MARSHALL DAY Acoustics

HUTT CITY WHARFLINE REPLACEMENT
CONSTRUCTION NOISE MANAGEMENT PLAN

Rp 002 20240919 | 22 September 2025

MARSHALL DAY Acoustics

Level 2, 5 Willeston Street
PO Box 25442
Wellington 6140 New Zealand
T: +64 4 499 3016
www.marshallday.com

Project: **HUTT CITY WHARFLINE REPLACEMENT**

Prepared for: **Z Energy Ltd**
C/- Mettleworks Ltd
6b Setsan Way, Ngaio
Wellington 6035

Attention: **Brent Cooper**

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1.0 INTRODUCTION

Marshall Day Acoustics has been engaged by Z Energy to prepare a Construction Noise Management Plan (CNMP) for the Hutt City Wharfline (HCWL) project, which involves the installation of a pipeline from Point Howard to the end of Seaview Wharf in Wellington

This CNMP is required to satisfy Condition 16 of consent RM240340 with the Hutt City Council (HCC), and condition 18 of consent WGN250111 with the Wellington Regional Council (WRC). It identifies the performance standards for the Project and sets out best practicable options (BPO) for noise management.

This CNMP will be implemented throughout the construction period. It should be considered a 'living document' that will be expanded and updated as the Project progresses. It is the primary tool for managing the Project's construction noise effects.

A glossary of terminology is included in Appendix A.

2.0 CONTACT DETAILS

Contact details for the relevant personnel are included in Table 1. The Project Manager is ultimately responsible for implementing this CNMP.

Table 1: Contacts

Role	Name	Organisation	Phone	Email
Project Manager	Brent Cooper	Mettleworks Ltd	027 441 4318	brent.cooper@mettleworks.co.nz
Acoustic Specialist	Micky Yang	MDA	029 045 026 05	micky.yang@marshallday.co.nz

3.0 DESCRIPTION OF WORKS

3.1 Overview of Project

The Hutt City Wharfline (HCWL) is a pipeline that stretches from the Seaview Industrial Zone to the Seaview Wharf. The Project is currently at Stage 2, which is to replace the HCWL section between Point Howard and the Seaview Wharf. The pipe will be installed using a pipe-pull method as part of the CPL Seaview Wharf project with no new piling required at the wharfhead. Piling is only required at the shoreside.

3D maps of the project areas are shown on Figure 1, and Figure 2 shows an overview of the pipe pull method. Refer the Little Blue Penguin Management Plan for detailed kororā burrow locations.

The closest receivers are located on Howard Road and Church Lane, set back around 70 m from the works.

Noisy works will be carried out during daytime hours only (7:30 am – 6 pm). Workdays would be Monday to Saturdays and up to three Sundays in a row over the course of the project. Abrasive blasting undertaken on Sundays must be limited to three consecutive Sundays between 7:30 am and 6 pm. The Sunday works are required because of the need to complete the pipeline construction/shore pull during a good weather window.

The pipeline construction/shore pull duration is estimated at 15 – 16 days. The overall project is scheduled to last approximately 10 months.

Figure 1: Site map of shoreside work area

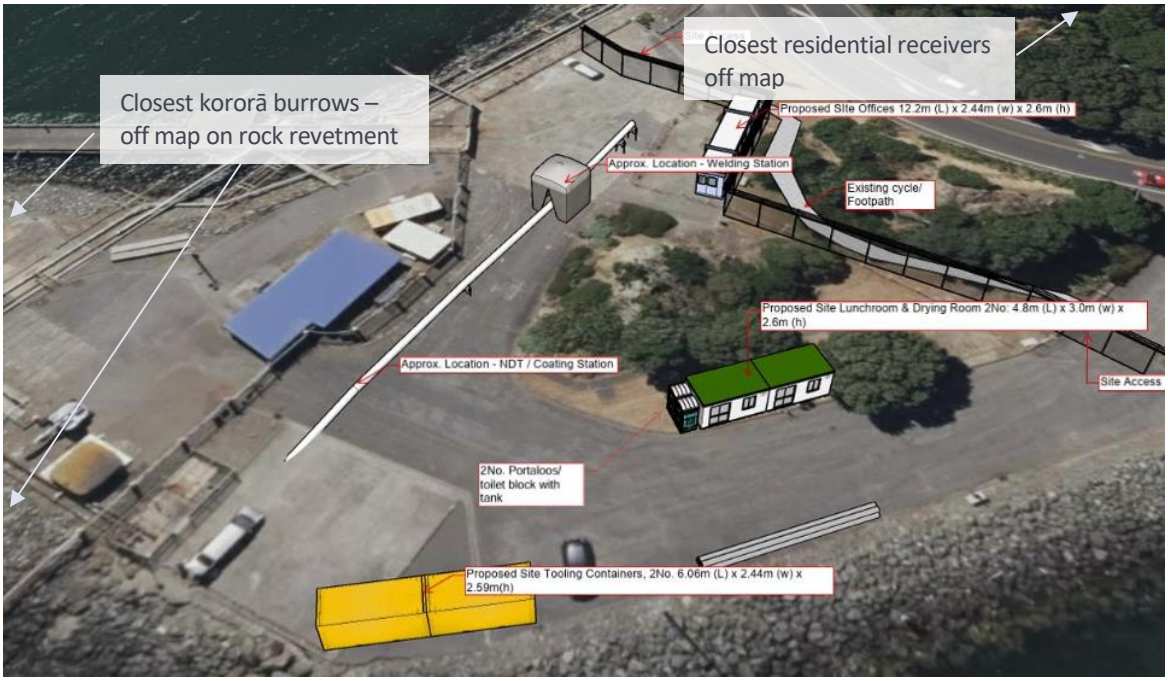
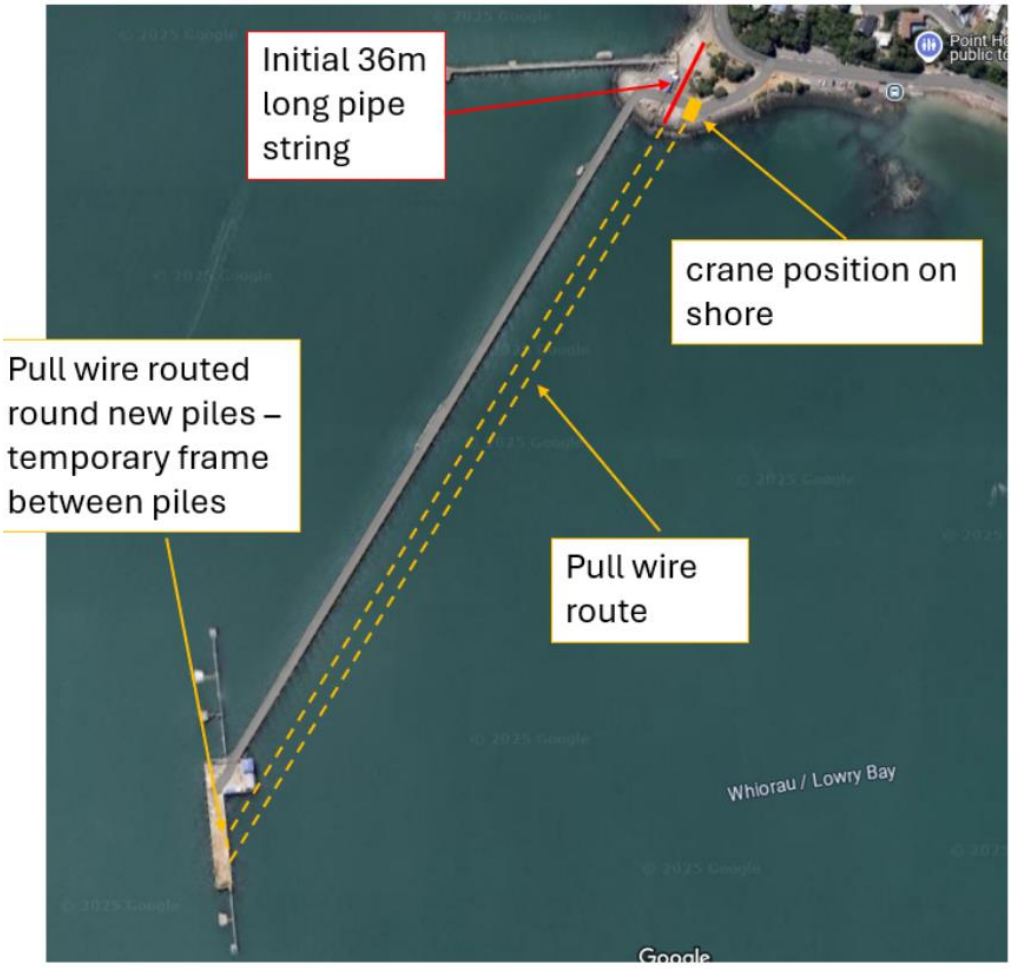


Figure 2: Site map of pipeline



3.2 Construction Methodology

The general construction methodology is summarised in Table 2. Quiet works such as site establishment are not included in the table. A full timeline of the works is included in Appendix C.

