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Acoustics 

EASTLAND PORT – TWIN BERTHS
OPERATIONAL NOISE ASSESSMENT

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Project: **TWIN BERTHS OPERATIONAL NOISE ASSESSMENT**

Prepared for: **Eastland Port Ltd**

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Report No.: **Rp 006 R10 20200542**

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1.0 SUMMARY

Eastland Port has engaged Marshall Day Acoustics Limited (MDA) to assess the operational noise effects of Stage 2 of the proposed 'Twin Berths' project (the Proposal).

This report focuses on the Proposal's noise and vibration when operating at or near capacity when two log ships are in berth. Construction noise and vibration effects of the Proposal are addressed in a separate report ('Twin Berths Construction Noise Assessment', dated 15 August 2022).

We have undertaken an assessment of the cumulative change to the noise environment from existing to potential future Twin Berths operations, and a compliance assessment with the relevant noise and vibration rules. The findings of our assessments are as follows:

- We have modelled port noise contours for the peak periods for two scenarios:
 - Current operations: current peak operations with a log ship and kiwifruit ship in berth. This scenario has been calibrated to the measured level at the Portside Hotel Noise Monitoring Terminal (NMT) during a comparable peak operations period. The highest predicted levels at the adjacent noise sensitive receivers are 64 dB $L_{dn(5-day)}$ at the Portside Hotel and 63 dB $L_{dn(5-day)}$ at 100 Customhouse Road apartments.
 - Future operations: two log ships with two harbour cranes loading each ship and a kiwifruit ship in berth. Representative of peak future operations. The highest predicted level at the adjacent noise sensitive receivers is 66 dB $L_{dn(5-day)}$ at the Portside Hotel and 67 dB $L_{dn(5-day)}$ at 100 Customhouse Road.
- The key findings from the future operations are:
 - Noise levels are predicted to increase by up to 4 decibels at the most exposed façade of 100 Customhouse Road. Subjectively, this is a just perceptible increase. A smaller increase of up to 2 decibels is predicted at the Portside Hotel which is a subjectively imperceptible increase.
 - Internal noise levels for 100 Customhouse Road and Portside Hotel are predicted to be reasonable because the façade design control in place at the time of those developments are sufficient (30 decibel reduction required across the façade). The resulting level of up to 37 dB $L_{dn(5-day)}$ inside is below both our recommended threshold of 40 dB $L_{dn(5-day)}$ and the more lenient maximum threshold recommended in the Port Noise Standard of 45 dB $L_{dn(5-day)}$. Outdoor areas are currently compromised by high port noise levels, and this will remain the case with the Proposal.
- The predicted noise levels generally comply with the TRMP rules. There are some exceedances for both the current operations as well as the Proposal, but the associated noise effects would be negligible
- Vibration is predicted to be negligible at all nearby receivers and readily compliant with the TRMP
- We recommend the following to ensure that the best practicable option is adopted to minimise noise effects from the Proposal:
 - A single set of noise limits apply to cumulative noise emission from the port based New Zealand Standard NZS 6809:1999 *Acoustics – Port Noise Management and Land Use Planning*
 - An overarching Noise Management Plan (NMP) be developed for all operations in the Proposal area (including the Wharfside Logyard and Wharves 6 & 7).

Overall, given the minimal noise effects associated with the Twin Berth Proposal and taking into account the mitigation provided by a NMP, we consider the operational noise and vibration effects of the Twin Berth Proposal are reasonable and generally in keeping with expectations of noise from the port.

2.0 INTRODUCTION

2.1 Proposed works

The full project is known as the Twin Berth Project (TBP) and is designed to enable two ships up to 200m long to berth at the port simultaneously. This will unlock greater capacity for bulk freight and potential options for container freight in future.

Stage 1 of the TBP was consented in December 2020. This stage remediated the former slipway to reduce its footprint within the port to enable more manoeuvring space for ships, and rebuilt part of Wharf 6 and all of Wharf 7.

Stage 2 provides for the remaining works required to complete the TBP as follows:

- Extension of the existing Wharf 8 structure into the area of the inner breakwater;
- Reclamation next to the Southern log yard;
- Rebuilding the outer breakwater structure;
- Deepening access channels in the outer port to accommodate larger Handymax vessels; and
- Improving stormwater collection and treatment facilities in the Southern log yard.

Stage 2 is referred to as ‘the Proposal’ in our report.

2.2 Scope of Operational Noise Assessment

This report focuses on the operation of the Proposal once the construction works are complete. We have addressed noise from proposed construction works in the accompanying construction noise report.

In this assessment we have specifically addressed cumulative noise and vibration emissions during representative full capacity operations when two log ships are in berth.

The Proposal primarily affects operations in the area shown on Figure 1. We understand that there would be no material change to the existing noise emissions from the Southern Logyard, Wharfside Logyard and Upper Logyard as a result of the Proposal.

Figure 1: Map of existing port showing operations areas related to the Proposal (map from 4Sight)



3.0 METHODOLOGY

3.1 Overview of Assessment Approach

We have carried out an assessment of effects due to the change in noise level from current full capacity operations to the future full capacity operations envisioned by the Proposal. This includes all operations in all areas of the port.

The effects assessment has been based on the busiest 5-day period ($L_{dn(5\text{-day})}$) in accordance with the Port Noise Standard. The $L_{dn(5\text{-day})}$ parameter is essentially the energy average sound level calculated over a 24-hour period, with night-time noise is weighted by adding 10 decibels to reflect the greater sensitivity to noise at night. Refer to Appendix C for a detailed description of this Standard's methodology.

We have also compared the predicted noise and vibration levels from the Proposal's operations to the relevant noise and vibration limits in the Tairāwhiti Resource Management Plan (TRMP). The TRMP separates 'Essential Port Activities' from all other operations:

Essential Port Activities Chapter 24 definition: *"Loading or unloading of cargo onto or off ships, and the operation of machinery essential to these activities provided that the best practicable option is adopted to ensure noise is minimised. This plant is assumed to operate 24 hours. Chippers and debarkers are excluded as they could be treated as necessary to reduce noise emissions."*

Non-Essential Activities Activities which are not associated with loading or unloading cargo. This includes log stack maintenance, general cleaning/maintenance, and operation of the debarker.

Vehicles on public roads and train movements are excluded from port noise contours as per TRMP Rule C11.2.15.8 D 1.

A full glossary of technical terms is included in Appendix A.

3.2 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 responses¹. Table 1 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.

¹ 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 1: Noise level change compared with general subjective perception

Noise level change	General subjective perception ²	Impact ³
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 Proposal, 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.

3.3 Noise Sources

The noise source data for the model was prepared from measurements we undertook of all high noise logging equipment at Eastland Port and supplemented with data from other New Zealand ports where necessary (e.g. mobile harbour cranes, kiwifruit operations).

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 2 summarises the sources used in the noise model.

² Based on research by Zwicker & Scharf (1965); and Stevens (1957, 1972).

³ 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 2: Noise sources used in the operational noise models

Noise sources used in model	Type of activity	Sound power level (dB L _{WA})
Debarker	Non-Essential Port Activity	118
Log ships (including ship cranes)	Essential Port Activity	113
Log ships (not using ship cranes)	Essential Port Activity	111
Mobile harbour crane	Essential Port Activity	111
Log loaders	Essential Port Activity	109
Maffi (port truck)	Essential Port Activity	107
Reefer ship (kiwifruit/squash)	Essential Port Activity	107
Road trucks	Essential Port Activity	106
Small loaders (e.g. sweeper), water truck	Non-Essential Port Activity	105
Hi stackers	Essential Port Activity	104
Small diesel forklift (kiwifruit/squash)	Essential Port Activity	95

3.4 Operational Scenarios (current and future)

The Port Noise Maps for the current and future operations were produced from the representative peak 5-day period of cargo throughput or activity (i.e. the ‘worst-case’ noise emissions).

We have predicted noise levels for the following peak 5-day period scenarios:

- **Current operations:**
 - o A log ship at Wharf 8 for 5 days, with ship cranes loading
 - o A kiwifruit ship at Wharf 7 for 2 days.
- **Future Operations:**
 - o A log ship at Wharf 7 for 5 days with harbour cranes loading
 - o A second log ship at Wharf 8 for 2 days with harbour cranes loading
 - o A kiwifruit ship at Wharf 8 for 2 days.

The predicted noise levels with the log ship using its onboard cranes to load (as per current operations) are slightly quieter than using harbour cranes, but the difference is less than one decibel. The Future Operations scenario is therefore representative of both ship loading methods.

We understand the assumptions align with representative existing (current) and future master planning (future) busy operating periods.

3.5 Noise Model Inputs

Representative assumptions were used to determine operational noise, including the location of sources and their duration. These assumptions have been developed with Eastland Port and ISO who manage the logyard operations⁴.

⁴ Discussions with Marty Bayley (Eastland Port), Andy Kinsella (Eastland Port), Rob Blake (Eastland Port) and Paul Coker (ISO).

The modelling assumptions for each noise source includes a description, the number of equipment items, and an equivalent 'on-time'. The 'on-time' operational profile is explained by way of the following two examples:

- Upper Logyard – Log Trucks
This represents truck movements entering, being unloaded, and leaving the upper log yard. The average '5-day movements' 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 at an average speed of 15km/hr. The number of movements is input as 93 truck movements per day and 29 movements per night over the 5-day peak period.
- Wharfside Logyard – High stacker
This represents high stackers operating in the wharfside log yard. The sound power level of each unit is included at a representative location. The daytime 'on-time' description indicates that there is one unit operating 100% of the daytime and 33% of the night-time on all 5 days.

The figure set in Appendix E shows the operational assumptions for area of the port.

3.6 Calculation of Noise Levels

The noise model has been prepared using SoundPLAN, an internationally recognised computer noise modelling program. 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.

SoundPLAN 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 NZ between predictions and measurements.

The model relies on the following geo referenced base data sourced from GDC:

- Topographical contours at 1m intervals (2005)
- Cadastral boundaries
- Building outlines
- Geo referenced aerial imagery

The noise contours are developed 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.

The façade noise maps on buildings are calculated grid points at 3m intervals, starting at 1.5m above ground level. This ensures grid points at each level vertically, as well as spatial representation horizontally, across each building's façades.

3.7 Calibration of the Noise Model

We have undertaken attended noise monitoring to verify the shape of the modelled noise contours, and reviewed noise monitoring data to calibrate the Current Port Noise Maps.

The main calibration location is the long-term monitor on the roof of the Portside Hotel. This monitor has direct line-of-sight to the wharfside log yard and part of the southern log yard, capturing the noise levels at the closest sensitive receivers. We carried out an attended measurement from the balcony of the hotel room below the monitor during a busy night-time period. The measured level was within 1 decibel of the monitor data, which provides confidence that the monitor is representative of noise levels at the hotel occupation level.

We used the monitor data to calculate the $L_{dn(5\text{-day})}$ for the 3 months from October to December 2020 to identify the loudest 5-day period⁵. The levels ranged from 61 – 63 dB $L_{dn(5\text{-day})}$, with the loudest 5-day period being 30 November – 4 December 2020.

Table 3 compares the predicted results from the Port Noise Model to the monitor results for the loudest 5-day period.

Table 3: Comparison of noise model to noise monitor results

Noise descriptor	Predicted noise level at noise monitor location	Noise monitor results
5-day noise level	64 dB $L_{dn(5\text{-day})}$	63 dB $L_{dn(5\text{-day})}$
Average daytime noise level (7am – 10pm)	58 dB L_{Aeq}	59 dB L_{Aeq}
Average night-time noise level (10pm – 7am)	58 dB L_{Aeq}	56 dB L_{Aeq}

The table shows that the predicted levels are just one decibel above the monitor data. We consider that the noise model provides an accurate representation of the current peak operating periods, and no calibration adjustments to the model are necessary.

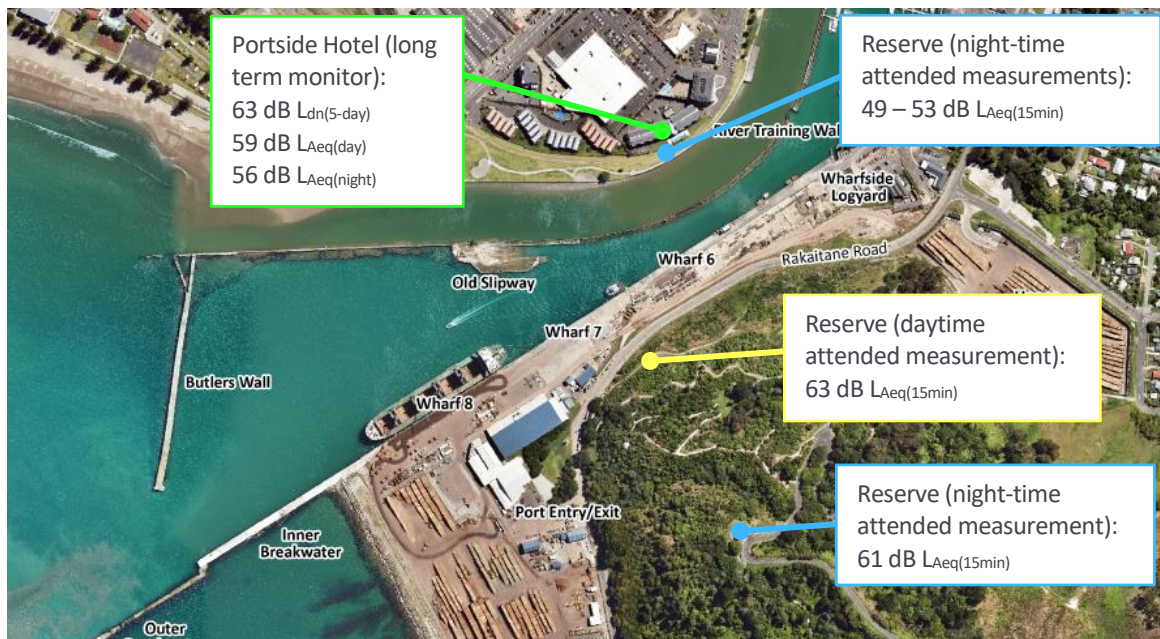
4.0 EXISTING ENVIRONMENT

4.1 Current Noise Levels

The existing environment adjacent to the port is dominated by port noise. The main noise producing activities are the log ships (ship cranes and generators/stacks), log handling (loaders and high stackers) and transport of logs (road trucks and port trucks).

We have carried out a number of attended measurements at locations surrounding the port and analysed the data from the long-term monitor on the Portside Hotel roof. Figure 2 shows a map of the positions and measured levels. The attended results are presented in detail in Appendix B.

