1.0 TECHNICAL MEMO – MARINE MAMMALS

To:	Stacey Sharp & Blair Masefield, Beca (consultant planners)
From:	Helen McConnell, Principal Consultant, SLR Consulting NZ Ltd
Date:	11 July 2023

Perceived Conflict of Interest – Declaration:

I am aware that SLR Consulting NZ Ltd has recently acquired 4Sight Consulting and that Mark Poynter and Dee Isaacs (formerly 4Sight – now owned by SLR/4Sight) were engaged by the applicant to assist with the marine ecology assessment and Iwi/Hapū engagement process respectively. I can confirm that I have had no previous contact with Mark or Dee in this regard and that I have been engaged to act on behalf of Northland Regional Council for the purpose of reviewing the Northport Application as described below. I declare that I have no conflict of interest with the applicant.

1.1 Statement of Qualifications and Experience

My name is Helen Maree McConnell. I hold a Master of Science degree (with distinction) in Marine Science from the University of Otago which I completed in 2002; and a Bachelor of Science degree, majoring in Zoology, also from the University of Otago (1998). I am currently employed as a Principal Consultant at SLR Consulting NZ Limited (SLR). I have held this position since January 2020. Prior to this I was an Associate Consultant for the same company (since August 2015). My role at SLR is to provide high quality technical marine science advice to a range of clients (typically industry and government) spanning the topics of aquaculture, marine discharges, oil and gas, mining, and coastal development. Before joining SLR I was employed as a consulting ecologist with Resource and Environmental Management Ltd (2013-2015), a Research Officer at Massey University (2008-2013) and a Senior Technical Support Officer, Department of Conservation (2003-2007).

I have 19 years of experience in research, policy development, and environmental consultancy. I have been involved in a wide range of marine and coastal projects, both in the private and public sectors, though my specialist area is marine mammal ecology and conservation. I have authored or co-authored 13 peer-reviewed publications on related topics and have prepared and presented ecological evidence at numerous resource consent hearings, the following being the most recent examples:

- Port of Tauranga Ltd Coastal Permit Application (before the Environment Court in February 2023). I was engaged as the marine mammal expert on behalf of the

applicant to assess the potential effects on marine mammals from the development of the Port of Tauranga (wharf extensions and dredging).

- Beach Energy Resources NZ (Kupe) Ltd Marine Consent Application (before the Environmental Protection Authority in December 2022) to undertake a development drilling programme from the Kupe Wellhead Platform. I was engaged by the applicant to advise on the potential effects of development drilling on marine mammals;
- New Zealand King Salmon Coastal Permit Application (before the Marlborough District Council (MDC) in December 2021). I was engaged as a marine mammal expert by MDC to peer review the applicant's information pertaining to the potential effects of the proposed Blue Endeavour Marine Farm in the outer Marlborough Sounds on marine mammals.
- Ohinau Aquaculture Limited Coastal Permit Application (before the Waikato Regional Council in December 2019 and the Environment Court in November 2020). I was engaged as the marine mammal expert on behalf of the applicant to assess the potential effects on marine mammals from the establishment of a mussel spat collecting farm in Mercury Bay, Coromandel Peninsula.

I confirm that the statements made within this memorandum are within my area of expertise and I am not aware of any material facts which might alter or detract from the opinions I express. Whilst acknowledging this consenting process is not before the Environment Court, I have read and agree to comply with the Code of Conduct for Expert Witnesses as set out in the Environment Court Consolidated Practice Note 2023. The opinions expressed in this memorandum, are based on my qualifications and experience, and are within my area of expertise. Where I rely on the evidence or opinions of others in this memorandum, my statements clearly acknowledge this.

2.0 APPLICATION DESCRIPTION

Applicant's Name:	Northport Limited (Northport)
Activity type:	**Land Use (s9), Coastal Permit (s12), Water Permit (s14), Discharge Permit (s15)**
Purpose description:	Northport seek to construct, operate, and maintain an expansion of the existing port facility to increase freight storage and handling capacity, and transition into a high-density container terminal.
Application references:	Northland Regional Council: APP.005055.38.01 Whangārei District Council: LU2200107
Site address:	Ralph Trimmer Drive, Marsden Point, Whangārei

3.0 SITE AND PROPOSAL DESCRIPTION

3.1 Site and Environmental Setting – Marine Mammals

A description of marine mammal use of Whangārei Harbour and a surrounding Area of Interest (**AOI**) was provided in Appendix 14 of the Assessment of Environmental Effects[1] (**AEE**). This appendix was prepared by Dr Deanna Clement of Cawthron Institute and is herein referred to as Clement (2022).

I concur with the description of the existing environment provided in Clement (2022); noting that several species regularly visit Whangārei Harbour/Bream Bay, especially bottlenose dolphins, common dolphins, orca, and Bryde's whales. Other species that are expected to be present less frequently (as seasonal visitors) include New Zealand fur seals, leopard seals, southern right whales, and humpback whales. Clement (2022) summarises important ecological information for each of these species including highly relevant information about seasonality, habitat use (in particular breeding, feeding and migratory behaviours) and threat status (in terms of both the New Zealand Threat Classification System and the IUCN listing).

Of relevance to this application, and in terms of the New Zealand Coastal Policy Statement (**NZCPS**), Clement (2022) identifies several NZCPS policy 11(a) species[2] that are likely or will possibly be present in Whangārei Harbour/Bream Bay. These species are listed below. Policy 11 of the NZCPS requires effects on these species be avoided, and this requirement is echoed in the Proposed Regional Plan (**PRP**) for Northland.

- Bottlenose dolphin (NZCPS Policy 11(a)(i) species; classified as 'threatened - nationally endangered' by the NZTCS[3]);
- Killer whales (NZCPS Policy 11(a)(i) species; classified as 'threatened - nationally critical' by the NZTCS);
- Bryde's whale (NZCPS Policy 11(a)(ii) species; classified as 'threatened - nationally critical' by the NZTCS);
- Southern right whale (NZCPS Policy 11(a)(i) species; classified as 'at risk – recovering' by the NZTCS);
- Humpback whale (NZCPS Policy 11(a)(ii) species; classified as 'endangered' by

[1] *Application for resource consents for the expansion of Northport*, prepared by Reyburn & Bryant, dated 6 October 2021

[2] Indigenous taxa that are identified as 'threatened' or 'at risk' in the New Zealand Threat Classification System (NZTCS) (NZCPS Policy 11(a)(i)); or Taxa listed by the IUCN as 'threatened' (NZCPS Policy 11(a)(ii)) or Habitats of indigenous species where the species are at the limit of their natural range or are naturally rare (NZCPS Policy 11(a)(iv)).

[3] New Zealand Threat Classification System, see Baker et al. (2019).

the IUCN[4]); and

- Leopard seal (NZCPS Policy 11(a)(iv) species; classified as 'at risk – naturally uncommon' by the NZTCS).

Of relevance to marine mammals, Policy 11 of the NZCPS also requires that significant effects on important habitat during vulnerable life stages, (Policy 11(b)(ii)), and important habitat to migratory species (Policy 11(b)(v)) be avoided, and other adverse effects avoided, remedied, or mitigated.

