MARSHALL DAY Acoustics

188 BEAUMONT STREET
DRAFT CONSTRUCTION NOISE AND VIBRATION MANAGEMENT PLAN

Rp 002 20251034 | 4 February 2026

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Project: **188 BEAUMONT STREET**

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1.0 INTRODUCTION

Marshall Day Acoustics ("**MDA**") has been engaged by Westhaven Residential Limited Partnership, to prepare a Construction Noise and Vibration Management Plan ("**CNVMP**") for the proposed development at 188 Beaumont Road, Wynyard Quarter, Auckland ("**Site**") for a three-tower residential-led mixed use building ("**Project**").

This CNVMP identifies the performance standards for the Project and sets out best practicable options ("**BPO**") for noise and vibration management.

The purpose of the CNVMP is to identify and adopt the BPO for the management of construction noise and vibration to avoid, mitigate or remedy adverse effects.

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

A glossary of terminology is included in Appendix A.

2.0 PROJECT DESCRIPTION

2.1 Overview

The works involve:

- Sheet piling to construct a cut-off wall for the lift pit and core
- Reinforced bored concrete piles, socketed into East Coast Bays Formation siltstone and sandstone rock for the building foundations. This may require vibrated steel casings
- Approximately 6-8 months of piling (including establishment of piling plant, installation of approximately 150 bored piles, installation of pile caps and ground beams)
- Approximately 9-11 months of civil and podium works (including the installation of ground floor services, site level establishment, ground floor construction and construction of the shared podium)
- Approximately 20-24 months for the construction of the tower (including the construction of all three buildings).
- Standard construction methods for all other activities to construct the buildings. These include minor earthworks, concreting, compaction, building construction.
- Approximately 2.5-3 years total construction duration

Site maps showing the site, the nearest receiver (Orams Marine), and zoning are attached in Appendix B.

The works are scheduled for approximately 3 years between [month year] and [month year].

Construction hours will be 0700 – 1800 hrs, Monday to Saturday.

While Orams has provided their written approval, consultation (Section 6.2) is still recommended.

2.2 Contact Details

Contact details for the relevant personnel are listed in Table 1. The Project Manager is responsible for implementing this CNVMP.

Table 1: Contacts

Role	Name	Organisation	Phone	Email
Project Manager	TBC	TBC	TBC	TBC
Engagement	TBC	TBC	TBC	TBC
Acoustic Specialist	TBC	TBC	TBC	TBC

2.3 Conditions of Consent

This CNVMP is required to satisfy Consent Condition X – see Appendix C for the full acoustic conditions.

3.0 NOISE

3.1 Noise Performance Standards

Construction noise must be measured and assessed according to New Zealand Standard NZS 6803:1999 "*Acoustics – Construction Noise*". The noise limits apply at 1m outside the façades of buildings, and only while they are occupied.

The construction noise limits are summarised in Table 2.

Table 2: Construction noise limits for construction duration of at least 15 days

Time	Noise limit (dB)	
	Average ($L_{Aeq(30min)}$)	Maximum (L_{AFmax})
Monday to Friday 0630 – 2230	75	90
Saturday 0700 – 2300	80	90
Sunday 0900 – 0700	65	85
All other times	60	75
All other times in the *City Centre Residential Precinct* and the *Learning Precinct*	55	75

3.2 Predicted Noise Levels

Table 3 shows predicted levels for high-noise construction activities. It identifies the equipment that requires mitigation and/or management and the source-receiver distances where the risk begins. It will be kept up to date by the Acoustic Specialist when new information becomes available, e.g. through noise monitoring (Section 7.2).

Table 3: Indicative noise levels at 1m from a building façade[1]

Equipment	Sound Power	Barrier	Façade Noise Level (dB L_{Aeq})			Limit Setback (m) to achieve noise level (L_{Aeq})		
	(dB L_{wA})	(dB)	5m	25m	100m	75 dB	60 dB	55 dB
No barrier								
Vibrated casing / sheet piling	116	0	97	91	68	52	209	331
Large bored piling rig	111	0	92	86	63	33	132	209
Excavator (20T)	103	0	84	78	55	14	63	100
Vibratory roller	103	0	84	78	55	14	63	100
Mobile Crane (35T) operating	98	0	79	73	50	8	40	63
Hydraulic power pack	97	0	78	72	49	7	36	58
Generator (150kVA)	93	0	74	68	45	4	25	40
Compressor	93	0	74	68	45	4	25	40
With barrier								
Large bored piling rig	111	10	82	76	53	11	52	83
Excavator (20T)	103	10	74	68	45	4	25	40
Vibratory roller	103	10	74	68	45	4	25	40
Mobile Crane (35T) operating	98	10	69	63	40	3	14	25
Hydraulic power pack	97	10	68	62	39	2	13	22
Generator (150kVA)	93	10	64	58	35	1	8	14
Compressor	93	10	64	58	35	1	8	14

