Styles Group
Acoustics & Vibration Consultants

ACOUSTIC ASSESSMENT

THE POINT RETIREMENT VILLAGE
MISSION BAY

PREPARED FOR

Ngāti Whātua Ōrākei Whai Rawa Limited and Generus Living Group Limited

DATE

21 October 2025

Assessment prepared by Styles Group for Ngāti Whātua Ōrākei Whai Rawa Limited and Generus Living Group Limited.

REVISION HISTORY

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1	21/10/25		Final	Jamie Exeter, MASNZ, Assoc. NZPI Principal Styles Group	Jon Styles, MASNZ Director and Principal Styles Group

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Executive summary

Ngāti Whātua Ōrākei Whai Rawa Limited and Generus Living Group Limited have engaged Styles Group to assess the potential noise and vibration effects associated with the construction and operation of The Point Mission Bay, a proposed comprehensive retirement village development in Orakei, Auckland.

This report has been prepared to accompany a Fast Track Resource Consent application. It includes:

- predicted noise and vibration levels
- an assessment of the worst-case noise and vibration levels against the limits set by the Auckland Unitary Plan for permitted activities
- an assessment of the potential noise and vibration effects
- proposed mitigation measures to manage noise and vibration effects
- recommended conditions of consent.

The following mitigation measures are proposed to ensure compliance with the permitted noise and vibration limits wherever practicable, and to manage noise and vibration effects where compliance cannot be achieved during construction work:

- There will be proactive communication with the neighbours before construction work begins.
- All construction work involving heavy vehicles and plant will be undertaken between 07:30 and 18:00 on Monday to Saturday.
- A final Construction Noise and Vibration Management Plan will be prepared for the project. This will set out the best practicable options for minimising construction noise and vibration effects and ensuring that the project standards are met.
- Physical mitigation such as temporary construction noise barriers, localised screening, and acoustic shrouds will be used to mitigate noise emissions.
- Restrictions on plant size and location will be adopted to minimise the effects of high-noise and vibration generating activities, including sheet piling, vibratory compaction, and concrete breaking.
- Submersible electric pumps used for dewatering will be positioned and screened to ensure they do not generate unreasonable noise levels at night.
- Mechanical plant for servicing the buildings and transformers on the site will be designed and operated to ensure that the permitted operational noise limits are complied with.

The key findings of this report are:

- Construction noise and vibration levels will comply with the permitted limits for the majority of the construction period (approximately nine years).
- Resource consent is required for temporary infringements of the permitted construction noise and vibration limits at nine neighbouring receivers.
- Noise and vibration generated by the proposed construction activity will not result in any unreasonable effects on the neighbouring sites.
- Operational noise for the village will comply with the permitted limits and will be consistent with the existing noise environment.

We have recommended conditions of consent based on our findings. We consider these to be suitable to manage the effects of construction noise and vibration, and operational noise generated by the proposal.

1.0 Introduction

Ngāti Whātua Ōrākei Whai Rawa Limited and Generus Living Group Limited have engaged Styles Group to assess the noise and vibration effects associated with the construction and operation of The Point Mission Bay, a proposed comprehensive retirement village development over several lots at the northern ends of Rukutai Street, Aotea Street, Kupe Street, and Te Arawa Street, Orakei (the **Site**).

The proposed retirement village includes the integration of the existing aged care facility in the western portion of the Site.

The purpose of this report is to:

- identify the operational and construction noise and vibration sources associated with the proposed activity and the resulting noise and vibration levels at the neighbouring sites
- identify if consent is needed for any infringements of the Auckland Unitary Plan (the **AUP**) permitted noise and vibration standards
- describe the potential noise and vibration effects of the proposal in the context of the existing noise environment
- recommend mitigation measures and propose conditions of consent based on our findings.

Our assessment is based on our site visit, information and reports prepared by the project team, and the application architectural drawings prepared by Warren & Mahoney.

Our noise level predictions have been prepared using manual calculations and DGMR iNoise computer noise modelling software based on the International Standard ISO 9613-2:2024 *Attenuation of sound during propagation outdoors*. Our calculations and assessments comply with the following Standards and guidance:

- NZS 6801:2008 *Acoustics – Measurement of environmental sound*.
- NZS 6802:2008 *Acoustics – Environmental noise*.
- NZS 6803:1999 *Acoustics – Construction noise*.
- Association of Australasian Acoustical Consultants *Guideline for Interpreting and Applying NZS 6803-1999*.

The applicant proposes to develop the retirement village in stages, with some buildings occupied by residents of the village before others are constructed. We understand that the occupation agreements for all new and existing units include clauses that constitute the occupiers' written approval to construction work on the Site. We have therefore disregarded any potential construction noise and vibration effects on the residents of the retirement village.

The author of this report, Jamie Exeter, is a Principal at Styles Group Acoustics and Vibration Consultants with over 20 years of experience in the field of acoustics. For more than 17 years, Jamie has specialised in the measurement, prediction, and assessment of environmental noise and vibration within the regulatory framework of District Plans and the Resource Management Act 1991.

Jamie holds a Diploma in Audio Engineering and is a professional Member of the Acoustical Society of New Zealand. He has significant experience with large-scale residential development projects and regularly undertakes peer review work for local authorities. Jamie is one of the three authors of the Association of Australasian Acoustical Consultants *Guideline for Interpreting and Applying NZS 6803-1999* (the New Zealand Standard for measuring and assessing construction noise).

The reviewer, Jon Styles has been the Director and Principal of Styles Group Acoustics and Vibration Consultants for over 20 years. He has twice been the President of the Acoustical Society of New Zealand and has been an elected Council Member for more than 17 years. He is also on the Board of Directors of the Australasian Association of Acoustical Consultants.

Jon has over 24 years' experience in advising on the management of noise and vibration effects, including the construction, maintenance, and operational noise effects of significant residential and commercial developments. Jon is a regular and experienced expert witness for Council, Environment Court, District Court, High Court, and Board of Inquiry hearings.

We confirm that, in our capacity as authors of this report, we have read and abide by the Environment Court's Code of Conduct for Expert Witnesses, contained in the Environment Court Practice Note 2023.

A glossary of acoustical terms used within this document is attached as Appendix A.

2.0 The proposal

The proposal includes the construction of five new buildings and the integration of the existing aged care facility building located in the western portion of the Site.

The new buildings will be 5-8 stories high and contain 256 Independent Living Units, 1-2 levels of basement parking, and indoor recreation and amenity areas including a restaurant, lounge areas, and a gym.

The proposed site layout and building forms are illustrated in Figure 1.

Figure 1: Proposed site layout

The proposed construction work comprises enabling works followed by five sequential stages of works over a period of approximately 9-10 years. The proposed construction hours for the use of heavy plant and truck movements are 07:30 to 18:00, Monday to Saturday. There will be no noisy construction work undertaken on Sundays or public holidays.

The works expected to take place during each stage are set out below:

Enabling works

- Site establishment
- Underground services and infrastructure installed.

Stage 1

- Construction of basement and podium level for Buildings 2 and 3
- Construction of Building 2
- Construction of restaurant.

Stage 2

- Construction of basement and podium for Building 3
- Construction of Building 3
- Demolition of Aotea Street Apartment blocks

- Construction of basement to Building 1 and entry pavilion
- Construction of restaurant on podium between Buildings 3 and 4.

Stage 3

- Construction of Building 1.

Stage 4

- Construction of Building 4 and basement
- Construction of remaining L2 basement
- Amenity space on podium.

Stage 5

- Construction of Building 5.

The proposed construction activities during these stages include:

- demolition of existing buildings (the two Aotea Street apartment blocks)
- hydraulic concrete breaking to remove existing foundations and palisade wall
- earthworks including basement excavation, building platform construction, and cut and fill
- sheet piling for temporary shoring along the northern boundary during Stages 2 and 4
- bored piling for temporary shoring and foundations
- drilling for retaining walls
- vibratory compaction
- concrete pumping
- up to 5 truck movements per hour during earthworks (the highest traffic generating activity during construction), predominantly via Rukutai Street.