I make the following additional comments regarding Section 3 of Clement (2022):

- An AOI that extended from the Bay of Islands to the Hauraki Gulf was used to provide regional context to potential marine mammal use of Whangārei Harbour and Bream Bay. I agree that the scale of the AOI is appropriate and note the importance of assessing marine mammal presence over an area larger than that immediately affected by the proposal. This approach is in keeping with the requirement of the PRP for Northland which requires that when assessing the potential adverse effects of an activity on indigenous biodiversity a system wide approach should be taken;
- The use of multiple data sources that collate information about marine mammal presence through time is well recognised as best practise for assessing marine mammal distribution and occurrence. Accordingly, Clement (2022) used the following data sources:
    - Department of Conservation (**DOC**) sightings and strandings data[5]
    - Opportunistic visual sightings data collected by Northport Limited (**NPL**)
    - Acoustic monitoring data
    - Relevant published and unpublished scientific literature.

  On this basis, Clement (2022) uses the best available information to successfully establish a baseline of relative marine mammal occurrence in Whangārei Harbour/Bream Bay;

- While systematic surveys for marine mammals in the AOI will always be preferable to quantify marine mammal occurrence in a project area prior to project commencement, I consider that the approach taken by the applicant (as outlined in the bullet point above) is sufficient in this instance as multiple data sources spanning a long time period were appraised. I note that Pine (2022: Appendix C) states that acoustic monitoring has also been undertaken at four locations near Northport since June 2020. It is unclear why any marine mammal acoustic detections made during this monitoring have not been provided as part of the

[4] Childerhouse et al, (2008), also see https://www.iucnredlist.org/species/132832/3463914

[5] The data limitations associated with using DOCs opportunistic sighting and stranding data are clearly stated in Section 3.1.1. of Clement (2022)

application package as this data would be of additional value;

- Based on the information presented, I agree with the Clement (2022) conclusion regarding the significance of Whangārei Harbour/Bream Bay, that "based on current knowledge, the proposal area is not considered ecologically more significant in terms of feeding, resting or breeding habitats for any marine mammal species relative to other regions along the north-eastern coastline. But these waters do periodically support threatened or endangered species, such as bottlenose dolphins, orca, Bryde's whales, and southern right whales"; and
- I note that while Whangārei Harbour and Bream Bay are not considered of high relative importance as marine mammal habitat during sensitive life stages, it is important to recognise that feeding, resting, migrating and breeding behaviours will certainly occur here for some species (including threatened species). In particular, calves could be present from time to time.

3.2 Proposal

The proposal is as described in the context of a broad overview in Section 2 of Clement (2022). This overview outlines all potential works, noting that in some instances final design specifications and methodologies are yet to be confirmed. Clement (2022) takes a catch-all approach, such that all potential construction activities and methodologies are assessed in relation to potential effects on marine mammals. This approach serves to allow a full and thorough assessment of effects that may occur despite several methodological uncertainties (i.e. whether capital dredging will use a cutter suction dredge (**CSD**), a trailer-hopper suction dredge (**THSD**), or both; whether silt curtains will be used during reclamation operations).

I adopt that description of the proposal for the purpose of this assessment and note the following key elements with regard to marine mammal matters:

- I agree with Clement (2022) that pile driving and dredging are the construction activities of greatest relevance and concern to marine mammals on account of elevated levels of underwater noise associated with these activities and the associated potential for hearing damage (pile driving) or habitat avoidance (pile driving and dredging); and
- I note that a comprehensive mitigation package has been proposed in the draft Marine Mammal Management Plan. My memo assesses the appropriateness of the proposed mitigation measures outlined therein.

This memorandum is limited to the consideration of matters relating to marine mammals.

3.3 Reference documents

The following application documents have been reviewed and inform this technical memorandum.

<u>Application</u>

- Assessment of Environmental Effects entitled: *Application for resource consents for*

the expansion of Northport, prepared by Reyburn & Bryant, dated 6 October 2021 (henceforth referred to as AEE).

- Design Drawings entitled: *Northport – Proposed Reclamation and Dredging*, prepared by WSP, sheets C01 – C04, plan set dated 18 August 2022.
- *Appendix 5. Draft Marine Mammal Management Plan (page 64 – 96 of Appendix 5),* prepared by Enviser Ltd, dated September 2022.
- *Appendix 14. Potential effects on marine mammals,* prepared by Deanna Clement, Cawthron Institute, dated September 2022 (Clement, 2022).
- *Appendix 25. Assessment of underwater noise effects: percussive pile driving and capital dredging,* prepared by Matt Pine, Styles Group, dated 2 August 2022 (Pine, 2022).

s92 Request for Information

- Further information response prepared by Styles Group, dated 10 February 2023 (henceforth referred to as s92 Response).
- Draft conditions of consent, working draft, dated 21.04.2023.

4.0 REASON FOR CONSENT

4.1 Reasons for Consent

A list of resource consents sought (as per the application documents as lodged) are summarised in Sections 1.5 – 1.7 of the AEE and are as amended by the s92 Response.

4.2 Overall Activity Status

Overall, the resource consent is considered as a **Discretionary Activity**.

5.0 TECHINICAL ASSESSMENT OF APPLICATION AND EFFECTS

5.1 Assessment of Effects on Marine Mammals

The following potential effects of the proposed activity on marine mammals have been identified and assessed by Clement (2022):

- General construction noise;
- Pile driving noise;
- Dredging noise;
- Vessel strike;
- Operational loss and possible entanglements;
- Ecological effects of habitats and prey species; and
- Cumulative effects.

In my opinion all potential effects have been identified. The applicants key assessment conclusions and my technical review of these findings are outlined under the sub-headings below.

Methodology

With regard to assessment methodology, I note that Clement (2022) used the following process to evaluate the magnitude and scale of each potential effect in the context of expected marine mammal presence in the proposal area (see Section 3.1 of this memo):

1) A review of national and international literature for each effect is presented to predict the ways in which the proposed activities will affect marine mammals;
2) An assessment of the overall risk of each potential effect has been undertaken in terms of predicted scale, duration, likelihood, and possible consequences; and
3) Management and monitoring actions are recommended to address any residual effect of concern.

A summary of assessment findings for each potential effect is presented in Table 5 of Clement (2022), outlining:

a. the predicted spatial scale of effect;
b. the predicted duration of effect;
c. the predicted consequence level of effect;
d. the predicted likelihood of effect; and
e. the predicted significance of effect (considered both without and with mitigation measures).

This table provides an invaluable summary and I note that definitions of each of the terms used are provided. For all intents and purposes, 'significance level' as presented in Table 5, appears to be equivalent to 'magnitude' in terms of the Resource Management Act 1991 (**RMA**).

Overall, I agree that the methodology used is appropriate and is reflective of best practise with regards to assessments of effects for similar projects within New Zealand.

5.1.1 General Underwater Construction Noise

Underwater noise from general construction activities (namely reclamation and construction of the rock seawalls) has been sufficiently discussed by Clement (2022). I agree with the finding that these activities will be localised and intermittent; however, note that they may persist for months to years. Effects are predicted to be limited to behavioural effects for individual animals in the immediate vicinity of the proposal area and given the proposal area does not specifically represent important habitat for any marine mammal I concur that the magnitude of effect will be **negligible**.

