Acoustic Assessment and Construction Noise and Vibration Management Plan-Blackpool

Blackpool Stormwater, Waiheke Island

Auckland Council

135 Albert Street, Auckland CBD

Prepared by:

SLR Consulting New Zealand

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Revision Record

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1.0	4 April 2025	W. Posada	P. Runcie	P. Runcie

Basis of Report

This report has been prepared by SLR Consulting New Zealand (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Auckland Council (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

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Executive Summary

The proposed project seeks to upgrade the stormwater network along Moa Avenue, Nikau Road, and Tui Street on Waiheke Island.

Key construction activities include pavement cutting, open trenching, horizontal directional drilling and compaction. This document provides typical noise and vibration levels from the equipment and identifies setback distances required to meet noise and vibration guidelines.

The assessment identifies that with mitigation in place compliance can be achieved during most works and for most of the project timeframe. Recommended mitigation measures include screening, scheduling noisy works when buildings are unoccupied and consulting with occupants to manage adverse noise effects. With mitigation in place a limited number of infringements are predicted due to the proximity of receivers to the works. These are summarised, along with effects and durations, in **Table 1** below:

Table 1 Predicted Potential Noise Exceedances

Location	Works	External Level, L_{Aeq}	Internal Level, L_{Aeq}	Potential Noise Effects	Anticipated Duration
11 Moa Avenue	Pavement Cutting	80 dB	50-55 dB	Some occupants may feel annoyed, and concentration may be affected but residential and office activities can generally continue. Sound levels for television, radio and phone conversations would need to be slightly raised.	One day
13 Moa Avenue	Open cut trenching	80 dB	50-55 dB		Two days
	Compaction	85 dB	55-60 dB	Concentration is likely to be affected, and phone conversations may become difficult, and people are likely to seek respite by moving to another room.	One day
11 Rata Street	Compaction	80 dB	50-55 dB	Some occupants may feel annoyed, and concentration may be affected but residential and office activities can generally continue. Sound levels for television, radio and phone conversations would need to be slightly raised.	One day
	Tree removal	85 dB	55-60 dB	Concentration is likely to be affected, and phone conversations may become difficult, and people are likely to seek respite by moving to another room.	One day

Location	Works	External Level, L_{Aeq}	Internal Level, L_{Aeq}	Potential Noise Effects	Anticipated Duration
32 Tui Street	Compaction	80 dB	50-55 dB	Some occupants may feel annoyed, and concentration may be affected but residential and office activities can generally continue. Sound levels for television, radio and phone conversations would need to be slightly raised.	One day
13 Nikau Road	Compaction	80 dB	50-55 dB		One day
26 Nikau Road	Tree removal	80 dB	50-55 dB		One day
40 Nikau Road	Compaction	80 dB	50-55 dB		One day
	Pavement cutting	85 dB	55-60 dB	Concentration is likely to be affected, and phone conversations may become difficult, and people are likely to seek respite by moving to another room.	One day

On the basis of the above and considering the temporary nature of the predicted infringements, noise effects can be considered reasonable and acceptable .

The assessment concludes that vibration effects can be appropriately managed throughout the works when compared to commonly adopted guideline values for the avoidance of amenity impacts and cosmetic damage to buildings.

In summary, with mitigation measures in place, and noting the short duration of potential noise exceedances, noise and vibration effects are considered reasonable and acceptable.

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Acronyms and Abbreviations

Term	Description
A' weighted	A frequency adjustment which represents how humans hear sounds.
Ambient noise level	The all-encompassing sound associated with an environment or area.
ACDP-HGIS	Auckland Council District Plan-Hauraki Gulf Islands Section.
dB	Decibel
dBA	'A' weighted decibel
DIN 4150-3	German Industrial Standard DIN 4150-3 (1999): Structural vibration – Part 3 Effects of vibration on structures.
Free field	A monitoring location where the microphone is positioned sufficiently far from nearby surfaces for the measured data to not be influenced by reflected noise.
Hz	Hertz
Impulsive noise	Noise with a high peak of short duration, or sequence of peaks.
Intermittent noise	Noise which varies in level with the change in level being clearly audible.
L90, L10, etc.	Statistical exceedance levels, where LN is the sound pressure level exceeded for N% of a given measurement period.
LAeq	The 'A' weighted equivalent noise level. It is defined as the steady sound level that contains the same amount of acoustical energy as the corresponding time-varying sound.
LAmax	The A' weighted maximum sound pressure level of an event.
Low frequency	Noise containing energy in the low frequency range.
LP or SPL	Sound Pressure Level.
Lw or SWL	Sound Power Level.
NZS 6801:2008	New Zealand Standard NZS 6801:2008 "Measurement of Environmental Sound".
NZS 6802:2008	New Zealand Standard NZS 6802:2008 "Assessment of Environmental Noise."
NZS 6803:1999	New Zealand Standard NZS 6803:1999 "Acoustics – Construction Noise."
Octave-band	A frequency band where the highest frequency is twice the lowest frequency.
Rating level	A derived level used for comparison with a noise limit.
Tonality	Noise containing a prominent frequency.

1.0 Introduction

This Construction Noise and Vibration Assessment Construction Noise and Vibration Management Plan (**CNVMP**) provide a framework for controlling noise and vibration levels at neighbouring noise-sensitive buildings during the proposed stormwater pipe upgrade/replacement works (Stage 1) at Blackpool Stormwater in Waiheke Island, Auckland.

