

Appendix 4

Noise Assessment



MARSHALL DAY
Acoustics



NORTHPORT CONTAINER TERMINAL EXPANSION NOISE ASSESSMENT

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Project: **NORTHPORT CONTAINER TERMINAL EXPANSION**

Prepared for: **Northport Limited
PO Box 44
Ruakākā 0151**

Attention: **Greg Blomfield**

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EXECUTIVE SUMMARY

Northport Limited (Northport) has engaged Marshall Day Acoustics Limited (MDA) to undertake a noise assessment of a proposed container terminal expansion east of the existing port (the Project).

We have measured noise levels in the existing environment and prepared port noise models of the 'current' (2022) and 'future' (2035) (including the Project) peak operations periods. The noise model has been validated using measurements as far as practicable. In summary:

- Noise monitoring of peak port operations just complied with the permitted WDP noise limits.
- The current (2022) peak port operations model generally aligns with the noise monitoring results.
- Consented Berth 4 operations will require management to ensure cumulative compliance, or a resource consent will need to be obtained/varied to exceed the permitted levels.
- The Future (2035) peak port operations model predicts a noticeable increase in port noise levels, but a negligible to just-perceptible increase in cumulative noise levels (relative to measured levels prior to the refinery shut down in June 2022). Port activities are predicted to continue to comply with the WDP 55 dB L_{day} and 75 dB L_{AFmax} limits but exceed the 45 dB $L_{Aeq (15min)}$ night-time limit.

We consider this Project affords an opportunity to implement New Zealand Standard NZS 6809:1999 *Acoustics – Port Noise Management and Land Use Planning* (Port Noise Standard), which is specifically developed to manage issues of noise generated by ports. The Port Noise Standard states *"mitigation measures may be necessary when the day-night average sound level in a residential community exceeds 55 dB L_{dn} ."* By 2035, the closest dwellings in neighbouring communities are predicted to receive port noise levels of up to 54 dB $L_{dn (5 day)}$ in Marsden and 58 dB $L_{dn (5 day)}$ in Reotahi during the peak week of the year. The annual average noise level for a fully developed New Zealand port is typically 3 – 5 decibels lower than the peak.

External daytime port noise levels are predicted to increase to 48 and 51 dB L_{day} by 2035 for the most exposed dwellings in Marsden and Reotahi respectively. This is well below WDP permitted limits, appropriate for residential use, and would not influence conversation voice level or general amenity in outdoor spaces, but general annoyance would increase.

External night-time port noise levels are predicted to increase to 47 and 51 dB L_{night} by 2035 for the most exposed dwellings in Marsden and Reotahi respectively. The corresponding predicted level received inside the most exposed bedrooms is 32 and 36 dB L_{night} in Marsden and Reotahi respectively. Port noise levels would be more audible inside bedrooms on busy nights and intrusive at times with open windows. Some residents would choose to shut windows to improve sound insulation performance.

Northport propose the following controls to manage port noise effects:

- Adopt port noise limits aligned with those recommended in the Port Noise Standard.
- Implement a Noise Management Plan (NMP) to minimise port noise effects. The NMP would be reviewed annually in consultation with the community, including the current port noise contours.
- Following the NMP annual review, offer to mitigate dwellings exposed to port noise levels above 55 dB $L_{dn (5-day)}$. The mitigation would constitute an open offer to fund mechanical ventilation and cooling of habitable rooms to achieve an internal design noise level of 40 dB $L_{dn (5-day)}$. By 2035, we predict this offer would apply to 16 dwellings in Reotahi and none in Marsden.

1.0 INTRODUCTION

This report addresses the construction and operation of the Northport's proposed reclamation (Berth 5). Refer to the AEE for a detailed description of the project.

Port noise contours have been modelled for the peak periods during 'current' (2022) and 'future' (2035) (including the Project) operational scenarios. The current scenario enables an understanding of the existing noise environment for benchmarking purposes. The 'future' scenario enables assessment against the relevant existing WDP rules and the establishment of a mitigation response to manage effects of potentially increased port noise in accordance with the Port Noise Standard.

A glossary of technical terms is included in Appendix A and an aerial image of current Northport operations at Marsden Point is included in Appendix B.

2.0 EXISTING ENVIRONMENT

2.1 Description of Environment

Northport operates at Marsden Point, on land zoned 'Port Zone' pursuant to the WDP. The port is bordered by the fuel jetty and import terminal (formerly the oil refinery) to the east, other 'Port Zoned' properties (not owned or operated by Northport) to the south, and residential dwellings in Marsden Bay to the west and Reotahi to the north across Whangārei Harbour.

There are four distinct receiving environments:

- Reotahi is a coastal settlement on the northern side of the Whangārei Harbour, 1 – 1.5 km from the Northport operations. Existing dwellings are zoned 'Rural Village Residential' in the WDP.
- Marsden Bay is a coastal settlement on the southern side of Whangārei Harbour, approximately 500m west of the Northport log yard. Existing dwellings are zoned 'General Residential'.
- Industrial areas to the south of Northport are not noise sensitive (e.g. Marsden Point import terminal and the Carter Holt LVL Plant).
- Coastal, Rural and other Open Space Zones are used for recreational purposes during the day.

2.2 Consented Noise Limits

Northport holds two land use consents which authorise port operations (LUC#3 – 1999 and LUC#1 – 2004) on Berths 1-4 and associated land. The consent conditions for both consents are structured with interim noise limits which apply until the land is zoned and the District Plan is operative. All the existing port operational area is now zoned, and therefore the relevant operative District Plan noise rules apply. These are contained in WDP rule NAV.6.1. The relevant rules are reproduced in Appendix C. In summary, Northport must comply with the following noise limits in the Marsden and Reotahi residential communities:

- 0700 – 2200 hours (day) 55 dB L_{Aeq} (written hereafter as 55 dB L_{day})
- 2200 – 0700 hours (night) 45 dB $L_{Aeq(15min)}$ and 75 dB L_{AFmax}

This report necessarily refers to many noise measurements metrics. For simplicity, and to enable comparison with metrics used in the Port Noise Standard, we note that the L_{Aeq} noise level over the entire daytime period can be written as L_{day} . Likewise, the L_{Aeq} noise level over the entire night-time period can be written as L_{night} .

Noise emissions from the port do not materially change between the daytime and night-time periods. Therefore, the primary constraints are the night-time noise limits applying in the Marsden Bay and Reotahi Living zones.

2.3 Measurements of the Existing Noise Environment

2.3.1 Comparison of Northport to Marsden Point Refinery Noise Emissions

Noise emissions from the Refinery and Northport were measured between May and July 2018. The purpose of the measurements was to establish the relevant contribution of Refining NZ and Northport to the overall average level of noise received in the surrounding residential areas. A shutdown at the refinery over the monitoring period enabling the estimation of Northport and the Refinery contributions. The results are detailed in a separate monitoring report¹. The following provides a summary for the purposes of informing model calibration.

Both short-term attended measurements and long-term unattended measurements were carried out. Measurements were carried out for the following scenarios:

- Baseline (no appreciable noise generated by Northport or the Refinery)
- Northport activity only
- Northport and Refinery activity

The long-term unattended measurements were undertaken at 14 The Heights, Reotahi. The average noise level over the night period² in 'downwind' conditions when both the Refinery and Northport were operating, was 47 dB L_{Aeq} ³. The noise contribution from each source is estimated as follows:

- Northport: **43 dB L_{Aeq} (15min)**
- Refinery: 44 dB L_{Aeq} (15min)
- Other environmental sources: 39 dB L_{Aeq} (15min)
- Total: 47 dB L_{Aeq} (15min)

We understand the Refinery stopped its refining activities in June 2022. Residual storage and logistic activities are yet to be measured in isolation, but noise contributions received in Reotahi are expected to reduce appreciably.

2.3.2 Northport Noise Emissions

The results above are generally commensurate with the short-term attended noise surveys. Specifically, on 21 May 2018 there were three log ships berthed at Northport, the refinery was shut down and the weather calm. The attended night-time noise level in Reotahi was dominated by Northport ship loading activities, but also influenced by environmental noise sources such as crickets, birds and water movement. The measured noise levels generally ranged between 42 – 43 dB L_{Aeq} (15min) in Reotahi and 33 – 35 dB L_{Aeq} (15min) at the eastern end of the Marsden Bay settlement.

Overall, the 2018 noise measurements of Northport operations complied with the operative WDP day-time noise limits, and were just compliant with the 45 dB L_{Aeq} (15min) operative WDP night-time noise limit.

Outside the short-term night-time noise monitoring, the long-term port noise contributions were difficult to quantify due to the insufficient signal to noise ratio, and distance constraints identified above. However, there are typical relationships between the port noise measurement descriptors.

¹ MDA report Rp 001 20180532, titled 'Refining NZ and Northport Noise Measurements', dated 25 October 2018.

² Assessed over 2200 to 0500 hours to avoid bird noise contamination

³ This dwelling is one of the closest to NZ Refining and Northport and has an elevated view of both operations. It is considered representative of the most exposed dwellings in Reotahi.

The most useful relationship is between the dB $L_{Aeq(15min)}$ descriptor used by the WDP noise limits at night (discussed in Section 2.2) and the dB $L_{dn(5-day)}$ descriptor used by the Port Noise Standard (discussed in Section 3.4). The measured port noise level of 43 dB $L_{Aeq(15min)}$ is estimated to be represented by the equivalent 48 dB $L_{dn(5-day)}$ noise contour based on modelling of Northport operations and our long-term monitoring data from other New Zealand ports with comparable operations (e.g. Napier).

We consider that the 2018 monitoring described above supports the ‘current’ modelling results as far as practicable. The monitoring exercise is used to benchmark the noise models for the full 5-day ‘current’ and ‘future’ peak operational periods.

2.3.3 Northport Container Handling

Container handling volumes increased in 2021 and subsequent monitoring was undertaken to supplement the findings above. We undertook additional noise monitoring in Reotahi during representative container operations as follows:

- An evening survey⁴ on 4 August 2021 found that the container handling operations were quieter than the intensive log operations routinely carried out at Northport and as described above. Noise from the port was occasionally audible above ambient levels and estimated to be in the order of 27 dB $L_{Aeq(15min)}$. The maximum noise levels were generally below 45 dB L_{AFmax} , except for a ship horn at 62 dB L_{Amax} . The overall ambient noise levels (including the port, refinery, birds/crickets, distant traffic) ranged from 34 – 43 dB $L_{Aeq(15min)}$.
- A second evening survey⁵ of container handling operations was undertaken between 7-10 December 2021. The results supported the findings above, with many container movements generating no audible noise at the measurement positions. The overall ambient noise levels were 38 – 43 dB $L_{Aeq(15min)}$. An unattended monitor recorded audio of all night-time events above 60 dB L_{AFmax} . There was only one event, measuring 61 dB L_{AFmax} , which sounded like container handling. All other events were deemed to not be port related, the loudest event measured 65 dB L_{AFmax} and sounded like a ruru (morepork) call.

In summary, the intensive log handling activities in 2018 remain representative of Northport’s ‘current’ peak period noise emissions.

3.0 PLAN AND POLICY CONTEXT

A comprehensive discussion of the plan and policy context for the application is provided in the AEE. We set out below a summary of the relevant provisions as they relate to noise.

3.1 Regional Coastal Plan for Northland (RCP) & Proposed Regional Plan for Northland (nPRP)

With reference to RCP Map A3, port activities take place in the Marine 5 (Port Facilities) and Marine 2 (Conservation) Management Area. The relevant policies and rules for both areas in the Operative RCP generally align with, or defer to, the WDP controls summarised in Section 3.2 below. This is largely unchanged with reference to the nPRP rule C.1.8.22 (appeals version, March 2022).

3.2 Whangārei District Plan (WDP)

3.2.1 Zoning

Zoning maps are included in Appendix B.

⁴ MDA memo Mm 003 20200547, dated 6 September 2021

⁵ MDA memo Mm 004 20200547, dated 6 September 2021

Northport operations subject to this assessment are on land zoned 'Port Zone' within 'Port Operations Area A'. Port Operations Area A contains and is limited to the functions and operations of the Port. This project would involve an expansion of Port Operations Area A into the adjacent Coastal Marine Area (CMA).

3.2.2 Port Zone (PORTZ)

Northport is recognised as regionally significant infrastructure. The purpose of the Port Zone includes: *"To enable the ongoing and future growth and development of the Port and any associated operational areas and facilities"*.

It anticipates future expansion of Northport operations: *"It is expected that there will be future expansion and development within the Port Zone to respond to the future growth of the upper North Island. Flexibility to adapt and to develop the area in order to support the Port and its future operations is important. The unique operational needs and environmental effects associated with the Port necessitates a special purpose zone which is tailored to address those needs and effects."*

The PORTZ chapter seeks to ensure a balance between the continued and future operation and development of the Port and managing the effects on the environment.

The Port noise limits are summarised in Section 2.2 above.

3.2.3 Sound Insulation Requirements

NAV.1 state: *"In certain areas noise sensitive activities are restricted in order to ensure the unhindered and continued operation of high noise generating activities. In other areas the provision of acoustic insulation requirements for buildings containing noise sensitive activities in high noise environments will allow various activities to co-exist in Environments anticipating mixed use. Guidance from the most recent New Zealand Standards will ensure that noise levels are measured and analysed in accordance with international best practice."*

To minimise reverse sensitivity effects, NAV.6.5 sets minimum Sound Insulation Requirements for the design and construction of new noise sensitive activities established in high noise environments. It provides external design noise levels, spectrum shapes and maximum internal noise levels for habitable spaces. This is applicable, for example, near Port Nikau, but does not currently apply in relation to Northport. This is because Northport is currently well positioned, at considerable distance from noise sensitive receivers in Marsden Bay and Reotahi - meaning that minimum Sound Insulation Requirements have not been necessary in these receiving environments to date. However, similar land use controls could be implemented with respect to future port growth. This is outside the scope of the current application, but may be something that Whangārei District Council considers appropriate to require in future.

3.3 National Planning Standards (NPS)

Chapter 15 of the National Planning Standards (NPS)⁶ titled 'Noise and Vibration Metrics Standard' is reproduced for reference in Appendix C. In summary: *"Any plan rule to manage noise emissions must be in accordance with the mandatory noise measurement methods and symbols in the applicable New Zealand Standards incorporated by reference into the planning standards and listed below"*. The two standards of relevance are:

- New Zealand Standard 6801:2008 Acoustics – Measurement of environmental sound
- New Zealand Standard 6809:1999 Acoustics – Port noise management and land use planning

⁶ Ministry for the Environment. 2019. National Planning Standards. Wellington: Ministry for the Environment. <https://www.mfe.govt.nz/sites/default/files/media/RMA/national-planning-standards-november-2019.pdf>

3.4 Port Noise Standard (NZS 6809:1999)

The Port Noise Standard is already in use by most of the major New Zealand Ports (e.g., Port Napier and Port Otago), including the necessary measurement and assessment provisions, as well as port noise limits and land use controls within appropriate Port Noise Control Boundaries.

The objective of the Port Noise Standard is to ensure the long-term compatibility of ports and their neighbours by the application of appropriate land use planning techniques. The Standard recognises the need for ports to operate in an effective manner and provides guidelines to ensure that any adjacent residential communities can co-exist with ports and their associated activities. This is achieved in two parts:

- Noise Control Boundaries (land use controls to avoid reverse sensitivity associated with the ‘hum’ of port operations)
- Port Noise Management Plan (minimise noise effects within the port, such as ‘banging’ from log or container handling)

The Port Noise Standard uses the concept of *Inner* and *Outer Noise Control Boundaries* which it recommends be incorporated into planning maps in the District Plan. Each boundary has an associated range of permitted and conditional activities.

The *Inner* and *Outer Control Boundaries* are based around an acoustic parameter called the *Day/Night Level* or L_{dn} which is measured in dB. This parameter is essentially the energy average sound level calculated over a 24-hour period. Night-time noise (L_{night}) is weighted by adding 10 decibels to reflect the greater sensitivity to noise at night. In the Port Noise Standard, the *Inner* and *Outer Noise Control Boundaries* equate to a predicted noise level over a 5-day period of 65 dB L_{dn} and 55 dB L_{dn} respectively. The Port Noise Standard addresses both existing and new ports. C1.4 notes that “mitigation measures may be necessary when the day-night average sound level in a resident community exceeds 55 dBA L_{dn} ”.

The Port Noise Standard is summarised in detail in Appendix D. Northport proposes to introduce the key concepts in the Port Noise Standard via its management of noise effects in proposed resource consent conditions, including the Port Noise Management Plan.

4.0 MODELLING METHODOLOGY

4.1 Overview

A computer-based noise model is used to predict the ‘energy average’ noise emissions from the Port over a peak 5-day operating period. The model consists of the following parts that must be accurate for the noise contours to be reliable:

- **Noise sources**
The equipment reference noise levels are representative. Measurements have been made of representative Port machinery to determine the sound power levels in the model.
- **Operational scenario**
The operational assumptions are representative, including the location of sources and their operational duration. These assumptions have been developed, and reviewed, with the Port on a regular basis since 2017.
- **Modelling methodology**
The software takes into account attenuation due to distance, shielding, ground absorption, topography, air absorption and assigns the +10 decibels night weighting for the L_{dn} index. It enables both individual and cumulative assessment of noise emissions.

- **Calibration**

The model relies on short-term and long-term monitoring to verify the shape of the overall level of the contours and calibrate the model.

4.2 Noise Sources

The noise source data for the model was prepared from representative machinery data measured at other New Zealand ports.

In every case, the octave band spectrum of the noise source was measured at a known distance while the equipment undertook several cycles of operation. From this data, the sound power level of the equipment was calculated. The calculated sound powers were cross checked against data for similar equipment. Table 1 summarises the sources used in the current (2022) noise model.