Once the retirement village is constructed and fully operational, vehicles will access the Site via Te Arawa Street, Rukutai Street, and Aotea Street (as well as via Kupe Street for the existing care facility). There will be some parking at ground level for residents and visitors, but parking for private vehicles, deliveries, service vehicles, and waste collection will mostly be beneath the new buildings and screened from the neighbouring properties.

3.0 The site and the existing environment

The Site is predominantly in the *Residential — Terrace Housing and Apartment Buildings Zone* (**THAB**) under the AUP. A small portion of the Site is zoned *Residential – Mixed Housing Suburban Zone* (**RMHS**). Two public walkways are located within the Site. These are zoned *Special Purpose – Māori Purpose Zone* (**SPMP**) and *Open Space – Informal Recreation Zone* (**OSIR**).

The surrounding land is zoned as follows:

- The northern boundary of the Site adjoins Takaparawhau / Michael Joseph Savage Memorial Park, which is zoned OSIR.
- The southern boundary of the Site adjoins properties zoned THAB, RMHS, and *Residential – Mixed Housing Urban Zone* (**RMHU**). These neighbouring properties mostly contain residential dwellings.
- To the west of the Site, on the other side of Kupe Street, are properties zoned SPMP and THAB.

The closest neighbouring sites are identified in Table 1 and illustrated in Figure 2.

Table 1: The neighbouring properties

Reference (Figure 2)	Address	AUP Zone	Occupied by
01	215 Kupe St	THAB	Car park
02	222 Kupe St	SPMP	Early childhood education centre (owned by the joint applicant Ngāti Whātua Ōrākei)
03	230 Kupe St	SPMP	Ngāti Whātua Ōrākei offices
04	48 Te Arawa St	RMHU	Multiple-level residential dwelling
05	2/48 Te Arawa St	RMHU	Multiple-level residential dwelling
06	59 Te Arawa St	RMHS	Multiple-level residential dwelling
07	104 Rukutai St	RMHS	Multiple-level residential dwelling
08	113 Rukutai St	RMHS	Single and multiple-level residential dwellings
09	115-117 Rukutai St	RMHS	Single-level residential dwellings
10	119 Rukutai St	RMHS	Multiple-level residential dwelling
11	119B Rukutai St	RMHS	Multiple-level residential dwelling
12	86 Aotea St	RHMU	Multiple-level residential dwelling
13	97-99 Aotea St	RHMS	Multiple-level residential dwellings
14	39 Atkin Ave	RHMU	Residential dwellings (below site level)

Figure 2: The Site and surrounds (cross referenced with Table 1)

All neighbouring residential dwellings and the early childhood education centre (**ECE centre**) are *Activities Sensitive to Noise* (**ASN**) according to the definitions provided in Chapter J of the AUP.[1] The Ngāti Whātua Ōrākei offices are not an ASN.

4.0 Construction noise and vibration

This section of the report provides an assessment of the potential construction noise and vibration in accordance with the AUP standards for permitted activities.

The construction methodologies, plant, timeframes, and staging referenced in our assessment have been provided to us by the applicant and the project team.

4.1 AUP permitted construction noise limits

Standard E25.6.1(3) of the AUP requires all construction noise to be measured and assessed in accordance with NZS 6803: 1999 *Acoustics – Construction Noise*.

The permitted construction noise limits are provided in E25.6.27.

> **E25.6.27. Construction noise levels in all zones except the Business – City Centre Zone and the Business – Metropolitan Centre Zone**
>
> 1) Noise from construction activities in all zones except the Business – City Centre Zone and the Business – Metropolitan Centre Zone must not exceed the levels in Table E25.6.27.1 Construction noise levels for activities sensitive to noise in all zones except the Business – City Centre Zone and the Business – Metropolitan Centre Zone when measured 1m from the façade of any building that contains an activity sensitive to noise that is occupied during the works.

[1] ASN include *"Any dwelling, visitor accommodation, boarding house, marae, papakāinga, integrated residential development, retirement village, supported residential care, care centres, lecture theatres in tertiary education facilities, classrooms in education facilities and healthcare facilities with an overnight stay facility"*

Table E25.6.27.1 Construction noise levels for activities sensitive to noise in all zones except the Business – City Centre Zone and the Business – Metropolitan Centre Zone

Time of week	Time Period	Maximum noise level (dBA)	
		L_{eq}	L_{max}
Weekdays	6:30am – 7:30am	60	75
	7:30am – 6:00pm	75	90
	6:00pm - 8:00pm	70	85
	8:00pm - 6:30am	45	75
Saturdays	6:30am – 7:30am	45	75
	7:30am – 6:00pm	75	90
	6:00pm - 8:00pm	45	75
	8:00pm - 6:30am	45	75
Sundays and public holidays	6:30am – 7:30am	45	75
	7:30am – 6:00pm	55	85
	6:00pm - 8:00pm	45	75
	8:00pm - 6:30am	45	75

2) Noise from construction activities in all zones except the Business – City Centre Zone and the Business – Metropolitan Centre Zone must not exceed the levels in Table E25.6.27.2 Construction noise levels for noise affecting any other activity when measured 1m from the façade of any other building that is occupied during the works.

Table E25.6.27.2 Construction noise levels for noise affecting any other activity

Time Period	Maximum noise levels L_{eq} (dBA)
7:30am – 6:00pm	75
6:00pm – 7:30am	80

3) For a project involving a total duration of construction work that is less than 15 calendar days, the noise levels in Table E25.6.27.1 Construction noise levels for activities sensitive to noise in all zones except the Business – City Centre Zone and the Business – Metropolitan Centre Zone and Table E25.6.27.2 Construction noise levels for noise affecting any other activity above may be increased by 5dB in all cases.

4) For a project involving a total duration of construction work that is more than 20 weeks the noise limits in Table E25.6.27.1 Construction noise levels for activities sensitive to noise in all zones except the Business – City Centre Zone and the Business – Metropolitan Centre Zone and Table E25.6.27.2 Construction noise levels for noise affecting any other activity above may be decreased by 5dB in all cases.

The relevant AUP permitted construction noise limits between 07:30 and 18:00 on Monday to Saturday are:

- 70 dB L_{Aeq} and 85 dB L_{Amax} outside all residential dwellings and the ECE centre.
- 70 dB L_{Aeq} outside the Ngāti Whātua Ōrākei offices.

The construction noise limits only apply outside buildings that are occupied. All construction noise must be measured and assessed at 1 m from the most exposed façade of the occupied buildings in accordance with NZS 6803:1999.

4.2 AUP permitted construction vibration limits

The permitted construction vibration limits are set out in AUP standard E25.6.30, as follows:

E25.6.30. Vibration

1) Construction and demolition activities must be controlled to ensure any resulting vibration does not exceed:

   a. 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; and

   b. the limits in Table E25.6.30.1 Vibration limits in buildings 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.

Table E25.6.30.1 Vibration limits in buildings

Receiver	Period	Peak Particle Velocity Limit (mm/s)
Occupied activity sensitive to noise	Night time 10pm to 7am	0.3 mm/s
	Daytime 7am to 10pm	2 mm/s
Other occupied buildings	At all times	2 mm/s

Works generating vibration for three days or less between the hours of 7am to 6pm may exceed the limits in Table E25.6.30.1 Vibration limits in buildings above, but must comply with a limit of 5mm/s peak particle velocity 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, where:

   i. 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

ii. 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.

The limits specified in E25.6.30(1)(a) are designed to prevent cosmetic damage in buildings, while those in E25.6.30(1)(b) aim to mitigate potential effects on people inside buildings.

4.2.1 Building damage limits E25.6.30(1)(a)

The DIN 4150–3:1999 Standard referenced in E25.6.30(1)(a) recommends vibration limits for avoiding cosmetic building damage (e.g. cracked plaster) according to the design, occupancy, and sensitivity of the subject building. The classifications for this are:

- Line 1: Buildings used for commercial purposes, industrial buildings, and buildings of similar design
- Line 2: Dwellings and buildings of similar design and/or occupancy
- Line 3: Structures that, because of their particular sensitivity to vibration, cannot be classified under lines 1 and 2 and are of great intrinsic value (e.g., listed buildings under preservation order).

We have based our assessment on applying the Line 2 limits at the neighbouring residential dwellings. Line 3 applies to any receiving structure that is deemed by a suitably qualified person as being particularly sensitive to vibration and/or of great intrinsic value e.g., a heritage building. We understand there are no nearby buildings that meet the criteria for a Line 3 structure.

