Styles Group
Acoustics & Vibration Consultants

NOISE EFFECTS

L CHANNEL DREDGING
CONSENTING PROJECT

PREPARED FOR

Port of Tauranga

DATE

17 August 2026

Assessment of noise effects prepared by Styles Group for Port of Tauranga.

REVISION HISTORY

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Statement of experience

I am Jon Styles, the Director and Principal of a team of eight consultants at Styles Group Acoustics and Vibration Consultants. I have over 24 years' experience advising on the management of construction and operational noise and vibration effects. I am a Council Member of the Acoustical Society of New Zealand, and I am on the Board of Directors of the Australasian Association of Acoustical Consultants.

I confirm that I have read and understood the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2023, and I agree to comply with it.

I acknowledge that, as an expert, I have an overriding duty to assist the decision maker impartially on matters within my area of expertise. In preparing this report, I have exercised my independent professional judgement, and the opinions I express are my own. I understand that my duty as an expert is not to advocate for the interests of the applicant or any other party.

I confirm that the matters addressed in this report are within my area of expertise, except where I expressly state that I am relying on information or opinions provided by another person. I have not omitted to consider any material facts known to me that might alter or detract from the opinions expressed in this report.

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1.0 Introduction

Port of Tauranga (**PoTL**) has engaged Styles Group to assess the airborne noise effects from capital and maintenance dredging works in the Port Zone of Tauranga Harbour.

This report has been prepared to accompany an application under the Fast Track Approvals Act to renew the necessary resource consents for capital and maintenance dredging activities associated with the deepening, widening and maintenance of the Port's shipping channels.

We have predicted and assessed the airborne noise effects from dredging activities undertaken in the coastal marine area (**CMA**) and received on land. This report includes:

i. Noise level predictions of capital and maintenance dredging activities.

ii. An assessment of the noise levels and effects in accordance with the relevant criteria in the Bay of Plenty Regional Coastal Environment Plan (**RCEP**), Tauranga City Plan (**TCP**) and relevant New Zealand Standards, NZS 6809:1999 Acoustics – Port Noise Management and Land Use Planning (**NZS6809** or the **Port Noise Standard**) and New Zealand Standard 6803:1999 *Acoustics- Construction Noise* (**NZS6803** or the **Construction Noise Standard**); and

iii. Recommended noise management measures and conditions of consent.

This report should be read in conjunction with the application documents and the Assessment of Environmental Effects (AEE). A glossary of acoustical terms used within this document is attached as Appendix A.

We have prepared an assessment of underwater noise effects under separate cover.

2.0 The Project

The Project relates to the renewal of resource consents to enable PoTL to carry out dredging to deepen and widen their existing shipping channels. The application sets out the proposed dredging volumes and consent duration.

Figure 1 displays the extent of the proposed capital dredging works and Figure 2 displays the extent of proposed maintenance dredging works.

Figure 3 displays the locations where dredged material will be deposited in the CMA. The airborne noise from disposal activities will be significantly below any of the applicable noise limits or standards controlling noise generated from the CMA and received on land. We have not assessed the airborne noise effects of disposal given the large separation distances to shore.

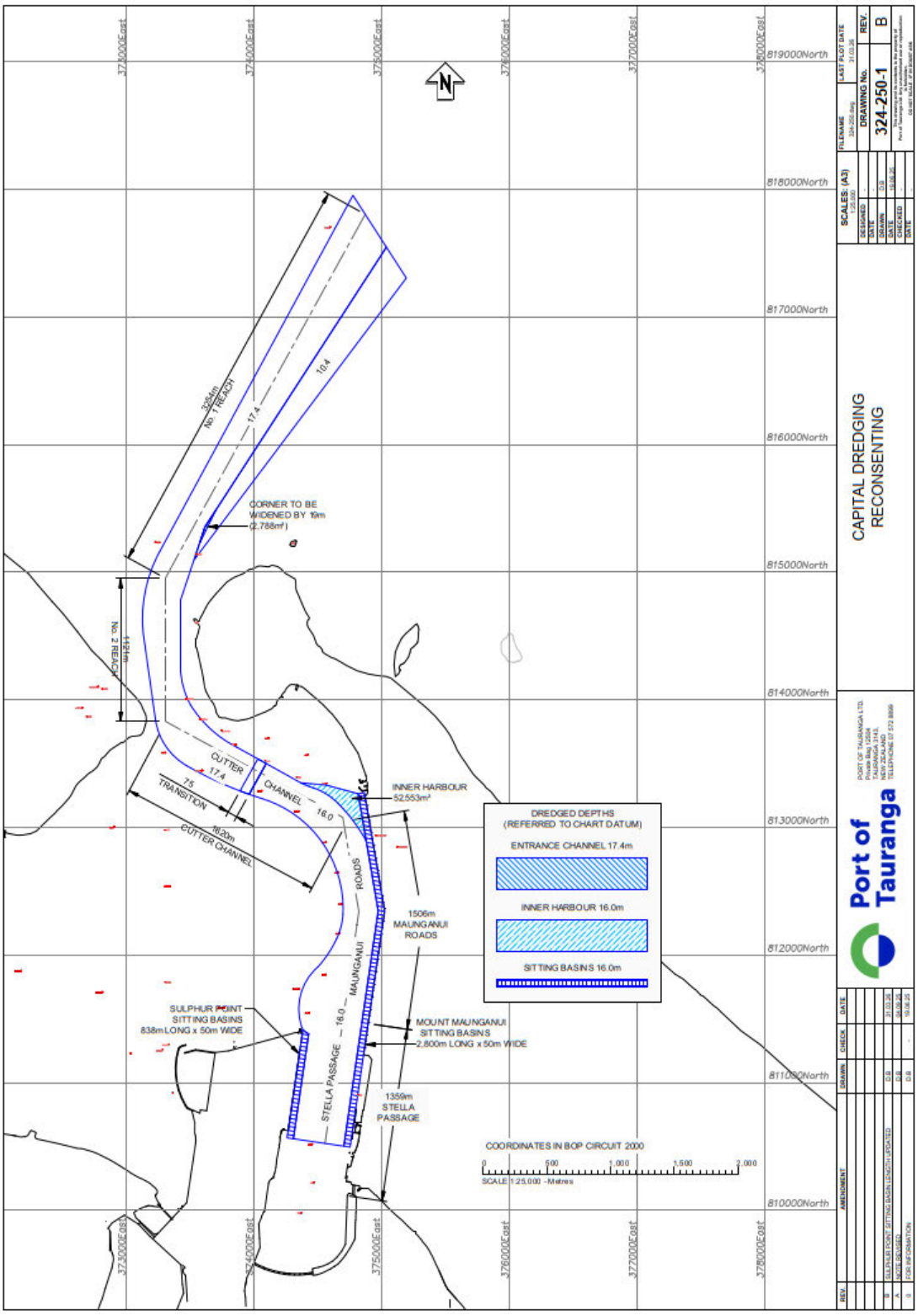


Figure 1 Proposed capital dredging

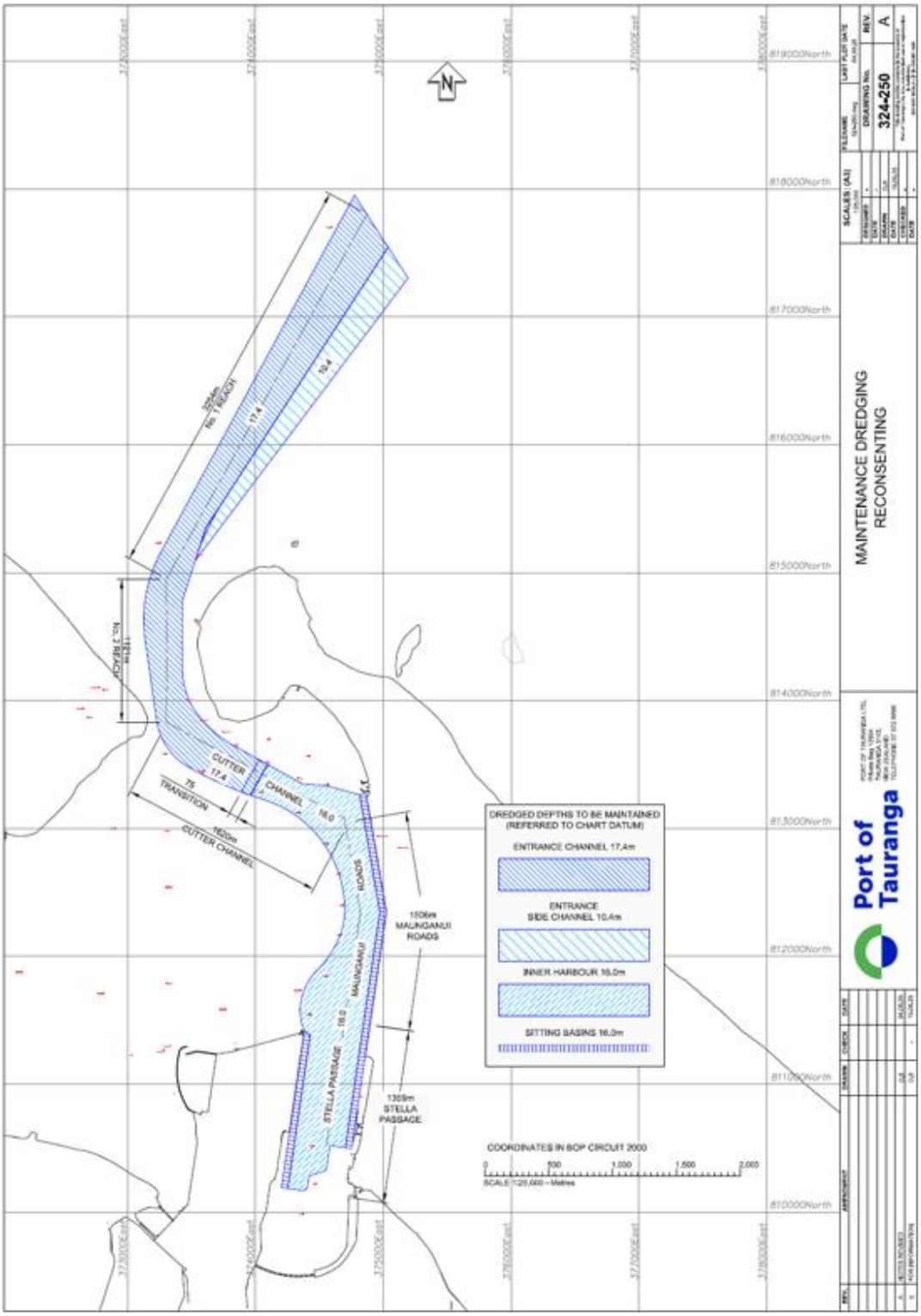


Figure 2 Proposed maintenance dredging

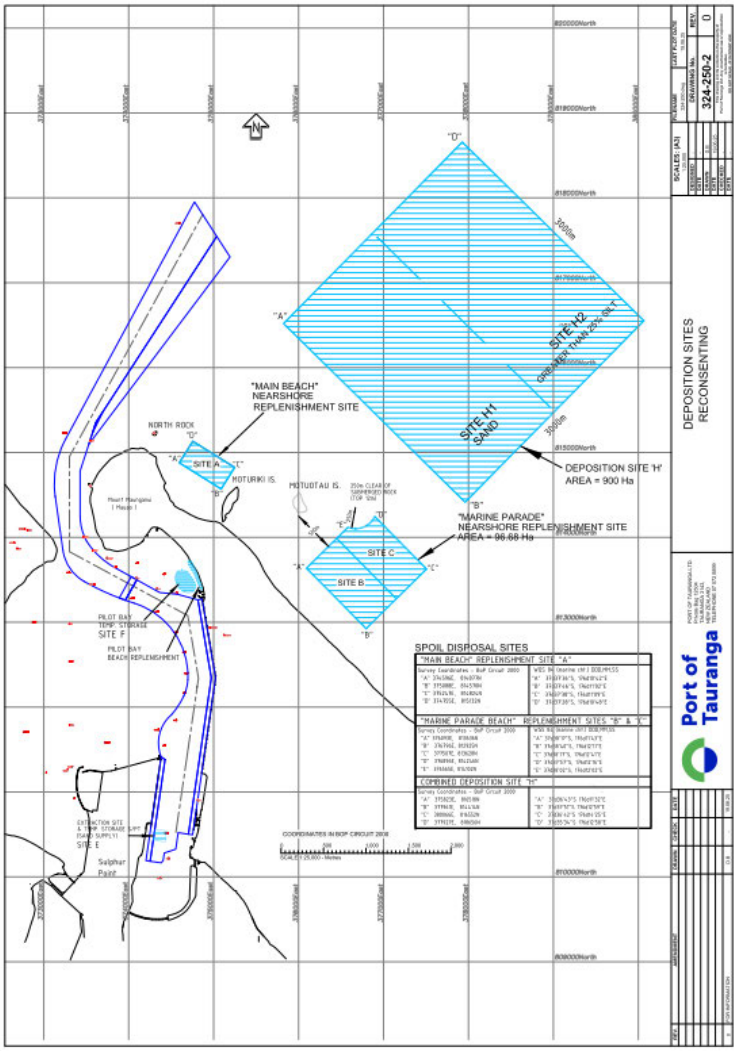


Figure 3 Deposition sites

3.0 Port noise standards in the RCEP and TCP

The RCEP and TCP Port Zone noise limits and associated noise control boundaries have been established in general accordance with the recommendations of the Port Noise Standard.

The Port Noise Standard describes the methods for establishing noise limits for all activities within the scope of "Port Noise". Port Noise is defined in the standard to mean (emphasis added):

> Noise generated within a port and includes noise from handling of cargo and passengers; operation of machinery and equipment; ships at berth; maintenance, repair, storage and administration activities; and vehicle/ rail traffic only when it relates to port activities and is inside the port. Noise from vessels not at berth is excluded, as is noise associated with construction of permanent port facilities. **Construction work should be evaluated using NZS 6803".**

The objectives, policies and rules of the RCEP and TCP establish a noise management framework that anticipates and provides for noise associated with the operation and

maintenance of the Port. The *Issues* in the RCEP recognise that maintenance and capital dredging is required to keep PoTL operational. The *Issues* also identify that:

- The Port's shipping channels are identified as regionally significant infrastructure (Issue 57).
- Capital dredging is required to deepen or widen new or existing shipping channels or berths (Issue 58).
- That full land-based disposal of dredgings is impractical (Issue 59)
- That further works are proposed to complete, extend and/or upgrade the wharfs, berth areas and navigation channels (Issue 60).

