

APPENDIX 9G

DRAFT SHIPYARD NOISE MANAGEMENT PLAN (NMP)



MARSHALL DAY
Acoustics



**NORTHLAND SHIPYARD AND DRYDOCK
APPENDIX 9L SHIPYARD NOISE MANAGEMENT
PLAN (NMP)**

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Project: **NORTHLAND SHIPYARD AND DRYDOCK NOISE MANAGEMENT PLAN**

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1.0 INTRODUCTION

This Noise Management Plan (**NMP**) has been prepared for the management of noise emitted by the Northland Shipyard and Drydock (**Drydock**) at Marsden Point, Whangārei. The drydock Preferred Operator must implement this Drydock NMP to satisfy Condition 2. Two drydock configurations are proposed, a floating drydock (Option 1) and a ship lift (Option 2). Section 3.0 details common management and mitigation measures that apply to both options, as well as specific measures for each option where appropriate.

Several activities will be undertaken at the facility, including hull maintenance such as blasting and grinding, internal vessel refit and repair, and painting and coating application. Blasting will be the loudest activity and is the focus of this NMP. Other low noise activities can generally be managed through general mitigation and management measures detailed in Section 3.0.

This NMP recognises that blasting noise has a distinctive character and, at times, may be higher than desirable at nearby residential receivers in Marsden Bay and Reotahi.

This NMP addresses noise effects associated with the Drydock. It excludes the management of noise from Northport operations or surrounding commercial and industrial activities.

The Preferred Operator's Environmental Manager (or representative) is responsible for implementing this NMP. It is consistent with the noise management framework in Section 8 of New Zealand Standard NZS 6809: 1999, "*Acoustics – Port Noise Management and Land Use Planning*" (the **Port Noise Standard**) and includes measures specific to drydock operations. It will be reviewed annually.

The NMP must:

- Ensure drydock operations comply with the relevant noise limits in Condition 1
- Provide a framework for the measurement, monitoring, assessment, and management of noise
- Identify and adopt the best practicable option (BPO) for the mitigation and management of noise effects
- Require engagement with the community and timely management of complaints (including through participation in the Community Liaison Group - Section 4.2)
- Restrict outdoor blasting, hammering and grinding activities to the hours of 7am to 6pm, Monday to Saturday

A glossary of terminology is included in Appendix A.

2.0 DRYDOCK

2.1 Environment

A map of the existing environment is included in Appendix B showing the drydock in the Whangārei Harbour, west of Northport. There are four distinct receiving environments near the drydock:

- Marsden Bay is a coastal settlement on the southern side of Whangārei Harbour, approximately 400 m west.
- Reotahi is a coastal settlement on the northern side of the Whangārei Harbour, approximately 1.3 – 1.5 km from the drydock operations.
- Port and Industrial Zones to the east and south are not noise sensitive (e.g. Northport, Marsden Point import terminal and the Carter Holt LVL Plant).
- Open Space Zones at the coastal interface are occupied by the public during the day.

Marsden Bay is the closest settlement and will generally receive the highest noise levels from blasting activities at the drydock.

2.2 Configurations

Two drydock configurations are proposed:

1. The floating drydock
This includes wing walls approximately 17 m tall on the eastern and western sides of the berth pocket. The wing walls will provide some noise shielding to residential communities. Large vessels may also be transported longitudinally onto the hard stand, in which case, they have similar noise emissions to those described for the ship lift option below.
2. The ship lift
Ships would be moved onto the hardstand to the south, then maintained, primarily relying on the proposed 4m high site perimeter noise wall, which would provide minimal noise mitigation. This option also moves the blasting operations closer to Marsden Bay residences which increases noise levels in this area.

2.3 Operations

The Drydock Facility will provide marine maintenance services for vessels up to 230 m in length.

The Preferred Operator and its contractors will undertake the following types of work at the facility:

- Hull maintenance (blasting and grinding)
- Internal vessel refit and repair
- Painting and coating application
- Vessel movements (docking and undocking)
- Landside support activities (compressors, generators, plant)
- Transport and logistics
- Specialist sub-contractors (e.g. electrical, mechanical).

2.4 Blasting Noise

1.1.1 Blasting Types

Drydock blasting noise is predicted to be the loudest activity and the hours of blasting are restricted to 7am - 6pm with no blasting permitted in the evening and night-time period.