Figure 2: Map of existing noise environment measurements



⁵ We understand from conversations on site that the post-lockdown months are busiest that the Port has ever been. This level of activity is still relevant in 2022.

Noise levels at the Portside Hotel monitor location were measured to be 63 dB $L_{dn(5\text{-day})}$ during a representative peak period. For context:

- The measured level is just below the 64 dB $L_{dn(5\text{-day})}$ limit which applies to cumulative noise emissions from the port at this location (Wharves 6 & 7 Consent, see Appendix D).
- Port noise levels of 60 – 65 dB $L_{dn(5\text{-day})}$ are relatively high. New Zealand Standard NZS 6809:1999 *Acoustics – Port Noise Management and Land Use Planning* recommends that any noise sensitive buildings (new or alterations to existing) exposed to these noise levels are adequately insulated from port noise.

The measured average levels of 59 dB L_{Aeq} during the daytime and 56 dB L_{Aeq} during the nighttime at the Portside Hotel monitor are representative of the cumulative noise levels during peak port operations for receivers overlooking the port from an elevated position. We note that this data includes extraneous noise, but the levels are likely to be dominated by port activities.

The attended measurements were ‘spot checks’ and did not necessarily capture peak port operations. However, they provide a good indication of the day-to-day noise levels from the port as well as details on the location and type of noise generating activities.

4.2 Closest Receivers

The closest noise-sensitive receivers⁶ are located across the Turanganui River as shown on Figure 3.

Figure 3: Closest receivers to Proposal area



The 100 Customhouse Road dwellings and Portside Hotel have direct line of sight to the port activities in the Wharfside Yard and Wharves 6, 7 & 8. The closest port operations are around 150m from the façades of these buildings.

⁶ ‘TRMP definition of Noise Sensitive Activity’: ‘Dwellings, visitor accommodation, hospitals, health care and medical centres, residential care housing, educational institutions, structures for the purpose of, or activities involving public assembly.’

The next closest receiver is the Waikanae Beach TOP 10 Holiday Park camping, which is around 400m from the port activities. This receiver is less exposed to port noise than the dwellings/hotel and is adjacent to SH35 which would raise the ambient levels.

4.3 Internal Noise Levels at 100 Customhouse Road and Portside Hotel

In general, allowing noise sensitive activities (dwellings, accommodation etc.) to be developed in commercial/industrial areas can result in occupants being exposed to high noise levels, causing adverse effects. This in turn can lead to reverse sensitivity effects on the established commercial operations adjacent to the new noise sensitive activity.

To mitigate this risk, noise sensitive activities are often subject to façade design controls which ensure that that internal noise environment does not exceed a reasonable level. This places the responsibility on the developer to mitigate the anticipated noise from the adjacent sites and provide a reasonable internal noise environment for their activities (residential and accommodation in this case).

We understand all nearby buildings in the Commercial Zone across the Turanganui River were subject to such controls at the time of consent, and no Resource Consents were granted to depart from required façade controls⁷.

The 100 Customhouse Road dwellings and the Portside Hotel were constructed in an area that was exposed to port and commercial activity noise. The District Plan operative at the time of development required these buildings to be designed to ensure internal noise levels did not exceed 35 dB L_{A10} at night-time based on the maximum permitted noise levels from the adjacent zones. The limit for port noise received at a commercial zone is 65 dB L_{A10} at all times, so a noise reduction of 30 decibels is therefore required across the façade facing the port.

This reverse sensitivity control is sufficient to ensure a good level of internal amenity for the receivers across the river based on the existing noise levels. A 30-decibel reduction would mean that internal noise levels would be approximately 35 dB $L_{dn(5-day)}$ from current operations, which is a significant improvement on the 45 dB $L_{dn(5-day)}$ internal criteria recommended in the Port Noise Standard.

Outdoor areas are likely to be compromised during the busiest port operation periods (i.e. conversations may require a raised voice, port noise clearly noticeable, and residents may choose to relocate indoors for noise sensitive activities). We note that these outdoor areas were consented and built with port noise considered.

⁷ Sarah Hunter (4Sight planner), email correspondence on 11 May 2022

5.0 ASSESSMENT OF NOISE EFFECTS

5.1 Predicted Noise Levels

We have modelled two scenarios – one representing a current operational use of the port without the Proposal (Current Operations) and the forecast future operations at the port enabled by the Proposal involving two berthed log ships (Future Operations). The Future Operations considers ship loading operations in the reclaimed area.

Table 4 summarises the highest predicted noise levels at the closest noise sensitive receivers for each scenario. We have also included a representative location on Kaiti Hill, although we note this is not a noise sensitive receiver.

Table 4: Highest predicted noise levels at noise-sensitive receivers during peak period operations

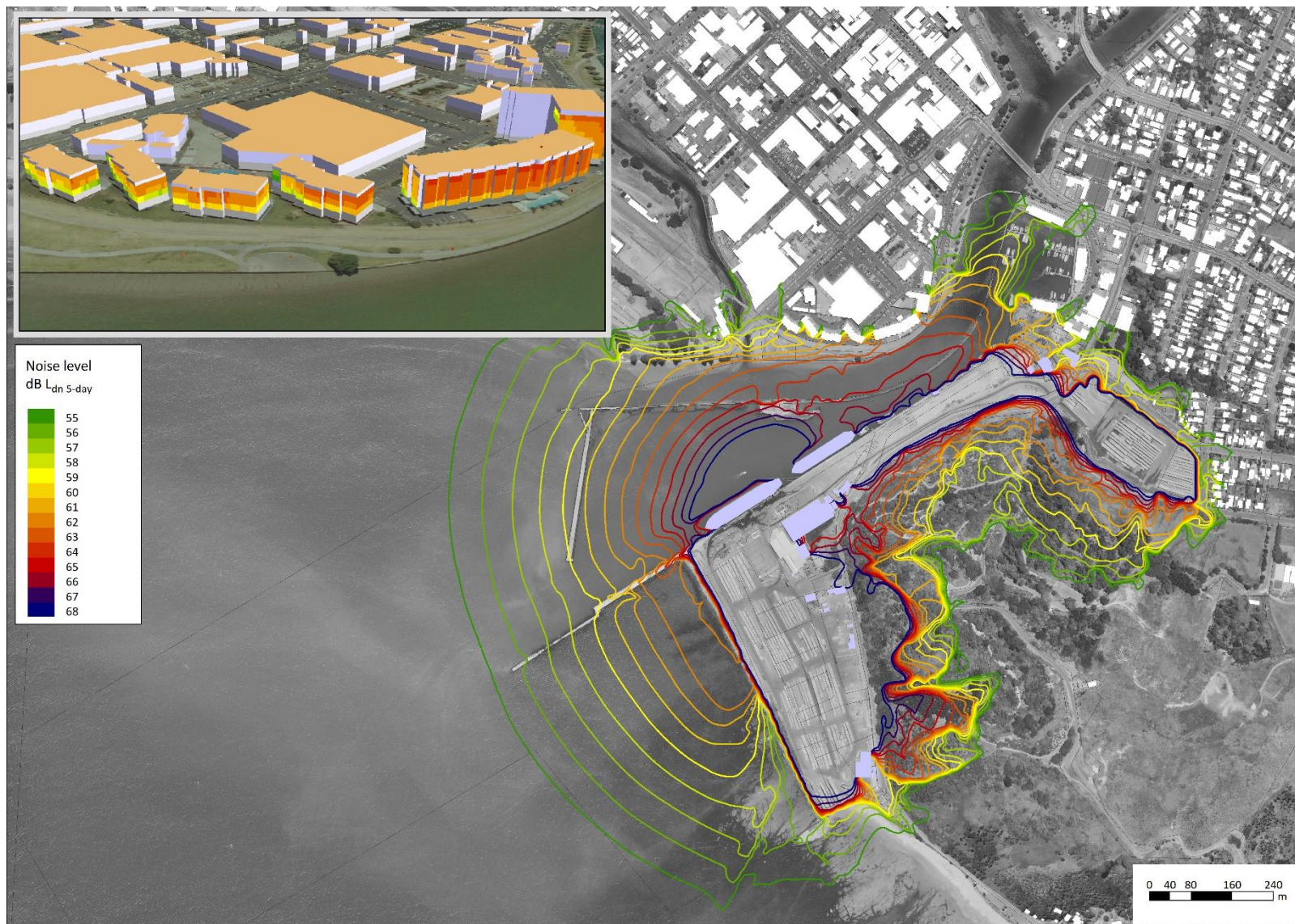
Receiver	Current Operations	Future Operations
100 Customhouse Road dwellings (highest façade incident level)	63 dB $L_{dn(5-day)}$	67 dB $L_{dn(5-day)}$
Portside Hotel (highest façade incident level)	64 dB $L_{dn(5-day)}$	66 dB $L_{dn(5-day)}$
Holiday Park	55 dB $L_{dn(5-day)}$	59 dB $L_{dn(5-day)}$
Kaiti Hill picnic area	55 dB $L_{dn(5-day)}$	57 dB $L_{dn(5-day)}$

The predicted noise contours for each scenario are shown in the figure set in Appendix E. These figure sets include operational assumptions for each scenario.

The key summary figures for each scenario is provided overleaf. These figures show:

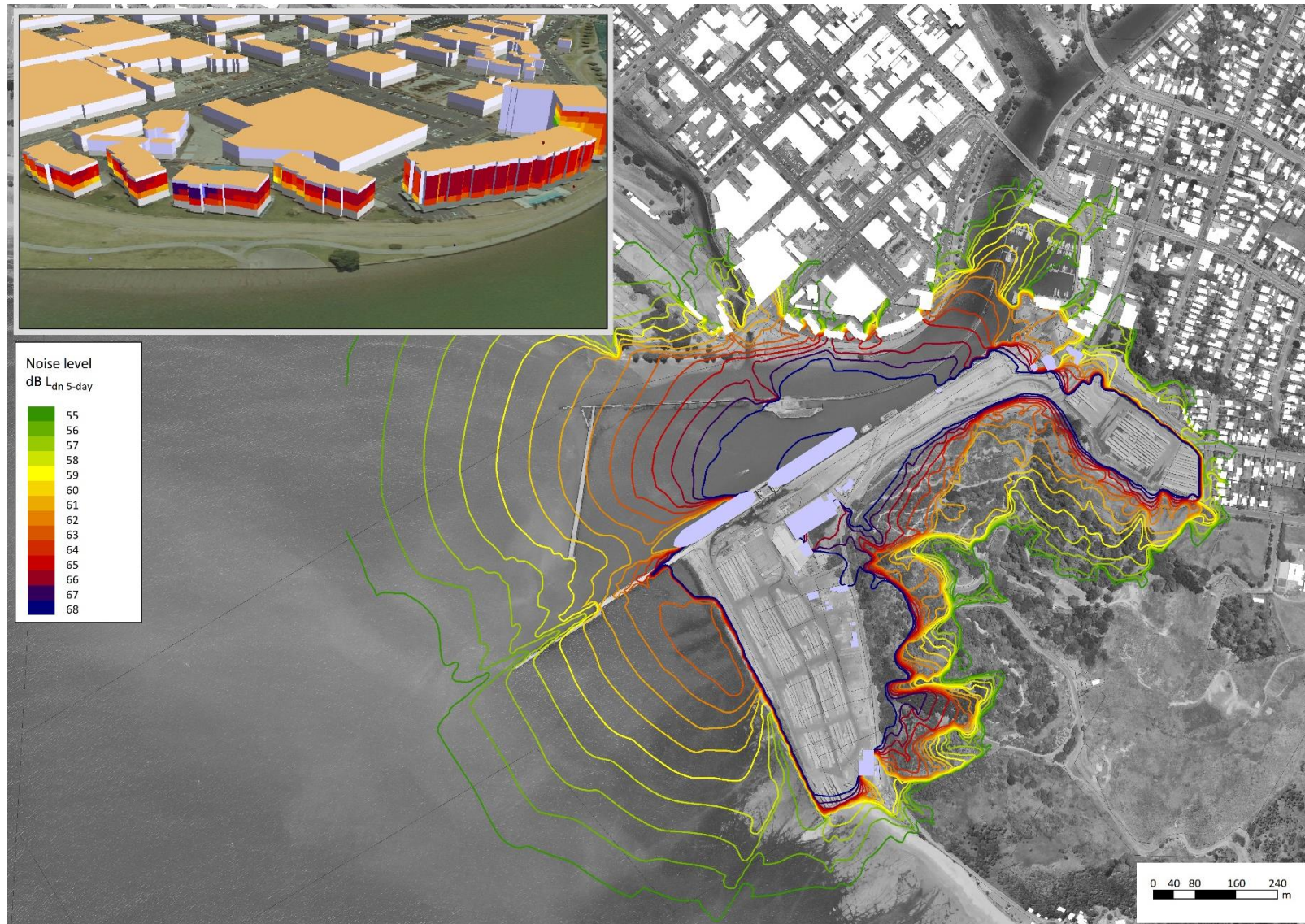
- The predicted noise contours at 1.5m above ground level interpolated from 10m x 10m grids. Note that there is an interpolation accuracy of +/- 1.5 decibels.
- The incident façade noise levels for the 100 Customhouse Road apartments and Portside Hotel.

Figure 4: Predicted noise contours and façade noise levels for Current Operations



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Figure 5: Predicted noise contours and façade noise levels for Future Operations



5.2 Assessment of Overall Noise Levels

5.2.1 Comparison to Existing Consents

The Wharfside Logyard and Wharves 6 & 7 Consent Conditions (refer Appendix D) specified port noise limits of 65 dB $L_{dn(5\text{-day})}$ at the Commercial Zone boundary and 64 dB $L_{dn(5\text{-day})}$ at the Portside Hotel monitor. The port is currently operating just below these noise limits (measured level of 63 dB $L_{dn(5\text{-day})}$ at the monitor location).

The predicted noise level from the Proposal is 67 dB $L_{dn(5\text{-day})}$ at the Commercial Zone boundary (1.5m above ground) and 66 dB $L_{dn(5\text{-day})}$ at the Portside Hotel monitor location. These are, and will continue to be, high port noise levels. Nonetheless, this is 1 – 2 decibels higher than permitted by the existing Consents, which is an imperceptible difference.

5.2.2 Internal Noise Levels for Closest Receivers

The 30-decibel façade noise reduction control is predicted to control internal noise levels to around 33 dB $L_{dn(5\text{-day})}$ during peak periods based on the current port noise levels.