We have assessed the actual and potential noise effects from proposed maintenance and capital dredging works in terms of the permitted noise environment authorised by the relevant RCEP and TCP port noise standards. These standards are described below.

3.1 The RCEP Port Zone noise limits

The noise standards in the RCEP manage the noise emissions from activities undertaken in the Port Zone (in the CMA) and received on land. Rule PZ1 of the RCEP controls noise emissions from activities in the Port Zone using the recommended noise limits and assessment methods in the Port Noise Standard.

Rule PZ1 requires that:

> The emission of noise from activities in the coastal marine area of the Port Zone is a permitted activity, subject to the noise not exceeding the following conditions:
>
> a) The long-term average sound level (L_{dn}) from all activities within the Port Zone shall not exceed 55 dBA at any point outside the 55 dBA noise control boundary (shown on Map Sheet 11c) nor 65 dBA at any point outside the 65 dBA noise control boundary;
>
> b) No single 15-minute sound measurement level shall exceed 65 dBA L_{eq} between 2200 and 0700 at any point outside the 65 dBA noise control boundary;
>
> c) The night-time maximum sound level (L_{max}) shall not exceed 85 dBA at any point outside of the 65 dBA noise control boundary.
>
> d) Sound levels shall be measured in accordance with NZS 6801:2008 Acoustics - Measurement of Sound and assessed in accordance with NZS6809:1999 Acoustics – Port Noise Management and Land Use Planning.

Rule PZ1 essentially requires that noise from activities in the Port Zone does not exceed the noise limits in (a), (b) and (c), when measured and assessed at the 65 dB L_{dn} Inner Noise Control Boundary (**ICB**), or 55 dB L_{dn} when measured and assessed at the Outer Noise Control Boundary (**OCB**) or any other assessment location beyond the OCB.

Figure 4 displays the extent of the Port Zone in the CMA and the position of the ICB and OCB across the adjacent land to the west and east of the Port.

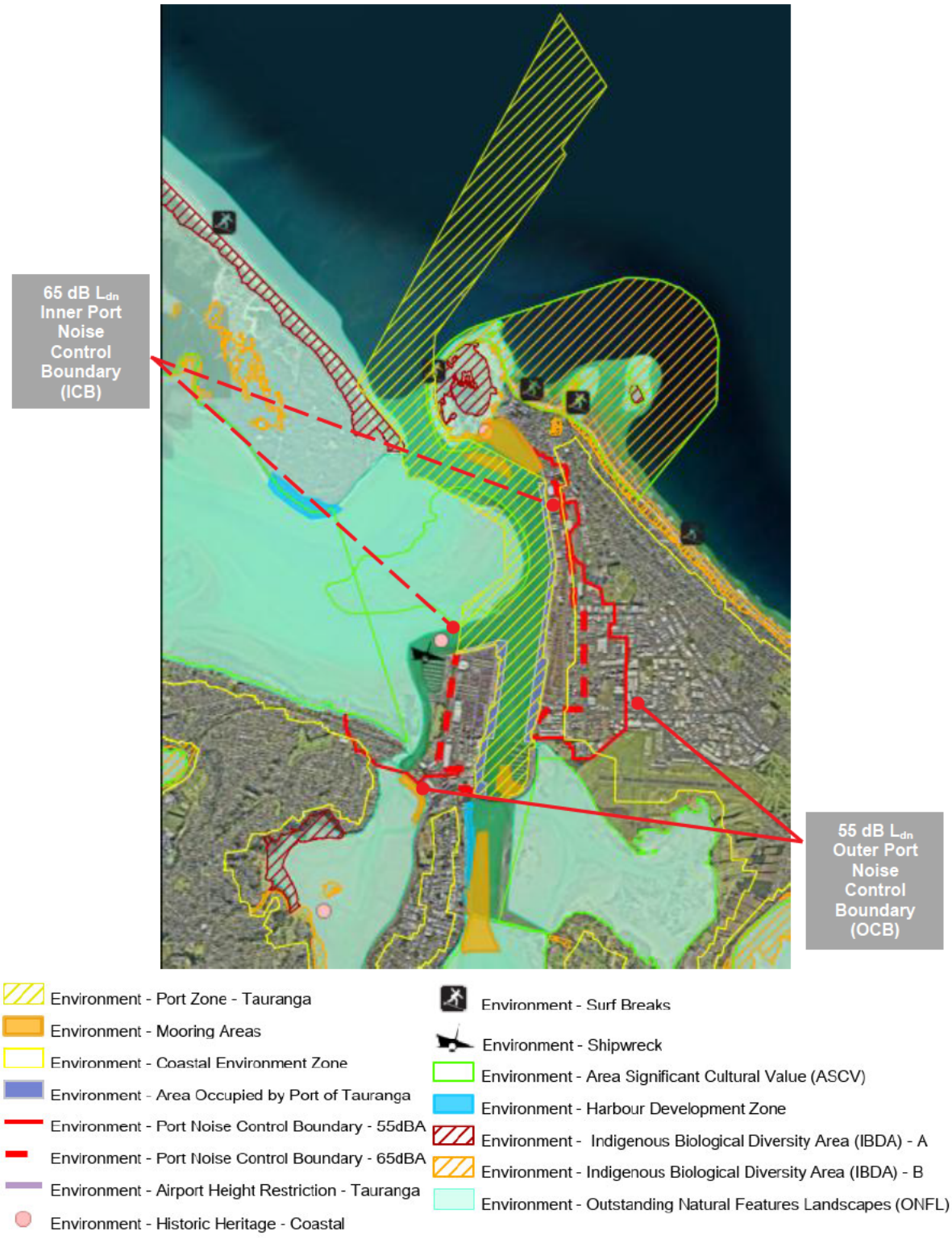


Figure 4 Bay of Plenty Regional Coastal Environment Plan Zoning and Port Noise Control Boundaries referred to in Rule PZ1

3.2 The TCP Port Industry Zone noise limits

The TCP noise standards control the noise levels generated from port-related activities in the Port Industry Zone (on land) and received on land. These noise standards do not control noise generated from the Project as dredging noise will be generated from the CMA. However, the TCP standards are helpful to understand the level of port noise that is permitted to be generated across land adjacent to the Port.

The TCP includes port noise limits that essentially mirror those found in the RCEP.

The TCP also includes land-use planning controls to manage the compatibility of land use activities exposed to port noise, in accordance with the recommendations of the Port Noise Standard.

Rule 4E.2.7 of the TCP requires that port noise levels are managed to achieve compliance with the following noise limits:

a) The long-term average sound level (L_{dn}) from all activities within the Port Industry Zone shall not exceed 55 dBA at any point outside the 55 dBA noise control boundary (Diagram 4, Section 5, Plan Maps Part B), nor 65 dBA at any point outside the 65 dBA noise control boundary;
b) No single 15-minute sound measurement level shall exceed 65 dBA L_{eq} between 2200 and 0700 at any point outside the 65 dBA noise control boundary;
c) The night-time maximum sound level (L_{max}) shall not exceed 85 dBA at any point outside of the 65 dBA noise control boundary;
d) Between the 55 dBA L_{dn} and 65 dB L_{dn} noise control boundaries (Diagram 4, Section 5, Plan Maps Part B), additions to existing buildings beyond 25% of existing gross floor area, new residential activities, visitor accommodation, homestay, schools and tertiary education remises and health centres shall meet the following requirements:

    (i) All habitable room(s) shall be designed by a suitably qualified acoustic engineer to achieve 45 dBA L_{dn} within that room. Where exterior windows and/or doors need to be closed to achieve this internal level a ventilation system shall be provided that is capable of providing an airflow that is controlled within the range of 5 to 10 air changes per hour throughout the habitable rooms of the building. For the avoidance of doubt the internal design of 45 dBA L_{dn} shall include noise from both the Port Industry Zone and any ventilation system operating at its design rating.

(e) Sound levels shall be measured in accordance with NZS 6801:2008 Acoustics - Measurement of Sound and assessed in accordance with NZS6809:1999 Acoustics – Port Noise Management and Land Use Planning.

Diagram 4, Section 5, Plan Maps Part B (cited in part a of the rule) is reproduced in Figure 5 overleaf.

Rule 4E.2.7(d) requires that new and altered buildings containing noise sensitive activities that are located inside the OCB are acoustically treated to ensure the internal noise environment is adequately protected from port noise.

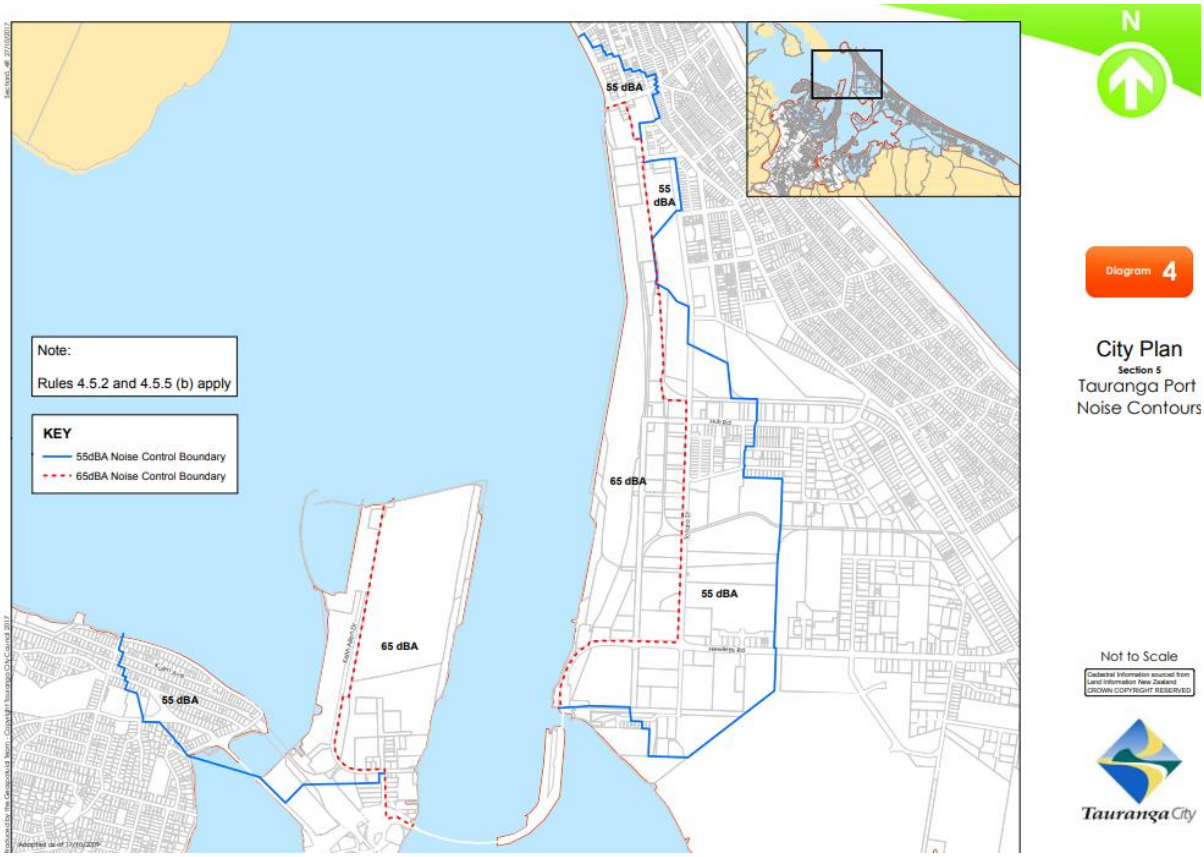


Figure 5 Tauranga Port Noise Contours (Diagram 4, Section 5 of the TCP)

3.3 TCP controls on noise sensitive activities within the OCB

The Port Noise control boundaries identified in Figures 4 and 5 represent the areas of land defined by the ICB and OCB where Port Noise must be controlled so that noise levels do not exceed 65 dB L_{dn} (at the ICB) and 55 dB L_{dn} (at the OCB).

The control boundaries also define the location where any new or altered noise sensitive activities require acoustic treatment to achieve land use compatibility. The TCP definition of "noise sensitive activities" includes all buildings or parts of buildings used for, or intended to be used for the following purposes:

- Residential activity
- Visitor accommodation
- Schools and tertiary education premises
- Health Centres

New and altered noise sensitive activities that are *outside* the OCB are not required to be acoustically treated to mitigate port noise.

3.4 RCEP and TCP controls for construction noise

The port noise controls in the RCEP and TCP are designed to manage the effects of ongoing noise associated with the operation of the port, in accordance with the definition of Port Noise in the Port Noise Standard. The Port's operational noise sources include trucks, vessels at berth, craneage, container and log handling, reefers and similar.

The definition of "Port Noise" in the Port Noise Standard excludes noise from port-related "construction work" and states that "***Construction work should be evaluated using NZS 6803"***. Section 1.5 of NZS6809 also states (emphasis added):

> "Assessment or control of construction noise associated with facilities and structures, other than noise associated with maintenance, repair or construction of ships at any port, **requires special measurement and assessment techniques that are outside the scope of this Standard**. **These activities may be assessed using the relevant New Zealand Standard dealing with construction noise**".

Maintenance and capital dredging fall within the definition of construction work in the Construction Noise Standard. Section 3.1 of NZS 6803 defines construction work as (emphasis added):

> **CONSTRUCTION WORK means any work in connection with** the construction, erection, installation, carrying out, repair, maintenance, cleaning, painting, renewal, removal, alteration, dismantling, or demolition of:
>
> a) Any building, erection, edifice, structure, wall, fence or chimney, whether constructed wholly or in part above or below ground level;
>
> b) Any road, motorway, **harbour or foreshore works**, railway, cableway, tramway, canal or aerodrome;
>
> c) Any drainage, irrigation or river control work;
>
> d) Any electricity, water, gas or telecommunications reticulation;
>
> e) Any bridge, viaduct, dam, reservoir, earthworks, pipeline, aqueduct, culvert, drive, shaft, tunnel or reclamation; or
>
> f) Any scaffolding.
>
> Construction work includes:
>
> (a) Any work in connection with any excavation, site preparation, or preparatory work, carried out for the purpose of construction work;
>
> (b) The use of any plant, tools, gear, or materials for the purpose of any construction work;
>
> (c) **Any construction work carried out underwater, including** work on ships, wrecks, buoys, rafts, and **obstructions to navigation**; and
>
> (d) Any inspection or other work carried out for the purpose of determining whether construction work should be carried out.

