Construction Noise and Vibration Management Plan

Eastern Busway Alliance

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Eastern Busway

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4	22/08/2023	Alex Bees	Note: Appendix C Schedules and general reference to applicable the pending EB2 and 3R Conditions have been omitted until aforementioned consents have been approved.
5	15/09/2023	Alex Bees	Final following issue of EB2 and 3B3R resource consents
6	5/12/2024	Jonathan Green	Update to include EB3C

Document Approval		
Action	**Name**	**Position**
Responsible	Jonathan Green	Environmental Lead
Reviewer	Saul Chambers	HSE Manager
Approver	Matt Zame	Project Director

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Acronyms

Table 1 Acronyms

Acronym	Term	Definition
AT	Auckland Transport	
AC	Auckland Council	
AUP(OP)	Auckland Unitary Plan (Operative in part) 2016	
ALT	Alliance Leadership Team	The team that will perform the day-to-day operational leadership and management functions of the Alliance
APD	Project Director	The Alliance Project Director
AT	Auckland Transport	Auckland Transport
BPO	Best Practicable Option	
CNVMP	Construction Noise and Vibration Management Plan	
EB1	Eastern Busway Panmure to Pakuranga	
EB2	Eastern Busway Pakuranga Town Centre	
EB3C	Eastern Busway Pakuranga to Botany - Commercial	
EB3R	Eastern Busway Pakuranga to Botany - Residential	
EB4	Eastern Busway Botany Town Centre Station	
EBA	Eastern Busway Alliance	The alliance between the Alliance Participants formed for the delivery of Eastern Busway Stages 2, 3 and 4
km	Kilometre(s)	
KPI	Key Performance Indicator	The measurable value that demonstrates how effectively the Alliance is achieving key business objectives
KRA	Key Result Area	Performance targets against which the Alliance achievements are measured
m	Metre(s)	
m^2	Square Metre(s)	
m^3	Cubic Metre(s)	
PAA	Project Alliance Agreement	Formed between AT and the selected Participants for the purposes of detailed design, construction, commissioning, and defects correction of the Project
PAB	Project Alliance Board	
RMA	Resource Management Act 1991	
SLT	Senior Leadership Team	

For a full list of Eastern Busway acronyms please see document **EB-LS-0-PP-000001 Acronyms**

1 Introduction

1.1 Project Scope

The Eastern Busway is a rapid transit busway project that will create faster, more reliable and connected transport options for communities in east and south Auckland. It is being delivered by Auckland Transport, a Council Controlled Organisation (CCO) of Auckland Council.

Auckland Transport (AT) has formed an Alliance Team, the Eastern Busway Alliance (EBA), comprised of the following Alliance Participants: AT, Fletcher Construction Infrastructure Ltd., ACCIONA Construction NZ Ltd., AECOM NZ Ltd., and Jacobs NZ Ltd. The scope and terms of EBA's services are defined in the Project Alliance Agreement (PAA).

1.2 Project Description

The Eastern Busway project is a multimodal transport upgrade project between Panmure and Botany (Figure 1) in east Auckland. The project consists of four sections and Panmure Station. Panmure station is complete; Section 1, Panmure to Pakuranga is also complete. Section 2, 3 Residential are in the delivery phase, and Section 3 Commercial and 4 are in the planning and consenting phase.

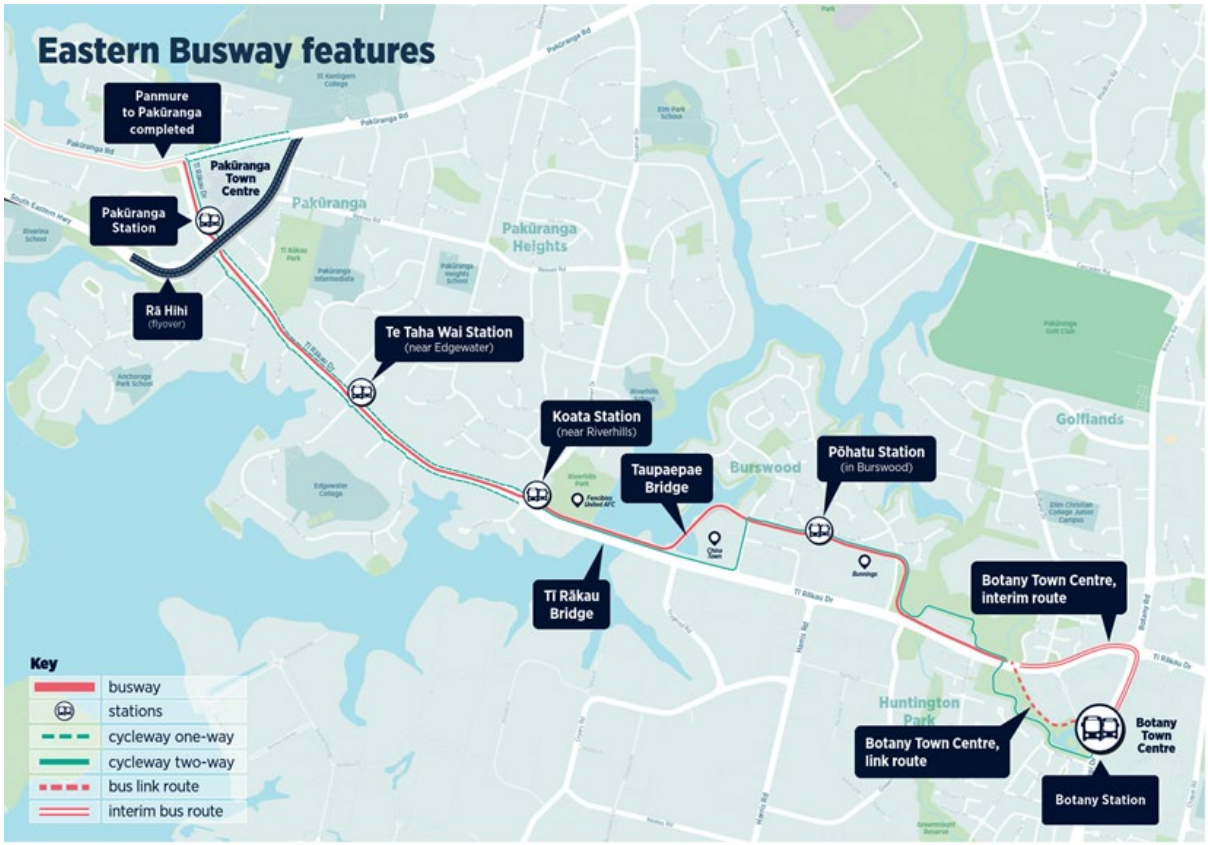

Figure 1 Eastern Busway alignment between Panmure and Botany town centres in east Auckland

1.3 Project Objectives

The client objectives for this project are as follows:

- Provide a multimodal transport corridor that connects Pakuranga and Botany to the wider network and increases choice of transport options.
- Provide transport infrastructure with existing land use and supports a quality, compact urban form.
- Contribute to accessibility and place shaping by providing better transport connections between, within, and to the town centres.
- Provide transport infrastructure that improves linkages, journey time and reliability of the public transport network.
- Provide transport infrastructure that is safe for everyone.
- “Provide or Safeguard future” transport infrastructure at (or in the vicinity of) Botany Town Centre to support the development of strategic public transport connection to Auckland Airport

2 Management Plan Scope & Objectives

2.1 Purpose and Scope

The purpose of this Construction Noise Vibration Management Plan (CNVMP) is to provide a framework for the development and implementation of the Best Practicable Option (BPO) to avoid, remedy or mitigate construction noise and vibration effects and achieve the noise and vibration standards set out in the relevant consent conditions to the extent practicable. It identifies the noise and vibration performance standards that must, where practicable, be complied with and details the management and control methodologies to be implemented to achieve compliance. Where compliance cannot be achieved, the CNVMP identifies BPO mitigation measures to be implemented on a site-specific basis. Importantly, the CNVMP framework sets out steps to engage with the community and stakeholders to share information on potential effects of noise and vibration associated with the works and gain feedback on appropriate management approaches.

The CNVMP is a living document, and further updates may be necessary during construction of the project. Any changes to the CNVMP that may result in a materially different outcome will require certification by Auckland Council.

Any schedules produced for site specific noise and vibration management will also require certification. Further details on the certification process are set out in Section 2.4 of this CNVMP.

2.2 Roles and Responsibilities

The team responsible for achieving CNVMP objectives is set out in Table 2 below. A team approach shall be taken when planning and implementing CNVMP BPOs, management procedures and monitoring. Team members will have the appropriate experience, project involvement and responsibility to ensure that all relevant aspects of the works are considered when making decisions on CNVMP implementation. This will ensure adequate resources, commitment and expertise is applied to noise and vibration management throughout the construction period.

Table 2 Roles and Responsibilities

Name	Role	Phone number	Email
Andy Gibbard	Construction Manager	021 315 447	Andy.gibbard@easternbusway.nz
Jonathan Green	Environmental Manager	027 4805245	Jonathan.green@easternbusway.nz
Shivam Jakhu	Project Acoustics Advisor	021 549 584	shivam.jakhu@easternbusway.nz
Sian Pritchard	Customer and Community Manager	021 284 1905	sian.pritchard@easternbusway.nz

All personnel working on the Eastern Busway are responsible for the requirements of this CNVMP. They must be briefed on this CNVMP and sign an induction form and any noise and vibration schedules that relate to the work they will be carrying out.

2.3 Hours of Construction

The standard hours of operation during the construction period are:

- Weekdays – 07:00 to 18:00
- Saturdays – 07:00 to 15:00
- No construction works on Sundays

2.3.1 Night-time works

Night-time works are required for the Eastern Busway works where works cannot practicably take place during the day. Reasons for night works include traffic requirements, safety requirements and quality requirements.

2.4 Plan Review and Updates

The CNVMP is a live document and may require update throughout the course of the works to reflect material changes associated with construction techniques or the environment. EBA is entitled to update or to revise the certified CNVMP at any time, including for a new project stage or works. EBA must submit the updated or revised document to the Auckland Council Monitoring team for certification at least ten working days prior to the new stage of the works commencing or as soon as practicable following identification of the need for a material change during construction (whichever is relevant). If EBA has not received a response (short of certification) from Auckland Council within ten working days of submitting the revised information, then EBA will be deemed to have certification and can commence the works, stage or activity.

3 Designation and Resource Consent Condition Requirements

This CNVMP has been prepared in accordance with the conditions for Eastern Busway. If there is a conflict between the CNVMP and the corresponding legislative requirements, including consent conditions, then the legislative requirements shall prevail.

The conditions for Eastern Busway are provided in the table in Appendix G. Cross-references to sections of this CNVMP that cover the requirements of each condition are provided in the table.

4 Performance Standards

4.1 Construction Noise

Construction noise shall be measured and assessed in accordance with New Zealand Standard NZS 6803:1999 'Acoustics - Construction Noise' (NZS6803:1999). With the exception of The Warehouse Pakuranga site, construction noise must and comply with the noise standards set out in Table 3 as far as practicable. These noise levels are applicable 1m from any building facade.

Table 3 Construction noise criteria - residential

Receiver	Period	Maximum Noise Level, dBA	
		Leq	Lmax
Buildings containing activities sensitive to noise	Monday to Friday 6:30am – 7:30am	55	75
	Monday to Saturday 7:30am – 6:00pm	70	85
	Monday to Friday 6:00pm – 8:00pm	65	80
	Sundays and public holidays 7:30am – 6:00pm	55	85
	At all other times	45	75
All other buildings	7:30am – 6:00pm	70	-
	6:00pm – 7:30am	75	-

Table 4 Construction noise criteria - commercial

Time period	Maximum noise level L_{Aeq} dB > 20
07:30 – 18:00	70
18:00 – 07:30	75

4.1.1 Noise criteria at 10, 1/10, 14, 14A and 14B Dolphin Street

Noise generated by construction works in the vicinity of 10, 1/10, 14, 14A and 14B Dolphin Street must not exceed the noise criteria set out in Table 3 between the hours of 0700 and 2000. A CNVMP or Schedule may not authorise any infringement of the Project Construction Noise Standards that apply during these hours at these properties.

4.2 Construction Vibration

Construction vibration shall be measured in accordance with German Standard DIN 4150-3:1999 "Structural Vibration Part 3: Effects of vibration on structures", and shall comply with the vibration standards set out in Table 5 as far as practicable.

Table 5 Vibration criteria

Vibration Level	Time	Category A	Category B
Occupied activities sensitive to noise	Night-time 2000h – 0700h	0.3mm/s ppv	2mm/s ppv
	Daytime 0700h – 2000h.	2mm/s ppv	5mm/s ppv
Other occupied buildings	All other times	2mm/s ppv	5mm/s ppv
All other buildings	Daytime 0630h – 2000h	Tables 1 and 3 of DIN4150-3:1999	

The Category A criteria may be exceeded, if the works generating vibration take place for three days or less between the hours of 7am to 6pm, provided that the Category B criteria are complied with, and:

- All occupied buildings within 50m of the extent of the works generating vibration are advised in writing no less than three days prior to the vibration-generating works commencing; and
- The written advice must include details of the location of the works, the duration of the works, a phone number for complaints and the name of the site manager.

4.3 The Warehouse Pakuranga Specific Noise and Vibration Criteria

The noise from construction activity shall not exceed the noise limits set out in Table 6 when measured and assessed at least at any point 6m from the interior wall of The Warehouse Pakuranga indoor retail area closest to the Reeves Road Flyover.

Table 6 The Warehouse Pakuranga specific noise standards

Period	Maximum noise level, dB LAeq
6:30am – 8:00am	65
8:00am – 9:00pm	60*
9:00pm – 12:30am (following day)	65
12:30am – 6:30am	No noise limit
**The noise limit between 8:00am and 9:00pm may be exceeded by up to 3dB by the cumulative noise of general construction works and piling work in Reeves Road but only for the duration that piling work is undertaken within 100m of The Warehouse Pakuranga building.*	

The noise criteria set out in Table 6 shall not be subject to change via the CNVMP or a Schedule unless the Requiring Authority provides written approval from The Warehouse Limited to Auckland Council.

Vibration levels at The Warehouse Pakuranga caused by construction works shall not exceed 5 mm/s PPV.

4.4 Blasting Specific Noise and Vibration Criteria

Prior to commencement of production blasts (i.e., blasting that is undertaken as part of the construction process), trial blasts (i.e. preliminary blasts that occur prior to production blasts for the purpose of data acquisition), must be undertaken to determine how adverse effects will be managed and how compliance with Conditions 53, 54 and 55 in the EB3C NoR will be achieved in production blasting. Trial blasts will determine site-specific attenuation characteristics, air overpressure levels and maximum instantaneous charge weight (MIC) thresholds. Outcomes must be documented in a Trial Blasting Report. This Trial Blasting Report must be used for subsequent design of production blasting.

Air overpressure from all blast events must not exceed 120 dB LZpeak at the facade of any occupied building measured and assessed in accordance with the provisions of the Australian Standard AS 2187.2-2006 Explosives – Storage and use – Use of explosives.

Air overpressure from blast events must not exceed 133 dB LZpeak at the facade of any unoccupied building measured and assessed in accordance with the provisions of Australian Standard AS 2187.2-2006 Explosives – Storage and use – Use of explosives.

Unless a Schedule is approved which sets out mitigation and management measures for blasting at specific buildings, including alternative blasting vibration standards at those buildings, vibration from all blasting activities must not exceed the limits set out in “German Industrial Standard DIN 4150-3:1999 Structural vibration – Part 3 Effects of vibration on structures” when measured in accordance with that Standard on any structure not on the same site as where blasting is occurring.

A building is deemed to be occupied if there are persons inside only during the blast event (i.e., if the occupants of a dwelling are not inside the dwelling during the blast event then the dwelling is deemed to be unoccupied).

Blasts must be performed at set times during the daytime only, between 9am and 5pm, Monday to Saturday only.

Vibration and air overpressure level predictions must be performed prior to every blast event. If exceedances of the criteria are predicted, then the blasting methodology must be adjusted prior to the blast to ensure the criteria will be complied with. Blasting must not be carried out where overpressure levels are predicted to be above the Project Standards at any building. Blasting must not be carried out where vibration levels are predicted to be above the project standards at any building.

5 Equipment Noise and Vibration Source Data

5.1 Noise Sources

Various construction activities and pieces of equipment will act as noise sources on site. Table 7 details predicted noise levels from the likely significant noise sources at various receiver setback distances. The noise data has been taken from British Standard 5228-1:2009 “Code of practice for noise and vibration control on construction and open sites”, manufacturers data or the AECOM database of noise measurements[1]. The noise levels do not account for mitigation.

The noise levels detailed in Table 7 allow identification of the need for mitigation or management to achieve compliance with the relevant noise criteria. Section 7 of this CNVMP provides details of management procedures and mitigation measures.

Table 7 Construction equipment source noise data

Equipment	Noise level at various set back distances, dB L_{Aeq}			
	5m	10m	20m	50m
William Roberts Road Works				
Establishment and clearance of building at 16 Cortina Place				
10T Excavator with rock-breaker attachment	94	88	82	74
Handheld concrete saw / chainsaw	93	87	81	73
Excavator, 10T	85	79	73	65
Excavator, 20T	85	79	73	65
Earthworks				
20T Excavator	83	77	71	63
Roller compactor, 12T	85	79	73	65
6 wheel truck	85	79	73	65
Pavement works				
6 wheel truck	85	79	73	65
Plate compactor, 500 kg	88	82	76	68
Roller compactor, 12T	85	79	73	65
Handheld concrete saw / chainsaw	93	87	81	73
Bitumen sprayer	79	73	67	59
Grader	77	71	65	57
EB2/EB3R/EB3C Main works				
Site establishment (including utility works, demolition and clearing)				
6-Wheeler trucks	85	79	73	65

[1] Past noise measurements of construction activities carried out and held on file by AECOM.

10T Excavator with rock breaker attachment	95	89	83	75
Handheld concrete saw / chainsaw	93	87	81	73
10T Excavator	85	79	73	65
20T Excavator	85	79	73	65
500kg Plat compactor	88	82	76	68
Earthworks and civil works				
20T Excavator	83	77	71	63
Roller compactor, 12T	85	79	73	65
6-wheel truck	85	79	73	65
Mobile crane	84	78	72	64
Pavement Construction (including surfacing)				
6-wheel truck	85	79	73	65
Plate compactor, 500 kg	88	82	76	68
Roller compactor, 12T	85	79	73	65
Handheld concrete saw / chainsaw	93	87	81	73
Bitumen sprayer	79	73	67	59
Grader	77	71	65	57
12T Double Drum Steel Roller	85	79	73	65
Concrete mixer truck	85	79	73	65
Bridge construction (Reeves Road Flyover, Taupaepae, Ti Rakau Creek)				
Gantry crane	73	67	61	53
Large crawler crane	81	75	69	61
Bored pilling rig	89	83	77	69
20T Excavator	85	79	73	65
Concrete pump	81	75	69	61
Concrete mixer truck	85	79	73	65
6-Wheeler trucks	85	79	73	65

5.2 Vibration Sources

Some construction activities are predicted to generate elevated vibration levels during some construction activities. Table 8 summarises the setback distance from each of these activities, inside of which exceedance of either the DIN 4150 cosmetic building damage criteria or the Category A or B criteria detailed in Section 4 of this CNVMP may occur at the foundation of receiving buildings.

