

1.0 TECHNICAL MEMO – UNDERWATER NOISE

To:	Stacey Sharp & Blair Masefield, Beca (consultant planners)
From:	Jonathan Vallarta, Underwater Acoustics, SLR Consulting
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 Whangārei District Council and 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 Jonathan Vallarta. I currently hold the role of Underwater Acoustics Business Lead at SLR Consulting (Canada) Ltd. and have over 20 years of experience as an underwater acoustics consultant, primarily assessing noise impact from anthropogenic activities on marine fauna.

I also have experience in a wide range of positions, including teaching, design, project management, acoustic consulting, and collaborative research. Throughout my professional career I have supported projects in Africa, the Arctic, Canada, Caribbean Islands, Mexico, and the USA. I have considerable experience providing training courses in the fundamentals of underwater noise, monitoring, and mitigation techniques. I have also offered technical advice on underwater noise issues, identifying relevant regulations and criteria together with an assessment of potential project underwater noise impacts.

I joined SLR in January 2020 and I am based in Vancouver, Canada. My previous experience includes running a passive acoustic monitoring business, while lecturing several university courses and consulting for JASCO Applied Sciences over four years. I hold a Ph.D. (in underwater acoustics) from Heriot-Watt University in Edinburgh, Scotland, awarded for research into the significance of passive acoustic array configuration on sperm whale range estimation. I also hold a bachelor's degree in electronic engineering and communications from Iberoamericana University in Mexico City.

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 2014. The opinions expressed in this memorandum, are based on my qualifications and experience, and are within my area of expertise. If I rely on the evidence or opinions of another, my statements will acknowledge that.

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

A description of the site and environmental setting was provided in Appendix 25 of the Assessment of Environmental Effects (AEE) entitled: *Application for resource consents for the expansion of Northport*, prepared by Reyburn & Bryant, dated 6 October 2021.

3.2 Proposal

The proposal is as described in Appendix 25 of the AEE (referenced in Section 3.3 below).

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

- *Capital dredging requires specialized vessels to remove hard substrates. Dredging generates sounds are generally non-impulsive in nature. Although the sounds vary depending on the type of dredging technique used, their maximum noise levels are lower than those reached with percussive piling. No risk for permanent/temporal hearing loss was identified from capital dredging.*
- *“The reclamation and associated works at the eastern end of Northport will expose marine mammals and fish to acoustic-related disturbances that are either physiological or behavioural. Those risks are highest for the percussive piling but will occur over a limited range and not extend beyond the harbour entrance.”*

The memorandum sets out the findings of the technical review undertaken of the Applicant's underwater noise assessment, and largely focuses on methodology and key conclusions on noise levels, receptors, and management controls. Further assessment on the underwater noise effects has been undertaken by Council's marine mammals and marine ecology experts.

3.3 Reference documents

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

Application

- 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 25. Assessment of underwater noise effects: percussive pile driving and capital dredging*, prepared by Matt Pine, Styles Group, dated 2 August 2022.

s92 Request for Information

- Further information response prepared by Styles Group, 10 February 2023 (henceforth referred to as s92 Response).

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 TECHNICAL ASSESSMENT OF APPLICATION

5.1 Review of Underwater Noise Assessment

A technical review of the Styles Group Underwater Noise Assessment (referenced in section 3.3 above) has been undertaken. Key findings are summarised below:

- Noise criteria
 - The noise criteria meet the noise thresholds accepted by the scientific community for minimising impacts on marine fauna. I agree the noise criteria assessment utilised is appropriate.
- Sound Sources
 - Source levels correspond to those cited by peer reviewed literature of anthropogenic activities. I agree that the source levels referred to are appropriate.

- Environmental inputs
 - The Styles Group assessment utilises appropriate environmental inputs such as bathymetry, sea-floor composition, and sound speed profiles for the underwater noise model. I agree with the environmental inputs used are sufficient.
- Modelling
 - Sound transmission loss modelling is based on theoretical propagation loss methods such as parabolic equation and ray tracing that project the sound field from the sound source. I agree the modelling methodology is appropriate.
- Monitoring and Sound Source Validation
 - Acoustic components and locations chosen to measure the ambient sounds are appropriate. Sound source levels measured correspond to those proposed by the literature. I agree with the monitoring assessment implemented.
- Mitigation Measures.
 - The applicant provides the underwater noise assessment necessary to implement the appropriate mitigation strategies by the relevant technical specialists. This would be prepared in consultation with marine mammal experts and underwater noise experts and is a commonly adopted means to manage such effects. I concur with the Marine Mammal Management Plan (MMMP) to control effects as described in the AEE.

