



# Construction Noise and Vibration Management Plan (CNVMP)

3 Pigeon Mountain Road, Half Moon Bay, Auckland 2012

**HND HMB LTD**

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## Basis of Report

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## Table of Contents

<b>Basis of Report</b> .....	<b>i</b>
<b>Acronyms and Abbreviations</b> .....	<b>iv</b>
<b>1.0 Introduction</b> .....	<b>1</b>
<b>2.0 Project Description and Site Location</b> .....	<b>1</b>
2.1 Project Description .....	1
2.2 Surrounding Receivers .....	1
2.3 Construction Methodology .....	4
2.4 Construction Programme.....	5
2.5 Hours of operation .....	5
<b>3.0 Roles and Responsibility</b> .....	<b>5</b>
3.1 Contact Details.....	5
3.2 Staff Training and Inductions .....	6
<b>4.0 Construction Noise and Vibration Criteria</b> .....	<b>6</b>
4.1 Construction Noise.....	6
4.2 Construction Vibration.....	7
4.3 Noise and Vibration at Unoccupied Properties .....	8
<b>5.0 Stakeholder Engagement</b> .....	<b>9</b>
5.1 Communication with the Community.....	9
5.2 Communication with Council .....	9
<b>6.0 Construction Equipment Emission Data</b> .....	<b>9</b>
6.1 Construction Noise.....	9
6.2 Construction Vibration.....	10
<b>7.0 Mitigation and Management Measures</b> .....	<b>11</b>
7.1 Mitigation Measures .....	11
<b>8.0 Compliant Handling</b> .....	<b>16</b>
<b>9.0 Noise and Vibration Monitoring</b> .....	<b>16</b>
9.1 Noise .....	16
9.2 Vibration .....	17

## Tables in Text

Table 1	Summary of Surrounding Receivers.....	2
Table 2	Construction Activities and Appropriate Durations.....	5
Table 3	Table for Key Personnel and Contact Details .....	5
Table 4	Construction Noise Levels for Activities Sensitive to Noise in a Residential Zone	7



Table 5	Guideline Values for Vibration to be Used when Evaluating the Effects Short-term and Long-term Vibration on Structures (DIN 4150-3) .....	8
Table 6	Human Comfort Construction Vibration Limits in Occupied Buildings .....	8
Table 7	Plant Items and Typical Noise Emission Levels .....	9
Table 8	Plant Items and Typical Vibration Levels .....	11
Table 9	Recommended Noise and Vibration Mitigation Measures .....	12

## Figures in Text

Figure 1	Aerial Showing Site and Surrounding .....	4
Figure 2	Example Acoustic Shroud Around Breaker .....	14
Figure 3	Minimum Recommended Temporary Acoustic Screening Locations (during demolition, excavation, stockpiling, piling, compaction, and Concrete Works) ....	15
Figure 4	Example of Localised Acoustic Screening (during concrete breaking works) .....	15



## Acronyms and Abbreviations

Term	Description
<b>'A' weighted</b>	A frequency adjustment which represents how humans hear sounds.
<b>Ambient noise level</b>	The all-encompassing sound associated with an environment or area.
<b>AUP</b>	Auckland Unitary Plan Operative in part
<b>dB</b>	Decibel
<b>dBA</b>	'A' weighted decibel
<b>DIN 4150-3</b>	German Industrial Standard DIN 4150-3 (1999): Structural vibration – Part 3 Effects of vibration on structures.
<b>Free field</b>	A monitoring location where the microphone is positioned sufficiently far from nearby surfaces for the measured data to not be influenced by reflected noise.
<b>Hz</b>	Hertz
<b>Impulsive noise</b>	Noise with a high peak of short duration, or sequence of peaks.
<b>Intermittent noise</b>	Noise which varies in level with the change in level being clearly audible.
<b>L<sub>90</sub>, L<sub>10</sub>, etc.</b>	Statistical exceedance levels, where LN is the sound pressure level exceeded for N% of a given measurement period.
<b>LAeq</b>	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.
<b>L<sub>Amax</sub></b>	The 'A' weighted maximum sound pressure level of an event.
<b>Low frequency</b>	Noise containing energy in the low frequency range.
<b>L<sub>p</sub> or SPL</b>	Sound Pressure Level.
<b>L<sub>w</sub> or SWL</b>	Sound Power Level.
<b>NZS 6801:2008</b>	New Zealand Standard NZS 6801:2008 "Measurement of Environmental Sound".
<b>NZS 6802:2008</b>	New Zealand Standard NZS 6802:2008 "Assessment of Environmental Noise".
<b>NZS 6803:1999</b>	New Zealand Standard NZS 6803:1999 "Acoustics – Construction Noise".
<b>Octave-band</b>	A frequency band where the highest frequency is twice the lowest frequency.
<b>Rating level</b>	A derived level used for comparison with a noise limit.
<b>R<sub>w</sub></b>	Weighted Sound Reduction Index of a building element. That is, the laboratory tested (or theoretically calculated) sound insulation performance of a single element.
<b>Tonality</b>	Noise containing a prominent frequency.



