

**BEFORE THE BOARD OF INQUIRY
COASTAL RESOURCES LIMITED MARINE CONSENT APPLICATION**

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 consider a marine
consent application made by Coastal
Resources Limited to Dispose of
Dredged Material at the Northern
Disposal Site

**STATEMENT OF EXPERT EVIDENCE OF SIMON JOHN CHILDERHOUSE
FOR COASTAL RESOURCES LTD**

Dated: 25 October 2018

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MAY IT PLEASE THE COMMITTEE

1. EXECUTIVE SUMMARY

- 1.1. Coastal Resources Limited (CRL) are applying for a new resource consent to replace an existing and ongoing consent (EEZ900012; expiry 31 December 2032) for the disposal of dredged material at a deep-sea spoil disposal site east of Great Barrier Island, the Northern Disposal Area (NDA). The new consent seeks to expand the annual disposal limit from 50,000 m³ to 250,000 m³ per annum.
- 1.2. Based on my review of the Application, associated Appendices and other material, I consider that the proposed operation poses a very low or low risk to marine mammals from the impacts identified. The proposed mitigation and Conditions are appropriate to the level of risk proposed by the operation although I have made some suggestions for increased reporting.

2. INTRODUCTION

- 2.1. My full name is Simon John Childerhouse.
- 2.2. I hold the following qualifications:
 - 2.2.1. PhD in Marine Science, University of Otago (2009; Thesis – Conservation Biology of New Zealand sea lions);
 - 2.2.2. Post Graduate Diploma in Wildlife Management, University of Otago (1993; Thesis – Individual photographic identification and population size estimates for sperm whales at Kaikoura, New Zealand); and
 - 2.2.3. BSc in Zoology, University of Auckland (1991).
- 2.3. I am currently employed as a Senior Research Scientist at Blue Planet Marine, an environmental consultancy company based in Nelson, and have been employed there since 2012. Previously, I worked as a Marine Mammal Scientist for 11 years at the Department of Conservation (DOC) and a further three and a half years at the Australian Government's Marine Mammal

Centre. I have been a member of the Scientific Committee of the International Whaling Commission from 1998 until 2013 during which time I held the positions of Head of the New Zealand delegation for eight years, Chair of the Southern Ocean Whales sub-committee for three years and a member of the Australian delegation for three years. I am also an Executive Officer of the South Pacific Whale Research Consortium, a member of the Convention on Migratory Species Scientific Council's Aquatic Mammals Working Group and a member of the New Zealand Threat Classification System team for marine mammals managed by DOC.

- 2.4. I have more than 25 years' experience working as a marine mammal scientist in New Zealand, Australia, Antarctica, USA, Canada and the South Pacific. My work has included pure and applied marine research, leading and project managing large scale, international research projects, publication across a broad range of marine research, lecturing and teaching at various universities, representation of both Australian and New Zealand Governments at international meetings, development of national and international policy and strategic documents, and delivering applied and practical solutions to challenging marine conservation and resource-utilisation issues. I have considerable experience in the ecology and behaviour of marine mammals and the identification and mitigation of impacts of anthropogenic activities, including noise, on marine mammals.
- 2.5. I have more than 50 peer-reviewed research papers (including three book chapters) published in the international scientific literature. These include papers on nine different New Zealand marine mammal species, namely New Zealand sea lions, whales (sperm, humpback, southern right and blue) and dolphins (Hector's, Māui, dusky and bottlenose). I have also authored more than 80 unpublished research reports.
- 2.6. I have appeared as an expert witness on marine mammal ecology and/or potential impacts on marine mammals for the following consent applications:
 - 2.6.1. On behalf of Trans-Tasman Resources Limited (TTRL) for both its 2014 and 2016 marine mining consent applications to the New Zealand Environmental Protection Authority (EPA);

- 2.6.2. On behalf of DOC in regard to the 2014 Chatham Rock Phosphate (CRP) marine mining consent application to the EPA;
 - 2.6.3. On behalf of OMV New Zealand Limited (OMV) for its 2014 marine consent application to the EPA for the Maari Field Development drilling programme;
 - 2.6.4. On behalf of Environment Canterbury for its review of RMA consent applications for Lyttelton Harbour Channel Deepening and Reclamation projects, both in 2017;
 - 2.6.5. On behalf of Shell Taranaki Ltd for both its 2015 and 2016 marine consent application to the EPA for Māui Field activities and drilling operations; and
 - 2.6.6. On behalf of Tamarind Taranaki Ltd for its marine consent and marine discharge consent for activities in the Tui field.
- 2.7. I have read the following information in preparation of my evidence:
- 2.7.1. The Marine Consent Application (the “**Application**”) including the Appendices of that document. I have focused on the sections that relate to the description of the activity and marine mammals;
 - 2.7.2. EPA Key Issues Report (the “**Key Issues Report**”) dated September 2018;
 - 2.7.3. Proposed consent conditions provided by Coastal Resources Ltd (“**CRL**”);
 - 2.7.4. The EPA Report on the workability of the deemed consent conditions dated October 2018;
 - 2.7.5. Submissions on the application provided to the EPA; and
 - 2.7.6. The evidence of expert witnesses presenting on behalf of CRL
- 2.8. My role in relation to CRL application has been to undertake an independent review of the application and IA as it relates to marine mammals and to consider and assess any potential impacts of the proposed activities on marine mammals, to prepare expert evidence and to respond to any questions raised by the Decision-Making Committee, EPA and/or submitters on this topic.

Code of Conduct

- 2.9. I confirm that I have read the Code of Conduct for expert witnesses contained in the Environment Court of New Zealand Practice Note 2014 and that I have complied with it when preparing my evidence. Other than when I state I am relying on the advice of another person; this evidence is entirely within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.
- 2.10. My qualifications as an expert witness are set out above. The issues addressed in this brief relate to the application for a marine consent and marine discharge consent and are matters within my area of expertise.