While no specific mitigations are proposed to manage general construction noise, I note that Clement (2022) states that monitoring will occur at construction commencement to

validate modelling results and, where necessary, the MMMP will be updated to ensure management actions are appropriate. Overall this is a vital component of the project and I strongly support this approach. While noise validation monitoring will largely focus on pile driving and dredging noise (see sub-headings below), Clement (2022) suggests that such monitoring will also measure general construction noise. I note that the draft MMMP states in Section 4.2.3 that reclamation noise will be characterised by measuring the noise generated when sediment is being pumped to shore. I anticipate that this will represent the most consistent underwater noise input from reclamation activities; hence, these measurements are appropriate for characterising general construction noise. This is a useful addition to the suite of in-situ noise measurements that are proposed.

5.1.2 Pile Driving Noise

The potential behavioural and physical effects associated with pile driving noise are discussed in Clement (2022) including relevant examples of measured effects on marine mammals from both New Zealand (e.g. Leunissen & Dawson, 2018) and international studies (e.g. Bailey et al., 2010).

Clement (2022) clearly explains how underwater acoustic thresholds (developed by NOAA, 2018) have been used to predict the onset of temporary and permanent threshold shifts (**TTS** and **PTS** respectively) and behavioural impacts. Underwater acoustic modelling was conducted by Pine (2022) to make these predictions and Clement (2022) clearly states that the results generated by Pine (2022) underpin her assessment findings. Site specific acoustic propagation modelling and the interpretation of model results to predict onset distances for TTS, PTS and behavioural effects represents best international practise. Pine (2022) also makes predictions regarding the effects of 'masking' (which occurs when anthropogenic noise interferes with the perception of important biologically important sounds). These predictions provide excellent additional context and currently exceed international best practise on the basis that such techniques have only recently been developed (e.g. Pine et al., 2019) and most assessments of effects do not yet include predicted zones of masking.

I am not an acoustician; however, I am familiar with the concept of predicting onset distances from established thresholds and am experienced at interpreting model findings and applying them in an ecological context to estimate the magnitude of underwater noise effects on marine mammals. I note that Pine (2022) has been technically reviewed by Dr Vallarta on behalf of Whangārei District Council and Northland Regional Council and Dr Vallarta's findings should also be considered as both Dr Clement and myself are heavily reliant on the modelled predictions to assess the potential effects on marine mammals.

The predicted worst-case sound levels from impact driving[6] as modelled by Pine (2022) were interpreted by Clement (2022) as follows:

- For dolphins (mid-frequency cetaceans) TTS onset would only be expected within c. 200 m of the site, and PTS would be restricted to within 26 m;
- For baleen whales (low-frequency cetaceans) TTS and PTS onset is predicted

[6] Noting that vibro-piling results were not presented by Clement (2022) as source levels were lower than those file impact piling

within c. 1,350 m and 500 m respectively;

- For fur seals (otariids in water) TTS is predicted at c. 100 m and no PTS is predicted;
- For leopard seals (phocids in water) TTS is predicted to c 750 m and PTS to 150 m;
- For all species, low-level and moderate-level behavioural responses would be expected within 2 km and 1 km of the site respectively;
- Listening space reductions (**LSR**) for all species may occur out to 3 km, but the closer to the source the greater the potential for acoustic signal interference; and
- For all species, the maximum predicted distance at which piling noise would be audible is c. 6 km.

I have no reason to question these findings as they utilise established techniques, from a well-recognised and highly regarded science service provider and the results are comparable to those produced for similar projects in New Zealand. I also note that Dr Vallarta has confirmed that the model predictions are robust and follow international best practise methods.

The results that are summarised above clearly indicate that both physical effects and behavioural effects from underwater piling noise will be spatially restricted to Whangārei Harbour and entrance.

As expected, masking distances are slightly greater than those predicted for behavioural response with some masking predicted for all species out to c. 3 km from the construction site. In the context of Bream Bay, this means that all pile-driving noise effects on marine mammals will be restricted landward of a theoretical line between Marsden Point and Home Point, and the contour maps (presented as Figure 6 in Appendix 14) show that within this range underwater noise propagates more readily along the channels.

During pile driving I would expect that whales and dolphins will avoid entering Whangārei Harbour, but I concur with Clement (2022) that seals would most likely continue to utilise the harbour as they are able to avoid loud underwater noise by swimming with their heads above water when necessary (Mikkelsen et al., 2017) and tend to readily habituate to disturbance.

Clement (2022) did not specifically address the potential for cetaceans to become entrapped inside Whangārei Harbour. This is a theoretical possibility if animals are present in the inner harbour at the outset of any piling activity; however the rates of occurrence of whales and dolphins inside the harbour is relatively low on a daily basis, hence the likelihood of this happening is very low. I note that the implementation of stop work procedures when cetaceans are detected close to the construction site (see **Table 1**) should facilitate the departure of any animals from inside the harbour once piling is underway; however, to provide greater certainty that piling noise will not trap cetaceans, **I recommend that piling operations temporarily cease if cetaceans are detected or reported from the inner harbour (regardless of proximity to the Marine Mammal Observation Zone) at any time during active piling. Piling activity should not recommence until animals are observed to leave the harbour.**

Overall I agree with the findings of Clement (2022) with regards to pile driving noise on marine mammals that:

- The likelihood of physical effects (TTS and PTS) is low based on 1) the small zone of predicted onset for dolphins and fur seals, and 2) the lower rates of occurrence for baleen whales and leopard seals in the immediate vicinity of the construction site; and
- Behavioural responses would only be expected out to 2 km from the construction site and low level masking effects would be expected over a similar range. These effects are unlikely to be of ecological significance[7] as piling activity will be intermittent[8] and limited to daylight hours and marine mammals are unlikely to be consistently present within the affected area.

I also note that the onset distances reported are those for cumulative sound exposure levels, meaning that animals would need to remain in the onset zones for extended periods and be exposed to multiple percussive strikes (1,700 strikes over 24 hours) for these predicted effects to materialise. Given the free ranging nature of marine mammals throughout large home ranges, this level of underwater noise exposure is extremely unlikely. This coupled with the reporting of worst-case model outcomes gives me confidence that the predictions of effects of underwater noise on marine mammals, as presented in Clement (2022) are highly conservative.

Despite the relatively low risk to marine mammals from the proposed pile driving, the applicant has developed an extensive suite of pro-active mitigation measures to further reduce the potential for any adverse effects. This approach is supported, particularly given the potential presence of threatened species near the construction site from time to time.

The proposed mitigation measures are outlined in **Table 1** along with my evaluation comments and a note as to how each measure has been adopted into the draft Marine Mammal Management Plan (**MMMP**, provided in Appendix 5 of the application). Any further recommendations that I make (above those already offered by the applicant) are also presented in bold text in **Table 1** and throughout this memo.

Table 1 Proposed control measures to minimise pile driving effects on marine mammals

Proposed control measure	Evaluation comments
Best Practicable Options (BPOs) to minimise source noise (i.e. careful selection of piling method and pile size, and the use of cushion	• I support this control and note that it represents best practise. This control has been included in Section 4.2.1 of the MMMP. • While I note that vibro-piling is preferred over impact piling to minimise source noise, caution is

[7] Where my inferred threshold for ecological significance is - no predicted change to population size or dynamics; and/or any changes to habitat would be highly localised (<5% of total habitat area) following MacDiarmid et al., (2014).