There are several types of blasting used for different applications. Table 1 summarises the blasting types and their usage. Blasting is generally undertaken on the ship hull and is generally focussed on the part below the water line.

Table 1: Blasting Types

Blasting type	Wet or dry	Medium	Usage
Open dry abrasive blasting	Dry	Garnet	Rarely
Wet abrasive blasting	Wet	Garnet	25% of dockings
Ultra High Pressure Blasting (UHP)	Wet	Water	15-20% of dockings
High Pressure Blasting (HP)	Wet	Water	Preferred
Vacuum abrasive blasting	Dry	Garnet	Preferred

The blasting types are described as follows, generally from loudest to quietest:

- **Open dry abrasive blasting:** Rarely used. It is not a representative activity (outlier). If dry abrasive blasting is still necessary, encapsulation is mandatory for air quality discharge reasons (shrink wrap over scaffold). Temporary noise barriers should also be considered (Section 3.6.3).
- **Wet abrasive blasting:** Generally using garnet as the medium and utilised in approximately 25% of dockings.
- **Ultra High Pressure (UHP) water blasting:** Used for full coating removal and surface preparation, capable of stripping all coatings and rust back to bare steel. 40,000 PSI is the highest pressure used for stripping paint back to bare steel.
- **High Pressure Blasting (HP) water blasting:** Typically used for cleaning light to moderate fouling, removing only loose paint and light surface rust where preserving the existing surface profile is acceptable. A PSI of 5,000 to 10,000 PSI is generally used for this type of work.
- **Vacuum abrasive blasting:** Preferred method of bare steel preparation. Uses sucker trucks, typically 4–5 trucks operating continuously with 8–10 on rotation for a smaller vessel (70 m) and potentially double for a large ship (230 m).

1.1.2 Docking duration

Vessel duration in the drydock is highly variable, ranging from one week to eight months. The most representative duration is three weeks, structured approximately as:

- One week blasting (continuous daytime working)
- One week painting
- One week ancillary activities

1.1.3 Number of Crews

We understand the typical number of blasting crews operating on a ship would be three to five at any one time. There is the possibility that up to eight crews could operate on a larger ship at one time but this would not occur regularly given the complexity of managing so many work fronts.

What is more likely is having eight blasting crews spread between multiple ships. The hardstand enables up to three ships to be docked at once which could increase the requirement for blasting. Noise modelling presented in Section 2.7 includes scenarios with four and eight blasting crews to provide an estimation of noise for each scenario.

2.5 Noise Limits

The relevant consent conditions are included in Appendix C.

Condition 1 sets the following noise limits to noise received at the notional boundary of any noise sensitive activity, which in this case is the closest dwellings in the Marsden Bay and Reotahi residential communities:

- Day: 55 dB L_{Aeq} (0700 – 2200)
- Night: 45 dB L_{Aeq} (2200 – 0700) and 75 dB L_{AFmax}

The noise limits specify 15-minute measurement intervals. Assessment in accordance with NZS 6802:2008 applies adjustments to the measured intervals to determine the Rating Level. The Rating Level includes application of adjustments to account for the character and duration of the noise source. The following adjustments apply to blasting noise due to its character and duration, but are equal and opposite so cancel out:

- Special audible characteristics (SAC): Blasting noise has a distinct ‘hiss’ that is noticeably different in character compared to components of the existing noise environment (e.g. port noise, coastal

environmental noise and community activities). Therefore, it will likely be observed to have SAC and a +5dB adjustment would be applied in accordance with NZS 6802:2008 clause 6.3.

- **Duration:** The hours of blasting are proposed to be restricted to 7am to 6pm. Within this period, the cumulative duration of each blasting noise source is up to 5 hours of the 15-hour daytime period. Therefore, a duration adjustment of -5dB would be applied in accordance with NZS 6802:2008 clause 6.4.

2.6 Noise Model

A computer-based noise model is used to represent blasting noise emissions. The noise model consists of the following parts that must be representative to enable the noise contours to be reliable:

- **Noise sources.** Measurements have been made of representative blasting activities to determine the reference sound power levels and spectrum used in the model.
- **Operational scenario.** Assumptions include the number, location and height of noise sources which is dependent on the ship size and blasting requirements. The typical operational duration of the noise source within the daytime period and the proportion of the docking period where active blasting occurs. This has been developed in consultation with the Preferred Operator to ensure it is representative of busy operations.
- **Noise barriers.** A 4m noise barrier around the western perimeter of the drydock has been added to the noise model to shield noise for lower level sources. Buildings on the drydock have also been added at a height of 8m which provide additional shielding to the west.
- **Modelling methodology.** The software calculates noise emissions and attenuation with distance, allowing for shielding from buildings, barriers and topography, and ground and air absorption.
- **Calibration.** The model should be calibrated with noise monitoring to verify shape and level of the noise contours (Section 3.7).