## 1.0 Introduction

This document serves as the Construction Noise and Vibration Management Plan (**CNVMP**) for the construction works at 3 Pigeon Mountain Road in Half Moon Bay, Auckland. It outlines noise and vibration criteria and identifies mitigation, management, and monitoring measures along with communication and complaints procedures. This is a living document and will be updated as and when needed in response to new project information.

The intention of this document is to provide a framework for noise and vibration management to control noise and vibration levels at neighbouring buildings. This document refers to the following documents and standards:

- Auckland Unitary Plan (AUP).
- NZS 6803: 1999 Acoustics – construction noise (NZS 6803).
- German Industrial Standard DIN 4150-3 (1999): Structural vibration – Part 3 Effects of vibration on structures.

***This draft CNVMP should be updated according to the identified final construction methodology and relevant conditions of consent prior to commencement of construction.***

## 2.0 Project Description and Site Location

### 2.1 Project Description

The proposed development comprises construction of 92 residential units (terrace houses) with an access driveway for the whole site. The key construction activities associated with the proposal are expected to involve the following activities:

- Demolition;
- Excavation;
- Stockpiling;
- Piling;
- Compaction; and
- Concrete works (for construction of internal roads)

### 2.2 Surrounding Receivers

Based on the Auckland Unitary Plan Operative in Part (the AUP), the subject site and sites on the western, southern, and eastern sides are located on land zoned Residential – Mixed Housing Suburban. To the north across Ara-Tai Road are commercial activities linked to the Half Moon Bay Marina. The neighbouring properties with the greatest potential to be exposed to noise and/or vibration generated from the proposed construction activities are summarised in **Table 1** and **Figure 1** below.



**Table 1 Summary of Surrounding Receivers**

Fig 2 ref.	Address	Approximate Distance to Closest Activity, meters					Comment
		Demolition	Excavation	Stockpiling	Piling	Compaction	
R01	14 Poseidon Place	35	35	74 Bulldozer 79 Excavator 80 Trucks	29	48	Two-storey dwelling
R02	12 Poseidon Place	31	34	69 Bulldozer 75 Excavator 87 Trucks	30	52	Two-storey dwelling
R03	10 Poseidon Place	28	33	69 Bulldozer 76 Excavator 93 Trucks	28	55	Two-storey dwelling
R04	8 Poseidon Place	36	40	79 Bulldozer 88 Excavator 106 Trucks	38	37	Two-storey dwelling
R05	6A Poseidon Place	45	46	90 Bulldozer 100 Excavator 119 Trucks	41	43	One-storey dwelling
R06	4 Poseidon Place Half	60	58	103 Bulldozer 115 Excavator 131 Trucks	48	54	Two-storey dwelling
R07	11 Pigeon Mountain Road	38	40	74 Bulldozer 88 Excavator 79 Trucks	28	43	Two-storey dwelling
	2 Compass Point Way	31	35	67 Bulldozer 81 Excavator 66 Trucks	28	42	Two-storey dwelling
R08	4 Compass Point Way	30	35	64 Bulldozer 78 Excavator 60 Trucks	31	46	One-storey dwelling
R09	2/9 Tuscan Place	24	28	50 Bulldozer 63 Excavator 43 Trucks	23	39	One -storey dwelling
	9 Tuscan Place	45	49	80 Bulldozer 72 Excavator 58 Trucks	43	47	Two-storey dwellings
R10	11 Tuscan Place	27	30	54 Bulldozer 68 Excavator 37 Trucks	28	25	Two-storey dwellings