Table 2: Summary of construction methodology

Activity	Methodology	Equipment	Duration
Pre-trenching	Dig trench from shore to end of wharf using excavators	20 – 30 T excavators on land and jack up barge, rock breaker	1 - 2 months
Pipe installation	Weld and abrasive blast the pipe joins section by section in yard while it is being pulled to the end of the wharf	Abrasive blasting, welding, generators, winch, hand tools	2 – 3 weeks
Post-trenching and backfilling	Drag a jetting sled or plough over the trench to cover in sediment, then install sand and rock covering	Winch or vessel, jetting sled, cranes, jack up barge, excavators	1 month
Piling within the coastal marine area	Vibrated with impact, if required 4x 610mm temporary piles. Sheet piling following installation of temporary piles.	Crane mounted vibro hammer, impact hammer	1 week
Piling on landside	Bored piling 2x 600mm piles	Large piling rig	1 week
Install riser at wharfside	Install riser to connect pile to the wharf	Crane, jack up barge, hand tools	1 week
Shore-side trenching	Dig trench and connect to onshore buried pipeline	Excavators, rock breaker, abrasive blasting, welding, generators, crane, hand tools	1 – 2 months
Install on-wharf pipework	Install pipework on the wharfhead	Crane, abrasive blasting, welding, generators, hand tools.	1 – 2 months
Demolish existing wharfline	Cut up and remove existing pipe from wharf approach structure	Diamond wire saw, generator, crane, hand tools.	1 month

4.0 NOISE PERFORMANCE STANDARDS

4.1 Consent Conditions

Appendix D and Appendix E shows the full conditions of consent related to noise.

4.2 Noise limits

Construction noise shall be measured and assess in accordance with New Zealand Standard NZS 6803: 1999 *Acoustics - Construction Noise*. Table 3 shows the applicable noise limits for airborne construction noise. They apply at 1m from an occupied building, unless otherwise provided for in this CNMP.

Table 3: Noise limits

Day	Period	dB L_{Aeq}	dB L_{AFmax}
Weekdays	0630 – 0730	55	75
	0730 – 1800	70	85
	1800 – 2000	65	80
	2000 – 0630	45	75
Saturdays	0730 – 1800	70	85
	1800 – 0730	45	75
Sundays and public holidays	0730 – 1800	55	85
	1800 - 0730	45	75

4.3 Noise Threshold for Kororā Burrows

The noise threshold at the entrance to active burrows is 70 dB $L_{Aeq\,(15\,min)}$.

5.0 PREDICTED NOISE LEVELS

5.1 Predicted Levels and Compliance Setback Distances

The sound power levels have been sourced from the British Standard BS 5228-1:2009 "*Code of practice for noise and vibration control on construction and open sites, Part 1: Noise*", and from MDA's measurements of similar equipment.

Table 4 shows the sound power levels used in this assessment, along with setback distances required for achieving compliance with the 70 dB L_{Aeq} daytime noise limit. The predictions do not include site noise barriers or noise enclosures.

Table 4: Indicative noise levels at 1 m from a building façade[1]

Equipment	Sound power level, dB L_{WA}	Predicted noise Level, dB L_{Aeq}			Compliance setback, m
		20 m	50 m	100 m	70 dB L_{Aeq}
Large rock breaker (20 – 30 T)	121	90	81	73	132
Large rock breaker with shroud (20 – 30 T)	114	83	74	66	69
Small rock breaker with shroud (1 – 5 T)	104	73	64	56	28
Vibrated piling	116	85	76	68	83
Impact piling with cushion head/dolly	114	83	74	66	69
Bored piling	111	80	71	63	52
Horizontal directional drilling (HDD)	108	77	68	60	40
Excavator (20 – 30 T) on land or barge	103	62	53	45	8
Abrasive blasting (sandblasting)	130	99	90	80	302
Welding (generator)	101	70	61	53	20

5.2 Compliance Assessment

The closest residential receiver is approximately 70 m from the works.

The predictions in Table 4 show that the following activities require mitigation:

- Large concrete breakers will require a breaker shroud and a noise barrier (with a minimum 10 dB reduction) to generally comply with the 70 dB L_{Aeq} threshold at the closest kororā burrow. Only a shroud is required to comply with the 70 dB L_{Aeq} noise limit at the closest residential receiver. Noise barriers are addressed in Section 6.5.
- Small rock breakers and directional drills both require site noise barriers to keep noise levels generally below the 70 dB L_{Aeq} threshold the closest kororā burrow
- Abrasive blasting requires a noise enclosure to comply with the 70 dB L_{Aeq} limit (addressed in Section 6.5.3)
- Vibrated or impact piling will require a noise barrier around the burrows to generally comply with the 70 dB L_{Aeq} threshold at the closest kororā burrow.

[1] In accordance with the requirements of NZS 6803:1999 (Section 3.0), inclusive of 3 decibels façade reflection

5.3 Abrasive Blasting Mitigation

Noise levels from the abrasive blasting using have been predicted using SoundPLAN noise modelling software which implements the methodology described in ISO 9613-2:1996 "*Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation.*"

Noise levels have been predicted with and without mitigation. The mitigation includes:

- Building an enclosure around abrasive blasting works with either 12 mm plywood or a suitable alternative. Small openings are allowed at the northern and southern ends.
- A noise barrier to screen the kororā burrows

The mitigation measures above are explained further in Section 6.5.

The predicted noise levels at the dwellings are as shown in Table 5.

Noise contour maps are included in Appendix B.

Table 5: Predicted noise levels from abrasive blasting

	Predicted noise levels, dB L_{Aeq}	
Location	**Without mitigation**	**With mitigation**
Residential receivers		
1 Church Lane	75 – 80	65 – 70
2 Church Lane	70 – 75	65 – 70
3 Church Lane	75 – 80	65 – 70
4 Church Lane	65 – 70	65 – 70
3A Howard Road	70 – 75	65 – 70
5 Howard Road	70 – 75	65 – 70
Kororā burrows		
Burrows within 20 m of proposed works	75 – 80	70 – 75
Burrows at least 35 m away from proposed works	70 – 75	65 – 70

The predictions show how that a full noise enclosure is necessary to meet the 70 dB L_{Aeq} noise limit at the closest residential receivers.

The predicted noise levels are slightly over the 70 dB L_{Aeq} threshold at the closest kororā burrow with mitigation, but below the threshold at burrows further afield. It is noted that there is a further 5 decibel reduction from the entrance to inside the burrows[2].

[2] Lawrence, B.C., Bull, L.S., Arden, S.C., Warren, V.E. (2023). Effect of Piling on Little Blue Penguins. In: Popper, A.N., Sisneros, J., Hawkins, A.D., Thomsen, F. (eds) The Effects of Noise on Aquatic Life. Springer, Cham. https://doi.org/10.1007/978-3-031-10417-6_90-1

6.0 MITIGATION AND MANAGEMENT

The following section sets out options for the mitigation and management of noise.

6.1 Staff Training

All staff will participate in an induction training session prior to the start of construction, with attention given to the following matters:

- Construction noise limits (Section 0)
- Activities with the potential to generate high levels of noise (Section 5.1)
- Noise mitigation and management procedures (Section 6.0)
- The sensitivity of receivers and any operational requirements and constraints identified through communication and consultation (Section 8.0)

Awareness of current noise matters on, or near active worksites, will be addressed during regular site meetings and/or 'toolbox' training sessions.

6.2 General Measures

Noise disturbance or nuisance can arise whether or not noise levels comply with the project limits. To minimise disturbance, general mitigation and management measures include, but are not limited to, the following:

- Avoid unnecessary noise, such as shouting, the use of horns, loud site radios, rough handling of material and equipment, and banging or shaking excavator buckets
- Avoid high engine revs through appropriate equipment selection and turn engines off when idle
- Maintain site accessways to avoid pot holes and corrugations
- Mitigate track squeal from tracked equipment, such as the crawler crane or excavators (may include tensioning and watering or lubricating the tracks regularly)
- Minimise the construction duration near sensitive receivers
- Stationary equipment (e.g. generators) should be located away from noise sensitive receivers and site buildings, with material stores or temporary noise barriers used to screen them
- Reversing alarms on vehicles must only be of a broadband type when used at nighttime (2200 - 0700) or on Sundays/public holidays.
- Implement specialised mitigation measures for concrete or rock breaking (Section 6.7) and abrasive blasting (Section 6.6)
- Ensure advanced communication is complete (Section 8.0) prior to commencing activities that are predicted to exceed the noise performance standards (Section 5.2)
- Undertake monitoring as appropriate (Section 7.0)

Note that people tend to be less disturbed by continuous engine noise compared with intermittent noise or activities with special audible character (e.g. reversing beepers, whistling, banging tailgates or shouting).