4.0 VIBRATION

4.1 Vibration Performance Standards

4.1.1 Cosmetic Building Damage

AUP rule E25.6.30 (1)(a) requires construction vibration to be measured and assessed in accordance with German Standard DIN 4150-3:2016 "*Vibrations in buildings – Part 3: Effects of vibration on structures*".

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

The short-term (transient)[2] vibration limits in Figure 1 apply at building foundations in any axis.

The long-term (continuous)[3] vibration limits in Table 4 apply at all floor levels, but levels are normally highest in horizontal axes on the top floor.

DIN 4150-3 limits are for avoiding cosmetic building damage, such as cracking in paint or plasterwork. Cosmetic building damage effects are deemed 'minor damage' in the Standard and can generally be easily repaired. The Standard states: "*Experience has shown that if these values are complied with, damage that reduces the serviceability of the building will not occur*." Much higher vibration levels (i.e. an order of magnitude higher) would be needed for potential structural damage.

Figure 1: Short-term (transient)[1] vibration at building foundations (DIN 4150-3 2016: Figure 1)

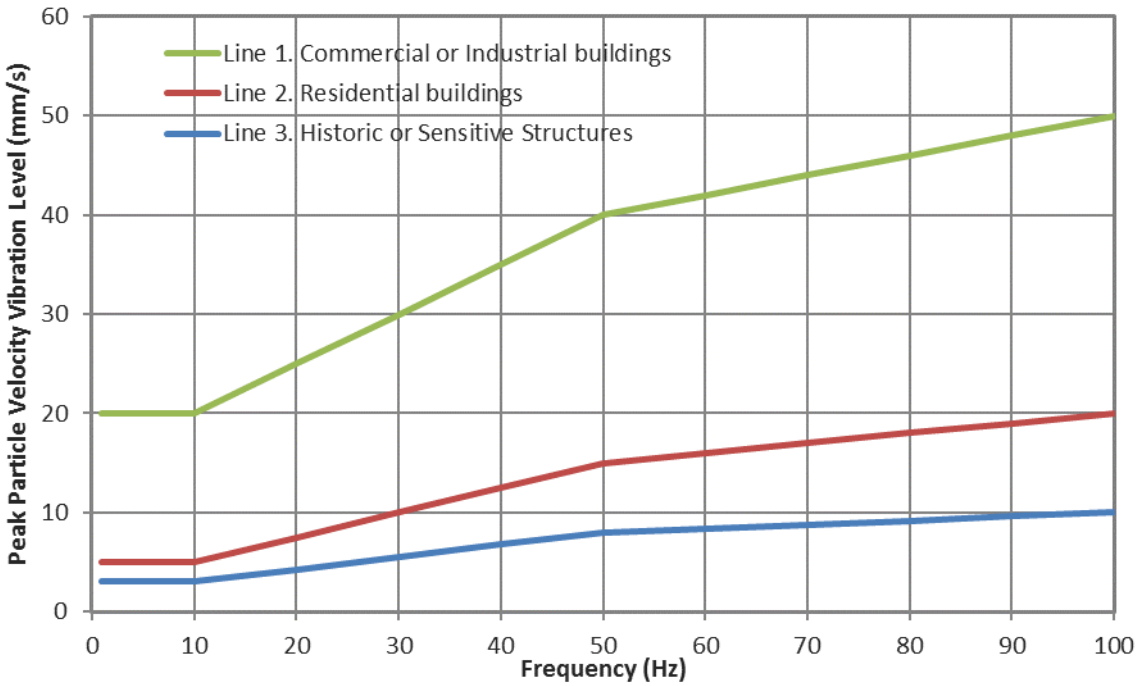

Table 4: Vibration at horizontal plane of highest floor (DIN 4150-3 2016: Tables 1 and 4)

Building Type	Peak Particle Velocity Vibration Level (mm/s)	
	Short-term (transient)[2]	Long-term (continuous)[3]
Line 1. Commercial or Industrial	40	10
Line 2. Residential	15	5
Line 3. Vibration sensitive	8	2.5

4.1.2 Amenity

AUP rule E25.6.30 (1)(b) requires construction vibration to comply with the limits in Table 5 in any axis when measured in the corner of the floor of the storey of interest for multi-storey buildings, or within 500mm of ground level at the foundation of a single storey building.