The noise source data for the model is based on measurements of blasting and other activities at existing drydock facilities in New Zealand. Data will be updated as additional measurements are undertaken at the Preferred Operator's facilities.

2.7 Noise Contour Maps

The noise contours maps for wet abrasive blasting activities are included in Appendix D. The maps include representative noise levels for the different drydock configurations and different ship sizes to inform likely noise levels at receptors. The maps represent unmitigated wet abrasive blasting, the loudest blasting method, used in approximately 25% of dockings. They conservatively exclude the mitigation and management measures in Section 3.0. To achieve compliance where the contours indicate levels approaching or above the limits in Condition 1, the Preferred Operator will apply the measures in Section 3.0, including blasting method selection, crew numbers and location, scheduling against wind conditions, and localised screening where warranted.

The maps will be reviewed on an annual basis to reflect any material change in character or intensity of drydock noise emissions. Any updated maps will be presented to the Community Liaison Group (Section 4.2) prior to adoption in this NMP.

3.0 MITIGATION AND MANAGEMENT

3.1 Training

All staff will participate in an induction training session prior to commencing work, with attention given to the following matters:

- The noise sensitivity of residential receivers, particularly in Marsden Bay
- Activities with the potential to generate high noise levels (Sections 2.2 and 2.7)
- Best practice noise mitigation and management procedures (Section 3.0)
- Any operational requirements and constraints identified through communication and consultation with the Community Liaison Group (Section 4.2)

Awareness of current noise matters will be addressed using noticeboards, staff communications or further targeted training sessions.

The Preferred Operator will also require onsite tenants and contractors to comply with this NMP.

3.2 Equipment Selection

The Preferred Operator will:

- Prioritise quieter models/options
- Use electric motors rather than diesel engines where practicable
- Use rubber tracked equipment rather than steel tracked equipment where practicable
- Use equipment that is suitably sized for the task
- Maintain equipment well to minimise rattles, squeaks etc
- Fit engines with exhaust silencers and engine covers where practicable
- Avoid tonal reversing or warning alarms (beepers). Alternatives include broadband alarms (squawkers/quackers), flashing lights, proximity sensors, reversing cameras and spotters.

This policy extends to the upgrade of existing equipment where appropriate and practicable.

3.3 General Measures

The following common mitigation measures should be implemented even if noise levels comply with the limits in Condition 1:

- Avoid unnecessary noise, such as shouting, the use of horns, rough handling of material and equipment, and banging or shaking machinery attachments
- Avoid steel on steel contact or take care to minimise impact where required (e.g. closing ship hatch, stacking of scaffolding)
- Avoid high engine revs through appropriate equipment selection, observe speed limits on drydock and public roads, and turn engines off when idle
- Utilise buildings and/or container stacks as noise barriers to screen the Marsden and Reotahi residential interface where practicable and appropriate (Section 3.6)
- Undertake maintenance and repairs for drydock plant and equipment within workshop buildings and avoid the use of sledge hammers outdoors (e.g. use hydraulic jacks to remove dents in steel surfaces where practicable)
- Maintain paved surfaces to avoid potholes and corrugations

3.4 Hours of operation

Outdoor blasting, hammering and grinding activities will be restricted to the daytime hours of 0700 to 1800 hours, Monday to Saturday.

Other quieter activities may be undertaken 24/7 provided they do not include loud and impulsive activities. For example, suitable work at night may include transportation, careful loading of equipment, painting, fitting and turning within a workshop or vessel, or other work inside the vessel that does not result in grinding, drilling or hammering of the hull.