6.3 Scheduling

Avoid night works where practicable.

6.4 Equipment Selection

When selecting construction equipment, the following will be implemented where practicable:

- Equipment shall be suitably sized for the proposed task
- Equipment shall be maintained and fitted with exhaust silencers and engine covers
- Tonal reversing or warning alarms (suitable alternatives may include flashing lights, broadband audible alarms or reversing cameras inside vehicles) should be avoided. However, in some instances, this may be unavoidable due to safety reasons

6.5 Noise Barriers and Enclosures

6.5.1 Temporary Noise Barriers

Temporary noise barriers will be used where an activity is predicted to exceed the construction noise limits (Section 5.0), unless they are ineffective (e.g. where a receiver is elevated and would look over the barrier). They will be installed prior to works commencing and maintained throughout the works.

Effective noise barriers typically reduce the received noise level by 10 decibels.

Where practicable, the following guidelines will be used in designing and installing temporary noise barriers:

- The panels will have a minimum surface mass of 6.5 kg/m^2. Suitable panels include 12 mm plywood or the following proprietary 'noise curtains':
  - SealedAir 'WhisperFence 24dB' (www.sealedair.com)
  - Hushtec 'Premium Series Noise Barrier' (www.duraflex.co.nz)
  - Soundbuffer 'Performance Acoustic Curtain' (soundbuffer.co.nz)
  - Hoardfast 'Fast Wall Premium PVC partition panels' (www.ultimate-solutions.co.nz)
  - Safesmart 'Acoustic Curtain 6.5kg/m^2' (www.safesmartaccess.co.nz)
  - Alternatives will be approved by a suitably qualified and experienced acoustic specialist
- The panels will be a minimum height of 2 m, and higher if practicable to block line-of-sight
- The panels will be abutted, battened or overlapped to provide a continuous screen without gaps at the bottom or between panels
- Barriers will be positioned as close as practicable to the high-noise activity to block line-of-sight between the activity and noise sensitive receivers. A site hoarding at the boundary may not be effective for all receivers. Add extra barriers close to high-noise activities to ensure effective mitigation for sensitive receivers on upper floors.
- Placed to screen the kororā burrows

6.5.2 Permanent Noise Barriers

Upgrading an existing boundary fence (or constructing a new one) can provide effective construction noise mitigation. Its construction should be more durable than a temporary barrier (minimum surface mass of 10 kg/m^2, such as 18 mm plywood or 20 mm pine). Other guidelines for permanent barriers are the same as for temporary barriers (Section 6.5.1).

6.5.3 Noise Enclosures

Noise enclosures surround the source on more than one side and have a roof (an example is included as Figure B.3 in NZS 6803: 1999). The effectiveness of an enclosure depends on how well the noise source can be enclosed without constraining its operation (e.g. mobility, heat, dust, lighting).

Where practicable, the following guidelines will be used in designing and installing enclosures:

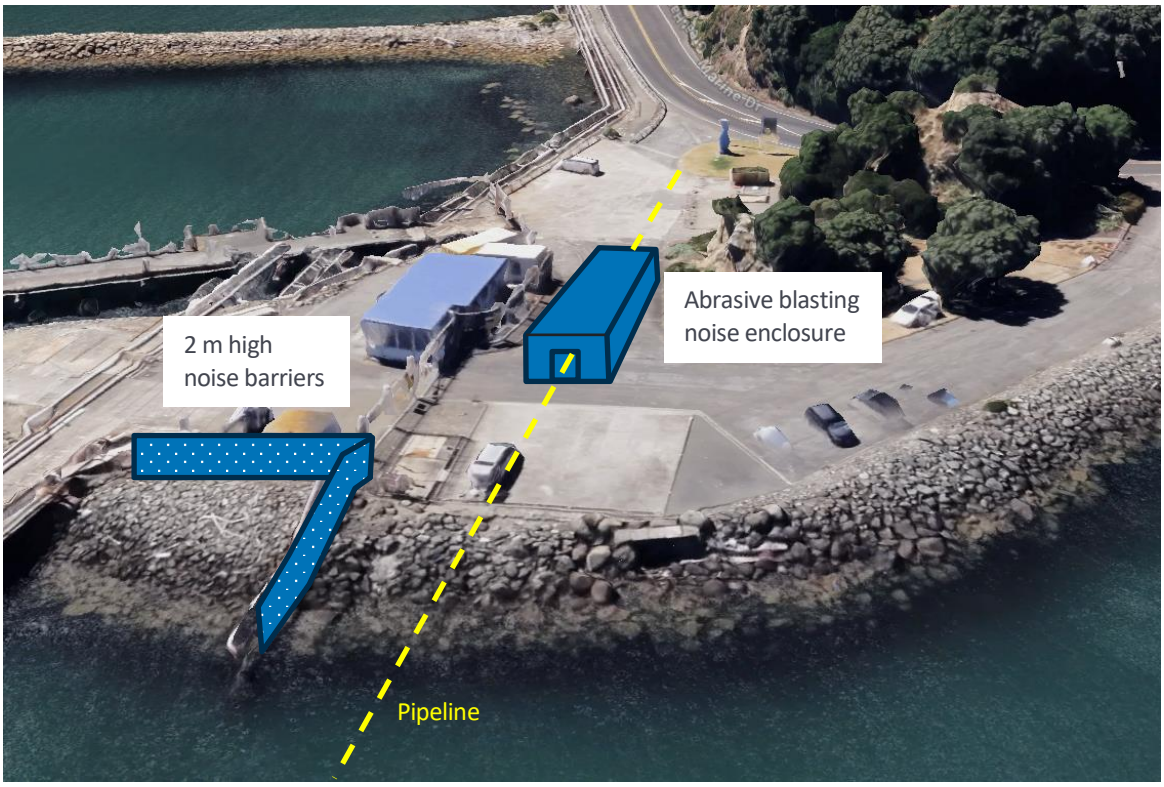
- Enclosures will be considered where a noise barrier can't achieve compliance noise limits, particularly for stationary plant such as compressors, pumps, generators, air tools and paver cutting stations
- Enclosures can be made from the noise curtains listed above, or the following proprietary options are available:
  - Echo Barrier 'Cutting Station' (www.supplyforce.co.nz)
  - Soundbuffer 'Cutting Enclosure' (soundbuffer.co.nz)
  - Hushtec 'Acoustic Tent' (www.duraflex.co.nz)

An enclosure is required for abrasive blasting (refer Section 6.6).

6.6 Abrasive Blasting

- Avoid night-time periods
- Construction a noise enclosure around the blasting area as shown on Figure 3

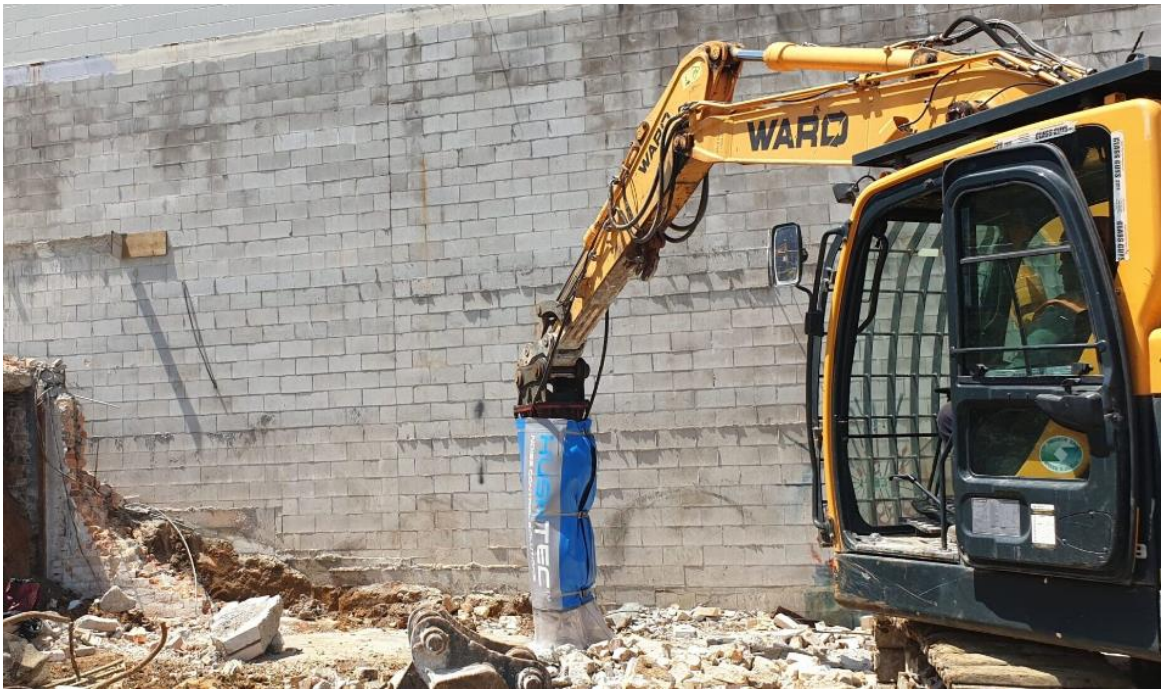
Figure 3: Noise enclosure and noise barriers



