. Nevertheless, it is possible to draw up a list of seabird species that likely occur in the STB and to use this as the basis for assessing the impact(s) of potential effects. The information is sufficient for me to give

my expert opinion on the potential effects of the proposed mining operations and resulting sedimentation on seabirds in the STB.

49. For all the reasons I have set out here and in my 2017 evidence, I consider the proposed mining, regulated by appropriate conditions (as discussed above), will not result in material harm to seabirds, and that a grant of consent on this basis would achieve the requirement of favouring caution and environmental protection.

Dr David Thompson

19 May 2023