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11 June 2025

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Mark Lile
Landmark Lile Limited

By email: mark@landmarklile.co.nz

Dear Mark,

Construction noise and vibration assessment- Maitahi Village [FTA-2502-1009]

Styles Group have assessed the construction noise and vibration effects from the construction of the Maitahi Village at 7 Ralphine Way, Maitahi Valley, Nelson (the **Site**).

Our advice responds to Item 3 of the further information request issued by the Maitahi Village Fast Track Consenting Panel:

> "*The application does not contain a specialist noise and vibration assessment in relation to construction noise effects. Rather, reliance is placed on Section 5.12 of the Assessment of Environmental Effects (AEE) on compliance with NZS 6803:1999 Acoustics – Construction Noise.*
>
> *Given the scale and length of the construction activity, and the range of noise generating activities that may occur e.g. piling, plate compacting, excavators, machinery and pumps, trucks etc, the applicant is requested to comment on how it has assessed and confirmed that the construction works will comply with NZS 6803:1999 Acoustics – Construction Noise at the nearest receivers, and what the level of effect from construction noise on sensitive receivers is expected to be.*
>
> *Further comment is sought on vibration effects from the construction activities and how this has been assessed in relation to potential effects on sensitive receivers"*

1.1 Author's statement of experience

I am and have been the Director and Principal of Styles Group Acoustics and Vibration Consultants for 20 years. I served two terms as the President and have been a Council Member of the Acoustical Society of New Zealand for 17 years and I am on the Board of Directors of the Australasian Association of Acoustical Consultants (**AAAC**).

I have over 24 years' experience in advising on the management of noise and vibration effects, including the construction, maintenance and operational noise effects of major and strategic transport infrastructure (including port, road, air and rail) and the development of provisions to improve the compatibility of residential development around such infrastructure.

I have undertaken a significant number of construction noise and vibration assessments across New Zealand. I am regularly engaged by Councils across New Zealand to review resource consents and Notices of Requirement subject to noise and vibration standards.

I am a regular and experienced expert witness for Council, Environment Court, District Court and High Court and Board of Inquiry hearings. I confirm that, in my capacity as author of this report, I have read and abide by the Environment Court of New Zealand's Code of Conduct for Expert Witnesses Practice Note 2023.

I have adopted the guidance in the AAAC *Guideline for Interpreting and Applying NZS 6803-1999 v1.0* (**AAAC Guideline**) when preparing this advice.

2.0 Construction noise and vibration standards in the NRMP

The Site has recently been rezoned by Private Plan Change 28. The Site is subject to a varied zoning pattern (Residential/ Suburban Commercial/ Open Space/ Rural) in accordance with the Structure Plan map within Schedule X.

Our review[1] of the Nelson Resource Management Plan (**NRMP**) finds that there are no permitted construction noise and vibration standards to control construction noise and vibration generated from the Site (in the Rural/ Residential/ Open Space Zones) and received in a Rural Zone (i.e. the receivers adjacent to the Site).

We have recommended Project Noise Standards based on NZS6803:1999 *Acoustics – Construction Noise* (**NZ6803**) that are commonly adopted to manage construction noise and vibration effects from long-term construction projects on noise sensitive receivers across New Zealand.

[1] The NMRP only controls construction noise[1] and vibration[1] generated from the Inner City Zone and received in a residential zone.

The application has assessed the construction noise effects in accordance with the maximum permitted noise levels prescribed by REr.43 and includes a reason for consent for construction noise levels to exceed the maximum permitted noise levels in REr.43. We understand that Rule REr.43 is designed to control noise level generated from non-residential activity in a residential zone and received at another site in a residential zone. We understand the Ralphine Way Receivers are in a Rural Zone and therefore this rule is not applicable.

Rule RU.r.47 prescribes maximum permitted noise levels from noise generated in Rural Areas and received at any site in a Residential Zone. The Ralphine Way Receivers are in a Rural Zone and therefore we understand that this rule is also not applicable.

3.0 Proposed project standards to manage construction noise and vibration effects

3.1 Construction noise

The proposal is to manage construction noise effects in accordance with Project Noise Standards that are based on the recommended noise limits in NZS6803.