Noise levels are predicted to increase by up to 4 decibels as a result of the Proposal, so the internal noise levels would be up to 37 dB $L_{dn(5\text{-day})}$ during peak periods. This is still well below the 45 dB $L_{dn(5\text{-day})}$ upper criteria of acceptable internal noise levels in the Port Noise Standard, and the 40 dB $L_{dn(5\text{-day})}$ that we would otherwise recommend as typical and appropriate in these situations.

5.2.3 Outdoor Noise Levels for Closest Receivers

The outdoor areas of the Portside Hotel and 100 Customhouse Road apartments would be impacted by noise levels in the order of 69 – 70 dB $L_{dn(5\text{-day})}$ ⁸. We note that these areas were consented and built with port noise considered and are already compromised by current high noise levels. The predicted increase of 3 – 4 decibels would be just perceptible, but this is unlikely to change the way in which they are used/occupied or increase noise effects experienced at those sites.

Noise levels at the Holiday Park are predicted to be up to 59 dB $L_{dn(5\text{-day})}$ and the closest part of the site (400m from the port) during peak periods. This is a relatively high noise level for a camping area, but we note that it is also a compromised environment due to existing port noise and SH35 which is 50m from the site.

5.3 Change in Noise Level Assessment

Table 4 shows that the change in noise level for the most affected receiver building façades (the apartments at 100 Customhouse Road) would be up to 4 decibels as a result of the Proposal. Subjectively, this is a just perceptible change in noise level. However, we consider this change to be reasonable on the basis that:

- That the existing façade design requirements ensure a suitable internal noise environment at current and predicted future noise levels
- The outdoor areas are already compromised by high port noise levels, and this is unlikely to change as a result of the Proposal

The change in noise level at the Portside Hotel is smaller (up to 2 decibels) because the noise environment is controlled by existing activities in the Wharfside Yard at this location. Subjectively, the Proposal is predicted to result in an imperceptible change in noise level for this receiver.

⁸ Outdoor areas for these receivers are small (balconies and courtyards) and are close to the building facades. Therefore there would be a +3 decibel increase in noise level from the façade reflection.

A just perceptible increase of 4 decibels is predicted at the Holiday Park as a result of the Proposal. This increase is unlikely to materially change the noise environment at this location, as it is already controlled by existing port noise and the close proximity of SH35.

Further afield, noise levels will be relatively unchanged in residential and commercial areas to the north and east.

5.4 Maintenance Dredging

Maintenance dredging does not form part of the port operations during peak periods, so we have addressed this activity separately.

We understand the maintenance dredging would be carried out during daytime hours only with a backhoe dredge. This source is predicted to have a sound power level of 110 dB L_{WA} , which is lower than the log ship sound power level of 113 dB L_{WA} .

In summary:

- Dredging of the berth areas near to receivers would only be undertaken when there are no ships in berth. Noise levels would therefore be lower than typical port operations when dredging takes place.
- Dredging of the port navigation channel would generally not be noticeable to nearby receivers due to the setback distance (more than 400m) and existing noise levels from the port masking the dredging noise.

Overall, we consider the potential noise effects of maintenance dredging to be negligible.

5.5 Behavioural Effects on Marine Mammals/Birds

We understand that there are no studies at Eastland Port of operational noise effects on local fauna. Furthermore, there is no clear general guidance on noise thresholds for the onset of behavioural response due to noise in marine mammals and birds.

Notwithstanding the above, we consider that the likelihood of long-term behavioural modifications of aggregations of marine mammals and/or birds in response to the Proposal is low for the following reasons:

- We understand from the project's marine ecologist that there are no known marine mammal or bird aggregations nearby the port area except for the nearby kororā
- Specific measures for kororā are addressed in Section 9 of the 'Eastland Port Twin Berths Project Little Penguin/ Kororā (*Eudyptula minor*) Assessment of Ecological Effects' dated July 2022.
- We predict that noise emissions from the operational activities provided for by the Proposal are not materially different in level or location to the current noise emissions.
- Intermittent events such as bangs and crashes which can generate high noise levels both in air and underwater (e.g. logs impacting the side of vessels) will be avoided/minimised as far as practicable through the measures in the NMP (operator training, appropriate methodology, equipment selection etc.).
- Existing shipping approach and departure paths will not materially change, nor will the speed at which vessels travel.

6.0 PLANNING FRAMEWORK

The Proposal is subject to the following:

- The noise and vibration rules in the general noise section of the TRMP (activities on land)
- The noise rules for the Coastal Environment in the TRMP (activities in the Coastal Marine Area)
- The Resource Management Act's (RMA) requirement to avoid unreasonable noise and to adopt the best practicable option to avoid, remedy or mitigate adverse effects

The following sections contain our assessment of the Proposal against the relevant sections of these documents.

The Proposal considers all operations in the vicinity cumulatively as the activities are interlinked. The individual Resource Consents for the Wharfside Logyard and Wharves 6 & 7 would therefore be superseded should Consent be granted for the Proposal. Nonetheless, the existing consents have been considered as they provide useful context to the predicted noise emissions from the Proposal and an indication of what would be considered acceptable noise from the port. This is addressed in Section 5.2.1.

6.1 TRMP General Noise Section (Activities on Land)

Section C11.2.15 Rules for Noise of the TRMP addresses noise and vibration emissions from land-based port activities.

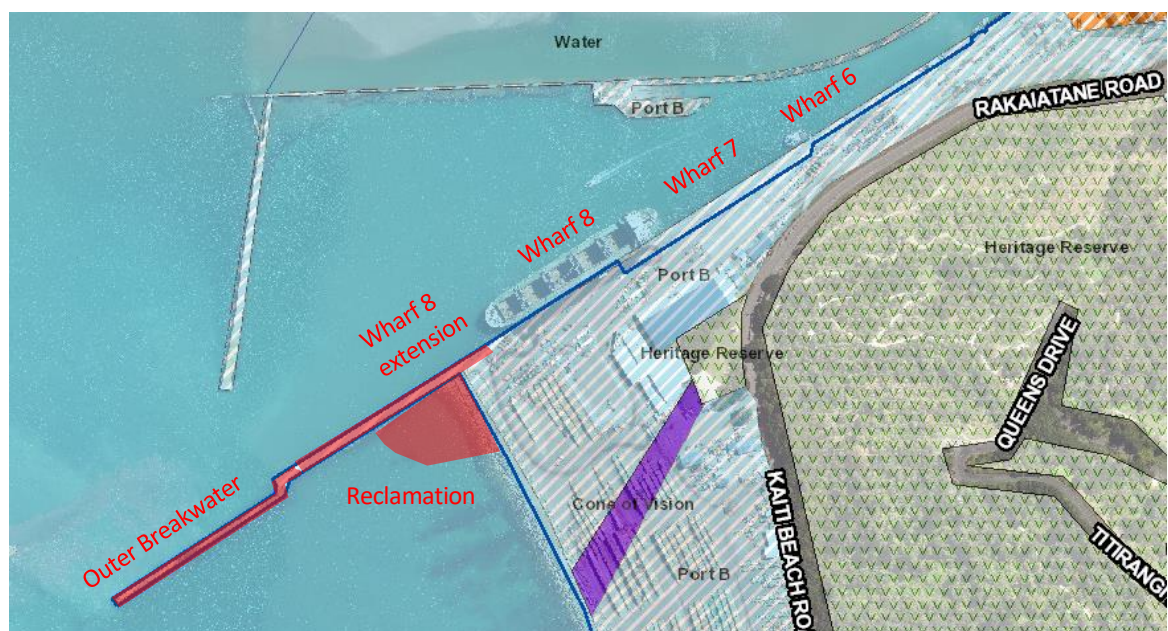
Infringements of the rules in this section result in a **Discretionary Activity Status**.

6.1.1 Port Zoning

Figure 6 shows the zoning of the port:

- Eastland Port land is zoned Port Management Zone - Port B. This includes all wharf and land areas with the exception of the proposed reclamation area.
- The berth areas and reclamation are within the Coastal Marine Area (CMA). Noise emissions from these areas are addressed in Section 6.2 (Coastal Environment).

Figure 6: Zoning map with Port Management Zones



The noise rules that apply to the Port B Zone are addressed in the following sections.

6.1.2 Port Zone Rules

Rule C11.2.15.1 G – Proposal exceeds limits, but negligible effect

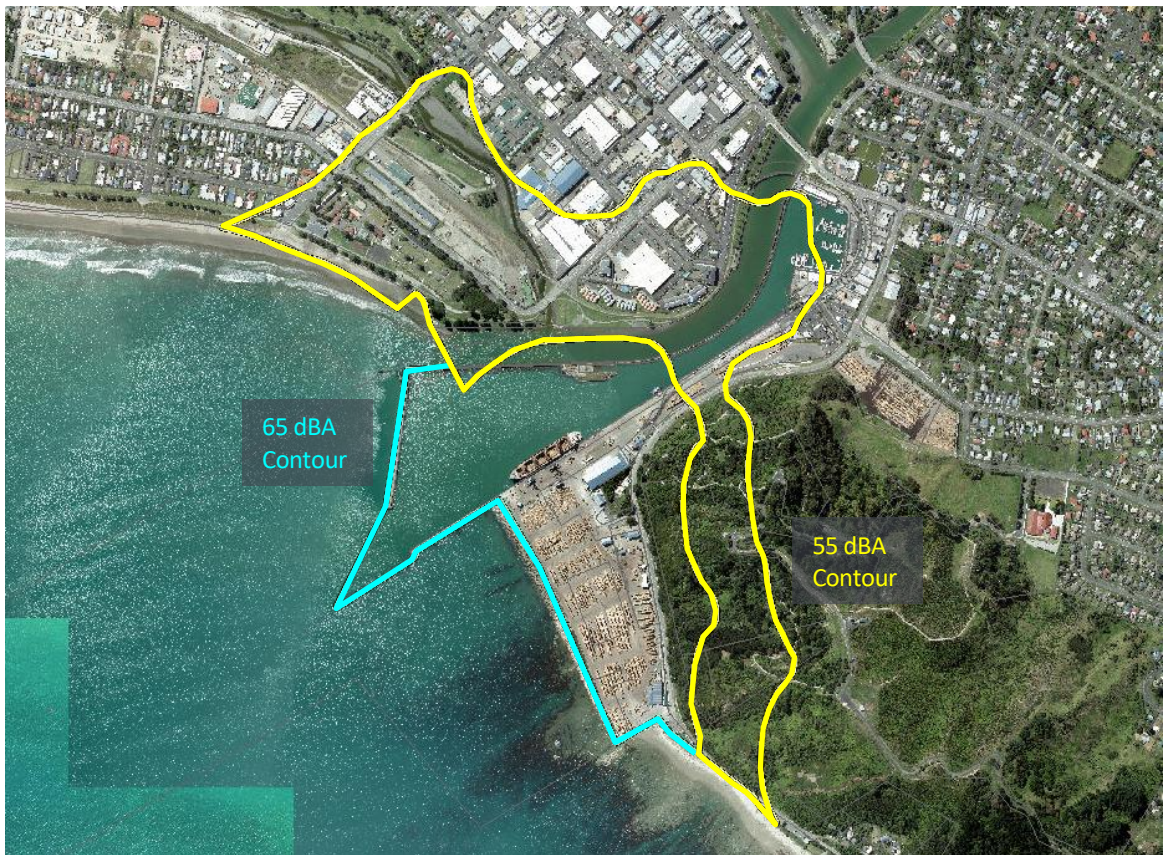
This rule addresses the general noise standards for the Port Management Zone. The rule is as follows:

“1. General

- a) The longer-term average sound level (L_{dn}) from “essential port activities” within the Port Management zones shall not exceed 55dBA at any point outside the 55dBA noise contour nor 65dBA at any point outside the 65dBA noise contour.*
- b) Non-essential port activities conducted in the Port Management zones shall comply with noise limits specified in Section C11.2.15.*
- c) The short-term average sound level (L_{eq}) shall not exceed 60dBA between 10.00pm and 7.00am.*
- d) The night-time maximum sound level (L_{max}) shall not exceed 85dBA between the hours of 10.00pm and 7.00am at any point outside the 65dBA noise contour.*
- e) Persons carrying out [SIC] essential port activities shall provide, on the third anniversary of the Plan becoming operative, and every three years thereafter, certification that noise produced complies with standards a) – d) above*

The 55 dBA and 65 dBA noise contours discussed above are shown on Figure 7.

Figure 7: TRMP Port Noise Contours



Part b) is not relevant as the Proposal does not include ‘non-essential port activities’. Part e) is also not relevant to the Proposal.

The TRMP's Port Noise Control boundaries and Port Noise Contours do not regulate operations at Wharves 6 & 7, the Wharfside Logyard and Upper Logyard, as those parts of the port's activities operate pursuant to resource consents which each have specific noise conditions governing those parts of the port.

The predicted noise levels from activities in all areas, excluding those with separate consent described above, are generally compliant with Rule C11.2.15.1 G.A. The exception is a 1 decibel exceedance of the 55 dBA $L_{dn(5\text{-day})}$ contour on the side of Titirangi/Kaiti Hill to the east for both the current operations and the Proposal's operations. The effect is negligible because it is reserve land and not occupied by noise sensitive activities, and a 1 decibel exceedance is negligible in scale. Subjectively, a difference in noise level of 1 decibel is imperceptible.

The predicted noise contours are included in Appendix F.

We predict that compliance would also be achieved with the short-term noise limits.

6.1.3 Methods of Assessment of Noise

Rule C11.2.15.8 A 1. – Proposal has been assessed in accordance with this rule

This rule addresses the methods for the measurement and assessment of noise. It states that:

“All measurements shall be taken in accordance with:

...

e) NZS 6809:1999 “Acoustics - Port Noise Management and Land Use Planning”

The Noise Contour Boundaries are determined based on the busiest 5-day period in accordance with the Port Noise Standard. Activities during this period involve continuously loading log ships, which is considered an “essential port activity”. Appendix C includes a description of the Port Noise Standard's metrics and land use controls.