This document includes:

- relevant noise and vibration criteria.
- an assessment of noise and vibration levels and comparison with the relevant criteria.
- identified mitigation, where required.
- specific and general management and monitoring measures.
- an outline of the communication and complaints procedures.

This is a living document and shall be updated as and when needed in response to new project information.

The CNVMP is based on the following documents and standards:

- Blackpool SW Improvements Stage 1, Rev B, dated 11 February 2025, provided by Auckland Council - Healthy Waters Desing Office.
- Blackpool SW Improvements Stage 1, Nikau Rd-Tui St, Rev C, dated 14 March 2025, provided by Auckland Council - Healthy Waters Desing Office
- Auckland Council District Plan-Hauraki Gulf Islands Section (**ACDP-HGIS**).
- New Zealand Standard NZS6803 *"Acoustics – Construction Noise"* (**NZS6803**).
- German Institute for Standardization DIN4150-3 *"Structural vibration – Part 3 Effects of vibration on structures"* (**DIN4150-3**).

2.0 Project Location and Description

2.1 Project Location and Surrounding Receivers

The proposed upgrade works seeks to improve the stormwater network for the Blackpool community along Moa Avenue, Nikau Road and Tui Street. **Figure 1** shows the proposed extent of works.

Figure 1 General View of Extent of Works

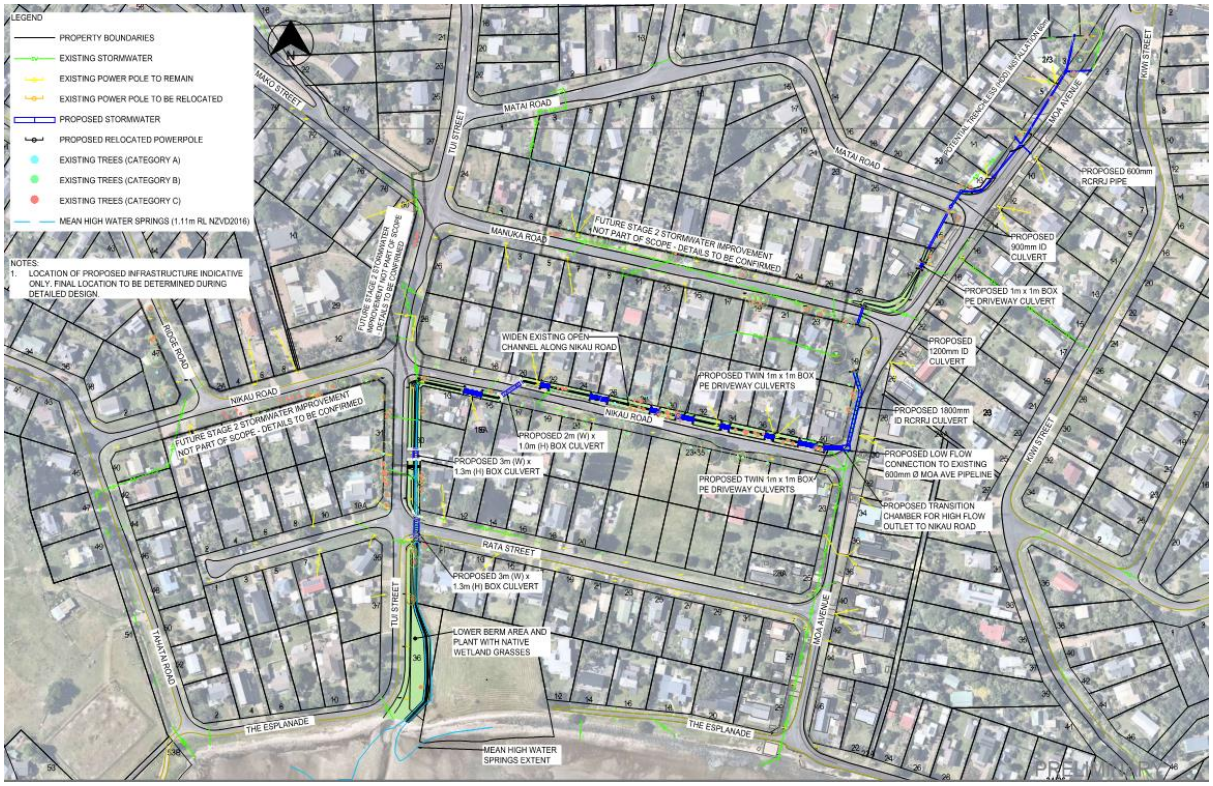


Table 2 Summary of Nearest Receivers

Receiver Ref. Number	Address	Comment
1	10 The Esplanade	One-storey dwelling
2	37 Tui Street	One-storey dwelling
3	35 Tui Street	Two-storey dwelling
4	10A Rata Street	One-storey dwelling
5	31 Tui Street	Two-storey dwelling
6	11 Nikau Road	Two-storey dwelling
7	12 Nikau Road	Vacant Lot
8	28 Tui Street	One-storey dwelling
9	16 Nikau Road	One-storey dwelling
10	18 Nikau Road	One-storey dwelling
11	20 Nikau Road	One-storey dwelling
12	22 Nikau Road	Two-storey dwelling
13	24 Nikau Road	One-storey dwelling
14	26 Nikau Road	One-storey dwelling
15	28 Nikau Road	Two-storey dwelling