NZS6803 provides guideline noise limits that are based on the duration of construction works at any one location, and the occupation of the receiving site. NZS6803 provides recommended noise limits based on the following durations of construction work:

i. Up to 14 days (short-term duration)

ii. More than 14 days but less than 20 weeks (typical duration)

iii. More than 20 weeks (long-term duration).

We understand that the earthworks phase will extend for approximately 3.5-4 years, with civil works to be undertaken in 10 stages over a total construction programme of approximately 9 years[2]. We understand it is possible that each stage could be longer than 20 weeks in duration. We have therefore assessed the proposal in accordance with NZS6803's recommended construction noise limits for a long-term duration project.

We understand that construction activity will take place between 7:30am and 6:00pm, Monday to Saturday. NZS6803 recommends that noise limits of 70 dB L_{Aeq} and 85 dB L_{AFmax} applies during this timeframe. The noise limits are measured and assessed 1m from the façade of any occupied dwelling in a rural zone.

The proposal is to comply with NZS6803's recommended construction noise limits for long-term projects at all occupied dwellings on adjacent sites. These limits are reproduced in Table 1 below[3].

Table 1 - NZS6803 recommended upper limits for construction noise received in residential zones and dwellings in rural areas

Time of Week	Time Period	Long-term duration (dBA)	
		L_{eq}	L_{max}
Weekdays	0630-0730	55	75
	0730-1800	**70**	**85**
	1800-2000	65	80
	2000-0630	45	75
Saturdays	0630-0730	45	75

[2] https://www.fasttrack.govt.nz/__data/assets/pdf_file/0015/1932/23.-Maitahi-Village-Project-Anticipated-Staging-Timeline.pdf

Time of Week	Time Period	Long-term duration (dBA)	
		L_{eq}	L_{max}
	0730-1800	**70**	**85**
	1800-2000	45	75
	2000-0630	45	75
Sundays and public holidays	0630-0730	45	75
	0730-1800	55	85
	1800-2000	45	75
	2000-0630	45	75

The noise levels from construction work are required to be assessed 1m from the façade of any occupied building[4] and typically over a 15-to-60 minute period. There is no averaging or other adjustment over the day, night or any other period. The noise limits set out in NZS6803 must be complied with for every 15-to-60 minute period during the works.

3.1.1 Proposed Project Noise Standards

We recommend that the following noise limits are applied as Project Noise Standards. These are an abbreviated form of the guideline noise limits from NZS6803. They essentially permit noisy work between 7.30am to 6pm from Monday to Saturday and a much lower noise limit at night, on Sundays and Public Holidays.

Time period	Maximum noise levels	
	$L_{Aeq(15min)}$	L_{AFmax}
7:30am- 6:00pm, Monday to Saturday	70 dB	85 dB
All other times and on Public Holidays	45 dB	75 dB

The lower noise limits applying on Sundays, Public Holidays and at night will be reasonably restrictive for works close to the Ralphine Way Receivers. However, the lower limits can be complied with for most works provided they are well removed from the Ralphine Way Receivers. It is likely that light civil works and construction of dwellings could occur when the 45 dB noise limit applies, provided the work is well separated from the Ralphine Way Receivers by distance and / or topography.

[4] The limits apply at 1 m from the façade and 1.2 to 1.5 m above the relevant floor level of any building that is occupied during the works. They do not apply at unoccupied buildings.

3.2 Construction vibration

Vibration effects generated from construction works are proposed to be managed in accordance with the limits in Tables 1 and 3 of German Standard DIN 4150-3:2016 "*Structural Vibration – Part 3: Effects of Vibration on Structures"* (the **DIN Standard**). The DIN Standard limits are designed to ensure that construction vibration avoids damage to buildings.

The DIN Standard uses a three-tiered classification system for buildings according to their susceptibility to vibration damage, as follows:

Line 1: *Buildings used for commercial purposes, industrial buildings and buildings of similar design (Line 1);*

Line 2: *Dwellings and buildings of similar design and/or occupancy (Line 2);*

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. buildings listed buildings under preservation order (Line 3).*

The DIN Standard guideline values are also determined by the frequency and the nature of the vibration (short-term or long-term). The short-term vibration limits of the DIN Standard should be applied unless measurements demonstrate that the vibration is producing resonance in the structure, or it is occurring often enough to cause structural fatigue.