Rule C11.2.15.8 D 1 – Proposal has been assessed in accordance with this rule

This rule states that:

“Noise from motor vehicles within the boundaries of an industrial, port or commercial site shall be included in the calculation of noise emission from that site”

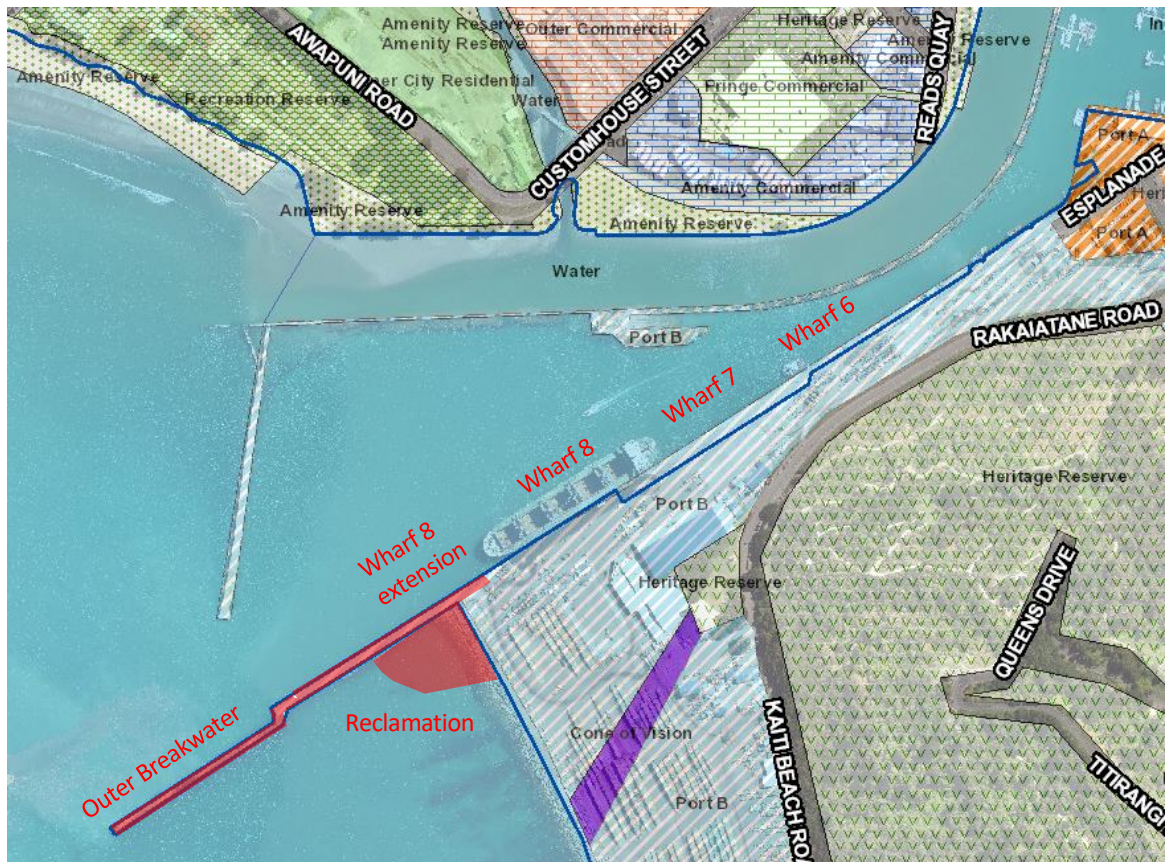
Noise from vehicles inside the port site has therefore been included but vehicle noise beyond the port boundary has been excluded.

6.1.4 General Noise Rules

The TRMP zoning map is shown on Figure 8.

Land immediately adjacent to the port or directly opposite the port (on the other side of the Tūrangānuī River) is zoned Heritage Reserve, Amenity Reserve, Recreation Reserve, Amenity Commercial (grouped as ‘Commercial’ for the purpose of the noise rules), Inner City Residential and Port A.

Figure 8: Zoning map with Port Management Zones



The rules applying to these surrounding zones are addressed in the following sections.

Rule C11.2.15.1 A – Proposal has been assessed in accordance with rule

This rule states that:

“The following general rules shall apply to all permitted activities with respect to noise (excluding vibration):

A All Zones

1. *At any boundary where the zones differ, the appropriate noise limit shall be the lowest average maximum noise level (L10) permitted by either zone.*
- ...
3. *Noise associated with emergency warning devices used by emergency services shall be exempt from all rules contained in C11.2.15.1”*

This rule addresses noise from the port activities received at the adjacent zones.

Rule 11.2.15.1 B 1 – Proposal exceeds limits, but negligible effect

This rule states:

“The average maximum noise level (L10) and maximum noise level (Lmax) as measured at or within the boundary of any site zoned residential or at, or within the boundary of any site zoned Neighbourhood Reserve shall not exceed the following limits:

Time	Noise level
<i>Monday to Saturday:</i>	
• 7am – 6pm:	55 dB L_{A10}
• 6pm – 10pm:	50 dB L_{A10}
• 10pm – 7am:	45 dB L_{A10} and 70 dB L_{Amax}
<i>Sundays and Public Holidays:</i>	
• 7am – 6pm:	50 dB L_{A10}
• 6pm – 10pm:	45 dB L_{A10}
• 10pm – 7am:	45 dB L_{A10} and 70 dB L_{Amax}

The closest residential zone is the Inner City Residential Zone on the northern side of SH35. This is approximately 300m from the port operations.

The predicted noise level at the southern end of this zone for the current operations is 54 dB L_{A10} during the daytime and night-time, which exceeds the limits. The Proposal's operations are 3 decibels louder at this location. This part of the site currently contains commercial and industrial activities, so we consider that the effect of the infringement is negligible.

The Captain Cook Motor Lodge is located at the northern end of this zone. The predicted noise level from current port activities is 55 dB L_{A10} during the daytime and night-time which infringes the limits. The Proposal's operations are predicted to be 3 decibels louder at this location which is just perceptible. These levels are relatively low, and the receiver is adjacent to SH35 so would already be affected by road traffic noise. Furthermore, we note that the lodge is within the 55 dB $L_{dn(5-day)}$ contour in the TRMP, so would have been subject to Rule C11.2.15.1 G as follows:

“No structure or additions to existing structures associated with a noise sensitive activity shall be erected on land located between the 55dBA Noise Contour Boundary and the 65dBA Noise Contour Boundary for the Port of Gisborne, except where the internal Ldn of 45dBA in all habitable rooms with doors and windows closed is achieved.”

Rule C11.2.15.1 C 1 – Proposal is compliant

This rule states:

“The average maximum noise level (L10) as measured at or within the boundary of any industrial, port, commercial or Suburban Commercial zone shall not exceed the following limits:

Zone	Noise level
<i>Industrial and Port</i>	75 dB L_{A10}
<i>Commercial</i>	70 dB L_{A10}
<i>Suburban Commercial</i>	65 dB L_{A10}

The highest predicted noise level at the Amenity Commercial (grouped as Commercial for the purpose of the noise rules) zone is 64 dB L_{A10} . This readily complies with the 70 dB L_{A10} limit.

The predicted noise level at the Port A Zone (Coastguard offices, The Works restaurant etc.) is 58 dB L_{A10} which readily complies with the 75 dB L_{A10} limit.

Rule C11.2.15.1 E 1 – Proposal exceeds limits, but negligible effect

This rule states:

“The average maximum noise level (L10) and maximum noise level (Lmax) arising from any zone as measured at or within the boundary of any site zoned Heritage Reserve shall not exceed the following limits:

Time	Noise level
Day (7am – 9pm)	50 dB LA10
Night (9pm – 7am)	50 dB LA10 and 50 dB LAm _{ax}

The predicted noise level at a representative location in the adjacent Heritage Reserve from the current operations is 60 dB LA10 during the daytime night-time during the peak period. This is a significant exceedance of the 50 dB LA10 limit. The Proposal’s noise emissions are predicted to be 4 decibels louder. However, we consider the effect to be negligible this location is a transient area already controlled by port noise and is not considered noise sensitive.

TRMP Rule C11.2.15.1 F 1 – Proposal is compliant

This rule states:

“The average maximum noise level (L10) arising from any zone as measured at or within the boundary of any site zoned Amenity Reserve or Recreation Reserve shall not exceed the following limits:

Amenity/Recreation Reserve adjacent to:	Noise level
..	...
Industrial or Port	75 dB LA10
...	...

The highest predicted noise level at the closest Amenity Reserve zone is 64 dB LA10, which readily complies with the 75 dB LA10 limit.

The closest Recreation Reserve is slightly further away, and the highest predicted noise level is 62 dB LA10 which also readily complies.

6.1.5 TRMP Controls of Noise Sensitive Activities in the Amenity Commercial Zone

Rule C11.2.15.1 C 2 – For information of receiving environment only, does not apply to Proposal

This rule requires noise sensitive activities in areas nearby to the port to provide sufficient façade sound insulation to ensure internal noise levels do not exceed an acceptable level. We understand that an equivalent rule was in place at the time of consent of these buildings (100 Customhouse Road dwellings, Portside Hotel).

The façade sound insulation performance relates the assessment of overall noise levels from the Proposal (refer Section 5.2). The rule states:

“Where buildings for permanent residential and visitor accommodation are permitted in industrial, port, commercial, Inner Residential or Suburban Commercial zones, the developer shall design and construct the building so as to comply with the following internal noise limits (Maximum level of permitted noise for each zone shall be assumed to occur as specified in Figure C11.4 above):

<i>Time</i>	<i>Average Maximum Internal Noise Level (dB LA10)</i>	<i>Maximum Internal Noise level</i>
<i>Day and evening (7am – 10pm)</i>	65	-
<i>Night (10pm – 7am)</i>	35	65

6.1.6 TRMP Vibration Rules

Rule C11.2.15.3 A – Proposal is compliant

This rule addresses vibration received within residential zoned sites. It states that:

1. *“Vibration shall not be noticeably discernible at or within the boundary of any site zoned residential or Rural Lifestyle or the notional boundary of any dwelling zoned Rural Residential, Rural Production, Rural General, by a suitably experienced person using unaided senses; or*
2. *The maximum weighted vibration level (Wb or Wd) arising from any zone as measured at or within the boundary of any site zoned residential, or Rural Lifestyle or the notional boundary of any dwelling zoned Rural Production, Rural General, shall not exceed the following limits:*

<i>Zone</i>	<i>Time</i>	<i>Maximum Weighted Vibration Level (Wb or Wd)</i>
<i>Residential</i>	<i>7am – 6pm, Monday to Saturday</i>	<i>45 mm/s²</i>
	<i>At all other times</i>	<i>15 mm/s²</i>

There are no residential areas nearby the activities associate with the Proposal, so compliance with the relevant limits would be achieved.

Rule C11.2.15.3 B – Proposal is compliant

This rule addresses vibration received within the industrial, port, commercial, suburban commercial and reserve zones. The rule states:

1. *“Vibration shall not be noticeably discernible at or within the boundary of any site zoned industrial, port, commercial, Suburban Commercial, or reserve by a suitably experienced person using unaided senses; or*
2. *Vibration shall not exceed the rules specified in Figure C11.11, at or within the boundary of any site zoned industrial, port, commercial, Suburban Commercial or reserve*
3. *The maximum weighted vibration level (Wb or Wd) arising from any zone as measured at or within the boundary of any site zoned industrial, port, commercial, Suburban Commercial or reserve shall not exceed the following limits:*

<i>Zone</i>	<i>Time</i>	<i>Maximum Weighted Vibration Level (Wb or Wd)</i>
<i>Industrial, Port, Commercial, Suburban Commercial, Reserves</i>	<i>At all times</i>	<i>60 mm/s²</i>

The relevant zones are all a sufficient distance away from log handling activities to comply with the 60 mm/s² limit.

6.2 TRMP Coastal Environment Section

Section 11.2.16 Rules for Noise in Coastal Environment of the TRMP addresses noise emissions from port activities within the Coastal Marine Area.

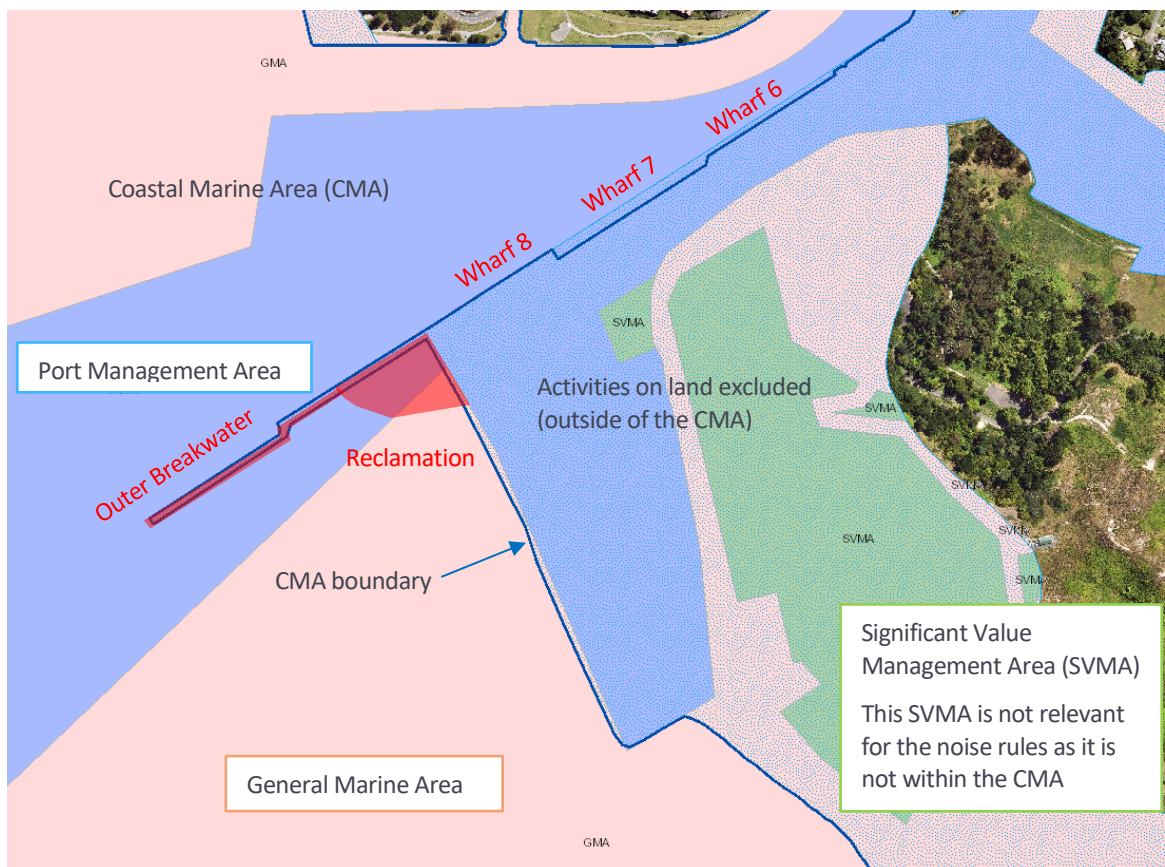
Infringements of the rules in this section result in a **Discretionary Activity Status**, with the exception of infringing the noise limits in the Coastal Marine Area (CMA) of a Significant Values Management Area (SVMA) which is a **Non-Complying Activity Status**.