[2] Short-term (transient) vibration is "*vibration which does not occur often enough to cause structural fatigue and which does not produce resonance in the structure being evaluated*"

[3] Long-term (continuous) vibration includes types not covered by the short-term vibration definition

Table 5: Vibration amenity at horizontal plane of floor level of interest (AUP E25.6.30.1)

Receiver	Peak Particle Velocity Vibration Level (mm/s)	
	0700 – 2200	2200 – 0700
Occupied activity sensitive to noise	2	0.3
Other occupied buildings	2	2

4.2 Predicted Vibration Levels

Table 6 shows predicted levels for high-vibration construction activities. It identifies the equipment that requires mitigation and/or management, and the source-receiver distances where the risk begins.

The predictions are based on regression analysis of available vibration measurements. The amenity setbacks are based on typical levels, whereas the setbacks for cosmetic building damage are more conservative (i.e. addition of a 100% safety factor) to inform risk.

Table 6 will be kept up to date by the Acoustic Specialist when new information becomes available and through vibration monitoring (Section 7.3).

Table 6: Indicative distances to comply with vibration limits at building foundations

Equipment	Vibration setback distance (m)				
	Vibration Amenity		Building Protection[1]		
	BS 5228	AUP	Heritage	Residential	Commercial
	1 mm/s	2 mm/s	2.5 mm/s	5 mm/s	10 mm/s
Vibrated pile casing	4	1	3	1	0
Sheet piling	5	2	4	1	0
Drum roller (6 - 8t)	6	3	5	2	1
Plate compactor (450 kg)	4	2	3	2	1

[1] Includes 100% safety factor

5.0 MITIGATION AND MANAGEMENT

5.1 Training

All staff will participate in an induction training session before starting work on the demolition of the carpark and construction, with attention given to the following matters:

- Activities with the potential to generate high levels noise and/or vibration
- Mitigation and management measures (Section 5.0)
- Sensitive receivers and any agreements made through engagement (Section 6.0)
- Monitoring requirements (Section 7.0)

As the construction progresses, any updates of noise and vibration matters will be addressed during regular site meetings and/or 'toolbox' training sessions.

5.2 Equipment Selection

When selecting construction equipment:

- Use quieter construction methodologies where practicable (e.g. pulverising instead of concrete breaking)
- Use electric motors rather than diesel engines where practicable
- Use rubber tracked equipment rather than steel tracked equipment where practicable
- Use equipment that is suitably sized for the task
- Maintain equipment well to minimise rattles, squeaks etc
- Fit engines with exhaust silencers and engine covers where practicable
- Avoid tonal reversing or warning alarms (beepers). Alternatives include broadband alarms (squawkers/quackers), flashing lights, proximity sensors, reversing cameras and spotters

5.3 Scheduling

Scheduling is an important management tool, particularly where a receiver expresses concern about construction works at a certain time of day. Where necessary due to safety reasons or programme issues, high noise and vibration noisy works predicted to exceed the relevant construction noise and vibration standards of the AUP will be programmed to minimise disturbance to Orams Marine.

Scheduling should be considered as the first measure for all activities which are predicted to exceed the relevant noise and vibration limits. If scheduling is not practicable, then other measures such as noise barriers, revising methodology and temporary relocation should be considered.

5.4 General Measures

Complaints can arise even if the noise and vibration levels comply with the Project limits. To minimise complaints, the following common mitigation measures are recommended:

- Avoid unnecessary noise. This means managing the site to ensure:
  - No shouting
  - No unnecessary use of horns
  - No loud site radios
  - No rough handling of material and equipment
  - No banging or shaking excavator buckets
  - No unnecessary steel on steel contact (e.g. during the loading of scaffolding on trucks)
  - No high engine revs. This includes choosing the right sized equipment and turning engines off when idle.
- Avoid unnecessary vibration. This means managing the site to ensure:
  - No unnecessary dropping of heavy objects
  - No potholes, bumps or corrugations in site accessways
  - Excavator operators are skilled and use their machine considerately
- Mitigate track squeal from tracked equipment, such as excavators. This may include tensioning and watering or lubricating the tracks regularly
- Locate stationary equipment (e.g. generators) away from noise sensitive receivers and/or screen them behind site buildings and material stores
- Orient mobile machinery to maximise the distance between the engine exhaust and the nearest sensitive building façade (e.g. excavators)

- Utilise specific measures for the following activities:
  - Excavators (Section 5.5)
  - Piling (Section 5.6)
  - Compaction (Section 5.7)
- Engagement is complete (Section 6.0) prior to commencing high-noise and vibration activities
- Undertake monitoring (Section 7.0)

5.5 Excavators

All excavators can generate high noise and vibration levels. The actual level they generate depends very much on the experience and temperament of the operator.