3. SCOPE OF EVIDENCE

- 3.1. In this evidence, I will discuss the following:
- 3.1.1. The existing environment with respect to marine mammals, including available information on the status, distribution and abundance in proposed Northern Disposal Area (the “NDA”) and broader region;
 - 3.1.2. Potential impacts on marine mammals from the proposed activities, including: a description of the proposed activities; potential impacts; and a review of scientific evidence;
 - 3.1.3. Response to issues raised in the Key Issues Report and technical reviews, where these are relevant to my evidence; and
 - 3.1.4. Response to issues raised by submitters about marine mammals.

4. DESCRIPTION OF THE PROPOSED ACTIVITY

- 4.1. CRL are applying for a new resource consent to replace an existing and ongoing consent (EEZ900012; expiry 31 December 2032) for the disposal of dredged material at a deep-sea spoil disposal site east of Great Barrier Island, the NDA. The new consent seeks to expand the annual disposal limit from 50,000 m³ to 250,000 m³ per annum. The existing consent will be

surrendered upon the new consent being approved. The disposal site for the new consent is the same site as the existing consent which has been used since 2013. To date, over 545 trips to the NDA have been undertaken with approximately 223,205 m³ of dredged spoil disposed of (as at 1 October 2018).

- 4.2. The material to be disposed of at the NDA is from dredging operations in the wider region and is marine sediment. The sediment is generally loaded onto a bottom-dump barge from the source location by digger. The dredged sediment is then transported to the NDA via bottom-dump barges, either self-propelled or towed by tugs. The barges used have varying capacities ranging from around 350 m³ to 700 m³ and averaging 500 m³. Unloading is then achieved by the opening of the barge floor (while the barge remains in motion over the disposal spot at a rate of 4-7 knots depending on weather conditions) and the disposal from the barge is achieved in 1-2 minutes. The barge is then closed and proceeds back to Auckland (a 20 to 24 hour round-trip).

5. EXISTING ENVIRONMENT – MARINE MAMMALS

Application information

- 5.1. A summary of marine mammals potentially found in the NDA and wider region is provided in Section 5 of the body of the Application and also Sections 3.5.2, 4.5 and 4.8 of Appendix 5 and Appendix 9 of the Application. Given the limited amount of specific information available about marine mammals in the NDA and their generally wide-ranging behaviour, it is appropriate to draw on information about marine mammals from the wider region in assessing what may be present in the NDA. For the purposes of this Evidence, I have considered an area within approximately 100 km of the NDA as providing useful information about what marine mammals may potentially be found within the NDA.
- 5.2. Data collected from the existing disposal programme and research surveys in or near the NDA include sightings of common dolphins (n=1), unidentified whale (n=1) and an acoustic detection which was assumed to be a marine

mammal (n=1). At face value, this a very low sighting rate given that 545 trips to the NDA have been undertaken to 1 October 2018.

5.3. Overall, the information provided in application provides reasonable but brief summaries of the key marine mammal species likely to be found in the region and in the NDA itself. These include common dolphins, bottlenose dolphins, Killer whales, Bryde's whales, blue whales, fin whales and humpback whales.

5.4. The general conclusions of the Application with respect to marine mammals are:

5.4.1. Section 3.5.2 of Appendix 5 - *“Marine mammals, such as whales and dolphins, use the northeast region of New Zealand as part of a migratory path and/or feeding and nursery grounds. Disposal operations such as the presence of a vessel and the periodic addition of a large quantity of sediment to the water column may disrupt their natural behaviours by forcing the animals off their normal migratory path. However, studies have shown that the presence of these animals in the vicinity of the site is not common”*; and

5.4.2. Section 4.5 of Appendix 5 - *“The disposal of a barge load of material directly on top of mammals or fish is likely to have adverse effects to the individual animals involved. The current consent (EEZ900012) controls are in place to prevent disposal of material if mammals are present in the area. The presence of fine sediment plumes will potentially impact on fish present in the water column. However, the plumes are short lived and the fish and mammals are mobile and able to avoid the plumes. Given the low numbers and intermittent presence of these species, the risk of impacts to these species are likely to be low”* and *“The intermittent activity of disposal operations would create noise disturbance for fin fish and marine mammals in the vicinity. No breeding activity of fish or mammals is known to occur in the disposal area therefore the short duration of the disposal activity, and the likelihood that the individuals will divert to avoid contact, will prevent any significant risk. Any effects to sea birds will be indirect but localised to the disposal area. There is a*

small potential for these effects to take the form of reduced food species.”

- 5.5. I note in Section 5 of the Application that it says, “*Studies have shown that the presence of these mammals in the vicinity of the NDA is not common*”. I am unclear what studies are being referred to in this instance and clarification from the Applicants would be useful.

Additional information and analysis

- 5.6. As noted in the Application, there have been only three sightings of marine mammals from in and around the NDA from more than 400 disposal and survey trips. Given that the existing consent conditions require 30 minutes of both visual and acoustic monitoring prior to release of the spoil, this represents 545 hours (i.e. 30 minutes of visual plus 30 minutes of acoustic monitoring per release) of marine mammal survey work up until October 2018. I note that these surveys represent the only dedicated marine mammal survey effort undertaken in or around the NDA that I am aware of.
- 5.7. At face value, the 545 hours of observations with only three marine mammal records suggests that marine mammals rarely occur in the NDA. However, there are some important caveats to this interpretation. These include:
- 5.7.1. Since disposal is principally at night, visual observations, even using thermal imaging equipment, will have reduced effectiveness of detection;
 - 5.7.2. Observations are principally limited to times prior to disposal and when vessels are present and there is therefore little or no observations when disposal vessels are absent;
 - 5.7.3. Acoustic monitoring will be influenced by background sound levels and so detection effectiveness will be reduced with noise generated from the tug and/or barge (e.g. engine, machinery, propeller);
 - 5.7.4. The training and experience of the personnel undertaking the marine mammal survey work was limited; and
 - 5.7.5. Both visual and acoustic monitoring is generally undertaken from the tug which is approximately 200m from the barge which will reduce the effectiveness of detection.