Receiver Ref. Number	Address	Comment
16	30 Nikau Road	One-storey dwelling
17	32 Nikau Road	Two-storey dwelling
18	34 Nikau Road	One-storey dwelling
19	36 Nikau Road	One-storey dwelling
20	38 Nikau Road	One-storey dwelling
21	40 Nikau Road	Two-storey dwelling
22	19 Moa Avenue	Vacant Lot
23	23 Manuka Road	One-storey dwelling
24	26 Manuka Road	One-storey dwelling
25	28 Manuka Road	One-storey dwelling
26	17 Moa Avenue	One-storey dwelling
27	15 Moa Avenue	One-storey dwelling
28	13 Moa Avenue	One-storey commercial building
29	11 Moa Avenue	One-storey commercial building
30	9 Moa Avenue	One-storey dwelling
31	7 Moa Avenue	One-storey dwelling
32	5 Moa Avenue	One-storey dwelling
33	3 Moa Avenue	One-storey dwelling
34	166 Ocean View Road	One-storey dwelling
35	1 Moa Avenue	One-storey dwelling
36	2 Moa Avenue	One-storey dwelling
37	3 Kiwi Street	Two-storey dwelling
38	5 Kiwi Street	Two-storey dwelling
39	8 Moa Avenue	One-storey dwelling
40	10 Moa Avenue	Three-storey dwelling
41	12 Moa Avenue	Two-storey dwelling
42	14 Moa Avenue	One-storey dwelling
43	16 Moa Avenue	One-storey dwelling
44	18 Moa Avenue	One-storey dwelling
45	20 Moa Avenue	One-storey dwelling
46	22 Moa Avenue	One-storey dwelling
47	24 Moa Avenue	One-storey dwelling

Receiver Ref. Number	Address	Comment
48	26 Moa Avenue	Two-storey dwelling
49	28 Moa Avenue	One-storey dwelling
50	30 Moa Avenue	Two-storey dwelling
51	32 Moa Avenue	Two-storey dwelling
52	23 Moa Avenue	One-storey dwelling
53	23-35 Nikau Road	Two and one-storey buildings (Community space)
54	21 Nikau Road	One-storey dwelling
55	19 Nikau Road	One-storey dwelling
56	17 Nikau Road	Two-storey dwelling
57	15 Nikau Road	Two-storey dwelling
58	13 Nikau Road	Two-storey dwelling
59	30 Tui Street	One-storey dwelling
60	32 Tui Street	One-storey dwelling
61	11 Rata Street	One-storey dwelling

2.2 Construction Methodology

The works in this project are understood to involve the following main construction activities.

- Cutting of asphalt.
- Excavation of open cut trenches and pits using an excavator.
- Horizontal Directional Drilling (HDD).
- Compaction of fill material.
- Tree Removal (If required)

At the time of writing, two designated tentative laydown areas have been identified and assessed to ensure efficient storage and management of all necessary equipment (i.e., at Blackpool Park or at 36 Tui Street). Equipment operated in the laydown area is expected to include trucks and excavators.

2.3 Construction Programme

The approximate expected duration of the construction activities is provided in **Table 3** below. The works will progress in a linear fashion following the works, the following approximate durations are relative to the duration of works **at individual properties**.

Table 3 Construction Activities and Appropriate Durations

Activity	Approximate Duration
Open trenching works	Two (2) days
Asphalt Cutting	One (1) day.
Horizontal Directional Drilling (HDD)	One (1) day.
Compaction of filling material	One (1) day.
Tree removal (if required)	One (1) day.

2.4 Hours of Work

The hours of construction works will generally be between 7:30 am to 6:00 pm Monday to Saturday.

2.5 Roles and Responsibilities

A project team representative will be assigned to be the responsible person for implementation of this CNVMP. All documentation relating to construction noise and vibration should be reviewed by the project team representative before it is issued.

2.6 Contact Details

The key personnel and contact details for management of construction noise and vibration of the development are provided in **Table 4** below.

Table 4 Table of Key Personnel and Contact Details

Role	Name	Organisation	Phone	Email
Project Manager	TBC	TBC	TBC	TBC
Acoustic Advisor	William Posada	SLR	027 281 63 92	wposada@slrconsulting.com
Contractor Project Manager	TBC	TBC	TBC	TBC
Public Complaint Contact	TBC	TBC	TBC	TBC

[Other fields to be completed when contractor is appointed].

2.7 Staff Training and Inductions

Training related to construction noise and vibration management and awareness for personnel working on the site will be undertaken as part of the site induction programme. This requires personnel to participate in an induction training session when they commence work.

Inductions are to include a briefing on this CNVMP, with attention given to the following aspects in particular:

- Roles and responsibilities for the management of construction noise and vibration.
- Relevant noise and vibration criteria.
- Information about noise and vibration sources on-site and locations of critical surrounding receivers.
- Noise and vibration mitigation measures and management procedures.
- Complaints management procedures.

In addition to the above general induction training, specific activities that may generate significant noise and/or vibration effects will be identified at “tool-box” meetings prior to those works being undertaken. The tool-box meetings should also be used to address any concerns or complaints that have been raised.