The Construction Noise Standard states that maintenance and capital dredging fall within the definition of construction work. We consider that this is sensible and typical of the way that dredging work is treated elsewhere in New Zealand. The process of capital and maintenance dredging a channel is fundamentally the same as the process for building and maintaining a road. The construction and maintenance phases in both examples comprise the construction phase, whereas the vehicles that use the road and the ships that use the channel generate noise during the operational phase of the activity.

The RCEP does not include any explicit reference to the Construction Noise Standard. However:

- Policy PZ10 of the RCEP requires that noise from PoTL is managed "*using the Port Zone noise control* ***and appropriate standards***".
- Rule PZ1(d) of the RCEP states that "*Sound levels shall be measured in accordance with NZS 6801:2008 Acoustics - Measurement of Sound and assessed in accordance with NZS6809:1999 Acoustics – Port Noise Management and Land Use Planning.*"

The Port Noise Standard specifically excludes the assessment of construction noise from its' scope and requires that construction noise is assessed in accordance with the Construction Noise Standard. The project is within the scope of the Construction Noise Standard. We have therefore recommended that noise levels from the project are measured and assessed in accordance with the relevant guideline noise limits in the Construction Noise Standard.

The Construction Noise Standard is commonly adopted in the measurement and assessment of noise levels from maintenance and capital dredging projects throughout New Zealand, and consistent with the approach adopted in the consenting of dredging operations for numerous ports across New Zealand[1].

We also note that Rule 4E.2.14 of the TCP[2] controls noise levels from construction work (generated and received on land) in accordance with the noise limits and assessment methods in the Construction Noise Standard.

---

[1] At least including Northport, South Port, Ports of Auckland Limited, Eastland Port, Napier Port, Port of Lyttelton and CentrePort Wellington

[2] The city plan rule does not apply to the Project as the noise is generated from the coastal marine area and received on land. However, the rule provides a relevant baseline in terms of the permitted noise environment for construction noise. Rule 4E.2.14 of the TCP requires that:

> a. Construction noise from a site in any zone within the City shall not exceed the limits recommended in, and shall be measured and assessed in accordance with, NZS 6803:1999 Acoustics Construction Noise;
> b. Construction activities undertaken from 20 December – 10 January (inclusive) within the Mount Maunganui area from Adams Avenue to Grace Avenue, noise levels shall not exceed Rule 4E.2.1 – Residential Zones and Rural-Residential Zone.

We therefore consider that the relevant noise limits for the Project are those set out in the Construction Noise Standard.

4.0 Proposed project noise standards

We have recommended Project Noise Standards that control noise levels from capital and maintenance dredging activities using the recommended noise limits and assessment methods in the Construction Noise Standard.

We consider that the Construction Noise Standard is the appropriate New Zealand standard for the measurement and assessment of noise. The construction noise provisions and standards have been adopted on numerous other port noise projects across New Zealand

The Construction Noise Standard specifies guideline noise limits for construction noise received by the community for the reasonable protection of health and amenity for works of limited duration. The Construction Noise Standard specifically recognises that the community will tolerate higher noise levels for short term projects.

4.1 Proposed project noise standards

The Construction Noise Standard sets out procedures for the measurement and assessment of noise from construction work. The guideline noise limits in the Construction Noise Standard are based on the duration of construction works at any one location, and the occupation of the receiving site.

The recommended noise limits in the Construction Noise Standard are based on the duration of construction work, with noise limits for “short-term duration” works (less than 14 calendar days), “typical duration” projects of between 14 days and 20 weeks, and “long-term” works at any one location with a duration exceeding 20 weeks.

We understand that any individual capital or maintenance dredging campaign undertaken as part of the consent will have a total duration of approximately six weeks. This means that the noise levels affecting any receiver will be no longer than approximately six weeks. We understand that there would generally be a large period of respite between any subsequent dredging in the same location, but that this cannot be guaranteed. Accordingly, it is difficult to manage the respite period and there is no respite period defined in the Construction Noise Standard that could be used to ‘separate’ campaigns for the purpose of determining the overall length of any particular project.

Accordingly, we have assessed the Project against the “long term duration” noise limits in the event that respite periods might be short and / or the full period of works could be 20 weeks or more. This is a conservative approach.

The long-term duration construction noise limits are reproduced in Tables 1 and 2 below.

The noise limits apply measured at 1m from the façade and 1.2 to 1.5 m above the relevant floor level of any building that is occupied during the works, except at buildings that are owned

by or under control of PoTL. The noise limits do not apply at buildings that are unoccupied during works.

Table 1: NZS 6803 recommended long term duration noise limits for construction noise received at any residential or rural dwelling, or any building where it is necessary to manage sleep disturbance

Time of week	Time period	Noise limit L_{Aeq}	Noise limit L_{AFmax}
Weekdays	0630-0730	55 dB	75 dB
	0730-1800	70 dB	85 dB
	1800-2000	65 dB	80 dB
	2000-0630	45 dB	75 dB
Saturdays	0630-0730	45 dB	75 dB
	0730-1800	70 dB	85 dB
	1800-2000	45 dB	75 dB
	2000-0630	45 dB	75 dB
Sundays	0630-0730	45 dB	75 dB
	0730-1800	55 dB	85 dB
	1800-2000	45 dB	75 dB
	2000-0630	45 dB	75 dB

Table 2 - NZS 6803 recommended long term duration noise limits for construction noise received at occupied industrial or commercial buildings for all days of the year

Time Period	Long-term duration
	L_{Aeq}
0730-1800	70 dB
1800-0730	75 dB

The nighttime noise limits in Table 1 are designed to apply to receivers in industrial or commercial areas where it is necessary to prevent sleep disturbance effects.

The Construction Noise Standard states that the noise level assessment duration should not exceed 60 minutes and that 15 minutes will often be adequate. We have adopted an assessment duration of 60 minutes.

5.0 Noise modelling, measurements and predictions

We have used Brüel & Kjær Predictor computer noise modelling software to predict the noise levels from dredging activities. The noise level predictions enable comparison with the recommended Project Noise Standards (that are the consistent with the long-term duration noise limits in the Construction Noise Standard).

The predicted noise levels can also be compared with the level of Port Noise that is anticipated and provided for under the RCEP and TCC Port Noise Standards to provide additional context.

We have also undertaken noise monitoring to characterise the ambient noise environment inside the Harbour and to determine whether the noise levels from the Project are likely to be audible above the noise levels typically generated by vessel traffic[3] inside the Harbour.

5.1 Noise modelling

The noise models are based on the methods in International Standards ISO 9613-1/2 *Acoustics – Attenuation of sound during propagation outdoors*. The computer noise model is three-dimensional and takes into account the topography, buildings, ground coverage, physical attributes of the sound sources and receivers and many other factors.

The noise model has been prepared using terrain data and aerial photography from the LINZ Data Service website. The topographical contours encompass the harbour and a large area of the surrounding land. We have ensured the integrity of the noise model by careful scrutiny of the final three-dimensional model.

The noise modelling assumes that the log stacks in the port are low or non-existent and therefore do not form any noise barrier.

The input parameters for the dredging noise models are set out in Table 3.

Table 3 Predictor dredging noise model input parameters

Parameters/calculation settings	Details
Software	Brüel & Kjær Predictor 2024 and DGMR iNoise 2025 (the successor of Predictor)
Calculation method	ISO 9613.1/2
Meteorological parameters	Single value, C0 = 0 (downwind in all directions away from the source)
Ground attenuation over land	0.5

[3] Vessel traffic includes Port movements, commercial and recreation activity.

Parameters/calculation settings	Details
Ground attenuation over water	0.0
Air temperature	283K
Atmospheric pressure	101.33kPa
Air humidity	60%
Receiver heights (relative)	1.5m above ground
Dredging operations	See details below

5.2 Dredging

We understand that the proposed capital and maintenance dredging works may be undertaken using two common types of dredgers:

i. A trailing suction hopper dredger (**TSHD**). A TSHD is a vessel that uses a trailing arm to vacuum material from the seafloor while following a predetermined dredge route. Material is deposited into the TSHD as it moves forward until the fill capacity is reached at which point the arms are lifted and the TSHD travels to the designated disposal area where the dredged material is deposited.

ii. A mechanical backhoe dredger (**BHD**). BHDs are a stationary platform or barge systems that typically use an excavator to lift and remove dredgings. The dredgings are loaded onto a barge or other vessel that transports it to the disposal site.

In general terms, BHDs are stationary systems that use excavators, while TSHDs are self-propelled vessels coupled with hoppers and articulated dredging pipes that extend onto the sea-floor.

5.3 TSHD dredging noise model parameters

We understand that the TSHD vessel, the "*Albatros*" will be used for this project. We have reviewed the published acoustical data for the Albatros to inform our predictions. The sound power level of the vessel varies based on how full the hopper is. We have carried out preliminary predictions using the worst-case scenario where the hopper is empty and the sound power level is 113dB. We understand that the Albatros has been used for maintenance dredging at PoTL on many occasions.

The spectrum of the sound power level used is provided in Table 3.

Table 4: Sound power level of TSHD

63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	L_{WA}
90 dB	103 dB	105 dB	106 dB	108 dB	107 dB	101 dB	95 dB	113 dB

5.3.1 Vessel speed

The noise model assumes that the TSHD vessel will dredge at a speed of approximately 2-3 knots. This is typical for most dredging operations we have been involved with and are aware of. At this speed the dredge will cover a distance of up to approximately 1400m in any 15-minute period. The BHD advances at a much slower rate and for the purpose of this assessment has been assumed to remain stationary over any given 60 minute period.

5.3.2 Vessel tracks

The vessel tracks used in the project noise model for the TSHD are based on the actual vessel tracks of the Albatros during the Port's 2023 maintenance dredging campaign. We understand that the 2023 vessel tracks are generally representative of the areas that proposed dredging works will be undertaken, especially in the inner harbour areas where the noise controls apply. Whilst the actual vessel tracks for this Project may differ, we consider that using the tracks that represent the 'worst case' for the closest receivers provides a suitably realistic basis for the noise modelling.

5.4 Backhoe dredging noise model parameters

We understand that dredging operations near to the berthing pockets and wharf structures will be carried out using a long reach backhoe excavator, then placed in a split hopper barge.

The backhoe dredging noise model is based on noise measurements of a large backhoe dredger (the "Machiavelli", owned by Heron Construction Co. Ltd) operating at Port of Napier in March 2021. We understand that the Machiavelli is the largest BHD in New Zealand and that it has operated at PoTL in the past.

The noise measurements were obtained from the adjacent breakwater with a clear and direct line of sight to the backhoe dredger 53m away (as displayed in Figure 6). The noise measurements were conducted in the late evening to reduce the influence of other construction and port activities nearby that could not be excluded from the measurements. The dredger was operating a mechanical ripper to loosen sandstone rock. The engine and hydraulic systems dominated the total noise output of the machine. From our observations of other dredging operations, we consider that the noise emissions we have measured are similar to and potentially slightly greater than the level of noise from dredging softer material.

The measurement data has been converted to a sound power level based on the L_{Aeq} metric. The spectrum of the sound power level used is provided in Table 3.

Table 5: Sound power level of backhoe dredger

31 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	L_{WA}
107 dB	109 dB	114 dB	104 dB	106 dB	104 dB	99 dB	95 dB	89 dB	109 dB



Figure 6 Noise measurements of a backhoe dredger (Napier Port, March 2021)

6.0 Noise level contours

We have calculated noise level contours for a variety of operating scenarios. They are contained in Appendix B to this report. The noise levels have been calculated as $L_{Aeq(1hr)}$ levels for comparison with the Construction Noise Standard and the proposed Project Noise Standards, and as $L_{Aeq(12hr)}$ levels to assist with the assessment of overall noise effects.

The noise models in Appendix B represent the "worst-case" dredging noise levels that will be received on land for the following operating scenarios:

1. The $L_{Aeq(1hr)}$ noise level for dredging in the Stella Passage using a long reach backhoe excavator (**BHD**), with dredged material placed in a split hopper barge.
2. The $L_{Aeq(1hr)}$ noise level for dredging in Inner Harbour shipping channel
3. The $L_{Aeq(1hr)}$ noise level for dredging in the Harbour entrance channel
4. The $L_{Aeq(12hr)}$ noise level for typical dredging operations during the daytime period for Dredging Path "A". This noise model represents the average noise levels over a typical day of TSHD dredging operations in the Inner Harbour channels, with the vessel

travelling to the consented disposal sites outside the Harbour to dispose of dredged material. The noise model also includes a backhoe dredger operating in the vicinity of Sulphur Point Wharf, and a vessel collecting the dredged material for disposal.

5. The $L_{Aeq(12hr)}$ noise level for typical dredging operations during the daytime period for Dredging Path "B". This noise model represents the average noise levels over a typical day of backhoe dredging operations in the vicinity of Sulphur Point Wharf, with a separate vessel collecting the dredged material and traveling to the consented disposal sites outside the Harbour.

7.0 Port Zone noise measurements

We monitored the noise levels inside Tauranga Harbour between 21 October and 3 November 2023. The objective of the noise monitoring was to characterise the ambient noise environment inside the Harbour and to determine whether the noise levels from the Project are likely to be audible above the noise levels typically generated by vessel traffic[4] inside the Harbour.

The sound level meter was deployed on a coastal platform to the west of Salisbury Wharf. Figure 7 displays the noise measurement location.

The instrumentation comprised a 01dB Cube logger with an outdoor microphone kit, sound recording, 1/3rd octave band recording and logging in one second intervals. All measurement and assessment of the data has been undertaken in accordance with the relevant sections of NZS6801:2008 and NZS6802:2008.

[4] Vessel traffic includes Port movements, commercial and recreation activity.