3.5 Blasting Noise

To minimise the noise effects of blasting activities described in Section 2.4:

- Restrict to the daytime hours of 0700 to 1800 hours, Monday to Saturday (Section 3.4)
- Prioritise quieter forms of blasting where practicable
- Prioritise the scheduling of wet abrasive blasting during favourable meteorological conditions where practicable (i.e. when Marsden Bay is not directly downwind of the blasting). Northport operates an established local model for this approach (www.northport.co.nz/weatherfeed).
- Use effective noise barriers where practicable, especially for wet garnet blasting activities with line of sight to Marsden Bay. The effective use of noise barriers is detailed in Section 3.6.
- Use low-noise nozzle types (e.g. Snake Bite XQ or Blast Force Silencer) where appropriate
- Undertake noise monitoring at the community interface to verify predicted noise levels

3.6 Noise Barriers

3.6.1 Floating Drydock Wing Walls

The floating drydock design includes wing walls approximately 17 m tall on the eastern and western sides of the berth pocket. The wing walls will provide some noise shielding to residential communities for vessels within the drydock. Where practicable, centre the vessel in the middle of the drydock to maximise the noise mitigation from the wing walls to screen residential receivers in Marsden and Reotahi.

3.6.2 Perimeter Noise Wall and Drydock Buildings

A 4 m high noise wall will be maintained on the western edge of the facility and there are several buildings proposed to support landside infrastructure approximately 8 m high. These structures will effectively screen noise sources near ground level (e.g. vehicles, pumps and cranes) but may be less effective when noise sources are elevated (e.g. blasting and grinding).

3.6.3 Source Noise Barriers

Localised noise screening is a supplementary measure where the operational controls in Section 3.5 are not sufficient to achieve the noise limits in Condition 1. Screening is generally only warranted where several risk factors combine:

- High intensity wet abrasive (garnet) blasting
- Blasting at elevated positions above the shielding of the wing walls, perimeter wall or buildings
- Direct line of sight to Marsden Bay dwellings
- Marsden Bay downwind of the blasting location

The Preferred Operator may use screening or any combination of operational controls to achieve compliance. Effective screening typically reduces received noise levels by 10 decibels.

When used, the following guidelines will be used in designing and installing noise barriers:

- Use moveable noise barrier panels or acoustic matting on scaffolding and cherry pickers.
- Panels should have a minimum surface mass of 6.5 kg/m². Suitable panels include 12 mm plywood or the following proprietary 'noise curtains':
 - o SealedAir 'WhisperFence 24dB' (www.sealedair.com)
 - o Hushtec 'Premium Series Noise Barrier' (www.duraflex.co.nz)
 - o Soundbuffer 'Performance Acoustic Curtain' (soundbuffer.co.nz)
 - o Hoardfast 'Fast Wall Premium PVC partition panels' (www.ultimate-solutions.co.nz)
 - o Safesmart 'Acoustic Curtain 6.5kg/m²' (www.safesmartaccess.co.nz)
- The barriers will be positioned as close as practicable to the blasting nozzle and item being blasted.

3.7 Noise Monitoring

The Preferred Operator will undertake noise monitoring:

- To validate the drydock noise contour maps where practicable (Appendix D)
- In response to a reasonable noise complaint if it assists in understanding the level and/or effect of the source of complaint (Section 4.1)

Monitoring results will be available to Council and Community Liaison Group (Section 4.2).

4.0 ENGAGEMENT

4.1 Communication

The Preferred Operators website will provide updates on operational matters and details for complaints response, a summary of noise control initiatives and this NMP (available for download).

Targeted engagement with community and stakeholders is undertaken on a case-by-case basis and/or through the Community Liaison Group (Section 4.2).

4.1.1 Complaints Response

When a complaint or enquiry is received, either electronically or via telephone, immediate acknowledgement will be provided. Where possible, a response will be provided the same day. Where the inquiry demands a more detailed response, this will be provided within two working days or an alternative timeframe where this is communicated to the people who made the complaint.

All noise complaints should be recorded in a complaints file that is available to Council on request. For each complaint, an investigation should be undertaken involving the following steps as soon as practicable:

- Acknowledge receipt of the concern or complaint:
 - o Time and date the complaint was received and who received it
 - o Time and date of the activity subject to the complaint (estimated where not known)
 - o The name, address and contact details of the complainant (unless they elect not to provide)
 - o The complainant's description of the activity and its resulting effects, including notes about the character of the noise (e.g. one-off bang, continuous hum, low or high frequency)
 - o The complainant's description of the location or relative direction of the source
 - o Any relief sought by the complainant (e.g. scheduling of the activity)