6.7 Concrete Breaking and Rock Breaking

- Avoid night-time periods
- Minimise the duration of breaking (e.g. small rocks should be excavated directly and larger basalt boulders removed by truck for breaking offsite), and the number of breaking periods (e.g. complete all breaking in one extended period rather than two shorter periods with the same overall duration)
- Match the size of breaker to the scale of the works (i.e. large enough to undertake the works efficiently, but avoiding oversized units)
- Match the chisel/tip type to the material and use a dampened bit to avoid ringing
- Avoid 'blank' firing by engaging the material before commencing and stopping before it fires through the material
- Use a shroud attachment as shown in Figure 4

Figure 4: Rock breaker shroud



6.8 Exceeding Noise Limits/Night Works

Night-works may be necessary at some point during the construction period. However, the nosiest activities (i.e. rock breaking, vibro or impact piling, and abrasive blasting) must not occur.

Where activity noise levels are predicted to exceed the night-time noise limits (see Section 5.0), the contractor must seek explicit permission from the local authority to exceed the limits and carry out a Best Practicable Option (BPO) assessment. The BPO assessment shall include, but not be limited to:

- The reasons why works cannot take place during the standard hours
- Reasons why a quieter method, to achieve the same objective, cannot be implemented
- What mitigation measures are proposed to reduce the noise from activities
- Stakeholder engagement/notification of potentially affected parties, including the local authority
- Noise monitoring protocols

This CNMP shall then be updated to include this BPO assessment.

7.0 NOISE MONITORING

Construction noise levels shall be monitored:

- During the first instance of abrasive blasting and rock breaking
- In response to a reasonable noise complaint

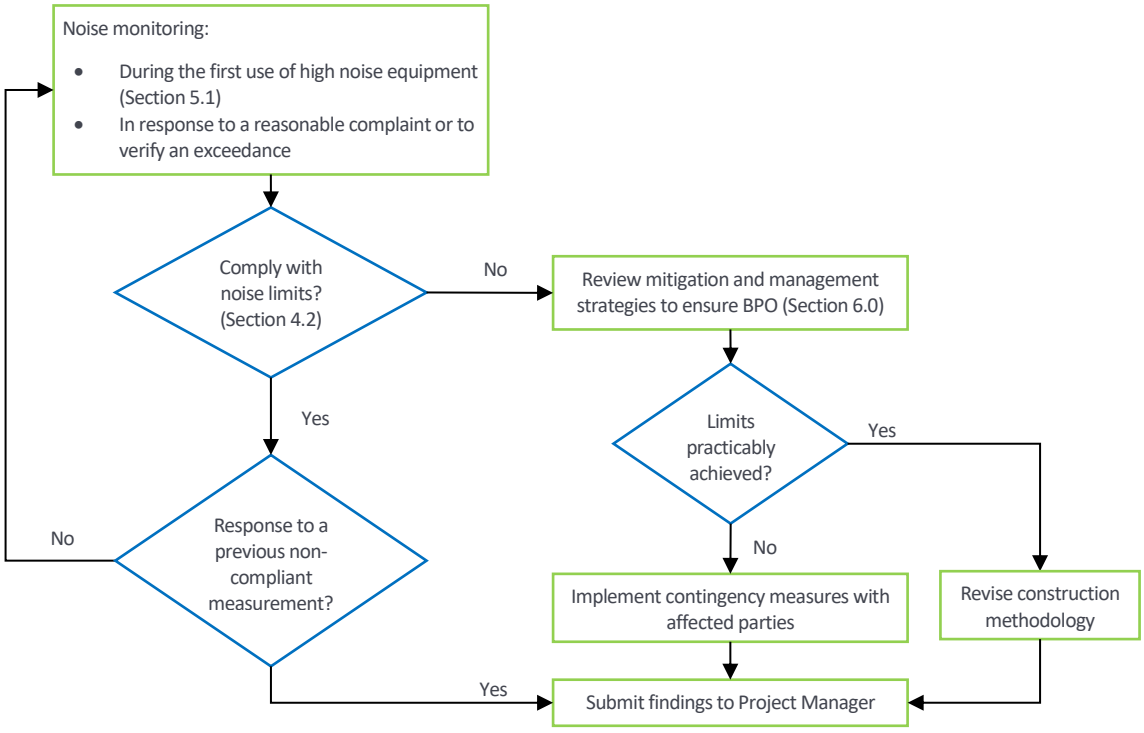
The following sets out the procedures for carrying out noise monitoring:

- At 1m from the most affected building façade, or proxy position and adjusted for distance and façade reflections where appropriate
- By a suitably qualified and experienced specialist (e.g. Member of the Acoustical Society of New Zealand) in accordance with the requirements of New Zealand Standard NZS 6803: 1999 *"Acoustics - Construction Noise"*
- For a representative duration, reported with the measured level (e.g. 65 dB $L_{Aeq\ (30min)}$)
- The results should be used to update Section 5.0 if appropriate

Spot checks of noise levels may be carried out by a member of the construction team who is trained in noise monitoring.

A noise monitoring flowchart is presented in Figure 5.

Figure 5: Noise Monitoring Flow Chart



8.0 ENGAGEMENT WITH NEIGHBOURS

8.1 Communication

Written communication prior to the works (e.g. newsletter, website, emails etc.) shall:

- Be provided to occupiers of buildings within 200 metres of works area for works between 6:30 am and 8 pm (or 800 metres where night-works are proposed between 8 pm and 6:30 am) – condition 16 of the HCC consent
- Be provided at least 2 weeks (14 days) prior to the Project commencing – condition 16 of the HCC consent
- Acknowledge that some activities are predicted to generate high noise levels that may result in disturbance for short periods.
- Include details of the overall works, its timing, duration and contact details where enquiries and complaints should be directed.

Written communication during the works:

- Public site signage shall include contact details of the project manager
- Regular project updates shall be provided via communication channels. This shall include details of impending activities that may result in disturbance, including concrete cutting, rock breaking and piling.
- It shall include scheduled timing and duration of noisy activities and contact details where complaints and enquiries should be directed.
- Any night works, outside of low noise activities, shall be advised (separately) at least 5 days prior to the works commencing.

8.2 Complaints Response

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

- Acknowledge receipt of the concern or complaint within 24 hours and record:
  - Time and date the complaint was received and who received it
  - Time and date of the activity subject to the complaint (estimated where not known)
  - The name, address and contact details of the complainant (unless they elect not to provide)
  - The complainant's description of the activity and its resulting effects
  - Any relief sought by the complainant (e.g. scheduling of the activity)
- Identify the relevant activity and the nature of the works at the time of the complaint
- Review the activity noise levels (Section 5.1) to determine if the activity is predicted to comply with the relevant noise performance standards at the complainants building. Undertake noise monitoring to verify noise levels.
- Review the mitigation and management measures in to ensure the activity represents the BPO (Section 6.0). Review the relief sought by the complainant. Adopt further mitigation and management measures as appropriate.
- Report the findings and recommendations to the Project Manager, implement changes and update this CNMP as appropriate.

- Report the outcomes of the investigation to the complainant, identifying where the relief sought by the complainant has been adopted or the reason(s) otherwise.

In most cases, ceasing the activity would provide immediate relief. In some cases, this may not be practicable for safety or other reasons. The complainant shall be kept updated regularly during the time it takes to resolve the matter.

9.0 UNDERWATER PILING NOISE – PREDICTED ZONES

9.1 Overview

The following sections contain the marine mammal effect thresholds, piling methodology, source levels, and marine mammal observations zones (MMOZs).

The main purpose of this section of the plan is to summarise the key parameters which go into calculating the MMOZs. These details will be updated when the Acoustic Specialist completes on-site monitoring as part of the verification process (see Section 11.0), and updated zones will be calculated. The updated MMOZs will be included in the Marine Mammal Management Plan (MMMP)[3] which is used by the Marine Mammal Observers (MMO) during piling works.