[8] Piling will consist of cycles of vibro-piling, welding and impact piling ensuring breaks in impact piling during each piling day.

blocks)	warranted here as oftentimes vibro-piling takes a lot longer to achieve what would be achieved by impact piling over a shorter timeframe. The overall noise emissions need to be considered balancing both source level and duration. I am reassured to see that this issue is acknowledged in the MMMP. • Regarding the use of cushion blocks I note that wooden blocks tend to perform best, and that this technique may reduce source noise levels by 11 to 26 dB (CSA Ocean Sciences, 2014). The source level reduction afforded by the use of cushion blocks will serve to effectively reduce the size of the zones in which effects on marine mammals will occur. Noting that such reductions are ecologically significant as even a 2.5 dB noise reduction is the equivalent to a 44% reduction in acoustic intensity, or a 16% reduction in perceived loudness (Wood et al., 2018). • **I also recommend the use of bubble curtains during impact pile driving.** In most circumstances bubble curtains provide an effective barrier to underwater noise propagation, and therefore are an excellent method to reduce the zones of impact for marine fauna (Lucke et al., 2011). I discuss bubble curtain use in relation to the establishment of Marine Mammal Observation Zones later in this table.
Reduce unexpected noise by using ramping up and / or soft starts	• I support this control and note that it represents best practise. This control has been included in Section 4.2.1 and Section 4.2.6.2 of the MMMP. • The operational details of soft starts are not described in the MMMP aside from stating that piling impact energy will be gradually increased over a ten minute period. While I agree with this intention and the 10 minute duration, I note there are several different approaches that could be used for soft starts for impact piling including variations to both hammer energy and strike interval (see Bailey et al., 2010; Brandt et al., 2011 and Leunissen, 2017 for soft start regime examples). An example of soft start regime for vibro-piling can be found in Wang et al., 2014). While I don't consider a need for the soft start operational detail to be included in the MMMP, **it would be worth including a statement in the MMMP that soft start procedures will be selected in accordance with best practice at time of construction.**

	• **I recommend that the MMMP should also state that soft start procedures will be required for both impact- and vibro-piling.** • It is noteworthy that Section 4.2.6.2 of the MMMP states that: "In some instances, such as pile testing which requires immediate full energy, soft starts will not be possible". It is encouraging to see that protocols are proposed for such circumstances whereby "Testing situations will only occur in optimal visibility conditions (i.e., MMO can easily and confidently observe the MMOZ for the required period) when the designated MMO shall ensure that the exclusion zone has been closely monitored for 30 minutes and that no mammals have been present in that period". I consider that this approach is pragmatic and appropriate to manage adverse effects on marine mammals.
In situ verification of underwater noise levels from piling activities and adjust mitigation if necessary	• I support this control and note that it represents best practise. This control has been included in Section 4.2.2 and 4.2.3 of MMMP and includes construction activities in addition to piling (e.g. dredging and reclamation). • I note that the methodology for the measurement of underwater noise that is outlined in Section 4.2.3 of the MMMP has been developed in collaboration with an underwater noise specialist. The requirement for measurements to commence as soon as practicable during normal operating conditions is critical. **With regard to this, a condition should be developed to specify a timeframe. My recommendation here would be to require in-situ underwater noise measurements to commence within two weeks of piling commencing.** • The proposed mobile noise measurements will be invaluable for confirming the spatial extent of marine mammal shut down zones.
Regular maintenance and upkeep of piling equipment	• I note that this control is proposed in Table 5 of Clement (2022) and Table 4 of the MMMP, but it is not listed as a BPO in Section 4.2.1 of the MMMP. • I support this control and **recommend that it is included as a BPO in Section 4.2.1 of the MMMP.**
Establishment of Marine Mammal Observation Zones (MMOZ) in which piling activities will cease if an	• I support this control and note that it represents best practise. This control has been included in Section 4.2.4 and Section 4.2.5 of the MMMP. • The MMMP proposes a MMOZ of 200 m to protect

animal enters	dolphins (including orca) and fur seals. I note that based on the modelling results, this provides complete protection against PTS and TTS for mid-frequency cetaceans and otariids, and also provides full protection to leopard seals from PTS. The MMOZ provides no protection to baleen whales on this basis an Extended MMOZ (EMMOZ) is also proposed. • Section 4.2.4 of the MMMP states that "all efforts should be made by MMOs to regularly scan areas further out from the designated MMOZ for any unexpected sighting of baleen whales or a leopard seal. If any sightings of these species are observed outside the MMOZ, piling should be halted as animals are likely to be within the zone for TTS, and the EMMOZ implemented instead". I agree that it is vital that MMOs are required to make observations beyond the 200 m MMOZ whenever piling operations are underway. • An EMMOZ of 800 m is proposed to offer additional protection to baleen whales and leopard seals. Given the low rates of occurrence of these species in the immediate vicinity of the project site an adaptive management approach is proposed with regards to when the EMMOZ is implemented whereby "the EMMOZ will be enacted after the first sighting of a whale or leopard seal in the wider Whangārei region (i.e., Bream Bay to Tutukaka). The EMMOZ will continue to be monitored for at least 48 hrs or until further sightings have been confirmed. After 48 hrs, with no further confirmed whale or leopard seal sightings, the MMOZ shut-down zone will be reinstated"[9]. • Based on the modelling results, and when implemented, the EMMOZ would provide 1) full protection against PTS for baleen whales (predicted onset distance of 500 m) and partial protection against TTS for baleen whales (predicted onset distance of 1,350 m); and 2) full protection against PTS and TTS for leopard seals. • I note that the MMMP requires a shutdown regardless of detection distance, for any baleen whale seen. This is an important addition and goes some way to addressing the issue that an 800 m EMMOZ only affords partial protection to baleen

[9] Quoted from Section 4.2.5 of the MMMP

	whales. I also note that MMOs will be expected to routinely scan beyond the MMOZ and EMMOZ boundaries to facilitate this. In my opinion, this is a reasonable solution that attempts to balance the injury risk posed by pile driving and the infrequent occurrence of baleen whales in the immediate vicinity of the port or within Whangārei Harbour. However, to afford more certain protection to baleen whales from acoustic injury **I would recommend that the applicant adopt bubble curtain technology to reduce the onset distances for PTS and TTS.** Bubble curtains would also offer a higher degree of protection to all marine mammals that could potentially be present in Whangārei Harbour/Bream Bay. The adoption of bubble curtain technology during a recent wharf construction project in Wellington Harbour reduced the overall sound levels by 5 dB which equated to a reduction of up to 20 dB when results were weighted for the hearing sensitivities of marine mammals (Warren, 2021). • Based on the potential for southern right whales to be present for a week or more at a time in what appears to be historical and re-emergent coastal calving habitat, **I would also recommend extending the period over which the EMMOZ will be monitored following a baleen whale sighting from 48 hours to one week. However, I note that if bubble curtain technology is adopted the EMMOZ approach may not be warranted.** • Alternatively, seasonal restrictions on piling operations could be considered, to preclude piling activities from July to October, when baleen whales with calves are expected to occur (Carroll et al., 2014). While the PRP states that consideration should be given to minimise effects during sensitive times, the relatively small zones of impact predicted by the modelling, the inconsistency of southern right whale presence across years, and the availability of nearby alternative coastal habitat, this approach may be disproportionally restrictive. **The use of bubble curtains to manage the risk to baleen whales is my preference over seasonal operational restrictions**. • If species identity cannot be confirmed then a precautionary approach is proposed whereby the EMMOZ will be enacted. I agree with this precautionary approach.