The guideline values provided in DIN 4150–3:1999 also depend on whether the vibration is ‘short-term’ or ‘long-term’. Short-term vibration is defined by the Standard as vibration which does not occur often enough to cause structural fatigue, and which does not produce resonance. Long-term vibration is all other types of vibration. In our experience, vibration measured in low-rise structures typically meets the short-term limits.

The DIN 4150–3:1999 frequency-dependent values for short-term vibration are illustrated in Figure 3. The dominant frequency (Hz) value will typically be less than 50 Hz when measuring ground-borne construction vibration in dwellings.

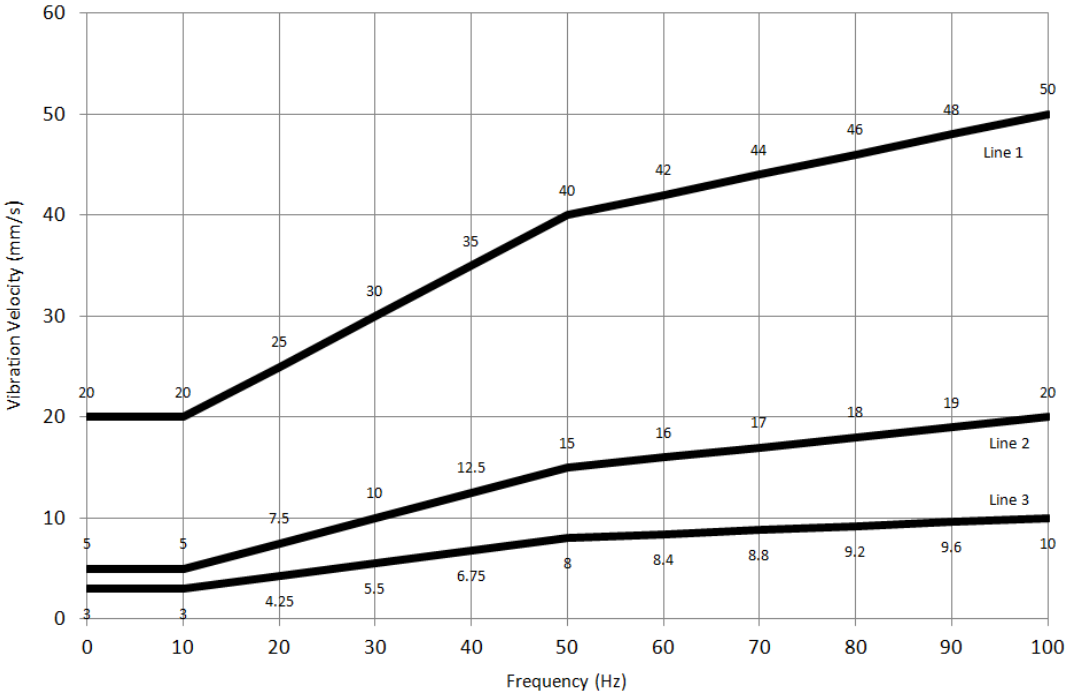

Figure 3: DIN 4150–3: 1999 guideline values for short-term vibration

4.2.2 Vibration amenity limits E25.6.30(1)(b)

The relevant permitted construction vibration amenity limit under E25.6.30(1)(b) is 2 mm/s PPV when measured within any occupied building. This is because the construction works will only take place during the daytime and vibration will be generated for more than three days.

4.3 Reference construction noise levels

We have used the reference construction noise levels displayed in Table 2 to predict worst-case construction noise levels at the neighbouring sites. These references are derived from our measurement database of modern construction equipment. They are generally consistent with data provided in NZS 6803:1999 Appendix C *Guide to Sound Level Data on Site Equipment and Site Activities*.

Table 2 also displays the minimum separation distances for each activity to comply with the AUP permitted noise limits based on the following general assumptions.

- The minimum distance stated is from the noise generating plant to the assessment position at 1 m from the most exposed façade of the building e.g. from an excavator engine to 1 m from the façade.
- The plant is being used continuously at the reference distance over a 15-minute sample period (i.e., 100% on-time).
- The distances include a +3 dB adjustment to the noise levels for reflections from the façade of the receiving building (as required by NZS 6803:1999).

- Acoustically reflective ground is assumed between the noise source and the receiver.
- The mitigated compliance distances are based on 2.4 m high construction noise barriers effectively screening the ground level of a building from the noise generating activity and reducing the noise level by 10 dB.

Table 2: Reference noise levels and minimum compliance distances

Construction activity	Unmitigated $L_{Aeq(15\ min)}$ noise level at 10 m	Unmitigated compliance distance	Mitigated compliance distance
Vibrating hammer on 20-t excavator driving sheet piles for temporary shoring	88 dB	106 m	34 m
Concrete breaking of existing slabs and palisade wall with hydraulic breaker on 20-t excavator	82 dB	54 m	17 m
Bored piling with a 20-t excavator	79 dB	38 m	12 m
Demolition of a building with a 20-t excavator	78 dB	34 m	11 m
Concrete breaking of existing slabs and palisade wall with hydraulic breaker on 20-t excavator with acoustic shroud on breaker attachment	77 dB	30 m	10 m
D6, D7, or D10 bulldozer	76 dB*	27 m	9 m
Compaction with a 15-t padfoot vibratory compaction roller	76 dB*	27 m	9 m
Drilling with a 12-t excavator for retaining walls	75 dB	24 m	8 m
Drilling at the building foundations with a CFA fixed mast drill rig 60-t	75 dB	24 m	8 m
Loader (skid steer 120HP)	75 dB	24 m	8 m
Tower crane under load	75 dB	24 m	8 m
Compaction with plate compactor	74 dB	22 m	7 m

Construction activity	Unmitigated $L_{Aeq(15\ min)}$ noise level at 10 m	Unmitigated compliance distance	Mitigated compliance distance
Compaction with 10-t twin drum vibratory roller	73 dB*	19 m	6 m
Cut and fill, clearing, and loading trucks with a 30-t excavator	72 dB	17 m	6 m
Drilling with a 6-t excavator	72 dB	17 m	6 m
50-t mobile crane under load	70 dB	14 m	5 m
Cut and fill, clearing, and loading trucks with a 20-t excavator	69 dB	12 m	4 m
Compaction with 5-t to 7-t vibratory compaction roller	69 dB*	12 m	4 m
Concrete pump and truck discharging	69 dB	12 m	4 m
Cut and fill, clearing, and loading trucks with a 10-t / 12-t excavator	67 dB	10 m	3 m
Compaction with 5-t to 7-t single drum static compaction roller	67 dB*	10 m	3 m
Compaction with 3-t vibratory compaction roller	67 dB*	10 m	3 m
Large generator	66 dB	9 m	3 m
Compaction with 3-t single drum static compaction roller	65 dB*	8 m	3 m
Use of handheld power tools	65 dB	8 m	3 m
Submersible electric pump for dewatering	55 dB – 65 dB	8 m	3 m
Tractor grader	62 dB*	6 m	2 m
Idling delivery truck, dump truck, moxy	62 dB	6 m	2 m

* Reference noise level is for a moving noise source.

4.4 Proposed construction noise and vibration mitigation measures

The proposed mitigation measures identified in this section are designed to manage the construction noise and vibration effects of the proposal on the neighbouring sites and comply with the AUP permitted construction noise limits as far as practicable.

The predicted construction noise and vibration levels in Sections 4.5 and 4.7 of this report are based on these mitigation measures being implemented. Recommended conditions of consent to require them are provided in Section 6.0 to ensure works meet the project limits.

- A final Construction Noise and Vibration Management Plan (**CNVMP**) will be prepared for the project based on the draft CNVMP attached as Appendix B.

  The objectives of the project CNVMP are to:

  i. Set out the procedures to identify and adopt the best practicable options for minimising adverse construction noise and vibration effects: and

  ii. Define the procedures to be followed to ensure that the project construction noise and vibration standards are being met.