Fig 2 ref.	Address	Approximate Distance to Closest Activity, meters					Comment
		Demolition	Excavation	Stockpiling	Piling	Compaction	
R11	8 Compass Point Way	34	34	61 Bulldozer 75 Excavator 40 Trucks	30	30	Two dwelling
R12	8A Compass Point Way	36	35	76 Bulldozer 91 Excavator 52 Trucks	30	45	Two-storey dwelling
R13	16 Indus Place	32	30	86 Bulldozer 101 Excavator 62 Trucks	26	43	Two-storey dwelling
	16A Indus Place	37	36	87 Bulldozer 102 Excavator 63 Trucks	32	48	Two-storey dwelling
R14	14 Indus Place	46	44	104 Bulldozer 116 Excavator 85 Trucks	42	53	Two-storey dwelling
R15	10 Compass Point Way	34	32	90 Bulldozer 103 Excavator 76 Trucks	31	39	Two-storey dwelling
R16	84 Compass Point Way	6	10	43 Bulldozer 53 Excavator 50 Trucks	6	5	Three - storey dwelling
R17	82 Compass Point Way	16	11	40 Bulldozer 49 Excavator 52 Trucks	6	25	One-storey dwelling
R18	80 Compass Point Way	14	9	38 Bulldozer 45 Excavator 51 Trucks	7	25	Three - storey dwelling
R19	78 Compass Point Way	19	10	41 Bulldozer 52 Excavator 50 Trucks	4	6	Three - storey dwelling
R20	76 Compass Point Way	33	11	52 Bulldozer 65 Excavator 56 Trucks	6	10	Three - storey dwelling





**Figure 1 Aerial Showing Site and Surrounding**



## 2.3 Construction Methodology

The following works are anticipated to be the key noise and vibration generating activities during construction:

- Demolition;
- Excavation;
- Stockpiling;
- Piling;
- Compaction; and
- Concrete works (for construction of internal roads)



The specific construction methodology shall be detailed in the project specific Construction Management Plan (**CMP**)<sup>1</sup>.

## 2.4 Construction Programme

The approximate expected duration of the construction activities is provided in **Table 2** below.

**Table 2 Construction Activities and Appropriate Durations**

Activity	Approximate Duration
Demolition	4 to 6 weeks
Excavation	2 to 3 weeks
Stockpiling	1 week each of them (two stockpiles)
Piling	2 to 3 weeks
Compaction	2 to 3 weeks

## 2.5 Hours of operation

The expected hours of construction works will generally be between 7:30 am to 6:00 pm Monday to Saturday. There is to be no operation of high noise-generating, motorised equipment on the site outside of these hours, including on Sundays and public holidays.

The above restriction on hours of works does not apply to low noise generating activities, such as painting, site set up, or staff meetings, which may occur outside of these hours.

## 3.0 Roles and Responsibility

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.

### 3.1 Contact Details

The key personnel and contact details for management of construction noise and vibration of the development are provided in **Table 3** below.

**Table 3 Table for Key Personnel and Contact Details**

Role	Name	Organisation	Phone	Email
Project Manager	Allen Lu	Risland Construction	029-126-7540	allen.l@rislandnz.co.nz
Contractor Project Manager	TBC	TBC	TBC	TBC

<sup>1</sup> 1 Construction Management Plan to be prepared by the Contractor/Project team at the appropriate time.



Role	Name	Organisation	Phone	Email
Public Complaint Contact	Vivian Xu	Risland Construction	027-683-6886	vivian.x@rislandnz.co.nz
Acoustics Advisor	Shrikar More	SLR Consulting	210-817-8996	smore@slrconsulting.com

### 3.2 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.

Induction will 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.