Figure 7 Noise measurement location- Port Zone, Tauranga Harbour

7.1 Noise measurement results

Appendix C displays the measured daily noise levels on those days when meteorological conditions were suitable for noise measurements. Several days were excluded due to high winds. The audio was also recorded for later playback to determine the controlling noise sources.

The measurements show that the ambient noise environment is dominated by noise from vessel traffic and from commercial, recreation and port activity when meteorological conditions are calm-to-moderate, with wind contributing to the noise levels on the "noisiest" days. Noise from wave action on the platform itself was minimal owing to the height of the microphone above the water, the relatively narrow piles and short fetch available in the harbour (meaning only small waves in most conditions).

The noise measurement results show that:

- The ambient noise levels inside the Harbour during the day and night are generally elevated. Noise levels of between 50 dB L_{Aeq} and 65 dB L_{Aeq} are common during the day and nighttime period.
- The ambient noise levels inside the Harbour are occasionally as low as 45 dB L_{Aeq} (during the day and night) when vessel traffic is low and meteorological and sea conditions are calm.

Long term measurements to accurately characterise the variation in level over several days and nights were not possible on Matakana Island, Mauão or on land near Pilot Bay due to access and security limitations. Accordingly, we have estimated the ambient noise levels at these areas based on the noise measurements obtained inside the harbour, our experience with sparsely or unpopulated coastal areas and taking into account the influence of vessel noise on these locations. We understand that there are no dwellings (or other buildings) housing receivers of noise on Mauão or on the area of Matakana Island that is near to the Project.

We expect that the noise levels on the northeastern end of Matakana Island (near Panepane point) and on the lower slopes of Mauão to be similar to the levels we have measured inside the harbour. We expect that the noise levels near the shore in these areas will be dominated by vessel traffic and wind and wave action, with the noise from PoTL likely comprising a 'hum' at a lower level that is sometimes audible depending on meteorological conditions. The noise levels at these locations will be highest when they are downwind of the relevant noise sources or the wind is on-shore. We expect that the noise levels on the shore at Pilot Bay will also be similar. Overall, we consider that these areas are dominated by wind and wave action on the shore, vessel traffic and in some cases the 'hum' from PoTL.

We expect that the noise levels further inland and away from the shore on Matakana Island and Mauão will be lower when meteorological conditions are calm compared to levels we have measured in the harbour. This will be largely due to being further way from the vessel traffic and wave action on the shores. However, the noise from the Project will also reduce at receiver locations that are further inland.

Noise measurements closer to State Highway 2 were not undertaken. We expect that the noise environment in the general vicinity of State Highway 2 will be high and dominated by traffic on the state highway, local roads and the industrial activity in the area.

8.0 Assessment of noise effects

We have recommended Project Noise Standards that control noise levels from capital and maintenance dredging activities using the recommended noise limits and assessment methods in the Construction Noise Standard.

We have assessed the actual and potential Project noise levels in terms of:

- The sensitivity of the zones and land use activities where Project levels may be audible
- The permitted level of Port noise authorised by the relevant RCEP and TCP noise standards at each zone
- The extent to which Project noise levels may be audible above ambient noise levels inside Port of Tauranga.

Figure 8 displays the land-based zoning arrangements adjacent to the works. The assessment of effects should be read in conjunction with this map.



Figure 8 Tauranga City Plan Zoning arrangements

8.1 Effects on zones and receivers inside the ICB

8.1.1 Noise effects in the Port Industry Zone and Rail Zone inside the ICB

Noise effects in the Port Industry Zone and Rail Zone inside the ICB



Permitted noise environment	The permitted noise standards for the Port Industry Zone anticipates and provides for elevated noise levels inside this area: • The RCEP and TCP permit port noise levels of up to 65 dB L_{dn} when measured and assessed at the ICB. • Rule 4E.2.3 of the TCP permits noise levels of up to 65 dB L_{Aeq} at any time within the Industry Zone. • Noise emissions from the Rail Zone are not controlled by the TCP. • The TCP permits noise from construction work in the Port Zone at levels generally up to 75dB L_{Aeq}[5] from Monday to Saturday and 45dB L_{Aeq} at night and on Sundays.
Sensitivity to Noise	These zones are not considered to be sensitive to noise as noise sensitive activities are not anticipated or provided for in these zones as a permitted activity.
Ambient noise measurements	We have not undertaken noise measurements in these areas given that they are not sensitive to noise. The noise environment will be dominated by the industrial activities within them.

[5] Rule 4E.2.14 of the TCP refers to the relevant noise limits that apply in the Construction Noise Standard. A 70 dB L_{Aeq} noise limit applies to works between 07:30 and 18:00 Monday to Saturday where the duration of the construction work is " long term duration" (more than 20 weeks).

Noise effects in the Port Industry Zone and Rail Zone inside the ICB	
Recommended noise limits in the Construction Noise Standard	The Construction Noise Standard recommends noise from long-term construction work does not exceed 70 dB L_{Aeq} during the daytime (0730-1800) and 75 dB L_{Aeq} at night time (1800- 0730) when measured and assessed at buildings containing industrial and commercial activities where it is not necessary to prevent sleep disturbance.
Assessment of effects	The highest noise levels at receivers inside the ICB will be generated when dredging operations are undertaken in the vicinity of the Port's wharf structures. Noise levels inside the ICB are predicated to range from 60 dB L_{Aeq} across the log yards, reducing to approximately 45 dB L_{Aeq} at the OCB. The predicted noise levels will readily comply with the noise limits in the Construction Noise Standard. The noise level contours indicate that the worst-case noise levels from dredging activities will be lower than the level of port noise permitted inside the ICB for all receivers in the Port Zone and Industry Zone. We consider that the noise levels will be reasonable at all times.
Recommendations	We recommend that the noise limits in the Construction Noise Standard apply, except that no limits should apply at buildings owned and controlled by the Port.

8.1.2 Noise effects in the High Density Residential Zone, Commercial Zone and Passive and Active Open Space Zones inside the OCB

Noise effects on receivers inside the OCB: The High Density Residential Zone, Commercial Zone and Passive and Active Open Space Zones	
High Density Residential Zone (orange), Commercial Zone (purple) and Passive and Active Open Space Zones (green) inside the OCB (blue line)	
Permitted noise environment	• The RCEP and TCP permit port noise levels of up to 65dB L_{dn} at the ICB and 55 dB L_{dn} at the OCB. • Noise from construction work in the Port Zone at levels generally up to 70dB L_{Aeq} from Monday to Saturday and 45dB L_{Aeq} at night and on Sundays.

Noise effects on receivers inside the OCB: The High Density Residential Zone, Commercial Zone and Passive and Active Open Space Zones	
Sensitivity to Noise	Noise sensitive receivers inside the OCB include residential activity and visitor accommodation. Rule 4E.2.7 (d) of the TCP requires that all noise sensitive activities inside the OCB are acoustically treated from the permitted noise levels in the Port Zone and Port Industry Zone. Habitable rooms must be acoustically treated to achieve a noise level of 45 dB L_{dn} in any habitable room. The design must be based on the external noise levels permitted in the Port Zone and Port Industry Zone during the day and night. The TCP does not manage port noise effects in outdoor living areas. Noise levels from the project may be audible in outdoor living areas. Coronation Park and the Sulphur Point and Marine Park are adjacent to the ICB and inside the OCB. Port Noise levels of between 65 dB L_{dn} and 55 dB L_{dn} are permitted at these locations.
Predicted noise levels from dredging activities	The highest noise levels at receivers inside the OCB (to the north of the Port) will be generated when dredging is carried out in the mid-channel area. The most exposed noise sensitive receivers inside the OCB are located between 26-40 The Mall. These receivers are predicted to receive noise levels of approximately 45- 50 dB L_{Aeq} when dredging operations are undertaken in the mid channel area, to the west of Pilot Bay. The noise level contours show that the noise levels across Coronation Park will be less than 45 dB L_{Aeq}.
Ambient noise measurements	The noise measurements undertaken from Pilot Bay demonstrate that: • The ambient noise levels inside the Harbour during the day and night are generally elevated. Noise levels of between 50 dB L_{Aeq} and 65 dB L_{Aeq} are common during the day and night time period. • The ambient noise levels inside the Harbour are occasionally as low as 45 dB L_{Aeq} (during the day and night) when vessel traffic is low and meteorological and sea conditions are calm.
Recommended noise limits in the Construction Noise Standard	The Construction Noise Standard recommends noise from construction work does not exceed 70 dB L_{Aeq} during the daytime (0730- 1800) and 45 dB L_{Aeq} during the nighttime period when measured and assessed at buildings containing residential dwellings or any building where it is necessary to prevent sleep disturbance.
Assessment of effects	The noise level contours demonstrate that the worst-case predicted dredging noise levels for receivers located between the ICB and OCB will be less than 50 dB L_{Aeq}. This is significantly less than the level of noise that is authorised by the TCP for operational port noise. The ambient noise measurements obtained from Pilot Bay characterise the noise amenity in this area of the Harbour. The noise measurements show that the noise levels of mid-channel dredging activity are only likely to be

Noise effects on receivers inside the OCB: The High Density Residential Zone, Commercial Zone and Passive and Active Open Space Zones	
	audible above harbour vessel traffic when vessel traffic is low and meteorological and sea conditions are calm. All noise sensitive receivers inside this area are required by the TCP to be acoustically treated from Port noise. The noise limits in the Construction Noise Standard are designed to deliver an adequate level of internal noise amenity for receivers that are not acoustically treated. We consider that the indoor noise levels experienced by receivers inside the OCB will be reasonable. We consider that dredging noise levels received in outdoor living areas will also be reasonable. Dredging noise levels received in Coronation Park will not be audible above background noise levels.
Recommendations	We have not identified the need for any restrictions to manage noise effects on these receivers.

8.1.3 Effects on Residential Zone receivers outside the OCB

Noise effects on Residential Zone receivers outside the OCB	
	
Permitted noise environment	• Port noise, where it does not exceed 55 dB L_{dn} when measured and assessed at any location beyond the OCB. • Rule 4E.2.1 of the TCP permits noise levels of 50 dB L_{Aeq} during the daytime (0700-2200) and 40 dB L_{Aeq} (2200-0700) during the nighttime in the Residential Zone. • Rule 4E.2.14 of the TCP permits noise levels from construction work in accordance with the noise limits in the Construction Noise Standard, except during the summer amenity period when the noise limits in Rule 4E.2.1 apply[6] to receivers in Mount Maunganui area from Adams Avenue to Grace Avenue.

[6] Rule 4E.2.14 of the TCP includes a summer respite period for construction noise. The noise limits in the Construction Noise Standard apply at all times, except for the period between 20 December and 10 January

Noise effects on Residential Zone receivers outside the OCB	
	• Noise from construction work in the CMA and Port Zone at levels generally up to 70dB L_{Aeq} from Monday to Saturday and 45dB L_{Aeq} at night and on Sundays.
Sensitivity to Noise	This zone contains residential dwellings that are not required to be acoustically treated. The Residential Zones are considered to be noise sensitive.
Predicted noise levels from dredging activities	The highest dredging noise levels received in the High Density Residential Zone of Mount Maunganui are predicted to occur when dredging operations are undertaken in the mid-channel area to the west of Pilot Bay Beach. Noise levels at the shoreline of Pilot Bay are predicted to range from 50 dB L_{Aeq}, reducing to 40 dB L_{Aeq} on the eastern side of the peninsular at Mount Maunganui main beach.
Recommended noise limits in Construction Noise Standard	The Construction Noise Standard recommends noise from construction work does not exceed 70 dB L_{Aeq} during the daytime[7] and 45 dB L_{Aeq} during the nighttime when measured and assessed at buildings containing residential dwellings or any building where it is necessary to prevent sleep disturbance.
Assessment of effects	**Noise effects during the daytime** The Construction Noise Standard recommends a daytime noise limit of 70 dB L_{Aeq} for construction noise received by residential receivers. The most exposed residential receivers are predicted to receive dredging noise levels of approximately 50dB L_{Aeq}. The predicted dredging noise levels would be perceived as being significantly less than a noise level of 70 dB L_{Aeq}. This noise level consistent with the level of noise permitted in the Residential Zones of the TCP[8]. The ambient noise measurements obtained from Pilot Bay characterise the noise amenity in this area of the Harbour. The noise measurements show that the noise levels dredging activity to the west of Pilot Bay are only likely to be audible to the closest receivers when vessel traffic is low and meteorological and sea conditions are calm. We expect these occasions will be very limited and in most cases the ambient noise levels will be higher. Rule 4E.2.14 of the TCP includes a summer respite period for construction noise. The rule requires that construction work undertaken

(inclusive), when noise from construction work must meet the more stringent Residential Zone noise limits in Rule 4E.2.1. This rule only applies to construction noise received within the Mount Maunganui area from Adams Avenue to Grace Avenue.

[7] Between 0630- and 2000 on Weekdays and between 0730 and 1800 on Saturday and Sunday.

[8] Rule 4E.2.1 of the TCP permits noise levels of 50 dB L_{Aeq} during the daytime period in the Residential Zones.