- The occupants of all buildings within 50 m of the Site boundary will be advised of the construction works at least 10 days before earthworks begin. The advice will be provided in writing and include the following information:

  i. A general description of the construction work.

  ii. The construction hours and expected duration of the works.

  iii. The approximate dates, times, and durations of the activities that will generate the highest levels of construction noise and vibration.

  iv. A contact name and phone number for any questions or complaints regarding noise and vibration throughout the project.

- Temporary construction noise barriers will be installed on the site boundaries (excluding the boundaries of the Site that adjoin the reserve and where there are vehicle crossings). The barriers will be positioned to block the line of sight between construction activities near to the boundary and the ground level of the nearest occupied buildings.

  All barriers on the site boundaries will be at least 2.4 meters high and constructed from solid timber with a surface mass of at least 7 kg/m^2 (e.g. 12 mm plywood) or proprietary construction noise barriers (e.g. Hushtec Performance Noise Barrier[2], SFI Echo Barrier[3]).

[2] https://www.hushtecsolutions.com/nz/performance-noise-barrier

[3] https://supplyforce.co.nz/construction-noise-barrier/echo-barrier

- Sheet piling will only be considered as an option for temporary shoring along the northern boundaries of Stages 2 and 4. Secant piling will be used for all other temporary shoring. Casing will not be driven.
- Noise from hydraulic concrete breaking will be reduced by using an acoustic shroud[4] when within 55 m of any occupied dwelling. An additional 2.4 m high portable construction noise barrier will be used when breaking is within 30 m of any occupied dwelling.

  The portable construction noise barrier will be constructed from plywood sheets or proprietary construction noise barriers (e.g. Pyrotek Wavebar Noise Curtains[5]) fixed to scaffolding or temporary metal fencing. The length of the barrier will be at least five times greater than its height, or it will be bent around the noise source.
- Static rollers will be used instead of vibratory rollers for compaction within 20 m of any occupied dwelling wherever practicable. A 10-t vibratory compactor will be needed for compaction of the accessways and has been included in our calculations.
- Submersible electric pumps used for dewatering on the Site will be positioned and screened to ensure that noise levels do not exceed 40 dB L_{Aeq} at night when measured in accordance with NZS 6803:1999 at 1 m from the façade of any occupied dwelling.
- All construction work involving heavy plant or vehicles with a gross vehicle mass exceeding 3.5 t will occur between 07:30 and 18:00 on Monday to Saturday. There will be no noisy works at night or on Sundays and public holidays. Administration, meetings, and quiet internal works (e.g., electrical fit out) may occur outside of these hours.

4.5 Predicted construction noise levels

Table 3 displays the predicted worst-case construction noise levels. Predicted noise levels outside multiple-level dwellings are noted as x dB / y dB, where 'x' is the noise level at the ground floor and 'y' is the noise level at the upper façade. Predicted noise levels that exceed the AUP permitted construction noise limit of 70 dB L_{Aeq} are displayed in bold.

The predicted noise levels represent the highest 15-minute periods for construction noise, not the average construction noise levels over the day. They are based on all proposed mitigation measures being applied, such as screening and shrouds. We understand that the noisiest construction activities will not take place at the same time.

[4] A reduction of at least 5 dB can be achieved by using an acoustic shroud such as the Hushtec Rock Breaker Shroud (https://www.hushtecsolutions.com/nz/rock-breaker-shroud/)

[5] https://www.pyroteknc.com/assets/documents/WAVEBAR-NC-304-4IG.pdf

The locations of the proposed construction activities on the Site have been provided to us by the relevant experts in the project team. The highest noise levels will be generated when construction activities take place within the mitigated compliance distances (Table 2) or near to multiple-level dwellings where ground level acoustic barriers are less effective.

Any construction activities not referenced in Table 3 will comply with the AUP permitted construction noise limits because they will only take place outside of the minimum compliance distances identified in Table 2.

Table 3: Predicted worst-case construction $L_{Aeq(15\ min)}$ noise levels

Receiving site	Breaking slabs and palisade wall with shroud <55m and screening <30m	Drilling at foundations with CFA rig	Bored piling for temporary shoring	Sheet piling for temporary shoring Stages 2 and 4	Excavation with 20-t excavator	Drilling at southern boundary for retaining walls with 12-t excavator	Compacting accessways with 10-t vibe roller
222 Kupe St (02)	< 55 dB	< 55 dB	< 55 dB	58 dB	< 55 dB	< 55 dB	< 55 dB
230 Kupe St (03)	< 55 dB	< 55 dB	< 55 dB	62 dB	< 55 dB	< 55 dB	< 55 dB
48 Te Arawa St (04)	<55 dB	53 dB / 63 dB	56 dB / 60 dB	**71 dB** / **74 dB**	50 dB / 60 dB	<55 dB	62 dB / 65 dB
2/48 Te Arawa St (05)	<55 dB	51 dB / 61 dB	55 dB / 58 dB	64 dB / **71 dB**	47 dB / 57 dB	<55 dB	50 dB / 60 dB
59 Te Arawa St (06)	54 dB / 64 dB	64 dB / **74 dB**	**71 dB** / **76 dB**	65 dB / **74 dB**	66 dB / **76 dB**	70 dB / **75 dB**	67 dB / **72 dB**
104 Rukutai St (07)	58 dB / 68 dB	58 dB / 68 dB	68 dB / **76 dB**	70 dB / **75 dB**	64 dB / **74 dB**	67 dB / **72 dB**	60 dB / 65 dB
113 Rukutai St (08)	56 dB	56 dB	62 dB	65 dB	56 dB	<55 dB	60 dB
115-117 Rukutai St (09)	55 dB	56 dB	66 dB	57 dB	56 dB	<55 dB	55 dB
119 Rukutai St (10)	59 dB / 69 dB	67 dB / **77 dB**	69 dB / **79 dB**	68 dB / **75 dB**	68 dB / **78 dB**	68 dB / **73 dB**	65 dB / 70 dB
119B Rukutai St (11)	57 dB / 67 dB	65 dB / **75 dB**	67 dB / **79 dB**	62 dB / **74 dB**	66 dB / **76 dB**	69 dB / **74 dB**	70 dB / **75 dB**
86 Aotea St (12)	63 dB / **73 dB**	56 dB / 66 dB	64 dB / **77 dB**	59 dB / 68 dB	68 dB / **78 dB**	<55 dB	61 dB / 66 dB
97-99 Aotea St (13)	56 dB / 66 dB	64 dB / **74 dB**	65 dB / **76 dB**	65 dB / **73 dB**	68 dB / **78 dB**	<55 dB	66 dB / **71 dB**
39 Atkin Av (14)	54 dB	< 55 dB	57 dB	56 dB	58 dB	<55 dB	57 dB

Noise levels generated by other construction activities throughout the project will range from 55 dB to 70 dB L_{Aeq} and will comply with the AUP permitted construction noise limits. Noise levels will be variable over the day, and periods of high noise will be interspersed with quieter periods. There will also be periods when little or no noise is generated e.g. when works are occurring within the new buildings.

A summary of the construction activities that are expected to generate noise levels greater than the AUP permitted limits is shown in Table 4.

Table 4: Construction activities expected to generate noise levels greater than 70 dB L_{Aeq}

Activities expected to generate noise levels greater than 70 dB L_{Aeq}	Sites where noise levels will exceed 70 dB L_{Aeq}	Stage of works
Sheet piling	48 Te Arawa St 2/48 Te Arawa St 59 Te Arawa St 104 Rukutai St 119 and 119B Rukutai St 97-99 Aotea St	Stage 4 Stage 2 Stages 2 & 4 Stages 2 & 4 Stages 2 & 4 Stage 2
CFA drilling	59 Te Arawa St 119 and 119B Rukutai St 97-99 Aotea St	Stage 5 Stage 2 Stage 1
Bored piling	59 Te Arawa St 104 Rukutai St 119 and 119B Rukutai St 86 Aotea St 97-99 Aotea St	Stage 5 Stage 4 Stage 2 Stage 3 Stage 2
Excavation	59 Te Arawa St 104 Rukutai St 119 and 119B Rukutai St 86 Aotea St 97-99 Aotea St	Enabling works
Drilling for retaining walls	59 Te Arawa St 104 Rukutai St 119 and 119B Rukutai St	Enabling works
Vibratory compaction	59 Te Arawa St 119B Rukutai St 97-99 Aotea St	Enabling works
Concrete breaking	86 Aotea St	Stage 2

Noise levels exceeding 70 dB L_{Aeq} will occur over a short period for each receiver identified in Table 4 while the relevant activity is completed at the nearest location. Periods of high noise will be intermittent and spread across different stages of the nine-year construction project.