The applicable limits also depend on whether the vibration is measured and assessed at the foundations of the building or at the upper level. The DIN Standard should therefore be referred to in full when being applied. A suitably qualified structural expert should be consulted if there are concerns about a building being particularly sensitive to vibration, or where the DIN Standard classification of the building or the nature of the vibration requires confirmation.

The DIN Standard frequency-dependant guideline values for short-term vibration measured at the foundations of the building are illustrated in Figure 1. Construction vibration measured in residential, commercial, and industrial buildings is typically less than 50 Hz. It occurs for a limited duration, and it does not often produce resonance in low rise structures.

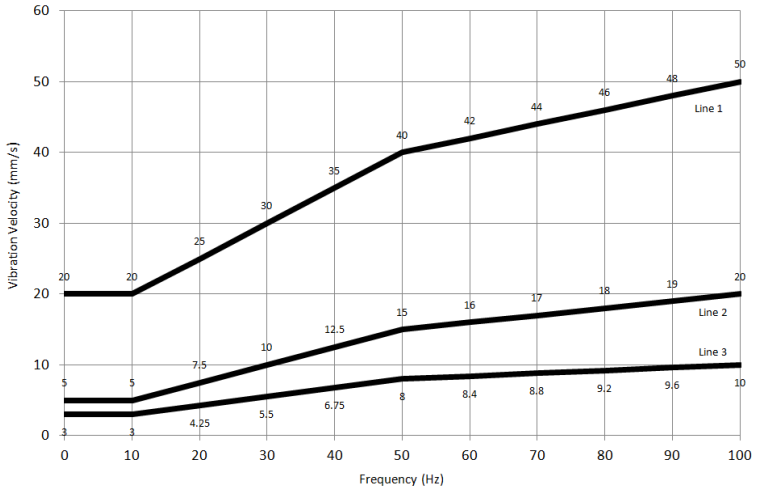

Figure 1: DIN Standard guideline values for short-term vibration

3.3 Proposed Project Vibration Standard

We recommend that a vibration limit of 5mm/s PPV measured on the foundation of any receiving building (occupied or not) is applied as the Project Vibration Standard. These are essentially the short term limits from the DIN Standard that are designed to ensure that cosmetic damage to buildings will not occur.

We consider that this limit is sufficient on its own on the basis that:

- The proposed CNVMP will ensure that the Ralphine Way Receivers will be made aware that works could be occurring close-by that might generate perceptible vibration. Forewarning the residents is an important way to mitigate the potential annoyance effects.
- The vibration generating works that that may be perceptible to neighbours is limited to works generally within 50-100m of the receivers. The vast majority of the works will be imperceptible to residents and will comply with any amenity-based control (if one was proposed) and the Project Vibration Standards by a significant margin.

4.0 The proposed construction works

The proposed construction works will involve bulk earthworks across large areas of the Site to prepare the site for future civil infrastructure (including roads) and subsequent built development. Figures 2 and 3 display the location and extent of cut and fill works across the Site, comprising total volumes of approximately 600,000m^3 (cut) and 670,000m^3 (fill).

We understand that earthworks will be undertaken using typical earthmoving equipment such as bulldozers, excavators, front end loaders, backhoes and skid steer loaders (for small scale works).

Civil works will involve levelling, filling, compaction, paving, installation of services. We understand these activities will be undertaken using typical construction plant and machinery such as bulldozers, compactors, excavators, paving machines, concrete pumps and trucks.

This assessment focusses on the potential construction noise levels associated with earthworks and civil works that will be undertaken near to occupied dwellings on Ralphine Way. The works in other parts of the Site will be separated from any existing dwellings by significant distances.

The plant and equipment used for earthworks and civil works will be the noisiest aspect of the construction phase. The noise levels from vertical construction (i.e. the construction of dwellings, units and other buildings) will generally be quieter than the noise from civil works, especially where they are separated from external boundaries by roads or open spaces.