Use of dedicated and experienced marine mammal observers (MMOs) for: pre-start observations, soft start procedures, normal operating procedures, stand-by operating procedures, shutdown procedures, post-piling observations and poor visibility procedures.	• I support this control and note that it represents best practise. This control has been included in Section 4.2.6 of the MMMP. • In general, I note that when the MMOZ is operative, one MMO will be required to undertake these duties, and that at least two MMOs will be on duty when the EMMOZ is being observed. • The MMMP is silent on the need for these MMOs to be appropriately trained. In regard to this **I recommend that a requirement be placed on the applicant that all personnel undertaking MMO duties be trained by a DOC approved MMO training provider[10] or an experienced marine mammal researcher. The MMMP should also define the required level of previous MMO experience.** • To address the potential of marine mammal presence in Whangārei Harbour at the start of each piling day, the MMMP proposes that the first pre-start observation period of each piling day extend to cover a 1 km radius. Given a) the size of Whangārei Harbour, b) the possibility that behavioural effects could occur out to 2 km (Pine 2022), and c) the pattern of past cetacean sightings in the harbour (see Figure 3 Clemet, 2022); **I recommend that this pre-start observation zone is extended up-harbour to encompass the channel and surrounds as far as One Tree Point. It is possible that these inner harbour observations at the start of each piling day could be undertaken by a good quality camera system that could be monitored remotely.** • To minimise the potential of cetaceans becoming trapped in the harbour once piling operations are underway, **I also recommend that operations are required to shut down if cetaceans are detected or reported from the inner harbour (regardless of proximity to the MMOZ) at any time during active piling. Piling should not recommence until the animals have been observed to depart the harbour and have moved beyond the relevant MMOZ.** • With regard to poor visibility procedures, I note that

[10] For a list of DOC approved training providers see: https://www.doc.govt.nz/our-work/seismic-surveys-code-of-conduct/observer-standards-and-training/

	these are clearly defined in Section 4.2.6.7 of the MMMP and a suitable adaptive management approach is proposed.
Daylight hours operations only	• I support this control but note that it has only been mentioned in passing in Section 4.4.2 of the MMMP. • I envisage that hours of piling operations will be clearly established in consent conditions and **recommend these align with those specified within Section 12.3 of the Construction Environmental Management Plan.**
Records made on Marine Mammal Sighting Form	• I support this control and note that it represents best practise. This control has been included in Section 4.2.6 of the MMMP and a template Marine Mammal Sighting Form has been provided as Appendix A of the MMMP.
Minimise the spread of piling stages over successive season (i.e. avoid piling over two consecutive winter seasons)	• I support this control but note that it is presented in Section 4.2.7 of the MMMP only as a recommendation, i.e., the MMMP states "If practical, the various piling stages of the project should be timed so that most of the piling work does not occur over successive seasons". • **I recommend this is adopted as a condition of consent such that works over successive seasons are prohibited**.
Communication with DOC and third parties, and monitoring of social media to receive regional sighting information	• I support this control and note that it has been included in Section 6 of the MMMP. • In addition to DOC, news and social media, **I also recommend that the applicant forges communication channels with the Rock Lobster Industry Council as this organisation collates whale sightings information from fishing vessels off the east coast of Northland.**

In my opinion, the primary effect to marine mammals from underwater piling noise will be the exclusion of cetaceans from Whangārei Harbour during periods of active piling.

However, I agree with Clement (2022) that there is no evidence to suggest that Whangārei Harbour provides habitat of high relative importance to any cetacean species and note that effects will be intermittent given the predicted piling schedule. Undoubtedly some feeding, resting, and breeding behaviours do currently occur within the harbour, but it appears (from a brief review of surrounding topography and bathymetry) that alternative habitat is readily available along Northland's east coast (e.g. Parengarenga Harbour, Rangaunu Harbour, Whangaroa Harbour, Whangaruru Harbour, Mahurangi Harbour), and indeed these alternatives represent waterways with less anthropogenic disturbance as they are not located on the doorstep of Whangārei City.

In summary, the suite of proposed mitigation measures are comprehensive and largely appropriate and, in several instances, go beyond what is required by best practise.

I recommend some additional edits to the draft MMMP to assist with document clarity and robustness. In particular, I make several recommendations relating to the level of monitoring effort to detect 1) visiting southern right whales and 2) any cetaceans that may be present inside Whangārei Harbour prior to daily piling activities commencing. I also recommend that the applicant use bubble curtain technology[11] to reduce the impact zones on marine mammals.

On the basis of the proposed controls described in the MMMP and assuming the adoption of my additional recommendations, I agree with the assessment findings that residual effects can be reduced to **negligible** (for PTS and TTS) and **less than minor** (for behavioural and masking effects).

5.1.3 Dredging Noise

The potential effects of dredging described in Clement (2022) are appropriately focused on the generation of continuous broadband underwater noise.

Clement (2022) correctly notes that source levels from dredging operations[12] do not typically exceed normal engine and propeller cavitation noise that would be expected from large commercial ships[13]. Indeed, international literature states that the risk of hearing damage to marine mammals from dredging noise is thought to be very low, with effects are most likely restricted to temporary behavioural responses and/or masking (Todd et al., 2015; Thomsen et al., 2013).

The results of site/project specific modelling to predict dredge noise propagation was undertaken by Pine (2022) for all three potential dredge types that may be utilised during the project (cutter suction dredge, trailer-hopper suction dredge and backhoe dredge). The model findings concur with the sentiment above that effects will be restricted to behavioural responses and masking if marine mammals approach to within c. 1 km of the active dredge (following Pine, 2022). These findings underpin the assessment results and clearly indicate that no injury (TTS or PTS) is predicted from any of the three dredge types proposed.

While the literature discussed regarding potential effects of dredging on marine mammals is quite light in Clement (2022), the approach taken to model effects of dredging noise and to predict zones of injury, behavioural effects and masking is suitable and exceeds the approach taken by many similar projects in New Zealand which do not include

[11] Noting that best practice design and installation of bubble curtains will be required to ensure they are effective at reducing underwater noise propagation.

[12] Where TSHD operations represent the loudest dredge type and typically falls within the range 160 to 188 dB re 1µPa at 1 m distance from the source (De Jong et al., 2010; Robinson et al., 2011).

[13] 176 to 188 dB re 1µPa at 1 m (McKenna et al., 2012)

modelling for dredge noise.

With regards to additional relevant literature, I am aware of two studies that have directly quantified the behavioural effects of dredging on marine mammals as follows:

- Diederichs et al. (2010) reported temporary avoidance by harbour porpoises within 600 m of a TSHD extracting sand in off the German North Sea Island of Sylt, but clearly showed that sand extraction activities did not lead to long-term avoidance of the area; and
- Pirotta et al. (2013) linked declines in the regular occurrence of foraging bottlenose dolphins in Aberdeen Harbour, Scotland to increased dredging (type unspecified) operations, concluding that noise (which resulted in masking of communication between conspecifics), in combination with suspended sediment (which resulted on decreased visibility) reduced foraging efficacy, and caused dolphin groups to move to alternative foraging patches when dredging intensity was high.

In addition, a recent study by McQueen et al (2020) determined a zone of behavioural response of 5 km from a port expansion project using a TSHD in the Netherlands, and dredging noise reportedly has little impact on pinniped behaviour, with several studies describing no adverse reaction or no sign of disturbance (EPA, 2007; Gilmartin, 2003, as cited in Todd et al., 2015).