- 5.8. The summary information provided in the Application is primarily a high-level overview, which is generally appropriate for most of the regionally common species given that there is little or no specific information available for most species. I have provided some additional information on marine mammals from other sources in:
- 5.8.1. **Appendix A** – This provides a map of all marine mammal records (i.e. sightings, strandings, bycatch) within approximately 100 km of the NDA as recorded in the DOC Marine Mammal Database to 9 July 2018; and
- 5.8.2. **Appendix B** – This provides a tabular summary of all marine mammal records (i.e. sightings, strandings, bycatch) within approximately 100 km of the NDA as recorded in the DOC Marine Mammal Database to the 9 July 2018.
- 5.9. It is important to note that the DOC Marine Mammal Database is a collection of data from a range of systematic, non-systematic, anecdotal and opportunistic sources with little validation or checking of actual records (e.g. no species identification is confirmed other than for most Hector's and Maui dolphins). There are also no estimates of spatial or temporal effort associated with the records so it is not possible to draw many useful conclusions from the database other than on an indicative basis.
- 5.10. It is also likely that other than the marine mammal monitoring undertaken by the operator, there has been little or no dedicated marine mammal survey effort in and around the NDA. Over 90% of the records included in this analysis are from within the Hauraki Gulf and therefore, won't provide any useful information (other than potential species presence) about marine mammals that may be found within the NDA. However, notwithstanding these issues, the database does represent the best available data set for marine mammals in the wider region and is useful in providing a broad context for the region.
- 5.11. Based on an analysis of the DOC Marine Mammal Database, there are 3,190 records of marine mammals within 100 km of the NDA. Over thirty-three different species have been recorded in this region but three quarters of the

total records are from two species: common dolphins (n=1,690; 53%) and Bryde's whales (n=756; 24%). This is likely a result of these two species being the primary focus of commercial whale watching operations out of Auckland which target both these species and also that this commercial operator regularly contributes directly to the database. The next eight most common species only contribute a total of 11% of the total records and the remainder of the species less than 1% each.

- 5.12. Of the thirty-three species recorded, there are at least six threatened¹ marine mammal species occurring in the greater region including Bryde's whale, Killer whale, Maui dolphin, blue whale, Hector's dolphins and southern right whales. Collectively, these species comprise 1,144 (or 36%) of the total records. However, it is important to note that there are no records from within the NDA and the closest record is approximately 17km away.
- 5.13. While the DOC records provide an insight into the importance of the greater region around the NDA for marine mammals, it is important to recognise that these records are a summary of records collected over the last 100 years (although 99% of records are from the last 40 years) and from an area covering in excess of 40,000 km². There is unlikely to be any single place where all of these species occur together as they occupy different depths, ecosystems and even seasons. Furthermore, the NDA covers a very small part of this greater region and it is highly likely that many of the species present in the broader region are never or rarely found in the NDA. For example, Māui and Hector's dolphins which are inshore, coastal dolphins and while present in the record, are unlikely to be present within the NDA especially as they are extremely rare on the east coast of the North Island. While it is appropriate to consider which species are found in the wider region (so that information about which species may occur in the NDA is also considered), it is important to make the distinction clear that the NDA only represents a small subset of the wider region. Therefore, the identification of the wider region as an important area for marine mammals, does not necessarily mean that each small part of that larger area (including the NDA) is also important to marine mammals.

¹ Based on Baker et al. (2016) Conservation Status of New Zealand Marine Mammals 2013.

- 5.14. Based on our general knowledge of the ecology of the marine mammal species that may be present in the NDA, it is my opinion that it is unlikely that the NDA represents an important area for any marine mammal species. I base my assessment on the following rationale:
- 5.14.1. Notwithstanding that caveats that exist around the marine mammal survey data collected from the disposal operation over the last few years, the fact remains that there has been some dedicated marine mammal survey effort in the NDA. This effort has detected very low levels of marine mammal activity. Given the boat positive nature of many dolphin species and some whales, if there were large number of marine mammals regularly using the area, it is likely that considerably more sightings would have been made. This is not to say that some species won't move through the area or occasionally be found in the area, but simply that it is unlikely to represent an important habitat;
 - 5.14.2. Based on the benthic and other ecological marine survey work undertaken in the area and reported in the Application, there is little evidence that the area is likely to represent good habitat for prey of, or even marine mammals themselves. This is reinforced by the fact that there has already been more than 200,000m³ of spoil deposited in the NDA to date which has significantly reduced overall biodiversity, abundance of marine organisms; and habitat likely to be suitable for marine mammals and their prey;
 - 5.14.3. The NDA itself is very small with an overall area of just over 7km². Given that impacts from spoil deposits are estimated to reach background levels with 1.5km from the deposit site as stated in the Application, any impacts will therefore be highly localised to the NDA and all within its boundary. This is a very small area of potential impact in contrast to the large home range of most marine mammal species which have ranges in the order of hundreds, if not thousands or tens of thousands, of square kilometres; and
 - 5.14.4. There is no evidence of any upwelling systems or areas of high primary productivity in the area which could be indicative of potential marine mammal foraging and feeding areas.

- 5.15. I also considered a range of other material when further investigating marine mammals potentially in and around the NDA including:
- 5.15.1. Aerial and other surveys for Bryde's whales undertaken in and around the Hauraki Gulf (Baker & Madon 2007, Constantine et al. 2015, Tezanos-Pinto et al. 2017);
 - 5.15.2. Historical records from the commercial whaling station at Whangaparapara on Great Barrier Island in the 1950s and 1960s (Torre et al. 2013);
 - 5.15.3. Satellite tracking studies of humpback whales (Garrigue et al. 2009; 2015); and
 - 5.15.4. Records of marine mammals in the Hauraki Gulf and broader region (Dwyer et al. 2016; Hupman et al. 2015; Dwyer et al. 2014).
- 5.16. While these documents all provide useful additional information as general context for the wider region, they do not provide any specific information about how marine mammals might use the NDA.

General conclusions about the existing environment

- 5.17. Although there have only been three species of marine mammals recorded in the area, the potential exists that many more species may use the area at certain times. However, the NDA is not thought to represent an important feeding or breeding area for any marine mammal species based on an assessment of biological and ecological factors (e.g. no evidence of upwelling and/or high levels of productivity) and notwithstanding that nearly 200,000 m³ of spoil has already been deposited in the area since 2013. So, while some marine mammals may utilise the area, they are unlikely to remain in the area for long as there appears to be little reason to do so.
- 5.18. Based on what we know about the broader region, the most likely marine mammals to visit the area are baleen whales (most likely humpback and possibly Bryde's whales) and dolphins but all probably only transit through the area during migrations or when searching through the broader area for prey.
- 5.19. Overall, I agree with the general conclusions of the Application with respect to marine mammals potentially occurring in the NDA.