6.2.1 Coastal Environment Zoning

Noise emissions from the Proposal are subject to the noise rules for the Coastal Environment. Figure 9 shows the Coastal Management Zones.

All port operations (including those associated with the Proposal) are within the Port Management Area shown in blue on Figure 9. We note there is a small section of the new reclamation in the General Marine Area, but understand this will become part of the adjoining Port Zone B.

Figure 9: Coastal Management Zones



The relevant rules for activities in the CMA are addressed in the following sections.

6.2.2 Coastal Environment Rules

Rule C11.2.16.1 B a) – Proposal is compliant

This rule states:

- a) *“The average maximum noise level (dB L_{A10}) and maximum noise level (dB L_{Amax}) generated within the Coastal Marine Area of the Port Management Area as measured at or within the boundary of (respectively) the General Management Area, the CMA of the*

Port Management Area and the Significant Value Management Area, shall not exceed the following limits set out Figure C11.15 (table below)

Management Areas (within the Coastal Marine Area only)	Average Maximum Noise Level at all times (dB L_{A10})	Maximum Noise Level between 9pm – 7am (dB L_{Amax})
<i>General Management Area and CMA Boundary of the Port Management Area</i>	70	70
<i>Significant Value Management Area</i>	50	70 – at all times

Figure C11.15 – Noise Standards for the Port Management Area

The predicted noise level at the closest General Marine Area (within the proposed reclamation area) from activities in the CMA (i.e. the log ships) is 69 dB L_{A10}. This is compliant with the 70 dB L_{A10} limit. We note that this may not be a relevant assessment location as it would be on land following the development of the reclamation.

The next closest General Marine Area is on the other side of Butlers Wall to the north. The predicted noise level is 66 dB L_{A10} which complies with the 70 dB L_{A10} limit.

The closest SVMA that is within the CMA is Tuamotu Island which is 3.5km to the south and well away from activities related to the Proposal. The 50 dB L_{A10} limit would therefore be complied with.

Rule C11.2.16.1 B b) – Proposal is compliant

This rule states:

- b) Noise shall not reach a level or be of such a nature that it results in the long-term modification of the behaviour of aggregations of marine mammals or birds. Long-term, for the purpose of this standard, means any change in behaviour which is not corrected within 30 minutes and repetitive modifications to behaviour which culminate in more than 60 minutes of response to noise. Modification of behaviour includes any visible flight or flee response to noise - especially movement from a nesting or rearing site but does not include accommodation responses such as re-orientation to the source of noise; or*

This rule is addressed in Section 5.5.

In summary, we consider that long term behavioural effects on aggregations of marine mammals are unlikely as:

- There are no known marine mammal or bird aggregations nearby the port area
- Potential effects on the nearby kororā are addressed in Section 9 of the ‘Eastland Port Twin Berths Project Little Penguin/ Kororā (Eudyptula minor) Assessment of Ecological Effects’ dated July 2022.
- Noise emissions from the operational activities provided for by the Proposal are not materially different in level or location to the current noise emissions.
- Noise will be mitigated and managed through the NMP (which will include operator training, appropriate methodology, equipment selection etc.).

Rule C11.2.16.1 B c) – Proposal has been assessed in accordance with rule

This rule states:

- c) The noise is generated by any siren, bell, foghorn or any other device used for navigation and/or warning purposes.”*

We have not included any of these sources in our assessment.

6.3 The Resource Management Act (RMA)

Section 16 of the RMA provides a duty to avoid unreasonable noise and applies to all landuse activities and activities in the coastal marine area. Section 16 is applicable to the Proposal in terms of the noise from operation and construction of the Project. It requires occupiers and persons carrying out activities to:

“... adopt the best practicable option to ensure that the emission of noise from that land or water does not exceed a reasonable level.”

Section 17 RMA provides for a duty to avoid, remedy or mitigate adverse effects. It requires all parties to:

“Avoid, remedy, or mitigate any adverse effect on the environment arising from an activity ... whether or not the activity is carried on in accordance with ... a national environmental standard, a rule, a resource consent, or a designation.”

The activities associated with the Proposal are generally comparable to the existing ship loading operations. No further mitigation measures are practicable to reduce the overall noise emissions from the second log ship.

We consider that the best practicable option is:

- Set a single suite of noise limits based on the Port Noise Standard which apply to cumulative noise emissions of the port activities, regardless of essential/non-essential activity status
- Provide a single over-arching NMP for operations in this area, which includes operator training, equipment selection, scheduling, noise monitoring etc. This will enable these interlinked operations which are adjacent to a noise sensitive area to be cohesively managed, instead of the current segmented approach (essential vs non-essential, various consent conditions applying to different areas etc.)

Overall, we consider that the noise levels from the Proposal are reasonable as:

- The change in noise level is predicted to be generally imperceptible
- The most affected receivers have been designed to accommodate the existing and proposed noise levels sufficiently
- The port NMP (see section 7.3.2) would ensure that the noise is no louder than necessary

7.0 RECOMMENDED MANAGEMENT AND MITIGATION

7.1 Matters to Resolve with Current Noise Management Approach

Chiles Ltd carried out a review of the Resource Consent application for the Wharves 6 & 7 and slipway redevelopment project (Stage 1 and 2 of the TBP) on behalf of Gisborne District Council in April 2018. Chiles’ findings provide relevant context to our compliance assessment for the Proposal.

The Chiles review⁹ highlighted the complications with the TRMP rules and various Resource Consents as follows:

“The applications rely to some extent on noise rules in the TRMP to manage potential effects. The TRMP includes rules generally based on the relevant New Zealand Standards, being NZS 6809 for port noise and NZS 6803 for construction noise. However, the TRMP deviates from NZS 6809 and NZS 6803 in some key respects, resulting in significant deficiencies.”

⁹ ‘S.42A-Appendix-5.2-Chiles-Technical-Memo.pdf’, dated 16 April 2018

Consequently, the TRMP rules are not considered adequate to control the noise effects of the current applications (or existing port operations). The situation is also complicated by three previous resource consents granted for log yards at the port, which are each subject to separate noise limits.

Appendix A provides a summary of issues identified with the TRMP and gives high level recommendations to address each issue in the context of the current applications. The recommendations are based on good practice following guidance in NZS 6809 and NZS 6803. A fundamental recommendation in Appendix A is that noise controls should apply to all sound from the port. Noise effects experienced by residents generally cannot be compartmentalised depending on bureaucratic definitions or other delineations within the port. A holistic approach is needed to manage effects on residents, as recommended in NZS 6809”

We agree with the findings in the Chiles review and support the holistic approach of using NZS 6809 as the primary tool to assess and manage cumulative operational noise effects from the port. We therefore propose that the Proposal operate subject to an operational NMP, prepared by a suitably qualified acoustician, certified by GDC and which addresses the Port Noise Standard as well as existing Consent Conditions. This would supersede existing NMPs and best enable integrated management of port noise in the sensitive wharveside area, including that related to the Proposal.

7.2 Port Noise Standard Recommendations

Rule C11.2.15.8 A 1 of the TRMP (Section 6.1.3) refers to NZS6809:1999 Acoustics – Port Noise Management and Land Use Planning (Port Noise Standard) for identifying how noise should be measured. Refer to Appendix BC for a detailed explanation of 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 any adjacent residential communities can co-exist with ports and their associated activities. This is achieved in two parts:

- Noise Contours (represent the ‘hum’ of port operations, where the current contours inform compliance, and the future contours inform land use controls)
- Port Noise Management Plan (minimise noise effects within the port from avoidable activities, such as dropping logs from height, banging crane loads against the sides of the ships, tonal reverse alarms on port equipment etc.)

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”*.

7.3 Our Recommendations

7.3.1 Single Set of Noise Limits for Cumulative Noise Emissions

One of the difficulties with managing noise emissions from the wharveside area is that a number of different noise limits apply depending on the purpose (essential vs. non-essential) and location (Wharveside Logyard, Wharves 6 & 7, or port-wide).

This makes it difficult to assess compliance because it requires detailed knowledge of the purpose of the operations, and noise contribution from each component. In general, compliance can only be assessed with a detailed noise model prediction.

We therefore recommend that a single noise limit set apply to cumulative noise emission from the port. This set of noise limits should be based on the Port Noise Standard:

- A day-night (long term) limit in $L_{dn(5\text{-day})}$
- Night-time (short term) limits in $L_{Aeq(9\text{ hour})}$ and $L_{Aeq(15\text{ minutes})}$.
- Updated Port Noise Contours and Port Noise Control Boundaries
- Requirements that noise be measured and assessed in accordance with the measures in the Standard

7.3.2 Noise Management Plan

We recommend a NMP is prepared to address the operations of the Proposal, Wharves 6 and 7 and the Wharfside Logyard. This would enable integrated management of noise emissions from activities in an area adjacent to sensitive receivers. As highlighted by Dr. Chiles, *“Noise effects experienced by residents generally cannot be compartmentalised depending on bureaucratic definitions or other delineations within the port”*.

The operational NMP should be required as a condition of consent and prepared with input from GDC. We do not consider the Upper Logyard and Southern Logyard need to be included in the NMP as those operations are either operated more distinctly and/or operate under existing separate NMPs.

The NMP would cover the following matters:

- The relevant noise limits
- Operator and staff training
- Equipment selection
- General measures
- Safety/reversing alarms
- Night-time activities
- Noise monitoring
- Community engagement

8.0 CONCLUSION

We have undertaken an assessment of the cumulative change to the noise environment from existing to potential future Twin Berths operations, and a compliance assessment with the relevant noise and vibration rules.

In summary:

- We consider that the predicted change in noise levels from the Proposal are reasonable as:
 - o The change in noise levels as a result of the Proposal is predicted to be just perceptible. However, the most affected receiver buildings have been designed to accommodate the existing and proposed noise levels sufficiently
 - o The proposed port NMP (Section 7.3.2) would ensure that the noise is no louder than necessary

- The predicted noise levels generally comply with the TRMP rules. There are some infringements, but these are predicted to have negligible adverse effects.
- Vibration is predicted to be negligible at all nearby receivers and readily compliant with the TRMP
- We recommend the following to ensure that the best practicable option is adopted to minimise noise effects from the Proposal:
 - o A single set of noise limits apply to cumulative noise emission from the port based on the Port Noise Standard
 - o An overarching NMP be developed for the Proposal that would also be able to be implemented more generally (including the Wharfside Logyard and Wharves 6 & 7).

APPENDIX A GLOSSARY OF TECHNICAL TERMINOLOGY

NZS 6801:2008	New Zealand Standard NZS 6801:2008 “Acoustics – Measurement of environmental sound”
NZS 6809:1999	New Zealand Standard NZS 6809:1999 “Acoustics – Port Noise Management and Land Use Planning”
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.
A-weighting	The process by which noise levels are corrected to account for the non-linear frequency response of the human ear.
$L_{Aeq}(t)$	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_{Amax}	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} .
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.
Essential Port Activities	Tairāwhiti Resource Management Plan, Chapter 24 definition: Loading or unloading of cargo onto or off ships, and the operation of machinery essential to these activities provided that the best practicable option is adopted to ensure noise is minimised. This plant is assumed to operate 24 hours. Chippers and debarkers are excluded as they could be treated as necessary to reduce noise emissions.
Noise Sensitive Activity	Tairāwhiti Resource Management Plan, Chapter 24 definition: Dwellings, visitor accommodation, hospitals, health care and medical centres, residential care housing, educational institutions, structures for the purpose of, or activities involving public assembly.
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 EXISTING ENVIRONMENT NOISE MEASUREMENTS

Table 5 presents a full summary of the attended measurements of the existing noise environment.

Table 5: Existing noise environment measurements

Position	Date, time	Duration	Measured levels (dB)				Noise sources
			L _{Aeq}	L _{A10}	L _{Amax}	L ₉₅	
Portside Hotel (room below long-term monitor)	23/11/20 4:45pm	15 mins	58	60	67	67	Log ship, high stacker, port trucks
Reserve in front of Portside Hotel	5/10/2020 10:51 pm	15 mins	49	51	62	46	Log ship
Reserve in front of Portside Hotel	6/10/20 12:29 am	15 mins	53	54	77	47	Log ship and high stacker in Wharfside Logyard
Path up to Kaiti Hill	23/11/20 4:09 pm	15 mins	63	64	80	57	Log ship, high stacker, port trucks
Top of Kaiti Hill	6/10/20 12:02 am	5 mins	61	63	73	56	Southern Logyard and log ship

APPENDIX C PORT NOISE STANDARD

C1 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.”*

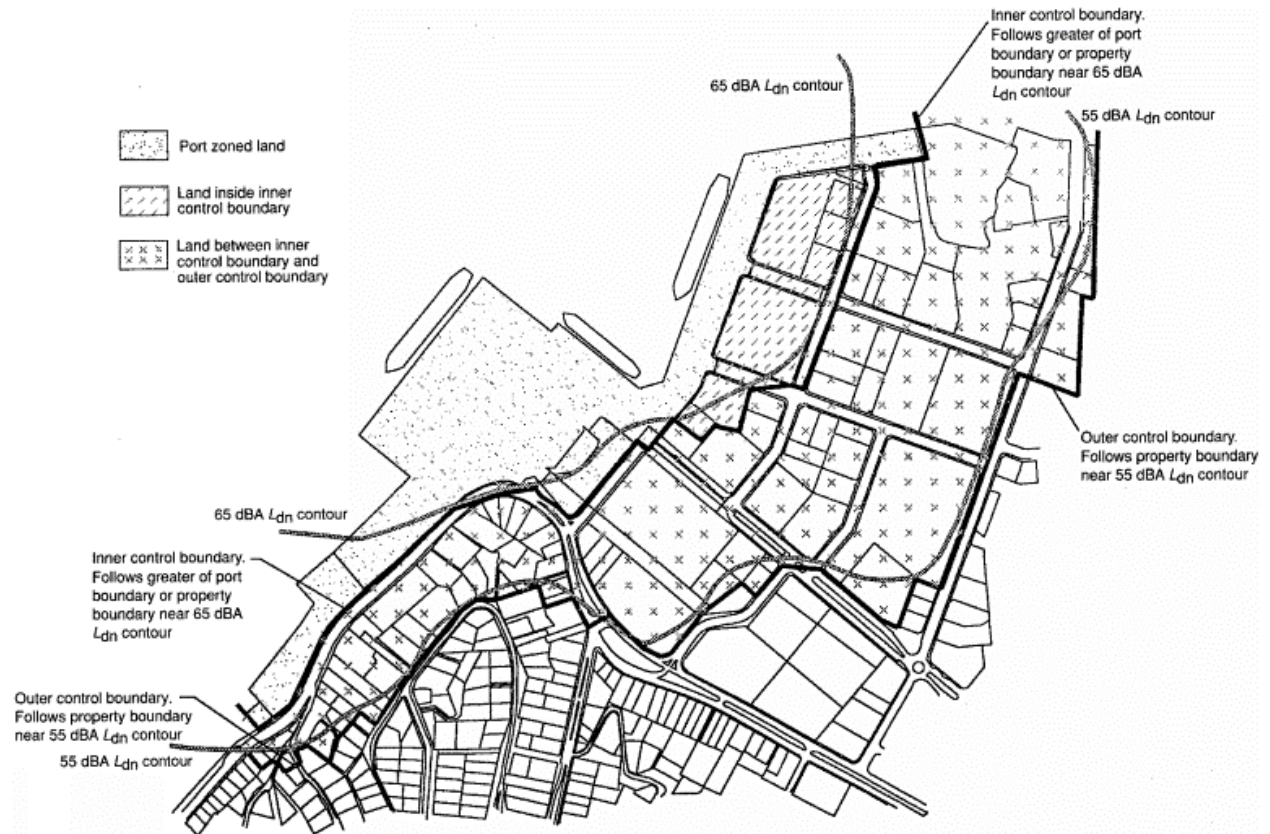
Land Use Controls

The Noise Control Boundaries are derived from the noise contours for the predicted peak operations period.