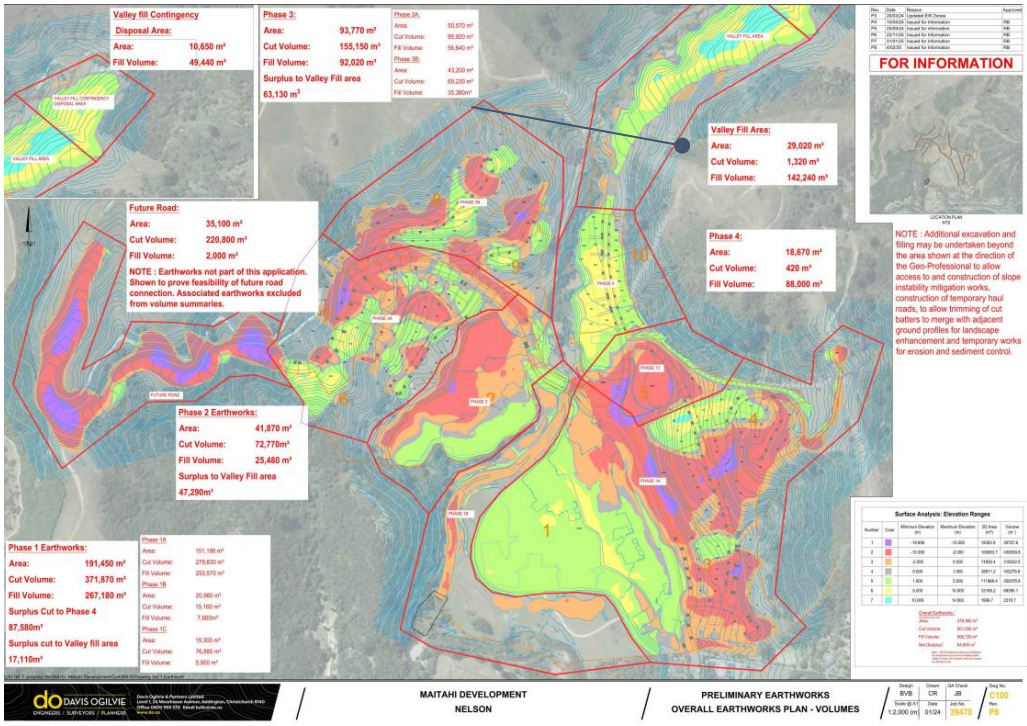

Figure 2 Preliminary Earthworks: Plan prepared by Davis Ogilvie Drawing No: C111/P5

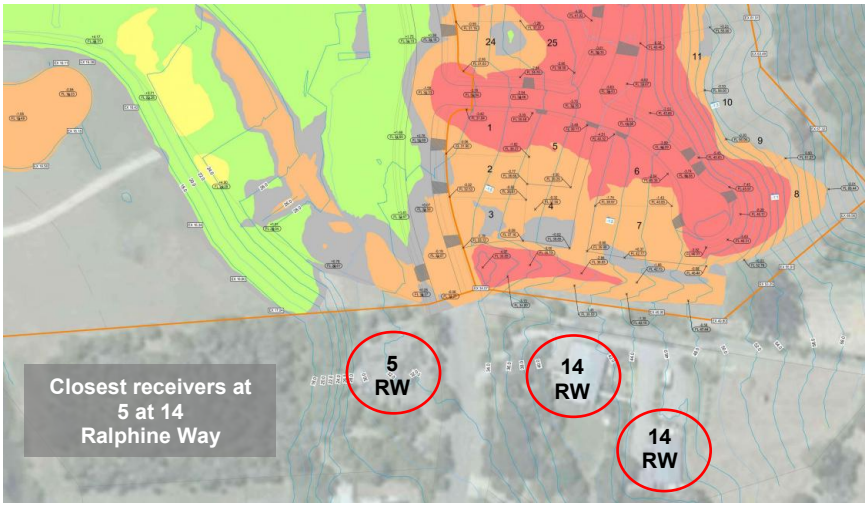

Figure 3 Earthworks near to occupied dwellings on Ralphine Way

Sheet 11/15 prepared Davis Ogilvie Drawing No: C111/P5

5.0 Receivers adjacent to the Site

This assessment is focussed on the potential construction noise and vibration effects on the occupants of dwellings in Ralphine Way (the **Ralphine Way Receivers**).