The vibration levels in Table 8 will be reviewed once monitoring has been carried out and will be updated if there is a material change to the works methodology. The vibration monitoring procedure is detailed in Section 9.3 of this CNVMP.

Table 8 Vibration emission radii

Equipment	Vibration emission radii			
	DIN 4150 Commercial structures (10 mm/s)	**DIN 4150 Residential structures (Category B, daytime) (5 mm/s)**	**Amenity (Category A, daytime/Category B, night-time) (2 mm/s)**	**Amenity (Category A, night-time) (0.3 mm/s)**
WRRE works				
20T Excavator	1.2m	4.7m	12m	N/A
6 Wheel Truck	0.2m	1m	2.4m	16m
Plate Compactor, 500 kg	0.3m	1.3m	3.2m	21m
Roller Compactor, 12T	2.1m	8.4m	21m	N/A
Roller Compactor, 7T	1m	6m	12m	45m
10T Excavator with rock-breaker attachment	1.8m	7.2m	18m	N/A
Vibratory Plate Compactor	1m	1m	3m	21m
EB2/EB3R/EB3C Main works				
Site establishment				
Plate Compactor	0.3m	1.3m	3.2m	21m
6-Wheeler Truck	1m	1m	2m	16m
10T Excavator with rock-breaker attachment	1.8m	7.2m	18m	N/A
20T Excavator	1m	5m	12m	N/A
Earthworks and civil works				
20T Excavator	1m	5m	12m	N/A
Roller Compactor, 12T	2.1m	8.4m	21m	N/A
6-Wheeler Truck	1m	1m	2m	16m
Pavement Construction (including surfacing)				
6-Wheeler Truck	1m	1m	2m	16m
Vibratory Plate Compactor	1m	1m	3m	21m

Roller Compactor, 12T	2.1m	8.4m	21m	N/A
Roller Compactor, 7T	1m	6m	12m	45m
Bridge construction (Reeves Road Flyover, Taupaepae, Ti Rakau Creek))				
Bored piling rig	1m	1m	3m	17m
20T Excavator	1m	5m	12m	N/A
6-Wheeler Truck	1m	1m	2m	16m

6 Affected Parties

6.1 Noise

Appendix A contains tables identifying buildings where construction activities have the potential to exceed the project noise criteria.

For the WRRE works, receivers affected by noise have been presented. Predictions include 1.8m high noise barriers implemented effectively around construction sites during typical construction works (20T Excavator in operation).

For the EB2/EB3R/EB3C main works, the maximum noise level predicted at each receiver during typical construction works is presented. Predictions have been carried out for daytime and night-time works. Predictions include 1.8m high noise barriers implemented effectively around construction sites.

6.2 Vibration – Building Damage (Category B) and Amenity (Category A)

Appendix B sets out tables where the Category A and B criteria are predicted to be exceeded at receivers for the WRRE works and the EB2/EB3R/EB3C works.

For the WRRE works, the buildings where the vibration amenity criteria have the potential to be exceeded have been predicted. Based on the type of structure of buildings surrounding the works and their setback distance from the works, there are no exceedances of the DIN 4150-3 building damage criteria set out in Table 4 predicted at any receivers as a result of the WRRE works.

For the EB2, EB3R and EB3C main works, predictions for the works are for the scenario where the 12T and 7T vibratory rollers are in use respectively at the boundary of the works footprint, and in operation at the closest location possible for each receiver.

Building condition surveys shall be carried out at every receiver where exceedance of the Category B criteria is predicted prior to the start of the works.

We note that the Category A criteria are only applicable to occupied buildings. The works will not affect amenity at buildings in proximity to the works if they take place while the building is unoccupied.

6.3 Estimated Durations of Exposure to Noise/Vibration

The estimated duration of exposure to noise/vibration levels above the criteria set out in section 4 are set out in Table 9.

Table 9 Estimated durations of exposure

Relative position of receiver to Eastern Busway works	***Approximate duration of exposure to noise above the daytime 70 dB L_{Aeq} noise criterion for the total duration of the works***	***Approximate duration of exposure to vibration levels above the daytime Category A 2 mm/s PPV criteria for the total duration of the works***	***Approximate duration of exposure to vibration levels above the daytime Category B criteria for the total duration of the works***
Directly facing construction works that are fixed in place, i.e. RRF construction works	*Cumulative total of 4 weeks*	*Cumulative total of 4 weeks*	*Cumulative total of 1-4 weeks**
Directly facing construction works that will progress linearly	*Cumulative total of 1-4 weeks*	*Cumulative total of 1-4 weeks*	*Cumulative total up to 1 week*
Set back one row of houses from works that will progress linearly	*Cumulative total up to 1 week*	*Cumulative total up to 1 week*	*No exceedances*

6.4 Schedules

A Schedule shall be prepared for any works where:

- Construction noise is either predicted or measured to exceed the noise standards in Table 3 or Table 6 except where the exceedance of the LAeq criteria is no greater than 5 decibels and does not exceed:
    - 0630 – 2000: 2 periods of up to 2 consecutive weeks in any 2 months; or
    - 2000 – 0630: 1 period of up to 2 consecutive nights in any 10 days

- Construction vibration is either predicted or measured to exceed the Category B standard at the receivers in Table 8.

Schedules are required for receivers in Appendix A where a noise level above 75 dB L_{Aeq} is predicted for daytime works and where a noise level above 50 dB L_{Aeq} is predicted for night-time works, and/or receivers that are listed in Appendix B where an exceedance of the Category B criteria is predicted.

Schedules have been prepared for the activities associated with EB2/EB3R/EB3C where exceedances of the above criteria are predicted. The Schedules cover affected receivers for the following site activities:

- Site Establishment
- Earthworks and Civil Works
- Pavement Works
- Reeves Road Flyover Construction
- Night-time works

Requirements for the Schedules are set out in the conditions for WRRE, EB2, EB3R, EB3C.

7 Management Procedures and Mitigation Measures

The proposed works have the potential to exceed the relevant criteria at the closest receivers. To avoid/minimise exceedances it is vital that appropriate mitigation methods and measures are utilised. This management plan identifies the methods to achieve BPO for mitigating adverse effects during the construction works. These methods and measures will include, but not be limited to, those detailed in this section of the CNVMP.

7.1 Training

As a minimum before commencing work on site all personnel will receive noise and vibration training as part of the EBA Project Induction. If required, specific training will be provided for site personnel. Training will cover:

- Roles and responsibilities for managing noise and vibration.
- Familiarisation with the noise and vibration criteria.
- Details of noise and vibration sources on-site.
- Noise and vibration mitigation and management procedures.
- The location of sensitive receivers.
- Construction noise and vibration effects on receivers.
- Details of any operational requirements and constraints identified through communication and consultation.
- The complaints management procedures.

7.2 Construction Vehicles, Traffic and Deliveries

Noise mitigation methods and measures for construction vehicles, traffic and deliveries shall include, where practicable:

- Fitting engine exhausts with silencers.
- Using broadband reversing alarms.
- Minimising slamming doors.
- Minimising speed and engine revs.
- Controlling / limiting noise from vehicle stereos being operated on site.
- Minimising the use of horns.
- Turning engines off when stationary for extended periods of time.
- Placing bedding layer or resilient liner in truck trays.
- Using rubber seals around tailgates.
- Minimising track squeal from tracked equipment such as excavators, by maintaining tracks regularly.

7.3 Plant and Equipment

Plant and equipment noise and vibration mitigation methods and measures shall include, where practicable:

- Selecting plant and equipment with low noise and vibration emission levels.
- Turning off plant and equipment or throttle them down to a minimum when not in use.
- Selecting appropriately sized equipment for the task.
- Electric motors should be used as a substitute for diesel engines where practicable.
- Using mufflers and engine covers/screens where appropriate.
- Ensuring equipment is operated in the correct manner and correctly maintained, including replacement of engine covers, repair of defective silencing equipment, tightening of rattling components, repair of leakages in compressed air lines and shutting down of equipment not in use.
- Avoiding, where practicable, the use of equipment which generates impulsive noise, including:
    - dropping materials from a height
    - metal-to-metal contact on equipment.
- Minimising drop height of materials when transferring (e.g. loading and unloading vehicles and storage areas).
- Enclosing generators with an effective muffler.
- Using power from the electricity network rather than from generators.
- Reducing noise and vibration emissions from plant that has the potential to exceed the criteria by installing silencers, vibration isolation or other appropriate mitigation.
- Placing tools and equipment on the ground, rather than dropping.
- Covering surfaces with resilient material where tools / equipment are placed.
- Not dragging equipment on the ground.
- Minimising the need for striking bare metal with tools.
- Where spoil is being loaded into a dump truck, or fill materials are being unloaded from a dump truck, position the truck to minimise tracking movements.
- Managing noise generated from the use of concrete, including by limiting noise generated by aggregate loading or by hammering the mixing.
- Using broadband reversing alarms on all mobile equipment.
- Crane and secure loads using straps rather than chains when safe and so far as reasonably practicable.
- Locate plant and equipment away from sensitive areas, such as next to residential buildings, to maximise distance from affected parties. Where this is not possible, restricted hours of operation should be considered.

7.4 Pneumatic Breakers

Noise and vibration mitigation methods and measures for breaking activities shall include, where practicable:

- Selecting equipment for the job that takes into account the need to minimise the length of time taken to complete the operation and minimise noise generation.
- Not “blank” firing the hammer. The activating valve should only be operated with the hammer in contact with the surface to be broken.
- Keeping breaker bushes and shafts greased as necessary.
- Using the correct chisel / tip shape for the type of material being broken.
- Using acoustic screens which block line of sight between breaker and sensitive receivers where work is contained within a compact area.

7.5 Compaction

Noise and vibration mitigation methods and measures for compaction activities shall include, where practicable:

- Providing mufflers and engine covers/screens on plant where appropriate.
- Removing obstructions on surfaces which may exacerbate vibration transmission where appropriate, prior to use of the compactor.

7.6 Generators

Noise mitigation methods and measures for generators shall include, where practicable:

- Installing enclosures around generators.
- Using mufflers and engine covers/screens where appropriate.
- Turn off generators or throttle them down to a minimum when not in use.
- Maximise the distance between the engine exhausts of the generators and the nearest sensitive building façades.

7.7 Piling

Noise and vibration mitigation methods and measures for piling activities shall include, where practicable:

- Minimising cable slap and chain clink.
- Providing mufflers and engine covers/screens on plant where appropriate.
- Removing obstructions which may exacerbate vibration transmission where appropriate, prior to piling operations.
- Minimise alternating rotation of the bored piling auger to loosen spoil into the muck bin. Shaking the ‘kelly bit’ connection creates a very loud banging that can result in noise complaints.

7.8 Noise Barriers and Enclosures

Noise barriers or enclosures will be used in areas where the noise criteria are predicted to be exceeded, and where they provide effective mitigation.

Noise barriers will generally only be effective for ground floor receivers where noise levels would be reduced by approximately 10 dBA. For a noise barrier to be effective it must physically obstruct line of sight between the noise source and receiver. Receivers on the first floor and above will be able to see over the noise barrier and it will provide little attenuation.

An effective noise barrier is constructed as follows:

- Positioned to physically obstruct line of sight between the construction work and receiver, where this is practicable.
- Positioned as close as practicable to the noisy construction activity.
- Abutted or overlapped to provide a continuous screen with no gaps at the base or between panels.
- Be a minimum of 2m high.

Noise barriers may be constructed from plywood with a minimum surface mass of 10kg/m^2. Proprietary noise mats such are available that have a lower surface mass but provide the same or better levels of noise attenuation. Noise mats shall be utilised during temporary works and works that progress quickly.

Noise enclosures should be utilised where practicable as they provide better attenuation to receivers above ground floor level.

Where enclosures are proposed their design will be agreed with the acoustics specialist.

7.9 Traffic Tyre Noise

Vehicle movements may cause temporary decks, steel plates and manholes to rock or move, giving rise to nuisance noises. Sharp changes in the level of the road surface may result in tyre noise. EBA will use the following methods to reduce noise from these sources so far as reasonably practicable, especially where the noise source will exist for long periods:

- Firmly fix traffic decks to the road or other structural elements to prevent motion.
- Placing rubber beneath traffic decks and steel road plates where movement occurs.
- Providing smooth transitions between changes in road surface level.
- Ensuring manhole covers are fitted correctly.

7.10 Scheduling of Activities

Scheduling of construction activities can be a key tool for managing construction noise and vibration effects. The time of day and the duration of the construction activities will be adjusted after consultation, where possible, to avoid particularly sensitive times for affected receivers. Consideration will also be given to respite periods and avoidance of activity on certain days (if requested by affected neighbours), where practicable.

Night-time disturbance to residential receivers will be reduced by carrying out noisy activities during the daytime.

Blasts must be performed at set times during the daytime only, between 9am and 5pm, Monday to Saturday only.

Sensitive hours for receivers that have been consulted are included in the Customer and Community communications database.

7.11 Night-time Works

In addition to the mitigation and management measures set out in section 7.1 to 7.10, the following measures will be implemented during night-works:

- Complete the works in as timely a manner as possible, to avoid works going late into the night.
- Avoid, where practicable, the night-time use of equipment which generates impulsive noise, including:
    - Dropping materials from a height
    - Metal-to-metal contact on equipment

8 Communication

Good stakeholder communication practices are a key component for the management of noise and vibration disruption from construction activities. Prior to construction commencing, clear communication channels will be established between the Project team and those in the community potentially most affected by construction activities. It is important that information is provided in a transparent and consistent manner in relation to exposure, duration, mitigation and management measures.

8.1 Stakeholder Engagement

Meetings with local business owners have been held to better understand business operating hours, sensitivities, building condition, ventilation and acoustics. Relationships with the following businesses are ongoing:

- Dementia NZ
- Te Tuhi (including Barnardos Early Learning)
- Pakuranga Medical Centre (property owners, centre manager, Triton Hearing)
- Pakuranga Library
- Citizens Advice Bureau
- Pakuranga and Howick Budgeting Service.
- Souly Funerals
- Auckland Council – Leisure Centre
- The Warehouse
- Pakuranga Plaza
- Edgewater Shops
- Riverhills Park occupants
- WRRE, EB2, EB3R and EB3C residents
- Botany Town Centre

Ongoing communication and consultation will be undertaken with notable noise and vibration receivers throughout the duration of construction occurring in the vicinity of the works.

8.2 Consultation Methodology

When construction noise and vibration are anticipated to exceed the relevant criteria, engagement with key stakeholders, neighbouring residents, and businesses will become key in mitigating disruption. The following practices will be implemented:

- A contact person will always be available during works and the contact details will be prominently displayed at the entrance to the site(s) so that they are clearly visible to the public.
- Early identification of upcoming works and an analysis of the impact on surrounding stakeholders.
- Notification letters, describing activity, duration and dates will be provided to all residences and businesses within 100-400 m of the construction area.
- All occupied buildings within 50m of the extent of the works generating vibration will be advised in writing no less than three working days prior to vibration-generating works commencing, and the written advice will include details of the

location of works, the duration of the works, a phone number for complaints and the name of the site manager.

- Individual notification shall be provided, and meetings offered to all neighbours that are predicted to experience noise or vibration levels that exceed the criteria detailed in Section 4 of the CNVMP after the BPO mitigation as detailed in Section 7 has been applied. Where it is impractical to avoid an exceedance, communication and consultation shall be undertaken with the receiver to identify methods and measures to mitigate the adverse effects of construction, including identifying why the selected management and mitigation measures and methods reflect the best practicable option.
- Ongoing consultation will be carried out throughout the construction period, and all stakeholder interactions will be recorded within the Record of Communications set out in Appendix D.
    - The record will include details of when the communication/consultation took place, what the comments were from the sensitive receivers, and where the comments have been incorporated into this CNVMP.
- All concerns and complaints regarding construction noise and vibration will be dealt with in accordance with Section 8.3 of this CNVMP.

8.3 Feedback and Complaints Procedure

Feedback and complaints will be dealt with in a responsible manner to ensure a relationship of trust and reliability between the community and the EBA.

The EBA shall ensure that:

- The EBA Communications and Engagement Team handles all feedback and complaints that arise on the works.
- The community is notified of the contact details through which complaints can be made. This will include the website, works notifications, onsite signage, and project publications and newsletters.
- EBA staff shall be briefed on the complaints process and are prepared to receive complaints through phone, by email, in writing, or through face-to-face contact.

The process for managing complaints is set out in Table 8.

Table 8 Feedback and complaints management process

Stage	Description
1	All feedback and complaints are forwarded to the EBA Communications and Engagement Team.
2	The EBA Communications and Engagement Team acknowledges the complaint on day of receipt by phone, email or in writing. If the Communications Engagement Team is not available, the EBA Project Manager or another member of the project team shall acknowledge the complaint.
3	The contact details and details of the complaint are entered into the Record of Consultations, or project consultation software.
4	The EBA Communications and Engagement Team shall work closely with the EBA Project Manager or Construction Manager to resolve complaints. They will be proactive in keeping complainants informed of what action is being taken to address their concerns.

5	If a complaint cannot be resolved within the complaints process timeframe, the complainant is invited to a meeting with the EBA Communications and Engagement Manager and the EBA Project Manager (or their delegated nominees). Resolution timeframes should be agreed at this meeting.
6	Each month a record of complaints activity will be reviewed by the EBA Community Manager to check that all actions have been closed out.

9 Monitoring

Monitoring will be undertaken to ensure works remain within the limits set out in the CNVMP and the site-specific Construction Noise and / or Vibration Management Plans.

9.1 Overview

9.1.1 Attended Monitoring

For attended monitoring, a suitably qualified acoustic engineer will visit the site and measure noise and/or vibration levels in real time. This enables:

- Review of the implementation of this CNVMP, including the mitigation and management measures (Section 7) and engagement (Section 8 and Record of Communication).
- Verification of the predicted levels (Section 6) to check they are representative, and the response protocols are appropriate for the resulting effects.
- Determination of compliance (Section 3).

9.1.2 Unattended Monitoring

For unattended monitoring, noise and/or vibration monitors are installed in suitable locations to measure levels continuously. They are set up to send an ‘alert’ message to the Environmental Lead and other relevant site personnel (Section 2.2) when levels exceed a pre-set alert threshold. The alert threshold(s) will be the relevant performance standard and/or site-specific threshold(s) determined through engagement.

Alerts will be investigated by the Environmental Lead as soon as practicable after they are received. The Environmental Lead will:

- Review site activities at the time of the alert and the setback distances for any relevant noise and/or vibration activities listed in Section 5.
- Seek support from the Acoustics Advisor to undertake detailed analysis of the alert measurement data if there is residual uncertainty around whether the alert is project related. The Project Acoustic Advisor will review the time trace and any alert recordings to understand the magnitude, frequency and character of the event.
- Review the BPO general measures (Section 7), relevant site-specific measures and attended monitoring to determine compliance if project related.

9.2 Noise

Construction noise will be measured and assessed in accordance with the requirements of New Zealand Standard NZS 6803: 1999 “Acoustics - Construction Noise”.

Attended noise monitoring will be conducted by the Acoustic Specialist or trained noise monitoring staff as identified in Table 2 of this CNVMP.

All equipment that is predicted to exceed 70 dB L_{Aeq} at 5m will be measured, where practicable, when first operating on site.

Construction monitoring shall be undertaken during construction activities when noise has potential to exceed the criteria, or in response to reasonable noise complaints. Noise monitoring shall also be undertaken if the construction methodology changes, such that noise criteria may be exceeded at other locations.