- Use the right sized excavator for the job
- Operate the bucket and armature with smooth movements (avoid jerking)
- Tip material from the bucket rather than shaking it clean where practicable
- Avoid hitting the bucket on the ground or dropping heavy objects
- Control the weight shift of the excavator to avoid the tracks lifting and thudding on the ground

5.6 Piling

- Avoid evening and night-time periods and Sundays/public holidays
- Prioritise piling methods that minimise noise and vibration (e.g. augured, screw or press-in piles rather than drop-hammer, impact hammer or vibratory methods)
- For bored piling, avoid shaking the auger to remove spoil where practicable. Shaking the kelly bit connection creates very loud banging that often results in noise complaints. If spoil does not fall off the auger easily, use tools to scrape the auger clean if necessary. If shaking is required due to Health and Safety constraints, ensure bushes are well maintained to minimise steel on steel contact.

5.7 Compaction

- Avoid evening and night-time periods and Sundays/public holidays
- Match the size of plate compactor or roller to the scale of the works (i.e. large enough to undertake the works efficiently, but avoiding oversized units)
- Avoid the use of the vibratory function on rollers where practicable (e.g. roll thinner layers of fill without the vibration function to achieve the same compaction standard)
- Where the vibration function is adjustable, minimise amplitude and maximise the driving frequency to minimise vibration effects where practicable
- Minimise the duration of the vibratory function on rollers (e.g. use vibro mode to settle and align aggregate, then turn vibratory function off for subsequent static rolling compaction)
- Minimise the number of periods (e.g. complete all plate compaction or vibratory rolling in one extended period rather than two shorter periods with the same overall duration)
- Start/stop vibratory function away from buildings and pass by while the vibration level is stable
- Switch off the vibration function within the safe setback distances (Section 4.2)

6.0 ENGAGEMENT

6.1 Communication

6.1.1 Before construction

Written communication will be provided to Orams Marine at least 1 week prior starting demolition and construction. It will include:

High level details of the overall works, its timing and duration

- Contact details and names of personnel whose job is to receive complaints and enquiries (should also match a person identified in Table 1)
- Acknowledge that some activities (listed in this document) are predicted to generate high noise and/or vibration levels and may result in disturbance for short periods

6.1.2 During construction

Once construction has begun, ongoing communication with Orams Marine is important. Regular communication during the works will include:

- Public site signage that includes contact details
- Details of upcoming activities that may result in disturbance
- Any significant changes to scheduled timing and duration of activities

6.2 Consultation

Consultation is recommended with Orams Marine even though they have provided written approval because they are predicted to receive high construction noise levels.

The purpose of consultation is to address concerns about noise and vibration on a case-by-case basis. The Project Manager will address any concerns and complaints in accordance with Section 6.3. A copy of all correspondence will be made available to Council upon request.

The following will be implemented by the Project Manager (or nominated person):

- If any exceedance of the cosmetic building damage standard is measured, that vibration activity will cease as soon as safe and practicable to do so
- Review the construction methodology, mitigation measures and management strategies to ensure they represent the BPO. The BPO considers:
    - Practicability
    - Predicted noise/vibration benefits
    - The interests of affected parties
    - Implications for Project timing and duration
    - Cost
- Consultation with Orams Marine to understand their sensitivities, including times they are occupied. The objective is to establish a collaborative approach to managing adverse noise and vibration effects
- A Project representative will be contactable during work hours (Section 2.2)
- A record of consultation will be kept at the site office and be available to Orams Marine and Council if requested
- Implement any measures agreed with the affected party in good faith

- Monitor the activity to verify the extent of any adverse effects (Section 7.0)

6.3 Complaints Response

Complaints will be acknowledged immediately where practicable and responded to within one day. If a more detailed response is needed, it will be provided within a timeframe agreed with the complainant.