5.2 Conclusion

Overall, I conclude that, subject to the application of mitigation measures to the percussive pile driving activities, the actual and potential adverse effects of the proposal will be acceptable.

6.0 TECHNICAL RESPONSE TO MATTERS RAISED IN SUBMISSIONS

6.1 Underwater Noise Impacts on Invertebrates

Relevant submissions: 172, 174, 183, 220

Response

Generalizations regarding the noise impacts of anthropogenic activities such as dredging on invertebrates (e.g., shellfish) are often inappropriate due to the scientific knowledge gap regarding our understanding of potential effects of sound and recovery from impact in marine fauna (Popper et al 2022). Accordingly, I consider this potential effect cannot be further addressed based on the currently available scientific analysis.

Evidence

Popper, A.N., Hice-Dunton, L., Jenkins, E., Higgs, D.M., Krebs, J., Mooney, A., Rice, A., Roberts, L., Thomsen, F., Vigness-Raposa, K. and Zeddies, D., 2022. Offshore wind energy development: Research priorities for sound and vibration effects on fishes and aquatic invertebrates. *The Journal of the Acoustical Society of America*, 151(1), pp.205-215.

6.2 Underwater Noise – Marine Mammal Hearing Loss

Relevant submission: 174

Response

Risks for permanent hearing loss on Bryde’s whales (475m) and risk of temporary hearing loss on NZ fur seals (111m) during percussive piling can be mitigated by the application of appropriate mitigation measures. The use of bubble curtains can help to attenuate noise and increase the distance of impact. In addition, the support of marine mammal observers (MMO) and passive acoustic monitoring (PAM) operators during percussive piling activities help to detect the presence of these animals to enable activities to be stopped, if necessary, when animals are within certain distances of the works.

Bubble curtains and MMO are both proposed as mitigation controls in the application and their implementation would be identified in the proposed MMMP. Accordingly, I consider the proposed mitigation appropriately addresses this potential effect.

6.3 Underwater Noise Impact from Pile Driving on Marine Mammals

Relevant submission 158

Response

The statement in paragraph 27 “*that pile driving is likely ... to disrupt marine mammal hearing and behaviour up to many kilometres away*” is not completely correct. Although it has been confirmed by the propagation model study that underwater noise has the potential to affect marine mammals, based on the modelling results of Appendix 25 the predicted zones of impact without the application of any noise mitigation are as follows:

- ~3 km for auditory masking (2,914m)
- ~2 km for behavioural response (2,047m)
- <1.5 km for temporary physiological injury (1,348m)
- <500 m for permanent physiological injury (475m)

The application of available mitigation technologies to reduce noise at the source will further reduce the impact zones.

7.0 STATUTORY CONSIDERATIONS

7.1 Resource Management Act 1991

Relevant statutory considerations under the RMA include:

- Section 16 RMA – Duty to avoid unreasonable noise

- Section 17 RMA – Duty to avoid, remedy, or mitigate adverse effects
- New Zealand Coastal Policy Statement
- Regional Policy Statement for Northland
- Proposed Regional Plan for Northland (Appeals Version)
- Operative Regional Coastal Plan.

Conclusion

Having reviewed the relevant provisions of the above-referenced documents, I concur with the assessment of underwater noise effects for the purpose of the percussive pile driving activities by Northport Limited that the noise criteria used aligns with the most updated guidance used by worldwide analysts, managers, other federal agencies, and other relevant user group/stakeholders to better predict how a marine mammal's hearing will respond to sound exposure.

Having specific regard to Policy D.5.27 of the Proposed Regional Plan, the approach to managing the effects of underwater noise outlined in the AEE are consistent with the direction set out within the policy framework.