- Identify the relevant activity and the nature of the works at the time of the complaint and then forward the complaint to the appropriate operational area and the communications team.
- Review the activity noise levels to determine if the activity is predicted to comply with the relevant performance standards (Section 2.5) at the complainants building. Consider attended monitoring (Section 3.7) to verify the underlying reference level assumptions.
- Review the mitigation and management measures to ensure the activity represents the BPO (Section 3.0). Review the relief sought by the complainant. Adopt further mitigation and management measures if appropriate.
- Report the findings and recommendations to the Environmental Manager, implement changes and update this NMP if appropriate.
- If requested, report the outcomes of the investigation to the complainant, identifying where the relief sought by the complainant has been adopted or the reason(s) otherwise

In most cases, ceasing the activity would provide immediate relief. However, this may not be practicable for safety and/or operational reasons.

4.2 Community Liaison Group

The Community Liaison Group (**CLG**) fulfils the liaison role recommended in Section 8.3 of the Port Noise Standard. The purpose of the CLG is to provide a cooperative approach to managing noise from drydock activities. The Preferred Operator will establish a suitable CLG or will participate in the existing Northport CLG if agreed with Northport, given the co-located nature of the two operations. The meetings are convened at least annually.

The Preferred Operator will:

- Gather feedback on noise issues and mitigation and management measures (Section 2.6)
- Present results of noise monitoring (Section 3.7)
- Present a summary of recent noise complaints and actions (Section 4.0)
- Present revisions of this NMP and noise contour maps (Appendix D)

APPENDIX A GLOSSARY OF TERMINOLOGY

dB	Decibel. The unit of sound level. Expressed as a logarithmic ratio of sound pressure P relative to a reference pressure of $P_r=20 \mu\text{Pa}$, i.e. $\text{dB} = 20 \times \log(P/P_r)$.
dBA	The unit of sound level which has its frequency characteristics modified by a filter (A-weighted) so as to more closely approximate the frequency bias of the human ear.
$L_{\text{Aeq}}(t)$	The equivalent continuous (time-averaged) A-weighted sound level. This is commonly referred to as the average noise level. The suffix "t" represents the time period to which the noise level relates, e.g. (8 h) would represent a period of 8 hours, (15 min) would represent a period of 15 minutes and (2200-0700) would represent a measurement time between 10 pm and 7 am.
L_{AFmax}	The A-weighted maximum noise level. The highest noise level which occurs during the measurement period.
Frequency	The number of pressure fluctuation cycles per second of a sound wave. Measured in units of Hertz (Hz).
Noise	A sound that is unwanted by, or distracting to, the receiver.
Ambient	The ambient noise level is the noise level measured in the absence of the intrusive noise or the noise requiring control. Ambient noise levels are frequently measured to determine the situation prior to the addition of a new noise source.
Special Audible Characteristics	Distinctive characteristics of a sound which are likely to subjectively cause adverse community response at lower levels than a sound without such characteristics. Examples are tonality (e.g. a hum or a whine) and impulsiveness (e.g. bangs or thumps). In some cases, noise limits are set for a specific activity for its character (e.g. Port Zone noise limits). Therefore, port noise character would be reasonably expected and not 'special' (e.g. would not apply to well managed log or container handling activities).
NZS 6801:2008	New Zealand Standard NZS 6801:2008 <i>"Acoustics – Measurement of environmental sound"</i>
NZS 6802:2008	New Zealand Standard NZS 6802:2008 <i>"Acoustics – Environmental noise"</i>
NZS 6809:1999	New Zealand Standard NZS 6809:1999 <i>"Acoustics – Port Noise Management and Land Use Planning"</i>

APPENDIX B MAP OF EXISTING ENVIRONMENT

Figure 1: Map of Existing Environment



APPENDIX C PROPOSED NOISE CONDITIONS

1. Noise limits

Noise must be measured in accordance with New Zealand Standard Acoustics – Measurement of Environmental Sound (NZS 6801:2008) and assessed in accordance with New Zealand Standard Acoustics – Environmental Noise (NZS 6802:2008), and comply with the following noise limits at the notional boundary of any noise sensitive activity:

Time (Monday to Sunday)	dB LAeq (15 min)	dB LAfmax
0700 to 2200 hours	55	Not applicable
2200 to 0700 hours	45	75