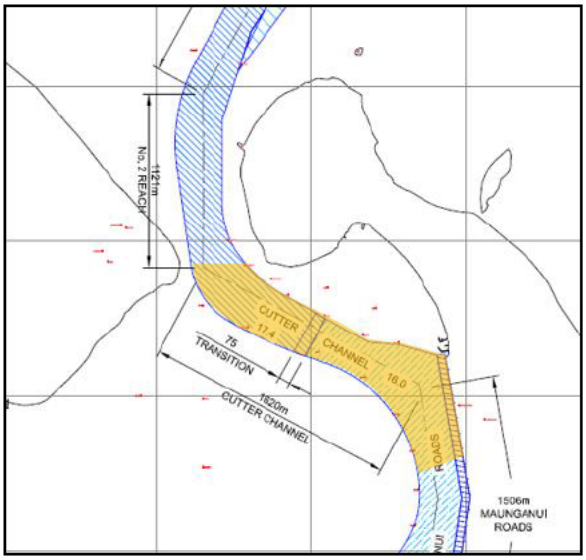
Noise effects on Residential Zone receivers outside the OCB	
	between 20 December and 10 January must comply with the underlying zone noise limits in Rule 4E.2.1 when measured and assessed at receivers within the Mount Maunganui area from Adams Avenue to Grace Avenue. The noise level predictions indicate that dredging noise levels undertaken during the daytime period will readily comply with the noise limits in Rule 4E.2.1 and therefore it is not necessary to limit activities in the respite period. The outdoor level of noise will be compliant with the guideline noise limits in the Construction Noise Standard and the permitted noise levels in the Residential Zones of the TCP. We consider that the dredging noise levels received in outdoor living areas will be reasonable. **Noise effects during the nighttime** The Construction Noise Standard recommends a nighttime noise limit of 45 dB L_{Aeq} for residential receivers. This noise limit is designed to deliver an adequate level of internal noise amenity for noise sensitive receivers that are not acoustically treated. The noise limit is also designed to provide adequate protection from sleep disturbance when allowing for partially open windows for cooling and ventilation. The noise level predictions demonstrate that nighttime dredging works in the channel to the west of Pilot Bay will require mitigation in order to comply with a noise limit of 45 dB L_{Aeq} at the most exposed residential receivers. We have recommended that dredging works within the area shown in Figure 9 are undertaken during the daytime period, unless an NMP is provided that demonstrates that the works can comply with a noise limit of 45dB L_{Aeq}. The NMP will confirm any physical or operational noise mitigation measures that must be observed to ensure compliance with the nighttime noise limits. This may include restrictions on operating in specific meteorological conditions. For example, it may be that dredging can comply with the relevant nighttime noise limits in wind conditions that impede propagation of noise levels toward the residential areas of Mount Maunganui (i.e. when wind is blowing from 0 degrees through to 90 degrees (north-through-east). We expect that the noise levels from dredging may at times be audible but we do not expect any sleep disturbance or amenity issues when noise levels are compliant with 45dB L_{Aeq} at night.
Recommendations	We recommend conditions of consent deliver the following outcomes: • Impose and require compliance with the recommended noise limits in the Construction Noise Standard. • Enable dredging works during the daytime period (i.e. between 0630- and 2000 on Weekdays and between 0730 and 1800 on Saturday and Sunday). We have not identified the need for any specific noise mitigation measures to ensure

compliance with the construction noise limits that apply during the daytime period.

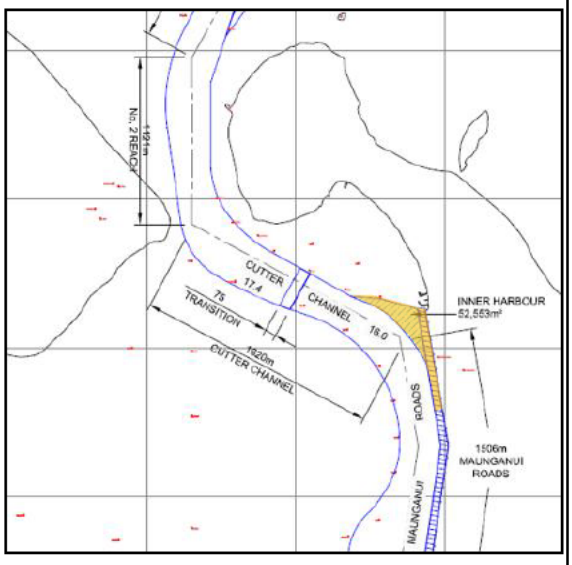
- Require any dredging works inside parts of Cutter Channel (shown in Figure 9) to be undertaken between the hours of 0630- and 2000 on weekdays and between the hours of 0730 and 1800 on weekends, unless an NMP is provided that demonstrates that the vessel and plant selected for the work will comply with the Construction Noise Standards that apply during the proposed hours of work. The NMP must identify any controls (i.e. operating in specific meteorological conditions, or other physical or management-based mitigation measures) that may be required to ensure compliance.

Figure 9 Daytime dredging only

Between the hours of 0630- and 2000 on weekdays and between 0730 and 1800 on weekends, unless works outside of these hours are authorised by an NMP



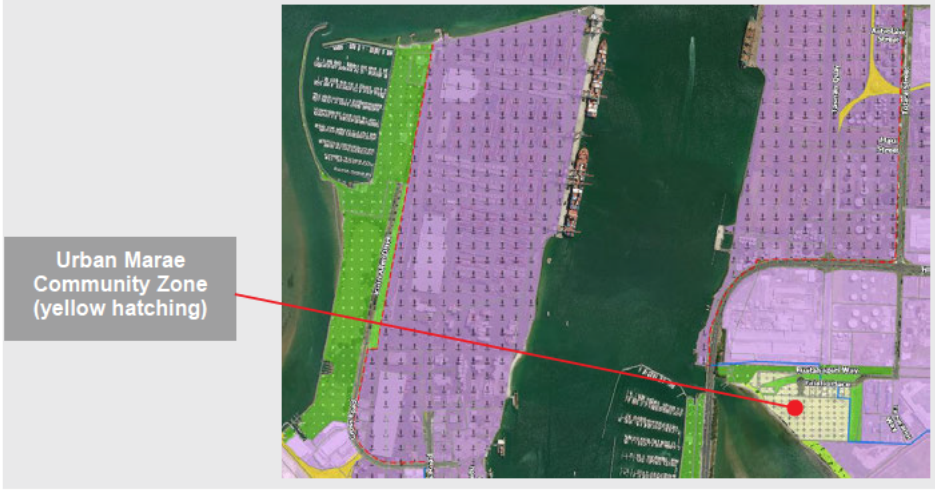
Maintenance dredging



Capital dredging

8.1.4 Effects on the Whareroa Marae in the Urban Marae Community Zone

Noise effects on receivers in the Whareroa Marae in the Urban Marae Community Zone



Permitted noise environment	**Port Noise levels permitted by RCEP and TCP:** • Port noise where it does not exceed 55 dB L_{dn} when measured and assessed at any location beyond the OCB. **TCP permitted noise standards (for noise that is generated and received on land):** • Rule 4E.2.3 requires of the TCP requires that noise levels from the Industry Zone must not exceed 50 dB L_{Aeq} during the daytime (0700-2200) and 40 dB L_{Aeq} (2200-0700) during the nighttime in the Urban Marae Community Zone. • Rule 4E.2.14 of the TCP permits noise levels from construction work in the Port Zone in accordance with the noise limits in the Construction Noise Standard.
Sensitivity to Noise	We understand that the Marae is used for a range of noise-sensitive activities including residential, accommodation and educational activities. We also understand the Marae also accommodate a range of other activities that are not defined by the TCP as noise sensitive, but are sensitive to noise nonetheless. Such activities are likely to include hui, Tangi and other ceremonies.
Recommended noise limits in Construction Noise Standard	The Construction Noise Standard recommends noise from long-term construction work does not exceed 70 dB L_{Aeq} during the daytime[9] and 45 dB L_{Aeq} during the nighttime when measured and assessed at buildings containing residential dwellings or any building where it is necessary to prevent sleep disturbance.
Predicted noise levels from dredging activities	The highest dredging noise levels received in the Whareroa Marae are predicted to occur when maintenance dredging operations are undertaken using a BHD at the closest position inside Stella Passage

[9] Between the hours of 0630- and 2000 on weekdays and between the hours of 0730 and 1800 on weekends.

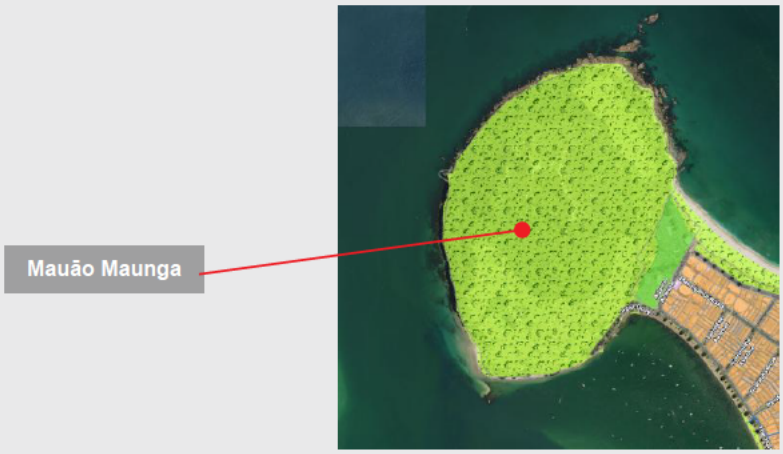
Noise effects on receivers in the Whareroa Marae in the Urban Marae Community Zone	
	relative to the Marae. The most exposed dwellings inside the Marae (east of the Whareroa boat ramp and the closest dwelling to the shoreline) are predicted to receive noise levels of up to 45 dB L_{Aeq}.
Assessment of effects	**Daytime noise effects** The predicted worst-case noise level of 45dB L_{Aeq} for BHD dredging will be a low level of noise that will not likely be audible above the background noise environment from State Highway 2, the Port Zone and Port Industry Zone and Airport. **Nighttime noise effects** The point receiver calculations in the project noise model indicate that the worst-case noise levels received at the Whareroa Marae will be approximately 45 dB L_{Aeq} when the BHD is undertaking maintenance dredging at the closest position inside Stella Passage relative to the Marae. This level of noise will comply with the noise limits in the Construction Noise Standard that are designed to protect non-acoustically treated noise sensitive receivers from sleep disturbance effects.
Recommendations	The noise level predictions demonstrate that proposal can comply with the recommended noise limits in the Construction Noise Standard at the Whareroa Marae. We have not identified the need for any specific noise mitigation to ensure compliance during the day or nighttime periods.

8.2 Noise effects on Mauão Maunga and Matakana Island

We understand Mauão Maunga and Matakana Island comprise high amenity areas of significant cultural significance to Iwi and are of high recreational value to the community. We have therefore considered the potential noise effects on these areas although they do not contain land use activities that fall under the TCP definition of "noise sensitive activities".

8.2.1 Effects on Mauão Maunga

Noise effects on Mauão Maunga



Activities within this area	Sacred tupuna maunga to Tauranga Iwi. A reserve of high cultural significance and recreational value.
Permitted noise environment	Mauão Reserve is at the harbour entrance and near to the Port Zone. The RCEP and TCP authorise long-term average sound levels up to 55 dB L_{dn} from port operations at Mauão Reserve. The TCP does not control the level of noise from other zones received within the Open Space zones. The noise from construction work received in open space areas is not controlled by the TCP. The construction noise limits only apply at occupied buildings.
Predicted noise levels from dredging activities	The highest levels of noise from the dredging vessel will be experienced when dredging is carried out at the channel entrance, and when the dredging vessel transits the harbour entrance. These are generally intermittent / transient events. The noise level contours show that the highest noise levels at the western base of Mauão (i.e. in the vicinity of Te Ara Tutanga walking track) are predicted to be approximately 60 dB $L_{Aeq(1hr)}$. The noise levels at Te Tihi o Mauão are predicted to be lower than 45 dB $L_{Aeq(1hr)}$. These higher noise levels will be experienced when the dredging vessel is actively dredging very near to Mauão. The noise levels will be significantly lower when the

Noise effects on Mauão Maunga	
	vessel moves to and from the disposal area or when it is working in the outer channel. The noise levels at these locations over the day are predicted to be much lower, with average noise levels of approximately 40-45dB $L_{Aeq(12hr)}$ being typical.
Recommended noise limits in Construction Noise Standard	The Construction Noise Standard does not provide recommended noise limits for open space zones that do not contain occupied buildings.
Assessment of effects	The dredging work is likely to be audible when the TSHD is actively dredging close to Mauão. These periods will generally be short and interspersed with quiet periods when the vessel is moving to and from the disposal area, or when it is working in the inner harbour or outer channel. We expect that the higher noise levels will be clearly audible as a 'hum' of the diesel engines and hydraulic pumps. The predicted levels show that it will be approximately 10dB quieter (half as loud) as the level of construction noise that is permitted by the TCP and RCEP at an occupied dwelling during the day. The audible effects on Mauão will be temporary and only present for a short proportion of any dredging campaign. We expect that the dredging noise levels will be similar in noise level to the noise generated by other commercial and recreational harbour traffic, and probably less than these sources on days when the harbour is busy.
Recommendations	We do not consider that any specific controls are required to manage the noise effects on Mauão.

8.2.2 Effects on Matakana Island

Noise effects on Matakana Island



Activities within this area	An island of significant cultural value to the five hapū of Matakana and Rangiwaea[10]. Project noise levels will be received at the eastern end of Matakana Island (Panepane Point). We understand this area is predominantly used for forestry and jetty activities.
Permitted noise environment	Matakana Island is directly adjacent to the Port Zone at the harbour entrance. The RCEP authorises long-term average sound levels of 55 dB L_{dn}, from port operations, provided that noise levels measured at the OCB do not exceed 55 dB L_{dn}. Matakana Island is in the Rural Zone of the Western Bay of Plenty District Plan. The Rural Zone noise limits only apply at the notional boundary of residential dwellings. We understand that there are no residential dwellings on or near Panepane Point.
Predicted noise levels from dredging activities	The eastern end of Matakana Island will be exposed to noise from the dredging vessel when dredging is carried out at the channel entrance, and when the dredging vessel transits the harbour entrance. The predicted dredging noise level at Panepane Point is approximately 65 dB $L_{Aeq(1hr)}$, reducing quickly with the attenuation provided by the beach and vegetation. The noise levels at these locations over the day are predicted to be much lower, with average noise levels of approximately 45-50dB $L_{Aeq(12hr)}$ being typical.
Recommended noise limits in Construction Noise Standard	The Construction Noise Standard does not provide recommended noise limits for land that does not contain occupied buildings.

[10] https://atlas.boprc.govt.nz/api/v1/edms/document/A2773684/content

	Noise effects on Matakana Island
Assessment of effects	The dredging work is likely to be audible when the TSHD is actively dredging close to Panepane Point. These periods will generally be short and interspersed with quiet periods when the vessel is moving to and from the disposal area, or when it is working in the inner harbour or outer channel. We expect that the higher noise levels will be clearly audible as a 'hum' of the diesel engines and hydraulic pumps. The predicted levels show that it will be approximately 10dB quieter (half as loud) as the level of construction noise that is permitted by the TCP and RCEP at an occupied dwelling during the day. The audible effects on Panepane Point and Matakana Island will be temporary and only present for a short proportion of any dredging campaign. We expect that the dredging will be similar in noise level to the noise generated by other commercial and recreational harbour traffic, and probably less than these sources on days when the harbour is busy.
Recommendations	We do not consider that any specific controls are required to manage the effects on Matakana Island.