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 10 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 10: Example of Inner and Outer Control Boundaries from Figure 1 of NZS6803: 1999)



The Port Noise Standard provides the following recommended rules for noise sensitive activities within the Noise Control Boundaries represented in Figure 9.

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.”

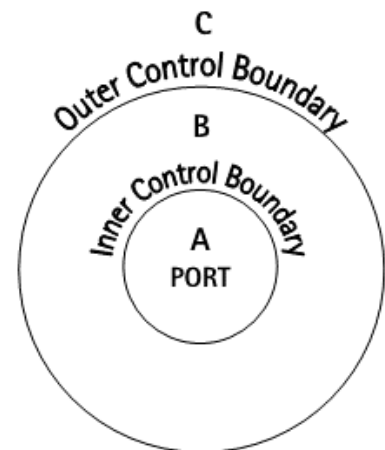
Area B – Between the Inner and Outer Control Boundaries (i.e. 55 dB L_{dn} – 65 dB L_{dn}):

- “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

Figure 11: Control areas A, B and C from Figure 2 of NZS6803: 1999



Noise Limits

The Port Noise Standard recommends the noise limits in Table 6 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 6: 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}

55 / 45 dB L_{Aeq} (day / night) noise limits typically equates to around 50 – 52 dB L_{dn} of continuous port noise. The Port Noise Standards Outer Control Boundary is inclusive of all properties onto which the 55 dB L_{dn} noise contour extends.

The main advantage of implementing the Port Noise Standard is to provide a structured framework for land use planning within the Outer Control Boundary as it expands to enable future port growth. Furthermore, the Port Noise Standard requires Eastland Port to implement a Noise Management Plan, which, if rigorously applied and appraised, would ensure that the best practicable option (**BPO**) is adopted (refer Appendix C2 below).

C2 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”*.

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.

Preparation of an operational NMP is typically required as a condition of consent, with input from key stakeholders and certification from council. To provide for integrated management of related activities, we suggest that it cover the Twin Berths operations, Wharves 6 & 7, and the Wharfside Logyard. The Upper Logyard and Southern Logyard would not need to be included as these yards have separate operations and their own NMPs.

APPENDIX D RESOURCE CONSENTS

D1 Wharfside Log Yard (2017)

Condition 28¹⁰ essentially repeats the NMP requirement from ‘the Upper Log Yard’ to enable consistency. The other relevant conditions are reproduced below. Refer to decision for full text.

Noise Monitoring

29. Within three (3) months of the commencement of Log yard operations, monitoring shall be undertaken of short term noise levels (LAeq[15 min] and LAm_{ax}) during representative daytime and night periods when Essential Port Activities and typical Non-essential Port Activities are being carried out in the Wharfside log yard. Monitoring results are to be provided to the Council within two (2) weeks of the results being available. All noise measurements, assessments and the reporting of measurement results shall be in accordance with the requirements of NZS6801:2008 and NZS6802:2008.

Advice Note B: For the purposes of this condition “Essential Port Activities” shall have the same meaning as set out in Chapter 24 of the District Plan (Chapter 24 as updated 13 January 2014).

Noise Emissions

Essential Port Activities

30. Noise from Essential Port Activities within the Wharfside log yard shall be managed so that the contribution to total cumulative noise from all essential port activities being carried out in the port are compliant with the noise limits set out in Rule 11.12.7.1 of the District Plan (Chapter 11 as updated 15 March 2013), except that noise from the Wharfside log yard shall not be assessed within any site zoned Port Management or Heritage Reserve. This exception does not apply to the requirements of Condition 32.

Advice Note C: For the purposes of this condition “Essential Port Activities” shall have the same meaning as set out in Chapter 24 of the District Plan (Chapter 24 as updated 13 January 2014) “Non-Essential Port Activities” are those activities which are not “Essential Port Activities” as described above.

Non-Essential Port Activities

31. Noise from non-essential Port Activities within the Wharfside log yard site shall comply with the following limits at any site zoned Amenity Commercial when measured in accordance with NZS6802:2008 Acoustics – Measurement of Environmental Sound and assessed in accordance with NZS6802:2008 Acoustics – Environmental Noise:
- Monday to Sunday 7.00 am to 10.00pm LA_{eq}(15 min) - 60 dB
 - Monday to Sunday 10.00pm to 7.00am LA_{eq}(15 min) - 50 dB
 - Monday to Sunday 10.00pm to 7.00am LA_{max} - 75 dB.
32. The average maximum noise level (L10) as measured at or within the boundary of any site zoned Heritage, Amenity and Recreation Reserve shall not exceed the following limits: 75dBA at all times.

¹⁰ Resource Consent No: LL-2016-107193-00, LU-2016-107181-00, CD-2016-107183-00

D2 Wharves 6 and 7 (2018)

The relevant ‘Wharves 6 and 7’ conditions from the 2017 consent¹¹ are reproduced in part below (refer to decision for full text). The relevant conditions were essentially repeated in the subsequent ‘Port Entry’ consent¹² (refer conditions 5 – 6 and 43 – 45 in that case), and ‘Wharves 5 and 6’ consent¹³, so are not reproduced here

4.	<p>Port Community Liaison Group (PCLG)</p> <p>The Consent Holder shall maintain a Port Liaison Group (PCLG) to provide an ongoing point of contact between the Consent Holder, the Council, adjacent landowners and occupiers and the community, in relation to demolition, reconstruction and ongoing operations from Wharves 6 and 7 to ensure that channels of communication are kept open. The Consent Holder shall send invitations for the first meeting of the PCLG within 20 working days of the commencement of this consent.</p> <p><u>Advice Note:</u></p> <p>An independent chair is recommended for the PCLG to ensure that there is independence with the running and co-ordination of the meetings and the topics under discussion. Ultimately any decision of an independent chair can be made by the members of the PCLG given this is a voluntary membership group.</p>
5.	<p>The Consent Holder shall invite a representative of the Council, and all the persons who lodged a submission on the application for this consent to attend the first meeting of the PCLG. At the time of this invitation the Consent Holder shall ask such persons whether they wish to receive further invitations to the PCLG meetings. If a positive response is received (whether by mail, email, telephone message or in person), that person shall be invited to PCLG meetings until the Consent Holder is advised that such invitations are no longer desired. The Consent Holder may also invite any other persons to provide assistance and to attend PCLG meetings.</p>
6.	<p>The Consent Holder shall provide a venue for PCLG meetings, chair the meetings and ensure that minutes are taken and circulated to attendees. Invitations to PCLG meetings shall be sent four (4) monthly during the term of this consent (with 10 working days' notice given of the date, time and venue of the next PCLG meeting), unless the PCLG agrees by a majority vote at a PCLG meeting to reduce the frequency of meetings. The Consent Holder shall make available all minutes of the PCLG meetings in a public accessible area of the Eastland Port website.</p>
7.	<p>An invitation to a special PCLG meeting shall be sent by the Consent Holder at least 30 working days prior to the commencement of earthworks, so that the PCLG can be informed about the proposed construction works and timetable, and any attendees can be provided with a copy of any draft or certified Construction Management Plan available at that time.</p>
39.	<p>Wharf 6 & 7 Noise Management Plan</p> <p>Not less than 30 working days prior to the commencement of operations on the redeveloped Wharf 6 and 7 areas a Noise Management Plan (NMP) prepared by a suitably qualified and experienced person, shall be submitted to Council's Consent Manager for certification. The objective of the NMP is to set out the methods and procedures necessary to ensure that the noise levels from all port activities are minimised as far as practicable. The NMP shall include but not be limited to noise mitigation measures such as:</p> <ul style="list-style-type: none"> Maintenance of surfaces to avoid the unnecessary generation of noise from vehicles travelling on rough surfaces. Speed restrictions on site for the purpose of noise management and for the reduction of braking and acceleration noise. Methods to prohibit the use of audible warning devices (including reverse alarms) as far as practicable. Vehicle operation guidelines to minimise noise emissions. Maintenance of machinery to minimise noise emissions. Education of staff to minimise noise emissions. Details of personnel responsible for port noise management. Consultation with the PCLG in the preparation of the NMP. Current NMP to be publicly available on EPL's website. NMP to be reviewed annually and any changes certified by Council. Management of off-site transportation noise effects with respect to matters over which Eastland Port Limited has control or responsibility. Details of permanent noise monitoring. Details of biennial noise monitoring at other locations. <ul style="list-style-type: none"> (i) Details of noise monitoring that will be conducted in response to complaints or to investigate issues. (ii) Annual reporting of noise monitoring results to the PCLG and display on EPL's website. (iii) Reporting of noise management actions/initiatives to the PCLG. (iv) Reporting of complaints, investigations and remedial actions to the PCLG. (v) Details of the current TRMP noise contours and comparison with the annual monitoring results required by Condition 41. (vi) Display of current real time monitoring data on EPL's website for access to the public. (vii) Integration of concurrent construction and operational noise management. <p><u>Advice Note:</u></p> <p>If the Council fails to respond to the request to certify the NMP within twenty working days, the NMP can then be assumed to be certified.</p>

¹¹ Resource Consent No: LU-2017-107936-00/CD-2017-107937-00/LL-2017-107938-00

¹² Resource Consent No: LU-2019-108764-00, DW-2019-108765-00, CD-2019-108766-0

¹³ Resource Consent No: LL-2016-107193-00, LU-2016-107181-00, CD-2016-107183-00

40.	<p>Noise Emissions</p> <p>Sound from all activities in the Tairāwhiti Resource Management Plan Management Area excluding the rail bridge, Port A Management zone and area outside the breakwater must comply with the following noise limits when measured and assessed in accordance with NZS 6801 and NZS 6809.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="padding: 5px;">At any point in the Amenity Reserve Zone outside the Port Inner Control Boundary (iii) At any point in the Heritage Reserve Zone more than 50m from the Port Management B Zone</td> <td style="padding: 5px;">65 dB L_{dn}</td> </tr> <tr> <td style="padding: 5px;">At any point in the Amenity Commercial Zone, Residential General Zone or Inner City Residential Zone</td> <td style="padding: 5px;">65 dB L_{dn} 60 dB L_{Aeq(9h)} (2200h-0700h) 65 dB L_{Aeq(15 min)} (2200h-0700h) 85 dB L_{Afmax} (2200h-0700h)</td> </tr> <tr> <td style="padding: 5px;">At the permanent port noise monitoring location (Portside Hotel)</td> <td style="padding: 5px;">63 64dB L_{dn} 60 dB L_{Aeq(9h)} (2200h-0700h) 65 dB L_{Aeq(15 min)} (2200h-0700h) 85 dB L_{Afmax} (2200h-0700h)</td> </tr> </table>	At any point in the Amenity Reserve Zone outside the Port Inner Control Boundary (iii) At any point in the Heritage Reserve Zone more than 50m from the Port Management B Zone	65 dB L _{dn}	At any point in the Amenity Commercial Zone, Residential General Zone or Inner City Residential Zone	65 dB L _{dn} 60 dB L _{Aeq(9h)} (2200h-0700h) 65 dB L _{Aeq(15 min)} (2200h-0700h) 85 dB L _{Afmax} (2200h-0700h)	At the permanent port noise monitoring location (Portside Hotel)	63 64dB L _{dn} 60 dB L _{Aeq(9h)} (2200h-0700h) 65 dB L _{Aeq(15 min)} (2200h-0700h) 85 dB L _{Afmax} (2200h-0700h)
At any point in the Amenity Reserve Zone outside the Port Inner Control Boundary (iii) At any point in the Heritage Reserve Zone more than 50m from the Port Management B Zone	65 dB L _{dn}						
At any point in the Amenity Commercial Zone, Residential General Zone or Inner City Residential Zone	65 dB L _{dn} 60 dB L _{Aeq(9h)} (2200h-0700h) 65 dB L _{Aeq(15 min)} (2200h-0700h) 85 dB L _{Afmax} (2200h-0700h)						
At the permanent port noise monitoring location (Portside Hotel)	63 64dB L _{dn} 60 dB L _{Aeq(9h)} (2200h-0700h) 65 dB L _{Aeq(15 min)} (2200h-0700h) 85 dB L _{Afmax} (2200h-0700h)						
41.	<p>Noise Monitoring</p> <p>The Consent Holder shall maintain a permanent noise monitor at the Portside Hotel or an alternative location agreed by the Council's Consents Manager. The monitor shall be regularly calibrated and continuously measure sound levels to provide sufficient valid data for the Consent Holder to prepare reports regarding compliance with the limits applying at this location under these conditions. The Consent Holder shall prepare a summary report of monitoring results and submit this to the Council's Consents Manager and PCLG every three months, within one month of the end of the reporting period. Data from the monitor must be publicly available on a website in real-time.</p> <p>Within three months of the re-commencement of operations in the Wharf 6 and Wharf 7 areas the Consent Holder shall conduct noise monitoring over at least a one-week period at two representative locations agreed with the Council's Consents Manager, in addition to the Portside Hotel permanent noise recording position. The Consent Holder shall submit a report setting out the results to the Council's Consents Manager and the PCLG within one month of the measurements. A copy of the report shall be displayed on the EPL website.</p> <p>An annual report shall then be prepared collating the information from the above monitoring and discussing compliance with the noise contours, the reasons for any non-compliance and the measures which have been adopted and implemented to address any non-compliance issues. A copy of this report shall be displayed on the website.</p>						