With regards to the potential for masking, I note that the low-frequency nature of dredging noise is less likely to mask high-frequency echolocation signals of odontocetes (i.e. dolphins) (Weilgart, 2007). Dredging noise could, however, affect some mid-frequency odontocete communication calls (e.g. Pirotta et al., 2013); of which bottlenose dolphins, common dolphins and orca are relevant to the project. Dredging noise could also potentially mask the low frequency vocalisations of baleen whales (Pirotta et al., 2013), and as illustrated by Pine (2022) could affect the listening space of pinnipeds. Pine (2022) concludes that masking effects are limited to within c. 1 km of the active dredge.

In keeping with the spatially limited nature of the predicted effects and considering that capital dredging to enlarge and deepen the existing swing basin will only occur over a discrete period of approximately 9 months, Clement (2022) concludes that even without controls, effects will be of **nil to less than minor** in extent. I agree with this conclusion and note that despite this, Clement (2022) has proposed several control measures to further minimise any effects, including regular equipment maintenance and in-situ verification of underwater noise levels to confirm that no further mitigations are warranted.

The requirement for regular maintenance aligns well with the guidance set out by the World Organisation of Dredging Associations (Thomsen et al., 2013) which states that adequate maintenance of dredge plant can be a very simple but effective mitigation measure to minimise noise emissions. I agree with Clement (2022) that this should be adopted as a mitigation measure but note that the MMMP does not list this requirement in Sections 4.3.1 and 4.2.1 where it outlines BPOs. **I recommend the MMMP is amended to incorporate this requirement.**

The requirement for in-situ verification of dredge noise goes further than current best

practise; however, I am supportive of this initiative as it will assist with current knowledge levels regarding dredge noise and potential effects on marine mammals.

I note that in Section 4.3.3 of the MMMP includes additional commitments to establish a marine mammal exclusion zone based on the in-situ noise measurements and includes the requirement for an onboard MMO to observe for marine mammals from any active dredge and for controls to be implemented if a marine mammal enters the exclusion zone. In my opinion this is a highly conservative approach and exceeds best practise. While I am supportive for the applicant to take this approach, I note that this takes a particularly conservative approach as:

- Marine mammals are not resident to Whangārei Harbour, but instead use the harbour periodically as part of a much larger home range; and
- Dredge noise is not dissimilar to that of commercial shipping which already occurs in Bream Bay and Whangārei Harbour and despite this animals still use the area.

5.1.4 Vessel Strike

The assessment provided by Clements (2022) assessed the risk of vessel strike associated with dredging activities and the increased volume of commercial ships that the proposed Northport expansion could lead to. I agree that the risk of vessel strike needs only be considered in the context of the latter, as dredged sediment is proposed to be used in the reclamation and will not be disposed of at sea.

While ship strike is a globally recognised threat to marine mammals (IWC, 2014), the risk is greatest when high levels of shipping traffic (particularly large fast vessels) overlap with high densities of baleen whales (Laist et al., 2001; Vanderlaan & Taggart, 2007).

With regard to the potential risk of vessel strike associated with increased shipping volume, the assessment undertaken by Clement (2022) found that the likelihood of a vessel strike is low. I agree that this conclusion is appropriate for Whangārei Harbour and Bream Bay as baleen whales are only infrequently present here (Clement, 2022; Baker & Madon, 2007); hence densities here are very low.

Clement (2022) states that Bryde's whales are the most reported whale species from the wider AOI and that they routinely travel between Bay of Islands and Hauraki Gulf, where Hauraki Gulf has been identified as important feeding habitat that supports elevated densities of Bryde's whales (Baker & Madon, 2007; Wiseman et al., 2011; Riekkola, 2013; Dwyer et al., 2016). Given this species spends a large proportion (91%) of their time just below the sea surface, makes them particularly vulnerable to ship strike (Constantine et al., 2015), and, as discussed by Clement (2022), ship strike mortalities in the Hauraki Gulf posed a significant threat to this species until the Hauraki Gulf Transit Protocol was established in 2015. The protocol, which applies only to the Hauraki Gulf[14]) has three key requirements; 1) that transit speed though the Gulf is reduced to 10 knots, 2) an active watch for whales is kept, and 3) whale sightings are reported immediately and relayed to other vessels in the vicinity.

[14] For map of the restricted zone, see: https://www.poal.co.nz/ops-information/Documents/POAL_Whale_2014.pdf

While significant increases in shipping traffic volumes in the wider AOI could potentially have consequences with regards to ship strike risk for threatened Bryde's whales, I understand that whale densities outside Hauraki Gulf are lower than those within the Gulf, Spatial variability in Bryde's whale density is well documented in Appendix 1 of Clement (2022) and is supported by several other studies (Baker & Madon, 2007; Wiseman et al., 2011; Riekkola, 2013; Dwyer et al., 2016). While Clement (2022) recognises that an increase in northbound shipping traffic through the wider AOI is expected, this increase is difficult to quantify, but based on the lower densities of Bryde's whales beyond Hauraki Gulf, the likelihood of ship strike here would be expected to remain at a low level despite the increased vessel traffic that could result from the proposed Northport development.

In Table 5 of Clement (2022) a maximum significance level of 'more than minor' is noted for vessel strike in the absence of mitigation measures. This level of effect describes the potential for death or injury of a threatened species. I note that following the adoption of the recommended mitigation measures this significance level reduces to 'less than minor' on the basis that 1) the probability of whale encounters is very low, 2) boating behaviour guidelines will be adopted by project vessels and 3) support will be afforded for the expansion of the Hauraki Gulf Transit Protocol beyond Hauraki Gulf waters. It is not immediately clear how these mitigations afford further protection to Bryde's whales in regional waters without the formal expansion of the commercial vessel transit protocol.

I note that the draft MMMP (in Section 4.4.1) encourages the use of speed limits, crew watches and reporting, but provides no detail about how these measures would be implemented. **I recommend that as a minimum, project vessels should adopt the equivalent requirements of the Hauraki Gulf Transit Protocol while undertaking project related activities in Whangārei Harbour and Bream Bay and that these requirements be specifically stated in the MMMP**. The adoption of such specific measures would provide a greater level of confidence that the potential for ship strike from project vessels can be managed to a significance level of **less than minor**, and that adverse effects on threatened species (as required by the NZCPS) can be avoided.

5.1.5 Operational Loss and Possible Entanglements

Debris in the marine environment is of global concern and can affect marine mammals in several ways: namely ingestion of, or entanglement in debris. An extreme consequence of marine debris ingestion is blockage of the digestive tract leading to death by starvation, however, sublethal effects include malnutrition, disease and exposure to toxins (see Baulch & Perry, 2014). Entanglement in debris can lead to injury or drowning. Clement (2022) discusses the issue of marine debris and concludes that adoption of waste management protocols can sufficiently manage this risk to a negligible level. I agree with this conclusion and the procedures outlined in the MMMP to achieve this.

The possibility of entanglement in silt curtains is also raised by Clement (2022). I too am unaware of any entanglement incidents involving marine mammals and silt curtains, and on this basis the risk would appear to be very low. The applicant is to be commended for proposing mitigations to ensure that this risk is reduced even further and I consider that these proposed mitigations are appropriate on the basis of best practise techniques used by the aquaculture industry to reduce the likelihood of marine mammal entanglement in finfish farms.