The only other nearby receiver is at 105 Maitaihi Valley Road. This dwelling is separated from the closest area of potential construction work by more than 200m. The Site is large, however there are no other proximate receivers near to other Site boundaries.

Figure 4 identifies the closest dwellings on Ralphine Way that may be occupied during the works. Table 2 identifies the separation distance between the dwelling and the closest area of construction work within the Site. Distances have been measured using the Top of the South Maps GIS viewer and with reference to the proposed roading, earthworks and scheme plans that form part of the application.

Table 2 Separation distances between the closest potential area of construction work and building façade of receiving dwellings on Ralphine Way

Address	Building type	Approximate distance between closest potential construction activity and receiving building façade
14 Ralphine Way	Two story dwelling	**≈15m from boundary of the Site where there will be earthworks** **≈50m from construction access road and areas of road construction** ≈35m from closest future residential lot
5 Ralphine Way	Two story dwelling	**≈17m from construction access road and areas of road construction** **≈12m from the closest part of the Site where there will be earthworks** ≈35m from closest building on Arvida development
18 Ralphine Way	Single level dwelling	≈80m from the closest part of the Site where there will be earthworks ≈100m from closest part of the Site where there will be road construction ≈70m from closest future residential lot
10 Ralphine Way	Two story dwelling	≈120m from closest part of the Site where there will be road construction ≈80m from the closest part of the Site where there will be earthworks ≈70m from closest future residential lot
1 Ralphine Way	Two story dwelling	≈75m from closest part of the Site where there will be earthworks and road construction ≈100m from closest building on Arvida development
2 Ralphine Way	Two story dwelling	≈120m from closest part of the Site where there will be earthworks and road construction
10 Ralphine Way	Two story dwelling	≈90m from boundary of the Site ≈70m from construction access road and areas of road construction
6 Ralphine Way	Two story dwelling	>100m from areas of construction work

Figure 4 Ralphine Way Receivers

The closest receivers are located at 5 and 14 Ralphine Way (shaded grey in Table 2).

6.0 Predicted construction noise and vibration levels

We have predicted the approximate noise levels that could be expected from construction works within 100-200m of the Ralphine Way Receivers.

The noise level predictions are based on measurements we have undertaken on other projects and generally represent the typical or slightly-above-average noise level from the type of plant listed. All noise level predictions have been prepared in accordance with NZS6803.

Appendix A includes the details for the predictions, reference sound levels and expected compliance distances for the noisiest construction works likely to be undertaken in areas of the Site that are in proximity to the Ralphine Way receivers.

The noise level predictions demonstrate that there are some construction activities that have the potential to exceed the Project Noise Standards if mitigation is not implemented. The largest separation distance required for compliance with the Project Noise Standards is for bored piling with a large excavator. This might be necessary for construction retaining walls. This would need to be separated from the Ralphine Way Receivers by at least 38m to comply (based on unmitigated compliance distances). Several other items of plant need to be separated by approximately 27m and there may be more than one item of plant operating in a general area.

In simple terms, there is potential for the Project Noise Standards to be exceeded when works are within approximately 50-100m of the Ralphine Way Receivers.

However, the proposal is to comply with the Project Noise Standards at all times. This means that careful management of works will be required for all construction activity within 100m of the

Ralphine Way Receivers. When allowing for several items of plant or machinery working in the general area, we consider it appropriate to require that works within 100m of the Ralphine Way Receivers are carefully managed by the CNVMP to ensure compliance. This might involve the implementation of localised screening for smaller (but noisy) works, working when the occupants of the closest Ralphine Way Receivers are not home, and / or using smaller plant that generates less noise. The latter may mean that works in those areas take slightly longer.

7.0 Proposed noise and vibration mitigation measures

The proposal is to manage the construction noise and vibration effects on the Ralphine Way Receivers through a Construction Noise and Vibration Management Plan (**CNVMP**). The CNVMP will be prepared in accordance with the information requirements set out in Annex E of NZS 6803:1999. The CNVMP will be submitted to the satisfaction of Nelson City Council before the commencement of construction.