## 4.0 Construction Noise and Vibration Criteria

Criteria for noise and vibration emissions from construction activities is contained within the AUP (Standards E25.6.27 and E25.6.30). (TBC subject to final conditions of consent)

### 4.1 Construction Noise

The noise limits listed below apply at nearby receivers. These limits apply at 1m from the façade of any building occupied during the works that contains an activity sensitive to noise when measured and assessed in accordance with NZS 6803.

#### At 84 Compass Point Way:

- 75 dB  $L_{Aeq}$  during demolition, piling and compaction works for an approximately duration of less than two weeks.
- 80 dB  $L_{Aeq}$  during concreting works for an approximately duration of up to two days.
- Noise limits in **Table 4** during all other times.

#### At 80 Compass Point Way:

- 75 dB  $L_{Aeq}$  during piling works for an approximately duration of up to three days.
- Noise limits in **Table 4** during all other times.



### At 76 Compass Point Way and 78 Compass Point Way:

- 75 dB LAeq during piling and concreting works for an approximately duration of up to five days at any receiver.
- Noise limits in **Table 4** during all other times.

### At all other Receivers

The noise limits in **Table 4** below apply to all other receivers during all construction activities.

**Table 4 Construction Noise Levels for Activities Sensitive to Noise in a Residential Zone**

Time of Week	Time Period	Long-term duration of Construction work	
		LAeq	LAmx
Weekdays	6:30 am – 7:30 am	55	70
	7:30 am – 6:00 pm	70	85
	6:00 pm – 8:00 pm	65	80
	8:00 pm – 6:30 am	40	70
Saturdays	6:30 am – 7:30 am	40	70
	7:30 am – 6:00 pm	70	85
	6:00 pm – 8:00 pm	40	70
	8:00 pm – 6:30 am	40	70
Sundays and public holidays	6:30 am – 7:30 am	40	70
	7:30 am – 6:00 pm	50	80
	6:00 pm – 8:00 pm	40	70
	8:00 pm – 6:30 am	40	70

## 4.2 Construction Vibration

Vibration from works within the site shall comply with the guideline values shown in Table 5 and Table 6. Vibration levels shall be measured and assessed in accordance with, German Standard DIN 4150-3.



**Table 5 Guideline Values for Vibration to be Used when Evaluating the Effects Short-term and Long-term Vibration on Structures (DIN 4150-3)**

Type of Structure	Short-term Vibration				Long-term Vibration
	Peak Particle Velocity (PPV), mm/s			PPV at horizontal plane of highest floor at all frequencies 1Hz to 10Hz	PPV at horizontal plane of highest floor at all frequencies 10Hz to 50Hz
	1 Hz to 10 Hz	10 Hz to 50 Hz	50 Hz to 100 Hz		
Building used for commercial purposes, industrial buildings	20 mm/s	20-40 mm/s	40-50 mm/s	40 mm/s	10 mm/s
Residential	5 mm/s	5-15 mm/s	15-20 mm/s	15 mm/s	5 mm/s
Building that have particular sensitivity to vibration and are of great intrinsic value	3 mm/s	3-8 mm/s	8-10 mm/s	8 mm/s	2.5 mm/s

**Table 6 Human Comfort Construction Vibration Limits in Occupied Buildings**

Receiver	Period	Peak Particle Velocity Limit <sup>1</sup>
Occupied building containing activity sensitive to noise <sup>2</sup>	Night-time 10:00 pm to 7:00 am	0.3 mm/s
Other occupied buildings	Daytime 7:00 am to 10:00 pm	2.0 mm/s
	At all times	2.0 mm/s

<sup>1</sup> In any axis direction.

<sup>2</sup> As defined in the AUP

### 4.3 Noise and Vibration at Unoccupied Properties

The AUP construction noise (see **Section 4.1**) and human comfort vibration limits (2 mm/s PPV) 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 noise limit in **Section 4.1**, and the human comfort vibration limit (2 mm/s PPV) 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 Stakeholder Engagement

### 5.1 Communication with the Community

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 neighbouring owners and/or occupants of the surrounding receivers outlined in **Section 2.2** prior to commencement and during the construction activities. The following methods of communication will be undertaken:

- Notice boards showing contact details of the project manager and contractor are to be displayed at the entrance(s) of the site at publicly accessible locations.
- All occupied neighbouring properties identified as sensitive receivers (**Table 1**) are 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.