Table 1: Noise sources used in the operational noise models

Noise Sources used in Model ⁷	Sound Power Level (dB L _{WA})
Mobile wharf cranes, trains	110 – 120
Ships (e.g. log, container, cruise)	105 – 115
RTG cranes, reach stackers, log loaders, diesel mafi and other trucks	100 – 110
Small fork-lifts	90 – 100
Reefer units, quay cranes, electric mafi	85 – 90

4.3 Operational Scenario

The Port Noise Maps are produced from the busy 5-day operational scenario model. The Port operational input assumptions are essential to ensure the model reflects the representative peak 5-day period of cargo throughput or activity.

The modelling assumptions include a description, the number of, and an equivalent ‘on-time’ description for each noise source. The ‘on-time’ operational profile is explained by way of the following three examples, shown in Figure F-6 of the Current Port Noise Maps (2022) included in Appendix F:

- **Item A1: ‘C3 Log trucks’**
This represents C3 log truck trips on-site. The ‘average day per 5-day’ for the noise source is split into day (0700-2200) and night (2200-0700) periods to enable application of the night weighting in the L_{dn} index. The sound power level of one truck is modelled travelling along the line shown in Figure F-6 at an average speed of 15km/h. The number of movements is input as 119 truck movements per day and 35 per night over the 5-day peak period, and 2 during the peak 15 minutes at night.
- **Item A7: ‘C3 Log Ship’**
This represents C3 log ship(s) at berth 1, spanning the entire 5 days and 5 nights.
- **Item A14: ‘ISO High Stacker Loading (3-5 units in log yard)’**
This represents 5 high stackers operating in the ISO log yard. There is only one source included in the model, as denoted in the ‘No.’ column. The noise source is shown at a representative location identified in Figure F-6. The ‘on-time’ description of ‘340%’ during both day and night-time periods represents 5 units at an equivalent utilisation of 68% over the 5-day period. The

⁷ Vehicles on public roads are excluded from port noise contours

peak night-time 15-minute interval 'on-time' description of '500%' identifies that they are all 5 units are operating simultaneously.

4.4 Modelling Methodology

The noise model has been prepared using SoundPLAN, an internationally recognised computer noise modelling programme. SoundPLAN uses a digital topographical terrain map of the area as its base. Each noise source is located at an appropriate height above the digital map and the software then calculates noise propagation in multiple directions, allowing for buildings, topography, shielding, reflections, and meteorological conditions.

The SoundPLAN model uses the calculation algorithms of ISO 9613-2: 1996 'Acoustics – Attenuation of noise during propagation outdoors – Part 2: General method of calculation'. Its accuracy has been established by field trials, including comparisons in New Zealand between predictions and measurements.

The model relies on the following geo referenced base data sourced from Linz data service (2017):

- Topographical contours at 20m intervals (supplemented by 1m contours from the Northland Regional Council's Open Data website)
- Cadastral boundaries
- Building outlines available (building heights not available, so a generic height of 4.5m is assumed to represent a typical single level dwelling).
- Street numbers and names
- Geo referenced aerial imagery

The noise contours are obtained by computer interpolation between calculated grid points at 10m intervals. This ensures that there is at least one data point on each parcel of residential land assuming a 20m x 20m parcel size.

5.0 PREDICTED NOISE LEVELS

5.1 Current Port Noise Contours (2022)

The Current Port Noise Maps (2022) are included in Appendix F, including the operating assumptions.

The current noise contours at 1.5m above ground level enable comparison with noise survey measurements undertaken in accordance with New Zealand Standard NZS 6801:2008 "Acoustics – Measurement of environmental sound". They are used for model verification and sound insulation assessment purposes for existing dwellings.

The results from the monitoring and attended noise surveys (Section 2.3) have been used to verify the shape of the current port noise contours at multiple locations. In summary:

- Reotahi: The current noise model predicts up to 47 dB $L_{Aeq(15min)}$ at the Reotahi interface and 43 dB $L_{Aeq(15min)}$ at the monitoring positions above during a peak night-time 15-minute period. This aligns well with the measured levels on a representative peak night (Section 2.3.2).
- Marsden Bay: The current noise model predicts 43 dB $L_{Aeq(15min)}$ at the Marsden Bay interface. This is noticeably higher than the measured levels above. The difference is attributed to the lack of yard activities in the western part of the Port and wind direction during the attended surveys.

In summary, we consider the model of the existing port operations to be representative of current peak period port noise emissions.

5.2 Consented Berth 4 Activities

The consented, but yet to be constructed, container activities on the Berth 4 and associated reclaimed land are part of the legal 'existing environment' for planning purposes.

The current operations (Section 5.1) are predicted to be at or near the WDP 45 dB $L_{Aeq}(15min)$ night-time limit in Reotahi based on a peak log handling scenario. Therefore, future night-time operations on Berth 4 will need to be managed to ensure that the noise levels do not exceed the applicable limits during these periods, or a resource consent will need to be obtained/varied to exceed the permitted levels. Management measures include:

- Prioritising daytime operations
- Scheduling of log handling vs. container handling (e.g., avoid intensive container operations in Berth 4 during busy log handling periods and vice versa)
- Ongoing noise monitoring to validate the management measures

5.3 Future Port Noise Contours (2035)

The Future Port Noise Maps (2035) are included in Appendix G, including the operating assumptions.

The future noise contours are used to inform port noise limits and identify existing dwellings that would be offered mitigation by Northport (discussed further in Section 7.0).

The Project provides for an increase in container activity intensity, which brings with it an increase in associated noise levels. Essentially, the 'hum' of the port is predicted to get louder with growth, based on today's technology. However, at other New Zealand ports, volume throughput has increased significantly in recent years without associated increases in peak period noise level. This is primarily due to investment in modern equipment and improvements in noise management.

We have not attempted to make any adjustment of noise levels in the modelling to account for potential equipment improvements over time, so our results represent a generally conservative approach. However, we have assumed the use of modern RTG and Quay Cranes, as well as electric mafi units.

The port noise level change associated with changes in intensity of use would be noticeable.

5.4 Predicted Noise Levels

The key results are summarised in Table 2 overleaf. We have included the predicted noise levels at the most exposed receivers in Marsden Bay and Reotahi. The predicted noise levels are less for other receivers nearby and generally drop off with increased distance from the port.

The modelled port noise maps are included in Appendix F (current) and Appendix G (future). Each set of maps include all the measurement descriptors in Table 2. All maps include noise contours at 1.5m above ground/water level and the roof of all buildings are coloured with the highest noise level predicted on any façade. Figures F6 and G6 show the source layouts, source locations and operational assumptions for the current and future operational scenarios respectively.

Port noise levels are predicted to be relatively stable across both day and night-time peak periods, which is representative of the 24-hour operations at other NZ ports.

It is important to note that these predictions focus only on the peak 5 days of the year, and the peak 15-minute night-time period in the year. The annual average noise levels for a fully developed New Zealand port is typically 3decibels below these predictions based on long-term measurement results from other similar sized ports in New Zealand (e.g. Napier).

Table 2: Key noise predictions at closest receivers

Location	Day-Night (24h)	Day (7am – 10pm)	Night (10pm – 7am)	
	dB L _{dn} (5-day)	dB L _{day}	dB L _{night}	dB L _{Aeq} (15min)
CURRENT (2022)				
38 Albany Rd, Marsden (west)	48	42	41	43
126 Reotahi Rd, Reotahi (north)	52	46	46	47
WDP noise limits (Section 3.2)	-	55	-	45
FUTURE (2035)				
38 Albany Rd, Marsden (west)	54	48	47	48
126 Reotahi Rd, Reotahi (north)	58	51	51	52
Port Noise Standard recommended noise limits (Section 3.4):				
- Inner Control Boundary	65	-	60	65
- Outer Control Boundary	55	-	50	55

6.0 NOISE EFFECTS

6.1 Comparison with District Plan Permitted Noise Limits

Table 2 predicts that current peak port activities comply with the WDP 55 dB L_{day} daytime noise limit, and are at, or near, the 45 dB L_{Aeq} (15min) night-time limit. This predicted night-time noise level is validated in Section 2.3.

Table 2 predicts that future peak port activities would continue to be within with the WDP 55 dB L_{day} daytime limit but would exceed the 45 dB L_{Aeq} (15min) night-time limit in both Marsden Bay and Reotahi. The predicted exceedance is up to 7 decibels at the most exposed dwellings and controlled by the proposed expanded container operations.

L_{AFmax} noise levels are associated with discrete events (e.g. log or container placement). Representative events are expected to occur more frequently with increasing activity intensity, but continue to comply with the 75 dB L_{AFmax} NAV limit.

6.2 Changes in noise level

The subjective impression of changes in noise can generally be correlated with the numerical change in noise level. While every person reacts differently to noise level changes, research shows a general correlation between noise level changes and subjective responses⁸. Table 3 overleaf shows indicative subjective responses to explain the noise level changes discussed in this report. From experience, we have found that the subjective perception of a noise level change can be translated into an RMA effect. This effect is based on people's annoyance reaction to noise level changes.

⁸ For instance, LTNZ Research Report No. 292: Road traffic noise: determining the influence of New Zealand Road surfaces on noise levels and community annoyance, Table 18. We predict a similar correlation for port noise.

Table 3: Noise level change compared with general subjective perception

Noise level change	General subjective perception ⁹	Impact ¹⁰
1 – 2 decibels	Insignificant/imperceptible change	Negligible
3 – 4 decibels	Just perceptible change	Slight
5 – 8 decibels	Appreciable to clearly noticeable change	Moderate
9 – 11 decibels	Halving/doubling of loudness	Significant
>11 decibels	More than halving/doubling of loudness	Substantial

We acknowledge that people may subjectively have an annoyance reaction to a greater or lesser degree, depending on their perception of the Project, however these individual and subjective variances are not used as a basis for assessing and controlling noise effects – instead an objective approach based on population level sensitivities is used.

Noise is measured on a logarithmic scale, meaning that a doubling in port activity intensity would result in a noise level increase of 3 decibels, a just-perceptible change. A tenfold increase would result in a noise level increase of 10 decibels, which would sound twice as loud.

6.3 Port Noise Effects

Port noise consists of two distinct components:

- The general ‘hum’ of port operations; and
- Intermittent events such as ‘banging’ from log or container handling.

The noise effects from each are described in the following sub sections.

6.3.1 Daytime ‘hum’ (Outdoor Areas)

The daytime noise effects are primarily associated with outdoor amenity. Table 4 overleaf provides a relationship between daytime noise levels (L_{day}) and typical noise effects in the Marsden and Reotahi communities (including residential gardens, parks, and beach areas).

The dwellings most exposed to port noise currently receive peak period levels of 42 and 46 dB L_{day} in Marsden and Reotahi respectively. These levels would be audible but not influence conversation voice level or materially affect general amenity in outdoor spaces.

Future peak period external noise levels are predicted to increase noticeably (typically 5 decibels) in both Marsden and Reotahi. The dwellings most exposed to port noise are predicted to receive peak period levels of 48 – 51 dB L_{day} . These levels are still well below 55 dB L_{day} permitted level in the WDP, appropriate for residential use, and would still not influence conversation voice level or general amenity in outdoor spaces, but general annoyance would likely increase.

⁹ Based on research by Zwicker & Scharf (1965); and Stevens (1957, 1972).

¹⁰ The descriptions in this column are based on our understanding of the perception in change in noise level. We have used these descriptions for several roading projects to explain the effects in RMA terms.

Table 4: Typical daytime noise effects in outdoor areas

Port noise level (dB L_{day})	# of affected Dwellings	Typical noise effects in outdoor areas
45 – 50	Current: 0 in Marsden 6 in Reotahi Future: 7 in Marsden 49 in Reotahi	Northport ‘hum’ is audible at times, primarily when activity intensity is high, sea state is low, and receivers are downwind of port operations. Well below the WDP permitted noise limits and comparable to a quiet suburban environment. Intermittent activities noticeable at times.
50 – 55	Current: None Future: 0 in Marsden 6 in Reotahi	Noticeably above <i>current</i> port noise levels, but compliant with the 55 dB L_{day} permitted noise limit, which is typical for a suburban, coastal, or rural production interface. Potential for masking distant sounds (e.g. bird calls). Would not influence conversation voice effort or materially affect general amenity in outdoor domestic spaces, but general annoyance increases.
55 – 60	Current: None Future: None	Significantly above <i>current</i> port noise levels, and marginally to noticeably above the residential noise limit of 55 dB L_{day} . Generally, above the upper desirable noise levels for residential activity involving an outdoor living component. Most natural sounds would be masked by port noise. Busy days would be intrusive and annoying to a considerable proportion of the residential population.
60+	Current: None Future: None	Many people would find port noise levels of 60 dB L_{day} unacceptable for activities such as family gatherings, barbecues, and outdoor occasions. Outdoor amenity would be seriously compromised. Almost all natural sounds would be masked.

6.3.2 Night-time ‘hum’ (Indoor Areas)

Residential communities are more noise sensitive at night, primarily during sleeping. Table 5 overleaf provides a relationship between external night-time noise levels (L_{night}) and typical noise effects inside a bedroom facing Northport in the Marsden and Reotahi communities. It assumes typical noise level reductions from predicted external levels to those received inside a typical bedroom of 15 decibels with open windows¹¹ and 20 – 25 decibels with shut windows¹².

AS/NZS 2107: 2016 provides the following design level ranges for “*Sleeping areas (night time)*” to enable evaluation of internal noise levels:

- *Houses in rural areas with negligible transportation: 25 – 30 dB L_{night}*
- *Houses and apartments in suburban areas or near minor roads: 30 – 35 dB L_{night}*
- *Houses and apartments in inner city areas or entertainment districts or near major roads: 35 – 40 dB L_{night}*

¹¹ Assumes a typical window open on security stays for ventilation purposes (e.g. 100mm opening width).

¹² Assumes 20 decibels for lightweight older style dwellings with timber joinery and 25 decibels for modern lightweight dwellings with aluminium joinery

Table 5: Typical night-time noise effects in bedrooms

External port noise level (dB L_{night})	# of affected dwellings	Typical noise effects in bedrooms
40 – 45	Current: 7 in Marsden 51 in Reotahi Future: 16 Marsden 50 Reotahi	Windows open: 25 – 30 dB L_{night} . Windows closed: 15 – 25 dB L_{night} . Current Northport noise levels on a busy night. Port ‘hum’ audible at times, primarily when activity intensity is high, sea state is low, and receivers are downwind of port operations. Generally compliant with the WDP 45 dB $L_{\text{Aeq}} (15\text{min})$ limit, which is typical for a suburban, coastal, or rural production interface. Generally acceptable for most of the population. Port noise levels of up to 30 dB L_{Aeq} indoors generally provides reasonable amenity and low likelihood of sleep disturbance, but port noise would be audible at times.
45 – 50	Current: 0 in Marsden 3 in Reotahi Future: 7 in Marsden 49 in Reotahi	Windows open: 30 – 35 dB L_{night} . Windows closed: 20 – 30 dB L_{night} . Noticeably above current port noise levels, but similar to current total ambient levels during peak periods (i.e. inclusive of refinery, community and natural environment components). Port noise would be clearly audible inside bedrooms on busy nights and intrusive at times with windows open. Individual intervals above 35 dB $L_{\text{Aeq}} (15\text{min})$ would be rare, and not representative of long-term noise effects. Some residents may choose to shut windows to improve sound insulation performance at busy times.
50	-	Port Noise Standard recommended Outer Control Boundary night-time (short-term) noise limit. Port Noise Standard recommends new dwellings, and alterations or additions to existing dwellings, should be required to be insulated for port noise if they are predicted to receive these noise levels.
50 – 55	Current: None Future: 0 in Marsden 5 in Reotahi	Windows open: 35 – 40 dB L_{night} . Windows closed: 25 – 35 dB L_{night} . Significantly above current port noise levels and most residents would choose to shut their windows to improve sound insulation performance on busy nights. Port noise would still be audible and potentially intrusive at times with windows closed for some people.
55 – 60	Current: None Future: None	Windows open: 40 – 45 dB L_{night} . Windows closed: 30 – 40 dB L_{night} . Generally unsuitable noise environment for residential activities unless zoned for such activities and insulated against port noise.
60	-	Port Noise Standard recommended Inner Control Boundary night-time (short-term) noise limit. Port Noise Standard recommends new dwellings should be prohibited.

Dwellings most exposed to port noise currently receive external noise levels of up to 41 – 46 dB L_{night} . Inside bedrooms with the windows open, levels are predicted to be approximately 26 – 31 dB L_{night} . In general, port noise would be audible inside bedrooms at times but generally acceptable for most of the population.

Future peak period external noise levels are predicted to increase noticeably to 47 – 51 dB L_{night} for the most exposed dwellings. The corresponding noise level received inside bedrooms with the windows open is predicted to increase proportionally to 32 – 36 dB L_{night} . Port noise levels would be clearly audible inside bedrooms on busy nights and intrusive at times with open windows. Some residents may choose to shut windows to improve sound insulation performance during these busy times.

Outside of the WDP noise limits and Port Noise Standard, annual average noise levels are normally relied upon to draw reliable relationships with long-term noise effects. As noted in Section 5.4, the annual average noise levels for a fully developed New Zealand port is typically 3 decibels lower than the peak periods described above.

6.3.3 Intermittent Noise Events

There is no change to predicted representative L_{AFmax} noise event levels (e.g. container or log placement). However, an increase in the number of noise events is predicted to be proportional to the increase in intensity of future port activities.

Port noise complaints are often aligned with outlier noise events, such as closing ship hatches ‘hard’ or inadvertently dropping a log or logs into the bottom of the ship’s hold. These events are not regular, repeatable or predictable, but the number of outlier events should reduce further as port noise management measures continue to evolve in accordance with the Port Noise Management Plan.