L_{Amax} noise levels generated by the proposed construction activities will be no greater than 15 dB above the predicted L_{Aeq} levels. Where compliance with the L_{Aeq} limit is predicted, the L_{Amax} level will be no greater than 85 dB L_{Amax} and will comply with the AUP permitted limit. The exception is concrete breaking, which can generate L_{Amax} levels up to 20 dB higher than the predicted L_{Aeq} levels.

Noise from concrete breaking is predicted to comply with the permitted L_{Aeq} limit but exceed the permitted L_{Amax} limit at 104, 119, and 119B Rukutai Street, and 97-99 Aotea Street by up to 4 dB when the nearest concrete breaking is undertaken.

At neighbouring sites where the predicted L_{Aeq} noise levels exceed the AUP permitted limit of 70 dB L_{Aeq}, the L_{Amax} noise levels will exceed the permitted limit of 85 dB L_{Amax} by the same margin.

4.6 Reasons for consent – construction noise

Our assessment confirms that certain elements of the proposed construction works will not comply with the permitted construction noise limits of 70 dB L_{Aeq} and 85 dB L_{Amax} under AUP standard E25.6.27(1).

The following temporary infringements of E25.6.27(1) are proposed over short periods for each receiver over the approximate nine-year construction project:

- Noise levels above 70 dB L_{Aeq} (ranging from 71 dB to 79 dB L_{Aeq}) between 07:30 and 18:00 Monday to Saturday at 48, 2/48, and 59 Te Arawa Street, 104, 119, and 119B Rukutai Street, and 86 and 97-99 Aotea Street.
- Noise levels above 85 dB L_{Amax} (ranging from 86 dB to 94 dB L_{Amax}) between 07:30 and 18:00 Monday to Saturday at 48, 2/48, and 59 Te Arawa Street, 104, 119, and 119B Rukutai Street, and 86 and 97-99 Aotea Street.

4.7 Predicted construction vibration levels

The operation of heavy construction plant near the boundaries of a site can generate vibration that is perceptible within nearby buildings. Vibration levels above 0.3 mm/s peak particle velocity (**PPV**) within buildings can be perceptible and levels exceeding 1 mm/s PPV can cause concern if the vibration is unexpected.

The construction vibration levels received at the neighbouring sites will depend on the distance between the plant and the structure, the equipment used, the experience of the operator, the ground conditions, and the response of the receiving building.

The highest vibration levels will be generated during excavation, compaction, and sheet piling. Typical vibration levels for these activities are provided in Table 5. These reference levels are

from our measurement database and were obtained using a geophone buried in the ground. The levels measured at the foundations of the neighbouring buildings (the AUP assessment location) at the same distance are likely to be lower.

Table 5: Typical construction vibration levels

Construction activity	Distance	Typical vibration levels (PPV)
Vibratory compaction with a 10-t roller	2 – 10 m	2 – 10 mm/s
Vibratory compaction with a 3-t roller	2 – 10 m	1.5 – 5 mm/s
Compaction with a large static roller	2 – 10 m	< 2 mm/s
Cut and fill works, loading trucks, and tracking slowly with a 6-t to 20-t excavator	2 – 10 m	< 2 mm/s
Heavy vehicle or tractor pass-by	10 m	< 1 mm/s
Sheet piling	10 – 20 m	5 – 13 mm/s

Vibratory compaction with a 10-t roller is required to construct the proposed accessways along the southern boundary. During this activity, vibration is predicted to infringe the AUP permitted construction vibration amenity limit (E25.6.30(1)(b)) of 2 mm/s PPV at 59, 104, 119, and 119B Rukutai Street, and 97-99 Aotea Street. The infringements will be intermittent over a period of 2-3 days for each receiver. The vibration will not exceed a level of 5 mm/s PPV.

All other construction activities will comply with 2 mm/s PPV at any neighbouring occupied building, due to the attenuation of vibration by distance.

The AUP permitted construction vibration limits for avoiding building damage (E25.6.30(1)(a)) are the guideline vibration values of DIN 4150–3:1999. These depend on the dominant frequency of the vibration, and they are considerably higher than the vibration amenity limits (see Figure 3). Construction vibration from the proposed works will readily comply with the AUP permitted standards for avoiding building damage.

4.8 Reasons for consent – construction vibration

Our assessment confirms that the proposed works will not comply with the permitted construction vibration amenity limit of 2 mm/s PPV during the daytime under AUP standard E25.6.30(1)(b).

The following infringements of E25.6.30(1)(b) are proposed on approximately 3 days for each receiver during the nine-year construction project:

- Vibration levels of between 2 and 5 mm/s PPV within the dwellings at 59, 104, 119, and 119B Rukutai Street, and 97-99 Aotea Street.

4.9 Objectives and policies

The objectives and policies of Chapter E25 of the AUP seek to enable construction activities that cannot meet the noise standards while managing adverse effects. The relevant objectives and policies are reproduced below.

E25.2 *Objectives* includes:

> 4) Construction activities that cannot meet noise and vibration standards are enabled while controlling duration, frequency and timing to manage adverse effects.

E25.3 *Policies* includes:

> 10) Avoid remedy or mitigate the adverse effects of noise and vibration from construction, maintenance and demolition activities while having regard to:
>
> a) The sensitivity of the receiving environment; and
>
> b) The proposed duration and hours of the operation of the activity; and
>
> c) The practicability of complying with permitted noise and vibration standards.

The approach to the management of construction noise and vibration effects resulting from the proposal is discussed in Sections 4.10 and 4.11.

4.10 Matters for discretion

Table E25.4.1 of the AUP applies a Restricted Discretionary status to activities that do not comply with the permitted activity standards in Chapter E25. The relevant matters for discretion and assessment criteria are provided in standards E25.8.1 and E25.8.2.

Construction noise and vibration is predicted to infringe the permitted limits under standards E25.6.27(1) (construction noise) and E25.6.30(1)(b) (construction vibration amenity).

The relevant matters for discretion under Standard E25.8.1 include:

> (a) the effects on adjacent land uses particularly activities sensitive to noise; and
>
> (b) measures to avoid, remedy, or mitigate the effects of noise.

The assessment criteria are set out under Standard E25.8.2(1) as follows:

> (a) whether activities can be managed so that they do not generate unreasonable noise and vibration levels on adjacent land uses particularly activities sensitive to noise
>
> (b) the extent to which the noise or vibration generated by the activity:
>
> i. will occur at times when disturbance to sleep can be avoided or minimised; and
>
> ii. will be compatible with activities occurring or allowed to occur in the surrounding area; and
>
> iii. will be limited in duration, or frequency or by hours of operation; and

iv. will exceed the existing background noise and vibration levels in that environment and the reasonableness of the cumulative levels; and

v. can be carried out during daylight hours, such as road works and works on public footpaths.

(c) the extent to which the effects on amenity generated by vibration from construction activity:

i. will be mitigated by written advice of the activity to adjacent land uses prior to the activity commencing; and

ii. can be mitigated by monitoring of structures to determine risk of damage to reduce occupant concern; and

iii. can be shown to have been minimised by the appropriate assessment of alternative options; and

iv. are reasonable taking into account the level of vibration and the duration of the activity (where levels of 10mm/s peak particle velocity may be tolerated only for very brief periods).

(d) whether the measures to minimise the noise or vibration generated by the activity represent the best practicable option.

The proposed measures to meet these assessment criteria and prevent construction noise and vibration from exceeding reasonable levels are discussed further in the following section.

4.11 Potential construction noise and vibration effects

Noise emissions are predicted to comply with the AUP permitted construction noise limits for most of the project, but there will be periods when it will not be practicable to comply outside the nearest dwellings. Construction noise levels that exceed the permitted construction noise limits will occur intermittently over short periods at nine neighbouring properties.