8.3 Cultural Values Reports

We have reviewed feedback from the Cultural Value Reports (**CVR's**) that relate to airborne noise effects.

Our technical work generally focuses on a quantitative assessment of the predicted noise levels (in decibels) from the Project. We use noise level predictions to inform a qualitative assessment of potential noise effects, taking into account measured and predicted existing noise levels and the permitted noise standards prescribed by the RCEP and TCP.

The Cultural Values Report (**CVR**) prepared by Ngāi Tamarāwaho provides a helpful overview of the differences between the western view of the soundscape (typically quantified in decibels) and the cultural soundscape:

> *"The cultural soundscape includes karanga, whaikōrero, karakia, waiata, manu, water, wind, quiet conversation and the environmental sounds through which people understand place. It also includes the absence of intrusive sound where quiet and restraint are required.*
>
> *Dredging noise, vessel movement, night activity, lighting and freight-related sound can change how Te Awanui and connected places are heard and experienced. Even where noise is technically compliant, the cumulative soundscape may still reflect industrial dominance over ancestral presence."*

We are not experts in cultural values; however, we have attempted to provide a meaningful assessment of the potential noise effects on the areas that we understand have significant

cultural significance to Iwi and Hapu. The assessment of effects on Mauão Maunga, Matakana Island and Whareroa Marae are set out in Sections 81.4, 8.2.1 and 8.2.2 of this assessment.

The CVR's provided from Ngāi Tamarāwaho, Waitaha, Ngāi Tukairangi and Ngāti Hangarau raise additional concerns relating to airborne noise effects that we address below.

8.3.1 Potential impacts on Huria Marae

We have assessed the potential impacts on Whareroa Marae given its proximity to the Project.

Ngāi Tamarāwaho raise concerns relating to potential noise effects on Huria Marae:

> *"The airborne noise report assesses dredging noise against construction noise standards and recognises that marae activities such as hui, tangihanga and ceremony may be sensitive to noise. That recognition is important. For Ngāi Tamarāwaho, the same principle applies to Huria. Karanga, whaikōrero, karakia, waiata, tangihanga, wānanga and quiet kōrero between kaumātua and mokopuna require an environment where the mana of the marae is not diminished".*

We understand that that Huria Marae is located at 1 Te Kaponga Street, approximately 3.5kms from the closest area of dredging. We predict that the dredging noise level will be less than approximately 32-33dB L_{Aeq}. This is a very low level of noise that is unlikely to be audible above background sound levels.

We consider that dredging noise will not affect activities such as hui, tangihanga and ceremony at Huria Marea given the large separation distance from the works.

We consider that no specific conditions are required to manage the noise at Huria Marae.

8.3.2 Potential impacts on Motuopae

Ngāi Tamarāwaho raise concerns relating to noise impacts on urupā and wāhi tapu as they may affect Motuopae - the urupā tapu of Ngāi Tamarāwaho. Section 16.2 of Ngāi Tamarāwaho's CVR records:

> *"The sensitivity of these places is not limited to whether physical remains are disturbed. A wāhi tapu may be affected by changes in surrounding waters, sediment movement, erosion, access, noise, vibration, lighting, traffic, visual intrusion, or the cumulative industrialisation of its setting."*

We understand that quietness is important to Ngāi Tamarāwaho to recognise and respect the dignity and values of Motuopae as urupā tapu.

Motuopae is well separated from the works (over 2.7km). We predict that the dredging noise level will be less than approximately 35dB L_{Aeq}. This is a very low level of noise that is unlikely to be audible above background sound levels.

We consider that the airborne noise from the Project will be very low and will not diminish the values of Motuopae. We consider that no specific conditions are required to manage the noise at Motuopae.

8.3.3 Truck, rail and freight noise

Ngāi Tamarāwaho raise concerns relating to noise effects from truck and freight. They consider that:

> "*effects should be addressed only as secondary or cumulative enabled effects where they are linked to port-capacity reliance or the wider Port system. Where that link is established, assessment and reporting must focus on Ngāi Tamarāwaho cultural landscapes and actual cultural receptors".*

Ngāti Hangarau raise similar concerns relating to effects from rail traffic:

> *"Ngāti Hangarau have been heavily affected by port noise since the 1920s when our marae was forced to move to enable the port rail link. To this day, increasing rail traffic as a direct result from increased port developments, continues to interrupt significant cultural events at our marae such as pōhiri and tangihanga"*

This assessment does not include an assessment of truck, rail or freight noise for a number of reasons. The primary reason is that the Project is to reconsent capital and maintenance dredging in the harbour. Additionally, truck, rail and freight noise within the Port are operational noise effects that are controlled by the existing framework of noise controls in the RCEP and TCP. As set out in Section 3.4, the port noise boundaries and associated controls in the RCEP and TCP are designed to control the effects of all ongoing operational Port noise (including future growth), including noise from the trucks and rail sidings within the Port, vessels at berth, craneage, container and log handling, reefers and similar.

The definition of "Port Noise" in the Port Noise Standard excludes noise from port-related "construction work" and states that "construction work should be evaluated using NZS 6803' (the Construction Noise Standard). The proposed dredging works fall within the definition of construction work and are therefore assessed in accordance with the Construction Noise Standard.

In summary, operational noise from trucks, rail and freight movements within the Port will continue to be controlled using the robust framework of noise limits and controls in the RCEP and TCP and are outside the scope of this Project.

8.3.4 Request for noise monitoring and mitigation

Ngāi Tukairangi and Waitaha request that PoTL undertakes noise monitoring and mitigation associated with dredging noise. Waitaha request specific consideration of night time management controls.

This assessment has been informed by a comprehensive noise modelling exercise that is informed by monitoring data obtained from previous dredging noise measurements. We

consider that there is no need for ongoing noise monitoring to demonstrate the Project can comply with the Project Noise Standards given the noise model has been informed by accurate data and taking into account the predicted margin of compliance.

The only exception applies to any night time works within the identified area of Cutter Channel (Figure 9). We have recommended that a NMP must be provided to demonstrate works can comply with the relevant noise limits before any night time works commence. We expect that NMP will need to be informed by additional noise measurements and/ or noise modelling to demonstrate compliance. This will be addressed in the NMP if night works are required.

8.3.5 Summary of response to CVRs

We have reviewed the relevant parts of the CVRs. We consider that no specific changes to the proposed noise management measures are required, and that no specific changes to the proposed conditions are necessary.

8.4 Overall conclusion on noise effects

Our assessment has concluded that the noise from the Project can be controlled to meet the Project Noise Standards (from the Construction Noise Standard).

Our assessment finds that some restrictions on dredging at night time may be required to manage the noise levels from Cutter Channel dredging works received in the residential zones adjacent to Pilot Bay. The proposal is to ensure that works within the identified area of Cutter Channel (Figure 9) are undertaken during the daytime period[11], unless an NMP is provided that demonstrates the works can comply with the relevant noise limits that apply for the proposed hours of work. The NMP will specify the nature and extent of any restrictions that must be observed, which will be informed by the noise emissions of the plant that is selected for the Project.

The effects on the various receivers are summarised below:

Noise effects in the Port Industry Zone and Rail Zone inside the ICB

The predicted noise levels will readily comply with the noise limits in the Construction Noise Standard. The noise level contours indicate that the worst-case noise levels from dredging activities will be lower than the level of port noise permitted inside the ICB for all receivers in the Port Zone. We consider that the noise levels will be reasonable at all times.

Noise effects on receivers inside the OCB: The High Density Residential Zone, Commercial Zone and Passive and Active Open Space Zones

The noise level contours demonstrate that the worst-case predicted dredging noise levels for receivers located between the ICB and OCB will be less than 50 dB $L_{Aeq.}$ This is significantly less than the level of noise that is authorised by the TCP for operational port noise. The noise

[11] Whareroa Marae

measurements show that the noise levels of mid-channel dredging activity are only likely to be audible above harbour vessel traffic when vessel traffic is low and meteorological and sea conditions are calm. We consider that the noise levels will be reasonable at all times.

Noise effects on Residential Zone receivers outside the OCB

The most exposed residential receivers are predicted to receive dredging noise levels of approximately 50dB $L_{Aeq.}$ The predicted dredging noise levels would be perceived as being significantly less than the permitted construction noise level of 70 dB L_{Aeq} that applies during the day time period[12].

Night time dredging works in the channel to the west of Pilot Bay Beach (shown in Figure 9) may only be undertaken during the day time unless an NMP is provided that demonstrates how dredging can be undertaken at night in compliance with the permitted noise standard of 45dB L_{Aeq}. This could include (for example) allowing night works to be undertaken when the wind is blowing from 0 degrees through to 90 degrees (north-through-east) or by using quieter dredging plant that may be able to work at night in any meteorological conditions and still comply with the noise limits. In the event that the consent holder proposes to undertake dredging outside of the daytime hours[13], an NMP must be submitted that demonstrates compliance with the relevant noise limits, including the operational parameters that must be observed to ensure compliance.

We expect that the noise levels from dredging may be audible at times, but we do not expect any sleep disturbance or amenity issues when noise levels are compliant with 45dB L_{Aeq} at night. With these restrictions observed we expect the noise levels to be reasonable at all times.

Noise effects on receivers in the Whareroa Marae in the Urban Marae Community Zone

Buildings containing noise sensitive activities inside the Marae are predicted to receive worst-case noise levels no greater than 45dB $L_{Aeq(1hr)}$ when the BHD vessel is operating at the closest part of Stella Passage relative to the Marae. This represents a low level of noise that will not be audible above the background daytime noise environment from State Highway 2, the Port Zone and Port Industry Zone and Airport. These noise levels are predicted to comply with the nighttime noise limits that are designed to provide noise sensitive receivers with adequate protection from sleep disturbance effects.

Noise effects on Mauão Maunga and Matakana Island

The dredging work is likely to be audible when the TSHD is actively dredging close to Mauão and Matakana Island. These periods will generally be short and interspersed with quiet periods when the vessel is moving to and from the disposal area, or when it is working in the inner harbour or outer channel. The audible effects on Mauão and Matakana Island will be temporary and only present for a short proportion of the overall Project.

[12] Between the hours of 0630- and 2000 on weekdays and between the hours of 0730 and 1800 on weekends.

[13] Between the hours of 0630- and 2000 on weekdays and between the hours of 0730 and 1800 on weekends.

We expect that the dredging will be similar in noise level to the noise generated by other commercial and recreational harbour traffic, and probably less than these sources on days when the harbour is busy. We consider that these effects will be reasonable.

Noise effects on Cultural Values

We have reviewed the relevant parts of the CVRs. We consider that no specific changes to the proposed noise management measures are required, and that no specific changes to the proposed conditions are necessary. This is primarily due to the very low level of noise that will be experienced at the Huria Marae and Motuopae, the proposed night time noise management measures and that the Project is to reconsent capital and maintenance dredging and does not seek to authorise an increase in truck or freight noise.

8.5 Overall noise effects

Our assessment and predictions demonstrate that the Project can be managed to comply with the Project Noise Standards. Works inside parts of Cutter Channel must be undertaken during the daytime period[14] unless a NMP is submitted that demonstrates how the works can comply with the construction noise limits that apply at night.

We have assessed the potential effects against the following criteria:

- Less than minor effects are those which are discernible day to day effects but are too small to be troublesome or annoying to most people.
- Minor effects are those which are clearly noticeable and may cause adverse reaction from time to time and for some people.
- More than minor effects are those which will be (at least) problematic and likely to result in adverse reaction from most people.

It is our opinion that the noise and vibration effects from the Project will be less than minor in all cases.

9.0 Recommended conditions of consent

We have worked with the Project Team to develop conditions of consent that deliver the following outcomes:

- Compliance with the Project Noise Standards to control the level of noise at noise sensitive receivers exposed to dredging noise. We have recommended the Project Noise Standards do not apply at any property or building under the ownership or control of PoTL (or its entities or subsidiaries). The Project Noise Standards are taken from

[14] Between the hours of 0630- and 2000 on weekdays and between the hours of 0730 and 1800 on weekends.

the Construction Noise Standard and represent the permitted standard for construction work in the CMA.

- That works inside the area shown in Figure 9 must be undertaken between the hours of 0630 and 2000 on weekdays and between the hours of 0730 and 1800 on weekends, unless an NMP is developed and certified before any works outside of these hours commence. The NMP will be required to set out all noise mitigation measures required to ensure compliance with the relevant noise limits for the proposed hours of work.

10.0 Conclusion

Styles Group has assessed the airborne noise effects from capital and maintenance dredging works in the Port Zone of Tauranga Harbour.

We have recommended Project Noise Standards that are consistent with the noise limits for "long-term duration" construction work in the Construction Noise Standard. The noise limits in the Construction Noise Standard are used to manage the noise effects from maintenance and capital dredging works across New Zealand and are adopted by the TCP to manage construction noise effects on noise sensitive activities.

Our assessment demonstrates that the Project can be completed whilst complying with the Project Noise Standards, subject to a restriction on nighttime works[15] within an area of Cutter Channel. An NMP must be developed and certified before any nighttime works can occur within this area. The predicted noise levels during the day are predicted to comply with the applicable Project Noise Standards and in most cases by a significant margin. We consider the noise levels will be reasonable for all receivers.

[15] Works outside the hours of hours of 0630- and 2000 on weekdays and between the hours of 0730 and 1800 on weekends.