Noise monitoring will be carried out at positions representative of noise sensitive locations at appropriate periods to check ongoing compliance with the construction noise criteria. The monitoring position will be at ground floor level.

Noise will be measured 1m from the most affected façade of the building, or in the area which relates to a noise complaint. If it is not practicable to measure at this position, measurements will be taken at a representative location and adjusted for distance and façade reflections if necessary. Measurements will also be taken at a known distance, such as 5m, from the noise generating equipment to establish source noise levels.

Additional measurement positions may be necessary if the initial measurement results indicate that noise may exceed criteria at other areas of the building façade. These measurements will be undertaken 1m from the façade if windows are normally open or inside the building if windows are normally closed. Where internal measurements are required, it will be necessary to control noise from local sources, such as people using the telephone, to ensure only construction noise is measured.

Noise monitoring will be conducted for 10-15 minutes at each measurement position, during representative construction activity.

The noise level will be reported with the measurement duration (e.g. 65 dB $L_{Aeq\ (15min)}$).

The noise monitoring procedure is outlined in Figure 4.

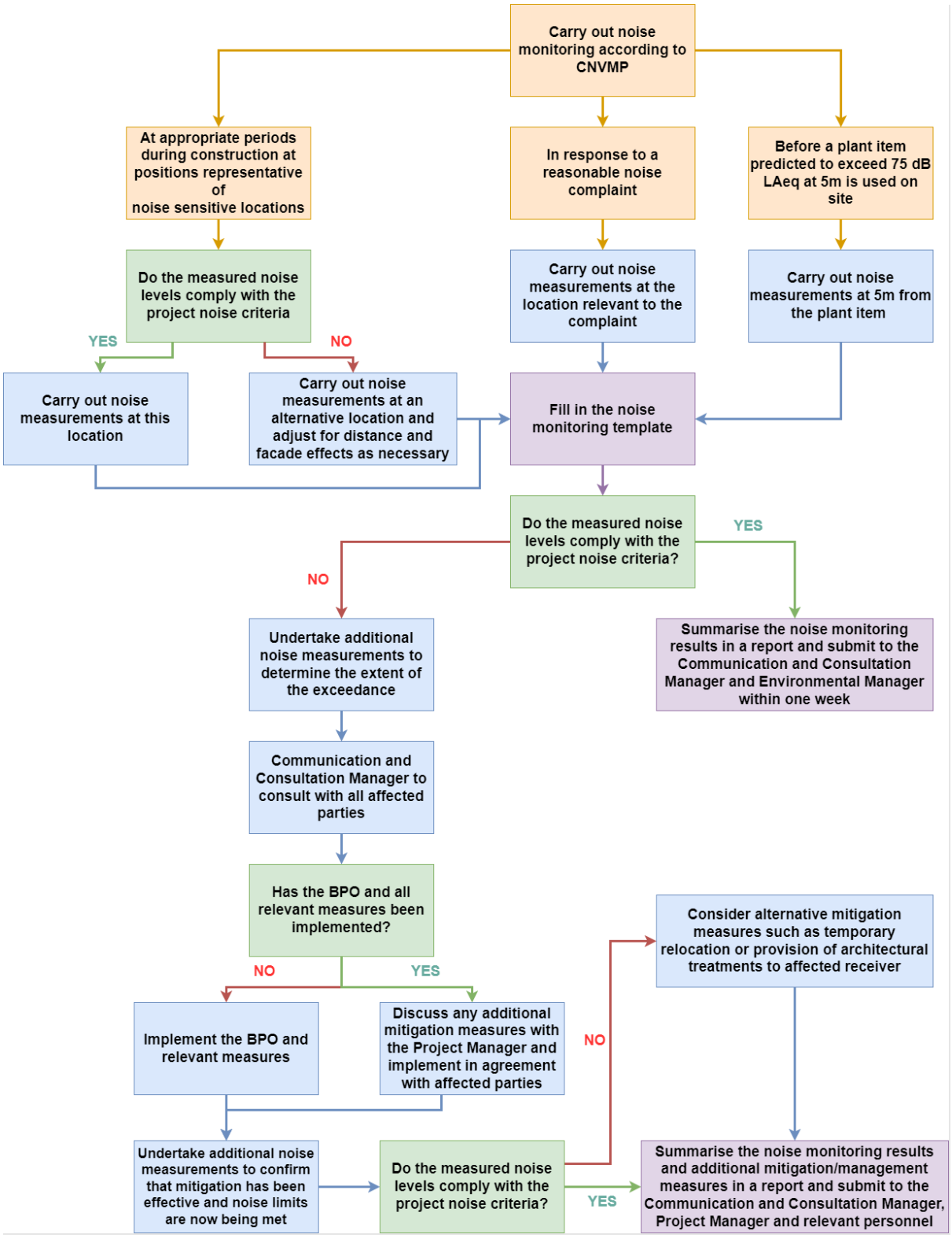

Figure 2 Noise monitoring procedure

9.3 Vibration

Construction vibration levels will be measured and assessed in accordance with the requirements of German Standard DIN 4150-3:1999 “Structural vibration – Part 3: Effects of vibration on structures”.

Vibration monitoring shall be undertaken:

- During the first use of the vibratory rollers, rock breaker and excavator, to verify measured vibration levels against the predicted levels set out in Table 7 (Section 5.2); and
- In response to reasonable complaints.

Attended vibration monitoring shall only be undertaken by the Project Acoustic Advisor or trained vibration monitoring staff as identified in Table 2 in Section 2.2 of this CNVMP.

Vibration shall initially be measured at the closest building foundations (usually at basement or ground floor level), and this requires consent to access the building of interest. Additional measurement positions may be necessary if the initial measurement results indicate that vibration may exceed criteria within other areas of the building. It may also be necessary to measure vibration levels in the habitable areas of buildings in response to a complaint.

Vibration monitoring will be conducted during representative construction activities and comprise measurements of peak particle velocity (PPV) at one-second intervals.

The duration of the vibration measurements will be sufficient to capture the highest vibration level from the source.

The vibration monitoring equipment (geophones) will be fixed to building structural members (e.g. with clamps, cable ties, or weighed down with sandbags).

The geophones will ideally be located at or near the façade of the building facing the vibration source and will be located away from areas where extraneous vibration (e.g. from footfall or building services) could affect the results.

Vibration monitoring shall also be undertaken in response to reasonable vibration complaints, or if the construction methodology changes such that vibration criteria may be exceeded at other locations.

The vibration monitoring procedure is outlined in Figure 5.

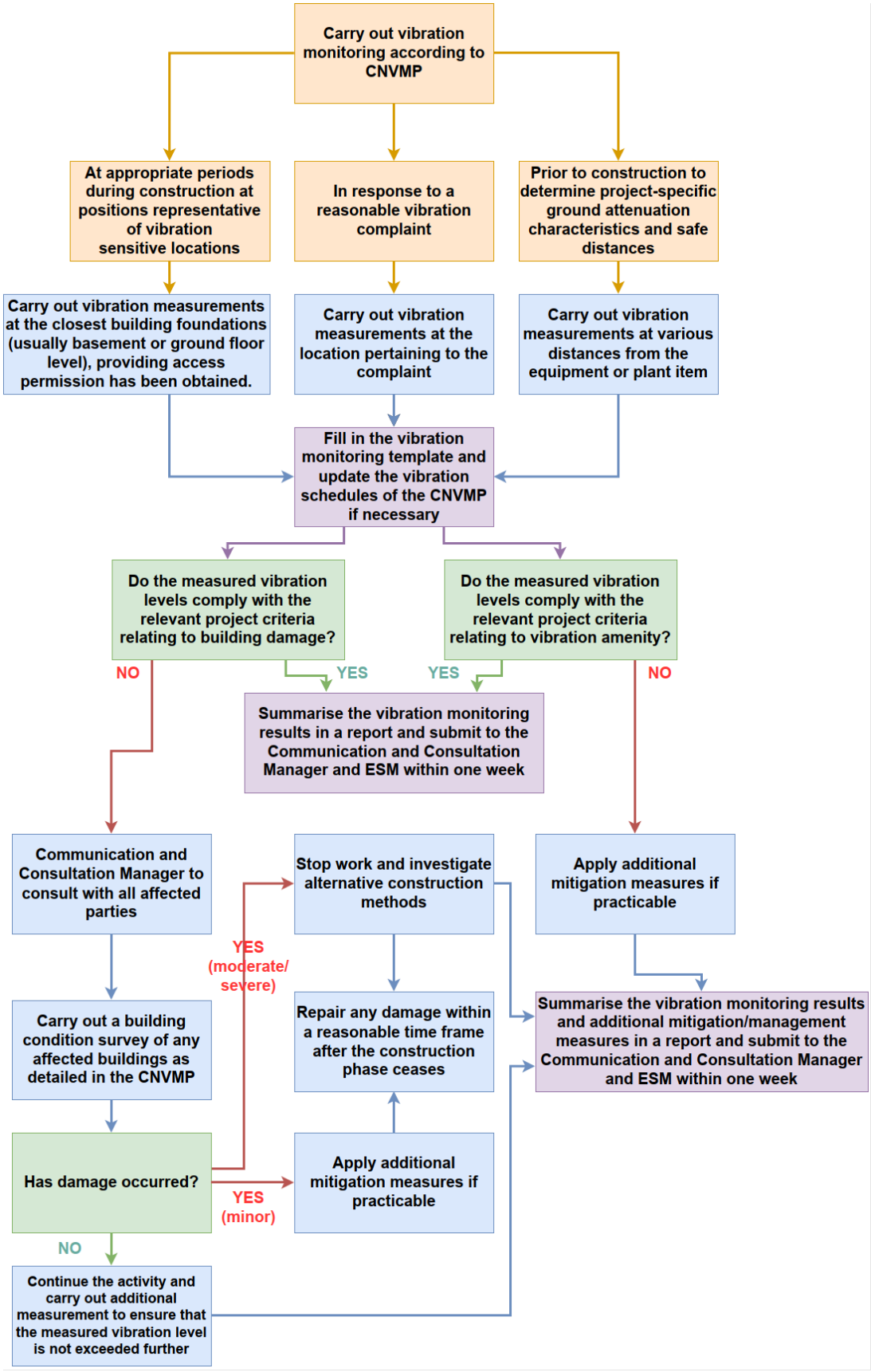

Figure 3 Vibration monitoring procedure

9.4 Monitoring at The Warehouse Pakuranga

The EBA will undertake monitoring during EB2's construction of noise and vibration levels at The Warehouse Pakuranga.

Noise monitoring will be undertaken during construction activities when noise has potential to exceed the criteria set out in 4.3.

Noise monitoring can be undertaken either within The Warehouse Pakuranga itself, for direct comparison against the requirements of Condition 40, or externally within proximity of The Warehouse Pakuranga by a suitably qualified and experienced person.

Given the size of The Warehouse Pakuranga, several monitoring locations may be required to check for compliance across the whole building.

If monitoring reports an exceedance of The Warehouse Pakuranga site-specific noise levels detailed in Condition 40 that was caused by construction activities, then noise generating construction activity shall stop when it is safe to do so. The reason for the exceedance shall be investigated and construction methodologies reviewed before proceeding with the related construction activity. Reporting of the incident must include Council and store manager for The Warehouse Pakuranga.

9.5 Reporting

All noise and vibration monitoring shall be summarised in a report and submitted to the EBA Communication and Stakeholder Manager and the Environmental Manager within one week of the assessment. The reports shall be stored electronically and kept at the site office and made available to Auckland Council upon request.

The noise monitoring template is presented in Appendix C.

The vibration monitoring template is presented in Appendix D.

9.6 Building Condition Surveys

A pre-construction building condition survey will be undertaken at all of the buildings where exceedances of the Category B vibration criteria are predicted in Appendix B before construction begins on the Project.

The procedure and requirements for the building condition surveys are set out in Condition 56 for EB2, Condition 32 for EB3R and Condition 59 for EB3C.

The building condition surveys will generally be undertaken as follows:

- The building surveys will be undertaken by an independent senior qualified person.
- The survey shall include:
    - Any information about the type of foundations
    - Existing levels of damage (aesthetic, superficial, affecting levels of serviceability)
    - Whether observed damage is associated with structural damage
    - Susceptibility of building or structure to further movement
    - Photographic evidence

- The Eastern Busway Alliance will provide the building condition survey structure survey report to the property owner and the Council within 15 working days of the survey being undertaken.

Where a post-construction building condition survey confirms that the building has deteriorated as the result of construction, the damage will be rectified. Such repairs, and/or works to repair damage, are limited to what is reasonably required to restore the general condition of the building as described in the building pre-condition survey.

10 Contingency Measures

This section describes contingency measures to be implemented in the event that the construction methodology changes leading to predicted/measured exceedances of the noise and/or vibration limits specified within this CNVMP. The Communications and Engagement Manager will liaise with any potentially affected receivers throughout the following processes.

10.1 Management Process

If the construction methodology changes such that any construction activity is predicted and/or measured to exceed the construction noise or vibration limits, then the following process will be applied:

- Check that the BPO and all relevant management measures have been implemented.
- The EBA Communications and Stakeholder Manager will engage with all affected parties, to understand their particular sensitivities, including times, activities and locations.
- The EBA Communications and Stakeholder Manager or nominated representative shall be available 24/7 during the proposed works.
- Carry out noise and/or vibration monitoring of the construction activity in question to verify the extent of any adverse effects.
- Implement further mitigation and/or contingency measures to avoid adverse effects as practicable and agreed with the affected party (refer to Section 7 of this CNVMP).

10.2 Noise

If noise monitoring demonstrates non-compliance with the noise limits identified in this CNVMP, the following procedures shall be implemented:

- Undertake additional noise measurements, as necessary, to determine the extent of the exceedance.
- Discuss additional mitigation options with the Project Manager as soon as the extent of the exceedance has been determined.
- Undertake noise measurements once recommended mitigation measures have been implemented to confirm that the mitigation has been effective, and the noise limits are now being met for the periods agreed.
- Preparation of a report recording the findings of the survey and detailing additional mitigation or management options. Copies of the report will be provided to the Project Manager, Communications and Stakeholder Manager and the Environmental Manager.
- Noise monitoring reports will be submitted to Council on receipt of a written request.

10.3 Vibration – Amenity

If a complaint is made by a building occupant regarding vibration levels, vibration monitoring will be conducted in the relevant rooms of the building (provided the owner's consent to enter the building and undertake monitoring is obtained in writing).

10.4 Vibration – Building Damage

If vibration monitoring demonstrates non-compliance with the vibration building damage limits, the construction activity responsible for the exceedance shall cease as soon as safe and practicable to do so. A detailed building condition survey shall then be undertaken by a suitably qualified specialist to determine if any damage has occurred.

If damage has not deemed to have occurred, then the activity can continue provided the measured vibration level is not exceeded further.

If minor damage has been confirmed to have occurred since the pre-construction surveys, such as cosmetic cracks, further mitigation will be applied if practicable. However, the activity can continue provided the measured vibration level is not exceeded further for non-heritage/vibration sensitive buildings.

If moderate or severe damage has occurred and the best practicable option has been implemented, it will be necessary to stop work (when safe to do so) and investigate alternative construction methods.

Appendix A: Affected Parties – Noise

William Roberts Road

Address	Use	Receiver type	Predicted typical noise level, dB L_{Aeq}
11 Cortina Place	Pakuranga Medical Centre	Commercial	70-75
1/9 Cortina Place	Souly Funerals	Commercial	70-75
10 Cortina Place	Car King Auto Centre	Commercial	70-75

EB2/EB3R Main works

Daytime works

Affected parties during use of the piling rig, RRF construction, daytime

Address	Receiver type	Maximum predicted noise level, dB L_{Aeq}
11 Reeves Road	Commercial	76-80
13r Reeves Road	Commercial	
2 Ti Rakau Drive	Commercial	
26 Ti Rakau Drive	Commercial	
3 Reeves Road	Commercial	71-75
2 Cortina Place	Commercial	

Affected parties during use of the excavator, EB2

Address	Receiver type	Maximum predicted noise level, dB L_{Aeq}
141 Pakuranga Road	Commercial	86-90
2r Ti Rakau Drive	Commercial	
11 Cortina Place	Commercial	
11 Reeves Road	Commercial	
5 Reeves Road	Commercial	
23b Dale Crescent	Residential	
1-2/17 Ti Rakau Drive	Residential	
10 7 Aylesbury Street	Commercial	
1/15,15 Ti Rakau Drive	Residential	
1/9 Cortina Place	Commercial	
7a Cortina Place	Commercial	
10 Aylesbury Street	Commercial	81-85
10-14 Cortina Place	Commercial	
1-2/5 Ti Rakau Drive	Residential	
1-2/13 Ti Rakau Drive	Residential	76-80 71-75
1-2/92 Pakuranga Road	Residential	
126 Pakuranga Road	Commercial	

120 Pakuranga Road	Commercial	
100 Pakuranga Road	Residential	
3 Reeves Road	Commercial	
21 Dale Crescent	Residential	
3 Ti Rakau Drive	Residential	
1-2/7 Ti Rakau Drive	Residential	
94 Pakuranga Road	Residential	
116b Pakuranga Road	Residential	
2/23 Ti Rakau Drive	Residential	
13r Reeves Road	Commercial	
1/11,11 Ti Rakau Drive	Residential	
12,12a William Roberts Road	Residential	
18a William Roberts Road	Residential	
1/9,9 Ti Rakau Drive	Residential	
106 Pakuranga Road	Residential	
1-2/90 Pakuranga Road	Residential	71-75
1/14 William Roberts Road	Residential	
24 William Roberts Road	Residential	
1/19,19 Ti Rakau Drive	Residential	
64 Dale Crescent	Residential	
24r William Roberts Road	Residential	
7 Cortina Place	Commercial	
2 Dale Crescent	Residential	
15 Reeves Road	Residential	
100 Pakuranga Road	Residential	
2 Cortina Place	Commercial	
183 Pakuranga Road	Residential	
21 Ti Rakau Drive	Residential	

Affected parties during use of the excavator, EB3R

Address	Receiver type	Maximum predicted noise level, dB L_{Aeq}
148 Edgewater Drive	Residential	86-90
165b Edgewater Drive	Residential	
176 Gossamer Drive	Residential	
6,1/6 Mattson Road	Residential	
4 Edgewater Drive	Residential	
9a,9b Mattson Road	Residential	
165a Edgewater Drive	Residential	81-85
212 Ti Rakau Drive	Residential	
5a Tiraumea Drive	Residential	76-80
75a Ti Rakau Drive	Residential	
1-2/2 Chevis Place	Residential	

1-2/130 Ti Rakau Drive	Residential	
128 Ti Rakau Drive	Residential	
158 Ti Rakau Drive	Residential	
214 Ti Rakau Drive	Residential	71-75
92 Ti Rakau Drive	Residential	
1-2/1 Chevis Place	Residential	
160 Ti Rakau Drive	Residential	
5 Tiraumea Drive	Residential	
176 Ti Rakau Drive	Residential	
156 Ti Rakau Drive	Residential	
138 Ti Rakau Drive	Residential	
172 Gossamer Drive	Residential	
207 Ti Rakau Drive	Commercial	
4 Tiraumea Drive	Residential	
184 Ti Rakau Drive	Residential	
94 Ti Rakau Drive	Residential	
171 Gossamer Drive	Residential	
126-2/126 Ti Rakau Drive	Residential	
146 Edgewater Drive	Residential	
169 Gossamer Drive	Residential	
108 Ti Rakau Drive	Residential	
136 Ti Rakau Drive	Residential	
210 Ti Rakau Drive	Residential	
2a, 2b, 2c Marriott Road	Residential	
174 Ti Rakau Drive	Residential	
102 Ti Rakau Drive	Residential	
106 Ti Rakau Drive	Residential	
100 Ti Rakau Drive	Residential	
140 Ti Rakau Drive	Residential	
186 Ti Rakau Drive	Residential	
166 Ti Rakau Drive	Residential	
170 Ti Rakau Drive	Residential	
1/9 Bolina Crescent	Residential	
90 Ti Rakau Drive	Residential	