6. POTENTIAL IMPACTS ON MARINE MAMMALS FROM THE PROPOSED ACTIVITIES

Application information

6.1. Assessments of potential impacts from the proposed activity is provided in Section 7² of the Application and also Sections 4.5³ and 4.8⁴ of Appendix Five of the Application. The Application identifies the following impacts potentially relevant to marine mammals:

- 6.1.1. Contaminant leaching and bio-accumulation/contamination;
- 6.1.2. Sedimentation plumes and flow on ecological effects including on marine mammal prey, habitat quality and primary productivity;
- 6.1.3. Disposal of spoil directly on top of marine mammals during barge release; and
- 6.1.4. Noise disturbance.

6.2. The overall conclusions of the Application with respect to potential impacts is that, *“Given the low numbers and intermittent presence of these species, the risk of impacts to these species are likely to be low⁵”* and *“Given the nature of the activity and its location, no potential significant risk to fin fish, mammals or birds have been identified⁶.”*

Additional information and analysis

6.3. I agree with the potential impacts identified in the Application and would add an additional one, vessel strike. I have provided an independent assessment of these potential impacts in **Appendix C**. Overall, the risk for each of the potential impacts is very low with the exception of a single risk (i.e., injury from spoil being deposited directly onto a marine mammal) which is considered to be a low risk.

² Application. Section 7, pages 28-29.

³ Appendix 5 of the Application. Section 4.5, page 86-87.

⁴ Appendix 5 of the Application. Section 4.8, page 88-89.

⁵ Appendix 5 of the Application. Section 4.5, page 86.

⁶ Application. Executive Summary, page vii.

7. PROPOSED CONDITIONS AND MITIGATION MEASURES

- 7.1. I reviewed the proposed consent conditions in Section 9⁷ of the Application proffered by Coastal Resources Ltd including further details provided in Appendix 9⁸ of the Application. Given my assessment of extremely low or low risk posed by all the potential impacts assessed, the Conditions and mitigation measures (e.g., Proposed Condition 11⁹ and Condition 17(g)¹⁰) identified in the Application were generally adequate given the level of risk to marine mammals from the activity.
- 7.2. Notwithstanding this conclusion, I suggested some amendments and additional conditions to aid in understanding and clarifying the nature of the potential impacts on marine mammals. I have reviewed the amendments to the proposed consent conditions attached to Mr Hay's evidence, which have adopted some of my suggested amendments, and I provide the following comments, adopting Mr Hay's numbering.

Proposed Condition 14 – marine mammal monitoring

- 7.3. Condition 14 (numbered Condition 11 in the original application)¹¹ specifies that 30 minutes of both visual and acoustic monitoring must be undertaken of the disposal site prior to release of the spoil and that the release of spoil can occur only when no marine mammals are within the disposal area. In principle, this provides excellent mitigation and risk reduction for the activity. The 30-minute period is consistent with the provisions of the *2013 Code of Conduct for Minimising Acoustic Disturbance to Marine Mammals from Seismic Survey Operations* developed by DOC which utilise a 30-minute pre-start observation period. However, as I noted previously in my paragraph 5.7, there are some potential limitations with this approach.

⁷ Application. Section 9, page 42-47.

⁸ Appendix 9 of the Application. Pages 1-8.

⁹ Application. Section 9, page 46.

¹⁰ Application. Section 9, page 47.

¹¹ Application. Section 9, page 46.

7.4. *The effectiveness of visual observations at night.* Marine mammal monitoring is challenging enough during daylight hours and international research has clearly shown that sighting efficiencies during the day are significantly reduced once conditions reach Beaufort sea state 3 (e.g., about 7-10 knots of wind). Even with the use of a thermal imaging system as specified in Appendix 9, I believe that it is highly unlikely that marine mammals would be reliably detected at night. The particular challenges for using such a system on marine mammals include: (i) a limited field of view, (ii) the generally short surfacing intervals of most marine mammals making them rarely available for viewing and (iii) that most marine mammals are heavily insulated by a layer of blubber that means that their outer skin temperature is often very similar to ambient and so they are not readily detectable to thermal imaging. The reality is that even visual observations by skilled and experienced observers during the day can be problematic and this is likely to be even more challenging at night. *Conclusion:* Notwithstanding these limitations, I am not aware of any better alternatives for visual observations at night and therefore the present approach represents the best practical solution for visually monitoring at night, albeit with the caveat that it is likely to be less than 100% effective at detecting marine mammals. By comparison, seismic surveys in New Zealand are not required to undertake visual observations at night but they are during the day although these surveys have considerably more sophisticated acoustic monitoring systems in operation 100% of the time. One option could be to limit disposal to daylight hours but, given the low risk posed by the operation, I believe that this would be unnecessarily restrictive especially given that most disposal operations are presently being undertaken at night. However, the applicant should be encouraged to dispose of spoil during daylight hours whenever possible.

7.5. *The effectiveness of acoustic detections with loud background noise.* Marine mammals will only be detectable via acoustics if they are (i) vocalising, (ii) the system has the sensitivity to detect them, and (iii) the signal to noise ratio is sufficient that the vocalisations can be heard over the background noise. Without knowing the specific noise characteristics of the tug and/or barge, it is not possible to determine how well (or over what distances) marine mammals can be heard. Vessels like tugs generally have a strong low frequency noise component which overlaps with the low frequency

vocalisations provided by many baleen whales. Therefore, it is unlikely that these whales would be able to be detected even if they are present and vocalising. There is less likely to be to significant operational noise in the mid and high frequency bands that toothed whales and dolphins vocalise and communicate in and, therefore, it should be possible to detect these species although the signal to noise ratio still needs to be adequate for detection. *Conclusion:* As with visual detections, acoustic methods also have some limitations. Some practical steps to improve the acoustic detection probability could include stopping (or at least slowing as much as possible) the vessel/s and reducing all sources of operational noise (e.g., turning off echosounders, generators, reducing engine revs as much as possible). While there are some obvious practical constraints on these, they will increase the detectability of marine mammals. The system described for use in acoustic monitoring is pretty simple but does have the capability of detecting marine mammals when optimal conditions are met. While there are some technical improvements that could be made (e.g., more sophisticated acoustic systems included towed arrays), they would require a higher level of training to use effectively and would cost significantly more.