3.0 Stakeholder Engagement

3.1 Neighbour Communication

Communication with surrounding stakeholders is of similar importance to the level of noise or vibration generated by the works. Maintaining a good relationship with the surrounding neighbours can assist greatly in ensuring effects from construction works are responsibly managed.

Communication shall be undertaken with the immediately neighbouring owners and/or occupants prior to commencement and during the construction activities. The following methods of communication shall be undertaken:

a) Notice boards showing contact details of the project manager and contractor will be displayed at the entrance(s) of the site at publicly accessible locations.

b) All occupied neighbouring properties within 20 m of the extent of the works to be advised in writing (e.g., via letter drop) prior to commencement of works. The communication will set out a brief overview of the works, the expected duration of the project and specific activities, the mitigation measures to be implemented, the working hours, and contact details for any concerns regarding noise and vibration.

3.2 Communication with Council

The contractor’s project manager will be responsible for communication with Auckland Council.

4.0 Noise and Vibration Criteria

Criteria for noise and vibration emissions from construction activities is contained within *Part 4.6* of the general rules of the Auckland District Plan-Hauraki Gulf Islands Section (**ACDP - HGIS**).

4.1 Noise Criteria

The proposed construction activities are planned to progress gradually along the road in a continual manner and, as a result, any individual receiver is unlikely to be close to the works for more than 20 weeks. Given this pattern of construction works, it is considered that the appropriate noise limits are those for construction activities between 15 days to 20 weeks (Typical duration work).

Part 4.6 of the ADP-HGIS states that noise from the planned construction activities must not exceed the limits in **Table 5**, representing the typical working hours. The limits apply 1 m from the façade of any occupied building during the works. If noise is predicted or measured to be higher than these values the process in **Section 3.0** shall be followed.

Table 5 Construction noise criteria at residential settlement area

Day of week	Time Period	Typical Duration - Noise Limit, dBA	
		L_{Aeq}	Maximum L_{Amax}
Weekdays	12:00 am – 6:30 am	45	75
	6:30 am – 7:30 am	60	75
	7:30 am – 6:00 pm	75	90
	6:00 pm – 8:00 pm	70	85
	8:00 pm – 12:00 am	45	75
Saturdays	12:00 am – 6:30 am	45	75
	6:30 am – 7:30 am	45	75
	7:30 am – 6:00 pm	75	90
	6:00 pm – 8:00 pm	45	75
	8:00 pm – 12:00 am	45	75
Sundays and public holidays	12:00 am – 6:30 am	45	75
	6:30 am – 7:30 am	45	75
	7:30 am – 6:00 pm	55	85
	6:00 pm – 8:00 pm	45	75
	8:00 pm – 12:00 am	45	75

4.2 Vibration Criteria

The **ACDP - HGIS** only considers specific vibration limits when blasting or pile driving form part of the construction methodology, hence no specific vibration requirements apply for the proposed project. However, it is considered good practice to manage vibration effects on amenity and buildings. Guideline values for construction activities are set out below to inform the management of works based on amenity and the avoidance of cosmetic damage (plaster or paint cracking).

4.2.1 Amenity

Table 6 below provides commonly adopted amenity vibration values in buildings in any axis when measured in the corner of the floor of the storey of interest for multi-storey buildings, or within 500 mm of ground level at the foundation of a single-storey building. If these values are met then impacts on amenity can be considered appropriately managed. If vibration is predicted or measured to be higher than these values the process in **Section 3.0** shall be followed.

Table 6 Human Comfort Construction Vibration Limits in Occupied Buildings

Receiver	Period	Peak particle velocity limit (millimetres/second)
Occupied activity sensitive to noise	Night-time 10:00 pm – 7:00 am	0.3 mm/s PPV
	Daytime 7:00 am – 10:00 pm	2 mm/s PPV
Other occupied buildings	At all times	2 mm/s PPV

4.2.2 Avoidance of Cosmetic Damage

The below guideline values are commonly adopted across New Zealand for the avoidance of cosmetic damage to structures. The surrounding dwellings are considered typical residential constructions and so in line 2 (Residential type buildings) in **Table 7** below should be used.

Table 7 Guideline Values for Vibration to be Used when Evaluating the Effects of Short-term and Long-term Vibration on Structures (DIN 4150-3)

Line	Type of Structure	Guideline values for v_i in mm/s				
		Short-term Vibration				Long-term Vibration
		Vibration at the foundation at a frequency of:			Vibration at horizontal plane of highest floor at all frequencies	Vibration at horizontal plane of highest floor at all frequencies
		1Hz to 10Hz	10Hz to 50Hz	50Hz to 100Hz		
1	Commercial type building	20	20-40	40-50	40	10
2	Residential type buildings	5	5-15	15-20	15	5
3	Listed buildings and sensitive to vibrations	3	3-8	8-10	8	2.5

4.3 Noise and Vibration at Unoccupied Properties

The construction noise (**Section 4.1**) and human comfort values (**Section 4.2**) are intended to control noise and vibration effects during construction works for the occupants of surrounding properties (i.e., to enable reasonable use of these properties throughout the construction programme). Therefore, should properties be vacant with no occupants to experience any noise and/or vibration effects, such limits no longer serve a purpose and are not applicable to the construction works.

If it can be confirmed that buildings are vacant or vacated during the construction works, the relevant amenity criteria, can be effectively disregarded at those specific properties, only. It is possible, however that the remaining occupied surrounding properties may still limit the level of noise and vibration which can be generated by the construction activities.