6.4 Cumulative Noise Effects

The current peak port night operations period was measured in 2018 at 14 The Heights, Reotahi (Section 2.3). The cumulative noise level (47 dB $L_{Aeq(15min)}$) was a mix of Northport (43 dB $L_{Aeq(15min)}$), Refinery (44 dB $L_{Aeq(15min)}$), and other environmental and community components (39 dB $L_{Aeq(15min)}$). We understand the Refinery stopped its refining activities in June 2022. Residual storage and logistic activities are yet to be measured in isolation, but noise contributions received in Reotahi are expected to be reduce appreciably. For the purposes of the cumulative effects assessment below, we have assumed the Refinery contribution reduces by 10 decibels at 14 The Heights, Reotahi.

Table 6 overleaf predicts the change in cumulative noise level and the associated subjective change in level at the most exposed dwelling in Reotahi (126 Reotahi Rd). It conservatively assumes the same contributions from Refinery and environment despite being closer to the Refinery and CMA respectively. In this example, and generally further afield, we predict a noticeable increase in port noise levels, but a negligible to just-perceptible increase in cumulative noise levels (relative to measured levels prior to the refinery shut down in June 2022). The table includes the equivalent modelled $L_{dn(5-day)}$ port noise level to enable comparison with the noise contours, proposed port noise limits and mitigation thresholds.

As noted in Section 5.4, it is important to note that these predictions focus only on the peak 5 days of the year, and the peak 15-minute night-time period in the year. The annual median noise level for a fully developed New Zealand port is typically 3 decibels below the peak operating period based on long-term measurement results from other similar sized ports in New Zealand (e.g. Napier). Overall, the changes would be less noticeable outside the peak operations periods.

Table 6: Cumulative noise levels and subjective change at 126 Reotahi Rd, Reotahi

Northport		Refinery	Other/Enviro	Cumulative	Description
dB L _{dn} (5 day)	dB L _{Aeq} (15min)	dB L _{Aeq} (15min)	dB L _{Aeq} (15min)	dB L _{Aeq} (15min)	
52	47	44	39	49	Predicted current (2022): pre refinery shut down June 22 (Section 5.4)
52	47	34	39	48	Estimated current (2022): post refinery shut down June 22
55	49	34	39	49	Mitigation at 55 dB L _{dn} (5 day): Negligible increase in both port (+2) and cumulative level (+0) vs pre refinery shut down June 22
58	52	34	39	52	Predicted future (2035): Noticeable increase in port level (+5), and a just-perceptible increase in cumulative level (+3) vs pre refinery shut down June 22

7.0 PORT NOISE CONTROLS

Northport propose the following controls to manage noise effects:

- Port noise limits aligned with those recommended in the Port Noise Standard. Port noise should be measured in accordance with New Zealand Standard NZS 6801:2008 'Acoustics – Measurement of Environmental Sound' and assessed in accordance with New Zealand Standard NZS 6809:1999 'Acoustics - Port Noise Management and Land Use Planning'.
- A Noise Management Plan (NMP) to minimise port noise effects. The NMP would be reviewed annually in consultation with the community, including the current port noise contours.
- Following the NMP annual review, offer to mitigate any further existing dwellings exposed to port noise levels above 55 dB L_{dn} (5-day). The mitigation would constitute an open offer to fund mechanical ventilation and cooling of habitable rooms. We predict the number of dwellings would number 16 in Reotahi and none in Marsden by 2035.

7.1 Noise Limits

The Port Noise Standard recommends noise limits apply at the Inner Noise Control Boundary based on the predicted 65 dB L_{dn} (5-day) noise contour. However, the 65 dB L_{dn} (5-day) noise contour is almost exclusively on port land or in the CMA. The highest predicted future noise levels in Reotahi are only marginally above the recommended Outer Control Boundary noise limit of 55 dB L_{dn} (5-day).

Therefore, to improve relevance, we recommend the following noise limits in Table 7. They would apply to all existing and consented activities in Port Operations Area A, and, proposed Project activities in an expanded Port Operations Area A. The Project is predicted to comply with these limits.

Table 7: Recommended port noise limits for Port Operations Area A

Location	Day-night (Long term)	Night-time (Short term)
At any point on land in the General Residential and Rural Village Residential Zones	58 dB L_{dn} (5-day) 61 dB L_{dn} (1-day)	53 dB L_{night} 58 dB L_{Aeq} (15 min) 75 dB L_{AFmax}

The Port Noise Standard focusses on the management of long-term port noise effects. The primary assessment and compliance metrics are L_{dn} (5-day) and L_{night} based on our experience of undertaking and reviewing long-term noise monitoring at other New Zealand ports such as Port of Napier and Port Otago. Table 2 highlights that the 55 dB L_{dn} (5-day) noise limit is also predicted to control compliance at Northport, as it does at other ports.

A typical port noise environment on a busy night can be described as a constant ‘hum’, with little fluctuation. In our experience, fluctuation of the ‘hum’ between individual 15-minute intervals is more evident in quieter low or shoulder seasons, which is less relevant to this planning exercise. In our view, the L_{dn} (1-day), and L_{Aeq} (15min) night-time controls recommended in the Port Noise Standard are secondary controls to inform attended short-term monitoring and management indicators. As such, while the L_{dn} (1-day) and L_{Aeq} (15min) limits may appear liberal, they provide certainty that excessive fluctuation will not occur.

The proposed noise limits are included in the set of proposed controls detailed in the AEE¹³.

7.2 Noise Management Plan

The Port Noise Standard recommends that a NMP should be developed to complement the proposed Port Noise Control Boundaries and associated planning restrictions. It states: *“The need for a management plan recognises that noise levels adjacent to the port may at times be higher than desirable.”* The Port Noise Standard provides guidance on the development and application of an NMP to *“ensure that emissions of noise from port activities is minimised, consistent with practicality, safety and the efficient operation, use and development of the ports”*.

MDA has helped Northport prepare a draft NMP attached as Appendix H. It is consistent with the port noise management requirements in Section 8 of the Port Noise Standard.

The objectives of the NMP are to:

- Ensure the port complies with the relevant noise performance standards
- Provide a framework for the measurement, monitoring, assessment, and management of noise
- Identify and adopt the BPO for the management of noise effects
- Require engagement with the community and timely management of complaints

The NMP would apply at all times. It would be considered a ‘living document’ that is expanded and updated as appropriate. Northport propose the NMP is to be reviewed annually in consultation with the community, including the current port noise contours. We support this.

7.3 Mitigation

Following the annual review of the noise contours in the NMP (Section 7.2), Northport would offer to mitigate any further dwellings exposed to port noise levels above 55 dB L_{dn} (5-day). This threshold aligns

¹³ AEE Section 3.4

with Port Noise Standard comment C1.4 where it states: “mitigation measures may be necessary when the day-night average sound level in a resident community exceeds 55 dBA L_{dn} ”.

The annual review process ensures upgrades of existing dwellings would be triggered proximate to when the noise effects materialise. This incentivises Northport to constrain their noise footprint through other means (e.g. investment in quieter equipment or timing of loud activities during the day).

We predict the number of dwellings would number 16 in Reotahi and none in Marsden by 2035. The detailed predicted noise levels for all 16 dwellings are included in Appendix E. The predicted noise levels for the most exposed façade range from 55 – 58 dB L_{dn} (5-day).

We recommend that mitigation achieves a spatial average indoor design sound level of 40 dB L_{dn} (5-day) in all habitable spaces. This recommendation is 5 decibels more stringent than the Port Noise Standard requirement for existing ports of 45 dB L_{dn} (5-day) and would improve amenity.

Dwellings would need windows to be closed at night to achieve 40 dB L_{dn} (5-day) inside. With the windows closed, we predict 40 dB L_{dn} (5-day) would be achieved. Accordingly, for the relevant dwellings Northport would provide an open offer to fund mechanical ventilation and cooling of habitable rooms. The enables occupants the close the windows during peak periods, or at any time at their discretion, and maintain a suitable indoor environment.

There are a further 7 existing dwellings in Marsden and 39 in Reotahi predicted to be exposed to noise levels above the Operative WDP 45 dB L_{Aeq} (15min) noise limit, but below the 55 dB L_{dn} (5-day) noise mitigation threshold. These dwellings would not be eligible for port funded mitigation. The scale of any exceedance of the WDP 45 dB L_{Aeq} (15min) noise limit is predicted to range from 1 – 4 decibels, which is a negligible to just noticeable increase in port and cumulative noise levels.

8.0 CONSTRUCTION NOISE

The following sections focus on construction noise. Construction vibration is predicted to be imperceptible at the closest sensitive receivers due to the very large setback distances.

8.1 Construction Noise Rules

Section 6.2 of the NAV section in the WDP requires noise from demolition/construction to be measured and assessed in accordance with New Zealand Standard NZS 6803: 1999 “Acoustics - Construction Noise”.

The standard daytime construction noise limits in the WDP are 70 dB L_{Aeq} and 85 dB L_{Amax} . These limits apply between 7:30am and 6pm, Monday – Saturday. A noise limit of 45 dB L_{Aeq} applies at night and during the day on Sundays, and transitional shoulder periods apply in the morning and evenings.

Refer to Appendix C2 for a full set of the construction noise limits.

8.2 Construction Noise Levels

The AEE details the proposed construction methodology and sequencing. The closest receivers are the dwellings at Reotahi, which are approximately 900m from the closest construction works. Predicted noise levels for key activities are summarised in Table 8 overleaf.

The proposed construction works are predicted to comply with the WDP construction noise limits.

Table 8: Summary of construction noise levels

Activity	Equipment	Sound power level (dB L _{WA})	Required setback to comply with 70 dB L _{Aeq} daytime limit	Required setback to comply with 45 dB L _{Aeq} night-time limit
Reclamation	Medium excavator (up to 40T)	105	30m	300m
	Large excavator (up to 180T)	113	65m	630m
	Pumps (for slurry)	93	<10m	100m
	Backhoe dredge	111	50m	525m
	Trailing suction hopper/cutter dredge (TSHD/TSCD)	107	36m	365m
	Mobile crane (placing rocks)	98	15m	160m
Piling	Vibro piling	116	85m	<i>Not proposed</i>
	Impact piling (with dolly and casing mitigation)	114	70m	<i>Not proposed</i>
	Bored piling	111	50m	<i>Not proposed</i>
	Large crane	108	40m	400m
General	Truck movements	105	30m	300m
	Concrete truck and pump	103	25m	250m

8.3 Construction Noise Effects

- Day: The predicted levels would be comparable to the ambient environment but may be noticeable due to the different character (e.g. the piling works). However, the levels are very low for construction, and to give context, they would readily comply with the WDP day-to-day noise limit of 55 dB L_{day}.
- Night: All potential night-time activities are predicted to comply with the night-time noise limits and would be largely indistinguishable from normal port activity, including excavation, dredging, equipment/material deliveries and concrete pours.

APPENDIX A GLOSSARY OF TERMINOLOGY

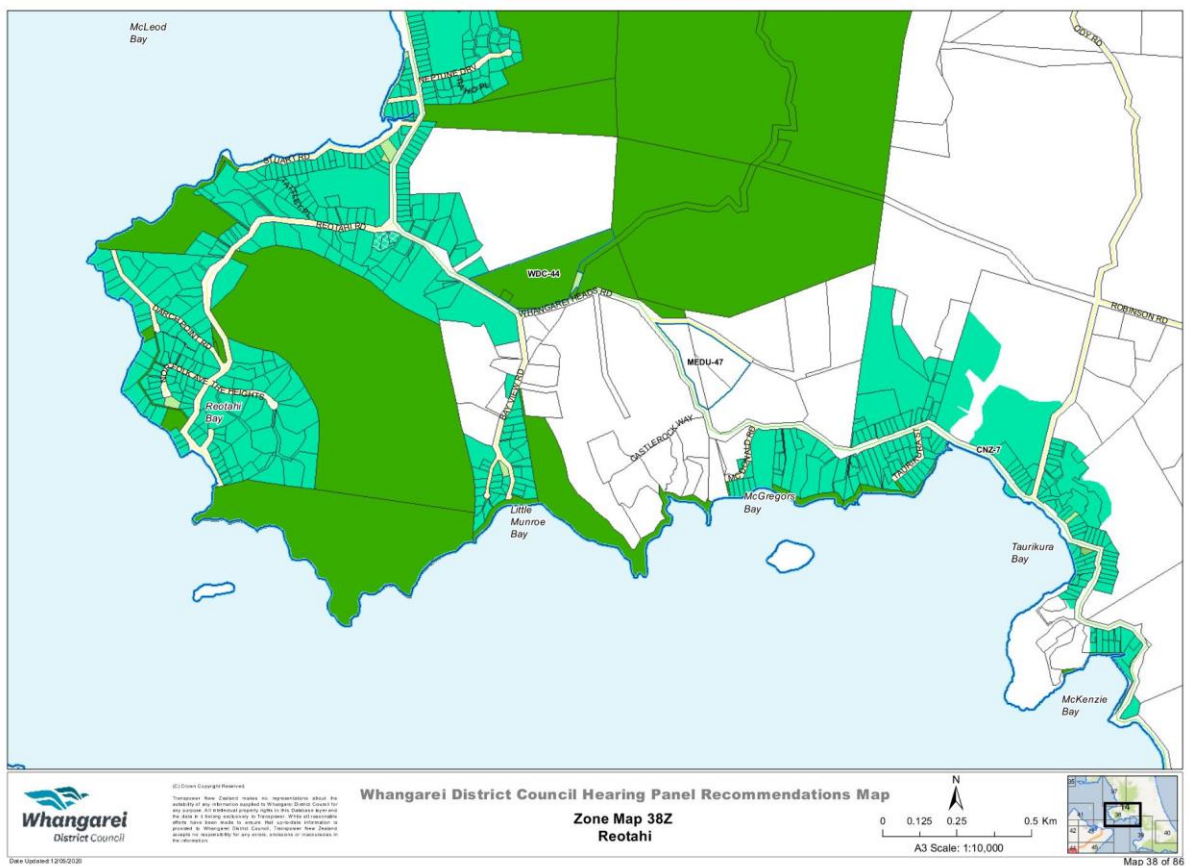
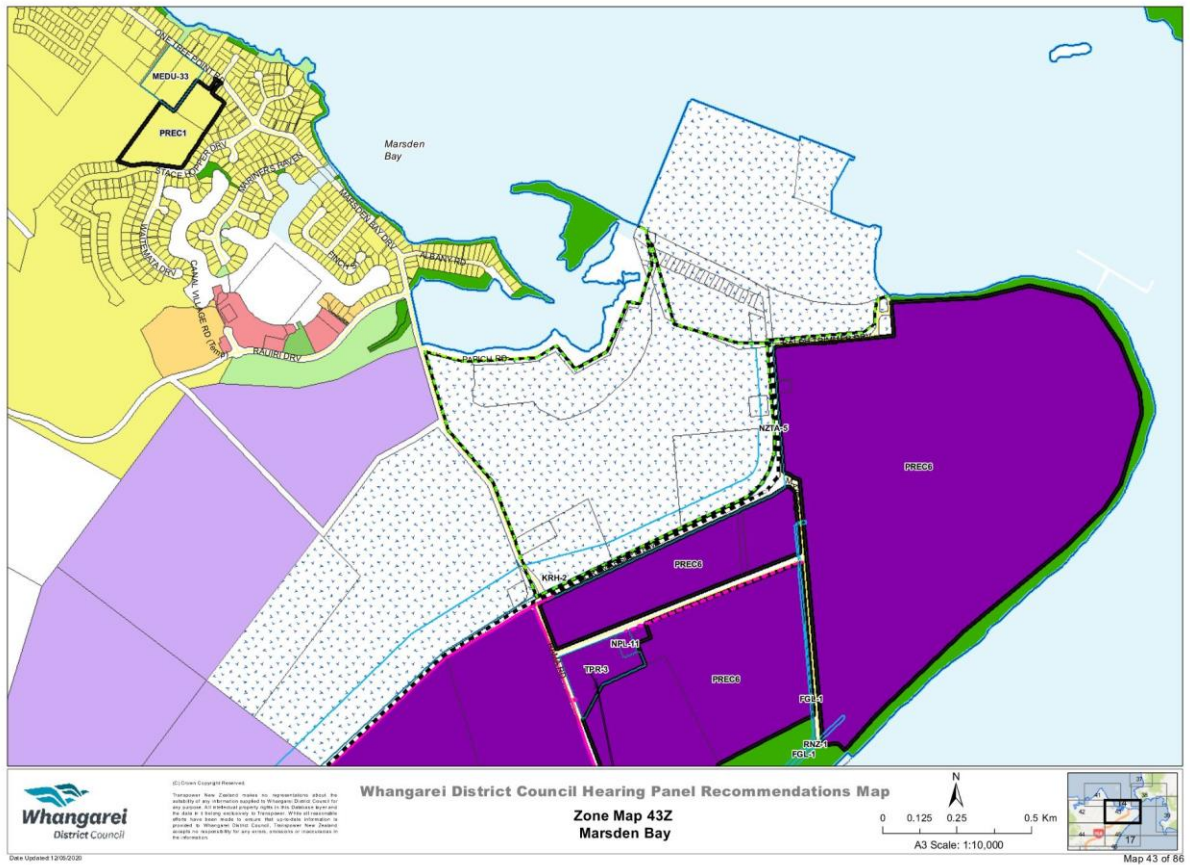
NZS 6801:2008	New Zealand Standard NZS 6801:2008 <i>“Acoustics – Measurement of environmental sound”</i>
NZS 6809:1999	New Zealand Standard NZS 6809:1999 <i>“Acoustics – Port Noise Management and Land Use Planning”</i>
dB	Decibel. The unit of sound level. Expressed as a logarithmic ratio of sound pressure 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.
$L_{\text{A90}}(t)$	The A-weighted noise level equalled or exceeded for 90% of the measurement period. This is commonly referred to as the background noise level.
L_{Amax}	The A-weighted maximum noise level. The highest noise level which occurs during the measurement period.
L_{day}	The equivalent continuous (time-averaged) A-weighted sound level (L_{Aeq}) over the daytime period (0700-2200 hours).
L_{dn}	The day night noise level which is calculated from the 24 hour L_{Aeq} with a 10 dB penalty applied to the L_{night} component.
L_{night}	The equivalent continuous (time-averaged) A-weighted sound level (L_{Aeq}) over the night-time period (2200-0700 hours).
L_p or SPL	Sound Pressure Level. A logarithmic ratio of a sound pressure measured at distance, relative to the threshold of hearing ($20 \mu\text{Pa}$ RMS) and expressed in decibels.
L_w or SWL	Sound Power Level. A logarithmic ratio of the acoustic power output of a source relative to 10^{-12} watts and expressed in decibels. Sound power level is calculated from measured sound pressure levels and represents the level of total sound power radiated by a sound source.
Frequency	The number of pressure fluctuation cycles per second of a sound wave. Measured in units of Hertz (Hz).
Hertz (Hz)	Hertz is the unit of frequency. One hertz is one cycle per second. One thousand hertz is a kilohertz (kHz).
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 this case, port noise limits are set specifically for port noise character. Therefore, port noise character would be reasonably expected and not 'special' (e.g. would not apply to log or container handling activities).