7.2 Other Statutory Documents

Other relevant statutory considerations include:

- Marine Mammal Protection Act 1072 (amended in 1994)

Conclusion

Having reviewed the relevant provisions of the above-referenced document, I concur with the assessment of underwater noise effects for the purpose of the percussive pile driving activities by Northport Limited that aligns well to provide threshold distances that enable the appropriate application of mitigation measures to protect threatened marine species from adverse effects.

7.3 Duration and Review of Consents

The Applicant seeks 35 year durations for the regional consents.

8.0 CONCLUSIONS AND 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 Recommended Conditions and Advice Notes

Should consents be granted, the following advice notes are recommended to avoid, mitigate, or remedy environmental effects of the proposal and to implement mitigation proffered by the Applicant.

Conditions and Advice Notes

NRC Conditions (amended)

Pile-driving sound level verification

57. Verification of the in-situ noise levels produced from pile-driving activities must be undertaken during pile-driving activities utilising underwater passive acoustic monitoring (PAM) instrumentation instruments and trained operators required by condition.

Avifauna

74. The Avifauna section of the CEMP must include:

- (a) Detailed descriptions and methodologies setting out how adverse effects on Kororā *Little Penguin* and Tōrea pango *Variable oystercatcher* will be managed, including:
 - (i) For Kororā *Little Penguin*, to ensure compliance with conditions 45 to 48 (relating to pre-construction surveys, implementation of construction works exclusion zones, and measures to reduce underwater noise from pile driving); and
 - (ii) For Tōrea pango *Variable oystercatcher*, to ensure compliance with conditions **Error! Reference source not found.** to **Error! Reference source not found.** (requiring protocols for pre- and during-constructions surveys, implementation of exclusions zones around active nests and nesting birds, and measures to reduce underwater noise from pile driving).

Marine Mammals

75. The Marine Mammals section of the CEMP must include (as an attachment) a Marine Mammal Management Plan (MMMP) which must detail:

- (a) ~~The marine mammals that may be present within Whangārei Harbour;~~
- (b) The potential for adverse effects of noise produced by construction activities on marine mammals that may be present within Whangārei Harbour;
- (c) Procedures for the verification of the in-situ noise levels produced from pile-driving activities by measuring the underwater noise of these activities as soon as practicable once pile-driving has commenced, and a process for identifying and implementing any corresponding adjustments to mitigation actions, if required (including revised Marine Mammal Observation Zones (MMOZs) and associated pile driving prohibition procedures);
- (d) Procedures for the continuation of acoustic monitoring at the established baseline stations across the Whangārei Harbour during pile-driving activities;

- (e) Piling methodology procedures for the reduction of noise levels at source, which may include:
 - (i) The use of vibro-driving where practicable;
 - (ii) “Soft start” or “ramping up” procedures where practicable;

Advice note: “Soft start” and “ramping up” are procedures whereby pile-driving energy is gradually increased to normal operating levels to give nearby marine animals an opportunity to move away from the area before sound levels increase to an extent that may cause discomfort or injury.
 - (iii) The use of a sacrificial non-metallic hammer cushion caps or dollies for impact piling to reduce underwater noise where practicable;
 - (iv) Modifications to pile striking by changing the contact time of the hammer (to reduce the noise generated by impacts through a reduction in the amplitude of the pile vibration) where practicable; and
 - (v) Available technologies to reduce noise at source and their implementation where practicable (for example bottom-driven piles, air balloons inflated within open piles to reduce ringing, and/or bubble curtain technology).

Dredging

88. The plan must provide the following information

- (m) A description of all other relevant measures to manage adverse effects on the receiving environment during the operation of the dredge vessel; including measures relating to underwater noise, biofouling, management of waste, and refuelling.
- (o) Procedures to be implemented to manage underwater dredging noise within the noise limits specified in these consents, including how any noise complaints are to be received and actioned.

Maintenance Dredging Management Plan (Maintenance DMP)

115. The plan must provide the following information:

- (m) A description of all other relevant measures to manage adverse effects on the receiving environment during the operation of the dredge vessel; including measures relating to underwater noise, biofouling, management of waste, and refuelling; and
- (o) Procedures to be implemented to manage underwater dredging noise within the noise limits specified in these consents, including how any noise complaints are to be received and actioned.

Memo prepared by: Jonathan Vallarta, Underwater Acoustics, SLR Consulting.

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