Appendix A Glossary of terms

Noise	A sound which serves little or no purpose for the exposed persons and is commonly described as 'unwanted sound'. The definition of noise includes vibration under the Resource Management Act.
Best practicable option	Defined in section 2 of the Resource Management Act as: in relation to a discharge of a contaminant or an emission of noise, means the best method for preventing or minimising the adverse effects on the environment having regard, among other things, to— a. the nature of the discharge or emission and the sensitivity of the receiving environment to adverse effects; and b. the financial implications, and the effects on the environment, of that option when compared with other options; and c. the current state of technical knowledge and the likelihood that the option can be successfully applied.
dB (decibel)	The basic measurement unit of sound. The logarithmic unit used to describe the ratio between the measured sound pressure level and a reference level of 20 micropascals (0 dB).
A-weighting	A frequency filter applied to the full audio range (20 Hz to 20 kHz) to approximate the response of the human ear at lower sound pressure levels.
Z-weighting	Zero frequency weighting. No filter is applied to the measured level.
Ambient noise	Ambient noise is the total of all noise within a given environment, comprising a composite of sounds from sources near and far.
Total sound	The totally encompassing sound in a given situation at a given time, from all sources near and far including the specific sound.
Residual sound	The total sound remaining at a given position in a given situation when the specific sounds under consideration are suppressed or are an insignificant part of the total sound.
Specific sound	The component of total sound that can be identified as associated with a specific source e.g. the noise from a proposed activity.
Background noise	See LA90(t).
$L_{A90(t)}$ (dB)	The A-weighted sound level in decibels equalled or exceeded for 90% of the of the measurement interval. It is the component of the total sound that subjectively is perceived as continuously present. Used in New Zealand as the descriptor for background noise in the 2008 versions of the N.Z. Standards NZS 6801 and NZS 6802.

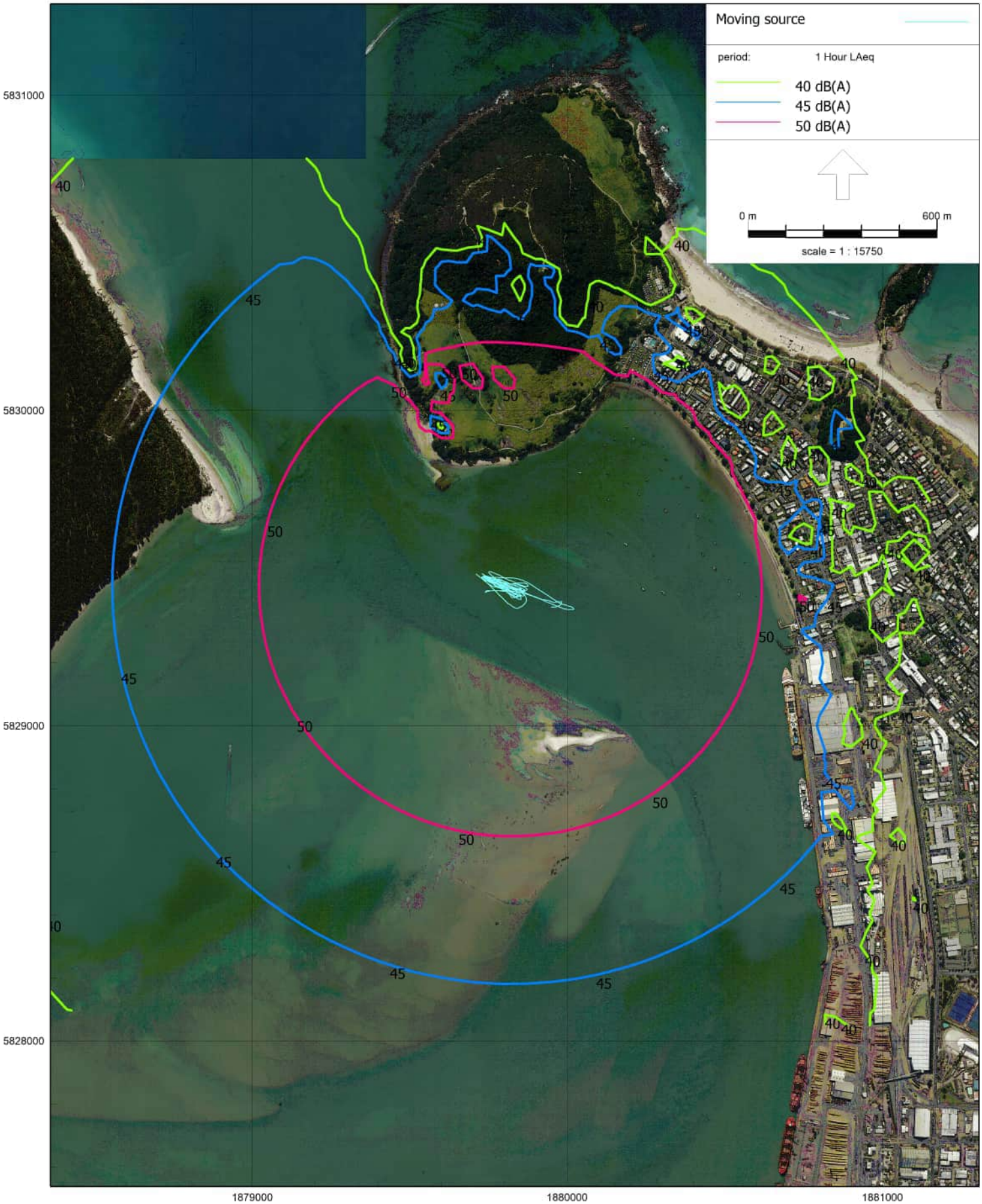
$L_{A95(t)}$ (dB)	The A-weighted sound level in decibels equalled or exceeded for 95% of the of the measurement interval. It is the component of the residual sound that subjectively is perceived as continuously present. Used in New Zealand as the descriptor for background noise in the 1991 and 1995 versions of the N.Z. Standards NZS 6801 and NZS 6802.
$L_{Aeq(t)}$ (dB)	The A-weighted equivalent sound pressure level with the same energy content as the measured varying acoustic signal over a sample period (t). The preferred metric for sound levels that vary over time because it takes into account the total sound energy over the time period of interest.
L_{AFmax} (dB)	The maximum A-weighted sound pressure level recorded during the measurement period using a fast time-weighting response.
Notional boundary	A line 20 metres from any side of a residential unit or other building used for a noise sensitive activity, or the legal boundary where this is closer to such a building.
NZS 6801:2008	N.Z. Standard NZS 6801:2008 Acoustics – Measurement of environmental sound.
NZS 6802:2008	N.Z. Standard NZS 6802:2008 Acoustics – Environmental noise.
NZS 6803:1999	N.Z. Standard NZS 6803:1999 Acoustics – Construction noise.
The Act	The Resource Management Act 1991.
s16	Section 16 of the Act states that "every occupier of land (including any premises and any coastal marine area), and every person carrying out an activity in, on, or under a water body or the coastal marine area, shall adopt the best practicable option to ensure that the emission of noise from that land or water does not exceed a reasonable level".
ISO 9613-1/2	International Standard ISO9613-1/2 Attenuation of sound during propagation outdoors
NMP	Noise Management Plan. A document to help the consent holder manage noise and vibration emissions during construction works.

Appendix B Noise rating level contours

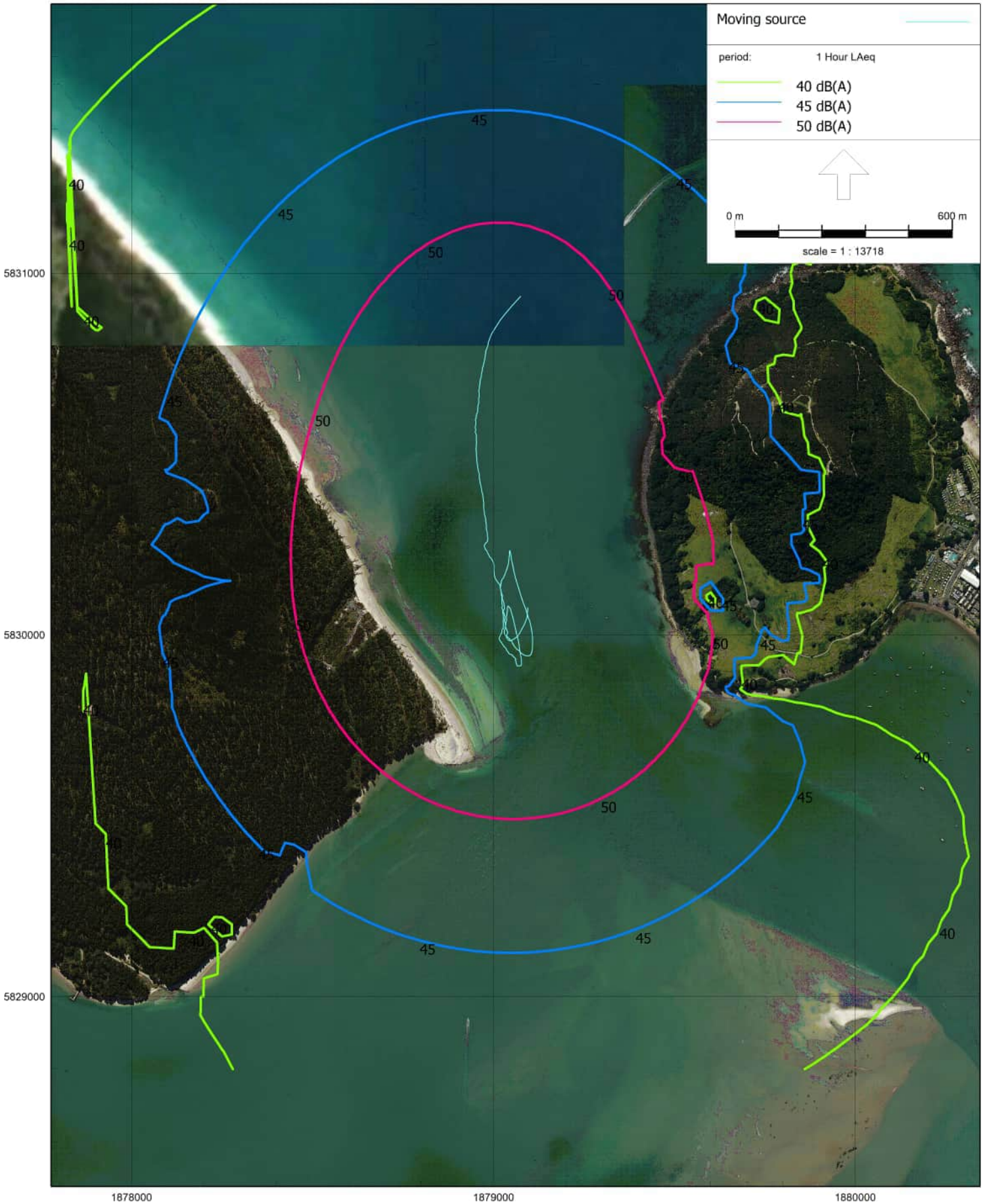
Port of Tauranga_Dredging mid-channel_1 hour LAeq

Styles Group, NZ

13 Mar 2024, 11:45



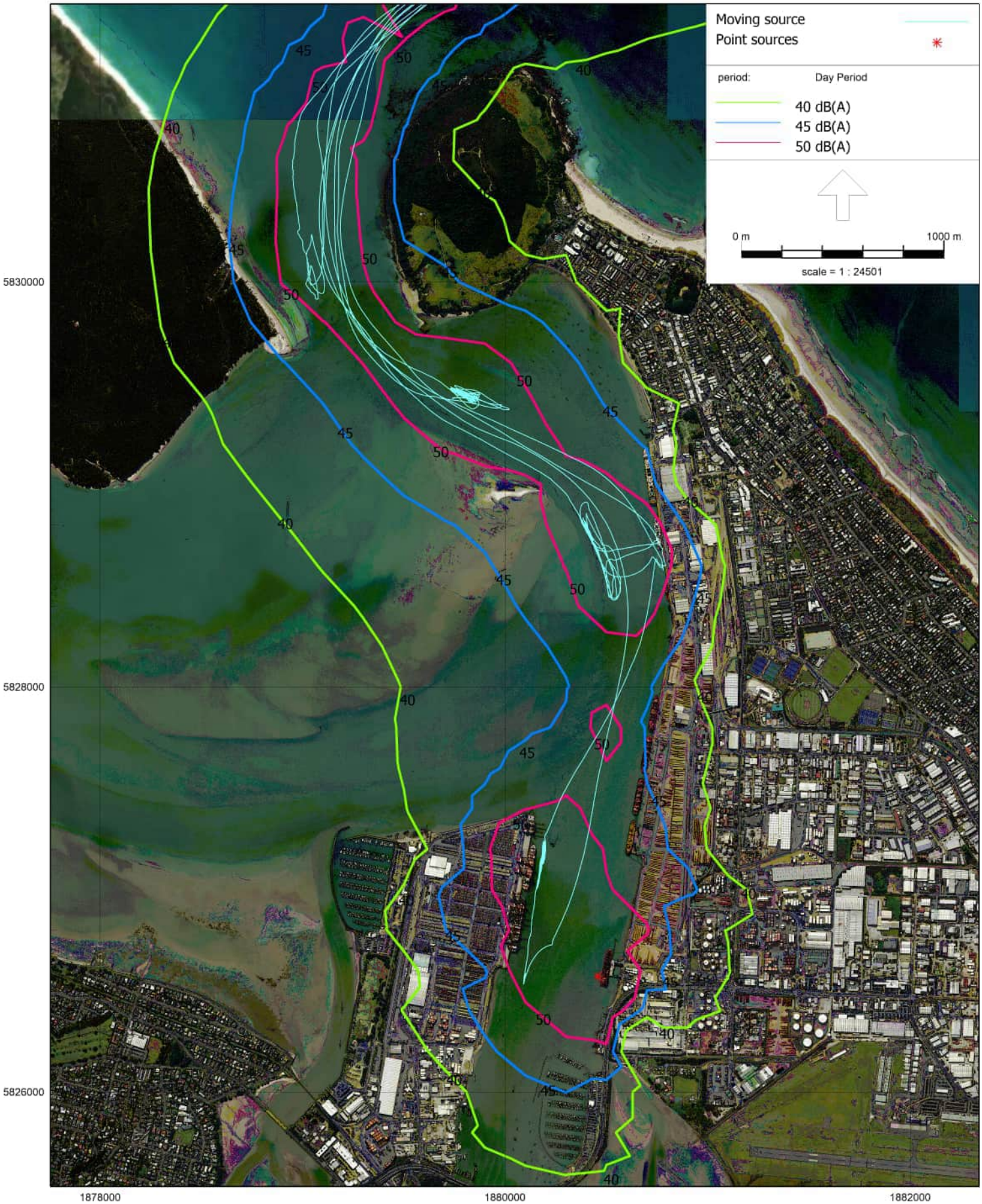
ISO 9613, [version of Area - Port of Tauranga_Dredging mid-channel_1 hour LAeq] , Predictor V2023 Licensed to Styles Group, NZ