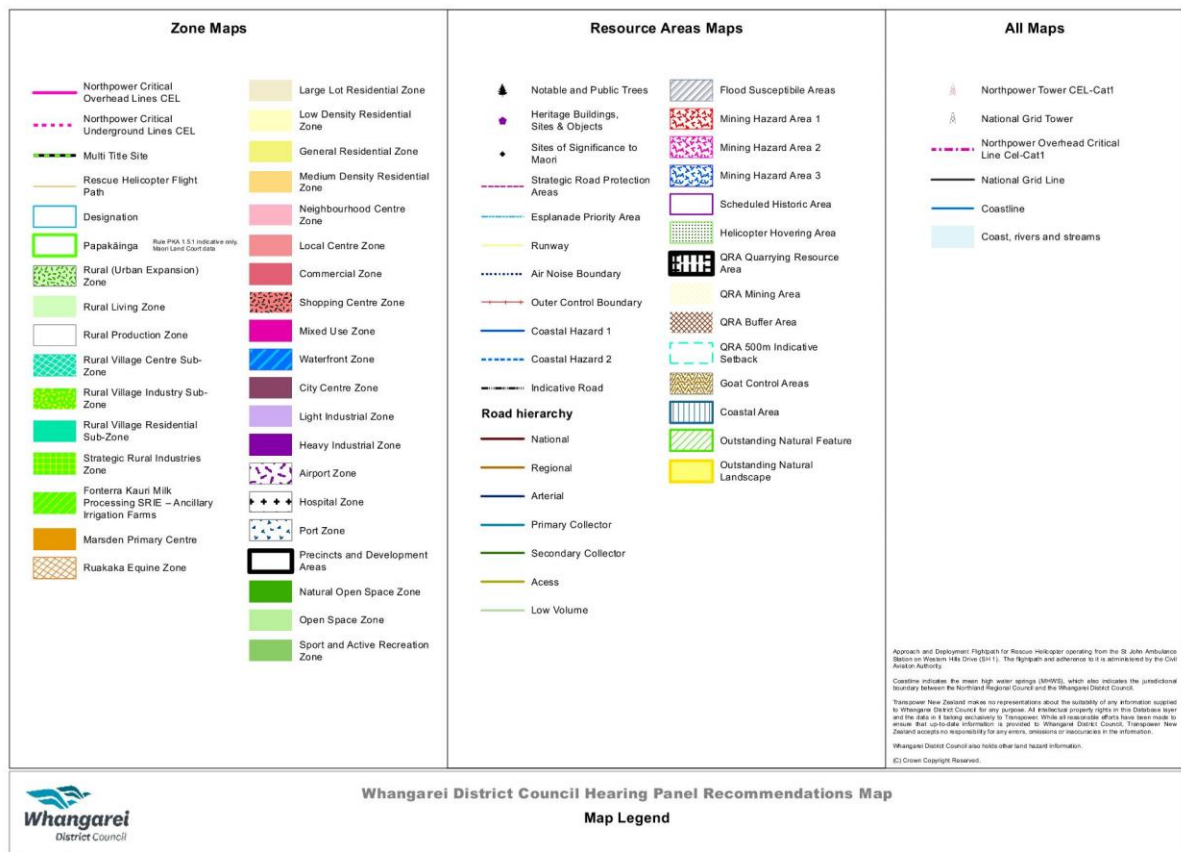
APPENDIX B AERIAL IMAGERY AND ZONING

B1 Aerial imagery of Northport (centre), Reotahi (northeast) and Marsden Bay (west)

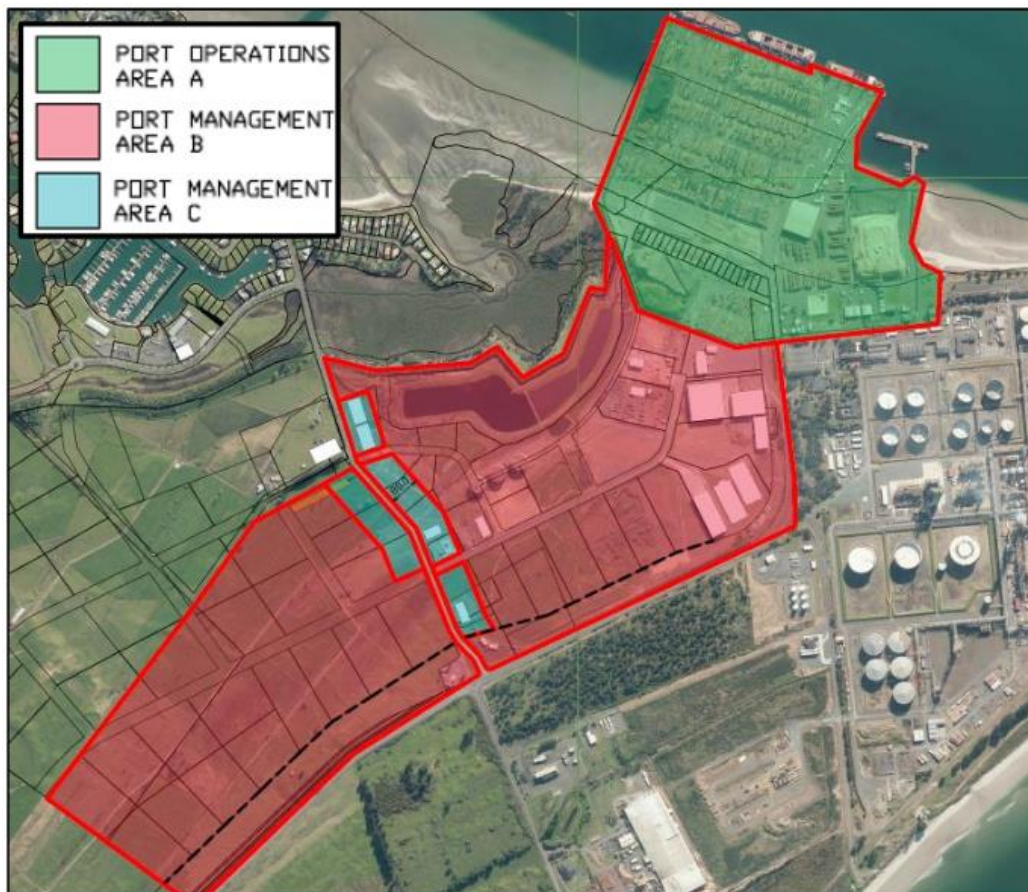


B2 WDP zoning





B3 Operative WDP, Port Zone (PORTZ), Appendix 1, Port Operations Area Map



APPENDIX C NOISE RULES

C1 Operative WDP NAV.6.1

The relevant sections are reproduced in part below.

NAV.6.1 Noise Arising from Activities within Environments

The following noise limits shall apply within and between Zones:

Noise emitted from any <u>site</u> in the following Zone	Noise measured within the applicable boundary of any of the following Zones (refer to following table for applicable assessment location)	Daytime 0700 to 2200 hours	Night-time 2200 to 0700 hours		Notes 8,9
		dB <u>L_{Aeq}</u>	dB <u>L_{Aeq}</u>	dB <u>L_{AFmax}</u>	
Port Rural Village Industrial Heavy Industrial	<u>Residential Zones</u> Neighbourhood Centre Natural Open Space Open Space Rural Production Rural Living Rural Village Residential Rural (Urban Expansion)	55	45	75	

The above noise rules shall apply within the relevant boundary assessment location as set out below:

Site boundary	Notional Boundary
<ul style="list-style-type: none"> • Living 1, 2 • Kamo Low / Medium Density Living • Bulk Format Retail • Kamo Activity Precinct • Open Space • Business 1, 2, 3, 4 • Town Basin • Airport • Marsden Point Port • Port Nikau - Noise Zone 1 and 2 • Marsden Primary Centre - Noise Zone 1 and 2 • Marsden Primary Centre - Town Centre 	<ul style="list-style-type: none"> • Living 3 • Coastal Countryside • Urban Transition • Countryside • Any noise sensitive activity not owned or controlled by the quarry owner or operator in a Quarrying Resource area • Rural Production • Rural Living • Rural (Urban Expansion)

NAV.6.2 Construction Noise

Noise from demolition and construction, including that undertaken as part of temporary military training activities, shall comply with the guidelines and recommendations of NZS 6803: 1999 "Acoustics - Construction Noise". Noise levels shall be measured and assessed in accordance with New Zealand Standard NZS 6803: 1999 "Acoustics - Construction Noise". NAV.6.2 shall not apply to permitted maintenance or utility works undertaken within the road carriageway of a road where:

- It has been demonstrated to Council that these works cannot reasonably comply with the referenced noise guidelines at the time when they must be carried out; and
- A construction noise and vibration management plan, as prepared by a c, has been provided to Council.

C2 NZS6803:1999

The relevant sections are reproduced in part below.

“Residential zones and dwellings in rural areas:

Table 2 – Recommended upper limits for construction noise received in residential zones and dwellings in rural areas

Time of week	Time period	Noise limits (dB)	
		L _{eq}	L _{max}
Weekdays	0630-0730	55	75
	0730-1800	70	85
	1800-2000	65	80
	2000-0630	45	75
Saturdays	0630-0730	45	75
	0730-1800	70	85
	1800-2000	45	75
	2000-0630	45	75
Sundays and public holidays	0630-0730	45	75
	0730-1800	55	85
	1800-2000	45	75
	2000-0630	45	75

“Industrial or commercial areas:

Table 3 – Recommended upper limits for construction noise received in industrial or commercial areas on all days

Time period	Noise limits (dB L _{Aeq})
0730-1800	70
1800-0730	75

Notes in the standards to the tables above:

7.2.5

The night time limits in Table 2 shall apply to activities carried out in industrial or commercial areas where it is necessary to prevent sleep interference, specifically where there are residential activities, hospitals, hotels, hostels, or other accommodation facilities located within commercial areas. The limits in Table 2 may also be used to protect other specific noise sensitive activities at certain hours of the day.

7.2.6

One major factor which should be considered is whether there is a relatively high background sound level (L₉₀) due to noise from sources other than construction work at the location under investigation. In such cases limits should be based on a determination of the existing level of noise in the area (a “background plus” approach).

7.2.7

Where there is no practicable method of measuring noise outside a building, the upper limits for noise measured inside the building shall be the levels stated in tables 2 and 3 minus 20 dBA. This is considered to be a typical value for the sound reduction normally achieved in New Zealand buildings with doors and windows closed.”

15. Noise and Vibration Metrics Standard

Mandatory directions

1. Any plan rule to manage noise emissions must be in accordance with the mandatory noise measurement methods and symbols in the applicable New Zealand Standards incorporated by reference into the planning standards and listed below:
 - New Zealand Standard 6801:2008 Acoustics – Measurement of environmental sound
 - New Zealand Standard 6802:2008 Acoustics – Environmental noise
 - New Zealand Standard 6803:1999 Acoustics – Construction noise
 - New Zealand Standard 6805:1992 Airport noise management and land use planning – measurement only
 - New Zealand Standard 6806:2010 Acoustics – Road-traffic noise – New and altered roads
 - New Zealand Standard 6807:1994 – Noise Management and Land Use Planning for Helicopter Landing Areas- excluding 4.3 Averaging
 - New Zealand Standard 6808:2010 Acoustics – Wind farm noise
 - New Zealand Standard 6809:1999 Acoustics – Port noise management and land use planning
2. Any plan rule to manage noise emissions must be consistent with the mandatory assessment methods in section 6 Rating Level and section 7 LMAX of New Zealand Standard 6802:2008 Acoustics – Environmental Noise (incorporated by reference into the planning standards), provided the type of noise emitted is within the scope of New Zealand Standard 6802:2008.
3. Any plan rule to manage damage to structures from construction vibration must be consistent with the metrics for peak particle velocity (ppv) in ISO-4866:2010 – Mechanical vibration and shock, incorporated by reference into the planning standards.

APPENDIX D PORT NOISE STANDARD

D1 Noise Control Boundaries

Noise Contours

The Port Noise Standard uses the concept of *Inner* and *Outer Noise Control Boundaries* which it recommends be incorporated into planning maps in the District Plan. Each boundary has an associated range of permitted and conditional activities.

The *Inner* and *Outer Control Boundaries* are based around an acoustic parameter called the *Day/Night Level* or L_{dn} which is measured in dBA. This parameter is essentially the energy average sound level calculated over a 24-hour period. Night-time noise is weighted by adding 10 decibels to reflect the greater sensitivity to noise at night. In the Port Noise Standard, the *Inner* and *Outer Noise Control Boundaries* equate to a predicted noise level over a 5-day period of 65 dBA L_{dn} and 55 dBA L_{dn} respectively.

Section 6.4.2 of the Port Noise Standard recommends that the location and extent of the Noise Control Boundaries should be determined with regard to:

- a) *“Port location and proximity to current or potential residential areas;*
- b) *Port activity types (current and future);*
- c) *Frequency of ship movement by type, time of day, duration of stay and expected berth location;*
- d) *Variation in port activities within a year (e.g. due to seasonal factors);*
- e) *Appropriate meteorological effects as set out in NZS 6801;*
- f) *Current and future port capacity and any proposed port operations;*
- g) *Noise monitoring data; and*
- h) *The best practicable option for reduction of noise emissions.”*

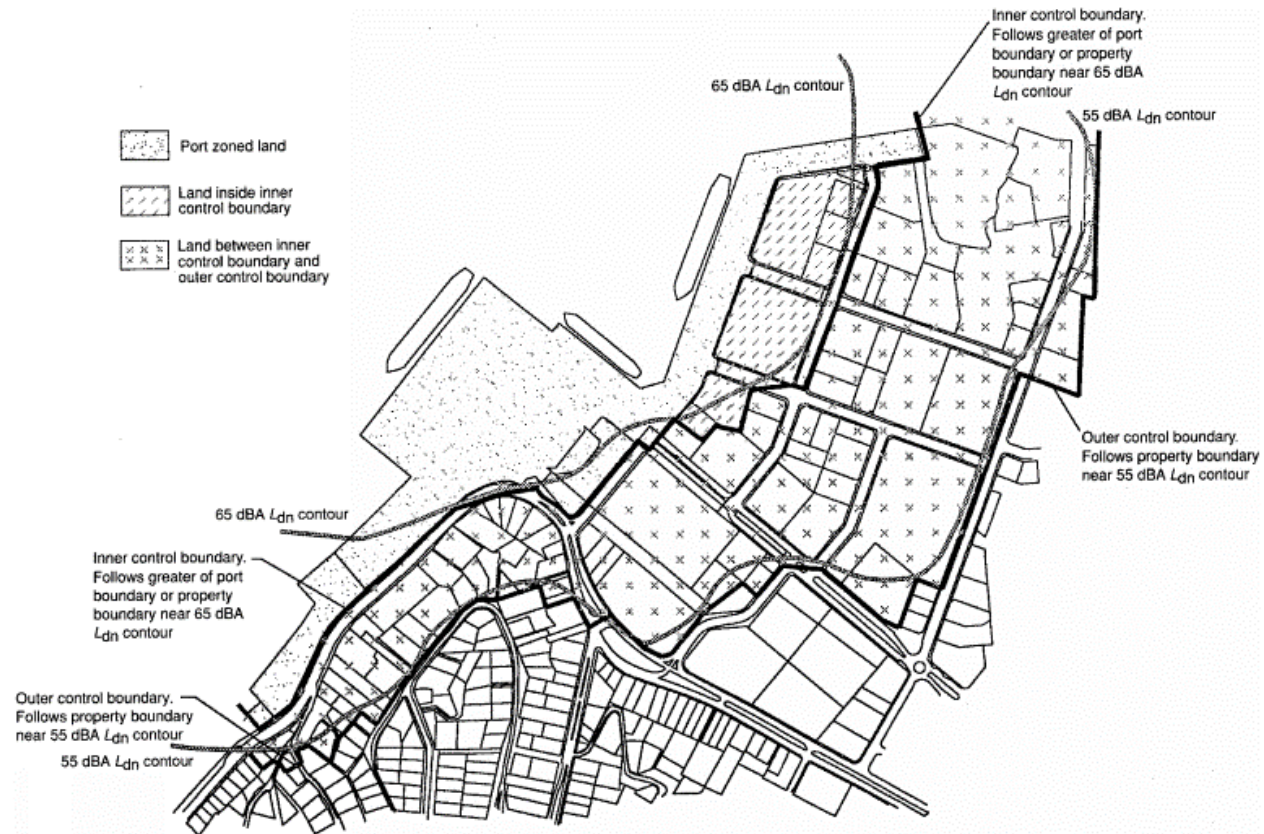
Land Use Controls

The Noise Control Boundaries are derived from the noise contours for the predicted peak operations period in the lifetime of the District Plan, which is typically 10 – 15 years in the future.