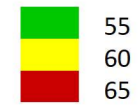
APPENDIX E PORT NOISE MAPS FOR FULL OPERATIONS (CURRENT AND FUTURE)

- Figure 1A, 1B Noise Contours in 5 dB Increments
- Figure 2A, 2B Noise Contours in 1 dB Increments
- Figure 3A, 3B Port Noise Model Inputs

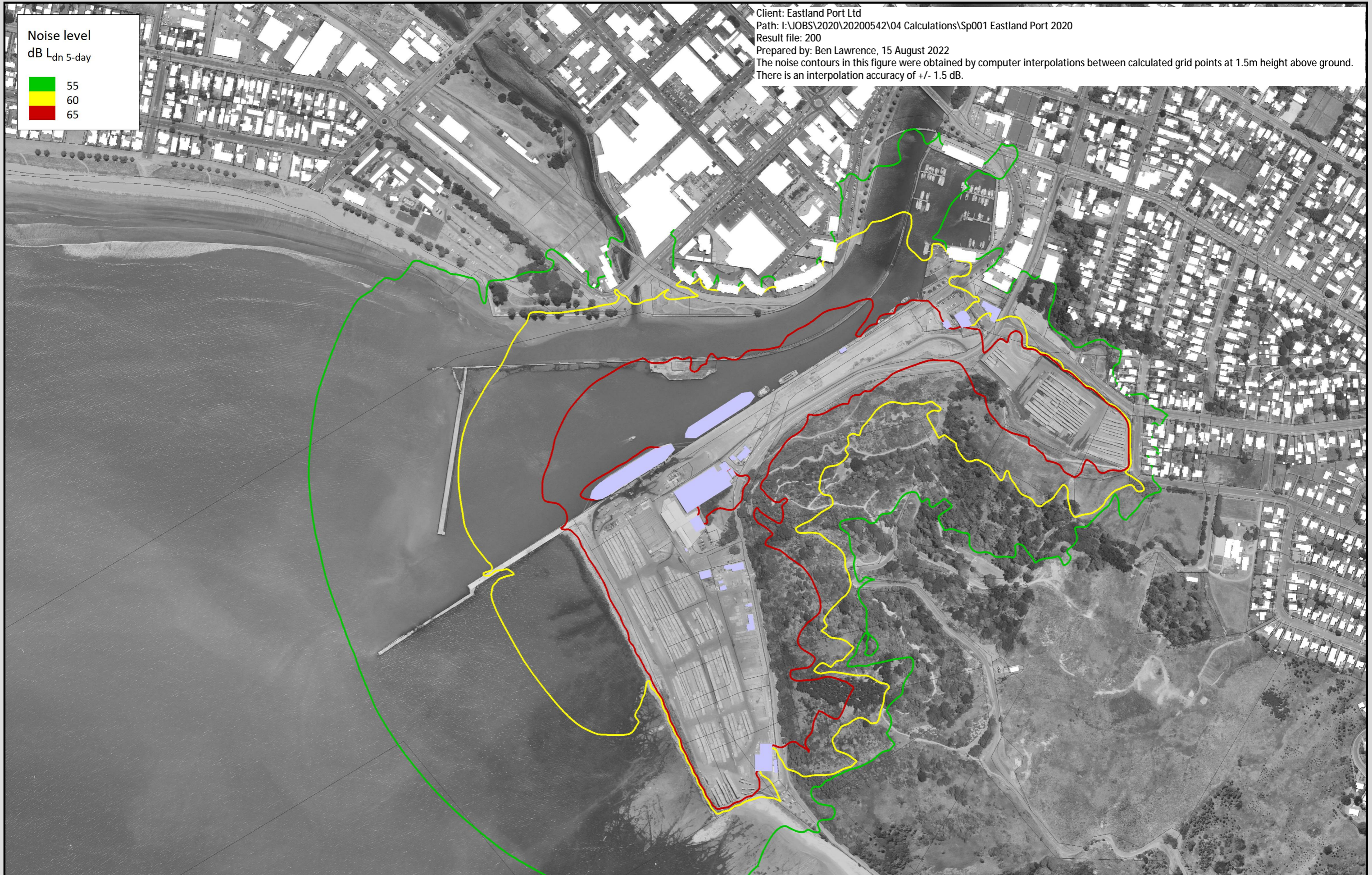
APPENDIX F TRMP NOISE RULE COMPLIANCE (CURRENT AND FUTURE)

- Figure 4A, 4B Compliance with L_{dn} rule
- Figure 5A, 5B Compliance with $L_{Aeq(9h)}$ night-time rule
- Figure 6A, 6B Compliance with L_{A10} rule

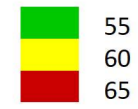
Noise level
dB L_{dn} 5-day



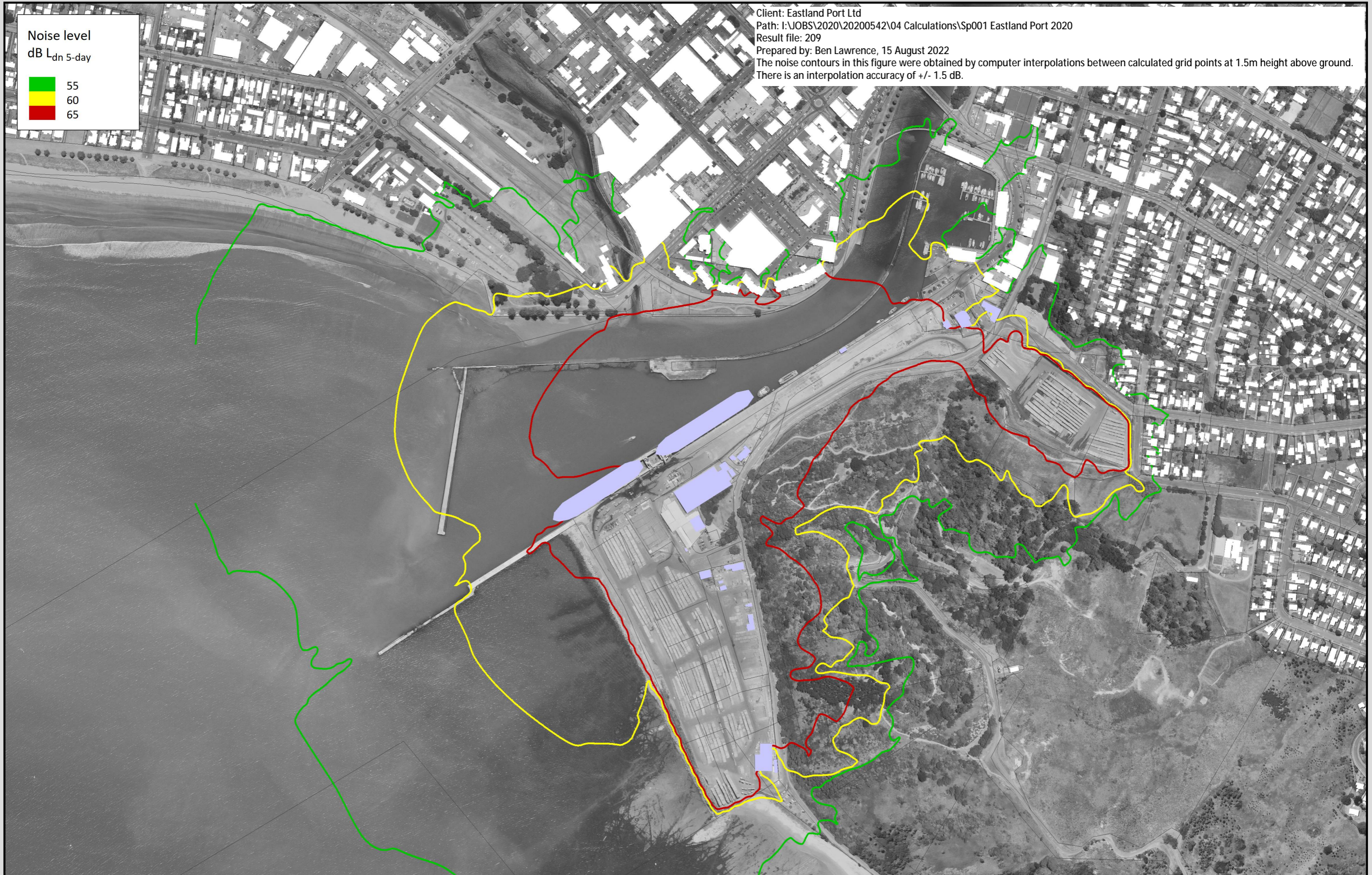
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Result file: 200
Prepared by: Ben Lawrence, 15 August 2022
The noise contours in this figure were obtained by computer interpolations between calculated grid points at 1.5m height above ground.
There is an interpolation accuracy of +/- 1.5 dB.



Noise level
dB L_{dn} 5-day

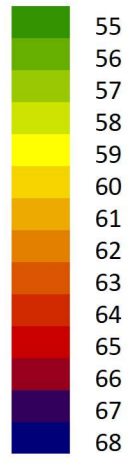


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Prepared by: Ben Lawrence, 15 August 2022
The noise contours in this figure were obtained by computer interpolations between calculated grid points at 1.5m height above ground.
There is an interpolation accuracy of +/- 1.5 dB.



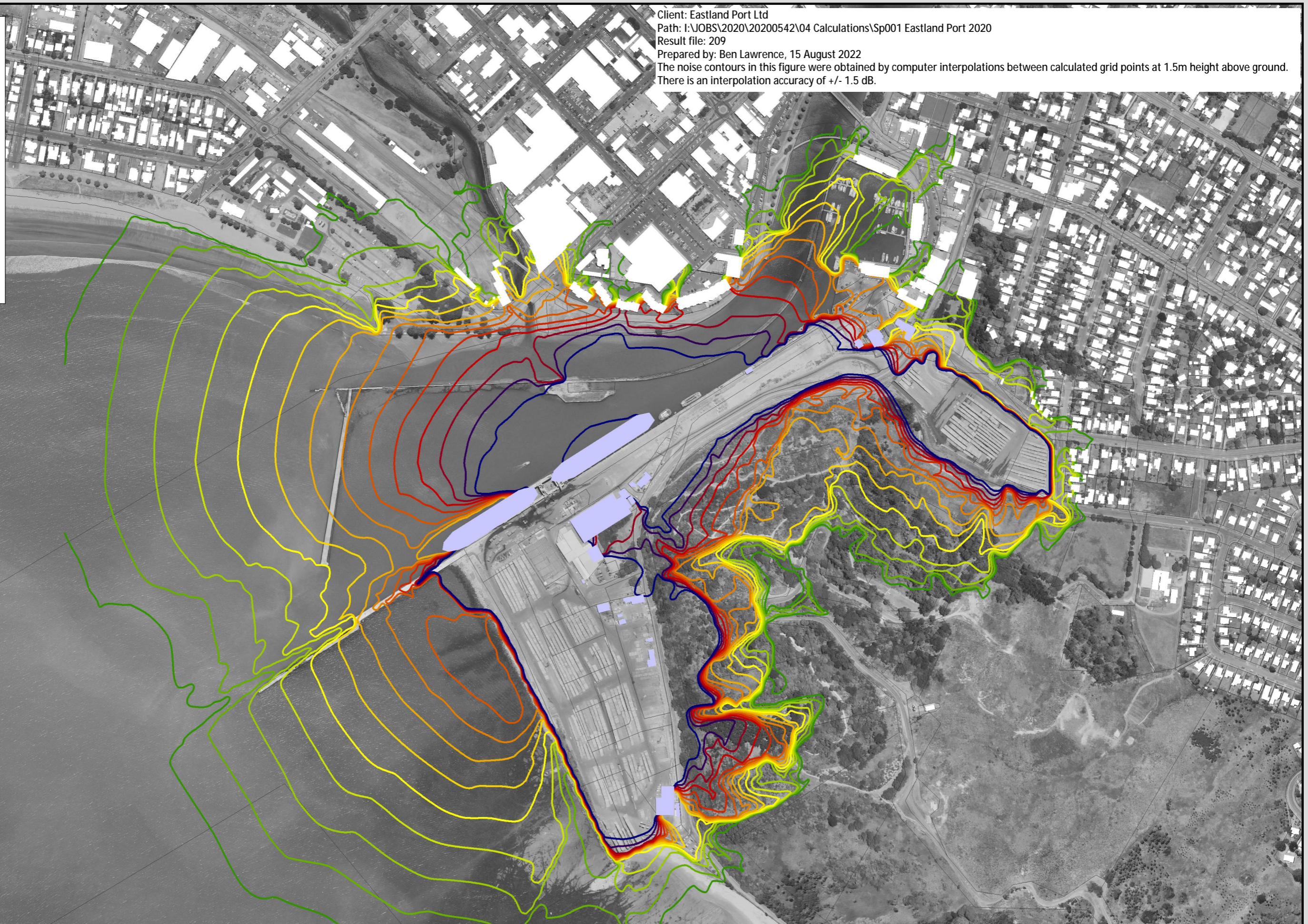
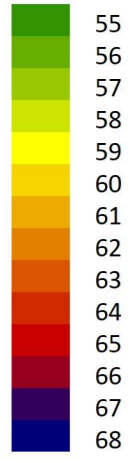
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Prepared by: Ben Lawrence, 15 August 2022
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Noise level
dB L_{dn} 5-day



Client: Eastland Port Ltd
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Result file: 209
Prepared by: Ben Lawrence, 15 August 2022
The noise contours in this figure were obtained by computer interpolations between calculated grid points at 1.5m height above ground.
There is an interpolation accuracy of +/- 1.5 dB.