My only additional comment on this topic is that the MMMP proposes that silt curtains will be regularly inspected, but no inspection schedule is proposed. **I recommend that underwater inspections occur on a monthly basis and that the MMMP is updated to include this detail.**

I agree that the magnitude of effect can be managed to a **negligible** level.

5.1.6 Ecological Effects of Habitats and Prey Species

Both permanent effects on intertidal and subtidal habitat from reclamation and temporary effects on subtidal habitat from dredging are briefly discussed by Clement (2022), and the potential flow-on effects for marine mammal prey is recognised. Based on the relatively small spatial scale of these effects when compared to the vast home ranges of marine mammals, and the fact that there is no evidence to suggest that this habitat is of higher relative importance to marine mammals than other coastal areas of the region, I agree with the finding presented by Clement (2022) that these effects will be of **nil to negligible** magnitude and that no specific mitigation measures are required.

I also note that of the marine mammal species that could be present within Whangārei Harbour and/or Bream Bay, bottlenose dolphins, killer whales, New Zealand fur seals, common dolphins, pilot whales, and leopard seals are known to exploit some benthic prey but none are solely reliant on it, rather their diets consist of a mixture of both benthic and pelagic prey species (Constantine & Baker, 1997; Visser, 2007; Harcourt et al., 2002; Meynier et al., 2008; Halls-Apsland and Rogers, 2004); Beatson et al., 2007). Hence, even if some effects to benthic prey quality and availability occur, these effects are highly unlikely to be of ecological significance.

5.1.7 Cumulative Impacts

Cumulative effects occur when the effects of an activity are added to or interact with other effects in space and time. Clement (2022) discusses cumulative effects with a focus on the cumulative effects of underwater noise in Section 4.7 of the assessment report. I note too that Pine (2022) modelled the effects of concurrent dredging and piling noise and the modelled results predict no additive effects. This modelling approach is helpful and usefully quantifies that **no cumulative underwater noise effects are anticipated**. I agree with this conclusion. As underwater noise from piling and dredging have been identified by Clement (2022) and myself as being the effects of greatest potential significance to marine mammals, it is reassuring that the potential for cumulative effects between these two sources have been quantified. Clement (2022) also raises the issue that there are two other consented but unimplemented marine development projects in Whangārei Harbour, but notes that these projects are unlikely to occur concurrently with the Northport Expansion project. **I recommend that the potential for any concurrent dredging or piling be avoided through appropriate consent conditions** (see Section 8 of this memo).

When considering cumulative effects, it is also important to acknowledge other threats that marine mammals may be exposed to. Waters of the AOI, and indeed much of the northeast coast of the North Island, are subject to multiple potential threats to marine mammals or their habitat including bycatch in fishing gear, disturbance from vessel traffic, and habitat degradation. In this regard cumulative effects will be of most relevance to

threatened species. The threatened species that are most likely to be present from time to time in the vicinity of the construction site are orca and bottlenose dolphins, I provide further comment regarding the potential for cumulative effects on these species below:

- Other threats to New Zealand orca and their habitat include habitat degradation, noise pollution, chemical pollution, and interactions with fisheries (Visser, 2007). New Zealand orca have extensive home-ranges (circumnavigating the entire North Island as a minimum) and cover large distances on a daily basis[15]. This life history trait has both advantages (ability to readily move to avoid disturbance) and disadvantages (exposure to a wide range of threats over a wide range of habitat). While the home-range or New Zealand orca is vast, the proposal site (including Whangārei Harbour) is small in contrast and there is no specific evidence to suggest that this habitat is of high relative importance for this species.
- Because of their coastal nature, bottlenose dolphins are susceptible to disturbance. DOC considers that adverse effects from tourism are the main threat to New Zealand bottlenose dolphins (DOC, 2022), where the presence of dolphin-watching boats interferes with foraging, breeding, and resting behaviours (Peters & Stockin, 2016). A rapid population decline has been documented for the Northland population (Tezanos-Pinto et al., 2009) and the Te Pēwhairangi (Bay of Islands) Marine Mammal Sanctuary was established in 2021 to address this problem and enforce stronger restrictions on dolphin-based tourism here. While effects of underwater noise from pile driving could affect bottlenose dolphin use of the harbour, this would only occur on an intermittent basis and, as with orca, there is no specific evidence to suggest that this habitat is of high relative importance for this species.

On this basis of the information presented above and assuming consent conditions are adopted to manage underwater noise and concurrent project work in and around Northport, I consider that cumulative effects will be of **negligible** magnitude.

5.2 Conclusion

Overall, I conclude that, subject to conditions, the actual and potential adverse effects of the proposal will be less than minor and that adverse effects on threatened marine mammal species can be avoided as required by the NZCPS.

6.0 TECHNICAL RESPONSE TO MATTERS RAISED IN SUBMISSIONS

6.1 Ship Strike

Relevant submissions: 112, 164, 145

- A concern has been raised that the increased risk of ship strike from increased shipping traffic has not been adequately assessed.

[15] Some New Zealand orca travel (on average) 100 – 150 km per day (Visser, 2007).

- I discuss this issue in **Section 5.1.4** of this memo and conclude that the potential for ship strike from project vessels can be managed to a significance level of less than minor. I acknowledge that some uncertainty remains with regards to the increased ship strike risk of third party vessels (on the basis that it is difficult to quantify the anticipated increase in vessel traffic in the wider AOI), but I note that high densities of Bryde's whales (the threatened large whale species that is most likely to be affected by ship strike; hence is of direct relevance to the NZCPS) are restricted to inner areas of the Haruaki Gulf, outside the AOI for this development, where existing protocol are in place to manage this risk. Taking a precautionary approach **I have also recommended that equivalent speed limits, watch keeping and reporting requirements are also specified in the MMMP for project vessels undertaking project work in Whangārei Harbour and Bream Bay**.

6.2 Marine Mammal Habitat Use

Relevant submissions: 114, 139, 164, 213

- A concern has been raised that the opportunistic nature of the DOC sightings database precludes conclusions on the relative importance of Whangārei Harbour/Bream Bay to marine mammals, and that on this basis systematic surveys to quantify marine mammal habitat use are required.

- I discuss the need for systematic surveys in **Section 3.1** of this memo and conclude that the approach taken by the applicant to assess marine mammal occurrence and habitat use in and around the project area is sufficient as multiple data sources spanning decades or more were used to establish a baseline of relative marine mammal occurrence in Whangārei Harbour/Bream Bay.

- In addition, anecdotal observations are presented by Dr Visser (Submission No. 213) to suggest that Whangārei Harbour/Bream Bay are used by cetaceans for the following functions: resting, foraging, socialising, mating, parturition, and as a safe place to raise young.

- In response, I note that habitat use by marine mammals has been adequately assessed by Clement (2022) and while I agree that there is no evidence to suggest that the proposal area is of higher relative importance during vulnerable life stages or migration compared with other coastal habit in the region, it is important to recognise that feeding, resting, migrating and breeding behaviours will certainly occur here for some species from time to time, but subject to my recommendations, I am satisfied that effects on marine mammals can be appropriately managed.