9.2 Effect Thresholds

The relevant NOAA[4] AUD INJ and TTS thresholds[5] are summarised in Table 6. The MMOZ are based on these criteria. The predicted peak noise levels from the planned piling works are well below the peak thresholds, so are not detailed here.

Table 6: Summary of TTS and PTS criteria

Criteria	Hearing Group	Impulsive sources (impact piling)	Non-impulsive sources (vibratory piling)
TTS thresholds	Low frequency cetaceans (baleen whales)	168 dB $SEL_{cum(LF)}$	177 dB $SEL_{cum(LF)}$
	High-frequency cetaceans (Orca, common/bottlenose/dusky dolphins)	178 dB $SEL_{cum(hf)}$	181 dB $SEL_{cum(hf)}$
	Very high-frequency cetaceans (Hectors/Maui dolphin)	144 dB $SEL_{cum(vhf)}$	161 dB $SEL_{cum(vhf)}$
	Other carnivores in water (Fur Seals)	170 dB $SEL_{cum(ow)}$	179 dB $SEL_{cum(ow)}$
AUD INJ thresholds	Low frequency cetaceans (baleen whales)	183 dB $SEL_{cum(LF)}$	197 dB $SEL_{cum(LF)}$

[3] Cawthron Report 3650, Marine Mammal Management Plan (MMMP)

[4] National Oceanic and Atmospheric Administration, 2024, *Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 3.0)*

[5] Temporary threshold shift (TTS) in humans can be likened to the 'muffled' effect on hearing after being exposed to high noise levels such as at a concert. The effect eventually goes away, but the longer the exposure, the longer the threshold shift lasts. Eventually, the TTS becomes permanent which is referred to as permanent threshold shift (PTS). AUD INJ is auditory injury and is defined as damage to the inner ear that can result in destruction of tissue and may or may not result in PTS.

Criteria	Hearing Group	Impulsive sources (impact piling)	Non-impulsive sources (vibratory piling)
	High-frequency cetaceans (Orca, common/bottlenose/dusky dolphins)	193 dB $SEL_{cum(hf)}$	201 dB $SEL_{cum(hf)}$
	Very high-frequency cetaceans (Hectors/Maui dolphin)	159 dB $SEL_{cum(vhf)}$	181 dB $SEL_{cum(vhf)}$
	Other carnivores in water (Fur Seals)	185 dB $SEL_{cum(ow)}$	199 dB $SEL_{cum(ow)}$

9.3 Piling Methodology

The piling methodology inputs to calculate the MMOZ are summarised in Table 7 [6].

The methodology will be validated during on site monitoring (refer Section 11.0).

Table 7: Piling Methodology

Pile Size	Number of piles per day	Piling Method	Strikes/Minutes per pile
610mm	2	Impact	500 strikes
		Vibro	20 minutes
1200mm – assumed for the pipe pull method	2	Impact	500 strikes
		Vibro	20 minutes

9.4 Underwater Piling Source Levels

The source levels for the planned piling works are presented in Table 8. These levels will be validated through monitoring.

Table 8: Predicted piling source levels at 1m from the pile [7] [8]

Piling details	Peak	RMS	$SEL_{(single\ strike)}$	SEL_{cum}
610mm impact	214	193	184	214
610mm vibro	N/A	184	N/A	200
1200mm impact	222	200	191	221
1200mm vibro	N/A	175	N/A	191

The sheet piling source levels are the same as the 1200mm vibro source levels. Therefore, they haven't been specifically presented.

Appendix F shows the representative bubble curtain mitigation spectrum. This is based on analysis of bubble curtain measurement results from the previous projects at Seaview.

[6] Marshall Day memo Mm 001 r02 dated 30 June 2025

[7] SEL thresholds have a reference of 1 μPa^2s and L_{peak}/RMS thresholds have a reference of 1 µPa

[8] Source levels have been predicted using a '15log(distance)' approximation of the distance attenuation between the measurement position and the pile.

9.5 Marine Mammal Observation Zones

The predicted TTS and PTS zones are summarised in Table 9 and Table 10, with and without a bubble curtain, respectively.

The key MMOZ are shaded yellow and grey. Zones shaded yellow indicate areas exceeding the 500m range of a single Marine Mammal Observer, while the grey zones can be monitored by a single marine mammal observer. Zones which are less than 50m do not require an observer.

Mitigation measures shall be employed – namely bubble curtains and others discussed in Section 10.0.

Table 9: Summary of TTS and AUD INJ zones (without bubble curtain). Yellow cells indicate areas >500m, and grey cells are able to be monitored by a single marine mammal observer.

Hearing Group		610mm diameter steel		1200mm diameter steel	
		Vibro Piling	Impact Piling	Vibro Piling	Impact Piling
Low-Frequency Cetaceans (LF)	TTS cumulative	450m	1km	90m	2.1km
	AUD INJ cumulative	<50m	110m	<10m	210m
High-Frequency Cetaceans (HF)	TTS cumulative	<50m	<50m	<10m	<50m
	AUD INJ cumulative	<10m	<10m	No Zone	<10m
Very High Frequency Cetaceans (VHF)	TTS cumulative	700	5.8km	< 50m	1.5km
	AUD INJ cumulative	<50	580m	No Zone	158m
Other Carnivores in Water (OCW)	TTS cumulative	240m	580m	<10m	198m
	AUD INJ cumulative	<50m	60m	No Zone	<50m

Table 10: Summary of TTS and AUD INJ zones (with bubble curtain). Grey cells are able to be monitored by a single marine mammal observer.

Hearing Group		610mm diameter steel		1200mm diameter steel	
		Vibro Piling	Impact Piling	Vibro Piling	Impact Piling
Low-Frequency Cetaceans (LF)	TTS cumulative	<10m	345m	<10m	833m
	AUD INJ cumulative	No Zones	<50m	No Zones	83m
High-Frequency Cetaceans (HF)	TTS cumulative	No Zones	<10m	No Zones	<10m
	AUD INJ cumulative	No Zones	No Zones	No Zones	No Zone
Very High Frequency Cetaceans (VHF)	TTS cumulative	<10m	115m	No Zones	188m
	AUD INJ cumulative	No Zones	<50m	No Zones	<50m
Other Carnivores in Water (OCW)	TTS cumulative	<10m	<50m	No Zones	134m
	AUD INJ cumulative	No Zones	<10m	No Zones	<50m

10.0 UNDERWATER NOISE – MITIGATION AND MANAGEMENT

10.1 Hours of Operation

Piling shall be restricted to within the start and end of civil twilight hours as per WRC condition 19 b). This is because it is not possible to identify marine mammals in the MMOZs without sufficient light.

Piling times are primarily controlled by the airborne noise limits, which restrict high-noise activities to 0730 – 1800, Monday to Saturday. However, during winter the civil twilight hours will restrict piling works in the evening.

Table 11 shows the civil twilight hours based on Civil Aviation guidance[9]. The red text indicates where these hours are more restrictive than the 0730 – 1800 piling construction hours.

Table 11: Summary of civil twilight hours. Red text indicates where twilight hours are more restrictive than the 0730 – 1800 construction hours

		NZDT times (in 24 hour time)			
		7th	**14th**	**21st**	**28th**
Jan	Morning	527	535	545	554
	Evening	2126	2124	2120	2114
Feb	Morning	607	617	626	635
	Evening	2104	2053	2043	2031
Mar	Morning	645	653	701	710
	Evening	2019	2006	1954	1943
Apr	Morning	620	628	635	643
	Evening	1827	1815	1805	1756
May	Morning	651	657	704	710
	Evening	1746	1739	1733	1729
Jun	Morning	717	721	723	724
	Evening	1726	1725	1726	1728
Jul	Morning	722	719	715	709
	Evening	1733	1738	1742	1749
Aug	Morning	700	651	641	629
	Evening	1757	1803	1810	1817
Sep	Morning	613	601	549	636
	Evening	1827	1833	1840	1948
Oct	Morning	621	610	558	549
	Evening	1957	2005	2014	2026
Nov	Morning	534	526	520	515
	Evening	2036	2046	2055	2104
Dec	Morning	512	513	514	517
	Evening	2113	2122	2124	2126

[9] https://www.aip.net.nz/

10.2 Underwater Noise Mitigation Measures

10.2.1 Maintenance of Equipment

Conduct regular maintenance on equipment to reduce the production of noise. Ensure that all noise suppression equipment (such as barriers and baffles) is maintained in good working order.

10.2.2 Dolly/Cushion for Impact Piling

A wooden, polymer or nylon dolly/cushion shall be placed between hammer and pile/pile cap to reduce the injury potential of impact piles from impulsive signals.

This measure is routinely employed by New Zealand piling contractors to reduce wear on equipment and to mitigate noise. It has been assumed in the acoustic assessment as the base case. Wooden cushions provide the greatest reduction in noise level. Polymer cushions are noticeably less effective, and nylon cushions are the least effective.