- 7.6. *The training and experience of personnel.* I note that recent revisions to the proposed conditions now include an element of training for personnel undertaking marine mammal observations which is important for ensuring efficient monitoring. While detecting marine mammals is not necessarily rocket science, there is good evidence that increased training and experience leads to improved detection probabilities and having an awareness of the limitations of each detection method is also important to efficient monitoring. *Conclusion:* Increased training of personnel can increase effectiveness of monitoring and should be strongly encouraged. While formally trained qualified and experienced marine mammal observers could be employed, given that they will only be required for 30 minutes monitoring every 20-24 hour trip, the cost effectiveness a such an approach would be very low and, given the low overall risk of the operation, is unnecessary. Instead, increased training for existing crew should be the preferred option.

- 7.7. *The monitoring location is at least 200 m from the location of the barge where the spoil will be released.* While this will be true for a tug and barge, it won't be so for a self-propelled barge where monitoring will occur at the location of release. It is considerably less efficient undertaking marine mammal monitoring at a distance from the release point. This is further compounded at night. Given the likely effective detection range of both visual and acoustic methods can be limited (e.g., especially at night and/or during moderate to rough weather), even being 200 m away from the release point will reduce detection probabilities. *Conclusion:* All efforts should be made to undertake monitoring from the actual location of the release point as this will increase detection probabilities.
- 7.8. Notwithstanding some limitations, I believe that Condition 14 strikes an appropriate balance between providing some mitigation of risk, given the low level of overall risk from the operation. While more sophisticated monitoring approaches could be employed, I believe that the significantly increased cost and training required to achieve a marginal improvement in detection effectiveness isn't warranted given the low overall risk posed by the operation.

Proposed Condition 19(e) – marine mammal reporting

- 7.9. Condition 19(e) (numbered Condition 17(g) in the original application)¹² is relatively straight forward and reasonable but is fairly limited in scope. It states that all marine mammal detections should be recorded and provided in monthly summaries. In addition, all acoustic recordings are to be made available to the EPA on request under Condition 14.
- 7.10. Given that the Applicant is undertaking what essentially amounts to self-monitoring of the operation, I suggested some additional reporting to increase transparency. This would include keeping written or electronic notes of each marine mammal monitoring period including the start and end time of visual and acoustic monitoring periods, marine mammals observed and by what method (e.g. binoculars, thermal camera, hydrophone, etc.) personnel undertaking the observations and whether they have completed

¹² Application. Section 9, page 47.

the training or not, general weather conditions (e.g. to be used to assess sightability at the time of monitoring), location of the monitoring (e.g., tug/barge/other) and distance from the release point, equipment used (e.g. thermal camera, binoculars, hydrophone, etc.) and any other relevant notes. These should also be made available to the EPA upon request. These requirements have been incorporated in outline into Condition 14.

General conclusions

7.11. The proposed conditions are appropriate given the low level of risk posed by the operation to marine mammals. I have provided some suggestions for improvements to the Conditions that I believe are reasonable and will lead to improved mitigation and reporting.

8. RESPONSE TO ISSUES RAISED BY SUBMITTERS

8.1. A number of submissions were received on the Application in relation to marine mammals. I have provided responses to issues raised and combined them into broad categories where appropriate.

Noise impacts and noise monitoring

8.2. A number of submissions were received in relation to noise and the monitoring of noise. Some submissions commented on the lack of sufficient information provided on the impact of noise on marine mammals. There is a brief summary of noise issues provided in Sections 4.4¹³ and 4.7¹⁴ of the Application. I believe that the Application provides an appropriate level of detail given the nature of the operation and the low risk of any potential impact of noise. I provide some additional information below in my Evidence.

8.3. I also note the best source of published information available about marine mammal acoustics from the vicinity of the NDA is MacDonald (2016) which is summarised in Appendix 5 of the Application¹⁵. One submitter commented that no data from the NZDF underwater listening station on the east coast of Aotea

¹³ Application. Section 4.4, page 45.

¹⁴ Application. Section 4.7, page 47.

¹⁵ Appendix 5 of the Application, Section 3.5.2, page 76.

has been considered. While this data could have been useful in describing vocalising marine mammals, to the best of my knowledge, none of this data is readily accessible nor have results been published anywhere. Given the low risk posed by this operation and the data already available in MacDonald (2006), I do not believe that it is reasonable to expect the Applicant to source, analyse and report on this data.

- 8.4. The operation itself will generate extremely low levels of noise compared with other anthropogenic noise sources such as seismic surveys, commercial vessel traffic, and pile driving operations. This is primarily because the operation utilises slow moving vessels (e.g. tugs, barges) travelling at 5-7 knots. Travelling at these slow speeds is known to generate low levels of noise in comparison to faster moving, larger vessels and therefore, the acoustic foot print of this operation will be considerably smaller and quieter than most other commercial vessel traffic operating in the region. In addition, vessels will only be on station in the NDA for just over 30 mins every 20-24 hours before they return to port, so there will be no sustained noise within the area. Based on these facts, I do not expect that there would be any impacts from operational noise on marine mammals.
- 8.5. The noise monitoring proposed in the Application is relatively simple and does have some limitations as I noted previously. However, I believe that it strikes an appropriate balance between providing some mitigation of risk, given the low level of overall risk. While more sophisticated, acoustic monitoring approaches could be employed, I believe that the significantly increased cost required to achieve a marginal improvement in detection effectiveness isn't warranted given the low overall risk posed by the operation

Potential impacts on marine mammals

- 8.6. Some submissions commented on a lack of detail on potential impacts on marine mammals from the proposed operation. There is a summary of potential impacts on marine mammals provided in Sections 3.5.2, 4.5 and 4.8 of Appendix 5 of the Application. I have also undertaken a risk assessment which appears in **Appendix C** of this Evidence. I believe that all the potential impacts from the proposed operation have been covered with the exception of vessel strike, which I have added. My assessment of risk for each of these potential impacts ranges

from very low to low. Based on these assessments, I would not expect see a lot of information provided in the Application about activities assessed as low risk and believe that the level of information provided is appropriate.