6.3 Underwater Noise Effects on Marine Mammals

Relevant submissions: 139, 158, 164, 172, 174

- A concern has been raised that elevated levels of underwater noise over the extended construction period (3.5 years) will result in marine mammal displacement from the harbour and that the proposed mitigations are inadequate

to manage these effects.

- In response: I discuss the issue of displacement from the harbour in **Section 5.1.2** of this memo and while whales and dolphins will most likely avoid entering Whangārei Harbour during active pile driving, I concur with Clement (2022) that the harbour does not constitute habitat of high relative importance and that piling activities will be intermittent, therefore these effects will not be of ecological significance.

- Based on the modelled onset distances for behavioural response, avoidance of the harbour could also occur for more sensitive species (e.g. baleen whales) during dredging activities as well, but the occurrence of baleen whales in the harbour is so low that this will not be of ecological significance.

- The implementation of bubble curtain technology would provide greater certainty that the effects on marine mammals (in particular baleen whales) can be managed to an acceptable level; hence **I recommend that this technology is adopted for impact piling.**

- Also in relation to underwater noise, a concern has also been raised about the potential effects on New Zealand fur seals at Motukaroro Island.

- In response, I note that during piling, seals will most likely continue to utilise the harbour as they are able to avoid loud underwater noise by swimming with their heads above water when necessary (Mikkelsen et al., 2017) and tend to readily habituate to disturbance. As stated by Clement (2022), “in-air hearing of both otariid (e.g. fur seals) and phocids (e.g. leopard seals) are substantially less sensitive than in water (e.g. Southall et al. 2007)” meaning that effects on seals ashore will be negligible.

6.4 Food Chain Effects on Marine Mammals

Relevant submissions: 164

- A concern has been raised that marine mammal prey distribution within the harbour has not been quantified and therefore insufficient information is available on which to assess the indirect effects on marine mammals.

- I discuss this issue in **Section 5.1.6** of this memo and conclude that because of the relatively small spatial scale of seabed disturbance effects when compared to the vast home ranges of marine mammals, and the fact that there is no evidence to suggest that this habitat is of higher relative importance to marine mammals than other coastal habitat in the region, these effects will be of nil to negligible magnitude.

6.5 Cumulative Effects on Orca and Bottlenose Dolphins

Relevant submissions: 164

- A concern has been raised that the cumulative effects on orca and bottlenose

dolphins have has not been adequately assessed.

- I discuss the issue of cumulative effects in **Section 5.1.7** and make specific notes regarding the potential for cumulative effects on orca and bottlenose dolphins. Overall I conclude that assuming consent conditions are adopted to manage concurrent project work in and around Northport, cumulative effects will be **negligible**.

7.0 STATUTORY CONSIDERATIONS

7.1 Resource Management Act 1991

Relevant statutory considerations under the RMA include:

- New Zealand Coastal Policy Statement
- Regional Policy Statement for Northland
- Proposed Regional Plan
- Operative Regional Coastal Plan.

Conclusion

Having reviewed the relevant provisions of the above-referenced documents, I conclude that the application aligns with the provisions of the PRP in that proposed mitigations are sufficient to ensure that adverse effects on threatened species can be avoided and that in undertaking the assessment of effects a system wide approach was taken.

7.2 Other Statutory Documents

Other relevant statutory considerations include:

- Wildlife Act 1953
- Marine Mammal Protection Act 1978

Conclusion

Having reviewed the relevant provisions of the above-referenced documents, I conclude that while under both instruments of legislation listed above it is an offence to ‘disturb’ marine mammals. I note that with the proposed mitigations in place, only low levels of disturbance are predicted from the proposed activities and that no effects of ecological significance are predicted. No additional approvals are required under the Wildlife Act 1953 or the Marine Mammal Protection Act 1978.

7.3 Duration and Review of Consents

The Applicant seeks 35 year durations for the regional consents.

8.0 RECOMMENDATION

8.1 Adequacy of information

The above assessment is based on the information submitted as part of the application. It is considered that the information submitted is sufficient to enable the consideration of the above matters on an informed basis.

8.2 Recommendation

The assessment in this memo does not identify substantial reasons to withhold consent. The aspects of the proposal considered by this memo could therefore be granted consent, subject to recommended conditions detailed in **Section 8.3** below.

8.3 Recommended matters to be covered by conditions

Should consents be granted, and in accordance with my recommendations throughout this memo, the following matters should be covered by conditions to avoid, mitigate, or remedy environmental effects of the proposal.

1. The implementation of bubble curtain technology to reduce the zones of physiological and behavioural impacts on marine mammals. I note that draft condition 75(e) requires that bubble curtains or similar technology must be implemented;

2. In-situ underwater noise monitoring must occur at construction commencement to validate modelling results and to ensure management actions are appropriate. I note that draft condition 75(c) requires that in-situ noise measurements commence within two weeks of piling commencing. I agree that this timeframe is realistic and appropriate;

3. In keeping with the Clement (2022) recommendation, piling works over successive seasons should be avoided. I note that draft condition 59 adequately addressed this requirement;

4. Soft-start procedures must occur at the commencement of each impact- and vibro-piling session. I note this requirement is outlined in draft condition 75(e) along with the requirement that soft start procedures will be selected in accordance with best practice at the time of construction.

5. Hours of piling operations must be clearly established in consent conditions and should align with those specified within Section 12.3 of the Construction Environmental Management Plan. Draft condition 58 achieves this by limiting pile driving to daylight hours;

6. To address the potential of marine mammal presence in Whangārei Harbour at the start of each piling day, the pre-start observation zone should extend up-harbour to encompass the channel and surrounds as far as One Tree Point. I note that draft condition 53 incorporates this recommendation;

7. To minimise the potential for cetaceans becoming entrapped in Whangārei Harbour

once piling operations are underway, operations should be required to temporarily shut down if cetaceans are detected or reported from the inner harbour (regardless of their location relative to any MMOZ). Piling activities should only recommence once animals have been observed leaving the harbour and have moved beyond the relevant MMOZ. This requirement has been incorporated into draft condition 55.

8. The potential for any concurrent dredging or piling (from other consented projects) should be avoided to reduce the potential of cumulative noise impacts on marine mammals. I note that draft condition 85 addresses the potential for concurrent dredging and draft condition X addresses the potential for concurrent piling.

9. Underwater inspections of silt curtains occur on a monthly basis. I note that draft consent condition 75(k) sufficiently addresses this requirement;

10. Project vessels adopt the equivalent requirements of the Hauraki Gulf Transit Protocol while undertaking project related activities in Whangārei Harbour and Bream Bay with regards to speed limits, watch keeping and reporting. I note that this requirement is clearly set out in draft condition 75(h); and

11. Regular maintenance of dredge and piling equipment to minimise source noise. I note that draft condition 75(k) includes this.

12. The MMMP should be updated to include the following details:

    a. All personnel undertaking MMO duties should be trained by a DOC approved MMO training provider or an experienced marine mammal researcher. I note that this is a requirement of draft condition 75(g).

    b. Communication channels with the Rock Lobster Industry Council should be established to receive real-time information about large whale sightings from fishing vessels off the east coast of Northland. I note that this is supported by draft condition 76(l).

Memo prepared by:	Helen McConnell, Principal Consultant, SLR Consulting NZ Ltd
Date:	11 July 2023

Memo reviewed and approved for release by:	Blair Masefield, Technical Director, Beca Limited On behalf of the Whangārei District Council and Northland Regional Council
Date:	2 August 2023

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