10.2.3 Pre-Start and Soft Start Procedures

Prior to the commencement of a noise-producing activity, MMOZs and surrounding waters are monitored for 30 minutes for the presence of marine mammals. If no marine mammal has been observed during the 30-minute period, or if any sighted mammals are unlikely to enter the MMOZs, a soft-start procedure can commence.

Soft starts shall be used where practicable. This mitigation measure involves gradually increasing the piling intensity (e.g. force/height of the drop hammer) over time to enable species to leave the area before full intensity piling commences.

To allow marine mammals adequate time to leave the area, the soft start should continue for at least 10 minutes before ramping up to full intensity.

10.2.4 Changes in Methodology

Low noise methods of pile driving such are bored/screw piling shall always be prioritised over vibro/impact piling where practicable. Vibro piling should also be prioritised over impact piling as it typically generates lower noise levels[10].

If it is discovered through underwater noise monitoring that the marine mammal observation zones (MMOZ) are too large to effectively monitor for the marine mammal observer(s), then the methodology will need to be revised. This could involve:

- Limiting the number of piles installed per day
- Limiting the number of impact strikes per pile by prioritising vibro piling
- Minimising both vibro and impact piling by drilling out the pile to depth once a seal has been achieved

The Acoustic Specialist shall be involved in this process to calculate the required methodology to reduce the zone to an appropriate size and validate the new zones through underwater noise measurements (refer to Section 11.0).

10.2.5 Bubble Curtains

This mitigation is an effective, relatively simple, and low-cost method of significantly reducing piling noise emissions. Bubble curtains are commonly implemented overseas. Calculations involving this mitigation are based on the spectral data in Appendix F. The mitigation provides the greatest reduction at high frequencies, so is highly beneficial for species such as Hectors dolphins.

[10] This is depending on the methodology details, so advice from the Acoustic Specialist should be sought

The bubble curtains can reduce the zones to around one-third of the original size. However, the attenuation is frequency dependant, and therefore varies with source spectrum, distance from the pile and species being considered.

10.3 Marine Mammal Observer (MMO) Roles and Procedures

A key part of any mitigation is undertaking observations for marine mammals during piling operations. The aim of observations is to ensure that any marine mammals entering the MMOZ are promptly identified, and appropriate mitigation action is undertaken.

The MMO has two general duties:

- Detect, record and report the presence of marine mammals within the wider operations area; and
- Enforce mitigation measures within the MMOZ, including documenting any action taken (if necessary) – such as shut downs or delayed starts if marine mammals are observed in the MMOZ.

Refer to the Marine Mammal Management Plan for the required qualifications, roles and procedures for the MMO(s).

11.0 UNDERWATER NOISE – VALIDATION OF MMOZS

Underwater construction noise levels and the MMOZ shall be verified through noise monitoring during the first occurrence of impact and vibro driven steel piles for representative pile types, sizes and locations. Noise monitoring shall be undertaken by the acoustic specialist.

Monitoring shall be undertaken for a representative duration to characterise the noise produced by the various activities – e.g., the installation of two piles of a given size and methodology.

Further monitoring shall be undertaken if there is a change in methodology that is predicted to result in larger zones.

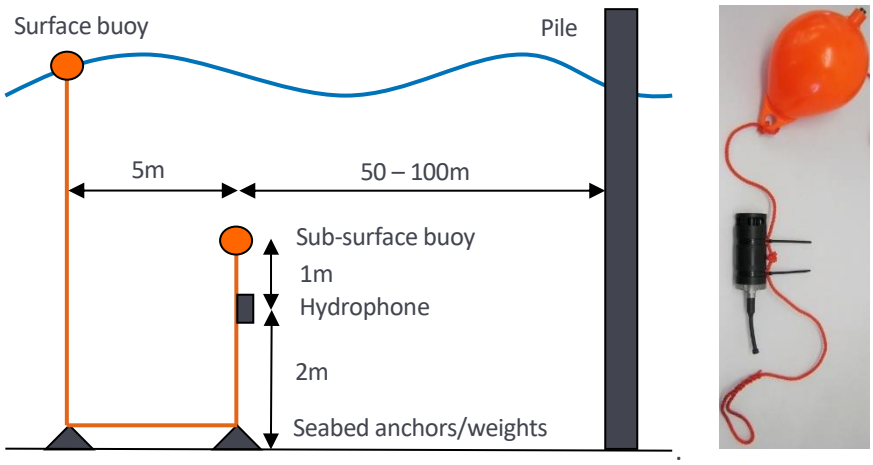
The results will be used to update the relevant Marine Mammal Observer Zones (MMOZ).

The underwater noise measurements will be undertaken using a compact self-contained hydrophone (underwater sound recording units). Measurements will be taken either off the wharf, or from a boat.

Calm sea state is required for good acoustic measurement conditions.

The generic setup for each hydrophone unit would be as shown in Figure 6.

Figure 6: Hydrophones indicative setup (not to scale)



APPENDIX A GLOSSARY OF TERMINOLOGY

Noise	A sound that is unwanted by, or distracting to, the receiver.
dB	Decibel (dB) is the unit of sound level. Expressed as a logarithmic ratio of sound pressure (P) relative to a reference pressure (Pr), where dB = 20 x log(P/Pr). The convention is a reference pressure of Pr = 20 μPa in air and Pr = 1 μPa underwater.
dBA	The unit of sound level which has its frequency characteristics modified by a filter (A-weighted) to more closely approximate the frequency bias of the human ear. A-weighting is used in airborne acoustics.
$L_{Aeq\,(t)}$	The equivalent continuous (time-averaged) A-weighted sound level commonly referred to as the average level. The suffix (t) represents the period, e.g. (8 h) would represent a period of 8 hours, (15 min) would represent a period of 15 minutes and (2200-0700) would represent a measurement time between 10 pm and 7 am.
L_{AFmax}	The A-weighted maximum noise level. The highest noise level which occurs during the measurement period.
NZS 6803:1999	New Zealand Standard NZS 6803: 1999 “Acoustics - Construction Noise”
Underwater noise	A sound that is unwanted by, or distracting to, the receiver underwater.

APPENDIX B NOISE CONTOUR MAPS OF FOR ABRASIVE BLASTING

Figure 7: Noise contour map of the predicted levels without mitigation to surrounding areas with sensitive receivers identified [produced via SoundPlan]