The Noise Control Boundaries are determined based on predicted noise contours. The relationship between predicted noise contours and Noise Control Boundaries is illustrated in the example from NZS 6809: 1999, reproduced as Figure 1 overleaf. The Noise Control Boundaries are inclusive, following cadastral boundaries (i.e. if the relevant predicted noise contour cuts through part of the property, the whole property is included within the Boundary).

Any building or part of a building used for a noise sensitive activity with the Noise Control Boundaries should be required to be adequately insulated from port noise. As such, any room used for a noise sensitive activity should be designed to achieve an indoor sound level from port noise not exceeding 45 dB L_{dn} , with all the windows and doors closed.

Figure 1: Example of Inner and Outer Control Boundaries from Figure 1 of NZS6803: 1999)

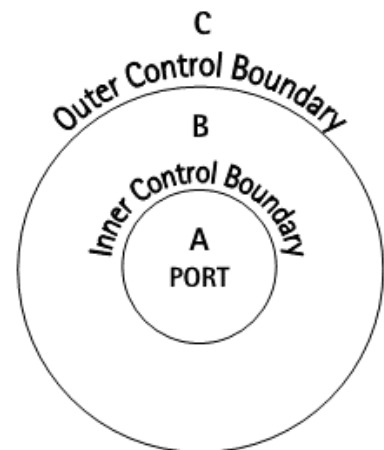


The Port Noise Standard provides that following recommended rules for noise sensitive activities within the Noise Control Boundaries represented in Figure 2.

Figure 2: Control areas A, B and C from Figure 2 of NZS6803: 1999

Area A - Inside the Inner Control Boundary (i.e. noise levels above 65 dB L_{dn}):

- "New noise sensitive activities should be prohibited.
- In exceptional circumstances new noise-sensitive activities could be discretionary activities subject to conditions requiring that buildings used for such activities be adequately insulated from port noise.
- Alterations or additions to existing buildings associated with noise-sensitive activities should be discretionary activities, subject to conditions requiring that alterations or additions to existing buildings used for noise-sensitive activities, be adequately insulated from port noise."



Area B – Between the Inner and Outer Control Boundaries (i.e. 55 dB L_{dn} – 65 dB L_{dn}):

- "New noise sensitive activities, and alterations or additions to existing buildings used for noise sensitive activities, should be permitted activities subject to conditions requiring that new buildings for alterations or additions to existing buildings used for noise-sensitive activities, be adequately insulated from port noise."

Area C – Outside the Outer Control Boundary (i.e. noise levels less than 55 dB L_{dn})

- No recommended land use controls

Noise Limits

The Port Noise Standard recommends the noise limits in Table 9 for existing Ports. Note that the daytime period is 0700 – 2200 hours on any day, and the night-time period is 2200 – 0700 hours on the following day.

Table 9: Noise Limits for existing ports

Location	Day-night (Long term)	Night-time (Short term)
At any point on land at, or beyond, the inner control boundary (i.e. beyond Area A)	65 dB L _{dn} (5-day)	60 dB L _{Aeq} (9 hrs)
	68 dB L _{dn} (1-day)	65 dB L _{Aeq} (15 min)
		85 dB L _{AFmax}

D2 Port Noise Management Plan

The Port Noise Standard recommends that a Port Noise Management Plan (**NMP**) should be developed to complement the proposed Port Noise Control Boundaries and associated planning restrictions. It states: *“The need for a management plan recognises that noise levels adjacent to the port may at times be higher than desirable.”* The Port Noise Standard provides guidance on the development and application of an NMP to *“ensure that emissions of noise from port activities is minimised, consistent with practicality, safety and the efficient operation, use and development of the ports”*.

MDA has helped Northport prepare a draft NMP attached as Appendix H. It is consistent with the port noise management requirements in Section 8 of the Port Noise Standard.

The objectives of the NMP are to:

- Ensure the port complies with the relevant noise performance standards
- Provide a framework for the measurement, monitoring, assessment, and management of noise
- Identify and adopt the BPO for the management of noise effects
- Require engagement with the community and timely management of complaints

The NMP would apply at all times. It would be considered a ‘living document’ that is expanded and updated as appropriate.

APPENDIX E PREDICTED NOISE LEVELS AT EXISTING DWELLINGS

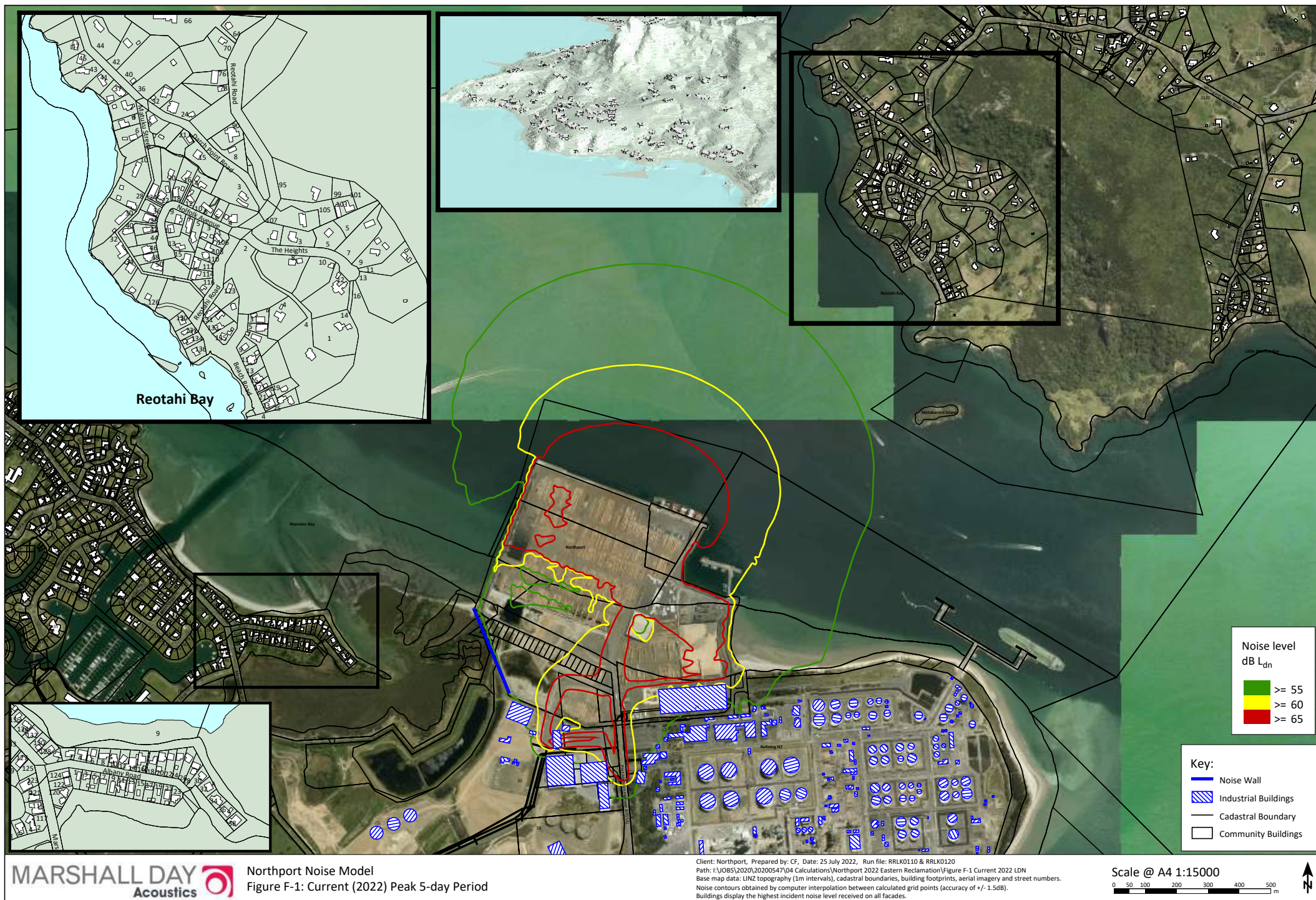
Table 10: Existing dwellings with predicted port noise levels greater than 55 dB L_{dn} (5-day) in 2035

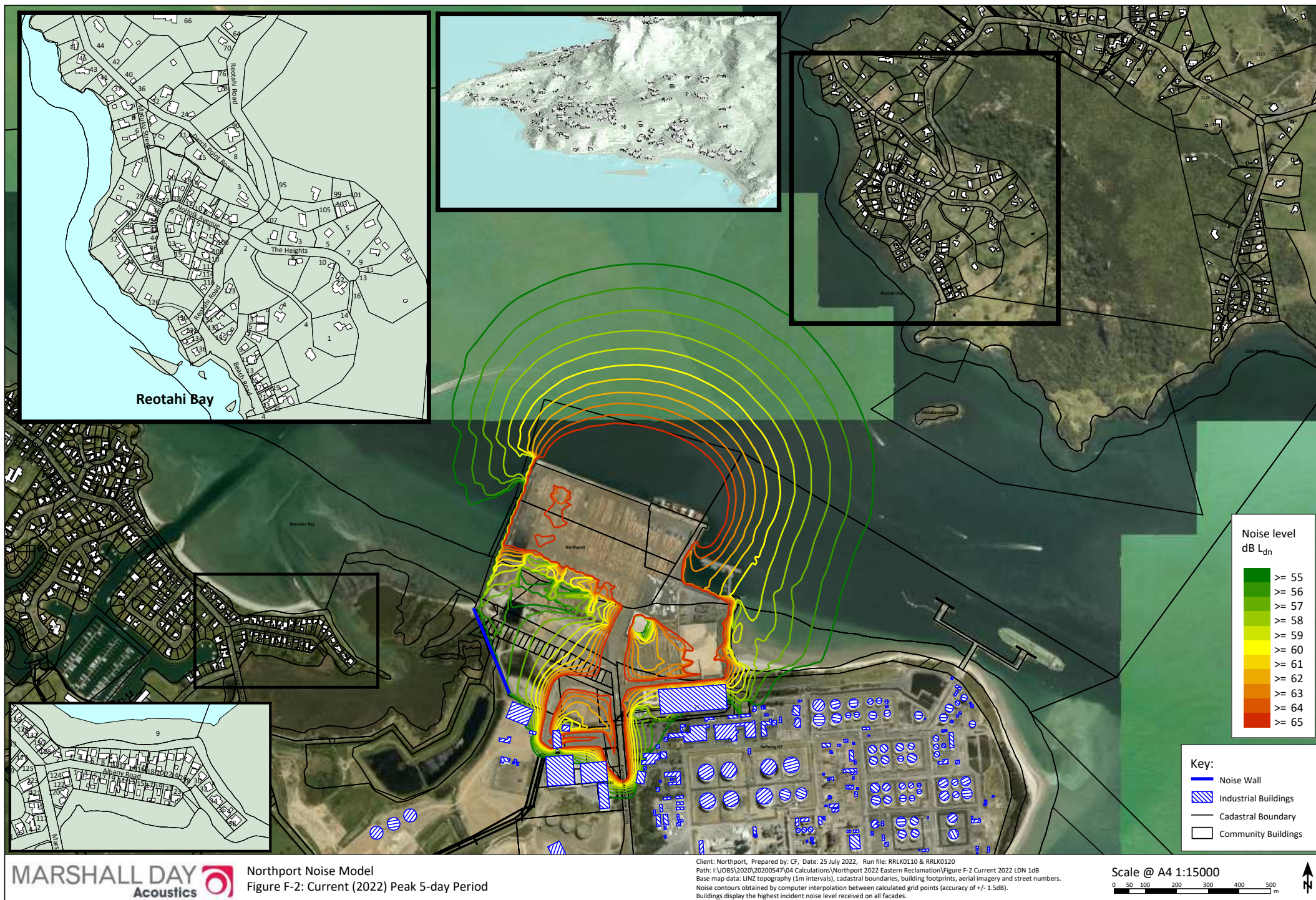
Address	Current (2022)				Future (2035)			
	24 hr	Day	Night	Night	24Hr	Day	Night	Night
	dB L _{dn} (5-day)	dB L _{day}	dB L _{night}	dB L _{Aeq} (15min)	dB L _{dn} (5-day)	dB L _{day}	dB L _{night}	dB L _{Aeq} (15min)
3 Beach Rd, Reotahi	50	43	43	44	55	49	49	49
9 Beach Rd, Reotahi	51	45	45	46	57	51	51	51
11 Beach Rd, Reotahi	51	45	45	46	58	51	51	52
15 Beach Rd, Reotahi	51	45	45	46	55	49	49	49
19 Beach Rd, Reotahi	49	43	43	44	55	49	49	49
21 Beach Rd, Reotahi	51	45	44	45	56	50	50	50
23 Beach Rd, Reotahi	51	45	45	46	57	51	51	51
25 Beach Rd, Reotahi	50	44	44	44	56	49	49	50
32 Norfolk Ave, Reotahi	51	45	44	45	56	49	49	50
34 Norfolk Ave, Reotahi	52	46	45	46	57	51	51	51
48 Norfolk Ave, Reotahi	50	44	43	44	55	49	49	49
123 Reotahi Rd, Reotahi	49	43	43	44	55	49	49	49
126 Reotahi Rd, Reotahi	52	46	46	47	58	51	51	52
131 Reotahi Rd, Reotahi	50	44	44	45	56	49	49	50
133 Reotahi Rd, Reotahi	49	43	43	44	55	49	49	49
134 Reotahi Rd, Reotahi	51	45	45	46	55	49	49	49