5.0 Noise Assessment

Table 8 identifies the range of high noise generating plant items expected to be used during the planned works and their associated typical noise levels. The noted setback distances to compliance have been calculated in accordance with the methodology in NZS 6803 and include façade corrections. Where works are planned to occur within the setback distances noted in column 4, mitigation is likely to be required to achieve compliance with the relevant noise criteria.

Table 8 Plant Items and Typical Noise Emission Levels

Type of Activity	Plant Item / Equipment	Reference Sound Pressure Level at 10m, L_{Aeq}	Approximate setback distance to achieve 75 dB L_{Aeq} Noise Limit	
			without mitigation	with mitigation(A)
Excavation / Open trenching	Excavator (5-20t) fitted with bucket	70 dB	8 m	1 m
Pavement Cutting	Petrol/Diesel hand operated driven cutting saw.	90 dB	80 m	20 m
Tree Removal	Lifting Crane (20t)	75 dB	14 m	4 m
	Chainsaw(B)	75-80 dB	25 m	N/A
Horizontal Directional Drilling (HDD).	Directional drill with thrust force up to 267 kN.	80 dB	25 m	3 m
Power generation	Diesel power generator 150 kVA, 1,500 rpm.	65 dB	5 m	<1 m
Compaction	Small ride-on vibratory compactor (<5t)	75 dB	14 m	2 m
	Small hand operated vibratory plate compactor (<100 kg)	75 dB	14 m	2 m

Notes to **Table 8**:

(A) Based on acoustically effective screening between the noise source and a ground floor receiver. Higher floors will have less shielding and setback distances are likely to vary from that stated above.
(B) Chainsaw operations would be likely to occur for no more than 5 minutes in a 15-minute period (the smallest assessment period), resulting in 15-minute levels 5 dB lower than if continuously operated.

Based on published data and measurements, trucks generate a typical sound exposure level of approximately 75-80 dBA L_{AE} at a distance of 10-metres from a truck pass-by. Given individual truck pass-by are transient and short in nature and construction noise is assessed in periods of no shorter than 15-minutes, truck noise levels at surrounding receivers are expected to be lower than, and therefore compliant with the daytime noise limit.

While most noise emission from the equipment in **Table 8** is reasonably steady state, it is expected that there could be instantaneous maximum noise events that cause levels in the order of 10 to 15 dB higher than those presented. The noise limit for these transient noise events is 90 dB L_{Amax}. We expect that compliance with the L_{Aeq} based noise limits will also result in compliance with the L_{Amax} based limit.

Based on typical noise levels and distances to surrounding receivers, general **compliance with the relevant ACDP - HGIS noise criteria can be achieved at most of the surrounding properties** during the planned works through adopting the noise mitigation and management measures outlined in **Section 6.0**.

For most of the construction works noise levels are expected to be lower than the ACDP - HGIS permitted noise limit.

Potential Noise Exceedances and Effects

The potential noise exceedances and effects are summarised in **Table 9** below, which provides detail of the properties that would experience external noise levels above 75 dB L_{Aeq}. These levels were calculated **with mitigation in place** as set out in **Section 6.0** and include a façade correction in accordance with NZS 6803. It also includes the anticipated durations and associated effects at the most exposed receivers.

Internal noise levels in **Table 9** have been identified based on residential buildings (with windows closed) being able to reduce external noise levels (without façade corrections) by 20-25 dB.

Table 9 Adverse Noise Effects Summary

Location	Works	External Level, L_{Aeq}	Internal Level, L_{Aeq}	Potential Noise Effects	Anticipated Duration
11 Moa Avenue	Pavement Cutting	80 dB	50-55 dB	Some occupants may feel annoyed, and concentration may be affected but residential and office activities can generally continue. Sound levels for television, radio and phone conversations would need to be slightly raised.	One day
13 Moa Avenue	Open cut trenching	80 dB	50-55 dB		Two days
	Compaction	85 dB	55-60 dB	Concentration is likely to be affected, and phone conversations may become difficult, and people are likely to seek respite by moving to another room.	One day

Location	Works	External Level, L_{Aeq}	Internal Level, L_{Aeq}	Potential Noise Effects	Anticipated Duration
11 Rata Street	Compaction	80 dB	50-55 dB	Some occupants may feel annoyed, and concentration may be affected but residential and office activities can generally continue. Sound levels for television, radio and phone conversations would need to be slightly raised.	One day
	Tree removal	85 dB	55-60 dB	Concentration is likely to be affected, and phone conversations may become difficult, and people are likely to seek respite by moving to another room.	One day
32 Tui Street	Compaction	80 dB	50-55 dB	Some occupants may feel annoyed, and concentration may be affected but residential and office activities can generally continue. Sound levels for television, radio and phone conversations would need to be slightly raised.	One day
13 Nikau Road	Compaction	80 dB	50-55 dB		One day
26 Nikau Road	Tree removal	80 dB	50-55 dB		One day
40 Nikau Road	Compaction	80 dB	50-55 dB		One day
	Pavement cutting	85 dB	55-60 dB	Concentration is likely to be affected, and phone conversations may become difficult, and people are likely to seek respite by moving to another room.	One day

On the basis of the above and considering the temporary nature of the predicted infringements, noise effects can be considered reasonable and acceptable.