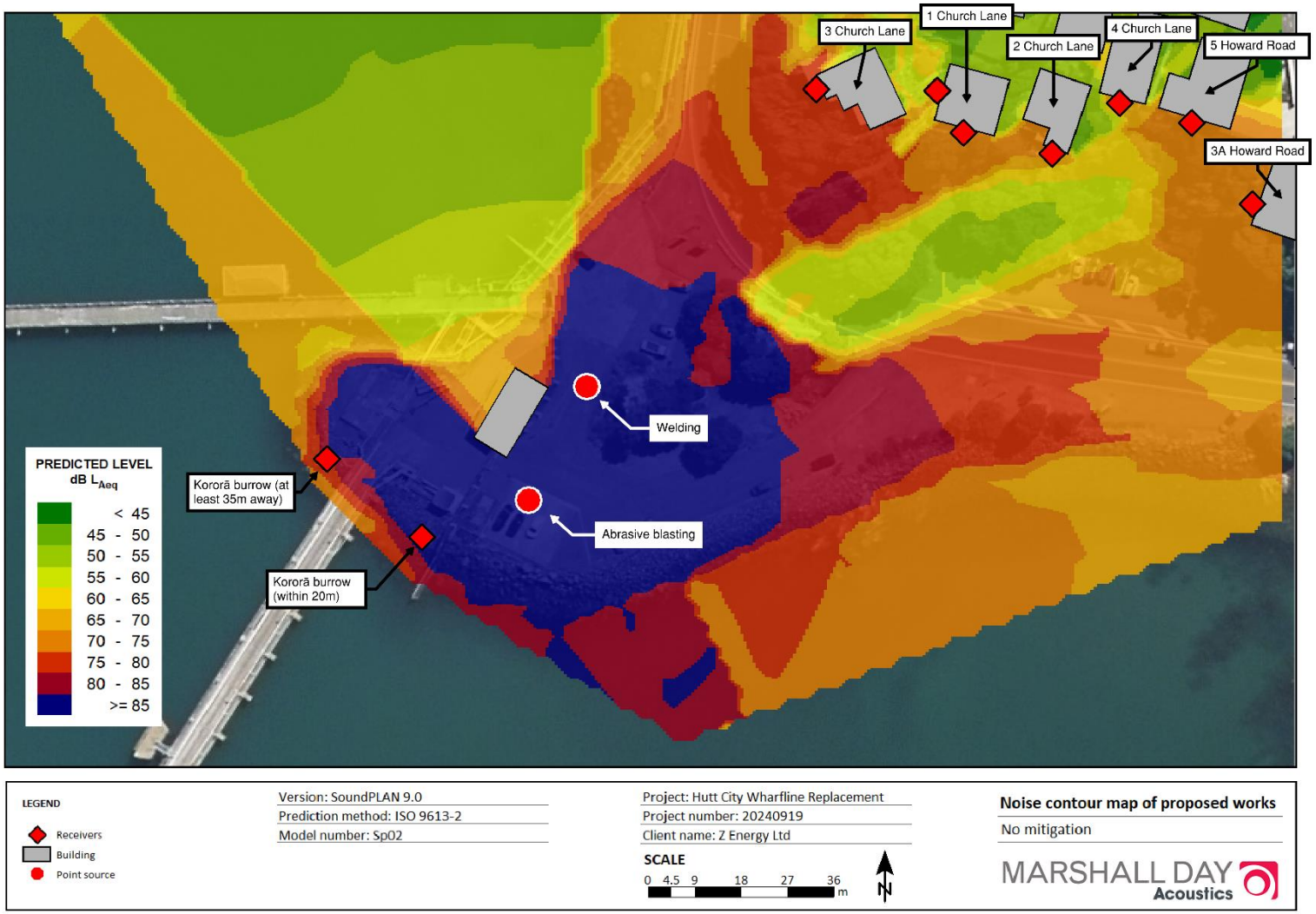
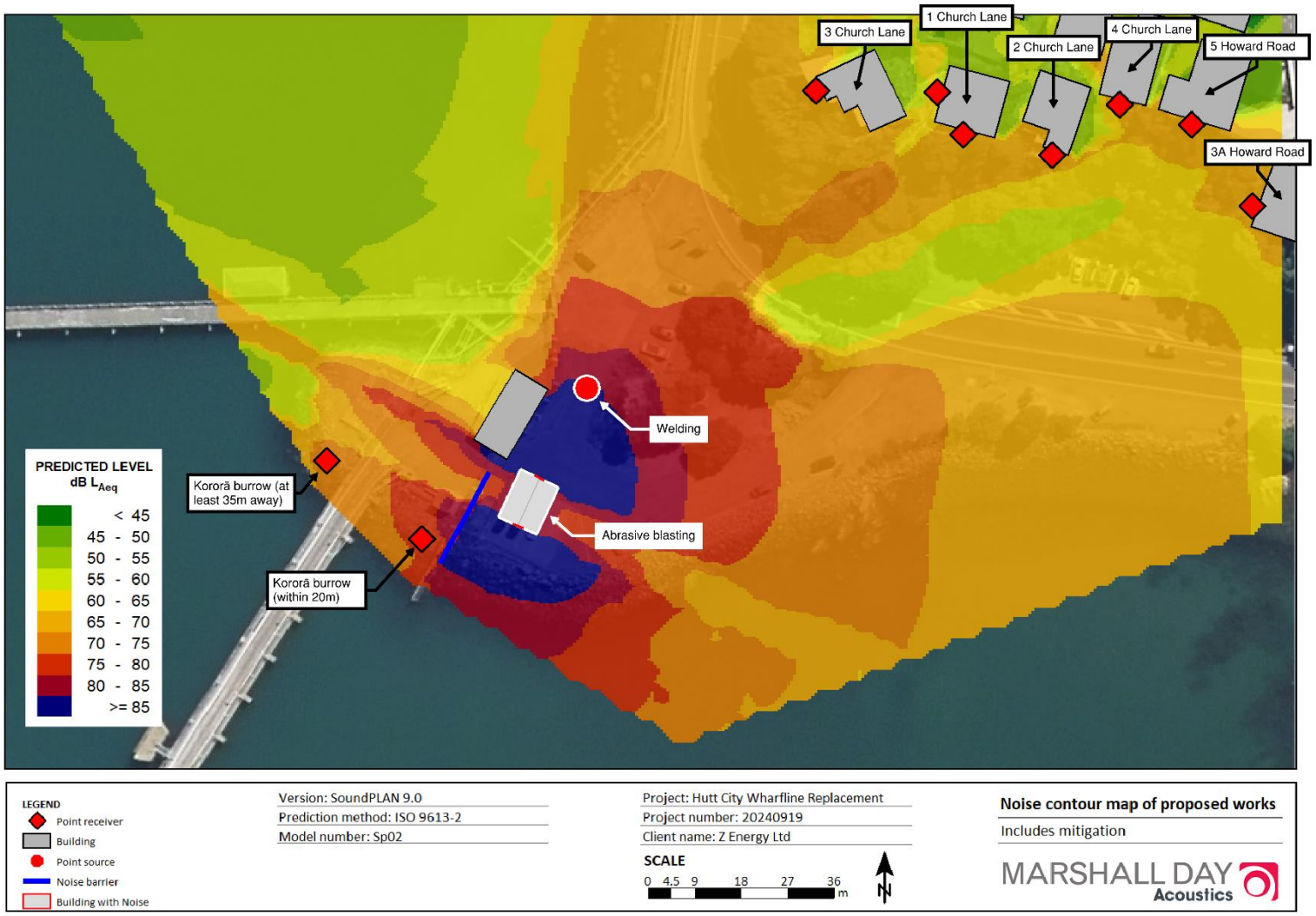


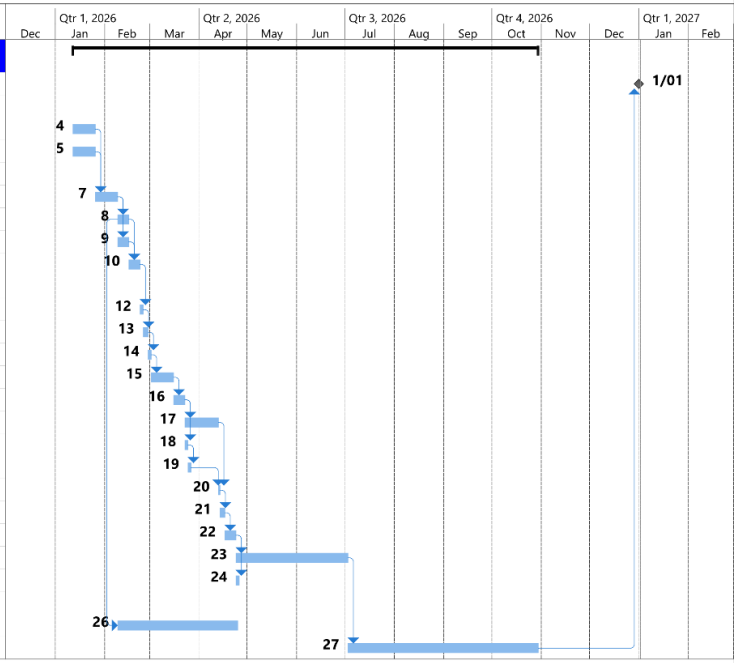
Figure 8: Noise contour map of the predicted levels with mitigation to surrounding areas with sensitive receivers identified [produced via SoundPlan]



APPENDIX C PROGRAMME OF WORKS AS OF 5 JUNE 2024

Hutt City Wharf Pipeline Replacement

ID	Task Name	Duration	Start	Finish
1	Hutt City Construction Schedule	9.7 mons	Mon 12/01/26	Thu 29/10/26
2	WorkSafe Compliance Plan Deadline	0 mons	Fri 1/01/27	Fri 1/01/27
3	**Offsite Prefabrication**	**0.47 mons**	**Mon 12/01/26**	**Sun 25/01/26**
4	Double Jointing	2 wks	Mon 12/01/26	Sun 25/01/26
5	Riser Pre-Fabrication and Specialist Coating	2 wks	Mon 12/01/26	Sun 25/01/26
6	**Shore Crossing Preparation**	**0.93 mons**	**Mon 26/01/26**	**Sun 22/02/26**
7	Site Establishment	2 wks	Mon 26/01/26	Sun 8/02/26
8	Excavation Trench - Onshore	1 wk	Mon 9/02/26	Sun 15/02/26
9	Dredge Trench - Nearshore and Shoal	1 wk	Mon 9/02/26	Sun 15/02/26
10	Bedding Preparation Float	1 wk	Mon 16/02/26	Sun 22/02/26
11	**Pipeline & Riser & Spool**	**4.33 mons**	**Mon 23/02/26**	**Thu 2/07/26**
12	Rollers Installation	2 days	Mon 23/02/26	Tue 24/02/26
13	Linear Winch Rig-up and Pull Wire Install	3 days	Wed 25/02/26	Fri 27/02/26
14	Flange and Pull Head Attachment	2 days	Sat 28/02/26	Sun 1/03/26
15	Pipe Pull, Welding, NDT, and FJC	2 wks	Mon 2/03/26	Sun 15/03/26
16	Flood Subsea Pipeline and Post Trench	1 wk	Mon 16/03/26	Sun 22/03/26
17	Rock Dumping and Sand Backfill	3 wks	Mon 23/03/26	Sun 12/04/26
18	Riser Spool Seabed Preparation	2 days	Mon 23/03/26	Tue 24/03/26
19	Riser Guide and Supports Installation	2 days	Wed 25/03/26	Thu 26/03/26
20	Subsea Flange Metrology	1 day	Mon 13/04/26	Mon 13/04/26
21	Riser Assembly and Hydrotest	3 days	Tue 14/04/26	Thu 16/04/26
22	Riser Installation	1 wk	Fri 17/04/26	Thu 23/04/26
23	On-Wharf & On-Shore Pipework & Civils	10 wks	Fri 24/04/26	Thu 2/07/26
24	Onshore Tie-in	2 days	Fri 24/04/26	Sat 25/04/26
25	**Survey**	**2.5 mons**	**Mon 9/02/26**	**Fri 24/04/26**
26	Survey Vessel	2.5 mons	Mon 9/02/26	Fri 24/04/26
27	**Contingency**	119 days	Fri 3/07/26	Thu 29/10/26