Inadequate information provided on marine mammals

- 8.7. Some submissions commented on an inadequate amount of information provided on marine mammals within the NDA and broader area. There is limited information provided in the Application but this primarily reflects that no dedicated marine mammal survey work has been undertaken in the area and therefore there is little information available. The best data we have from the general area is provided in MacDonald (2006) plus results from marine mammal monitoring collected by the Application under their existing consent. I have provided some additional information in **Appendices A** and **B** about marine mammals in the broader region and also elsewhere in this Evidence but note that the reality is that there is little specific information available about the NDA itself.
- 8.8. The amount of information provided in an application should be in proportion to the risk posed by that activity. Given that I have assessed the activity as posing a very low or low risk to marine mammals, I believe that the level of marine mammal information is adequate.

Scale of impact

- 8.9. I believe that there appears to be some confusion about the exact size of the NDA operational area and therefore the scale of potential impacts. The NDA essentially covers an area of approximately 7 km². Assessments and impact modelling provided in the Application confirm that any impacts from deposition and/or sediment plumes will be restricted to within the boundary of the NDA. This is a very small area of effect given the large home range area of most marine mammals. Furthermore, the NDA is an existing, already consented disposal area and has already had more than 200,000m³ of dredge spoil deposited there and therefore, the site is already modified and doesn't represent good habitat for marine mammals.

Vessel strike

- 8.10. Vessel strike has been raised by some submitters as being a potential issue for marine mammals from the proposed activity that was missing from the Application. I assessed the risk of vessel strike in **Appendix C** as very low. This is based on the simple reason that given the very slow vessel speed of 5-7 knots, a strike is highly unlikely and, if it does occur, then the resulting injury is likely to be minor. This operation is completely different from the large commercial vessels that travel at 2-3 times these speeds and which do represent a significant risk to large whales in particular. The recent success in reducing the vessel strike of Bryde's whales in the Hauraki Gulf came about through the slowing of large vessels from 20+ knots to 10 knots which is known to lead to both reduced strikes and reduced injuries and fatalities. The vessels in this application are considerably slower than this new slow speed limit. While this application will lead to considerably more vessel transits within the Gulf, given the very slow speeds, the risk from these additional transits will be very low.

Insufficient monitoring

- 8.11. Some submitters commented on the inadequacy of marine mammal monitoring programme which is limited to 30 minutes prior to the release of spoil. As I noted previously in Section 7 above, there are some limitations with the proposed monitoring methodology. However, given the low level of risk posed by the operation, I believe that the proposed monitoring represents a reasonable balance between cost and risk. To implement a more sophisticated and more robust monitoring programme is likely to lead to significant additional costs to the Applicant for what effectively amounts to 30 minutes of monitoring every 20-24 hour period.
- 8.12. A possible way to improve marine mammal monitoring of the NDA is that the Applicant could be encouraged to deploy a mooring with an acoustic recording device in the area. This would record all marine mammal vocalisations in the area including both when operational vessels were present and not present. This would provide some *in situ* information about what species occur in the area and whether there is likely to be any impact from spoil releases and/or increased vessel traffic.

9. CONCLUSION

- 9.1. Based on my review of the Application, associated Appendices and other material, I consider that the proposed operation poses a very low or low risk to marine mammals from the impacts identified. The proposed mitigation and Conditions are appropriate to the level of risk proposed by the operation although I have made some suggestions for increased reporting.



Dr. SIMON JOHN CHILDERHOUSE

25 October 2018

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APPENDIX A: SUMMARY OF ALL MARINE MAMMAL SIGHTING, STRANDING AND INCIDENT DATA FOR THE NORTHERN DISPOSAL AREA (NDA) AND WIDER REGION FROM THE DEPARTMENT OF CONSERVATION MARINE MAMMAL DATABASE (Data provided by DOC on 9 July 2018)

Figure A-1 is all marine mammal events for the NDA and wider region. **Figure A-2** is the same data but zoomed in to NDA.