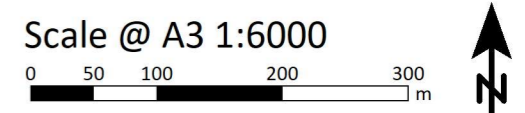
Noise level
dB L_{dn} 5-day



Scenario A 1 LOG SHIP AND 1 KIWIFRUIT SHIP (current operations)			Info sourced from Marty Bayley (EP), Andy Kinsella (EP), Paul Coker (ISO) and Rod Blake (EP ops manager)			
Eastland Port noise model inputs Peak 5-day period during the year			Site activities 'on-time'		Movements (average hour)	
Code	Model Source Description	Number of sources in model	Day (07-22)	Night (22-07)	Day (07-22)	Night (22-07) km/hr
A	Upper yard					
A1	Log Trucks	1		N/A	6	3 15
A2	Log Loaders	2	100%	100%		N/A
A3	High stacker	2	100%	0%		N/A
B	Wharfside logyard					
B1	Log trucks			N/A	3	2 15
B2	High stacker	1	100%	33%		N/A
B3	Loaders	1	50%	50%		N/A
C	Southern logyard					
C1	Log truck			N/A	22	11 15
C2	High stacker	4	100%	50%		N/A
C3	Loaders	2	100%	100%		N/A
D	Wharf					
D1	Maffi (dedicated to ship)	1	100%	100%		N/A
D2	Excavators (included in log ship source)	-	N/A	N/A		N/A
D3	Log ship stack (Wharf 8)	1	100%	100%		N/A
D4	Log ship cranes (Wharf 8)	4	100%	100%		N/A
E	Debarking					
E1	Debarker	1	53%	89%		N/A
E2	Loader for debarker	1	40%	22%		N/A
F	Port-wide equipment					
F1	4x maffi spread across all log yards	1	400%	400%		N/A
F2	Sweeper	1	33%	22%		N/A
F3	Water truck (full log yard)	1	33%	44%		N/A
F4	Loader over whole site (odd jobs)	1	22%	22%		N/A
G	Kiwifruit/squash operations					
G1	Container trucks	1		N/A	2	0 15
G2	Container forklift (truck unloading, diesel)	1	27%	4%		N/A
G3	Reefer ship (Wharf 7)	1	40%	40%		N/A
G4	Coolstore (negligible noise)	-	N/A	N/A		N/A



MARSHALL DAY Acoustics Figure 3A: Noise Model Assumptions (Current Operations)
All port operations



Scenario A 1 LOG SHIP AND 1 KIWIFRUIT SHIP (current operations)			Info sourced from Marty Bayley (EP), Andy Kinsella (EP), Paul Coker (ISO) and Rod Blake (EP ops manager)				
Eastland Port noise model inputs Peak 5-day period during the year			Site activities 'on-time'		Movements (average hour)		
Code	Model Source Description	Number of sources in model	Day (07-22)	Night (22-07)	Day (07-22)	Night (22-07)	km/hr
A Upper yard							
A1	Log Trucks	1		N/A	6	3	15
A2	Log Loaders	2	100%	100%		N/A	
A3	High stacker	2	100%	0%		N/A	
B Wharfside logyard							
B1	Log trucks			N/A	3	2	15
B2	High stacker	1	100%	33%		N/A	
B3	Loaders	1	50%	50%		N/A	
C Southern logyard							
C1	Log truck			N/A	22	11	15
C2	High stacker	4	100%	50%		N/A	
C3	Loaders	2	100%	100%		N/A	
D Wharf							
D1	Maffi (dedicated to ship)	1	100%	100%		N/A	
D2	Excavators (included in log ship source)	-	N/A	N/A		N/A	
D3	Log ship stack (Wharf 8)	1	100%	100%		N/A	
D4	Log ship cranes (Wharf 8)	4	100%	100%		N/A	
E Debarking							
E1	Debarker	1	53%	89%		N/A	
E2	Loader for debarker	1	40%	22%		N/A	
F Port-wide equipment							
F1	4x maffi spread across all log yards	1	400%	400%			
F2	Sweeper	1	33%	22%		N/A	
F3	Water truck (full log yard)	1	33%	44%		N/A	
F4	Loader over whole site (odd jobs)	1	22%	22%		N/A	
G Kiwifruit/squash operations							
G1	Container trucks	1		N/A	2	0	15
G2	Container forklift (truck unloading, diesel)	1	27%	4%		N/A	
G3	Reefer ship (Wharf 7)	1	40%	40%		N/A	
G4	Coolstore (negligible noise)	-	N/A	N/A		N/A	



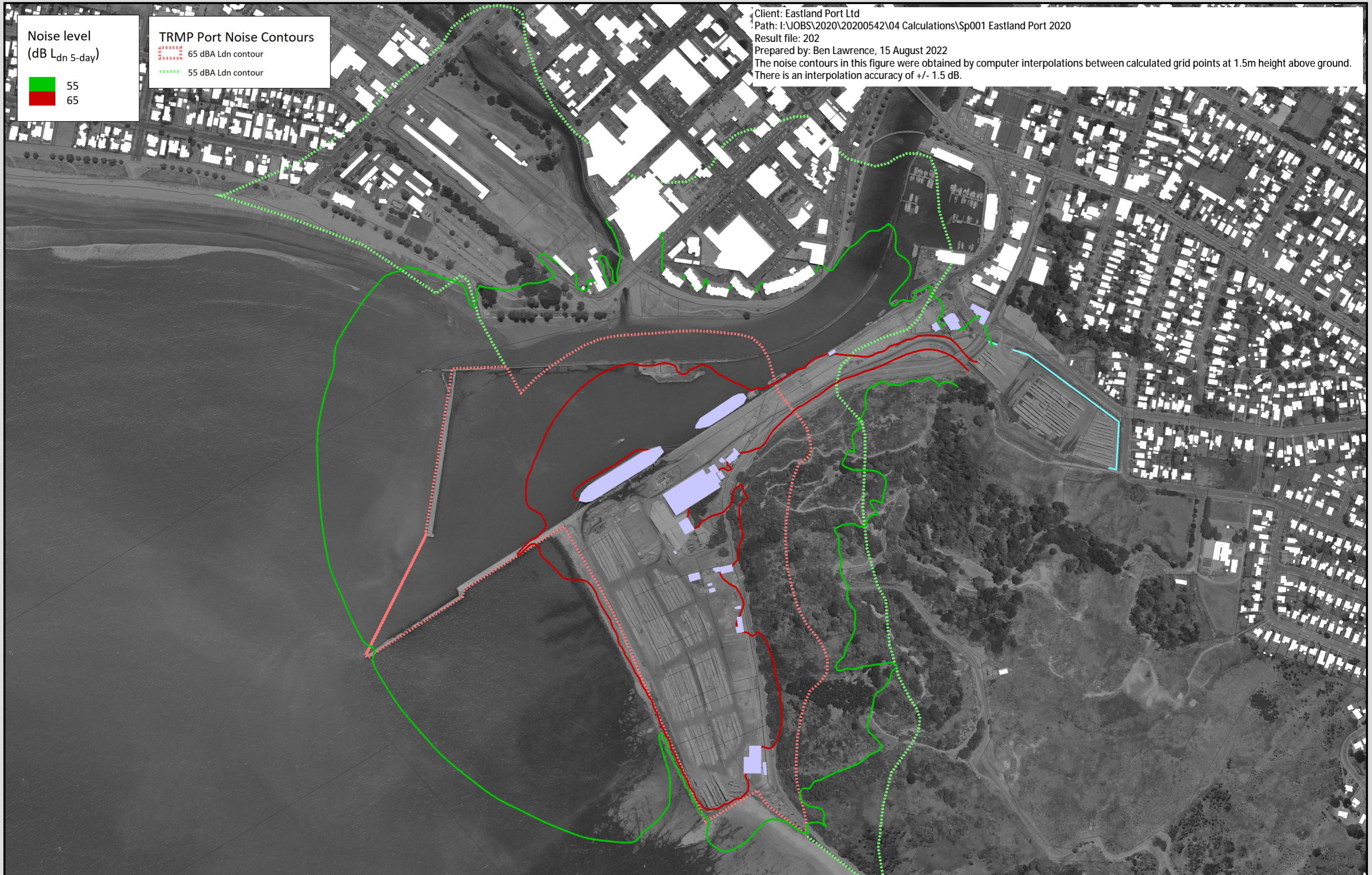
Noise level
(dB L_{dn} 5-day)



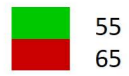
TRMP Port Noise Contours

65 dBA L_{dn} contour
55 dBA L_{dn} contour

Client: Eastland Port Ltd
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Result file: 202
Prepared by: Ben Lawrence, 15 August 2022
The noise contours in this figure were obtained by computer interpolations between calculated grid points at 1.5m height above ground.
There is an interpolation accuracy of +/- 1.5 dB.



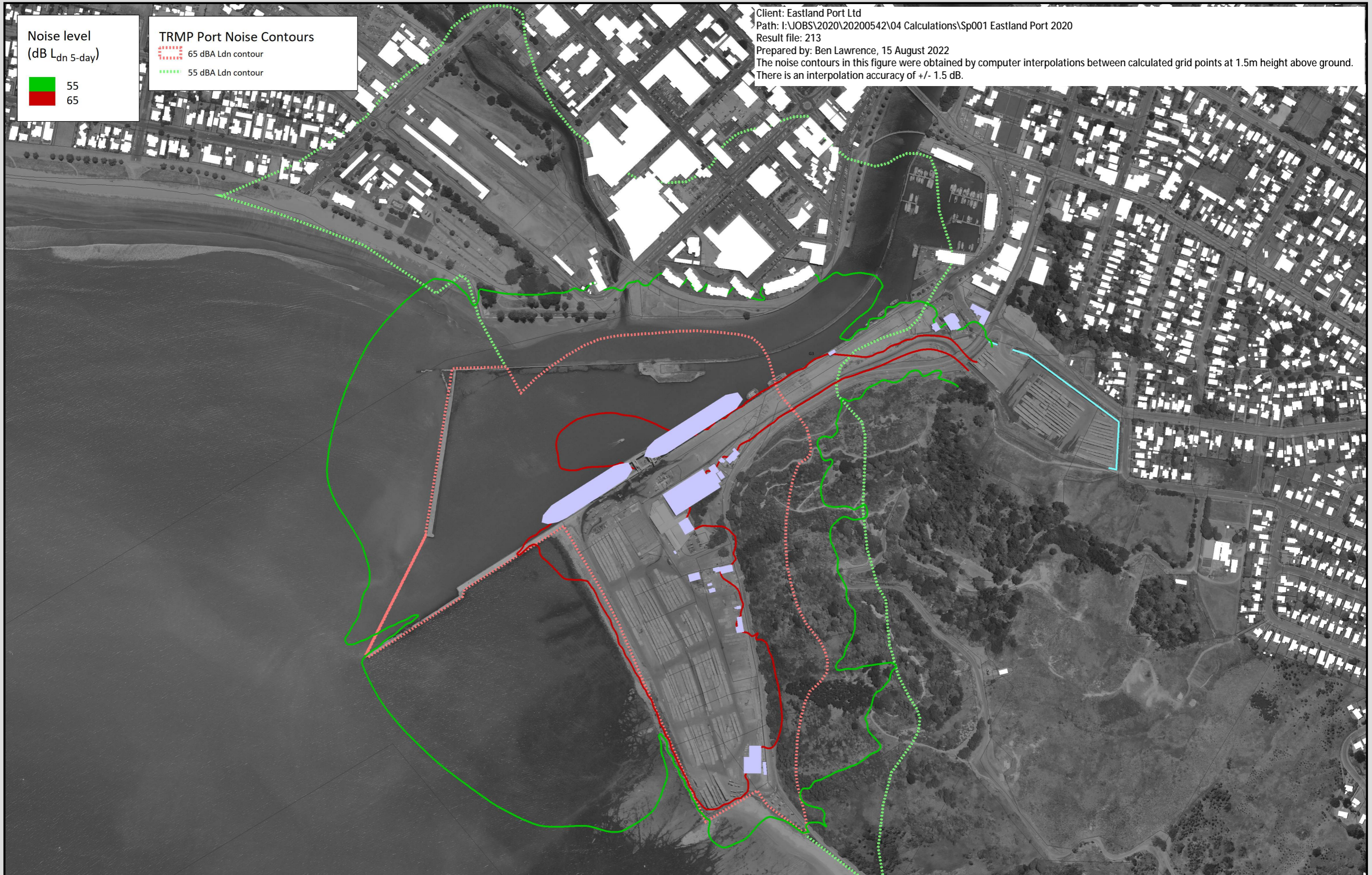
Noise level
(dB L_{dn} 5-day)



TRMP Port Noise Contours

65 dBA L_{dn} contour
55 dBA L_{dn} contour

Client: Eastland Port Ltd
Path: I:\JOBS\2020\20200542\04 Calculations\Sp001 Eastland Port 2020
Result file: 213
Prepared by: Ben Lawrence, 15 August 2022
The noise contours in this figure were obtained by computer interpolations between calculated grid points at 1.5m height above ground.
There is an interpolation accuracy of +/- 1.5 dB.



Noise level (night)
(dB $L_{Aeq}(9h)$)

60

TRMP Port Noise Contours

65 dBA Ldn contour

Client: Eastland Port Ltd
Path: I:\JOBS\2020\20200542\04 Calculations\Sp001 Eastland Port 2020
Result file: 202
Prepared by: Ben Lawrence, 15 August 2022
The noise contours in this figure were obtained by computer interpolations between calculated grid points at 1.5m height above ground.
There is an interpolation accuracy of +/- 1.5 dB.



Noise level (night)
(dB L_{Aeq} (9h))

60

TRMP Port Noise Contours

65 dBA L_{dn} contour

Client: Eastland Port Ltd
Path: I:\JOBS\2020\20200542\04 Calculations\Sp001 Eastland Port 2020
Result file: 213
Prepared by: Ben Lawrence, 15 August 2022
The noise contours in this figure were obtained by computer interpolations between calculated grid points at 1.5m height above ground.
There is an interpolation accuracy of +/- 1.5 dB.



MARSHALL DAY Acoustics Figure 5B: Compliance with TRMP L_{Aeq}(9h) Night-time Rule (Future Operations)
Essential port operations excluding Wharfside, Wharves 6 & 7 and Upper Log Yard

Scale @ A3 1:6000
0 40 80 160 240 m



Noise level
(dB LA10(15min))

70

TRMP Zones

Commercial, Residential and Reserve

Client: Eastland Port Ltd
Path: I:\JOBS\2020\20200542\04 Calculations\Sp001 Eastland Port 2020
Result file: 202
Prepared by: Ben Lawrence, 15 August 2022
The noise contours in this figure were obtained by computer interpolations between calculated grid points at 1.5m height above ground.
There is an interpolation accuracy of +/- 1.5 dB.



Noise level
(dB LA10(15min))

70

TRMP Zones

Commercial, Residential and Reserve

Client: Eastland Port Ltd
Path: I:\JOBS\2020\20200542\04 Calculations\Sp001 Eastland Port 2020
Result file: 213
Prepared by: Ben Lawrence, 15 August 2022
The noise contours in this figure were obtained by computer interpolations between calculated grid points at 1.5m height above ground.
There is an interpolation accuracy of +/- 1.5 dB.



MARSHALL DAY Acoustics  **Figure 6B: Compliance with TRMP LA10(15min) Rule (Future Operations)**
Essential port operations excluding Wharfside, Wharves 6 & 7 and Upper Log Yard

Scale @ A3 1:6000
0 40 80 160 240 m 