The proposed construction noise infringements are mostly at the upper levels of the neighbouring dwellings. The highest predicted construction noise levels outside the ground floors will not be noticeably louder than a compliant level of 70 dB L_{Aeq}.

The potential effects typically associated with construction noise up to the predicted levels are displayed in Table 6. The internal noise effects are based on the windows of the receiving buildings being closed and a noise level reduction of 20 dB through the façades. This is a conservative estimate that is based on a typical reduction for older buildings with single glazing and less air-tight joinery than modern buildings. The façades of modern buildings (which includes many of the neighbouring dwellings) will often provide a reduction of at least 25 dB.

Table 6: Temporary construction noise effects

Noise level at 1 m from the façade $L_{Aeq\ (15\ min)}$	Potential effects outside the building	Potential effects inside the nearest room of the building	Frequency
<55 dB	Will range from imperceptible to noticeable.	Unlikely to be noticeable.	During internal works, when earthworks are screened by a building, or when heavy plant is not being operated.
55-65 dB	Conversations may require raised voices. Construction noise may be dominant (depending on existing ambient level).	Up to 42 dB L_{Aeq} inside. Noise may be noticeable inside the building, but it is unlikely to interfere with daily residential activities.	When there is line of sight between the dwelling and earthworks.
65-70 dB	Conversation will require raised voices. People are unlikely to spend time outside.	Up to 47 dB L_{Aeq} inside. Noise will be noticeable inside the building, but it is unlikely to interfere with daily residential activities.	When earthworks are undertaken near to a dwelling.
70-75 dB	Conversation will be difficult even with raised voices. Levels above 71 dB L_{Aeq} are not predicted at the ground level.	Up to 52 dB L_{Aeq} inside. Annoyance for some occupants. Concentration may be affected but residential activities can continue. Sound levels for television, radio, and phone conversations would need to be slightly raised.	When concrete breaking, drilling, sheet piling, bored piling, excavation, or vibratory compaction are near to a multiple level-dwelling.
75-79 dB	Not predicted outside the ground floor of any neighbouring dwellings.	Up to 56 dB L_{Aeq} inside (at upper floors only). Annoyance for some occupants. Concentration may be affected but residential activities can generally continue. Sound levels for television, radio, and phone conversations would need to be raised.	When drilling, bored piling, or excavation are nearest to a multiple level-dwelling.

The construction noise effects in Table 6 will be avoided if works near to dwellings can be scheduled through consultation to take place when the neighbours are not home (e.g. during work and school hours). If this is not possible, people may be able to find respite from the temporary noise effects by moving indoors or to a room further away from the noise source.

Vibration is predicted to infringe the AUP permitted construction vibration amenity limit of 2 mm/s PPV during vibratory compaction but not to exceed 5 mm/s PPV. This will occur intermittently over a period of 2-3 days at the nearest dwellings. During this compaction, vibration will be clearly noticeable and may cause some annoyance. However, the effects will be mitigated by the proposed consultation. The residents will know when and for how long to

expect the highest levels. Vibration from all other proposed activities is predicted to comply with 2 mm/s PPV in any occupied building. There is unlikely to be any perceptible construction vibration within the nearest dwellings once earthworks in the nearest stages have been completed.

Vibration levels will remain within the AUP permitted limits for the avoidance of building damage. In accordance with DIN 4150-3:1999, construction vibration will not give rise to cosmetic damage in any neighbouring buildings.

Unreasonable noise and vibration effects on the neighbouring sites will be avoided by adopting the following measures during the proposed construction works:

- Communication with the neighbours. The occupants of the neighbouring buildings will know when to expect the highest noise and vibration levels and will have contact details for any questions or concerns.
- The use of physical mitigation including acoustic barriers and shrouds.
- Management of construction noise and vibration effects through the provisions of a project CNVMP.
- Restrictions on the locations of high-noise and vibration generating equipment, such as sheet piling which will only be used on the northern boundaries of Stages 2 and 4.
- Heavy vehicles (greater than 3.5 t) and machinery will only be used on the Site between 07:30 and 18:00, Monday to Saturday.

We consider that these measures will mitigate the noise and vibration effects on the neighbouring sites and address the matters set out in E25.8.1(1).

The proposed works will be carried out across the large site in a staged approach. For each receiver, the highest noise levels are expected only when heavy machinery is operating in the nearest portion of the Site. For most of the nine-year construction period, noise and vibration levels will be lower and will comply with the permitted construction noise and vibration limits.

In our experience, the construction noise and vibration levels generated by the proposal will not result in any unreasonable effects on the neighbouring sites.

5.0 Operational noise

This section provides our assessment of the operational noise emissions in accordance with the relevant AUP noise standards.

5.1 Operational noise limits

The AUP permitted noise limits in residential zones are set out in standard E25.6.2. These are identical to the permitted noise limits that apply in the SPMP (to the west of the Site) under E25.6.12(1) (in respect of noise received at properties within this zone from the proposal).

Standard E25.6.2 is reproduced below:

> **Standard E25.6.2(1) - Maximum noise levels in residential zones**
>
> The noise (rating) levels and maximum noise level arising from any activity in the Residential – Large Lot Zone, Residential – Rural and Coastal Settlement Zone, Residential – Single House Zone, Residential – Mixed Housing Suburban Zone, Residential – Mixed Housing Urban Zone and the Residential – Terrace Housing and Apartment Buildings Zone measured within the boundary of an adjacent site in these residential zones must not exceed the levels in Table E25.6.2.1 Noise levels in residential zones below:

Table E25.6.2.1 Noise levels in residential zones

Time	Noise level
Monday to Saturday 7am-10pm	50dB L_{Aeq}
Sunday 9am-6pm	
All other times	40dB L_{Aeq} 75dB L_{AFmax}

There are no limits for noise emissions from residential zones into the OSIR (Takaparawhau / Michael Joseph Savage Memorial Park).

5.2 Operational noise sources

The main noise sources involved with the proposed operation of the retirement village are:

- vehicle movements associated with staff, visitors, and service vehicles
- residents and the use of recreation and amenity areas
- noise from external mechanical plant including air conditioning, car parking ventilation, power transformers, and kitchen and refrigeration plant.

This section sets out our assumptions, references and methodology for modelling the operational noise emissions.

5.2.1 Vehicle movements

We have predicted vehicle noise emissions from the Site in the peak hours based on data provided by the project team, including Flow Transportation Specialists.

Vehicle crossings are proposed at the three road frontages, with the existing vehicle crossing at Kupe Street unchanged. There will be relatively even distribution of vehicles onto Kupe Street, Aotea Street, and Rukutai Street. There will be fewer vehicle movements at the Te Arawa Street vehicle crossing because it will only be used by staff. Vehicle activity in the basement car parking areas will be screened from the neighbouring properties.

We understand the peak daytime movements for private vehicles will be approximately 20 per hour at the Rukutai Street and Aotea Street crossing, with 12 per hour at the existing Kupe Street crossing, and 4 per hour at the Te Arawa Street crossing. Peak night-time movements at these crossings (including the Sunday morning and evening periods) will be no more than one vehicle in any 15-minute period.

Our sound level references for calculating noise emissions from private vehicle movements on the Site are 68 dB L_{AE} at 2.5 m (for slow moving vehicles on a sealed surface) and 70 dB L_{Amax} at 5 m for a car door being shut. These references are derived from the results of numerous measurements undertaken by Styles Group. Our predicted vehicle noise levels are displayed in Table 7.

Table 7: Predicted vehicle noise levels

Receiving site	Daytime $L_{Aeq(15\ min)}$	Night-time $L_{Aeq(15\ min)}$
215 Kupe St (01)	35 dB	30 dB
222 Kupe St (02)	< 20 dB	< 20 dB
230 Kupe St (03)	< 20 dB	< 20 dB
48 Te Arawa St (04)	40 dB	36 dB
2/48 Te Arawa St (05)	41 dB	36 dB
59 Te Arawa St (06)	27 dB	26 dB
104 Rukutai St (07)	34 dB	33 dB
113 Rukutai St (08)	34 dB	27 dB
115-117 Rukutai St (09)	33 dB	26 dB
119 Rukutai St (10)	42 dB	35 dB
119B Rukutai St (11)	42 dB	35 dB
86 Aotea St (12)	27 dB	20 dB
97-99 Aotea St (13)	39 dB	32 dB
39 Atkin Av (14)	< 20 dB	< 20 dB

Delivery and service vehicles will use the loading areas in the basements below Building 1 and Building 2, accessed via Rukutai Street and Aotea Street. These vehicle movements will be intermittent and will only occur during the daytime period (according to AUP Table E25.6.2.1).