Night-time works

Predicted noise levels during use of the chainsaw during tree removals (night-time), EB2

Address	Maximum predicted noise level, dB L_{Aeq}	Address	Maximum predicted noise level, dB L_{Aeq}
1-2/5 Ti Rakau Drive	71-75	8 Undine Street	46-50
3 Ti Rakau Drive	66-70	8 Palm Avenue	
1-2/7 Ti Rakau Drive		2/23 Ti Rakau Drive	

1/9,9 Ti Rakau Drive	61-65
21 Dale Crescent	
23b Dale Crescent	
1-2/90 Pakuranga Road	
1/11,11 Ti Rakau Drive	
1-2/92 Pakuranga Road	56-60
25 Dale Crescent	
23a Dale Crescent	
16 Dale Crescent	
14 Dale Crescent	
12 Dale Crescent	
1-2/13 Ti Rakau Drive	
33 Dale Crescent	
105 Pakuranga Road	
10a Dale Crescent	
94 Pakuranga Road	
27 Dale Crescent	
1-2/11 Dowling Place	
13 Dowling Place	
1-2/15 Dowling Place	
1/15,15 Ti Rakau Drive	
1-2/18 Dale Crescent	51-55
15 Undine Street	
1-2/5 Dowling Place	
8 Dale Crescent	
14 Undine Street	
9 Dowling Place	
7 Dowling Place	
1-26/33 Dale Crescent	
6 Dale Crescent	
9a Undine Street	
1-2/3 Dowling Place	
15 Osprey Street	
55 Dale Crescent	
1-2/101 Pakuranga Road	
7 Undine Street	
13 Osprey Street	
1-2/24 Dale Crescent	
1 Tamaki Bay Drive	
1-2/30 Dale Crescent	
10 Anthony Place	
21 Ti Rakau Drive	
6 Undine Street	
95 Pakuranga Road	
25 Pandora Place	
2/39 Dale Crescent	
6 Anthony Place	
5 Undine Street	
62 Dale Crescent	
1 Dowling Place	
60 Dale Crescent	
29 Tiraumea Drive	
16 Dowling Place	
1/19,19 Ti Rakau Drive	
1-2/32 Dale Crescent	
45 Dale Crescent	
10 Dowling Place	
1-2/17 Dowling Place	
4 Dowling Place	
1/34 Dale Crescent	
8 Anthony Place	
31 Tiraumea Drive	
1-2/20 Dowling Place	
22 Osprey Street	40-45
36 Dale Crescent	
1-2/2b Dowling Place	

17 Osprey Street	
1/23 Ti Rakau Drive	
1-2/17 Ti Rakau Drive	
1-2/20 Dale Crescent	
2 Dale Crescent	
22 Dale Crescent	
1/20 Osprey Street	
24 Osprey Street	
47c Dale Crescent	
9 Undine Street	
100 Pakuranga Road	
103 Pakuranga Road	
4 Dale Crescent	
12 Undine Street	
7a Undine Street	
10 Undine Street	46-50
5 Tamaki Bay Drive	

1-2/3 Palm Avenue	
40 Dale Crescent	
4a - 4b Palm Avenue	
61 Dale Crescent	
8 Dowling Place	
97 Pakuranga Road	
3 Undine Street	
41 Dale Crescent	
16 Osprey Street	
40a Dale Crescent	
65 Dale Crescent	
10 Dale Crescent	
1-2/43 Dale Crescent	
38 Dale Crescent	
12 Anthony Place	
2a Dowling Place	

Predicted noise levels during use of the chainsaw for tree removals (night-time), EB3R

Address	Maximum predicted noise level, dB L_{Aeq}
176 Gossamer Drive	75-79
172 Gossamer Drive	
138 Ti Rakau Drive	66-70
108 Ti Rakau Drive	
106 Ti Rakau Drive	
114 Ti Rakau Drive	
112 Ti Rakau Drive	
116 Ti Rakau Drive	
140 Ti Rakau Drive	
120 Ti Rakau Drive	
110 Ti Rakau Drive	
169 Gossamer Drive	
118 Ti Rakau Drive	
122 Ti Rakau Drive	
136 Ti Rakau Drive	
171 Gossamer Drive	
104 Ti Rakau Drive	
144 Ti Rakau Drive	
175 Gossamer Drive	

Address	Maximum predicted noise level, dB L_{Aeq}
89 Ti Rakau Drive	51-55
1-2/81 Cardiff Road	
1 Paradise Place	
6 Wheatley Avenue	
158 Ti Rakau Drive	
8 Roseburn Place	
10 Chevis Place	40-45
14 Snell Place	
3 Roseburn Place	
39 Miramar Place	
1-2/73 Cardiff Road	
75 Cardiff Road	
3/9 Bolina Crescent	
92 Ti Rakau Drive	
17 Fremantle Place	
4 Bolina Crescent	
9 Fremantle Place	
1-2/4 Marriott Road	
6 Ellesmere Crescent	

146 Ti Rakau Drive	60-65	9 Wheatley Avenue	
167 Gossamer Drive		71 Cardiff Road	
173 Gossamer Drive		5 Wheatley Avenue	
148 Ti Rakau Drive		5a Tiraumea Drive	
102 Ti Rakau Drive		14 Tiraumea Drive	
1-2/2 Chevis Place		8 Wheatley Avenue	
40 Riverhills Avenue		88 Cardiff Road	
2a, 2b, 2c Marriott Road		35 Miramar Place	
150 Ti Rakau Drive		38 Riverhills Avenue	
129 Ti Rakau Drive		16 Ellesmere Crescent	
75a Ti Rakau Drive		92, 1/92 Cardiff Road	
4 Edgewater Drive		94 Cardiff Road	
83 Ti Rakau Drive		1-3/59 Cardiff Road	
152 Ti Rakau Drive		96 Cardiff Road	
8 Ellesmere Crescent	56-60	7 Paradise Place	
100 Ti Rakau Drive		148 Edgewater Drive	
14 Edgewater Drive		12 Tiraumea Drive	
1/7 Wheatley Avenue		166 Ti Rakau Drive	
3 Wheatley Avenue		7 Snell Place	
126-2/126 Ti Rakau Drive		8 Chevis Place	
1-2/6 Roseburn Place		4 Chevis Place	
83c Ti Rakau Drive		210 Ti Rakau Drive	
7 Bolina Crescent		1-2/82 Cardiff Road	
1-2/1 Chevis Place		77 Cardiff Road	
36 Riverhills Avenue		19 Fremantle Place	
2/79 Cardiff Road		1-2/9 Roseburn Place	
9 Snell Place		7 Ellesmere Crescent	
91 Ti Rakau Drive		13 Tiraumea Drive	
2/5 Bolina Crescent		3 Paradise Place	
114a Ti Rakau Drive		5 Fremantle Place	
10 Ellesmere Crescent		12 Fremantle Place	
83b Ti Rakau Drive		8 Paradise Place	
65 Cardiff Road		2 Ellesmere Crescent	
6 Chevis Place		13 Wheatley Avenue	

142 Ti Rakau Drive	
154 Ti Rakau Drive	
98 Ti Rakau Drive	
156 Ti Rakau Drive	
7 Wheatley Avenue	
6 Bolina Crescent	
11 Snell Place	
1/67 Cardiff Road	
1-2/8 Edgewater Drive	
87 Ti Rakau Drive	
1-2/63 Cardiff Road	

14 Mattson Road	
1/79 Cardiff Road	
10 Edgewater Drive	
22 Miramar Place	
7 Chevis Place	
1/5 Bolina Crescent	
5 Ellesmere Crescent	
7 Roseburn Place	
98 Cardiff Road	
13 Roseburn Place	
9 Tiraumea Drive	

96 Ti Rakau Drive	51-55
5 Snell Place	
1-2/130 Ti Rakau Drive	
83a Ti Rakau Drive	
128 Ti Rakau Drive	
1/9 Bolina Crescent	
6, 1/6 Edgewater Drive	
2/9 Bolina Crescent	
94 Ti Rakau Drive	
14 Ellesmere Crescent	
67 Cardiff Road	
61 Cardiff Road	
14 Chevis Place	
7 Fremantle Place	
3 Bolina Crescent	
13 Snell Place	
2/4 Ellesmere Crescent	
3 Fremantle Place	
69a,69b Cardiff Road	
1-2/4 Roseburn Place	
12 Ellesmere Crescent	

12 Paradise Place	41-45
100 Cardiff Road	
78 Cardiff Road	
3 Chevis Place	
12 Roseburn Place	
1-2/14 Roseburn Place	
24 Ellesmere Crescent	
20 Ellesmere Crescent	
1-2/11 Chevis Place	
4 Snell Place	
33 Miramar Place	
9 Ellesmere Crescent	
15 Fremantle Place	
145 Ti Rakau Drive	
3 Ellesmere Crescent	
7 Marriott Road	
102 Cardiff Road	
2 Snell Place	
11 Tiraumea Drive	
3 Dolphin Street	
18 Chevis Place	

97 Ti Rakau Drive		1-3/12 Mattson Road	
2 Paradise Place		5 Chevis Place	
4 Wheatley Avenue		18a Ellesmere Crescent	
2/17 Tiraumea Drive		16 Tiraumea Drive	
1-2/10 Roseburn Place		214 Ti Rakau Drive	
15 Tiraumea Drive		1/4 Ellesmere Crescent	
6 Paradise Place		18 Tiraumea Drive	

Predicted noise levels during use of the concrete saw for pavement works (night-time), EB2

Address	Maximum predicted noise level, dB L_{Aeq}	Address	Maximum predicted noise level, dB L_{Aeq}
1-2/5 Ti Rakau Drive	71-75	103 Pakuranga Road	51-55
1-2/13 Ti Rakau Drive		24r William Roberts Road	
3 Ti Rakau Drive		26 Dale Crescent	
1-2/17 Ti Rakau Drive		1 Anthony Place	
1/11,11 Ti Rakau Drive	66-70	10 Dowling Place	
1-2/7 Ti Rakau Drive		3 Tamaki Bay Drive	
1/15,15 Ti Rakau Drive		24 William Roberts Road	46-50
1/19,19 Ti Rakau Drive		100 Pakuranga Road	
2/23 Ti Rakau Drive		16 Dowling Place	
1/9,9 Ti Rakau Drive		5 Tamaki Bay Drive	
21 Ti Rakau Drive		1 Tamaki Bay Drive	
1/23 Ti Rakau Drive		86 Ti Rakau Drive	
1-2/90 Pakuranga Road	61-65	19 Dowling Place	
1-2/3 Palm Avenue		38 Dale Crescent	
4a - 4b Palm Avenue		1-2/30 Dale Crescent	
1-2/92 Pakuranga Road		1-2/20 Dowling Place	
47c Dale Crescent	56-60	93 Pakuranga Road	
5 Palm Avenue		1-2/32 Dale Crescent	
94 Pakuranga Road		1-2/17 Dowling Place	

13 Dowling Place	
33 Dale Crescent	
105 Pakuranga Road	
6 Palm Avenue	
1-2/43 Dale Crescent	
1-2/11 Dowling Place	
1-2/15 Dowling Place	
1-2/5 Dowling Place	
9 Dowling Place	
8 Palm Avenue	
2/39 Dale Crescent	
7 Dowling Place	51-55
55 Dale Crescent	
1-26/33 Dale Crescent	
1-2/3 Dowling Place	
84 Ti Rakau Drive	
45 Dale Crescent	
1-2/24 Dale Crescent	
41 Dale Crescent	
1 Dowling Place	

2/34 Dale Crescent	
1-2/101 Pakuranga Road	
97 Pakuranga Road	
36 Dale Crescent	
4 Anthony Place	
1/34 Dale Crescent	
4 Dowling Place	41-45
95 Pakuranga Road	
25 Dale Crescent	
22 Dale Crescent	
5 Anthony Place	
1/14 Dowling Place	
7 Anthony Place	
23b Dale Crescent	
40 Dale Crescent	
1-2/9 Anthony Place	
1a Dowling Place	
59 Dale Crescent	
1-2/2b Dowling Place	

Predicted noise levels during use of the concrete saw for pavement works (night-time), EB3R

Address	Maximum predicted noise level, dB L_{Aeq}
5a Tiraumea Drive	61-65
1/10 Dolphin Street	
4 Tiraumea Drive	
5 Tiraumea Drive	56-60
2/10 Dolphin Street	
1/9 Bolina Crescent	
8 Dolphin Street	
14a Dolphin Street	
7 Tiraumea Drive	
6 Tiraumea Drive	
14 Dolphin Street	
9a,9b Mattson Road	
14b Dolphin Street	
2/9 Bolina Crescent	51-55

Address	Maximum predicted noise level, dB L_{Aeq}
10 Mattson Road	46-50
13 Mattson Road	
16 Dolphin Street	
94 Ti Rakau Drive	
2/5 Bolina Crescent	
7b Mattson Road	
13 Dolphin Street	
15 Dolphin Street	
3 Dolphin Street	
5 Dolphin Street	
6 Bolina Crescent	
8 Mattson Road	
17 Dolphin Street	
7h Mattson Road	

8 Tiraumea Drive		13 Tiraumea Drive	
12 Dolphin Street		11 Dolphin Street	
7a Mattson Road		7c Mattson Road	
9 Tiraumea Drive		15a Dolphin Street	
7 Bolina Crescent		1 Aurea Avenue	
10 Tiraumea Drive		11a Dolphin Street	
11 Tiraumea Drive		3 Bolina Crescent	
13a Tiraumea Drive		1/9 Dolphin Street	
9 Mattson Road		7 Dolphin Street	
6,1/6 Mattson Road		2/6 Cindy Place	
6 Dolphin Street		4 Bolina Crescent	
4,4a Dolphin Street		1/6 Cindy Place	
90 Ti Rakau Drive		14 Mattson Road	
12 Tiraumea Drive		5 Aurea Avenue	41-45
7g Mattson Road		8 Cindy Place	
3/9 Bolina Crescent	46-50	15 Tiraumea Drive	
92 Ti Rakau Drive		1-3/57 Cardiff Road	
1/5 Bolina Crescent		7 Cindy Place	
1-3/12 Mattson Road		88 Ti Rakau Drive	

Predicted noise levels during use of the concrete truck for RRFO works (night-time), EB2

Address	Maximum predicted noise level, dB L_{Aeq}	Address	Maximum predicted noise level, dB L_{Aeq}
18a William Roberts Road		1/15,15 Ti Rakau Drive	
12,12a William Roberts Road		10 Tiraumea Drive	
1/14 William Roberts Road	66-70	6 William Roberts Road	
23b Dale Crescent		2/8 William Roberts Road	
1/9 Bolina Crescent		10 Anthony Place	
7 Bolina Crescent		8 Dale Crescent	
16 William Roberts Road		17 Osprey Street	51-55
2/9 Bolina Crescent		15 Osprey Street	
25 Dale Crescent		1-2/3 Palm Avenue	
5a Tiraumea Drive		13 Osprey Street	
21 Dale Crescent		14 Tiraumea Drive	
20 William Roberts Road		26 Dale Crescent	
27 Dale Crescent		12 Tiraumea Drive	
3/9 Bolina Crescent		2/39 Dale Crescent	
18 William Roberts Road	61-65	10 Undine Street	

15 Reeves Road		8 Undine Street	
33 Dale Crescent		11 Ayr Road	
33 Dale Crescent		8 Anthony Place	
2/23 Ti Rakau Drive		8 Dolphin Street	
1/5 Bolina Crescent		6 Dale Crescent	
33 Dale Crescent		18 Tiraumea Drive	
33 Dale Crescent		23a Reeves Road	
2/5 Bolina Crescent		29 Tiraumea Drive	
1/23 Ti Rakau Drive		2/9 Ayr Road	
24 William Roberts Road		2 Ayr Road	
10,2/10 William Roberts Road		16 Tiraumea Drive	
17 Reeves Road		25 Reeves Road	
19 Reeves Road		1/4 William Roberts Road	
6 Bolina Crescent		31 Tiraumea Drive	
4 Bolina Crescent		1-2/13 Ti Rakau Drive	
33 Dale Crescent		4 Dale Crescent	
23a Dale Crescent		5 Palm Avenue	
24r William Roberts Road		5 Ayr Road	
7 Tiraumea Drive		24 Tiraumea Drive	
5 Tiraumea Drive		5 Undine Street	
21 Ti Rakau Drive		24 Osprey Street	
17a Reeves Road		8 Ayr Road	
12 Reeves Road		6 Undine Street	
1a Ayr Road		2 Dale Crescent	
2/14 William Roberts Road		4 Anthony Place	
1-2/18 Dale Crescent		8 Reeves Road	
1/19,19 Ti Rakau Drive		7 Undine Street	
3 Bolina Crescent		7 Ayr Road	
13a Tiraumea Drive		6 Reeves Road	
1-2/17 Ti Rakau Drive		14 Reeves Road	
15 Tiraumea Drive		15c Anthony Place	
9a Undine Street		10 Reeves Road	
1 Ayr Road		1/17 Tiraumea Drive	
1-26/33 Dale Crescent		1/12 Reeves Road	
9 Tiraumea Drive	56-60	7 Dolphin Street	

21 Reeves Road		3 Dolphin Street	
9 Undine Street		116b Pakuranga Road	
11 Tiraumea Drive		5 Dolphin Street	
4a Reeves Road		29 Reeves Road	
1-2/20 Dale Crescent		3 Undine Street	
33 Dale Crescent		4 Ayr Road	
1/2 Reeves Road		4,4a Dolphin Street	46-50
22 Dale Crescent		6 Anthony Place	
14 Dale Crescent		14a Reeves Road	
23 Reeves Road		1 Undine Street	
12b William Roberts Road		6 Ayr Road	
15 Undine Street		2/13 Ayr Road	
6 Palm Avenue		31 Reeves Road	
1/19 Reeves Road		10 Ayr Road	
12 Dale Crescent		3/183 Pakuranga Road	
4 Tiraumea Drive		12 Ayr Road	
16 Dale Crescent		6 Dolphin Street	
2/17 Tiraumea Drive		15 Anthony Place	
3 Ayr Road		12 Anthony Place	
7a Undine Street		4 Undine Street	
8 Palm Avenue		1/13 Ayr Road	
14 Undine Street		14 Ayr Road	
3/14 William Roberts Road		4 Reeves Road	
1-2/24 Dale Crescent		6a Ayr Road	
6 Tiraumea Drive		1/9 Ayr Road	
13 Tiraumea Drive		10 Dale Crescent	
10a Dale Crescent		11 Osprey Street	41-45
4a - 4b Palm Avenue		14 Anthony Place	
1/8 William Roberts Road		4c Bennett Road	
8 Tiraumea Drive		2c Bennett Road	
12 Undine Street	51-55	2/12 Reeves Road	

EB3C

EB3C Main Works — Excavator (Daytime)