The purpose of the CNVMP is to ensure that the Best Practicable Option is adopted so the effects on the Ralphine Way Receivers are minimised to the greatest extent practicable. The CNVMP will facilitate this by setting out for the contractor (without limitation):

- The Project Noise and Vibration Standards for the project
- Identification of the receivers (occupied buildings) where the Project Noise and Vibration Standards must be complied with
- Limitations on working hours for specific activities and work areas
- Specifications and requirements for acoustically effective barriers that must be installed prior to commencement of specific activities
- Minimum separation distances for compliance with the noise and vibration limits in the consent conditions
- Procedures for response to neighbour's concerns and dealing with any complaints
- Procedures for any noise and vibration monitoring during the works
- Details of any further noise and vibration mitigation measures available
- Details for advising the occupiers of the neighbouring buildings of the works, including when the highest noise levels and perceptible vibration can be expected
- Details for ensuring that contractors and operators on site are aware of the requirement to minimise noise and vibration effects on the neighbouring sites.

In our experience, a CNVMP is an important tool for the successful management of noise and vibration effects on receivers in proximity to large scale construction works and will ensure that the receivers are provided with advanced notice of the timing and duration of construction works, enabling them to plan around any potential disruption.

7.1 Specific noise and vibration mitigation measures

The CVNMP will prescribe the specific noise and vibration mitigation measures that will be adopted to reduce noise and vibration emissions from the Site by as far as practicable and to avoid any unnecessary effects on the surrounding receivers. The CNVMP will include the following:

i. A specific section that sets out the noise mitigation measures that must be observed within 100m of the Ralphine Way Receivers. This section should set out the specific limits and mitigation measures that the constructor will need to observe to ensure compliance with the Project Noise Standards.

ii. A general requirement for all receivers within 100m of the Site boundary to be advised in writing about the works. The advice will inform the receivers that construction noise will be experienced during the works and vibration may be perceptible at times during the day when works are near to the site boundary. The advice will also include:

- The hours of construction works on site
- The expected (and approximate) duration of the highest noise and vibration generating activities.
- A contact name and telephone number for any complaints, questions or concerns, or to discuss any sensitive times for noise or vibration.

iii. The details of all minimum separation distances and mitigation requirements to ensure compliance at all adjacent receivers. When any plant must be used within the minimum unmitigated separation distances (from an occupied building), additional mitigation must be employed to manage or minimise effects.

iv. Limits on all noisy works (as assessed at the receiver) to only take place between 07:30 and 18:00, Monday to Saturday. There will be no noisy works outside of these times unless there is sufficient separation distance or screening to achieve compliance with the lower Project Noise Standards that apply at those times.

v. A requirement for the same written notice to be provided for each stage of the works where there is a gap of more than 3 months between stages.

8.0 Assessment of compliance with Project Noise and Vibration Standards

8.1 Construction noise

Our assessment finds that construction noise can be managed to comply with the proposed Project Noise Standards at all occupied dwellings, subject to the implementation of a CNVMP. The CNVMP will prescribe the specific noise mitigation measures that must be implemented to ensure compliance with the construction noise standards when construction work is within 100m of the Ralphine Way Receivers.

The mitigation measures are expected to be straightforward and will be tailored to the proposed construction methodology and proposed plant when the proposed construction methodology has been confirmed. The practicable mitigation measures are expected to include:

- The use of temporary localised barriers to screen some plant and noisy activities.
- The use of smaller and / or quieter plant and construction methods, especially where screening is not practicable.
- Scheduling works to be undertaken when the closest dwellings are not occupied (via the engagement proposed as part of the CNVMP).

8.2 Construction vibration

Activities that may generate vibration during the construction phase include the operation of tracked excavators, and other heavy plant and vehicles. Any perceptible vibration will only be during the daytime on Monday to Saturday when the earthworks and civil works are being completed in areas of the Site near to the Ralphine Way Receivers.

The operation of heavy plant in proximity to the boundaries of the Site may result in some perceptible vibration at the closest dwellings but will not exceed the limits in the DIN Standard, given the separation distances to all structures on adjacent sites.