### 5.2 Communication with Council

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

## 6.0 Construction Equipment Emission Data

### 6.1 Construction Noise

**Table 7** identifies the range of high noise generating plant items expected to be used during construction and their associated typical noise levels.

**Table 7 Plant Items and Typical Noise Emission Levels**

Activity	Plant Item (C)	Plant Noise Level at 10 m, dB LAeq	Approximate Setback Distance to Compliance (A) (Without Mitigation), m	Approximate Setback Distance to Compliance (With Mitigation), m (B)
Demolition	Excavator (≤30t) with pulveriser attachment	75	22	5
	Excavator (≤5t) with a breaker attachment with shroud	75	22	5





Activity	Plant Item <sup>(C)</sup>	Plant Noise Level at 10 m, dB LAeq	Approximate Setback Distance to Compliance <sup>(A)</sup> (Without Mitigation), m	Approximate Setback Distance to Compliance (With Mitigation), m <sup>(B)</sup>
Excavation and Stockpiling	Excavator (≤20t) with bucket attachment	70	12	4
	Dump trucks (20-ton)	80	36	17
	Bulldozer (<20-ton)	80	36	17
Piling (Reinforced concrete pile)	Excavator (≤20t)	70	12	4
Compaction and Concreting works	Vibratory Compactor (<20t) <sup>(D)</sup>	80	38	10
	Vibratory plate compactor (<100Kg)	70	12	2
	Concrete mixing truck	70	12	4
	Concrete pump	67 - 70	10 - 12	3 - 4

**Notes:**

(A) Compliance level is 70 dB LAeq, representative of the day-time limit (7:30 am to 6:00 pm).

(B) Based on single storey receiver and acoustically effective screening between the noise source and receiver.

(C) Calculations are based on the following source heights above the ground level:

- Demolition: 0.5m, excavation and piling 1.5m and Compaction 1m and 0.5m (plate compactor).
- Stockpiling works: Excavator 2m, dump truck and bulldozer 1.5m.
- Concreting works: Vibratory plate compactor (<100Kg) 0.5m, concrete mixing truck 1.5m and concrete pump 1.5m.

(D) The setback distance is based on six movements (passing by an individual receiver) within 15-minutes as the plant is expected to be moving across the site and not idling/stationary at one location.

## 6.2 Construction Vibration

The highest level of construction vibration is expected to be associated with demolition, piling and compaction works. **Table 8** identifies the anticipated vibration level generated by such works. These reference levels should be considered indicative only due to the potential difference in machinery and ground conditions etc.



**Table 8 Plant Items and Typical Vibration Levels**

Activity	Plant Item	Approximate distance to compliance with 2 mm/s PPV limit	Approximate distance to compliance with 5 mm/s PPV limit	Comment
Demolition	Excavator (≤5t) with a breaker attachment	3-4	<2	Closest receiver 6m. Compliance with the human amenity vibration limits and DIN 4150-3 cosmetic damage limit would therefore be expected.
Piling	Excavator (≤20t)	2 m	<1 m	Closest receiver 4m. Compliance with the human amenity vibration limits and DIN 4150-3 cosmetic damage limit would therefore be expected.
Compaction	Vibratory Compactor (<20t)	10-15 m	7-8m	Closest receiver 5m. To achieve compliance with performance requirements SLR recommend no use of this equipment within 15 m of receivers.
	Vibratory plate compactor (<100Kg)	4-5 m	<2m	Closest receiver 5m. Compliance with the human amenity vibration limits and DIN 4150-3 cosmetic damage limit would therefore be expected.

**Note:** The above reference levels are derived from SLR in-house library measurement and should be considered indicative only due to the potential difference in machinery and ground conditions etc.