2. Noise Management Plan

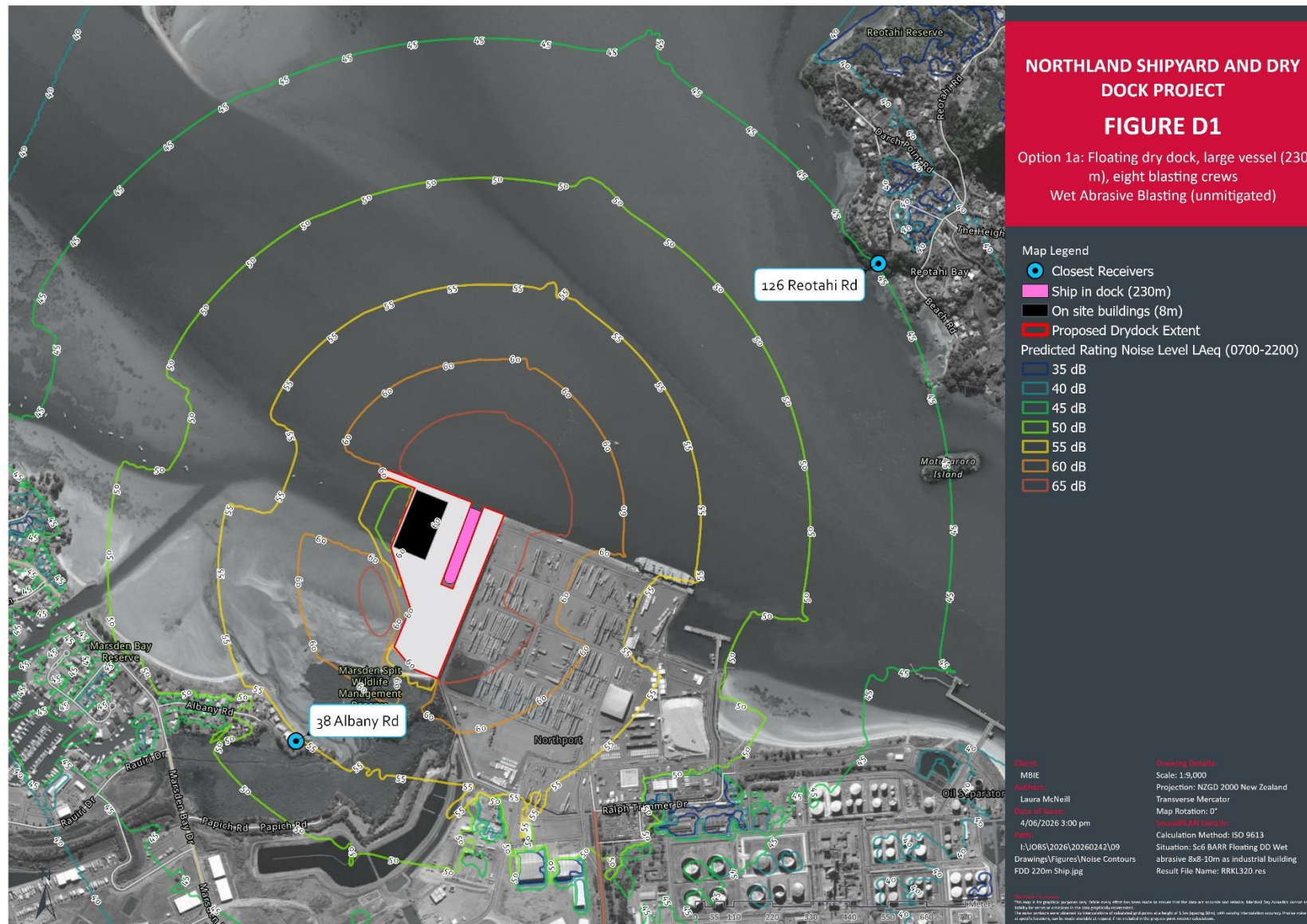
A Noise Management Plan (NMP) must be prepared by a suitably qualified person and submitted to Council for certification prior to the commencement of drydock activities on site. The NMP must:

- Ensure drydock operations comply with the relevant noise limits in Condition 1
- Provide a framework for the measurement, monitoring, assessment, and management of noise
- Identify and adopt the best practicable option (BPO) for the mitigation and management of noise effects
- Require engagement with the community and timely management of complaints (including through participation in the Community Liaison Group).
- Restrict outdoor blasting, hammering and grinding activities to the hours of 7am to 6pm, Monday to Saturday.