Waste collection is proposed to only take place twice per week on weekdays. This will only occur during the daytime period and will be outside of peak traffic hours. A 12-t compactor truck will collect waste from the basement car parks, where the activity will be screened from the neighbouring sites.

The noise levels generated by vehicle movements on the Site will comply with the permitted noise limits without requiring any specific mitigation.

5.2.2 Mechanical plant

The proposal includes external mechanical plant that is specified, designed, and located to ensure noise from mechanical services complies with the noise standards when assessed cumulatively with all other operational noise sources. This includes all air conditioning, car parking ventilation, transformers, and kitchen and refrigeration plant.

The design detail of this plant is yet to be developed. To avoid plant noise exceeding the noise standards, we have recommended a standard condition of consent to require the design and installation of all mechanical services to be overseen by a suitably qualified acoustic expert to ensure the noise generated will be at least 10 dB lower than the night-time permitted noise limits (i.e. a limit of 30 dB L_{Aeq} at any neighbouring residential property).

In our experience and based on the current layout, it will be possible for all the external components of any mechanical plant to comply with this recommended limit.

5.2.3 Activities associated with residents and visitors

The proposal has been designed to minimise noise effects on the adjacent residential receivers by locating the village's recreation and amenity areas on the northern side of the Site, where there are no residential receivers. These areas include a bowling green, a gym, a café, and a bar and restaurant. These activities are unlikely to be audible at the neighbouring residential sites and will comply with the permitted noise limits.

5.3 Operational Noise Rating Level predictions

The AUP permitted noise limits for operational noise are express as a Noise Rating Level that is derived in accordance with NZS 6802:2008. A Noise Rating Level is derived by assessing the highest representative noise levels of an activity and making any applicable adjustments for special audible characteristics and duration.

The predicted Noise Rating Levels for the operation of the village during the day and night-time periods are controlled by vehicle movements at all sites except 86 and 97-99 Aotea Street. As a conservative approach, we have assumed that mechanical plant could control the Noise Rating Levels at 86 Aotea Street and contribute to the Noise Rating Levels at 97-99 Aotea

Street. This is due to the proposed design limit of 30 dB L_{Aeq} for mechanical plant noise and the proximity of these neighbouring sites to the proposed buildings and transformers.

Noise from the Site will not have special audible characteristics. A duration adjustment will apply to the daytime Noise Rating Level in accordance with Section 6.4.6 of NZS 6802:2008. At most neighbouring sites, this will be at least -1 dB on Sundays and could be up to -5 dB on other days, depending on the distribution of vehicle movements. We have applied duration adjustments of -1 dB at all sites except for 86 and 97-99 Aotea Street, where we have applied 0 dB due to their proximity to the proposed transformers. These are conservative adjustments to assess the potential worst-case scenarios.

No duration adjustment has been applied to the Noise Rating Levels for the night-time period as this is not permitted by the Standard.

The predicted Noise Rating Levels at the nearest sites are displayed in Table 8. These are the noise levels for comparison with the AUP permitted noise limits when assessing compliance.

Table 8: Predicted worst-case Operational Noise Rating Levels

Receiving site	Daytime	Night-time	Compliance with AUP permitted noise limits
215 Kupe St (01)	34 dB	30 dB	Yes
222 Kupe St (02)	< 20 dB	< 20 dB	Yes
230 Kupe St (03)	< 20 dB	< 20 dB	Yes
48 Te Arawa St (04)	39 dB	36 dB	Yes
2/48 Te Arawa St (05)	40 dB	36 dB	Yes
59 Te Arawa St (06)	26 dB	26 dB	Yes
104 Rukutai St (07)	33 dB	33 dB	Yes
113 Rukutai St (08)	33 dB	27 dB	Yes
115-117 Rukutai St (09)	32 dB	26 dB	Yes
119 Rukutai St (10)	41 dB	35 dB	Yes
119B Rukutai St (11)	41 dB	35 dB	Yes
86 Aotea St (12)	32 dB	30 dB	Yes
97-99 Aotea St (13)	40 dB	33 dB	Yes
39 Atkin Av (14)	< 20 dB	< 20 dB	Yes

5.4 Compliance and potential operational noise effects

Our assessment confirms that noise emissions from the operation of the proposed retirement village will comply with the relevant permitted noise limits under AUP standards E25.6.2. and E25.6.12(1).

The noise sources associated with the proposed operation of the retirement village are already present in the existing environment and are common in residential areas.

We consider that the operational noise generated by the proposed activity will not result in any unreasonable effects on the neighbouring sites.

6.0 Recommended conditions

We recommend the following conditions of consent.

Construction noise limits

1. Construction works on the site must be designed and conducted to ensure that noise from the site does not exceed the Auckland Unitary Plan permitted construction noise limits, except for the construction activities and noise limits set out in the table below.

Construction activity	Assessment location	Noise limits
Concrete breaking	86 Aotea St	73 dB L_{Aeq} and 88 dB L_{Amax}
	104, 119A, 119B Rukutai St	70 dB L_{Aeq} and 90 dB L_{Amax}
	97-99 Aotea St	70 dB L_{Aeq} and 90 dB L_{Amax}
Drilling during foundation work	59 Te Arawa St	74 dB L_{Aeq} and 89 dB L_{Amax}
	119A Rukutai St	77 dB L_{Aeq} and 92 dB L_{Amax}
	119B Rukutai St	75 dB L_{Aeq} and 90 dB L_{Amax}
	97-99 Aotea St	74 dB L_{Aeq} and 89 dB L_{Amax}
Bored piling for temporary shoring	59 Te Arawa St	76 dB L_{Aeq} and 91 dB L_{Amax}
	104 Rukutai St	76 dB L_{Aeq} and 91 dB L_{Amax}
	119A Rukutai St	79 dB L_{Aeq} and 94 dB L_{Amax}
	119B Rukutai St	79 dB L_{Aeq} and 94 dB L_{Amax}
	86 Aotea St	77 dB L_{Aeq} and 92 dB L_{Amax}
	97-99 Aotea St	76 dB L_{Aeq} and 91 dB L_{Amax}
Sheet piling for temporary shoring	1/48 Te Arawa St	74 dB L_{Aeq} and 89 dB L_{Amax}
	2/48 Te Arawa St	71 dB L_{Aeq} and 86 dB L_{Amax}
	59 Te Arawa St	74 dB L_{Aeq} and 89 dB L_{Amax}
	104 Rukutai St	75 dB L_{Aeq} and 90 dB L_{Amax}
	119A Rukutai St	75 dB L_{Aeq} and 90 dB L_{Amax}
	119B Rukutai St	74 dB L_{Aeq} and 89 dB L_{Amax}
	97-99 Aotea St	73 dB L_{Aeq} and 88 dB L_{Amax}
Excavator works	59 Te Arawa St	76 dB L_{Aeq} and 91 dB L_{Amax}
	104 Rukutai St	74 dB L_{Aeq} and 89 dB L_{Amax}

Construction activity	Assessment location	Noise limits
Drilling for retaining walls	119A Rukutai St	78 dB L_{Aeq} and 93 dB L_{Amax}
	119B Rukutai St	76 dB L_{Aeq} and 91 dB L_{Amax}
	86 Aotea St	78 dB L_{Aeq} and 93 dB L_{Amax}
	97-99 Aotea St	78 dB L_{Aeq} and 93 dB L_{Amax}
	59 Te Arawa St	75 dB L_{Aeq} and 90 dB L_{Amax}
	104 Rukutai St	72 dB L_{Aeq} and 87 dB L_{Amax}
	119A Rukutai St	73 dB L_{Aeq} and 88 dB L_{Amax}
	119B Rukutai St	74 dB L_{Aeq} and 89 dB L_{Amax}
Vibratory compaction	59 Te Arawa St	72 dB L_{Aeq} and 87 dB L_{Amax}
	119B Rukutai St	75 dB L_{Aeq} and 90 dB L_{Amax}
	97-99 Aotea St	71 dB L_{Aeq} and 86 dB L_{Amax}

2. The construction noise limits stated in Condition 1 apply at 1 m from the façade of any occupied building, including the upper facades of multiple-level buildings, between 07:30 and 18:00 on Monday to Saturday.
3. All construction noise must be measured and assessed in accordance with NZS 6803:1999 *Acoustics – Construction noise*.
4. Construction noise limits do not apply at any point on the subject site. The L_{Amax} limits only apply outside buildings containing 'activities sensitive to noise' as defined by the Auckland Unitary Plan.
5. Any submersible electric pumps used for dewatering during construction must comply with a cumulative noise limit of 40 dB L_{Aeq} when measured and assessed in accordance with NZS 6803:1999 at 1 m from the nearest façade of any occupied dwelling. This noise limit applies at all times outside of 07:30 to 18:00 on Monday to Saturday.