5.1 Vibration Assessment

The highest level of construction vibration is expected to be associated with works such as excavation of material and compaction works. **Table 10** shows typical vibration levels generated by the activities and plant planned to be used during the works. These reference levels should be considered indicative only due to the potential difference in local ground conditions and machinery.

Table 10 Plant Typical Vibration Emission Levels

Activity	Plant Item	Approximate setback distance to achieve the following threshold levels:	
		Amenity	Avoidance of cosmetic damage
		2 mm/s PPV	5 mm/s PPV
Excavation / Trenching	Excavator (5-30t) fitted with bucket attachment	1 - 2 m	0 - 1 m
Compaction	Small ride on vibratory compactor (≤5t)	8 - 13 m	3 -4 m
	Small hand operated vibratory plate compactor (≤100 kg)	<1 m	<0.5 m

It should be noted that the above reference levels are derived from measurements on other sites and should be considered indicative only due to the potential difference in machinery and ground conditions etc.

To manage potential vibration effects it is recommended that allowance is made for compaction works within 10 m of dwellings to be undertaken using a hand operated vibratory plate compactor.

There is also potential for the generation of intermittent vibration by dropping heavy objects, running over ledges, or impact of unexpected items. It is not feasible to predict how regularly these events may occur, or what levels of vibration may be generated from these individual events, due to their arbitrary nature. They can, however, be readily minimised or avoided through considered management practices as outlined in **Section 6.0**.

Verification monitoring of initial compaction works is recommended to be undertaken to confirm the vibration levels for the specific equipment selected to enable suitable mitigation and management measures for the designated area of works.

Notwithstanding, it is likely that vibration may be perceivable at surrounding properties from time to time during the works. It is recommended that this is managed by way of providing advice before commencing construction (e.g., via letter drop) to avoid unexpected perceivable vibration giving rise to concern about property damage. This approach plays an important role in maintaining communication with the community.

Based on typical vibration levels, distances to surrounding receivers and with the above management in place, vibration from the works can be managed to minimise amenity impacts and avoid cosmetic damage in line with commonly adopted guideline values.

6.0 Mitigation and Management Measures

The recommended noise and vibration mitigation and management measures provided in **Table 11** have been identified to control construction generated noise and vibration levels with reference to the noise and vibration requirements identified in this document. These recommended mitigation measures are considered to be the best practicable options (BPO) and should be implemented as far as is feasible and practicable. Key mitigation and management measures are shown in **bold**.

Table 11 Recommended Noise Mitigation Measures during Daytime Works

Activity	Recommended Mitigation Measures
General Site Management	• Amplified music or radios not to be played on site. • All plant and equipment to be well maintained and serviced regularly. • Low noise/vibration emitting equipment and methods are to be selected where practical, with a preference to the selection of equipment fitted with silencers/mufflers. • Silencers or mufflers on construction plant, if any, to be properly maintained. • Tools and materials not to be thrown or dropped. • Delivery truck tailgates to be operated with consideration of neighbouring properties – not slammed or thrown open/closed. • Machines and plant that may be in intermittent use to be shut down between work periods or throttled down to a minimum. • Where feasible, equipment to be fitted with broadband reverse alarms. • Where practicable, works to be undertaken at times when closest neighbouring properties are unoccupied (e.g., during office working hours), this should be by pre-arrangement with neighbours. • Avoiding the unnecessary revving and idling of engines near neighbouring buildings. • Smallest/quietest machine practicable for the works to be used. • **Where practicable allow for acoustically effective screening to block the line-of sight between the source and receiver (typically at a height of at least 2 metres above ground level), along the constructions works.**
Laydown area	• Separate areas operating trucks and excavators from dwellings by at least 10 m or use acoustic screening between the temporary designated area of works boundary and dwellings. • **No activity to take place in laydown areas outside the hours of 7:30 am to 6:00 pm, Monday to Saturday**.
Excavation / Open cut trenching.	• **Only excavators 5-20 t to be used unless verification monitoring on-site identifies alternate methodology that can meet the project limits specified in Section 4.1.** • **Where feasible to use a 5-ton excavator to complete the works.**

Activity	Recommended Mitigation Measures
Compaction	**Compaction works shall be managed based on distance to occupied dwellings as follows:** • **Within 14 m of occupied dwellings – localised acoustic screening is required.** • **Greater than 14 m from occupied dwellings – no acoustic screening is required.** • **Within 14 m of occupied dwellings – only vibratory plate compactor <100kg to be used.** • **Greater than 14 m from occupied dwellings – plate or a ≤5t roller compactor can be used.** • Verification monitoring of initial compaction works is recommended to be undertaken to confirm the vibration levels for the specific equipment selected to enable suitable mitigation and management measures for the designated area of works.
Cutting pavement surfaces	• Surface cutting within 20 m of occupied dwellings to be carried out using localised acoustic screening (**Figure 2** or **Figure 3**) sufficient to block the line of sight from the source to the nearest residences.
Power Generation	Only power generators smaller than 150 kVA, 1,500 rpm to be used unless verification monitoring on-site identifies alternate methodology that can meet the project limits in **Section 4.1**. Such generators shall be located at least 5 metres away from any occupied dwelling.
Tree Removal	• **Where possible tree and vegetation removal shall be done using an excavator (e.g., by scooping) as a preference.** • **If chainsaw cutting is needed, works within 25 m from a dwelling should be managed by using a single chainsaw.** • **In cases where practicable to do so, an electric chainsaw should be used.**

Note on Table 11: The line items highlighted **in bold** are key measures highlighted for emphasis, drawing attention to important or critical mitigation/actions.