9.0 Assessment of construction noise and vibration effects

9.1 Construction noise effects

The closest receivers on 5 and 14 Ralphine Way may experience construction noise levels of up to 70 dB L_{Aeq} when earthworks and civil works are undertaken within approximately 50m of the dwellings (if the dwellings are occupied during works). The construction noise levels at all other occupied dwellings on Ralphine Way will readily comply with the Project Noise Standard of 70 dB L_{Aeq} without any specific noise mitigation or management.

The Site is large, and the construction will be staged. The construction noise levels generated from construction work in other areas of the Site will be much lower and will readily comply with the noise limits in NZS6803 without any specific noise mitigation or management.

The noise effects from the closest construction works are described in the table below (from the AAAC Guideline):

Table 3: Temporary construction noise effects at the nearest sites

Construction works	Noise level at 1 m from the façade $L_{Aeq\ (15\ min)}$	Potential effects outside the buildings	Potential effects inside the nearest rooms of the buildings
Earthworks, civil works (road construction and vertical construction work within 50m-150m of occupied dwellings	55 - 65 dB	Conversation may require raised voices over long distances	Noise levels will be noticeable, but they are unlikely to interfere with daily residential activities
Earthworks and civil works (road construction) within 50m of 5 and 14 Ralphine Way	65 - 70 dB	Conversation will require raised voices. People are unlikely to spend time outside	Slightly raised sound levels may be necessary for television, radio, and phone conversations

The CNVMP will be used to specify the noise mitigation methods that must be adopted when construction works are within 100 m of 5 and 14 Ralphine Way and will ensure the closest receivers have advanced notice of the timing and duration of construction work. Warning residents about temporary high construction noise levels and construction vibration removes startle factor and allows them to plan around the effects. Higher noise levels from temporary construction activities are generally tolerated if there is communication with the neighbours, the works are no louder than necessary, and the noise only occurs during daytime hours.

We consider that the construction noise levels will be reasonable level in terms of section 16 of the Act, taking into account the level and timing of noise effects, and the proposed implementation of a CNVMP.

9.2 Construction vibration effects

We expect that the occupants of 5 and 14 Ralphine Way may experience brief, intermittent but perceptible vibration when earthworks machinery is operating in the closest parts of the Site. These vibration levels may be experienced as small jolts or short periods of steady vibration that are just perceptible or noticeable. The vibration levels will comply with Project Vibration Standard to avoid building damage at all times based on the ample separation distances involved.

The CNVMP will ensure that receivers are provided with advance notice of the timing and duration of the proposed construction works. The vibration levels are not expected to unreasonably disrupt residential activities.

10.0 Proposed conditions of consent

1. Construction noise and vibration management plan (CNVMP)

The consent holder shall prepare and submit a CNVMP to Council a minimum of 20 days prior to commencement of construction work. The objective of the CNMP is to set out the methods and procedures that will be used to ensure compliance with the noise and vibration limits in condition [X].

The CNVMP shall set out:

a) The Project Noise and Vibration Standards

b) The programme of works and hours of operation

c) Identification of surrounding noise sensitive receivers

d) A specific section that sets out the noise mitigation measures that must be observed within 100m of the Ralphine Way Receivers. This section should set out the specific limits and mitigation measures that the constructor will need to observe to ensure compliance with the Project Noise Standards.

e) Written communication with occupants of all buildings within 100 m of the site of the works in writing at least ten (10) days prior to the commencement of activities on site. The written advice shall set out:

(i) a brief overview of the construction works

(ii) the working hours and expected duration

(iii) all mitigation measures to be implemented

(iv) the procedure for recording concerns/complaints regarding noise

The CNVMP must address the requirements of Annex E of NZS 6803:1999 *Acoustics – Construction Noise* and the AAAC *Guideline for interpreting and applying NZS 6803 1999* as a minimum. Construction works must not begin until certification has been received in writing from Nelson City Council. The CNVMP and any amendments must be prepared by a suitably qualified acoustics consultant (e.g., MASNZ). Amendments that include changes to the construction methodology must be tracked and the revised CNVMP submitted to Nelson City Council for certification.