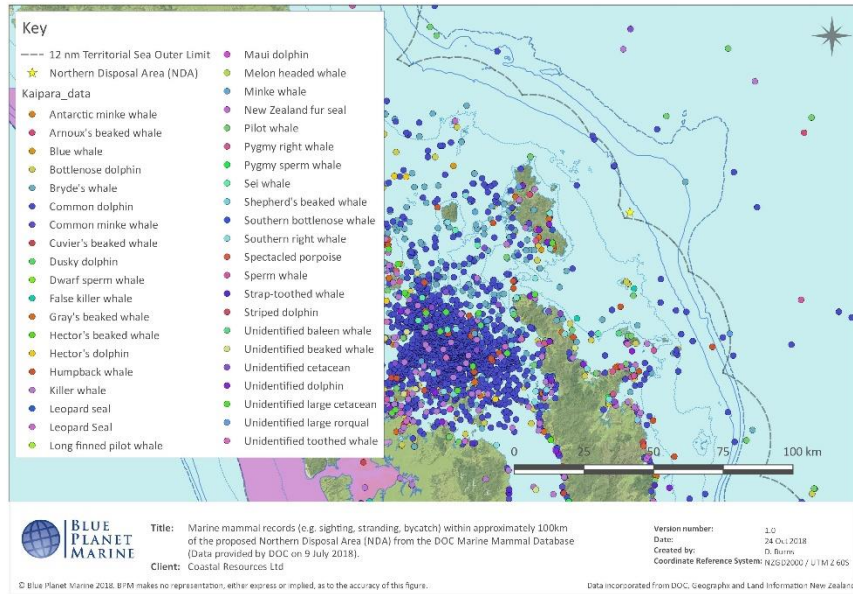


Figure A-1

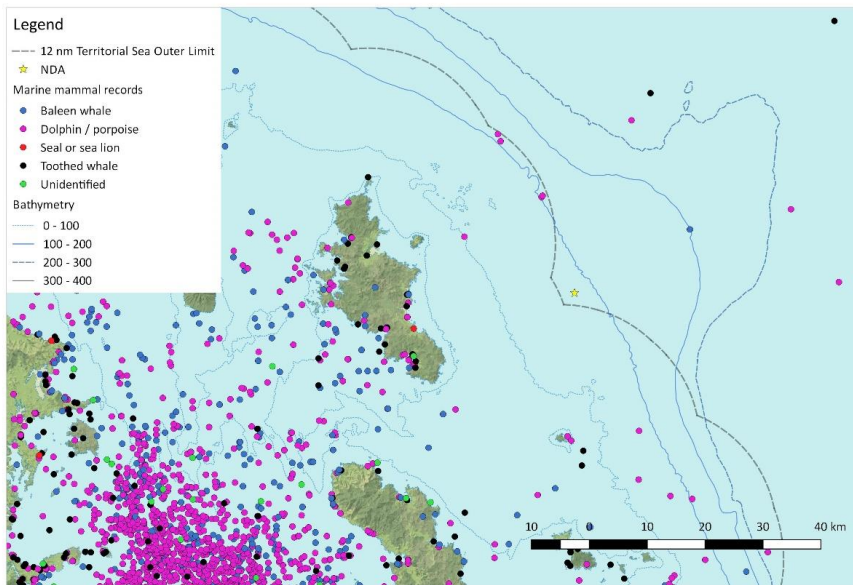


Figure A-2

APPENDIX B: SUMMARY OF ALL MARINE MAMMAL SIGHTING, STRANDING AND INCIDENT DATA FOR THE NORTHERN DISPOSAL AREA (NDA) AND WIDER REGION (i.e. within 100 km of the NDA) FROM THE DEPARTMENT OF CONSERVATION MARINE MAMMAL DATABASE (Data provided by DOC on 9 July 2018)

Species or group	Number of sightings	Status
Common dolphin	1,690	Not-threatened
Bryde's whale	756	Nationally critical
Bottlenose dolphin	185	Nationally endangered
Killer whale	147	Nationally critical
Pilot whale	46	Not-threatened
Southern right whale	44	Nationally vulnerable
Humpback whale	40	Migrant
Gray's beaked whale	36	Not-threatened
Antarctic minke whale	25	Not-threatened
Leopard seal	17	Vagrant
Sperm whale	16	Not-threatened
Strap-toothed whale	14	Data deficient
Hector's dolphin	11	Nationally endangered
Pygmy sperm whale	11	Not-threatened
Sei whale	11	Migrant
Southern bottlenose whale	9	Data deficient
Arnoux's beaked whale	8	Migrant
Blue whale	8	Migrant
New Zealand fur seal	8	Not-threatened
Cuvier's beaked whale	7	Data deficient
Pygmy right whale	7	Data deficient
False killer whale	5	Not-threatened
Hector's beaked whale	3	Data deficient
Dusky dolphin	2	Not-threatened
Shepherd's beaked whale	2	Data deficient
Striped dolphin	2	Vagrant
Dwarf sperm whale	1	Vagrant
Maui dolphin	1	Nationally critical
Melon headed whale	1	Vagrant
Spectacled porpoise	1	Data deficient
Unidentified baleen whale	8	N/A
Unidentified beaked whale	9	N/A
Unidentified cetacean	17	N/A
Unidentified dolphin	21	N/A
Unidentified large cetacean	16	N/A
Unidentified toothed whale	6	N/A
TOTAL	3,190	

APPENDIX C: POTENTIAL ENVIRONMENTAL RISKS FOR MARINE MAMMALS FROM THE PROPOSED ACTIVITY

Potential environmental Impacts	Spatial scale	Persistence / duration	Consequence	Likelihood	Overall risk level
Reduced foraging efficacy related to increased turbidity: from increased suspended sediment from the deposition plume	Localised (<1,500m): any impacts restricted to the area of the plume with higher than background levels of turbidity	Rapid recovery: as soon deposition ends, water will return to background levels within 1-2 hours.	Minor: increased turbidity could have minor impact on foraging efficiency for species that are primarily visual feeders but only within the area of plume	Remote: few marine mammals are only visual feeders and the plume only represents a very small proportion of the total foraging area available	Very low risk
Reduced prey availability: from increased sediment layers on the seabed from the deposition plume	Localised (<1,500m): any impacts restricted to the area of the plume	Temporary - moderate if stopped depending on prey type: plankton would recover quickly but sedentary, benthic fish may take longer to repopulation the area	Negligible: prey levels could be slightly reduced within the plume from displacement or increased mortality	Unlikely: levels of suspended solids and/or eco-toxins within the plume are expected to within background range	Very low risk
Habitat displacement: from a range of possible activities from impacts from the plume including the two identified above.	Localised (<1,500 m): any impacts restricted to the area of the plume	Rapid – moderate recovery if stopped depending on causal factor: causal agent may recover quickly after cessation (e.g. turbidity) or take longer (e.g. if all long lived sedentary prey are killed)	Moderate: individuals could be unable to use the area for key behaviour (e.g. feeding)	Unlikely: levels of suspended solids and/or eco-toxins within the plume are expected to within background range. The area is already modified and represents poor habitat for marine mammals.	Very low risk

Potential environmental Impacts	Spatial scale	Persistence / duration	Consequence	Likelihood	Overall risk level
Habitat displacement: from operational noise	Very localised (<500 m): given the slow vessel speeds, operational noise levels will be low and any impacts restricted to close to the vessel	Rapid recovery: once the vessel moves away, the noise will end.	Negligible: given the low levels of noise, any displacement is likely to be minimal and only over a small area and limited to when the vessel is present which is only 30mins every 20-24 hours.	Unlikely: given the low noise levels, displacement will be highly unlikely.	Very low risk
Toxicity and bioaccumulation/magnification: from potential indirect ingestion from prey with increased toxic levels	Localised (<1,500 m): any impacts restricted to the area of the plume	Temporary - moderate recovery if stopped depending on eco-toxin type: duration will depend on type of eco-toxin and its persistence in the environment	Minor: individuals and/or prey could be physiologically affected (e.g. lowered health condition)	Unlikely: very few actual examples of actual impact from eco-toxins on marine mammals and estimated levels expected to be well within acceptable limits.	Very low risk
Injury: from release of spoil directly onto marine mammals	Highly localised (<10 m): any impacts restricted to the immediate area below the barge	Rapid recovery: spoil will reach the seafloor within minutes of being released	Moderate - major: individuals immediately below the barge during release could be injured or killed	Remote: the area of effect is limited to the size of the barge opening and marine mammals would have to immediately under it when it is released	Very low to low risk
Injury: from vessel strike	Extremely localised (<1 m): any impacts restricted to direct contact with the tug and/or barge	Rapid recovery: marine mammals >1m from the vessels are not at risk	Negligible: individuals may be injured but given the very slow vessel speed of 5-7 knots, any injury will be very minor.	Remote: the very slow vessel speed means that the chance of strike is low	Very low risk