Notes on Acoustic Barriers

Acoustic barriers should be constructed from materials with a typical minimum surface mass of 7 kg/m^2. The panels should be abutted or overlapped to provide a continuous screen without gaps at the bottom or sides of the panels. The panels should be positioned as close as possible to the noisy construction activity to block the line-of-sight from the activity to noise sensitive receivers.

Suitable materials include plywood (e.g., 12mm thick) or the following proprietary noise barriers hung from mesh fencing:

- Duraflex ‘Noise Control Barrier - Performance Series’ (www.duraflex.co.nz)
- Soundex ‘Acoustic Curtain - Performance Series’ (www.ultimate-solutions.co.nz)

Alternatives should be approved by a suitably qualified acoustic specialist because some proprietary noise curtains have insufficient surface mass for general use.

Figure 2 Example Localised/Mobile Acoustic Screening

Notes on Acoustic Shed – Concrete Cutting

The principles governing the design of covers for machinery are simple: for example, covers need to enclose machines as fully as possible (at least the noisy part), they need to possess adequate insulation so that noise energy does not readily pass through them, and they need to be lined inside with an efficient sound absorbent so that noise is not built up within them or reflected out through openings. Because a certain number of openings are nearly always necessary, either for access or for ventilation; a sheet material mass of 7-10 kg/m^2 is typically sufficient.

Figure 3 below shows an example of this principle which may be found at Noise Enclosure > Acoustic Enclosure / Soundproof Enclosure (supplyforce.co.nz), other acoustic enclosures should be approved for use by the project acoustic advisor

Figure 3 Example Acoustic Shed for Concrete Cutting

7.0 Complaint Handling

Noise and/or vibration complaints will be responded to in a prompt manner. The Public Complaints Contact (see **Table 4**) will be the contact person for managing noise and vibration complaints; this role is also the contact for noise/vibration related visits from Auckland Council noise control officers or other Council staff.

The Public Complaints Contact shall ensure that complaints are logged on the project complaint register.

In the event of a complaint being received in relation to noise or vibration, the Public Complaints Contact shall:

a) Note in writing the nature of the complaint, request contact details from the complainant and advise them that the matter will be investigated as soon as possible. Immediately check activities and subjective noise or vibration levels in the area near the complainant's property and, if appropriate, other parts of the site.

b) If activities are identified that are considered to be generating excessive noise or vibration, the project team representative shall take appropriate action (e.g., implementation of mitigation measures, change of construction methodology, etc.) to reduce noise or vibration to an acceptable level.

c) Contact the complainant and advise them of the outcome of the investigation and make a written note in the complaint book of the event and the outcome.

If a complaint cannot be resolved through the above process, it may be necessary to arrange noise and/or vibration monitoring to determine the actual noise and/or vibration levels on the complainant's property (see **Section 8.0**).

8.0 Noise and Vibration Monitoring

8.1 Noise

Noise monitoring may be required in response to reasonable noise complaints being received. Construction noise levels shall be monitored and assessed as follows:

- Conducted by a suitably qualified and experienced person (e.g., Member of the Acoustical Society of New Zealand or equivalent).
- In accordance with the requirements of NZS 6803:1999.
- At a location representative of sensitive receivers/complainants in the vicinity.
- To reflect representative construction activities. The measured noise levels shall be stated along with the measurement duration (T).
- One metre from the most affected façade or, if this position is not accessible, at an equivalent position where practicable. If this is not possible, measured noise levels shall be adjusted for distance and façade reflections if necessary. If external measurement is impractical or inappropriate, noise monitoring shall be conducted inside the building of concern and the noise limit would be 20 dB less than the relevant limits.
- When monitoring is requested by Auckland Council in response to reasonable complaint.

If exceedance of the noise limits is identified by the monitoring, the activity resulting in the exceedance shall be stopped and the process should be reviewed. Mitigation measures to achieve compliance or reduce noise as far as practicable will be identified prior to re-starting the activity, these may take the form of increased boundary or localised screening, among others.

8.2 Vibration

Verification monitoring of initial compaction works is recommended to be undertaken to confirm the vibration levels for the specific equipment selected to enable suitable mitigation and management measures for the designated area of works. Vibration monitoring may also be required in response to reasonable noise complaints being received. Construction vibration levels shall be monitored and assessed as follows:

- Conducted by a suitably qualified and experienced person (e.g., Member of the Acoustical Society of New Zealand or equivalent).
- In accordance with the requirements of DIN 4150-3.
- To reflect representative activities and shall comprise measurements of peak particle velocity (PPV).
- Measurements are to be undertaken at the foundation of the building, in the corner of the floor of the storey of interest for multi-storey buildings or within 500 mm of ground level at the foundation of a single storey building as appropriate.

If the measured construction vibration levels exceed the limits in **Section 4.2**, the activity resulting in the exceedance shall be stopped and the process should be reviewed. Mitigation measures or revised construction methodology shall be identified prior to re-starting the activity.

8.3 Monitoring Programme

- **Noise**: As necessary, in response to complaint.
- **Vibration**:
  - As necessary, in response to complaint.
  - Verification monitoring of the initial compaction works is recommended to be undertaken to confirm the vibration levels for the specific equipment selected.