Construction vibration limits

6. Vibration from vibratory compaction works must not exceed 5 mm/s PPV within any occupied building outside the site. Where vibration is expected to exceed 2 mm/s PPV within an occupied building outside the site, the consent holder must provide the following information in writing to the occupants:
   (a) The dates and approximate times for the highest levels of vibration.
   (b) A phone number and contact person for any questions or to advise of any sensitive times for construction vibration during the day.

The advice must be provided no less than 3 days before the works expected to exceed 2 mm/s PPV begin. The consent holder must maintain records of any consultation and provide them to Auckland Council on request.

The vibration from all other works must comply with 2 mm/s PPV within any occupied building.

***Advice note**: The vibration amenity limits do not apply at any building that is not occupied during the works. This allows higher vibration works to be scheduled when occupants are not in the building, subject to compliance with building damage criteria and compliance with the amenity limits at other nearby buildings that are occupied.*

Construction Noise and Vibration Management Plan

7. At least ten (10) working days before any construction works authorised by this consent begin, the consent holder must submit a final CNVMP to Auckland Council for written certification. The final CNVMP must be generally in accordance with the draft CNVMP prepared by Styles Group, dated October 2025.

   The objectives of the final CNVMP must be to:

   (a) Set out the procedures to identify and adopt the best practicable options for minimising adverse construction noise and vibration effects; and

   (b) Define the procedures to be followed to ensure that the project construction noise and vibration standards are being met.

   To achieve the objectives above, the final CNVMP must be prepared with reference to Annex E of NZS 6803:1999 *Acoustics – Construction Noise* and the Association of Australasian Acoustical Consultants Guideline for Interpreting and Applying NZS 6803-1999, and must include the following information:

   i. The consented construction noise and vibration limits for the project.

   ii. A general outline of the construction programme for each stage of development, including works and construction hours.

   iii. Requirements and specifications for acoustically effective barriers and localised screening required for compliance with the project limits.

   iv. Minimum setback distances for compliance.

   v. Identification of surrounding noise and/or vibration sensitive receivers.

   vi. Details of general noise and vibration mitigation measures.

   vii. Details for advising the occupiers of the neighbouring buildings of the works, including when the highest noise levels and perceptible vibration can be expected.

viii. Procedures for responding to concerns from neighbours and dealing with any complaints (including the provision of contact details for any concerns regarding noise and vibration).

ix. Procedures for noise and vibration monitoring to be undertaken during the works and for applying any corrective action measures.

x. Procedures for ensuring that all contractors and operators on site are aware of the construction noise and vibration monitoring requirements during the works, and the requirement to minimise noise and vibration effects as far as practicable on the neighbouring sites.

***Advice note**: The CNVMP may be subject to amendment through the life of the project. Any subsequent amendment of the certified CNVMP which comprises changes to the construction methodology must be tracked and the revised CNVMP submitted to the Council for certification*

Notice to occupants of neighbouring sites

8. At least ten (10) working days before any earthworks authorised by this consent begin, the consent holder must advise the occupants of all buildings within 50 m of the site boundary of the works. The advice must be provided in writing and include the following information:

(a) A general description of the construction works.

(b) The construction hours and expected duration of the works.

(c) The approximate dates, times, and durations of the activities that will generate the highest levels of construction noise and vibration.

(d) A contact name and phone number for any questions or complaints regarding noise and vibration throughout the project.

Construction Hours

9. All construction work and the movement of heavy vehicles (vehicles with a gross mass exceeding 3.5 t) must only take place on site between the hours of 07:30 and 18:00, Monday to Saturday. No construction works or heavy vehicle movements are to be undertaken on Sundays or public holidays.

Advice note: This restriction does not apply to low noise generating activities such as site set up, painting, electrical works, or landscaping, which may occur at any time.

Mechanical Plant Design

10. All mechanical plant and transformers must be designed and operated to comply with a noise limit of 30 dB $L_{Aeq(15\ min)}$ within the boundary of any residentially zoned site. Compliance with this design limit must be confirmed by a suitably qualified and experienced person at the detailed design stage of the

project. Details of the design and input of an appropriately qualified person must be provided to Auckland Council in writing if requested within 12 months of the mechanical plant being installed.

7.0 Conclusion

Styles Group has assessed the potential construction and operational noise effects of the proposed retirement village.

We have identified the noise sources associated with the proposed activity and predicted noise and vibration levels at the neighbouring sites.

Our construction noise and vibration assessment confirms that the proposed works will not comply with the permitted construction noise limits under AUP standard E25.6.27(1) or the permitted construction vibration amenity limit under AUP standard E25.6.30(1)(b).

Construction noise will infringe the permitted limits at nine sites during various activities by 1-9 dB. The infringements will occur intermittently over short periods at each of these sites.

Construction vibration will infringe the permitted amenity limits at five sites by up to 3 mm/s PPV. The infringements will occur on up to three days at each of these sites.

The construction noise and vibration effects will be minimised by using physical mitigation, such as barriers and equipment shrouds, restricting the use of heavy vehicles and machinery to standard construction hours, and undertaking all works in accordance with a comprehensive project CNVMP. In our opinion, construction noise and vibration from the proposed work will not cause unreasonable disruption to the neighbouring activities.

Our operational noise assessment confirms that noise emissions from the proposed operation of the retirement village will comply with the relevant permitted noise limits under AUP standards E25.6.2. and E25.6.12(1).

We have recommended conditions of consent based on our findings to manage the effects of construction noise and vibration and operational noise generated by the proposed activity.

We consider that noise and vibration generated by the proposed activity will not result in any unreasonable effects on the neighbouring sites.

Appendix A Glossary

Noise	A sound which serves little or no purpose for the exposed persons and is commonly described as ‘unwanted sound’. The definition of noise includes vibration under the Resource Management Act.
dB (decibel)	The basic measurement unit of sound. The logarithmic unit used to describe the ratio between the measured sound pressure level and a reference level of 20 micropascals (0 dB).
A-weighting	A frequency filter applied to the full audio range (20 Hz to 20 kHz) to approximate the response of the human ear at lower sound pressure levels.
$L_{Aeq(t)}$ (dB)	The A-weighted equivalent sound pressure level with the same energy content as the measured varying acoustic signal over a sample period (t). The preferred metric for sound levels that vary over time because it considers the total sound energy over the time period of interest.
L_{AFmax} (dB)	The maximum A-weighted sound pressure level recorded during the measurement period using a fast time-weighting response.
L_{WA} (dB)	Sound power level (L_{WA}) is the acoustical energy emitted by a sound source. It is an absolute value and is not affected by distance or the environment. The L_{WA} is used in computer noise modelling to calculate the sound pressure level (e.g. L_{Aeq}) at a given distance.
L_{AE} (dB)	The A-weighted single event noise exposure level (also known as SEL). It is used to quantify the noise generated by individual events referenced to a standard period of one second. It is the dBA noise level over one second that would produce the equivalent sound energy as the actual event.
Noise Rating Level	A noise level derived in accordance with NZS 6802:2008 for comparison with a limit.
PPV (mm/s)	Peak particle velocity is the metric commonly used for measuring construction vibration in New Zealand. It is the instantaneous maximum velocity reached by a vibrating element as it oscillates about its rest position.

Appendix B Draft CNVMP