It is important to emphasise that not particularly vibration intensive activities form part of concreting works, therefore compliance with the AUP vibration requirements would be expected at neighbouring receivers.

## 7.0 Mitigation and Management Measures

### 7.1 Mitigation Measures

The recommended noise and vibration mitigation measures provided in **Table 9** have been identified to control construction generated noise and vibration levels such that they generally comply with the relevant applicable noise and vibration requirements. 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 measures are included in **bold** in **Table 9**.





**Table 9 Recommended Noise and Vibration Mitigation Measures**

Activity	Recommended Mitigation Measures
General Site Management	<ul style="list-style-type: none"> <li>• Amplified music or radios not to be played on site.</li> <li>• All plant and equipment to be well maintained and serviced regularly.</li> <li>• Low noise/vibration emitting equipment is to be selected where practical, with a preference to the selection of equipment fitted with silencers/mufflers.</li> <li>• Silencers or mufflers on construction plant, if any, to be properly maintained.</li> <li>• Low noise/vibration methods to be adopted where practical.</li> <li>• Tools and materials not to be thrown or dropped.</li> <li>• Machines and plant that may be in intermittent use to be shut down between work periods or throttled down to a minimum.</li> <li>• Smallest/quietest machine practicable for the works to be used.</li> <li>• Delivery vehicles must not idle whilst on the site, or in the street while waiting to access the site.</li> <li>• <b>The use of high noise generating equipment on the subject site to be restricted to between 7:30 am to 6.00 pm Monday to Saturday.</b></li> <li>• Where feasible, equipment to be fitted with broadband reverse alarms.</li> <li>• <b>Acoustically effective boundary screening to a height of at least 2.0 metres in the locations shown in Figure 3 below during demolition, excavation, stockpiling, piling, compaction, and concreting works.</b></li> <li>• Ensure recommended noise barriers are erected and maintained in a good condition.</li> </ul>
Demolition	<ul style="list-style-type: none"> <li>• Demolition works to be completed as quickly as possible.</li> <li>• Large materials to be removed off-site to be broken into smaller sizes for disposal or reuse.</li> <li>• If feasible, remove structures within the building first leaving the external building structures/walls facing neighbouring buildings to be the last part to be demolition works.</li> <li>• Localised acoustically effective screening to a height of 2.0 m above ground level to suit when works are in close proximity to neighbours, where practicable (see <b>Figure 3 and Figure 4</b>).</li> </ul> <p><b>Demolition works &gt; 22m from occupied dwellings:</b></p> <ul style="list-style-type: none"> <li>• No acoustic screening required for 5 or 30ton excavator units.</li> </ul> <p><b>Demolition works &lt; 22m from occupied dwellings:</b></p> <ul style="list-style-type: none"> <li>• 2.0m-high acoustic boundary screening between the excavator units and the receivers (see <b>Figure 3</b>)</li> <li>• A shroud around the breaker (an example is shown in <b>Figure 2</b>).</li> </ul>
Stockpiling	<p><b>Stockpiling Works &gt; 36m from occupied dwellings:</b></p> <ul style="list-style-type: none"> <li>• No acoustic screening required for an excavator (<math>\leq 20t</math>) with bucket attachment unit, dump trucks (20t) and bulldozer (<math>&lt; 20t</math>).</li> </ul> <p><b>Stockpiling Works &lt; 36m from occupied dwellings:</b></p> <ul style="list-style-type: none"> <li>• 2.0m-high acoustic boundary screening between stockpiling plant items the receivers (see <b>Figure 3</b>).</li> </ul>