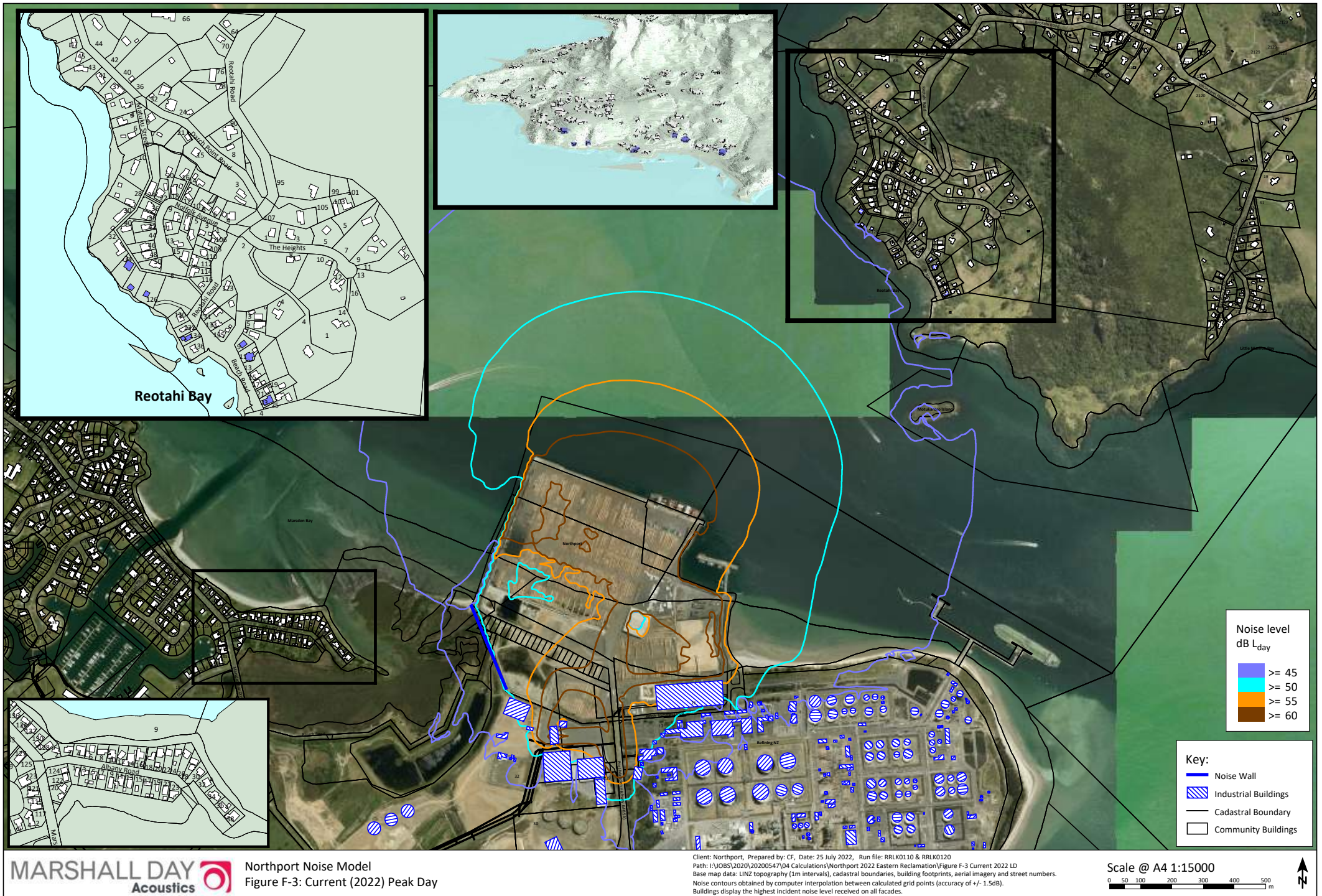
APPENDIX F CURRENT PORT NOISE MAPS

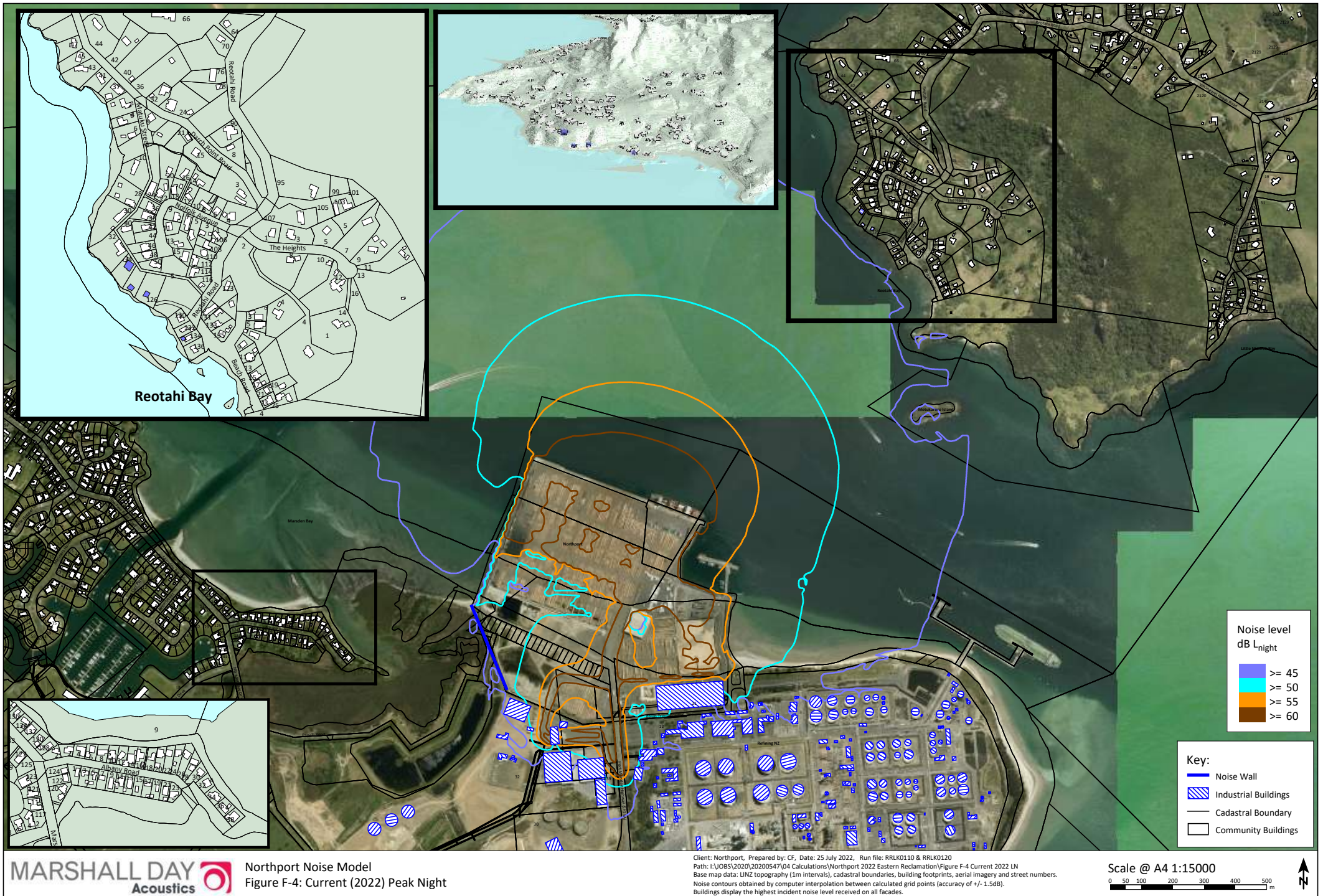
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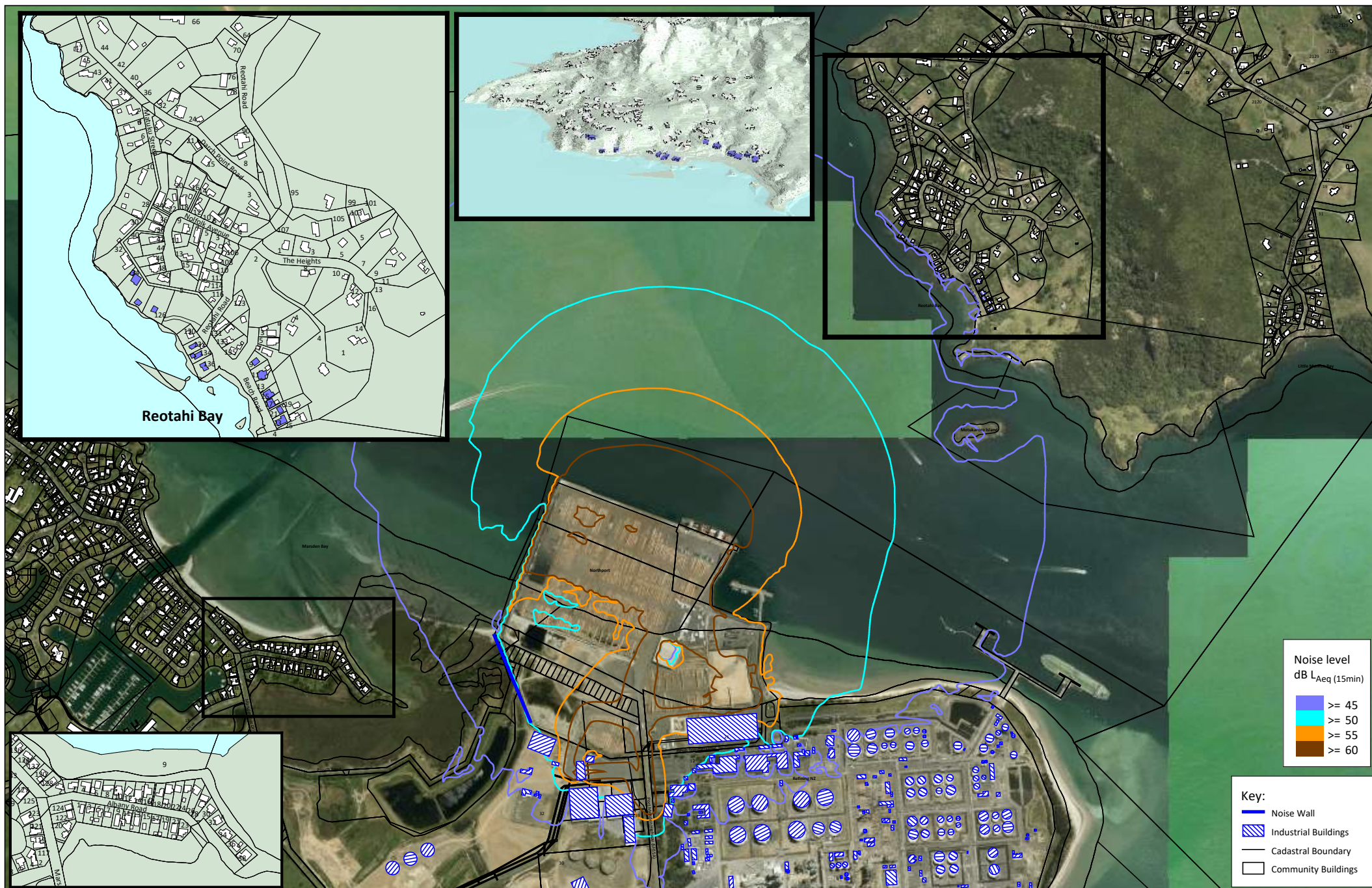
- Figure F-1 Current (2022) Peak 5-Day Period
- Figure F-2 Current (2022) Peak 5-Day Period
- Figure F-3 Current (2022) Peak Day
- Figure F-4 Current (2022) Peak Night
- Figure F-5 Current (2022) Peak Night 15-minute interval
- Figure F-6 Current (2022) Peak Operations Scenario