APPENDIX D: REPRODUCTION OF FIGURE 1 OF GARRIGUE ET AL. (2010) AND FIGURE 1 OF GARRIGUE ET. AL (2015) SHOWING SATELLITE TRACKING OF HUMPBACK WHALES FROM NEW CALEDONIA TRAVELLING DOWN THE EAST COAST OF NEW ZEALAND

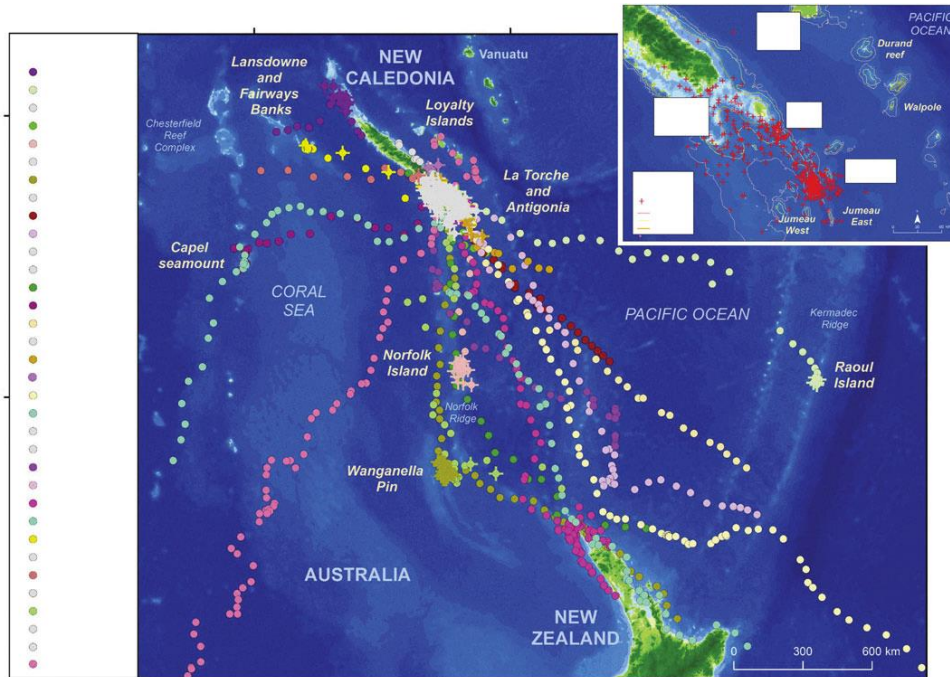


Figure D-1 Reproduction of Figure 1 of Garrigue et al. (2015)

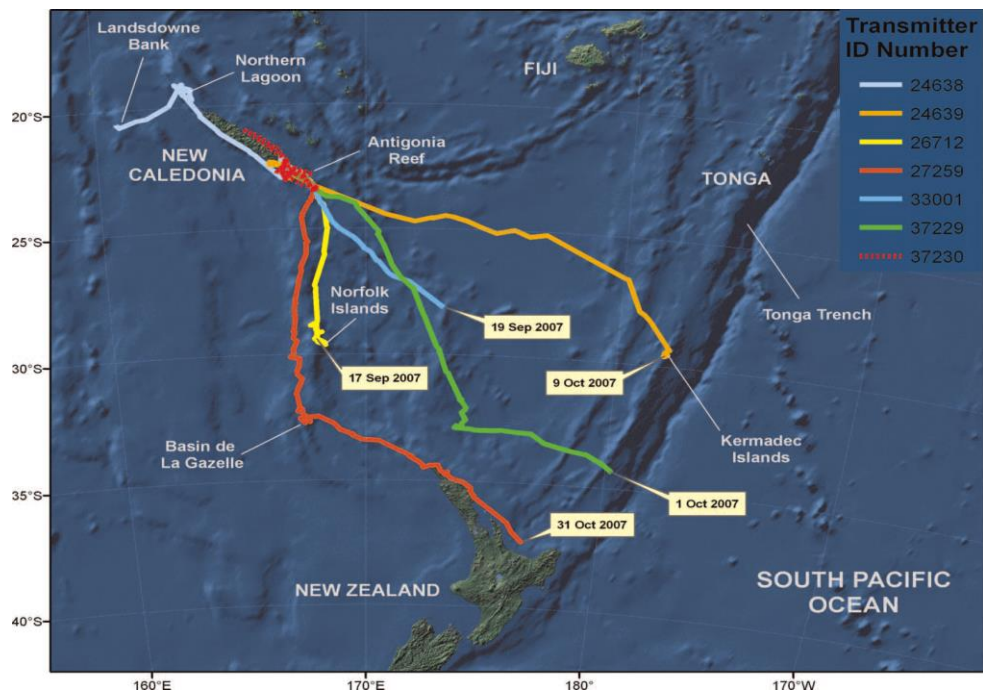


Figure D-2 Reproduction of Figure 1 of Garrigue et al. (2010)

APPENDIX E: REPRODUCTION OF FIGURE 1 OF GIBBS AND CHILDERHOUSE (2000) SHOWING NORTHERN (LEFT PANEL) AND SOUTHERN (RIGHT PANEL) MIGRATORY ROUTES OF HUMPBACK WHALES IN NEW ZEALAND (MODIFIED FROM AN ORIGINAL FIGURE IN DAWBIN 1956)