Activity	Recommended Mitigation Measures
Excavation	<ul style="list-style-type: none"> <li>• Heights of materials dropped from the bucket to be minimised.</li> <li>• Where spoil is being removed into a dump truck, or fill materials are being scooped from a dump truck, the dump truck to be positioned to minimise reversing and tracking movements.</li> <li>• Number of trucks required/idling on site to be minimised by planning and scheduling of works.</li> <li>• <b>Excavator engine/body to remain at least 5m from the boundary through full use of arm extension where safe and feasible to do so.</b></li> <li>• <b>Excavation equipment to be limited to an excavator with bucket attachment (≤20t)</b></li> </ul>
Piling (Reinforced concrete pile)	<ul style="list-style-type: none"> <li>• Quietest machine and method practicable for the works to be used.</li> <li>• Avoiding the unnecessary revving of engines and motor-driven tools and equipment.</li> <li>• Undertaking of works at times when closest neighbouring properties are unoccupied, where practicable.</li> <li>• Number of trucks required/idling on site to be minimised by planning and scheduling of works.</li> <li>• <b>Excavator engine/body to remain at least 2-3 m from the boundary through full use of arm extension where safe and feasible to do so.</b></li> <li>• <b>Piling equipment to be limited to an excavator mounted piling set up (≤20t).</b></li> <li>• Concrete mixing truck and concrete pumps to be located at least 15m away from occupied dwellings.</li> </ul>
Compaction and concrete works	<ul style="list-style-type: none"> <li>• Where practicable, compacting 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 to understand when properties are likely to be occupied.</li> <li>• <b>Initial vibration monitoring to be undertaken at commencement of the compaction activities to verify the site-specific vibration levels meet the requirements of AUP Standard E25.6.30(1).</b></li> <li>• Avoiding unnecessary start-up, run-down, revving and idling of engines near neighbouring buildings.</li> <li>• Smallest/quietest machine practicable for the works to be used.</li> </ul> <p><b>Compaction works &gt; 40m from occupied dwellings:</b></p> <ul style="list-style-type: none"> <li>• No acoustic screening required for a vibratory compactor (≤20t) and plate compactor (&lt;100kg).</li> </ul> <p><b>Compaction works &lt; 40m from occupied dwellings:</b></p> <ul style="list-style-type: none"> <li>• For vibratory plate compactor (&lt;100kg) no acoustic screening required.</li> <li>• If using a vibratory (≤20t), 2.0m-high acoustic boundary screening between the compactor and the receivers (see <b>Figure 3</b>).</li> </ul> <p><b>Concreting works &gt; 25m from occupied dwellings:</b></p>



Activity	Recommended Mitigation Measures
	<ul style="list-style-type: none"> <li>No acoustic screening required for a plate compactor (&lt;100kg), concrete mixing truck and concrete pump.</li> </ul> <p><b>Concreting works &lt; 25m from occupied dwellings:</b></p> <ul style="list-style-type: none"> <li>2.0m-high acoustic boundary screening between concreting plant items and the receivers (see <b>Figure 3</b>).</li> </ul>

## Notes on Noise Reduction Shroud

A noise control shroud fitted around breaker like that shown in **Figure 2** below.

**Figure 2 Example Acoustic Shroud Around Breaker**



## Notes on Acoustic Barriers

Any temporary noise barriers should be maintained throughout the period they are in use to ensure effectiveness. The panels should be constructed from materials with a typical surface mass of at least 7 kg/m<sup>2</sup> (lower surface mass may be acceptable if details are provided to project acoustic consultant for approval). 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., 12 mm thick) or the following proprietary noise barriers hung from mesh fencing:

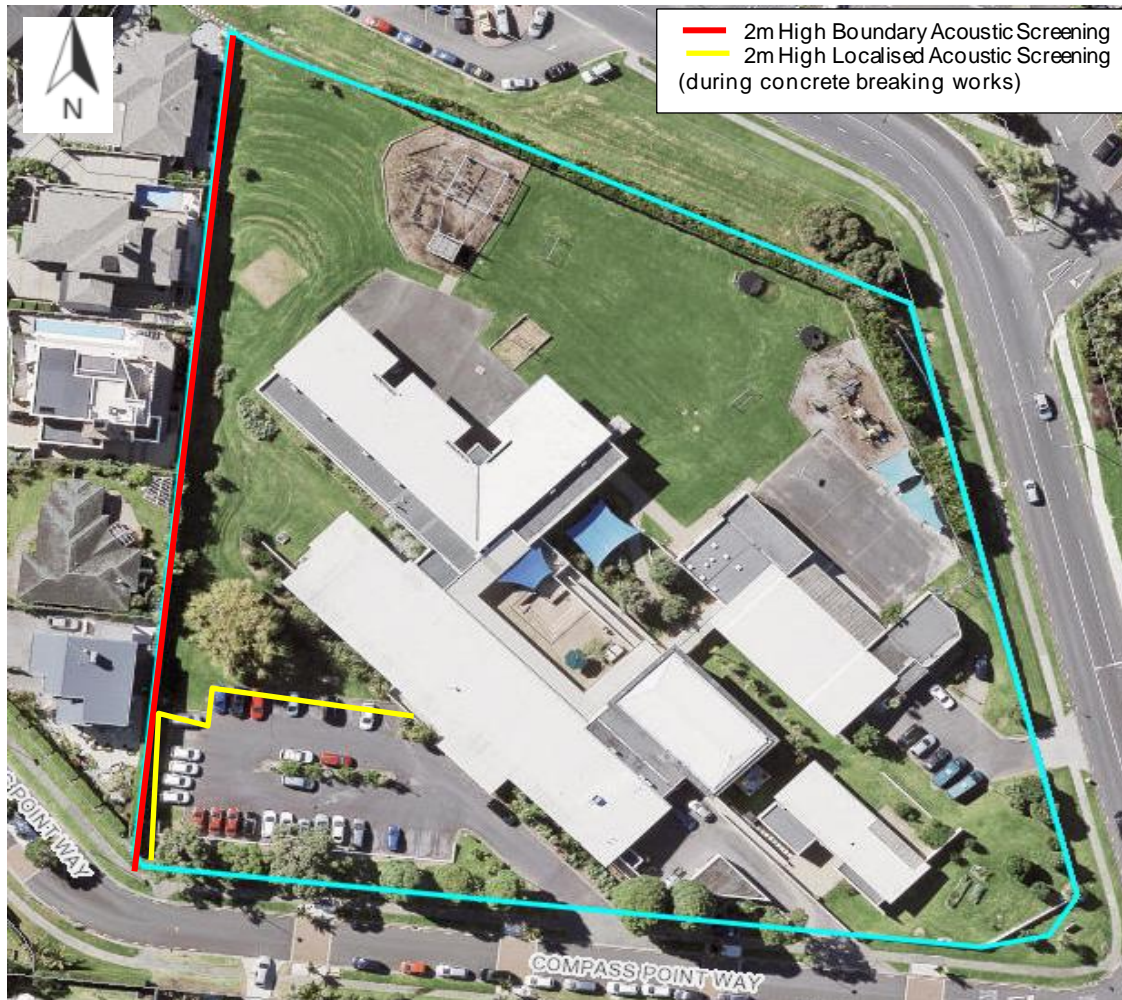
- Duraflex ‘Noise Control Barrier - Performance Series’ ([www.duraflex.co.nz](http://www.duraflex.co.nz))
- Soundex ‘Acoustic Curtain - Performance Series’. ([www.ultimate-solutions.co.nz](http://www.ultimate-solutions.co.nz))





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

**Figure 3 Minimum Recommended Temporary Acoustic Screening Locations (during demolition, excavation, stockpiling, piling, compaction, and Concrete Works)**



**Figure 4 Example of Localised Acoustic Screening (during concrete breaking works)**



## 8.0 Compliant Handling

Noise and/or vibration complaints will be responded to in a prompt manner. The Public Complaints Contact (see **Table 3**) 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.
- b) 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.
- c) If activities are identified as 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.
- d) 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 (as set out in **Section 9.0** below).

## 9.0 Noise and Vibration Monitoring

### 9.1 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 internal 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.

## 9.2 Vibration

Vibration monitoring is recommended during first occurrence of demolition and compaction works to confirm the site-specific vibration levels for comparison with the vibration limits in **Section 4.2**.

In the event of the monitoring revealing that vibration levels may exceed the limits; a review of the methodology shall be undertaken, and alternate equipment or methodologies shall be investigated and implemented to ensure compliance. Additional vibration monitoring may be required in response to reasonable 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 and AUP E25.6.30(1)(b).
- 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 500mm 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.