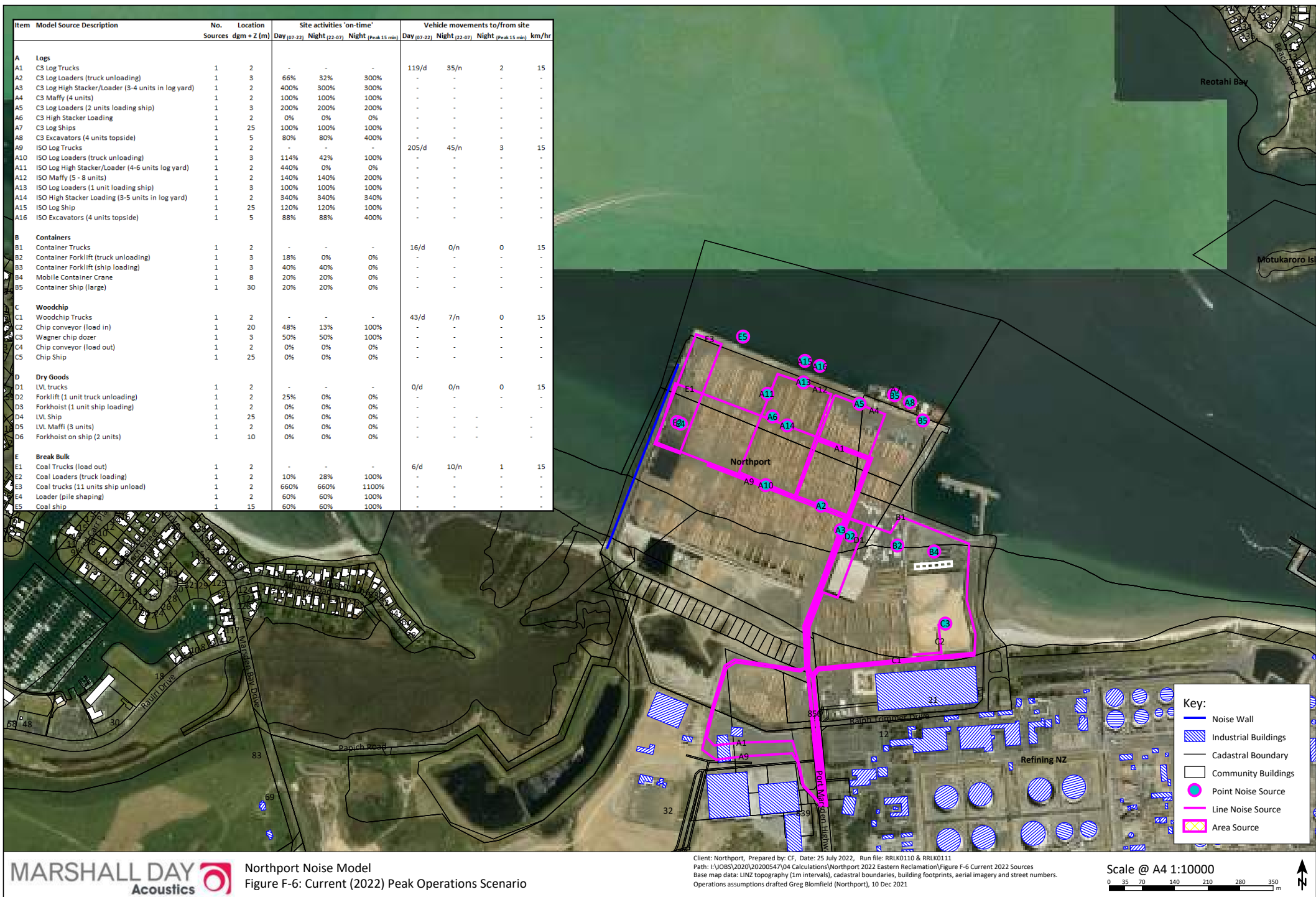








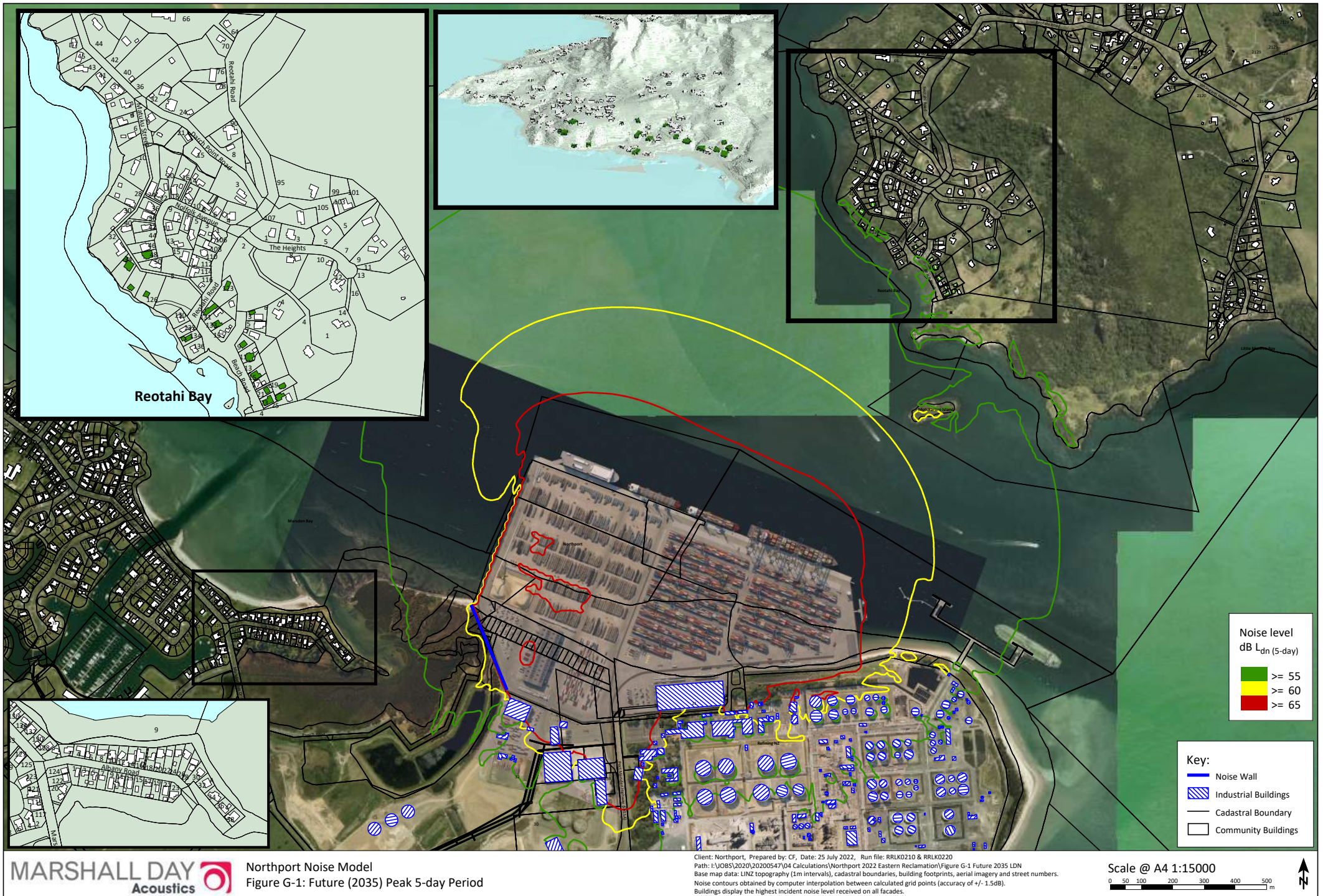


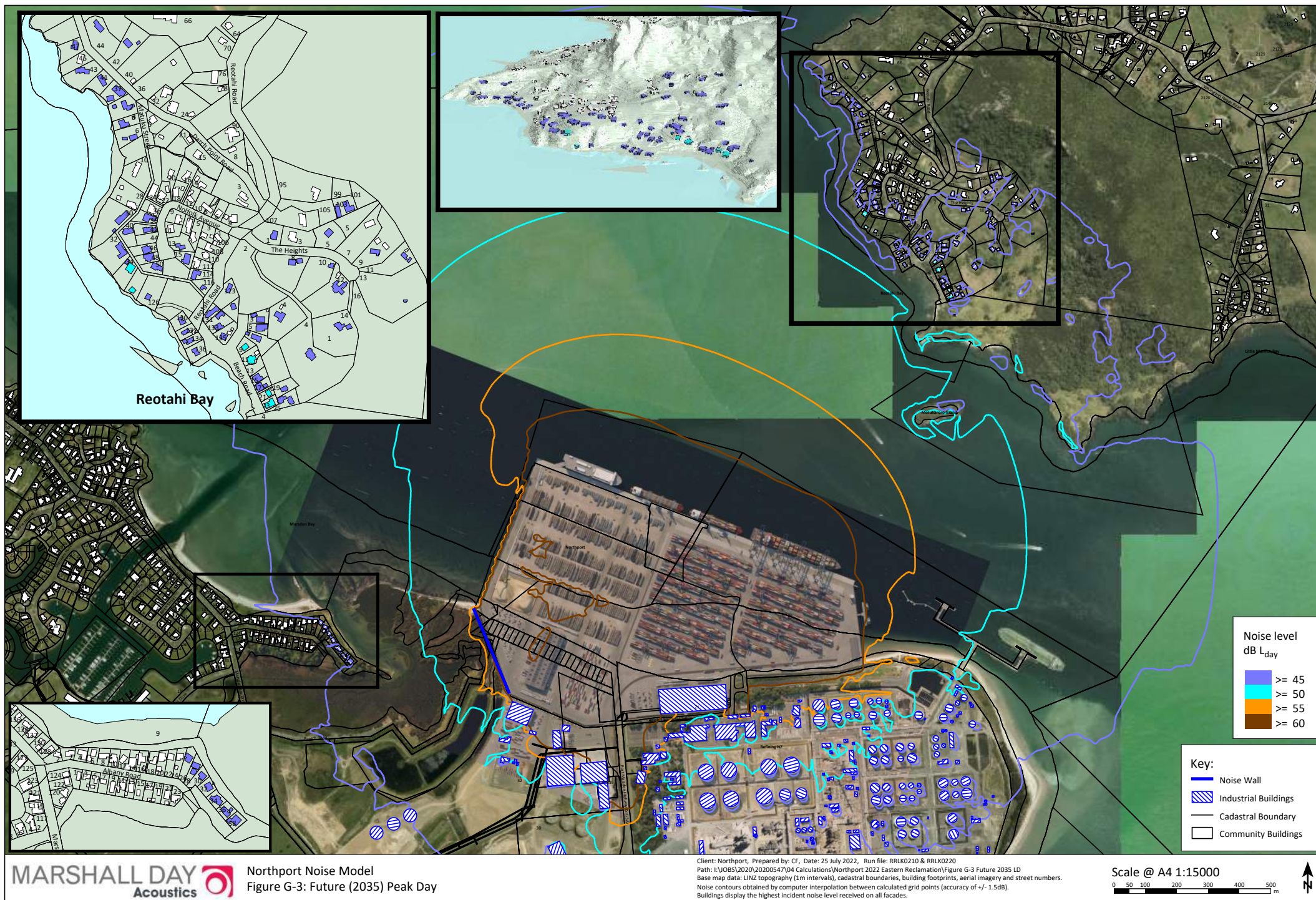


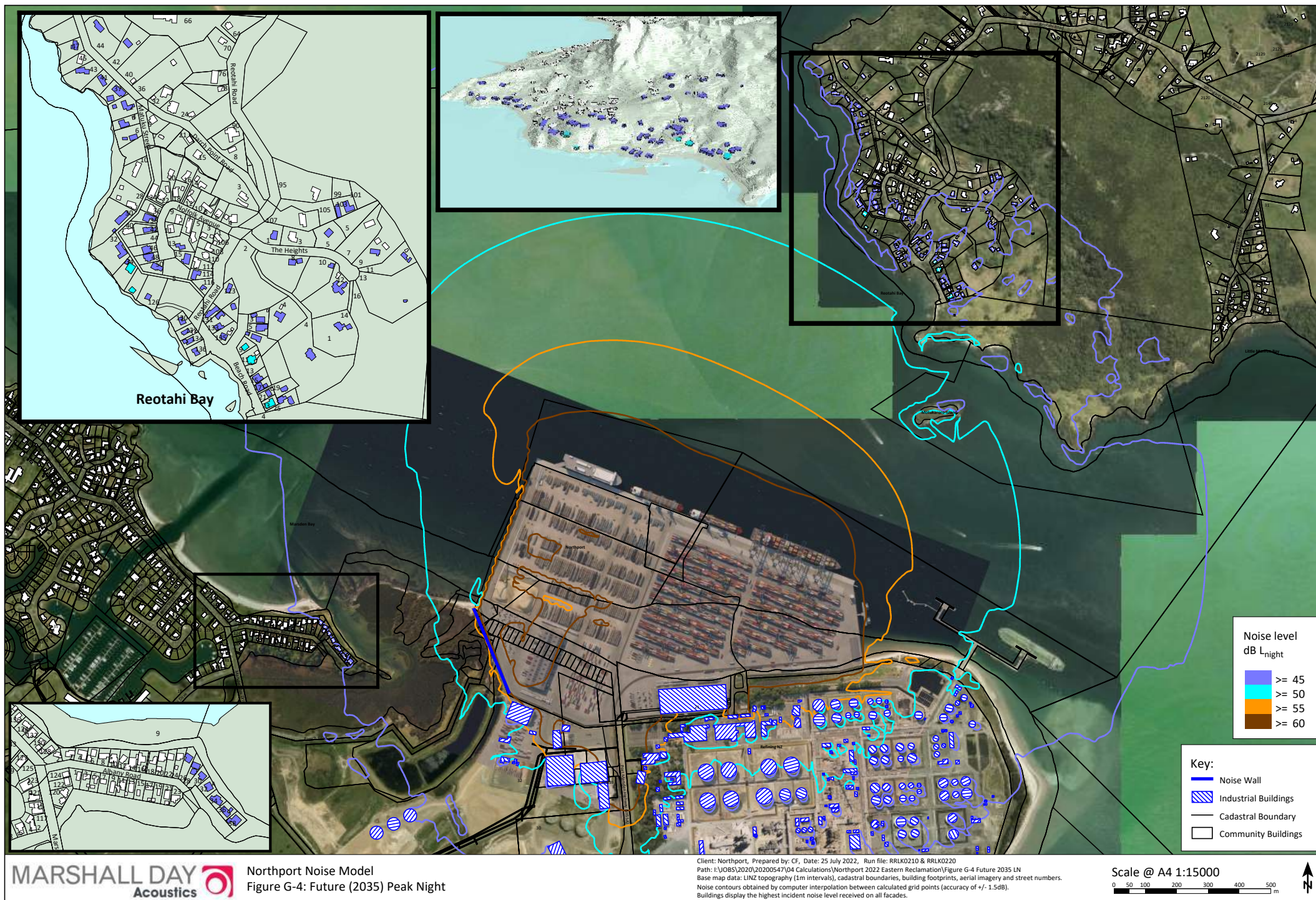
APPENDIX G FUTURE PORT NOISE MAPS

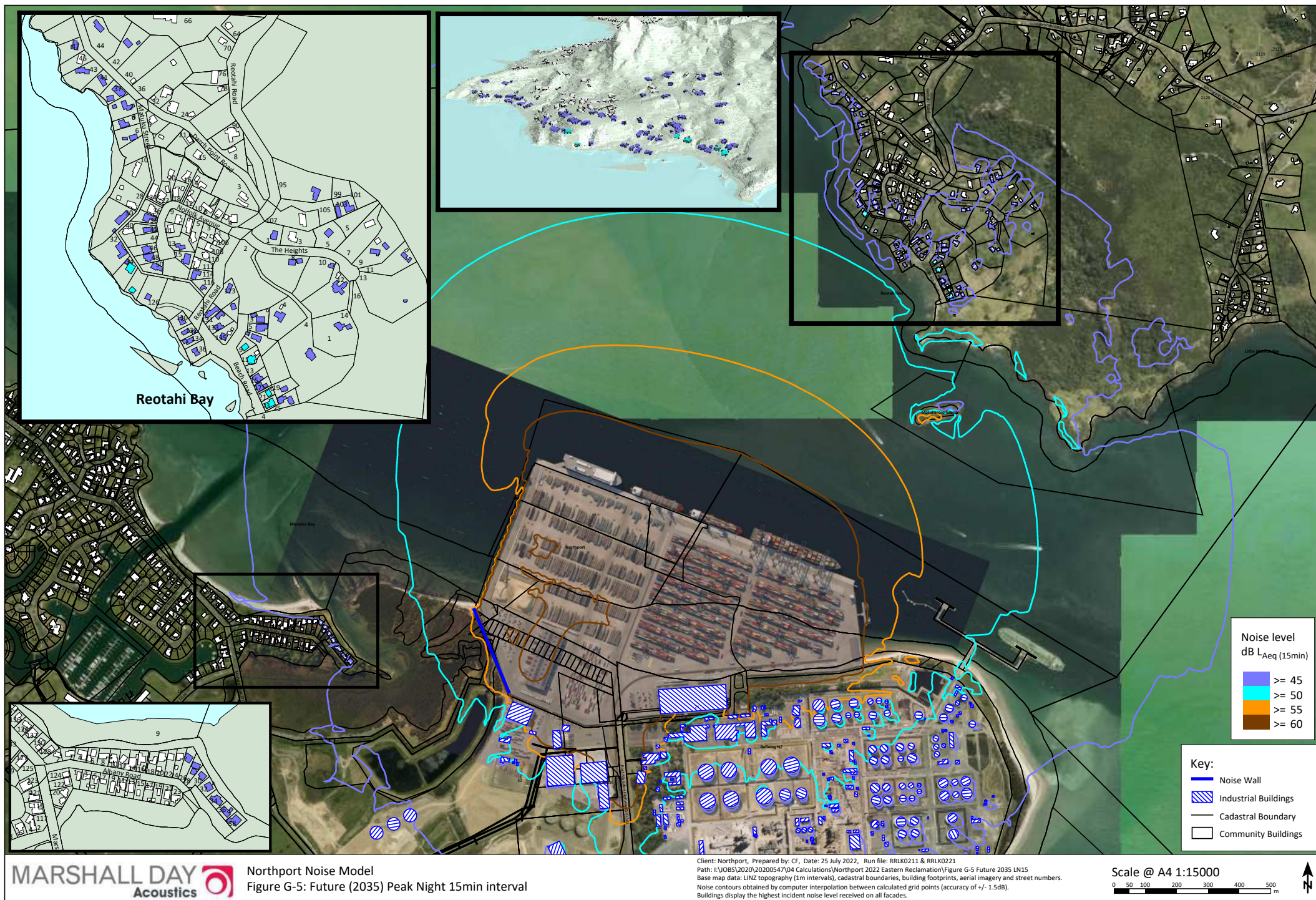
Attached overleaf:

- Figure G-1 Future (2035) Peak 5-Day Period
- Figure G-2 Future (2035) Peak 5-Day Period
- Figure G-3 Future (2035) Peak Day
- Figure G-4 Future (2035) Peak Night
- Figure G-5 Future (2035) Peak Night 15-minute interval
- Figure G-6 Future (2035) Peak Operations Scenario









Item	Model Source Description	No.	Location dgm + Z (m)	Site activities 'on-time'			Vehicle movements to/from site			
				Day (07-22)	Night (22-07)	Night (Peak 15 min)	Day (07-22)	Night (22-07)	Night (Peak 15 min)	km/hr
A	Logs									
A1	C3 Log Trucks	1	2	-	-	-	119/d	35/n	2	15
A2	C3 Log Loaders (truck unloading)	1	3	66%	32%	300%	-	-	-	-
A3	C3 Log High Stacker/Loader (1 unit in log yard)	1	2	400%	0%	0%	-	-	-	-
A4	C3 Maffi (5 units)	1	2	125%	125%	125%	-	-	-	-
A5	C3 Log Loaders (1 unit loading ship)	1	3	100%	100%	100%	-	-	-	-
A6	C3 High Stacker Loading (4 units in log yard)	1	2	300%	300%	300%	-	-	-	-
A7	C3 Log Ship	1	25	100%	100%	100%	-	-	-	-
A8	C3 Excavators (4 units topside)	1	5	80%	80%	400%	-	-	-	-
A9	ISO Log Trucks	1	2	-	-	-	205/d	45/n	3	15
A10	ISO Log Loaders (truck unloading)	1	3	114%	42%	100%	-	-	-	-
A11	ISO Log High Stacker/Loader (4-6 units log yard)	1	2	440%	0%	0%	-	-	-	-
A12	ISO Maffi (5-8 units)	1	2	140%	140%	200%	-	-	-	-
A13	ISO Log Loaders (1 unit loading ship)	1	3	100%	100%	100%	-	-	-	-
A14	ISO High Stacker Loading (3-5 units in log yard)	1	2	340%	340%	500%	-	-	-	-
A15	ISO Log Ship	1	25	100%	100%	100%	-	-	-	-
A16	ISO Excavators (4 units topside)	1	5	0%	0%	0%	-	-	-	-
A17	Mobile harbour crane (3 units)	1	5	180%	180%	240%	-	-	-	-
B	Containers									
B1	Container Trucks	1	2	-	-	-	379/d	126/n	7	15
B4	Mobile Container Crane (3 units)	1	8	120%	120%	240%	-	-	-	-
B5	Container ship (large)	1	30	100%	100%	100%	-	-	-	-
B6	Container ship (small)	1	30	40%	40%	100%	-	-	-	-
B7	Electric Maffi (16 units)	1	3	1200%	1200%	1200%	-	-	-	-
B8	Reefers (90 TEU 30x3high)	3	4	289%	289%	289%	-	-	-	-
B9	Reach Stackers (12 units)	1	3	900%	900%	1200%	-	-	-	-
B10	Gantry crane (4 units)	2	40	100%	100%	100%	-	-	-	-
B11	RTG Crane (4 units)	2	3	180%	180%	200%	-	-	-	-
B12	Rail (40 wagons)	1	2	-	-	-	16/d	16/n	0	5
C	Woodchip									
C1	Woodchip Trucks	1	2	-	-	-	43/d	7/n	0	15
C2	Chip conveyor (load in)	1	20	48%	13%	100%	-	-	-	-
C3	Wagner chip dozer (1-2 units)	1	3	110%	110%	100%	-	-	-	-
C4	Chip conveyor (load out)	1	2	40%	40%	0%	-	-	-	-
C5	Chip Ship	1	25	20%	20%	0%	-	-	-	-
D	Dry Goods									
D1	LVL trucks	1	2	-	-	-	6/d	0/n	0	15
D2	Forklifts (1 unit truck unloading)	1	2	25%	0%	0%	-	-	-	-
D3	Forkhoist (1 unit ship loading)	1	2	20%	20%	0%	-	-	-	-
D4	LVL Ship	1	25	20%	20%	0%	-	-	-	-
D5	LVL Maffi (3 units)	1	2	60%	60%	0%	-	-	-	-
D6	Forkhoist on ship (2 units)	1	10	40%	40%	0%	-	-	-	-
E	Break Bulk									
E1	Coal Trucks (load out)	1	2	-	-	-	0/d	1/n	0	15
E2	Coal Loaders (truck loading)	1	2	10%	28%	100%	-	-	-	-
E3	Coal trucks (11 units ship unload)	1	2	220%	220%	1100%	-	-	-	-
E4	Loader (pile shaping)	1	2	20%	20%	100%	-	-	-	-
E5	Coal ship	1	25	20%	20%	100%	-	-	-	-
F	Cruise Ship									
F1	Cruise ship	1	25	0%	0%	0%	-	-	-	-
G	Car Ship									
G1	Car Ship	1	25	60%	60%	100%	-	-	-	-
H	Project Cargo									
H1	Project Trucks	1	2	-	-	-	18/d	0	0	-
H2	Mobile Harbour Crane (2 units)	1	8	40%	0%	0%	-	-	-	-
H3	Project Vessel	1	25	20%	20%	0%	-	-	-	-
H4	Forklift Prolot	1	2	60%	0%	0%	-	-	-	-



APPENDIX H DRAFT PORT NOISE MANAGEMENT PLAN

Attached overleaf: MDA report Rp 001 20170776 (Port Noise Management Plan), dated 3 Aug 2022



Project: **PORT NOISE MANAGEMENT PLAN**

Prepared for: **Northport Limited
PO Box 44
Ruakaka 0151**

Attention: **Greg Blomfield**

Report No.: **Rp 001 20170776**

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Document Control

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Draft	-	For discussion	7 June 2019	C Fitzgerald	-
Draft	01	For Northport review	9 June 2019	C Fitzgerald	G Blomfield
Draft	02	For PC88 mediation	10 June 2021	C Fitzgerald	GJB on behalf of NPL SMT
Draft	03	For PC88 hearing	6 Aug 2021	C Fitzgerald	-
Draft	04	For Resource Consent	3 Aug 2022	C Fitzgerald	-

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APPENDIX A GLOSSARY OF TERMINOLOGY

APPENDIX B (PROPOSED) NOISE CONDITIONS

APPENDIX C CURRENT PORT NOISE CONTOUR MAP

1.0 INTRODUCTION

Northport Limited (**Northport**) must operate in accordance with this Port Noise Management Plan (**NMP**) to satisfy Condition 6 (relevant consent conditions are included in Appendix B).

The Northport appointed Environmental Manager (or similarly titled equivalent person) is responsible for implementing this NMP. It is consistent with the port noise management requirements in Section 8 of New Zealand Standard NZS 6809: 1999, “Acoustics – Port Noise Management and Land Use Planning” (the **Port Noise Standard**).

The objectives of this NMP are:

- Ensure the Port complies with the noise limits in Condition 2.
- To provide a framework for the measurement, monitoring and assessment, and management of port noise levels.
- To identify and adopt the Best Practicable Option (**BPO**) for the management of noise effects.
- To engage with the community and timely management of noise complaints, including through the establishment of and participation in a Port Noise Liaison Committee.

This NMP is a ‘living document’ that is expanded and updated as appropriate, with formal review at least annually in accordance with Condition 7.

For clarity, this Noise Management Plan has been prepared for the exclusive management of noise emitted by the Northport Facility and its associated operations in Port Management Area A. This plan does not cover the management of surrounding commercial and industrial activities.

A glossary of terminology is included in Appendix A.

2.0 PERFORMANCE STANDARDS

2.1 Port Noise Standard (NZS 6809)

Condition 1 requires that port noise is assessed in accordance with the Port Noise Standard.

The objective of the Port Noise Standard is to ensure the long-term compatibility of ports and their neighbours by the application of appropriate land use planning techniques. The Standard recognises the need for ports to operate in an effective manner and provides guidelines to ensure that the adjacent residential communities can co-exist with ports and their associated activities.

The Port Noise Standard, and noise limits adopted in Condition 2, rely on an acoustic descriptor called the Day/Night Level that spans a representative 5-day peak operations period ($L_{dn(5\text{ day})}$). This parameter is essentially the energy average sound level ($L_{Aeq(5\text{ day})}$) with 10 decibels added to contributions between 10pm and 7am to reflect the greater sensitivity to noise at night.

This NMP has been prepared in accordance with Section 8.1 of the Port Noise Standard, which states: *“The need for a management plan recognizes that noise levels adjacent to the port may at times be higher than desirable. The port noise management plan should be based on consideration of operational needs of the port balanced by consideration of the needs of the port’s neighbours, as ascertained through consultation with those neighbours and the local authorities. A liaison committee may be a useful method to foster communication and understanding of mutual needs.”*

This NMP addresses the wider statutory requirements of Section 16 and 17 of the Resource Management Act (RMA). Section 16 requires adoption of the best practicable option to ensure that the emission of noise does not exceed a reasonable level. Section 17 requires all occupants to avoid, remedy or mitigate any adverse effect on the environment.