Receiver	Use	Noise Level (dB LAeq)
28 Burswood Drive	Residential	89
21 Dulwich Place	Residential	86
198 Burswood Drive	Residential	82
18 Heathridge Place	Residential	80
203 Burswood Drive	Residential	79

38 Heathridge Place	Residential	77
201 Burswood Drive	Residential	75
12 Tullis Place	Residential	74
25 Burswood Drive	Residential	73
10 Heathridge Place	Residential	73
6A Tullis Place	Residential	72
27 Burswood Drive	Residential	72
196 Burswood Drive	Residential	72
2 Torrens Road	Residential	72
34 Burswood Drive	Residential	72
11 Tullis Place	Residential	71
380 Ti Rakau Drive	Commercial	89
1/28 Torrens Road	Commercial	87
245 Ti Rakau Dr	Commercial	82
3/28 Torrens Road	Commercial	81
5/272 Ti Rakau Drive	Commercial	79
386 Ti Rakau Drive	Commercial	74
22 Torrens Road	Commercial	73
16 Torrens Road	Commercial	72
5/28 Torrens Road	Commercial	72

EB3C Main Works Bridge A and Bridge B Construction — Impact Piling Rig (Daytime)

Receiver	Use	Noise Level (dB LAeq)
245 Ti Rakau Drive	Commercial	73
249 Ti Rakau Drive	Commercial	71

EB3C Long Weekend Works — Concrete Saw (Night-time)

Receiver	Use	Noise Level (dB LAeq)
38 Davington Way	Residential	54
40 Davington Way	Residential	53
36 Davington Way	Residential	53
32 Davington Way	Residential	51
7 Ifield Court	Residential	51
9 Ifield Court	Residential	51
5 Ifield Court	Residential	51
3 Ifield Court	Residential	51
47 Davington Way	Residential	51
2 Ifield Court	Residential	50
43 Davington Way	Residential	50
30 Davington Way	Residential	50
41 Davington Way	Residential	50
16 Ifield Court	Residential	49
8 Ifield Court	Residential	49
6 Ifield Court	Residential	49
37 Davington Way	Residential	49
35 Davington Way	Residential	48
20 Lutana Place	Residential	48

11 Lutana Place	Residential	48
9 Lutana Place	Residential	48
10 Ifield Court	Residential	48
20 Davington Way	Residential	47
39 Davington Way	Residential	47
22 Davington Way	Residential	47
22 Lutana Place	Residential	46
45 Davington Way	Residential	46
12 Ifield Court	Residential	46
11 Ifield Court	Residential	46
5 Tullis Place	Residential	46
11 Tullis Place	Residential	46
2 Torrens Road	Residential	46

EB3C Pavement Works — Plate Compactor (Night-time)

Receiver	Noise Level (dB LAeq)
37-41 Spalding Rise	86
74-78 Tiger Drive	84
53 Huntington Drive	73
31-35 Spalding Rise	71
29 Spalding Rise	68
68-72 Tiger Drive	68
415 Ti Rakau Drive	66
66 Tiger Drive	66
51a Huntington Drive	64
6 Bunker Rise	63
64 Tiger Drive	63
8 Bunker Rise	63
62 Tiger Drive	62
27 Spalding Rise	61
60 Tiger Drive	61
51 Huntington Drive	61
86 Huntington Drive	61
56-58 Tiger Drive	61
23 Spalding Rise	60
98 Huntington Drive	60
25 Spalding Rise	60
100 Huntington Drive	60
2 Nagle Place	59
4 Nagle Place	59
118 Huntington Drive	59
116 Huntington Drive	59
102 Huntington Drive	59

49 Huntington Drive	59
96 Huntington Drive	58
18 Nagle Place	58
54 Tiger Drive	58
90 Huntington Drive	58
88 Huntington Drive	58
16 Nagle Place	58
104 Huntington Drive	58
114 Huntington Drive	58
14 Nagle Place	57
45 Huntington Drive	57
6 Nagle Place	57
32 Spalding Rise	57
106 Huntington Drive	57
112 Huntington Drive	57
19 Spalding Rise	57
12 Nagle Place	57
15 Spalding Rise	57
28 Cottesmore Place	57
94 Huntington Drive	56
84 Huntington Drive	56
78 Huntington Drive	56
8-10 Nagle Place	56
32 Cottesmore Place	56
30 Cottesmore Place	56
108 Huntington Drive	56
26 Cottesmore Place	56
64 Huntington Drive	56
8 Saidia Place	56
110 Huntington Drive	55
10 Saidia Place	55
24 Cottesmore Place	55
47 Puma Drive	55
17 Spalding Rise	55
62 Huntington Drive	55
1 St Leger	55
8 Spalding Rise	55
11 Bunker Rise	55
9 Bunker Rise	55
45 Puma Drive	54
13 Bunker Rise	54
41 Puma Drive	54
43 Huntington Drive	54
4 Bunker Rise	54

34 Cottesmore Place	54
6 Saidia Place	54
43 Puma Drive	54
4 Saidia Place	54
92 Huntington Drive	53
2 Els Close	53
48-50 Tiger Drive	53
9 Saidia Place	53
7 Bunker Rise	53
4 Els Close	53
2 Saidia Place	53
22 Cottesmore Place	52
60 Huntington Drive	52
37 Puma Drive	52
31 Cottesmore Place	52
5 Bunker Rise	52
40 Cottesmore Place	52
82 Huntington Drive	52
5 Saidia Place	51
38 Cottesmore Place	51
39 Puma Drive	51
29 Cottesmore Place	51
7 Saidia Place	51
56 Huntington Drive	51
30 Spalding Rise	51
18 Cottesmore Place	51
52 Tiger Drive	51
20 Cottesmore Place	51
24 Puma Drive	51
3 Bunker Rise	51
27 Cottesmore Place	51
12a Midvale Place	51
16 Cottesmore Place	51
1/9 Midvale Place	50
28 Spalding Rise	50
13 Cottesmore Place	50
44 Tiger Drive	50
33 Puma Drive	50
12 Cottesmore Place	50
42 Tiger Drive	50
12 Midvale Place	50
14 Els Close	50
40 Tiger Drive	50
12 Els Close	50

1 Spalding Rise	50
36 Cottesmore Place	50
26 Spalding Rise	50
22 Puma Drive	50
1 Saidia Place	49
5 Lushington Place	49
7 Midvale Place	49
36 Tiger Drive	49
11 Lushington Place	49
15 Lushington Place	49
35 Puma Drive	49
14 Cottesmore Place	49
15 Puma Drive	49
10 Cottesmore Place	49
9 Cottesmore Place	49
23 Cottesmore Place	49
54 Huntington Drive	49
38Tiger Drive 49	49
9 Spalding Rise	49
20 Spalding Rise	49
3 Saidia Place	49
8 St Leger	49
161 Guys Road	49
25 Cottesmore Place	49
10 Midvale Place	48
6 Els Close	48
37 Huntington Drive	48
28 Burswood Drive	48
7 Spalding Rise	48
11 Cottesmore Place	48
175 Guys Road	48
68 Huntington Drive	48
11a Kenwick Place	48
9 Lushington Place	48
25 Burswood Drive	48
35 Huntington Drive	48
13 Lushington Place	48
5 Spalding Rise	48
70 Huntington Drive	48
48 Huntington Drive	48
72 Huntington Drive	48
10 Els Close	48
5 Midvale Place	48
20 Puma Drive	48

3 Spalding Rise	48
6 St Leger	48
14-18 Spalding Rise	47
171 Guys Road	47
5 Cottesmore Place	47
6 Cottesmore Place	47
3 Midvale Place	47
8 Els Close	47
173 Guys Road	47
1/5 St Leger	47
5 Els Close	47
8 Cottesmore Place	47
9 Huntington Drive	47
12 Lushington Place	47
18 Puma Drive	47
12 Spalding Rise	47
42 Huntington Drive	47
153 Guys Road	47
10 Lushington Place	47
15 Kenwick Place	47
155 Guys Road	47
7 Quartley Place	47
50 Huntington Drive	47
11 Spalding Rise	47
38 Huntington Drive	47
16 Lushington Place	47
9 Kenwick Place	47
2 Kenwick Place	47
1 Kenwick Place	47
10 Spalding Rise	47
23 Puma Drive	46
27 Burswood Drive	46
7 Cottesmore Place	46
34 Burswood Drive	46
36 Burswood Drive	46
9-17 Waihi Way 4	46
8 Lushington Place	46
9 Midvale Place	46
16 Puma Drive	46
19 Kenwick Place	46
31 Huntington Drive	46
18 Huntington Drive	46
13 Puma Drive	46
3 St Leger	46

14 Kenwick Place	46
29 Huntington Drive	46
1 Quartley Place	46
8 Midvale Place	46
10 Heathridge Place	46
6 Kenwick Place	46
4 St Leger	46
188 Guys Road	46
14 Lushington Place	46
14 Spalding Rise	46
13 Quartley Place	46
30 Tiger Drive	46
170 Guys Road	46
6 Heathridge Place	46
178 Guys Road	46
180 Guys Road	46
182 Guys Road	46
15 Puma Drive	46
31 Burswood Drive	46
34 Huntington Drive	46
9 Quartley Place	46
7 Lushington Place	46
8 Kenwick Place	46

EB3C Bridge Construction Works — Concrete Pours (Night-time)

Receiver	Noise Level (dB LAeq)
38 Davington Way	61
36 Davington Way	59
40 Davington Way	58
32 Davington Way	57
3 Ifield Court	56
47 Davington Way	56
5 Ifield Court	56
7 Ifield Court	55
9 Ifield Court	55
30 Davington Way	54
16 Ifield Court	51
39 Davington Way	51
6 Ifield Court	51
170 Gossamer Drive	51
176 Gossamer Drive	51
14 Wanaka Place	51
45 Davington Way	51

12 Wanaka Place	51
172 Gossamer Drive	51
8 Wanaka Place	51
10 Wanaka Place	51
43 Davington Way	51
20 Lutana Place	50
22 Lutana Place	50
2/162 Gossamer Drive	50
41 Davington Way	50
11 Ifield Court	50
2 Ifield Court	50
158 Gossamer Drive	49
11 Lutana Place	49
40 Riverhills Avenue	49
16 Wanaka Place	49
8 Ifield Court	49
165 Gossamer Drive	49
8 Ellesmere Crescent	49
18 Lutana Place	49
163B Gossamer Drive	49
1/162 Gossamer Drive	48
1/4 Ellesmere Crescent	48
171 Gossamer Drive	48
175 Gossamer Drive	48
37 Davington Way	48
16 Lutana Place	48
155 Gossamer Drive	48
169 Gossamer Drive	48
35 Davington Way	48
26 Davington Way	48
22 Wanaka Place	47

Appendix B: Affected Parties – Vibration

William Roberts Road Extension

Address	Distance to works, m	Receiver type	Exceeds Category A
11 Cortina Place	7	Commercial	Yes
1/9 Cortina Place	8	Commercial	Yes
10 Cortina Place	7*	Commercial	Yes
3 Cortina Place	16	Commercial	Yes
5 Cortina Place	17	Commercial	Yes
7 Cortina Place	18	Commercial	Yes
2 Cortina Place	18	Commercial	Yes
13 Reeves Road	18	Commercial	Yes

***10 Cortina Place is closest to the demolition works at 16 Cortina Place**

EB2

EB2, Daytime				
Address	**Distance to Works**	**Building Type/Structure**	**Exceeds Category A?**	**Exceeds Category B?**
123 -135 Pakuranga Road	1	Commercial	Yes	Yes
2r Ti Rakau Drive	1	Commercial	Yes	Yes
1-2/17 Ti Rakau Drive	1	Residential	Yes	Yes
141 Pakuranga Road	1	Commercial	Yes	Yes
1/15,15 Ti Rakau Drive	1	Residential	Yes	Yes
26 Ti Rakau Drive	1	Commercial	Yes	Yes
10-14 Cortina Place	1	Commercial	Yes	Yes
23b Dale Crescent	1	Residential	Yes	Yes
120 Pakuranga Road	1	Commercial	Yes	Yes
3 Reeves Road	1	Commercial	Yes	Yes
10 7 Aylesbury Street	1	Commercial	Yes	Yes
10 Aylesbury Street	1	Commercial	Yes	Yes
11 Reeves Road	1	Commercial	Yes	Yes
11 Cortina Place	2	Commercial	Yes	Yes
1/9 Cortina Place	2	Commercial	Yes	Yes
7a Cortina Place	2	Commercial	Yes	Yes
1-2/92 Pakuranga Road	3	Residential	Yes	Yes
126 Pakuranga Road	3	Commercial	Yes	No
1-2/90 Pakuranga Road	4	Residential	Yes	Yes
1-2/5 Ti Rakau Drive	4	Residential	Yes	Yes

1-2/13 Ti Rakau Drive	4	Residential	Yes	Yes
2/23 Ti Rakau Drive	4	Residential	Yes	Yes
116b Pakuranga Road	5	Residential	Yes	Yes
21 Dale Crescent	5	Residential	Yes	Yes
106 Pakuranga Road	5	Residential	Yes	Yes
18a William Roberts Road	5	Residential	Yes	Yes
100 Pakuranga Road	5	Residential	Yes	Yes
3 Ti Rakau Drive	5	Residential	Yes	Yes
1-2/7 Ti Rakau Drive	5	Residential	Yes	Yes
24 William Roberts Road	6	Residential	Yes	Yes
94 Pakuranga Road	6	Residential	Yes	Yes
12,12a William Roberts Road	6	Residential	Yes	Yes
64 Dale Crescent	6	Residential	Yes	Yes
118 Pakuranga Road	6	Residential	Yes	Yes
3 Cortina Place	6	Commercial	Yes	No
1/11,11 Ti Rakau Drive	6	Residential	Yes	Yes
1/14 William Roberts Road	6	Residential	Yes	Yes
1/19,19 Ti Rakau Drive	6	Residential	Yes	Yes
1/9,9 Ti Rakau Drive	6	Residential	Yes	Yes
100 Pakuranga Road	6	Residential	Yes	Yes
2 Dale Crescent	6	Residential	Yes	Yes
13r Reeves Road	7	Commercial	Yes	No
24r William Roberts Road	7	Residential	Yes	Yes
15 Reeves Road	7	Residential	Yes	Yes
21 Ti Rakau Drive	8	Residential	Yes	Yes
183 Pakuranga Road	8	Residential	Yes	Yes
8 Cortina Place	8	Commercial	Yes	No
1/4 William Roberts Road	8	Residential	Yes	Yes
1-2/3 Palm Avenue	8	Residential	Yes	Yes
5 Cortina Place	8	Commercial	Yes	No
7 Cortina Place	8	Commercial	Yes	No
84 Ti Rakau Drive	9	Residential	Yes	No
27r William Roberts Road	9	Commercial	Yes	No
191 Pakuranga Road	9	Residential	Yes	No
62 Dale Crescent	9	Residential	Yes	No
4a - 4b Palm Avenue	10	Residential	Yes	No
1 Reeves Road	11	Commercial	Yes	No
102 Pakuranga Road	11	Commercial	Yes	No
10,2/10 William Roberts Road	12	Residential	Yes	No

1-2/30 Latham Avenue	12	Residential	Yes	No
193a Pakuranga Road	12	Residential	Yes	No
20 William Roberts Road	12	Residential	Yes	No
17 Reeves Road	13	Residential	Yes	No
16 William Roberts Road	14	Residential	Yes	No
1-2/104 Pakuranga Road	14	Residential	Yes	No
23a Dale Crescent	14	Residential	Yes	No
1/23 Ti Rakau Drive	15	Residential	Yes	No
140s Pakuranga Road	16	Residential	Yes	No
1-3/189 Pakuranga Road	16	Residential	Yes	No
140s Pakuranga Road	17	Commercial	Yes	No
66 Dale Crescent	17	Residential	Yes	No
2/32 Latham Avenue	19	Residential	Yes	No
118 Pakuranga Road	19	Residential	Yes	No
108 Pakuranga Road	19	Residential	Yes	No
2/4 William Roberts Road	19	Residential	Yes	No
6 William Roberts Road	20	Residential	Yes	No
1/8 William Roberts Road	20	Residential	Yes	No

EB3R

EB3R, Daytime				
Address	**Distance to Works**	**Building Type/Structure**	**Exceeds Category A?**	**Exceeds Category B?**
107-109 Ti Rakau Drive	1	Commercial	Yes	Yes
9a,9b Mattson Road	1	Residential	Yes	Yes
4 Edgewater Drive	1	Residential	Yes	Yes
148 Edgewater Drive	1	Residential	Yes	Yes
165a Edgewater Drive	1	Residential	Yes	Yes
165b Edgewater Drive	1	Residential	Yes	Yes
6,1/6 Mattson Road	1	Residential	Yes	Yes
212 Ti Rakau Drive	1	Residential	Yes	Yes
176 Gossamer Drive	1	Residential	Yes	Yes
5 Tiraumea Drive	3	Residential	Yes	Yes
3 Fremantle Place	3	Residential	Yes	Yes
5a Tiraumea Drive	4	Residential	Yes	Yes
176 Ti Rakau Drive	4	Residential	Yes	Yes
210 Ti Rakau Drive	4	Residential	Yes	Yes
75a Ti Rakau Drive	4	Residential	Yes	Yes
214 Ti Rakau Drive	4	Residential	Yes	Yes
1-2/2 Chevis Place	4	Residential	Yes	Yes

160 Ti Rakau Drive	4	Residential	Yes	Yes
4 Tiraumea Drive	4	Residential	Yes	Yes
1-2/130 Ti Rakau Drive	5	Residential	Yes	Yes
92 Ti Rakau Drive	5	Residential	Yes	Yes
158 Ti Rakau Drive	5	Residential	Yes	Yes
156 Ti Rakau Drive	5	Residential	Yes	Yes
207 Ti Rakau Drive	5	Commercial	Yes	No
128 Ti Rakau Drive	5	Residential	Yes	Yes
1-2/1 Chevis Place	5	Residential	Yes	Yes
180 Ti Rakau Drive	5	Residential	Yes	Yes
94 Ti Rakau Drive	5	Residential	Yes	Yes
146 Edgewater Drive	5	Residential	Yes	Yes
184 Ti Rakau Drive	5	Residential	Yes	Yes
172 Gossamer Drive	5	Residential	Yes	Yes
169 Gossamer Drive	6	Residential	Yes	Yes
138 Ti Rakau Drive	6	Residential	Yes	Yes
171 Gossamer Drive	6	Residential	Yes	Yes
126-2/126 Ti Rakau Drive	6	Residential	Yes	Yes
186 Ti Rakau Drive	7	Residential	Yes	Yes
219 Ti Rakau Drive	7	Commercial	Yes	No
108 Ti Rakau Drive	7	Residential	Yes	Yes
136 Ti Rakau Drive	7	Residential	Yes	Yes
2a, 2b, 2c Marriott Road	7	Residential	Yes	Yes
174 Ti Rakau Drive	7	Residential	Yes	Yes
100 Ti Rakau Drive	7	Residential	Yes	Yes
102 Ti Rakau Drive	7	Residential	Yes	Yes
106 Ti Rakau Drive	7	Residential	Yes	Yes
8 Mattson Road	7	Residential	Yes	Yes
1/9 Bolina Crescent	8	Residential	Yes	Yes
140 Ti Rakau Drive	8	Residential	Yes	Yes
200 Ti Rakau Drive	8	Residential	Yes	Yes
166 Ti Rakau Drive	8	Residential	Yes	Yes
172 Ti Rakau Drive	8	Residential	Yes	Yes
2 Paradise Place	8	Residential	Yes	Yes
170 Ti Rakau Drive	8	Residential	Yes	Yes
90 Ti Rakau Drive	9	Residential	Yes	No
192 Ti Rakau Drive	9	Residential	Yes	No
190 Ti Rakau Drive	9	Residential	Yes	No
167 Gossamer Drive	9	Residential	Yes	No
122 Ti Rakau Drive	9	Residential	Yes	No