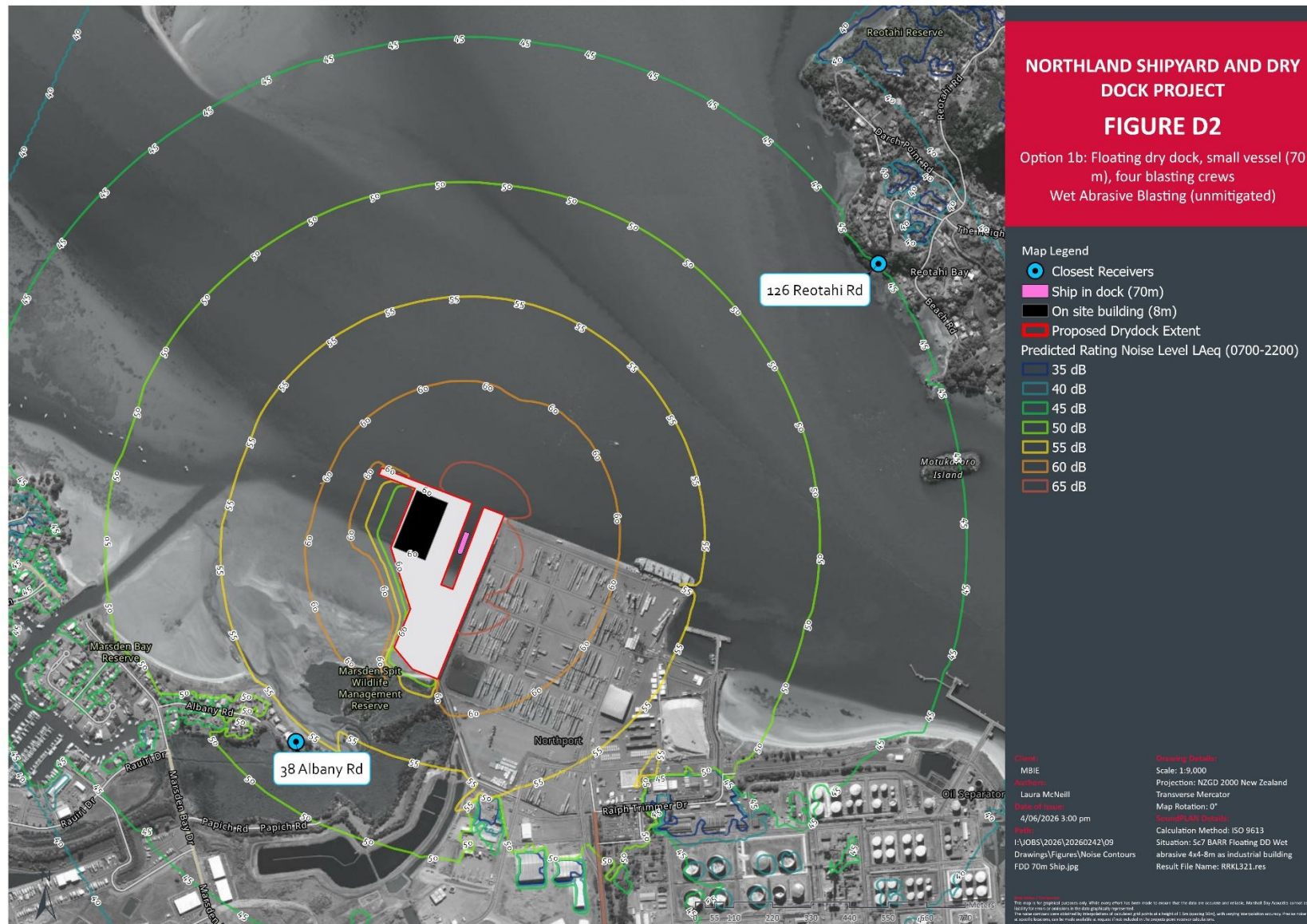
APPENDIX D NOISE CONTOUR MAPS – WET ABRASIVE BLASTING

The noise contour maps are for unmitigated wet abrasive blasting. They conservatively exclude the mitigation and management measures in Section 3.0 that will be applied to achieve compliance with the noise limits in Condition 1.