2.2 Noise Conditions

Northport operations subject to this NMP are on land zoned 'Port Zone' within 'Port Operations Area A' and vessels at berth in the adjacent Coastal Marine Area (CMA).

The relevant noise controls are reproduced in Appendix B. In summary, Northport will:

- Measure port noise in accordance with NZS 6801 and assess in accordance with NZS 6809 in accordance with Condition 1
- Comply with the noise limits in accordance with Condition 2
- Mitigate noise affected properties in accordance with Conditions 3 – 5
- Adopt the Best Practicable Option (BPO) to minimise port noise emissions in accordance with Condition 6
- Facilitate and participate in the Community Liaison Group in accordance with Condition 6
- Maintain this NMP as required by Condition 7

3.0 PORT NOISE

3.1 Port Operations

Northport operates the only commercial port with international trade directly serving the Northland region. It operates 24 hours per day, 7 days per week. The need for this NMP recognises that noise levels received in the community may at times be higher than desirable. It balances the operational needs of the port with those of the community.

Businesses and organisations that participate in port related activities at Northport include:

- Shipping lines
- Cargo owners
- Stevedores
- Log marshallers
- Cruise operators
- Transport contractors
- Other port users and contractors

The primary sources of Northport operations noise are:

- Cargo handling
- Ships at berth
- Industrial activities
- Vehicle movements

3.2 Noise Model

A computer-based noise model is used to represent the 'average' noise emissions from the Port operations over the busiest 5-day period each year (peak week). The port 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 Port machinery to determine the reference sound power levels used in the model.

- **Operational scenario.** Assumptions include the location of noise sources, their typical operational duration and duty. This is developed with Northport to ensure it is representative.
- **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 relies on attended short-term monitoring to verify shape and level of the noise contours (Section 4.8).

The port noise model is regularly updated to reflect changes in current operations and evaluate future master planning options. The model was last revised in 2022. It has both current and future operational scenarios, where the future scenario is generally forecast at least 10-15 years in the future.

The noise source data for the Northport model was prepared from measurements carried out on Northport machinery. In some cases, equipment information was supplemented with representative data measured at other Ports to make the data more complete or representative. The calculated sound powers were cross checked against data for similar equipment at other ports.

3.3 Port Noise Contour Maps

Northport must maintain a Current Port Contour Map based on a current busy 5-day operating scenario in accordance with Condition 7. The Current Port Noise Contour Map is included in Appendix C.

The Port Noise Contour Maps are prepared in accordance with the Port Noise Standard. They will be reviewed on an annual basis to reflect any material change in character or intensity of port noise emissions. Northport will present the updated Maps to the Community Liaison Group (Section 5.3) prior to adoption in this NMP.

The 55dB L_{dn} (5 day) noise contour identifies the properties that are eligible for the Port funded noise mitigation provisions in conditions 3 – 5 (none are currently eligible). Northport will maintain a register of treated properties and identify these properties on the Current Port Noise Contour Map.

4.0 MITIGATION AND MANAGEMENT

4.1 Training

All wharf-side staff and contractors must undertake an induction to gain access to the site. This induction, along with regular pre-job meetings (toolbox meetings or job safety reviews) prior to commencing work, will highlight and identify the following:

- The noise sensitivity of residential receivers in Reotahi and Marsden Bay
- Activities with the potential to generate high levels of noise (Section 3.1) and/or noise complaints (Section 5.2)
- Noise mitigation and management procedures in this NMP (Section 3.3)
- Any operational constraints agreed to through consultation with the Community Liaison Group (Section 5.3)

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

4.2 Equipment Selection

Noise is to be considered during the procurement of new equipment and will be included in specifications where appropriate. Other factors include efficiency, appropriateness and cost.

In general, when selecting equipment, Northport and port user companies will where practicable:

- Consider quieter models/options
- Consider electric motors over diesel engines
- Equipment to be suitably sized for the proposed task
- Equipment to be maintained and fitted with exhaust silencers and engine covers
- Avoid tonal safety alarms (Section 4.3)

This policy extends to the upgrade of existing equipment where appropriate and practicable. Specific recent initiatives include:

- Northport has for many years had a site policy to remove tonal alarms from all plant and vehicles used for reversing. Replacement of these alarms has been a blue flashing light.
- Fitting soundproofing and noise-reduction features on chip bulldozer
- Cranes have software installed that automatically controls the rate of descent near the ground to reduce the impact noise from containers landing on the wharf
- Purchase of container handling equipment incorporating technology to sense load and adjust engine revs accordingly.

4.3 Safety Alarms

Safety alarms are important to ensure the safety of those working at the port. Therefore, some vehicles are equipped with reversing alarms, or in the case of some equipment, warning alarms. The intermittent nature of alarms and the tone that is generated by some types can make them audible at a significant distance, and, given the nature of the operations, the noise of the alarms occur regularly.

It is not practicable for all alarms to be muted for occupational health and safety reasons. However, Northport's policy is to eliminate where possible the use of tonal reversing or warning 'beepers'. Suitable alternatives may include blue flashing lights, broadband audible 'squawkers', reversing cameras inside vehicles, and/or use of a banksman/dogman. Exceptions are considered on a case-by-case basis (e.g. port cranes while travelling).

The use of ship horns will be avoided where practicable, noting necessary exceptions such as those required by the Maritime NZ Rules (e.g. restricted visibility and distress signals).

Specific recent initiatives include:

- Ship horns are only used for safety reasons (e.g. fog) and not used to signal departure
- The elimination of tonal alarms on most heavy machinery

4.4 Night Activities

Most Northport noise complaints relate to banging from log loading activities. The complaints typically occur late at night or early in the morning. These periods are when residents are most sensitive to noise due to the potential for sleep disturbance. It is also when local road traffic noise is quietest, making Northport operations noise more apparent.

Northport operates continuously, potentially 24 hours per day, 365 days per year. However, where practicable, activities with the potential to result in sleep disturbance should be prioritised during the day or early evening. People tend to be less disturbed by low frequency continuous engine noise (e.g. reefers), than intermittent noise (e.g. engine revs and dropped containers) or activities with special audible character (e.g. reversing beepers, a throbbing ship engine or whistling).

4.5 General Measures

Complaints can arise whether or not noise levels comply with the rules in the District Plan. To avoid complaints, general mitigation and management measures include, but are not limited to:

- 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 where practicable (e.g. closing ship hatch) and take care to minimise other impacts (e.g. stacking of containers and logs)
- Avoid high engine revs through appropriate equipment selection, observe speed limits on port and public roads, and turn engines off when idle
- Mitigate squeal from tracked equipment, such as excavators (may include tensioning and watering or lubricating the tracks regularly)
- Utilise buildings and/or container stacks as noise barriers where practicable and appropriate
- Undertake maintenance and repairs for port plant and equipment within workshop buildings and avoid the use of sledge hammers outdoors (e.g. use hydraulic jacks to remove dents in containers where practicable)

4.6 Operational Procedures

Northport has several operational procedures and policies that it uses to manage noise onsite, to inform workers and to receive and manage complaints. These documents undergo regular revisions and can be adapted to changes in the ports operations.

- Noise Risk Advisory: This document is a risk assessment of the environmental conditions that might generate adverse conditions for the propagation of noise into noise sensitive areas. This document is completed by port staff daily at approx. 6pm when at least one log ship is working. Should adverse environmental conditions be identified, notification will be sent out to port users (stevedores and marshallers) who respond by email confirming that the risk identified has been briefed with staff at the pre job meeting.
- Operational reviews: Options to better manage noise are always explored. A trial initiative for 'No Hard Loading' between 2100hrs and 0700hrs is an example of this. This initiative is to manage ship loading to avoid loading deck cargo directly onto the hatch lids between these hours. As a result of this trial initiative, wherever possible, the starting of loading of logs on deck is to be minimised.

4.7 Tenants, Contractors and Port Users

Northport will include in its 'Port User Rules', a requirement for tenants, contractors and independent operators to comply with this Plan.

With road and rail operators, while not in a position to require changes, Northport will work with and encourage the adoption of practical opportunities to reduce noise output and effects during the night-time period. This includes minimising engine braking, road maintenance and minimising truck movements and avoiding the use of horns at night between 10pm and 7am where appropriate and practicable.

The WDP addresses construction noise separately from port operations. Likewise, construction noise management is not addressed by this NMP. It will be addressed separately on a project specific basis. Nonetheless, the objective will be to adopt the best practical option to avoid, remedy or mitigate the noise effects as far as practicable.

4.8 Noise Monitoring

Northport will undertake attended noise monitoring:

- To validate the Port Noise Contour Maps (Appendix C) where practicable
- In response to a reasonable noise complaint if it assists in understanding the level and/or effect of the source of complaint (Section 5.2)

Monitoring results will be available to Council and Community Liaison Group (Section 5.3).

5.0 ENGAGEMENT

5.1 Communication

This NMP is available for download from the [Northport Community Liaison Group webpage](#).

Newsletters and Media Releases are hosted on the [Northport Media webpage](#).

Contact details for Northport staff are hosted on the [Northport Contact Us webpage](#).

Targeted engagement with community and stakeholders is undertaken on a case-by case basis and/or through the Community Liaison Group (Section 5.3).

5.2 Complaints Response

The [Northport Contact Us webpage](#) provides a phone number (09 4325010) for Port Services Centre (24 hours), to which noise complaints should be directed.

Northport procedure 'ENV-1-100' details the procedure for handling environmental complaints.

When a noise complaint or enquiry is received, acknowledgement of the complaint will be confirmed. Where the inquiry requires a further response, this will be provided within five working days or an alternative timeframe where this is communicated to the people who made the complaint.

All noise complaints will be recorded on form 'FOR-12-113 rev 0' and stored in a complaints file that is available to Council on request and will be tabled at the CLG meeting. For each complaint, an investigation will be undertaken by the Environmental Manager involving the following steps as soon as practicable, with the ability to escalate the complaint further should the effects not be remedied in a satisfactory or timely manner:

Phase 1 – initial receipt of complaint

- 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 Advise complainant the immediate action will be taken, thank them for reporting the noise effects and confirm if they wish to be called back with an update.

Phase 2 – management of the complaint

- Review the environmental conditions. Look for actual condition and review the forecast
- 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 Environmental Manager
- Review the mitigation and management measures to ensure the activity represents the BPO (Section 4.0). Review the relief sought by the complainant. Adopt further mitigation and management measures if appropriate.

- Report the findings, 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.

Northport will maintain a register of noise complaints. They will be summarised and presented to the Community Liaison Group (Section 5.3) along with any action taken to investigate and resolve the complaints.

5.3 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 which is to provide a cooperative approach to managing local port noise issues. The CLG was setup as a condition of Northport's consents for construction of berths 1 and 2. However, on completion of the berths, the CLG has continued as an important medium to the community and can be geared up or down in terms of meetings per annum to meet the level of need for port change and activity.

CLG representation is listed on the [Northport CLG webpage](#), including:

- The port operator.
- Two port users.
- A representative from the Northland Regional Council.
- A representative from the Whangārei District Council.
- Two community representatives from Reotahi.
- Two community representatives from Albany Road.
- A representative from the Ruakaka Parish Residents & Ratepayers Association.
- A representative from the Whangarei Heads Citizens Association.
- A representative from Patuharakeke Te Iwi Trust Board.
- A representative from Ngātiwai Trust Board.

Northport will host and provide secretarial support for Community Liaison Group meetings. The meetings will be convened at least annually. Northport will:

- Present results of noise monitoring (Section 4.8)
- Present a summary of recent noise complaints and actions (Section 5.2)
- Present revisions of this NMP and Current Port Noise Contour Map (Appendix C)
- Gather feedback on noise issues and mitigation and management measures (Section 4.0)

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.
$L_{Aeq}(t)$	<p>The equivalent continuous (time-averaged) A-weighted sound level. This is commonly referred to as the average noise level.</p> <p>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.</p>
L_{AFmax}	The A-weighted maximum noise level. The highest noise level which occurs during the measurement period.
L_{dn}	The day night noise level which is calculated from the 24 hour L_{Aeq} with a 10 dB penalty applied to the night-time (2200-0700 hours) L_{Aeq} .
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 this case, port noise limits are set specifically for port noise character. Therefore, port noise character would be reasonably expected and not 'special' (e.g. would not apply to log or container handling activities).
NZS 6801:2008	New Zealand Standard NZS 6801:2008 <i>"Acoustics – Measurement of environmental sound"</i>
NZS 6809:1999	New Zealand Standard NZS 6809:1999 <i>"Acoustics – Port Noise Management and Land Use Planning"</i>

APPENDIX B (PROPOSED) NOISE CONDITIONS

Port noise limits

1. Noise arising from port activities in Port Operations Area A shall be measured in accordance with NZS 6801: 2008 and assessed in accordance with NZS 6809:1999 Acoustics – Port Noise Management and Land Use Planning.
2. Noise arising from port activities in Port Operations Area A, as measured within any residentially zoned land or the notional boundary of any existing residential unit shall not exceed the following limits:
 - a) Day-night (Long Term):
 - 58 dB L_{dn} (5-day)
 - 61 dB L_{dn} (1-day)
 - b) Night-time (Short term):
 - 53 dB L_{night} (10pm - 7am)
 - 58 dB L_{Aeq} (15 min)
 - 75 dB L_{AFmax}

Port Noise Mitigation

3. Where the measured or predicted¹ port noise level exceeds 55 dB L_{dn} (5-day) at the external façade of a habitable space in a residential unit the port shall offer to fund 100% of the cost of installing mechanical ventilation and cooling that:
 - a) Achieves an indoor design noise level no greater than 40 dB L_{dn} (5-day) in all habitable rooms of the residential unit when the windows and doors are closed;
 - b) Satisfies clause G4 of the New Zealand Building Code;
 - c) That is adjustable by the occupant to control the ventilation rate in increments up to a high air flow setting that provides at least 6 air changes per hour, or provides cooling that is controllable by the occupant and that can maintain the inside temperature of the habitable room below 25°C;
 - d) Provides relief for equivalent volumes of spill air;
 - e) Does not result in an outdoor heat pump condenser unit being located closer than 5m from the direct entrance to a living area; and
 - f) Mechanical ventilation noise shall be measured in accordance with AS/NZS 2107:2016 “Acoustics- Recommended design sound levels and reverberation times for building interiors”. The mechanical ventilation noise levels in habitable spaces shall not exceed the following:
 - (i) 35 dB L_{Aeq} in bedrooms, and
 - (ii) 40 dB L_{Aeq} in all other habitable spaces.
4. If the offer under condition 3 is accepted the mechanical ventilation shall be installed at the expense of the port operator within 1 year of the offer being accepted; or
5. If the offer under condition 3 is not accepted, the offer remains open whether accepted in the first instance or not.

¹ Informed by the periodic review of the current port noise contours required as part of the Port Noise Management Plan detailed in Condition 6.

Port Noise Management Plan

6. A Port Noise Management Plan shall be prepared in accordance with the requirements in Section 8 of NZS 6809:1999 Acoustics – Port Noise Management and Land Use Planning and submitted to Council within 3 months of the expanded port becoming operational. The plan must contain the following information:
 - a. The Port Noise Management Plan objectives (and methods to achieve the objectives), including, but not limited to:
 - i. To ensure the Port complies with the noise limits in Condition 2.
 - ii. To provide a framework for the measurement, monitoring, assessment, and management of port noise levels.
 - iii. To identify and adopt the best practicable options for the management of noise effects.
 - iv. To engage with the community and timely management of noise complaints, including through the establishment of and participation in a Port Noise Liaison Committee.
 - b. Noise modelling, noise monitoring, auditing, and reporting procedures to be undertaken and funded by the port operator.
 - c. Management practices that will be used to avoid, remedy or mitigate noise effects, including procedures for achieving noise reduction through port operational procedures and staff and contractor training.
 - d. Procedures to receive and respond to complaints, and a register of all complaints received, and the details of the complaints and any action taken to investigate and resolve the complaints.
 - e. The Current Port Noise Contour Map
 - f. Identification of all properties where Condition 3 applies.
 - g. Details of the Port Noise Liaison Committee required under condition 6(a)(iv) including:
 - i. The functions of the Committee, including to consider all noise issues arising from the port and to ensure that mitigation functions identified in the Port Noise Mitigation Plan are carried out.
 - ii. The invited members for the Committee and their roles, including at a minimum allocation of Committee seats for:
 - The port operator.
 - Two port users.
 - A representative from the Northland Regional Council.
 - A representative from the Whangārei District Council.
 - Two community representatives from Reotahi.
 - Two community representatives from Albany Road.
 - A representative from the Ruakaka Parish Residents & Ratepayers Association.
 - A representative from the Whangareia Heads Citizens Association.
 - A representative from Patuharakeke Te Iwi Trust Board.
 - A representative from Ngātiwai Trust Board.

- iii. Any secretarial and logistic support provided by the port operator to the Committee.
 - iv. The frequency of Committee meetings, which shall be annually at a minimum, and procedures for calling an emergency meeting of the Committee.
 - v. Procedures for recording minutes of the Committee meetings and making the minutes publicly available.
 - vi. Procedures for recommendations of the Committee to be considered and determined by the port operator.
 - vii. Any recommendations made by the Committee and methods to implement and achieve those recommendations.
7. The Port Noise Management Plan, and appended Current Port Noise Contour Map, shall be reviewed annually (at a minimum). An annual report shall be prepared for the Port Noise Liaison Committee that details any changes resulting from the review, including:
- i. Port Noise Management Plan;
 - ii. Current Port Noise Contour Map;
 - iii. A record of all acoustic mitigation works undertaken in the preceding 12 months, including records of offers of mitigation that have been refused or not responded to; and
 - iv. Any physical monitoring undertaken and the results of that monitoring.

APPENDIX C CURRENT PORT NOISE CONTOUR MAP

Attached overleaf:

Figure F-1 Current (2022) Peak 5-Day Period