116 Ti Rakau Drive	9	Residential	Yes	No
110 Ti Rakau Drive	9	Residential	Yes	No
175 Gossamer Drive	9	Residential	Yes	No
154 Ti Rakau Drive	9	Residential	Yes	No
104 Ti Rakau Drive	10	Residential	Yes	No
112 Ti Rakau Drive	10	Residential	Yes	No
120 Ti Rakau Drive	10	Residential	Yes	No
188 Ti Rakau Drive	10	Residential	Yes	No
114 Ti Rakau Drive	10	Residential	Yes	No
118 Ti Rakau Drive	10	Residential	Yes	No
1-2/204 Ti Rakau Drive	11	Residential	Yes	No
98 Ti Rakau Drive	11	Residential	Yes	No
9 Mattson Road	11	Residential	Yes	No
173 Gossamer Drive	11	Residential	Yes	No
206 Ti Rakau Drive	11	Residential	Yes	No
96 Ti Rakau Drive	12	Residential	Yes	No
208 Ti Rakau Drive	12	Residential	Yes	No
178 Ti Rakau Drive	12	Residential	Yes	No
194 Ti Rakau Drive	12	Residential	Yes	No
196 Ti Rakau Drive	12	Residential	Yes	No
4 Wheatley Avenue	12	Residential	Yes	No
3 Wheatley Avenue	13	Residential	Yes	No
6, 1/6 Edgewater Drive	13	Residential	Yes	No
144 Ti Rakau Drive	14	Residential	Yes	No
198 Ti Rakau Drive	14	Residential	Yes	No
152 Ti Rakau Drive	14	Residential	Yes	No
165 Edgewater Drive	14	Residential	Yes	No
129 Ti Rakau Drive	15	Residential	Yes	No
17 Fremantle Place	16	Residential	Yes	No
40 Riverhills Avenue	16	Residential	Yes	No
142 Edgewater Drive	16	Residential	Yes	No
177 Ti Rakau Drive	16	Residential	Yes	No
1/10 Dolphin Street	16	Residential	Yes	No
175a-1/175a Ti Rakau Drive	17	Residential	Yes	No
184b Ti Rakau Drive	17	Residential	Yes	No
1/144 Edgewater Drive	17	Residential	Yes	No
6 Tiraumea Drive	17	Residential	Yes	No
150 Ti Rakau Drive	18	Residential	Yes	No
146 Ti Rakau Drive	18	Residential	Yes	No
8 Dolphin Street	18	Residential	Yes	No

14 Edgewater Drive	18	Residential	Yes	No
148 Ti Rakau Drive	19	Residential	Yes	No
7 Tiraumea Drive	19	Residential	Yes	No
14 Edgewater Drive	19	Residential	Yes	No
7 Fremantle Place	19	Residential	Yes	No
19 Fremantle Place	19	Residential	Yes	No
7 Bolina Crescent	19	Residential	Yes	No
9 Fremantle Place	19	Residential	Yes	No
183 Ti Rakau Drive	20	Residential	Yes	No

Pavement Works, Night-time, EB3R				
Address	**Distance to works**	**Building Type/Structure**	**Exceeds Category A?**	**Exceeds Category B?**
1-2/13 Ti Rakau Drive	19	Residential	Yes	No
1-2/5 Ti Rakau Drive	19	Residential	Yes	No
1-2/17 Ti Rakau Drive	19	Residential	Yes	No
3 Ti Rakau Drive	20	Residential	Yes	No
1/15,15 Ti Rakau Drive	20	Residential	Yes	No
1-2/7 Ti Rakau Drive	21	Residential	Yes	No
1/11,11 Ti Rakau Drive	21	Residential	Yes	No
1/19,19 Ti Rakau Drive	21	Residential	Yes	No
2/23 Ti Rakau Drive	21	Residential	Yes	No
1/9,9 Ti Rakau Drive	22	Residential	Yes	No
21 Ti Rakau Drive	23	Residential	Yes	No
1/23 Ti Rakau Drive	32	Residential	Yes	No
1-2/3 Palm Avenue	39	Residential	Yes	No
4a - 4b Palm Avenue	41	Residential	Yes	No
1-2/90 Pakuranga Road	44	Residential	Yes	No

EB3C

Daytime pavement works in Burswood section (EB3C)

Address	Exceeds Cat B?	Exceeds Cat A?
21 Dulwich Place	Yes	Yes
28 Burswood Drive	Yes	Yes
18 Heathridge Place	Yes	Yes
198 Burswood Drive	Yes	Yes
203 Burswood Drive	Yes	Yes
38 Heathridge Place	Yes	Yes
25 Burswood Drive	Yes	Yes
10 Heathridge Place	Yes	Yes

201 Burswood Drive	Yes	Yes
12 Tullis Place	Yes	Yes
6a Tullis Place	Yes	Yes
27 Burswood Drive	Yes	Yes
7 Midvale Place	Yes	Yes
11 Tullis Place	Yes	Yes
196 Burswood Drive	No	Yes
34 Burswood Drive	No	Yes
26 Dulwich Place	No	Yes
2/203 Burswood Drive	No	Yes
19 Dulwich Place	No	Yes
415 Ti Rakau Drive	No	Yes
5 Midvale Place	No	Yes
53 Huntington Drive	No	Yes
10 Tullis Place	No	Yes
27 Heathridge Place	No	Yes
194 Burswood Drive	No	Yes
199 Burswood Drive	No	Yes

Night-time pavement works along Ti Rakau Drive (EB3C)

Address	Exceeds Cat B?	Exceeds Cat A?
37-41 Spalding Rise	No	Yes
74-78 Tiger Drive	No	Yes
53 Huntington Drive	No	Yes
68-72 Tiger Drive	No	Yes
31-35 Spalding Rise	No	Yes
415 Ti Rakau Drive	No	Yes
29 Spalding Rise	No	Yes
51a Huntington Drive	No	Yes
66 Tiger Drive	No	Yes
27 Spalding Rise	No	Yes

Appendix C: Noise Monitoring Template

Date: _ _ / _ _ / 20 _ _	Operator:	
Equipment set used	Model:	Serial No :
Date of last calibration: _ _ / _ _ / 20 _ _		

MEASUREMENT DESCRIPTION

¨ Machinery / operational noise (Not at a receiver)	¨ Noise at a receiver location
Construction location:	Receiver address:
Distance to machinery / operation: (m)	Distance to receiver: (m)
Describe noise sources (e.g. roller, piling, generator) and the location relative to the receiver:	
Describe any other unrelated noises (e.g. traffic noise) and the location relative to the receiver:	
Describe any reflecting surfaces (e.g. walls, buildings) and the location relative to the receiver:	
Describe any other factors such as barriers/terrain, or relative elevations of sources and receivers:	
It is useful to attach an aerial photograph where possible. If this is done include the following details: ¨ Location of site activity ¨ Measurement Locations ¨ Location of reflecting surfaces ¨ Relative heights ¨ Locations of unrelated sources ¨ Intervening barriers/terrain It is also useful to include photographs or diagrams of the measurement location, the major sound sources, and any other details you believe may be useful. ¨ Additional documents attached	

MEASUREMENT DETAILS

NOTES Please include any issues that were encountered during the measurements or other factors that may influence the validity of this measurement.

Location reference	Time	Measurement duration, t	$L_{Aeq(t)}$	L_{AFmax}	Adjustment for façade reflection	Equipment operating on site	Sounds heard at measurement location (note dominant and L_{AFmax} sounds)		Compliance achieved (y/n)
							Construction	Other sources	
	_ _ _ _ h ¨ Constant noise ¨ Cyclic noise	_ _ : _ _ min:sec	_ _ . _ dB	_ _ . _ dB					
	_ _ _ _ h ¨ Constant noise ¨ Cyclic noise	_ _ : _ _ min:sec	_ _ . _ dB	_ _ . _ dB					
	_ _ _ _ h ¨ Constant noise ¨ Cyclic noise	_ _ : _ _ min:sec	_ _ . _ dB	_ _ . _ dB					
	_ _ _ _ h ¨ Constant noise ¨ Cyclic noise	_ _ : _ _ min:sec	_ _ . _ dB	_ _ . _ dB					

Appendix D: Vibration Monitoring Template

Date: _ _ / _ _ / 20 _ _		Operator:
Equipment set used	Model:	Serial No. :
Date of last calibration: _ _ / _ _ / 20 _ _		

MEASUREMENT DESCRIPTION

¨ Machinery / operational vibration (Not at a receiver)	¨ Vibration at a receiver location
Construction location:	Receiver address:
Distance to machinery / operation: (m)	Horizontal Distance to receiver: (m)
	Floor Number:
Describe vibration sources (e.g. roller, piling, concrete breaking) and the location relative to the receiver:	
Describe any other unrelated vibration (e.g. traffic, other construction, footfall, lifts) and the location relative to the receiver:	
Describe geometry of foundation (e.g. walls, buildings) and the location relative to the receiver:	
Describe the coupling method (geophone to structure)	
Describe approximate composition of ground between source and receiver (e.g. basalt, sandstone)	
Describe structural resonance observed, if any. For example swaying at higher floors – note the approximate frequency and magnitude.	
It is useful to attach an aerial photograph where possible. If this is done include the following details: ¨ Location of site activity ¨ Measurement Locations ¨ Location of intervening geometry ¨ Relative heights ¨ Locations of unrelated sources ¨ Changes in composition of terrain It is also useful to include photographs or diagrams of the measurement location including building plans where available, the major vibration sources, and any other details you believe may be useful. It is important to note whether the measurement was at the foundation, or in the plane of the highest floor. ¨ Additional documents attached	

MEASUREMENT DETAILS

Location reference	Time	Measurement duration, t	PPV	Dominant axis of movement	Dominant frequency, Hz	Equipment operating on site	Vibrations observed at measurement location		Compliance achieved (y/n)
							Construction equipment	Other sources	
	_ _ _ _ h ¨ Continuous ¨ Transient	_ _ : _ _ min:sec	_ _ . _ mms^{-1}						
	_ _ _ _ h ¨ Continuous ¨ Transient	_ _ : _ _ min:sec	_ _ . _ mms^{-1}						
	_ _ _ _ h ¨ Continuous ¨ Transient	_ _ : _ _ min:sec	_ _ . _ mms^{-1}						
	_ _ _ _ h ¨ Continuous ¨ Transient	_ _ : _ _ min:sec	_ _ . _ mms^{-1}						

NOTES Please include any issues that were encountered during the measurements or other factors that may influence the validity of this measurement

Appendix E: Designation and Consent Conditions

EB2 NoR Conditions

<table>
<tr><th>Condition Number</th><th>Condition</th><th>Reference</th></tr>
<tr><td>37</td><td>Construction noise shall be measured and assessed in accordance with New Zealand Standard NZS 6803:1999 ‘Acoustics - Construction Noise’ (NZS6803:1999). With the exception of The Warehouse Pakuranga site, construction noise must and comply with the noise standards set out in the Tables 5 and 6 as far as practicable.

Table 5 Construction Noise Criteria – Residential Receivers (Irrespective of Zoning)
<table>
<tr><th rowspan="2">Time of week</th><th rowspan="2">Time Period</th><th colspan="2">Maximum noise level (dBA) > 20 weeks</th></tr>
<tr><th>L_{eq}</th><th>L_{max}</th></tr>
<tr><td rowspan="4">Weekdays</td><td>0630 – 0730</td><td>55</td><td>75</td></tr>
<tr><td>0730 – 1800</td><td>70</td><td>85</td></tr>
<tr><td>1800 – 2000</td><td>65</td><td>80</td></tr>
<tr><td>2000 - 0630</td><td>45</td><td>75</td></tr>
<tr><td rowspan="4">Saturdays</td><td>0630 – 0730</td><td>45</td><td>75</td></tr>
<tr><td>0730 – 1800</td><td>70</td><td>85</td></tr>
<tr><td>1800 – 2000</td><td>45</td><td>75</td></tr>
<tr><td>2000 - 0630</td><td>45</td><td>75</td></tr>
<tr><td rowspan="4">Sundays and public holidays</td><td>0630 – 0730</td><td>45</td><td>75</td></tr>
<tr><td>0730 – 1800</td><td>55</td><td>85</td></tr>
<tr><td>1800 – 2000</td><td>45</td><td>75</td></tr>
<tr><td>2000 - 0630</td><td>45</td><td>75</td></tr>
</table>
</td><td>4.1</td></tr>
</table>

	Table 6 Construction Noise Criteria - Commercial and Industrial Receivers **Time period** / **Maximum noise level L_{Aeq} dB > 20** 07:30 – 18:00 / 70 18:00 – 07:30 / 75	
38	Where compliance with the noise standards set out in Conditions 44 above is not practicable, and unless provided for in the Construction Noise Vibration Management Plan (CNVMP) as required by Condition 44, then the methodology in Condition 51 shall apply.	6.3
39	The noise from construction activity shall not exceed the following noise limits when measured and assessed at least at any point 6m from the interior wall of The Warehouse-Pakuranga indoor retail area closest to the Reeves Road Flyover a) 65dB LAeq between 6.30am and 8.00am; b) 60dB LAeq between 8.00am and 9.00pm; c) 65dB LAeq between 9.00pm and 12.30am the following d) No noise limit between 12.30am and 6.30am.	4.3
40	Construction noise levels measured within The Warehouse Pakuranga during piling activities within Reeves Road shall not exceed the equivalent of the following internal noise levels within the retail area at least 6m from the interior wall closest to the Reeves Road Flyover: a) 65dB LAeq between 6.30am and 8.00am; b) 63dB LAeq between 8.00am and 9.00pm for the duration of the piling activities associated with construction of Pile 9, Pile 10 and Pile 11 (as shown in the indicative piling plan below); c) 65dB LAeq between 9.00pm and 12.30am the following day; and d) No noise limit between 12.30am and 6.30am.	4.3
41	The Warehouse Pakuranga noise limits in Conditions 39 and 40 shall not be subject to change via the CNVMP or a Schedule unless the Requiring Authority provides written approval from The Warehouse Limited to Auckland Council.	4.3
42	If the noise levels specified in Conditions 39 and 40 cannot be achieved and remedied in accordance with Condition 55, all construction activities in the vicinity of The Warehouse Pakuranga must cease and measures must be implemented to meet the required noise levels. This work shall be fully funded by the Requiring Authority and completed before construction work recommences.	4.3
43	Construction vibration shall be measured in accordance with German Standard DIN 4150-3:1999 “Structural Vibration Part 3: Effects of vibration on structures”, and shall comply with the vibration standards set out in Table 7 as far as practicable:	4.2

<table>
<tr><td></td><td>

Table 7 Construction Vibration Criteria (with the exception of The Warehouse Pakuranga)

<table>
<tr><th>Vibration Level</th><th>Time</th><th>Category A</th><th>Category B</th></tr>
<tr><td rowspan="2">Occupied activities sensitive to noise</td><td>Night-time 2000h – 0700h</td><td>0.3mm/s ppv</td><td>2mm/s ppv</td></tr>
<tr><td>Daytime 0700h – 2000h</td><td>2mm/s ppv</td><td>5mm/s ppv</td></tr>
<tr><td>Other occupied buildings</td><td>All other times</td><td>2mm/s ppv</td><td>5mm/s ppv</td></tr>
<tr><td>All other buildings</td><td>Daytime 0630h – 2000h</td><td colspan="2">Tables 1 and 3 of DIN4150-3:1999</td></tr>
</table>

Activities sensitive to noise are defined in Chapter J of the AUP(OP).

</td><td></td></tr>
<tr><td>44</td><td>The Category A criteria may be exceeded, if the works generating vibration take place for three days or less between the hours of 7am to 6pm, provided that the Category B criteria are complied with, and:
a) All occupied buildings within 50m of the extent of the works generating vibration are advised in writing no less than three days prior to the vibration-generating works commencing; and
b) The written advice must include details of the location of the works, the duration of the works, a phone number for complaints and the name of the site manager.</td><td>4.2</td></tr>
<tr><td>45</td><td>Except for The Warehouse Pakuranga, where compliance with the vibration standards set out in Table 7 above is not practicable then the methodology in Condition 51 (Schedule) must apply.</td><td>4.2</td></tr>
<tr><td>46</td><td>The Requiring Authority must ensure that vibration levels at The Warehouse Pakuranga do not exceed the Category B levels listed in Condition 48.</td><td>0</td></tr>
<tr><td>47</td><td>Vibratory or impact/hammer piling shall not be utilised for the foundations for the Reeves Road Flyover. This prohibition does not apply to the use of vibration for sinking or extracting casings.</td><td>Covered in CEMP</td></tr>
<tr><td>48</td><td>Piling works shall not be undertaken within Reeves Road between the 1 November and the 5 January the following year unless otherwise allowed for in the SSCMP for The Warehouse Group.