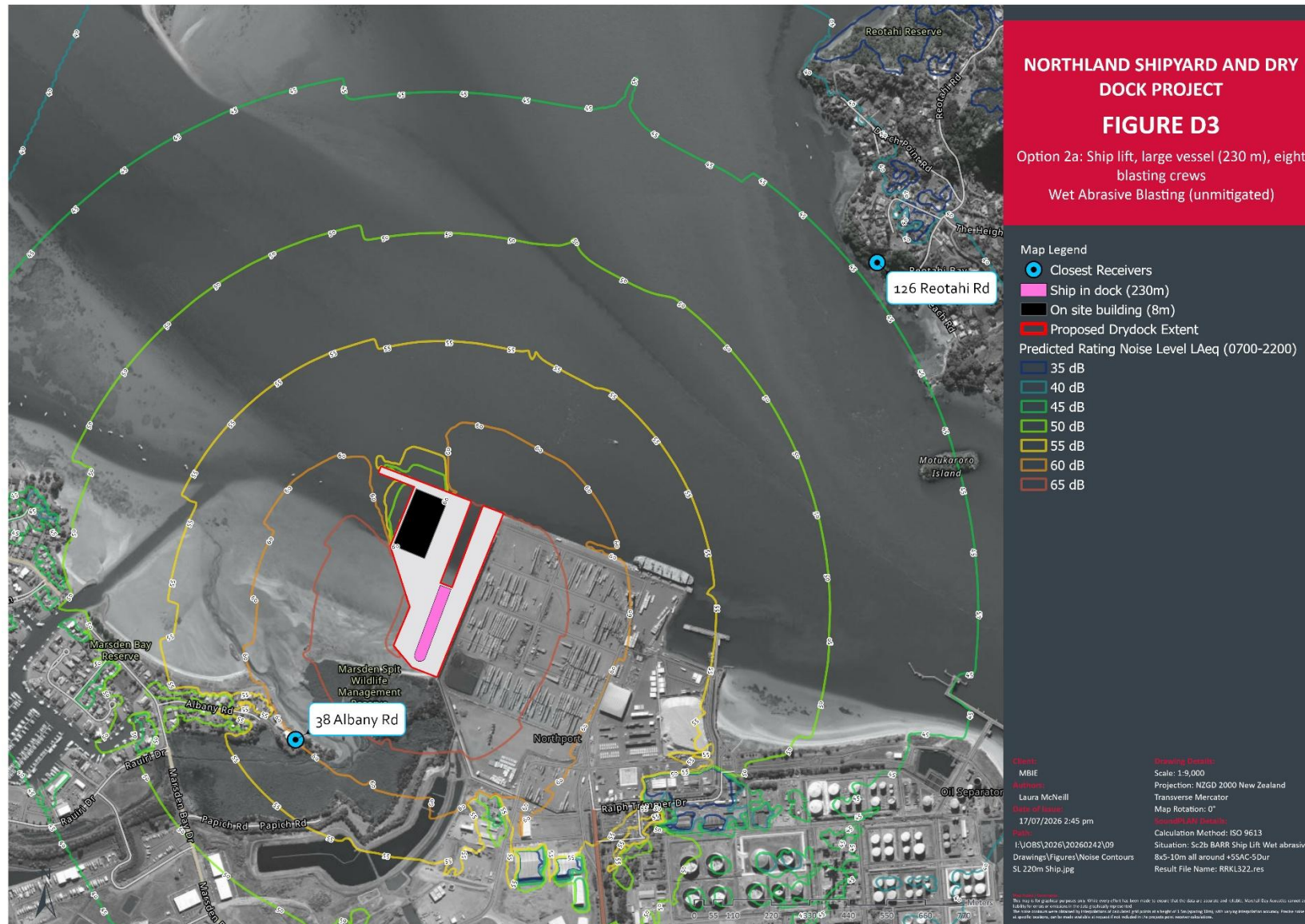
D1 OPTION 1A: FLOATING DRYDOCK, LARGE VESSEL (230 M), 8 BLASTING CREWS



D2 OPTION 1B: FLOATING DRYDOCK, SMALL VESSEL (70 M), 4 BLASTING CREWS



D3 OPTION 2A: SHIP LIFT, LARGE VESSEL (230 M), 8 BLASTING CREWS



D4 OPTION 2B: SHIP LIFT, SMALL VESSEL (70 M), 4 BLASTING CREWS