All construction works on the site must be carried out in accordance with the certified CNVMP. A copy of the CNVMP must be kept on site during construction hours.

2. **(Construction vibration limits)** All construction works on the site must be designed and conducted to ensure that the construction vibration does not exceed 5mm/s PPV when measured within 500m of ground level on the foundation or structure of any building on another site. Vibration shall be measured and assessed in accordance with the German Standard DIN 4150-3:2016 *Structural vibration – Effects of vibration on structures*.

3. **Construction noise levels**

Construction noise levels generated from the Site shall comply with the following limits, when measured and assessed 1m from the façade of any occupied dwelling or building on any other site in accordance with NZS 6803:1999: *Acoustics – Construction Noise*:

Time period	Maximum noise levels	
	$L_{Aeq(15min)}$	L_{AFMax}
7:30am- 6:00pm, Monday to Saturday	70 dB	85 dB
All other times and on Public Holidays	45 dB	75 dB

11.0 Summary

Styles Group have assessed the construction noise and vibration effects from the development of the Maitahi Village.

Our assessment finds that construction noise levels can be managed to comply with the guideline noise limits in NZS 6803:1999: *Acoustics – Construction Noise.* We have recommended that a CNVMP is prepared and implemented to ensure compliance is achieved at the closest receivers on 5 and 14 Ralphine Way.

Vibration generated from the operation of heavy machinery near to the Site boundaries may be perceptible at times to the closest receivers but will comply with guideline vibration values set out in the German Standard DIN 4150-3:2016 *Structural vibration – Effects of vibration on structures*.

We consider that the noise and vibration levels will be reasonable and have recommended conditions of consent based on our findings.

Yours sincerely,

Jon Styles, MASNZ
Director and Principal

Appendix A Predicted construction noise levels

Table 4 displays the minimum separation distances for each activity to comply with the NZS6803's recommended long-term duration noise limit of 70 dB $L_{Aeq,}$ based on the following 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 (for example, from the excavator to 1 m from the building façade)
- The plant is being used continuously at the reference distance over a 30-minute sample period (i.e. 100% on-time) unless otherwise stated
- The distances include a +3 dB adjustment to the noise levels for reflections from the façade of the receiving building (as required by NZS6803)
- Acoustically reflective ground is assumed between the noise source and the receiver
- The mitigated compliance distances are based on construction noise barriers effectively screening the ground level of the building from the noise generating activity and reducing the noise levels by 10dB. A noise barrier may not be practicable in some cases due to the size of the Site, height of neighbouring buildings (particularly in the future / legal receiving environment) and the height of the main noise source of the plant itself.

Table 4: Reference noise levels and compliance distances

Construction activity	Unmitigated $L_{Aeq(15\ min)}$ noise level at 10 m	Unmitigated compliance distance	Mitigated compliance distance (with noise barrier)
Bored piling (including for large retaining works) with 20-t excavator	79 dB	38 m	12 m
D6, D7, or D8 bulldozer working in small area	76 dB*	27 m	9 m
Padfoot vibratory compaction roller 15t – 20-t	76 dB*	27 m	9 m
Cut and fill, clearing, and loading trucks with a 40-t – 50-t excavator	72 dB	17 m	6 m
Cut and fill, clearing, and loading trucks with a 20-t excavator	69 dB	12 m	4 m
Cat 815 static compactor 18-t	69 dB*	12 m	4 m
Concrete pump and truck discharging	69 dB	12 m	4 m

Construction activity	Unmitigated $L_{Aeq(15\ min)}$ noise level at 10 m	Unmitigated compliance distance	Mitigated compliance distance (with noise barrier)
Cut and fill, clearing, and loading trucks with a 12-t excavator	67 dB	10 m	3 m
Large generator	66 dB	9 m	3 m
Terex TS14 30-t motor scraper	65 dB*	8 m	3 m
7,000 L watercart	65 dB	8 m	3 m
Grader	62 dB*	6 m	2 m
Idling delivery truck, dump truck, moxy, tractor	62 dB	6 m	2 m
Paving works (with all ancillary equipment operating)	75 dB	25 m	8 m

* Reference noise level is for a moving noise