Advice Note: By way of clarification, it is anticipated that if piling works starts on the 8th of January 2024 piling works should be completed by November 2024. However, the allowance for other time periods in the SSCMP is desired in case the piling works programme is delayed for such matters as mechanical failure, prolonged adverse weather and pandemics</td><td>Covered in CEMP</td></tr>
</table>

49	The Requiring Authority must submit a Construction Noise and Vibration Management Plan (CNVMP) for certification in accordance with Condition 8. The a) objectives of the CNVMP are to: Identify and implement the Best Practicable Option (BPO) for the management of all construction noise and vibration effects; b) Define the procedures to be followed where the noise and vibration standards (Conditions 37 and 43) are not met (following the implementation of the BPO); c) Set out the methods for scheduling works to minimise disruption; and d) Ensure engagement with affected receivers and timely management of complaints	This CNVMP and 2.1
50	The CNVMP must be prepared in accordance with Annex E2 of (NZS6803:1999) and shall as a minimum, address the following: a) Description of the works, machinery and equipment to be used; b) Hours of works, including a specific section on works at night (2230h - 0700h), incorporating clear definitions of the works undertaken at night (if any); c) The construction noise and vibration standards; d) Identification of receivers where noise and vibration standards apply; e) Management and mitigation options, and identification of the Best Practicable Option; f) Methods and frequency for regular construction noise and vibration monitoring and reporting of all monitoring results and outcomes; g) Procedures for communication as set out in the CCP with nearby residents and stakeholders, including: i. Notification of proposed construction activities, ii. The period of construction activities; and iii. Management of noise and vibration complaints. h) Contact details for the Communication and Consultation Manager; i) Procedures for the regular training of the operators of construction equipment to minimise noise and vibration as well as expected construction site behaviours for all workers; j) Identification of areas where compliance with the noise (Condition 43) and/or vibration standards (Condition 46- Category A or Category B) will not be practicable. k) Procedures for:	2.5 2.3, 2.3.1 4 6 7 9 8 2.2 7.1

	i. Communicating with affected receivers in accordance with the CCP, where measured or predicted noise or vibration from construction activities exceeds the noise criteria of Condition 44 or the vibration criteria of Condition 48; and ii. Assessing, mitigating and monitoring vibration where measured or predicted vibration from construction activities exceeds the Category B vibration criteria of Condition 48, including the requirement to undertake building consent surveys before and after works to determine whether any damage has occurred as a result of construction vibration; and iii. Requirements for review and update of the CNVMP.	6 8 8 2.4
51	A Schedule to the CNVMP (Schedule) must be prepared in consultation with the owners and occupiers of sites subject to the Schedule, when: a) Construction noise is either predicted or measured to exceed the noise standards in Condition 37, except where the exceedance of the LAeq criteria is no greater than 5 decibels and does not exceed: iv. 0630 – 2000: 2 periods of up to 2 consecutive weeks in any 2 months; or v. 2000 - 0630: 1 period of up to 2 consecutive nights in any 10 days; b) Construction vibration is either predicted or measured to exceed the Category B standard set out in Condition 43 at the receivers.	6.3
52	The objective of the Schedule is to set out the BPO for the minimisation of noise and/or vibration effects of the construction activity that are specific to the receiving environment and the activities that the Schedule would authorise, beyond those general measures set out in the CNVMP. The Schedule must include but not be limited to details such as: a) Construction activity and location plan, start and finish dates; b) The owners and occupiers of the receivers that would be captured by (c) below; c) The predicted noise and/or vibration level for all receivers where the levels are predicted or measured to exceed the applicable standards in Conditions 37 and/or 43; d) The proposed site-specific noise and / or vibration mitigation measures that are proposed to be adopted;	Covered in Schedules

	e) The mitigation options that have been selected and the options that have been discounted as being impracticable; f) The consultation and outcomes with owners and/or occupiers of properties identified in the Schedule and how consultation outcomes have and have not been taken into account; and g) Location, times, and types of monitoring and procedures for ensuring that all monitoring results and outcomes are reported on and made available to the Council and receivers subject to the Schedules on their reasonable request.	
53	The Schedule must be submitted to the Council for certification at least 5 (five) working days, except in unforeseen circumstances, in advance of construction works that are covered by the Schedule and shall form part of the CNVMP.	Covered in Schedules
54	The Requiring Authority must undertake monitoring during EB2's construction of the noise and vibration levels that The Warehouse Pakuranga is exposed to. Noise monitoring could be undertaken either within The Warehouse Pakuranga itself, for direct comparison against the requirements of Condition 46 or externally within proximity of The Warehouse Pakuranga by a suitably qualified and experienced person. Should external measurements be employed, then the Requiring Authority must document the façade reduction that has been employed and provide this information in its construction noise reporting. **Advice Note:** *Given the size of The Warehouse Pakuranga several monitoring locations may be required for compliance with Condition 58*	9.4
55	If monitoring reports an exceedance of The Warehouse Pakuranga site-specific noise levels detailed in Condition 46 that was caused by construction activities , then noise generating construction activity shall stop when it is safe to do so. The reason for the exceedance shall be investigated and construction methodologies reviewed before proceeding with the related construction activity. In accordance with Condition 50f reporting of the incident must include Council and store manager for The Warehouse Pakuranga.	9.4
56	Prior to the commencement of the Reeves Road Flyover's construction, the Requiring Authority shall provide a Schedule to address potential noise and vibration effects on The Warehouse Pakuranga (10 Aylesbury Street). The Schedule shall be prepared in accordance with Condition 51 and be subject to the certification process described in Condition 53.	6.3

57	Prior to construction, a building condition survey must be undertaken of any building or structure that has been identified and assessed as potentially affected by vibration damage arising from construction vibration, and in every case where vibration exceeds the Category B criteria in Condition 43. The identification and assessment requirement must be determined by an independent and suitability qualified person appointed by the Requiring Authority, and based on the criteria below, unless the relevant industry criteria applied at the time or heightened building sensitivity or other inherent building vulnerability requires it. Factors which may be considered in determining whether a building condition survey must be undertaken include: a) Age of the building; b) Construction types; c) Foundation types; d) General building condition; e) Proximity to any excavation; f) Whether the building is earthquake prone or where there is pre-existing damage; and g) Whether any basements are present in the building.	9.6
58	Where a building condition survey is required: a) The Requiring Authority must employ an appropriately qualified person to undertake the building condition surveys and that person is required to be identified in the CEMP; b) The Requiring Authority must contact owners of those buildings and structures where a building condition survey is to be undertaken to confirm the timing and methodology for undertaking a pre-construction condition assessment; c) Should written agreement from owners and occupiers to enter property and undertake a condition assessment not be obtained within three months from first contact, then the Requiring Authority is not required to undertake these assessments; d) Prior to the building condition survey, the Requiring Authority must determine whether the building is classified as a vibration sensitive structure; e) The Requiring Authority must provide the building condition survey report to the relevant property owner within 15 working days of the survey being undertaken, and additionally it must notify and provide Council with a copy of the completed survey report within 15 working days; f) The Requiring Authority must record all contact, correspondence and communication with owners and occupiers and this record is to be available on request for the Council; and g) The Requiring Authority must undertake a visual inspection when undertaking construction activities likely to generate high levels of vibration if requested by the building owner where a pre-	9.6

	construction condition assessment has been undertaken.	
59	During construction: a) The Requiring Authority must implement procedures that will appropriately respond to the information received from any vibration monitors deployed by the acoustic specialist in accordance with the CNVMP. Where necessary this may include temporary cessation of works in close proximity to the relevant building until measures have been implemented to avoid further damage and/or compromising the structural integrity of the building; and b) Any damage to buildings and structures resulting from the works must be recorded and repaired by the Requiring Authority and costs associated with the repair will be met by the Requiring Authority. Such repairs, and/or works to repair damage, are limited to what is reasonably required to restore the general condition of the building as described in the building condition survey. Such repairs must be undertaken as soon as reasonably practicable and in consultation with the owner and occupiers of the building.	9.6
60	Following construction: a) Within three months of the commencement of operation of the Eastern Busway Project (Package EB2), the Requiring Authority must contact owners of those buildings and structures where a building condition survey was undertaken to confirm the need to undertake a post-construction condition assessment; and b) Where a post-construction building condition survey confirms that the building has deteriorated as a direct result of construction works relating to the project, the Requiring Authority must rectify the damage at its own cost. Such repairs, and/or works to repair damage, are limited to what is reasonably required to restore the general condition of the building as described in the building pre-condition survey.	9.6

EB3R Conditions

Condition Number	Condition	Reference
21	Construction noise must be measured and assessed in accordance with New Zealand Standard NZS 6803:1999 'Acoustics - Construction Noise' (NZS6803:1999) and comply with the noise standards set out in the Tables 5 and 6 as far as practicable.	4.1

Table 5 Construction Noise Criteria – Residential Receivers (Irrespective of Zoning)

Time of week	Time Period	Maximum noise level (dBA) > 20 weeks	
		L_{eq}	L_{max}
Weekdays	0630 – 0730	55	75
	0730 – 1800	70	85
	1800 – 2000	65	80
	2000 - 0630	45	75
Saturdays	0630 – 0730	45	75
	0730 – 1800	70	85
	1800 – 2000	45	75
	2000 - 0630	45	75
Sundays and public holidays	0630 – 0730	45	75
	0730 – 1800	55	85
	1800 – 2000	45	75
	2000 - 0630	45	75

Table 6 Construction Noise Criteria - Commercial and Industrial Receivers

Time period	Maximum noise level L_{Aeq} dB > 20
07:30 – 18:00	70
18:00 – 07:30	75

22	Where compliance with the noise standards set out in Condition 21 above is not practicable, then the methodology in Condition 28 must apply.	6.3

<table>
<tr>
<td>23</td>
<td>Construction vibration must be measured in accordance with German Standard DIN 4150-3:1999 “Structural Vibration Part 3: Effects of vibration on structures”, and must comply with the vibration standards set out in Table 5 as far as practicable:

Table 5 Construction Vibration Criteria
<table>
<tr><th>Vibration Level</th><th>Time</th><th>Category A</th><th>Category B</th></tr>
<tr><td rowspan="2">Occupied activities sensitive to noise</td><td>Night-time 2000h – 0700h</td><td>0.3mm/s ppv</td><td>2mm/s ppv</td></tr>
<tr><td>Daytime 0700h – 2000h.</td><td>2mm/s ppv</td><td>5mm/s ppv</td></tr>
<tr><td>Other occupied buildings</td><td>All other times</td><td>2mm/s ppv</td><td>5mm/s ppv</td></tr>
<tr><td>All other buildings</td><td>Daytime 0630h – 2000h</td><td colspan="2">Tables 1 and 3 of DIN4150-3:1999</td></tr>
</table>
</td>
<td>4.2</td>
</tr>
<tr>
<td>24</td>
<td>The Category A criteria may be exceeded if the works generating vibration take place for 3 (three) days or less between the hours of 7am to 6pm, provided that the Category B criteria are complied with, and:

a) All occupied buildings within 50m of the extent of the works generating vibration are advised in writing no less than three days prior to the vibration-generating works commencing; and
b) The written advice must include details of the location of the works, the duration of the works, a phone number for complaints and the name of the site manager.</td>
<td>4.2</td>
</tr>
<tr>
<td>25</td>
<td>Where compliance with the vibration standards set out in Table 5 above is not practicable, and unless otherwise provided for in the CNVMP as required by Condition 28, then the methodology in Condition 26 shall apply.</td>
<td>6.3</td>
</tr>
<tr>
<td>26</td>
<td>The Consent Holder must implement and comply with the CNVMP listed in Condition 1, unless otherwise amended by process in Condition 13. The objective of the CNVMP is to provide a framework for the development and implementation of the Best Practicable Option (BPO) to avoid, remedy or mitigate the adverse effects on receivers of noise and vibration resulting during construction of the Eastern Busway Project (Package EB3R).

The objectives of the CNVMP are to:
a) Identify and implement the Best Practicable Option (BPO) for the management of all construction noise and vibration effects;
b) Define the procedures to be followed where the noise and vibration standards (Conditions 25 and 27) are not met (following the implementation of the BPO);
c) Set out the methods for scheduling works to minimise disruption; and
d) Ensure engagement with affected receivers and timely management of complaints.</td>
<td>This CNVMP and 2.1</td>
</tr>
</table>

27	The CNVMP must be prepared in accordance with Annex E2 of (NZS6803:1999) and must as a minimum, address the following:	
	a) Description of the works, machinery and equipment to be used;	2.5
	b) Hours of works, including a specific section on works at night (2230h - 0700h), incorporating clear definitions of the works undertaken at night (if any);	2.3, 2.3.1
	c) The construction noise and vibration standards;	4
	d) Identification of receivers where noise and vibration standards apply;	6
	e) Management and mitigation options, and identification of the Best Practicable Option;	7
	f) Methods and frequency for regular construction noise and vibration monitoring and reporting on construction noise and vibration;	9
	g) Procedures for communication as set out in the CCP with nearby residents and stakeholders, including: iv. Notification of proposed construction activities, v. The period of construction activities; and vi. Management of noise and vibration complaints.	8
	h) Contact details for the Communication and Consultation Manager;	
	i) Procedures for the regular training of the operators of construction equipment to minimise noise and vibration as well as expected construction site behaviours for all workers;	2.2
	j) Identification of areas where compliance with the noise (Condition 27) and/or vibration standards (Condition 29 Category A or Category B) will not be practicable.	7.1
	k) Procedures for: i. Communicating with affected receivers in accordance with the CCP, where measured or predicted noise or vibration from construction activities exceeds the noise criteria of Condition 27 or the vibration criteria of Condition 29; and	6
	ii. Assessing, mitigating and monitoring vibration where measured or predicted vibration from construction activities exceeds the Category B vibration criteria of Condition 29, including the requirement to undertake building consent surveys before and after works to determine whether any damage has occurred as a result of construction vibration; and	8 8 2.4
	iii. Requirements for review and update of the CNVMP.	

28	A Schedule to the CNVMP (Schedule) must be prepared in consultation with the owners and occupiers of sites subject to the Schedule, when: a) Construction noise is either predicted or measured to exceed the noise standards in Condition 21, except where the exceedance of the LAeq criteria is no greater than 5 decibels and does not exceed: i. 0630 – 2000: 2 periods of up to 2 consecutive weeks in any 2 months; or ii. 2000 - 0630: 1 period of up to 2 consecutive nights in any 10 days; b) Construction vibration is either predicted or measured to exceed the Category B standard set out in Condition 29 at the receivers. **Advice Note:** *Condition 37 does not apply to the management of construction noise for the receivers listed in Condition 40*	6.3
29	The objective of the Schedule is to set out the BPO for the minimisation of noise and/or vibration effects of the construction activity that are specific to the receiving environment and the activities that the Schedule would authorise, beyond those measures set out in the CNVMP. The Schedule must include but not be limited to details such as: a) Construction activity and location plan, start and finish dates; b) the owners and occupiers of the receivers to the construction activity that would be captured by (c) below; c) the predicted noise and/or vibration level for all receivers where the levels are predicted or measured to exceed the applicable standards in Conditions 21 and/or 23 d) the proposed site-specific noise and/or vibration mitigation measures that are proposed to be adopted; e) The mitigation options that have been selected and the options that have been discounted as being impracticable; f) the consultation and outcomes with owners and/or occupiers of properties identified in the Schedule and how consultation outcomes have and have not been taken into account; and g) location, times, and types of monitoring and procedures for ensuring that all monitoring results and outcomes are reported on and made available to the Council and receivers subject to the Schedules on their reasonable request.	Covered in Schedules
30	The Schedule must be submitted to the Council for certification at least 5 (five) working days, except in unforeseen circumstances, in advance of construction works that are covered by the Schedule and shall form part of the CNVMP. If no response is provided from the Council, prior to the planned work date, the Schedule must be deemed to be certified.	Covered in Schedules
31	Noise generated by construction works in the vicinity of 10, 1/10, 14, 14A and 14B Dolphin Street must not exceed the Project	4.1.1

	Construction Noise Standards that apply between the hours of 0700 and 2000 as set out in Condition 21 at those same properties. A CNVMP or Schedule may not authorise any infringement of the Project Construction Noise Standards that apply during these hours at these properties. **Advice Note**: *The construction noise criteria referenced in this condition may not be exceeded by way of a CNVMP or Schedule at these properties.*	
32	Prior to construction, a building condition survey must be undertaken of any building or structure that has been identified and assessed as potentially affected by vibration damage arising from construction vibration, and in every case where vibration exceeds the Category B criteria in Condition 32. The identification and assessment requirement must be determined by an independent and suitability qualified person appointed by the Consent Holder, and based on the criteria below, unless the relevant industry criteria applied at the time or heightened building sensitivity or other inherent building vulnerability requires it. Factors which may be considered in determining whether a building condition survey must be undertaken include: h) Age of the building; i) Construction types; j) Foundation types; k) General building condition; l) Proximity to any excavation; m) Whether the building is earthquake prone or where there is pre-existing damage; and n) Whether any basements are present in the building.	9.6
33	Where a building condition survey is required: a) The Consent Holder must employ an appropriately qualified person to undertake the building condition surveys and that person is required to be identified in the CEMP; b) The Consent Holder must contact owners of those buildings and structures where a building condition survey is to be undertaken to confirm the timing and methodology for undertaking a pre-construction condition assessment; c) Should written agreement from owners and occupiers to enter property and undertake a condition assessment not be obtained within three months from first contact, then the Consent Holder is not required to undertake these assessments; d) During the building condition survey, the Consent Holder must determine whether the building is classified as a vibration sensitive structure; e) The Consent Holder must provide the building condition survey report to the relevant property owner within 15 working days of the survey being undertaken, and additionally it must notify and provide Council with a copy of the completed survey report within 15 working days; f) The Consent Holder must record all contact, correspondence and communication with owners and	9.6

	occupiers and this record is to be available on request for the Council; g) The Consent Holder must undertake a visual inspection when undertaking construction activities likely to generate high levels of vibration if requested by the building owner where a pre-construction condition assessment has been undertaken; and	
34	During construction: a) The Consent Holder must implement procedures that will appropriately respond to the information received from any vibration monitors deployed by the acoustic specialist in accordance with the CNVMP. Where necessary this may include temporary cessation of works in close proximity to the relevant building until measures have been implemented to avoid further damage and/or compromising the structural integrity of the building; and b) Any damage to buildings and structures resulting from the works must be recorded and repaired by the Consent Holder and costs associated with the repair will be met by the Consent Holder. Such repairs, and/or works to repair damage, are limited to what is reasonably required to restore the general condition of the building as described in the building condition survey. Such repairs must be undertaken as soon as reasonably practicable and in consultation with the owner and occupiers of the building.	9.6
35	Following construction: a) Within three months of the commencement of operation of the Eastern Busway Project (Package EB3R), the Consent Holder must contact owners of those buildings and structures where a building condition survey was undertaken to confirm the need to undertake a post-construction condition assessment; b) Where a post-construction building condition survey confirms that the building has deteriorated as a direct result of construction works relating to the Project, the Consent Holder must rectify the damage at its own cost. Such repairs, and/or works to repair damage, are limited to what is reasonably required to restore the general condition of the building as described in the building pre-condition survey.	9.6

William Roberts Road Extension

Condition Number	Condition	Reference
6	Unless otherwise stated, all Management Plans required by the conditions of these consents must be submitted to Council for certification at least five (5) working days prior to commencement of construction works (excluding enabling works, site clearance, site investigations, relocation of services and establishment of site	For information

	entrances and temporary construction fencing). Related construction works must not commence until written approval or certification of all relevant Management Plans for those works have been received, unless otherwise approved in writing by the Council. ***Advice Note:*** *The Council will aim to acknowledge receipt of any Management Plan submitted for certification within two (2) working days. The Council will aim to confirm if any information required for certification is missing from any submitted Management Plan within three (3) working days. Where no further information is required, the Council will aim to provide certification to the Consent Holder within five (5) working days of submission of the Management Plan. If further information has been requested, the Council will aim to provide confirmation of certification to the Consent Holder within five (5) working days of the requested information being provided.*	
7	Any certified Management Plan may be amended, if necessary, to reflect any minor changes in design, construction materials, methods or management of effects to align with the conditions of consent. Any amendments must be agreed by the Council in writing prior to implementation of any changes. Re-certification is not required in accordance with Condition 6, if Council confirms in writing those amendments are within scope of the relevant conditions of consent, do not materially differ from the matters (design, construction materials, methods, or management of effects) previously certified, and any changes to the draft Management Plans are clearly identified.	For information
8	Any amendments to a certified Management Plan that do not differ materially from the matters (design, construction materials, methods, or management of effects) previously certified must be submitted to Council in accordance with Condition 6 to certify these amendments are consistent with the relevant condition(s) prior to implementation of any changes. Where a Management Plan was prepared in consultation with interested or affected parties, any material changes to that Plan must be prepared in consultation with those same parties.	For information
9	Management Plans may be submitted in parts or stages to address activities or to reflect the staged implementation of the Project. If submitted in part, Management Plans must clearly show the linkage with the Management Plans for adjacent stages and interrelated activities.	For information
16	The Consent Holder must prepare a finalised Construction Noise and Vibration Management Plan (CNVMP) for the proposed works. At least five (5) working days prior to Commencement of Construction, the Consent Holder must submit the CNVMP to the Council for certification that the CNVMP gives effect to the objectives and requirements below. Construction activity must not commence until confirmation is provided from the Council that the CNVMP satisfactorily meets the requirements and all measures identified in that plan as needing to be put in place prior to commencement of works have been addressed.	For information
	The objectives of the CNVMP are to:	
a	Identify and implement the Best Practicable Option (BPO) for the management of all construction noise and vibration effects;	This CNVMP
b	Define the procedures to be followed where the noise standards (Condition 22) are not met (following the implementation of the BPO);	6.3