9.0 Reporting

The following information shall be recorded and maintained by the Contractor Project Manager and be provided to Auckland Council upon reasonable request.

- Record of Discussions with Neighbours - See example pro-forma in **Appendix A.**
- Complaints Record – See example pro-forma in **Appendix B.**
- Noise and/or Vibration Monitoring Results – to be maintained by the project manager

Appendix A Example Proforma for discussions with neighbours

Acoustic Assessment and Construction Noise and Vibration Management Plan-Blackpool

Blackpool Stormwater, Waiheke Island

Auckland Council

SLR Project No.: 810.30391.00205

4 April 2025

A.1 Example Pro-forma for discussion with Neighbours

Date and Time:	
Location:	
Contractor's Representative:	
Public Member Individual/Representative/Group:	
Discussion Topics:	
Feedback:	
Outcome:	

Appendix B Example pro-forma complaints record

Acoustic Assessment and Construction Noise and Vibration Management Plan-Blackpool

Blackpool Stormwater, Waiheke Island

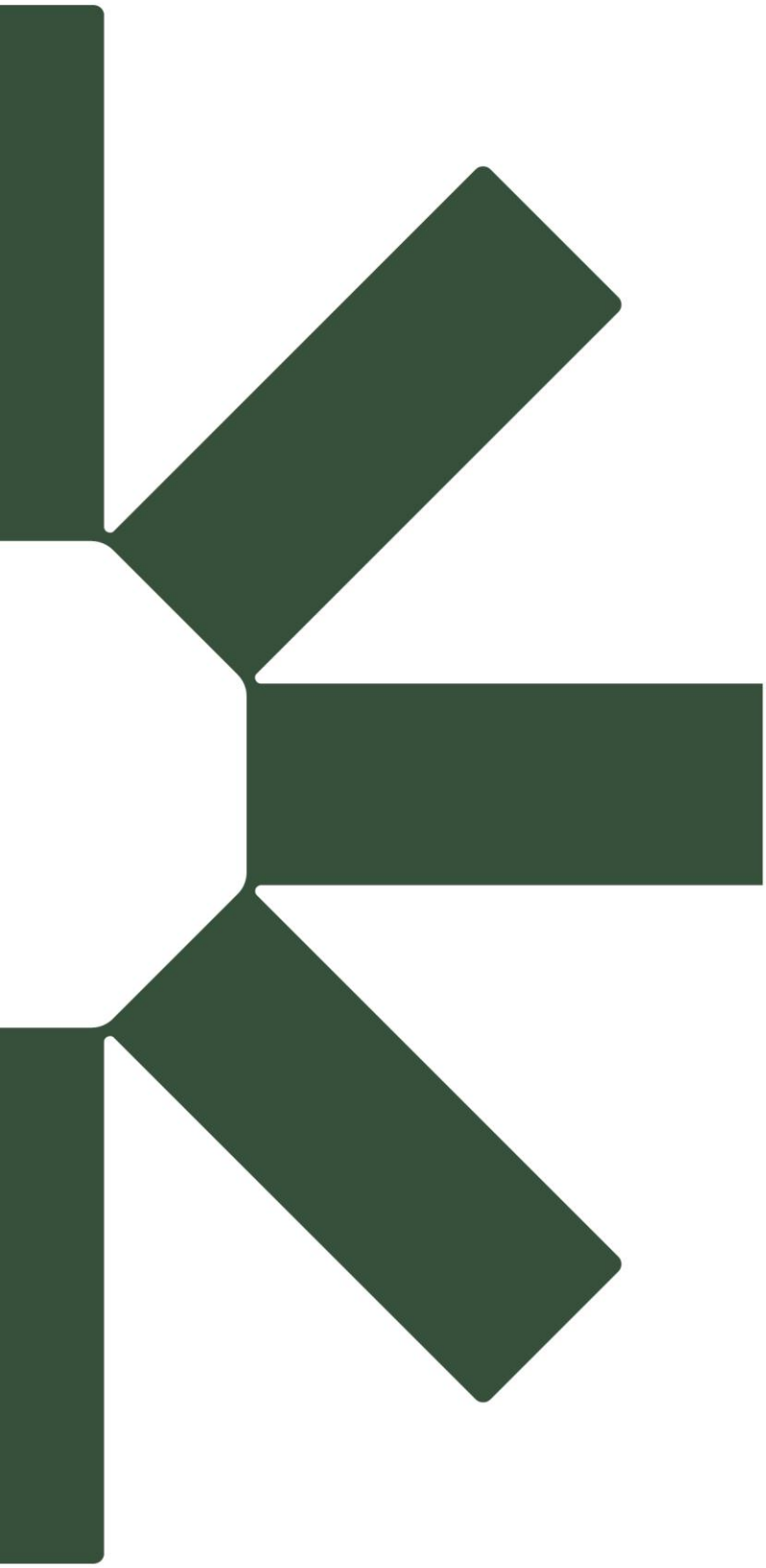
Auckland Council

SLR Project No.: 810.30391.00205

4 April 2025

B.1 Complaints Record

Date and Time:	
Location:	
Contractor's Representative:	
Complainant details (name and contact number/email):	
Nature of the Complaint:	
Comments:	
Outcome:	



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