All construction noise and/or vibration complaints will be recorded in a complaints file that is available to affected parties and Council on request. For each complaint, an investigation will be undertaken as soon as practicable using the following steps:

- Acknowledge receipt of the concern or complaint and record:
  - The name, address and contact details of the complainant (unless they elect not to provide)
  - Time and date the complaint was received and who received it
  - Time and date of the activity that caused the complaint (estimated where not known)
  - The complainant's description of the activity and its resulting effects
  - Any relief sought by the complainant (e.g. scheduling of the activity)
- Identify the relevant activity and review the activity log to verify the complaint (or otherwise)
- If a complaint relates to building damage, inform the on-duty site manager as soon as practicable and stop the relevant works pending an investigation. In most cases, stopping the activity will provide immediate relief. But in some cases, this may not be practicable for safety or other reasons, in which case the complainant will be kept updated regularly during the time it takes to stop the activity.
- Review data from monitoring (if available) to identify the time in question and, if possible, verify exceedance
- Review the predicted noise and/or vibration levels to determine if the activity was identified. Consider attended monitoring to verify the underlying reference level assumptions
- Review the mitigation and management measures in place to ensure the BPO has been applied (Section 5.0). Review the relief sought by the complainant. Adopt further mitigation and management measures as appropriate.
- Review the potential residual effects if predicted to continue to exceed the relevant performance standards
- Report the findings and recommendations to the Project Manager, implement changes and update this CNVMP as appropriate
- Report the outcomes of the investigation to the complainant, identifying where the relief sought by the complainant has been adopted or the reason(s) otherwise.

7.0 MONITORING

7.1 Overview

This is where a suitably qualified acoustic engineer visits the site and measures levels in real time. This enables:

- Review the implementation of this CNVMP, including the mitigation and management measures in Section 5.0 and engagement in Section 6.0
- Verify the predicted levels are representative and the response protocols are appropriate for the resulting effects

- Determine compliance

7.2 Noise

Construction noise will be monitored:

- In response to a reasonable noise complaint (Section 6.3)
- At 1m from the building façade facing the construction site, or a proxy position adjusted for distance
- By a suitably qualified and experienced specialist (e.g. Member of the Acoustical Society of New Zealand) in accordance with the requirements of New Zealand Standard NZS 6803: 1999 *"Acoustics - Construction Noise"*
- For an appropriate duration, reported with the measured level (e.g. 65 dB $L_{Aeq\ (30min)}$)
- The results will be used to update Section 3.2 if appropriate

7.3 Vibration

Construction vibration will be monitored:

- In response to a reasonable vibration complaint (Section 6.3)
- On the foundations and/or the top floor of the closest building as appropriate (Section 4.1), provided access to the building has been requested and granted
- By a suitably qualified and experienced specialist (e.g. Member of the Acoustical Society of New Zealand) in accordance the requirements of German Standard DIN 4150-3:2016 "*Vibrations in buildings – Part 3: Effects of vibration on structures*"
- For a representative construction duration, measured in 2 second intervals
- The results will be used to update Section 4.2 if appropriate

8.0 CNVMP REVIEW

This CNVMP shall be reviewed and/or updated as follows:

- In the event of a material change to the construction methodology, timing, or alignment.
- Annually, to check for any minor amendments and confirm the continued integrity of the overall plan.

APPENDIX A GLOSSARY OF TERMINOLOGY

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

NZS 6803:1999	New Zealand Standard NZS 6803: 1999 "Acoustics - Construction Noise"
Vibration	When an object vibrates, it moves rapidly up and down or from side to side. The magnitude of the sensation when feeling a vibrating object is related to the vibration velocity. Vibration can occur in any direction. When vibration velocities are described, it can be either the total vibration velocity, which includes all directions, or it can be separated into vertical (up and down vibration), horizontal transverse (side to side) and horizontal longitudinal direction (front to back) components.
PPV	Peak Particle Velocity (PPV) is the measure of the vibration amplitude, zero to maximum, measured in mm/s.
BS 5228:2009	British Standard BS 5228:2009 "Code of practice for noise and vibration control on construction and open sites, Part 1: Noise, Part 2: Vibration"
DIN 4150-3:2016	German Standard DIN 4150-3:2016 "Vibrations in buildings – Part 3: Effects of vibration on structures"

APPENDIX B SITE

Figure 2: Site zoning and aerial

APPENDIX C CONDITIONS OF CONSENT