<table>
<tr><td>c</td><td>Set out the methods for scheduling works to minimise disruption; and</td><td>7.10</td></tr>
<tr><td>d</td><td>Ensure engagement with affected receivers and timely management of complaints.</td><td>8</td></tr>
<tr><td></td><td>The CNVMP must include:</td><td></td></tr>
<tr><td>a</td><td>A description of the works;</td><td>1</td></tr>
<tr><td>b</td><td>Hours of operation, including a specific section on works at night (2230h - 0700h), incorporating clear definitions of the works undertaken at night (if any);</td><td>2.3</td></tr>
<tr><td>c</td><td>Contact details for staff responsible for implementation of the CNVMP;</td><td>2.2</td></tr>
<tr><td>d</td><td>The construction noise and vibration performance standards for the project;</td><td>4</td></tr>
<tr><td>e</td><td>General construction practices, management and mitigation;</td><td>7</td></tr>
<tr><td>f</td><td>Minimum separation distances from receivers for plant and machinery where compliance with the construction noise and vibration standards is achieved;</td><td>5</td></tr>
<tr><td>g</td><td>Identification of affected sensitive receivers where noise and vibration performance standards apply;</td><td>6</td></tr>
<tr><td>h</td><td>A specific section setting out the requirements for Schedules to be prepared where the noise levels from any works that cannot comply with the limits in Condition 22. The Schedules must set out the mitigation, monitoring and management measures (including communication with stakeholders and use of temporary noise barriers) that will be adopted for works which cannot comply with the project standards specified in condition 22. Schedules must be prepared in accordance with Conditions 25 and 26.</td><td>6.3</td></tr>
<tr><td>i</td><td>A communication, consultation and complaints response protocol including specific provisions for determining the times that receivers are sensitive to noise and vibration and the extent to which high noise and vibration works can be scheduled around those times where practicable.</td><td>8</td></tr>
<tr><td>22</td><td>Construction noise must be measured and assessed in accordance with the provisions of New Zealand Standard NZS 6803: 1999 "Acoustics - Construction Noise" and comply with the following Project Noise Standards unless otherwise provided for in any Schedule (refer Conditions 25 and 26):
<table>
<tr><th rowspan="2">Time of week</th><th rowspan="2">Time period</th><th colspan="2">Project Noise Standards</th></tr>
<tr><th>L_{Aeq} dB</th><th>L_{AFmax} dB</th></tr>
<tr><td colspan="4">Occupied buildings containing activities sensitive to noise</td></tr>
</table></td><td>4.1</td></tr>
</table>

	Weekdays	0630 – 0730	55	75	
		0730 – 1800	70	85	
		1800 – 2000	65	80	
		2000 – 0630	45	75	
	Saturdays	0730 – 1800	70	85	
		All other times	45	75	
	Sunday and public holidays	0630 – 0730	55	85	
		All other times	45	75	
	Occupied buildings containing all other activities				
	All days	0730 – 1800	70	-	
		1800 – 0730	75	-	

Activities sensitive to noise are defined in Chapter J of the Auckland Unitary Plan.

Advice Note:

The CNVMP required by Condition 16 and Schedules authorised by Conditions 25 and 26 may authorise noise levels exceeding those set out in this condition. The noise limits in this condition that apply between 1800 and 0730 on any day may only be exceeded by works that cannot be completed between 0730 and 1800 for practical reasons related to avoiding unreasonable traffic congestion during the day, or similar. These noise limits may not be exceeded for reasons related to shortening the construction timeframe or for making up lost time.

23	**Part 1 -** Construction vibration must comply with the vibration limits set out the following Table A. Where compliance is not achievable following the adoption of the Best Practicable Option, the process in Part 2 of Condition 23 applies. Construction vibration must be measured and assessed in accordance with DIN4150-3:1999. Table A – Construction Vibration Standards – Amenity:	4.2

	Part 2 - If measured or predicted vibration from construction activities exceeds the limits of Table A, the Consent Holder must consult with the affected receivers to: • Discuss the nature of the work and the anticipated days and hours when the exceedances are likely to occur; and • Determine whether the exceedances could be timed or managed to reduce the effects on the receiver. The Consent Holder must maintain a record of these discussions and make them available to the Council on its request.	
24	Construction vibration must comply with the vibration limits set out in E25.6.30(1)(a) of the Auckland Unitary Plan (Operative in part) (AUP(OP)) at all buildings and at all times.	4.2
25	A Schedule must be prepared when construction noise is either predicted or measured to exceed the standards in Condition 22, except where the exceedance of the standards in Condition 22 is no greater than five (5) decibels and does not exceed: • 0700-2200: one (1) period of up to two (2) consecutive weeks in any rolling 8-week period; or • 2200-0700: one (1) period of up to two (2) consecutive nights in any rolling 10-day period. The objective of the Schedule is to set out the BPO for the minimisation of noise effects of the construction activity. The Schedule must as a minimum set out:	6.3
a	Construction activity location, start and finish dates;	Covered in Schedules
b	The predicted noise level for the construction activity;	Covered in Schedules
c	The receivers affected by the works subject to the Schedule;	Covered in Schedules
d	Noise limits to be complied with for the duration of the activity;	Covered in Schedules

Receiver	**Time**	**Peak Particle Velocity Limit (mm/s)**
Occupied activities sensitive to noise *(As defined in Chapter J of the Auckland Unitary Plan)*	Night-time 2000 – 0700	0.3
	Daytime 0700 – 2000	2
Other occupied buildings	All other times	2

e	The mitigation options that have been selected and the options that have been discounted as being impracticable;	Covered in Schedules
f	The proposed noise monitoring regime; and timeframe impracticable) in advance of Construction Works which are covered by the scope of the Schedule.	Covered in Schedules
g	The consultation undertaken with owners and occupiers of sites subject to the Schedule, and how consultation outcomes have been taken into account.	Covered in Schedules
	The Schedule must be submitted to the Council for certification at least five (5) working days, (or as soon as practicable in unforeseen circumstances arise that make a five-day timeframe impracticable) in advance of Construction Works which are covered by the scope of the Schedule.	Covered in Schedules

EB3C

<table>
<tr><th>Condition Number</th><th>Condition</th><th>Reference</th></tr>
<tr><td>42</td><td>Construction noise shall be measured and assessed in accordance with New Zealand Standard NZS 6803:1999 ‘Acoustics - Construction Noise’ (NZS6803:1999). With the exception of The Warehouse Pakuranga site, construction noise must and comply with the noise standards set out in the Tables 5 and 6 as far as practicable.
Table 5 Construction Noise Criteria – Residential Receivers (Irrespective of Zoning)
<table>
<tr><th rowspan="2">Time of week</th><th rowspan="2">Time Period</th><th colspan="2">Maximum noise level (dBA) > 20 weeks</th></tr>
<tr><th>L_{eq}</th><th>L_{max}</th></tr>
<tr><td rowspan="4">Weekdays</td><td>0630 – 0730</td><td>55</td><td>75</td></tr>
<tr><td>0730 – 1800</td><td>70</td><td>85</td></tr>
<tr><td>1800 – 2000</td><td>65</td><td>80</td></tr>
<tr><td>2000 - 0630</td><td>45</td><td>75</td></tr>
<tr><td rowspan="2">Saturdays</td><td>0630 – 0730</td><td>45</td><td>75</td></tr>
<tr><td>0730 – 1800</td><td>70</td><td>85</td></tr>
</table></td><td>4.1</td></tr>
</table>

		1800 – 2000	45	75	
		2000 - 0630	45	75	
	Sundays and public holidays	0630 – 0730	45	75	
		0730 – 1800	55	85	
		1800 – 2000	45	75	
		2000 - 0630	45	75	

Table 6 Construction Noise Criteria - Commercial and Industrial Receivers

Time period	Maximum noise level L_{Aeq} dB > 20
07:30 – 18:00	70
18:00 – 07:30	75

43	Where compliance with the noise standards set out in Condition 42 is not practicable, then the methodology in Condition 49 must apply.	6.3
44	Construction vibration shall be measured in accordance with German Standard DIN 4150-3:1999 “Structural Vibration Part 3: Effects of vibration on structures”, and shall comply with the vibration standards set out in Table 7 as far as practicable:	4.2

Table 7 Construction Vibration Criteria

Vibration Level	Time	Category A	Category B
Occupied activities sensitive to noise	Night-time 2000h – 0700h	0.3mm/s ppv	2mm/s ppv
	Daytime 0700h – 2000h	2mm/s ppv	5mm/s ppv
Other occupied buildings	All other times	2mm/s ppv	5mm/s ppv
All other buildings	Daytime 0630h – 2000h	Tables 1 and 3 of DIN4150-3:1999	

Activities sensitive to noise are defined in Chapter J of the AUP(OP).

45	The Category A criteria may be exceeded, if the works generating vibration take place for three days or less between the hours of 7am to 6pm, provided that the Category B criteria are complied with, and: c) All occupied buildings within 50m of the extent of the works generating vibration are advised in writing no less than three days prior to the vibration-generating works commencing; and d) The written advice must include details of the location of the works, the duration of the works, a phone number for complaints and the name of the site manager.	4.2
46	Where compliance with the vibration standards set out in Table 7 above is not practicable, then the methodology in Condition 49 must apply.	
47	Prior to the commencement of construction, the Requiring Authority must submit a Construction Noise and Vibration Management Plan (CNVMP) for certification in accordance with Condition 6. The objectives of the CNVMP are to: a) Identify and implement the Best Practicable Option (BPO) for the management of all construction noise and vibration effects; b) Define the procedures to be followed where the noise and vibration standards (Conditions 42 and 44) are not met (following the implementation of the BPO); c) Set out the methods for scheduling works to minimise disruption; and d) Provide records of CNVMP-related consultation with residents /public /stakeholders /emergency services, including any changes to the CNVMP undertaken in response to that consultation and as detailed in the CCP (Condition 10).	This CNVMP and 2.1
48	The CNVMP must be prepared in accordance with Annex E2 of (NZS6803:1999) and must as a minimum, address the following: a) Description of the works, machinery and equipment to be used; b) Hours of works, including a specific section on works at night (2230h -0700h), incorporating clear definitions of the works undertaken at night (if any); c) The construction noise and vibration standards; d) Identification of receivers where noise and vibration standards apply; e) Management and mitigation options, and identification of the Best Practicable Option; f) Methods and frequency for regular construction noise and vibration monitoring and reporting of all monitoring results and outcomes; g) Procedures for communication as set out in the CCP with nearby businesses, residents, and stakeholders, including: i. Notification of proposed construction activities, ii. The period of construction activities; and iii. Effective management of noise and vibration complaints. h) Contact details for the person responsible for communication and consultation for the Eastern Busway Project; i) Procedures for the regular training of the operators of construction equipment to minimise noise and vibration as well as expected construction site behaviours for all workers;	2.5 2.3,2.3.1 4 6 7 9 8 2.2 7.1

	j) Identification of areas where compliance with the noise (Condition 42) and/or vibration standards (Condition 44 - Category A or Category B) will not be practicable; k) Outline specific details relating to methods for the control of vibration and airblast associated with blasting activities, which must be formulated to, as far as practicable, comply with the criteria set out in the conditions setting out blasting limits. l) Procedures for: i. Communicating with affected receivers in accordance with the CCP, where measured or predicted noise or vibration from construction activities exceeds the noise criteria of Condition 42 or the vibration criteria of Condition 44; and ii. Assessing, mitigating and monitoring vibration where measured or predicted vibration from construction activities exceeds the Category B vibration criteria of Condition 44, including the requirement to undertake building consent surveys before and after works to determine whether any damage has occurred as a result of construction vibration; and iii. Review and update of the CNVMP.	6 8 2.4
49	A Schedule to the CNVMP (Schedule) must be prepared in consultation with the owners and occupiers of sites subject to the Schedule, when: c) Construction noise is either predicted or measured to exceed the noise standards in Condition 37, except where the exceedance of the LAeq criteria is no greater than 5 decibels and does not exceed: vi. 0630 – 2000: 2 periods of up to 2 consecutive weeks in any 2 months; or vii. 2000 - 0630: 1 period of up to 2 consecutive nights in any 10 days; Construction vibration is either predicted or measured to exceed the Category B standard set out in Condition 43 at the receivers.	6.3
50	The objective of the Schedule is to set out the BPO for the minimisation of noise and/or vibration effects of the construction activity that are specific to the receiving environment and the activities that the Schedule would authorise, beyond those general measures set out in the CNVMP. The Schedule must include but not be limited to details such as: a) Construction activity and location plan, start and finish dates; b) The owners and occupiers of the receivers that would be captured by (c) below; c) The predicted noise and/or vibration level for all receivers where the levels are predicted or measured to exceed the applicable standards in Conditions 42 and/or 44; d) The proposed site-specific noise and / or vibration mitigation measures that are proposed to be adopted; e) The mitigation options that have been selected and the options that have been discounted as being impracticable;	Covered in Schedules

	f) The consultation and outcomes with owners and/or occupiers of properties identified in the Schedule and how consultation outcomes have and have not been taken into account; and Location, times, and types of monitoring and procedures for ensuring that all monitoring results and outcomes are reported on and made available to the Council and receivers subject to the Schedules on their reasonable request.	
51	The Schedule must be submitted to the Council for certification at least 5 (five) working days, except in unforeseen circumstances, in advance of construction works that are covered by the Schedule and shall form part of the CNVMP.	Covered in Schedules
52	Prior to commencement of production blasts (i.e., blasting that is undertaken as part of the construction process), trial blasts (i.e. preliminary blasts that occur prior to production blasts for the purpose of data acquisition), must be undertaken to determine how adverse effects will be managed and how compliance with Conditions 53, 54 and 55 will be achieved in production blasting. Trial blasts will determine site-specific attenuation characteristics, air overpressure levels and maximum instantaneous charge weight (MIC) thresholds. Outcomes must be documented in a Trial Blasting Report. This Trial Blasting Report must be used for subsequent design of production blasting.	4.4
53	Air overpressure from all blast events must not exceed 120 dB LZpeak at the facade of any occupied building measured and assessed in accordance with the provisions of the Australian Standard AS 2187.2-2006 Explosives – Storage and use – Use of explosives.	4.4
54	Air overpressure from blast events must not exceed 133 dB LZpeak at the facade of any unoccupied building measured and assessed in accordance with the provisions of Australian Standard AS 2187.2-2006 Explosives – Storage and use – Use of explosives.	4.4
55	Unless a Schedule is approved under Condition 49 which sets out mitigation and management measures for blasting at specific buildings, including alternative blasting vibration standards at those buildings, vibration from all blasting activities must not exceed the limits set out in “German Industrial Standard DIN 4150-3:1999 Structural vibration – Part 3 Effects of vibration on structures” when measured in accordance with that Standard on any structure not on the same site as where blasting is occurring.	4.4
56	For the purposes of Conditions 53 and 54, a building is deemed to be occupied if there are persons inside only during the blast event (i.e., if the occupants of a dwelling are not inside the dwelling during the blast event then the dwelling is deemed to be unoccupied).	4.4
57	Blasts must be performed at set times during the daytime only, between 9am and 5pm, Monday to Saturday only. The set times for blasting must be set out in the CNVMP as per Condition 48.	4.4
58	Vibration and air overpressure level predictions must be performed prior to every blast event. If exceedances of the criteria set out in Condition 55 are predicted, then the blasting methodology must be adjusted prior to the blast to ensure the criteria will be complied with. Blasting must not be carried out where overpressure levels are predicted to be above the Project Standards in Conditions 50 and 51 at any building. Blasting must not be carried out where vibration levels are predicted to be above the project standards in Condition 55 at any building.	4.4

59	Prior to construction, a building condition survey must be undertaken of the Chinatown Building (262 Ti Rakau Drive) and any other buildings or structure that has been identified and assessed as potentially affected by vibration damage arising from construction vibration, and in every case where the daytime Category B vibration criteria outlined in Condition 44 may be exceeded. The identification and assessment requirement must be determined by an independent and suitability qualified person appointed by the Requiring Authority, and based on the criteria below, unless the relevant industry criteria applied at the time or heightened building sensitivity, or other inherent building vulnerability requires it. Factors which may be considered in determining whether a building condition survey must be undertaken include: a) Age of the building; b) Construction types; c) Foundation types; d) General building condition; e) Proximity to any excavation; f) Whether the building is earthquake prone or where there is pre-existing damage; and g) Whether any basements are present in the building.	9.6
60	Where a building condition survey is required: o) The Requiring Authority must employ an appropriately qualified person to undertake the building condition surveys and that person is required to be identified in the CEMP; p) The Requiring Authority must contact owners of those buildings and structures where a building condition survey is to be undertaken to confirm the timing and methodology for undertaking a pre-construction condition assessment; q) Should written agreement from owners and occupiers to enter property and undertake a condition assessment not be obtained within three months from first contact, then the Requiring Authority is not required to undertake these assessments; r) Prior to the building condition survey, the Requiring Authority must determine whether the building is classified as a vibration sensitive structure; s) The Requiring Authority must provide the building condition survey report to the relevant property owner within 15 working days of the survey being undertaken, and additionally it must notify and provide Council with a copy of the completed survey report within 15 working days; t) The Requiring Authority must record all contact, correspondence and communication with owners and occupiers and this record is to be available on request for the Council; and The Requiring Authority must undertake a visual inspection when undertaking construction activities likely to generate high levels of vibration if requested by the building owner where a pre-construction condition assessment has been undertaken.	9.6

61	During construction: c) The Requiring Authority must implement procedures that will appropriately respond to the information received from any vibration monitors deployed by the acoustic specialist in accordance with the CNVMP. Where necessary this may include temporary cessation of works in close proximity to the relevant building until measures have been implemented to avoid further damage and/or compromising the structural integrity of the building; and Any damage to buildings and structures resulting from the works must be recorded and repaired by the Requiring Authority and costs associated with the repair will be met by the Requiring Authority. Such repairs, and/or works to repair damage, are limited to what is reasonably required to restore the general condition of the building as described in the building condition survey. Such repairs must be undertaken as soon as reasonably practicable and in consultation with the owner and occupiers of the building.	9.6
62	Following construction: a) Within three months of the commencement of operation of the Eastern Busway Project (Package EB3C), the Requiring Authority must contact owners of those buildings and structures where a building condition survey was undertaken to confirm the need to undertake a post-construction condition assessment; and b) Where a post-construction building condition survey confirms that the building has deteriorated as a direct result of construction works relating to the project, the Requiring Authority must rectify the damage at its own cost. Such repairs, and/or works to repair damage, are limited to what is reasonably required to restore the general condition of the building as described in the building pre-condition survey.	9.6
62a	The Requiring Authority must undertake a carpark condition survey, before construction of Taupaepae is commenced and again within 2 months of the completion of Taupaepae construction, of the temporary occupation area and adjacent carpark area within Chinatown (262 Ti Rakau Drive). The purpose of the pre-construction and post-construction carpark condition surveys is to determine whether any damage has occurred as a result of construction activities related to EB3C. Where the post-construction carpark condition survey confirms that the carpark has deteriorated as a direct result of the construction works relating to the Project, the Requiring Authority must rectify the damage at its own cost. Such repairs, and/or works to repair damage, are limited to what is reasonably required to restore the general condition of the carpark as described in the pre-construction carpark condition survey.	9.6