Project: 22-088
Date: Wed 5/06/24

Task	Project Summary	Manual Task	Start-only	Deadline
Split	Inactive Task	Duration-only	Finish-only	Progress
Milestone	Inactive Milestone	Manual Summary Rollup	External Tasks	Manual Progress
Summary	Inactive Summary	Manual Summary	External Milestone

APPENDIX D CONDITIONS OF CONSENT – HUTT CITY COUNCIL

Construction Noise

14. Construction noise shall be measured and assessed in accordance with New Zealand Standard NZS 6803:1999 "Acoustics - Construction Noise" and comply with the following NZS table, unless otherwise provided for in the CNMP.
    a. At the entrance to active burrows: 70dB $L_{Aeq\ (15\ min)}$.

    b. At any occupied building:

Day	Period	dB L_{Aeq}	dB L_{Amax}
Weekdays	0630 – 0730	55	75
	0730 – 1800	70	85
	1800 – 2000	65	80
	2000 – 0630	45	75
Saturdays	0730 – 1800	70	85
	1800 – 0730	45	75
Sundays and public holiday	0730 – 1800	55	85
	1800 - 0730	45	75

Note: This condition is required to mitigate adverse offsite construction effects.
Note: This condition was proffered by the applicant.

15. That abrasive blasting undertaken on Sundays must be limited to three consecutive Sundays between 7:30am and 6pm.

16. That the consent holder notifies surrounding residents within 200m of the application works area for works between 0630 – 2000, or 800m of the application works area for works between 2000 – 0630, at least two weeks (14 days) prior to the project commencing.

    Note: this notification may be provided through an online forum, website with regular updates or otherwise, provided all identified residents are provided notice and direction on how to access the web address.

17. During the project works, the consent holder shall provide site signage which includes contact details of the project manager, regular project updates be provided via communication channels (online forum, website). This shall include details of impending activities that may result in disturbance, including concrete cutting, rock breaking and abrasive blasting. It will include scheduled timing and duration of noisy activities and contact details where complaints and enquiries should be directed.

18. The consent holder shall submit a final Construction Noise Management Plan (CNMP) to Council's Manager Resource Consents and Compliance for certification 15 days prior to the commencement of works. The CNMP must be prepared by a suitably qualified person and be based on the draft Construction Noise Management Plan prepared by Marshall Day supplied in appendix L of the application and the supplementary information in the memorandum prepared by Marshall Day dated 30 June 2025 (Document No. Mm 001 r02, Cross Reference Rp 001 r01 20240919, Project No. 20240919. The CNMP must:
    a. Identify and adopt the best practicable options (BPO) for the management of construction noise and vibration and how these will be implemented to prevent adverse effects;

b. Provide details of equipment and plant to be utilized and anticipated noise levels for each stage of works;
c. Define the procedures to be followed when the noise standards in Condition 14 cannot be met;
d. Inform the duration, frequency and timing of works to manage disruption;
e. Provide identification and an assessment of nearby receivers and potential sensitive receivers (including avifauna) that may be affected by noise and vibration, including detail regarding separation distances from works, and strategies for communication with these receivers about the works; and
f. Manage the underwater noise levels from impact and vibratory pile driving methods to protect marine mammals and avoid adverse effects on threatened or at-risk species; and
g. Set out procedures for managing complaints about construction works, including details of the appropriate contact person, and complaints register.

19. The CNMP required by Condition 18 shall include the relevant measures from NZS 6803:1999 "Acoustics – Construction Noise", Annex E2 "Noise management plans".

APPENDIX E CONDITIONS OF CONSENT – WELLINGTON REGIONAL COUNCIL

Construction noise

17. Construction noise shall be measured and assessed in accordance with New Zealand Standard NZS 6803:1999 "Acoustics – Construction Noise" and comply with the following Project Standards, unless otherwise provided for in the CNMP.

    a) At the entrance to active burrows: 70 dB LAeq (15 min).

    b) At any occupied building:

Day	Period	dB L_{Aeq}	dB L_{AFmax}
Weekdays	0630 – 0730	55	75
	0730 – 1800	70	85
	1800 – 2000	65	80
	2000 – 0630	45	75
Saturdays	0730 – 1800	70	85
	1800 – 0730	45	75
Sundays and public holidays	0730 – 1800	55	85
	1800 - 0730	45	75

18. The consent holder shall submit a final Construction Noise Management Plan (CNMP) to the manager for certification 20 days prior to the commencement of works. The CNMP must be prepared by a suitably qualified person. The CNMP objectives are:

    a) Identify and adopt the best practicable option (BPO) for the management of construction noise;

    b) Define the procedures to be followed when the noise standards in Condition 17 are breached;

    c) Inform the duration, frequency and timing of works to manage disruption;

    d) Require engagement with complainants and the timely management of complaints;

    e) Manage noise levels from rock breaking and abrasive blasting to avoid adverse effects on Little Blue Penguin; and

    f) Manage the underwater noise levels from impact and vibratory pile driving methods to protect marine mammals and avoid adverse effects on threatened or at-risk species.

19. The CNMP required by Condition 18 shall include:

    a) the relevant measures from NZS 6803:1999 "Acoustics – Construction Noise", Annex E2 "Noise management plans";

    b) Measures to minimise underwater noise effects on marine mammals, including:

    - Restrict in-water impact or vibration pile driving to within the start and end of Civil Twilight hours only;
    - Use a non-metallic 'dolly' or 'cushion cap' between the impact piling hammer and the driving helmet (e.g. plastic or plywood);
    - Use piling methodologies that minimise underwater noise (i.e. 'Soft starts' – gradually increasing the intensity of impact piling, minimising the number of strikes and/or vibro driving time per day, the consideration of alternative driving methods, and use of bubble curtains);

- Establish marine mammal observation zone(s) around the construction area to minimise any risk of hearing impairment or injury to marine mammals from impact and vibration pile-driving activities. These zones shall:

  (i) Reflect piling method, pile size, noise mitigation method(s), and species sensitivity;

  (ii) Use the thresholds in the following table for management zones:

Hearing Group	Impulsive sources (impact piling)	Non-impulsive sources (vibratory piling)
Low-frequency cetaceans	PTS 183 dB SELcum(lf) / 222 dB Lpeak	197 dB SELcum(lf)
High-frequency cetaceans TTS (Orca, common / bottlenose dolphins)	178 dB SELcum(hf) / 224 dB Lpeak	181 dB SELcum(hf)
Very high-frequency cetaceans PTS (Hector's dolphin)	159 dB SELcum(vhf) / 202 dB Lpeak	181 dB SELcum(vhf)
Otariid pinnipeds TTS (Fur Seals)	170 dB SELcum(ow) / 224 dB Lpeak	179 dB SELcum(ow)

  (iii) Be based initially on the preliminary mammal observation zone(s) identified in Table 4 and Table 5 of the Marshall Day supplementary memo reference Mm001 r02 20240919 and dated 30 June 2025; and

  Be verified by underwater noise monitoring. The certified CNMP shall be revised and submitted to the Council for re-certification if measured levels exceed the predicted levels, or there is a change in piling method, size or type of piles to be driven which could result in larger mammal observation zone(s).

- A marine mammal observer shall be present at all times during impact or vibration piling activities, including 30 minutes prior to the commencement of any impact or vibration piling activities
- Impact or vibration piling activities shall cease or not commence if a marine mammal is observed within the marine mammal observation zone(s).

APPENDIX F BUBBLE CURTAIN MITIGATION