Moving source
period: 1 Hour LAeq
40 dB(A)
45 dB(A)
50 dB(A)
0 m
600 m
scale = 1 : 13718
5831000
5830000
5829000
1878000
1879000
1880000

Port op Tauranga_Dredging path A_Daytime LAeq

Styles Group, NZ

13 Mar 2024, 12:00

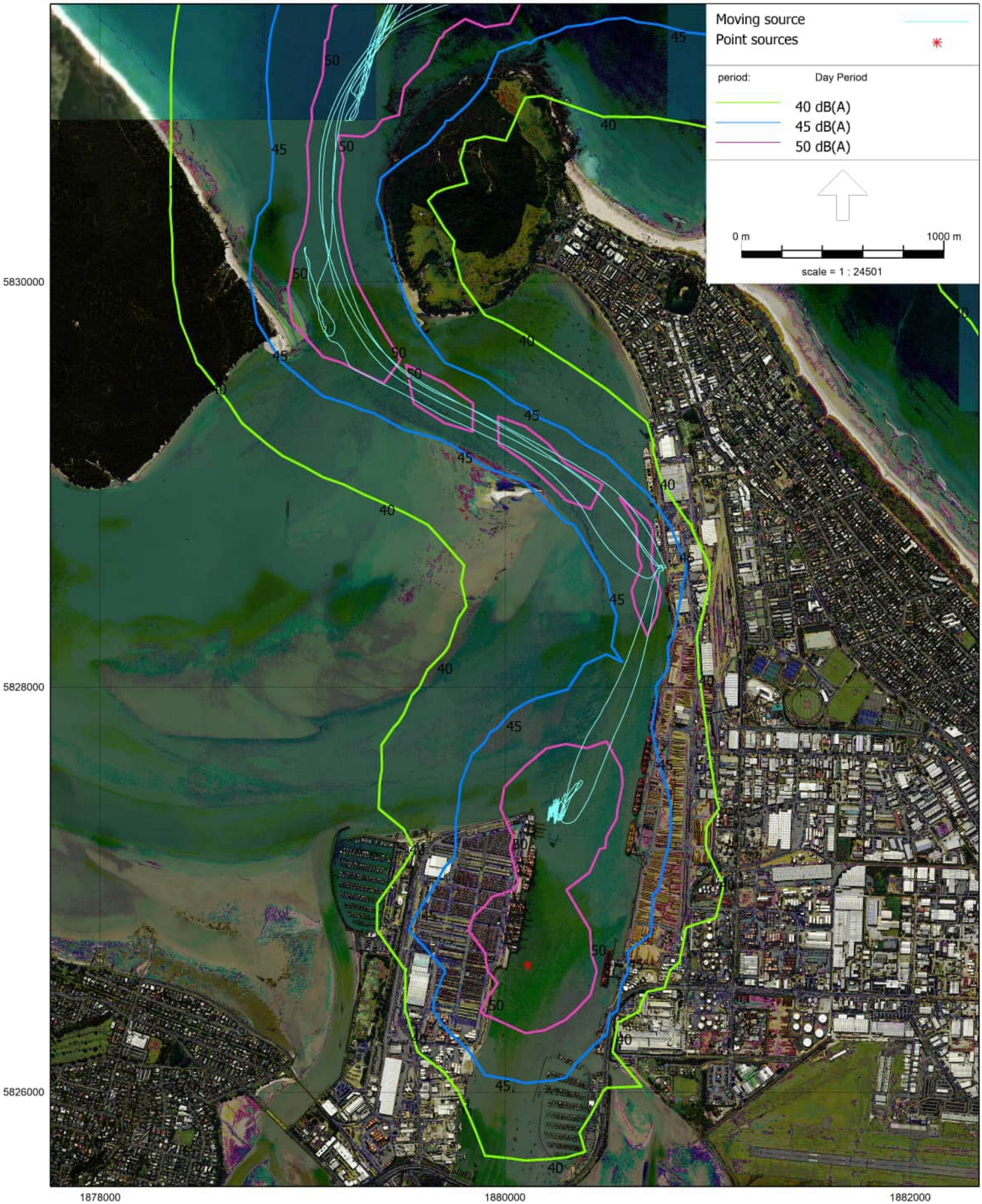


ISO 9613, [version of Area - Port of Tauranga_2 Aug Model_with back hoe right] , Predictor V2023 Licensed to Styles Group, NZ

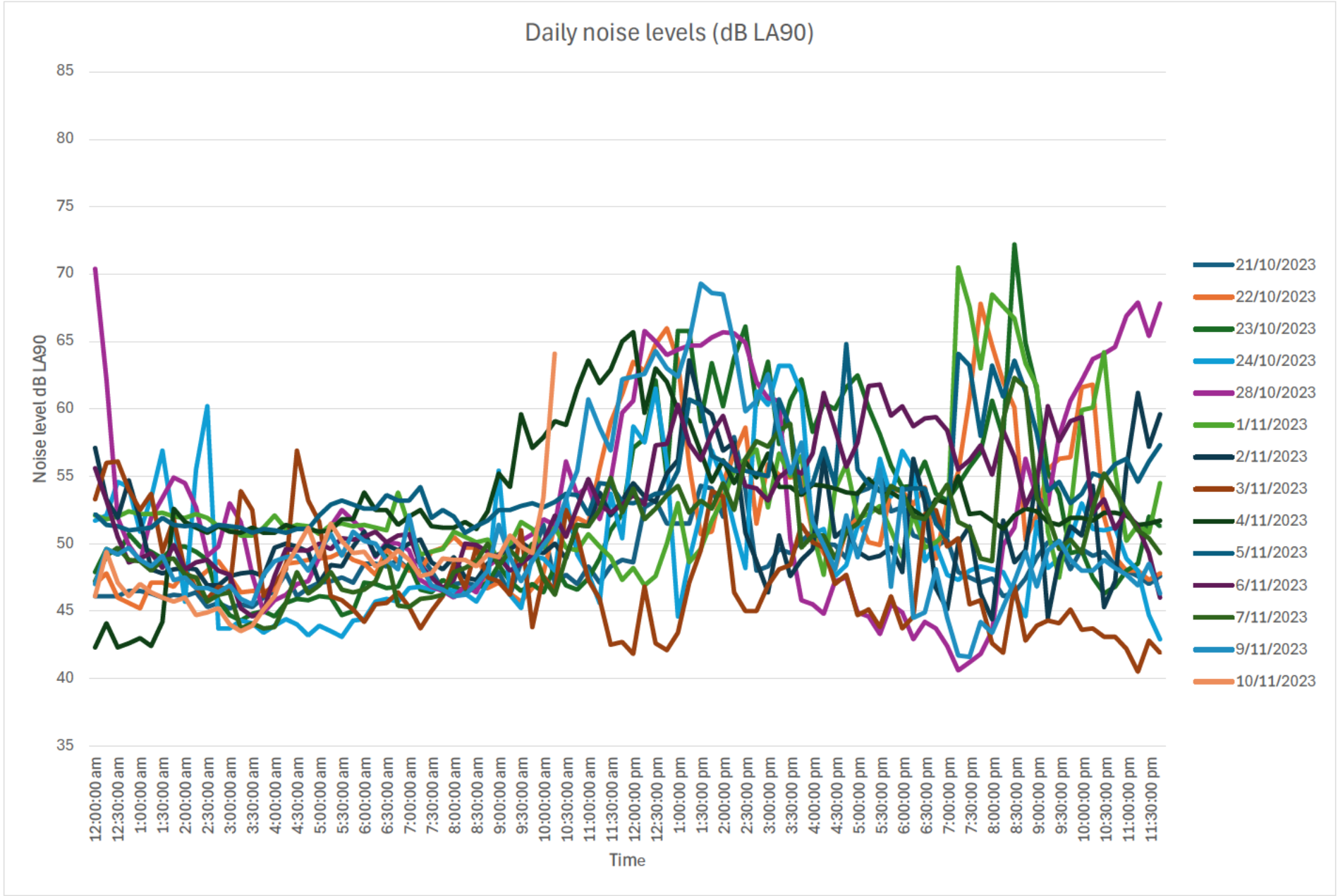
Port op Tauranga_Dredging path B

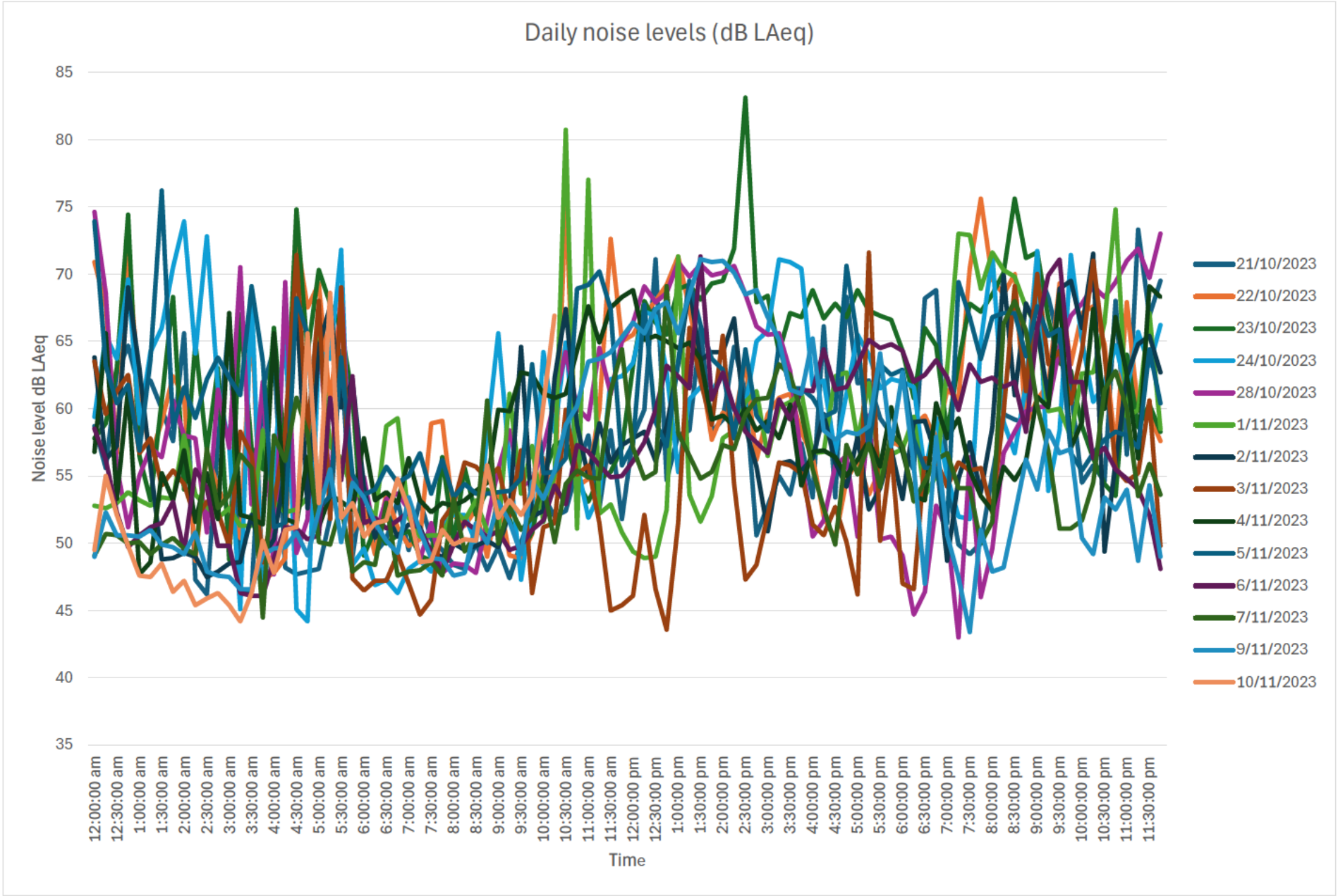
Styles Group, NZ

13 Mar 2024, 12:00



Appendix C Ambient noise measurements inside Tauranga Harbour


Daily noise levels (dB LA90)
Noise level dB LA90
85
80
75
70
65
60
55
50
45
40
35
12:00:00 am
12:30:00 am
1:00:00 am
1:30:00 am
2:00:00 am
2:30:00 am
3:00:00 am
3:30:00 am
4:00:00 am
4:30:00 am
5:00:00 am
5:30:00 am
6:00:00 am
6:30:00 am
7:00:00 am
7:30:00 am
8:00:00 am
8:30:00 am
9:00:00 am
9:30:00 am
10:00:00 am
10:30:00 am
11:00:00 am
11:30:00 am
12:00:00 pm
12:30:00 pm
1:00:00 pm
1:30:00 pm
2:00:00 pm
2:30:00 pm
3:00:00 pm
3:30:00 pm
4:00:00 pm
4:30:00 pm
5:00:00 pm
5:30:00 pm
6:00:00 pm
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8:00:00 pm
8:30:00 pm
9:00:00 pm
9:30:00 pm
10:00:00 pm
10:30:00 pm
11:00:00 pm
11:30:00 pm
Time
21/10/2023
22/10/2023
23/10/2023
24/10/2023
28/10/2023
1/11/2023
2/11/2023
3/11/2023
4/11/2023
5/11/2023
6/11/2023
7/11/2023
9/11/2023
10/11/2023


Daily noise levels (dB LAeq)
Noise level dB LAeq
85
80
75
70
65
60
55
50
45
40
35
12:00:00 am
12:30:00 am
1:00:00 am
1:30:00 am
2:00:00 am
2:30:00 am
3:00:00 am
3:30:00 am
4:00:00 am
4:30:00 am
5:00:00 am
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7:00:00 pm
7:30:00 pm
8:00:00 pm
8:30:00 pm
9:00:00 pm
9:30:00 pm
10:00:00 pm
10:30:00 pm
11:00:00 pm
11:30:00 pm
Time
21/10/2023
22/10/2023
23/10/2023
24/10/2023
28/10/2023
1/11/2023
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10/11/2023