WEEKLY REPORT

Project:	Te Karearea - Monitoring	**Document No.:**	Wr 03		
To:	Te Karearea Limited	**Date:**	4 February 2025		
Attention:	Alison Esler (Proviso)	**Project No.:**	20241413		
From:	Harry Zhang	**No. Pages:**	6	**Attachments:**	No
Subject:	Weekly Noise and Vibration Monitoring Report (27 Jan to 2 Feb 2025)				

This document details the results of the ongoing noise and vibration monitoring of earthworks activities, associated with the construction for the Te Karearea Project, located at 30 Benmore Crescent, Lower Hutt.

In summary, during the reporting period, there were no infringements of the construction noise limits due to construction activities.

In respect of vibration, we have analysed specific periods when complaints have been received (refer to *Mm 03 20241413*). Refer to that memo for specific details.

In respect of vibration, we have just reported the vibration levels. As the dwelling is close to the railway line, then vibration not associated with the works does occur. Within this memo, we have not removed or identified train passes. For future weekly reports, we will look to ways that we can remove these.

A glossary of terminology is included in Appendix A.

NOISE MEASUREMENTS

Noise Logger Locations

Two outdoor noise loggers have been installed within the properties of nearby residential receivers on Mary Huse Grove.

- 31 Mary Huse Grove – Located on ground level in the backyard. Line-of-sight from this logger to the work site is blocked by the railway bunding which runs adjacent to the property.
- 39 Mary Huse Grove – Located on the first floor balcony. This elevated position is more exposed to noise from the work site, as well as traffic noise from vehicles on State Highway 2.

Further detail regarding the locations and functionality of the noise loggers can be found in document reference '*Mm 01 r01 20241413 SA (Te Karearea – Noise Monitoring Protocol)*'. Previous weekly noise logger reports we have issued have the '*Wr*' document prefix.

Reporting Period: 27 January to 2 February 2025

Applicable Noise Limits

We understand that the conditions of consent within the Project's Resource Consent do not include specific noise limits for construction activities. Therefore, noise arising from construction activities must comply with the relevant rules under the Operative City of Lower Hutt District Plan ('the Plan'). During site working hours, the applicable noise limits for construction noise are **70 dB L_{Aeq} and 85 dB L_{AFmax}.**

The relevant rules and further details related to construction noise limits are included in Appendix B.

Week Overview

Figure 1 and Figure 2 provide visual summaries of the noise levels measured over the reporting period, with a + 3dB adjustment to allow for comparison with the noise limits (refer Appendix B for details). The green line denotes the L_{Aeq} 70 dB project limit.

L_{Aeq} noise values are for 15 minute periods (i.e. $L_{Aeq(15min)}$). We note that the noise limits do not specify a time period over which L_{Aeq} values must be averaged over. NZS 6803:1999 states that 15 minutes is often adequate.

The noise loggers capture the cumulative noise level of all sound sources in the area. This includes noise from construction activities, vehicles on the state highway, trains on the Hutt Valley line, etc. It is not possible to isolate noise from construction activities from these other sound sources. However, if the cumulative noise level is less than L_{Aeq} 70 dB, then construction noise levels alone are less than L_{Aeq} 70 dB.

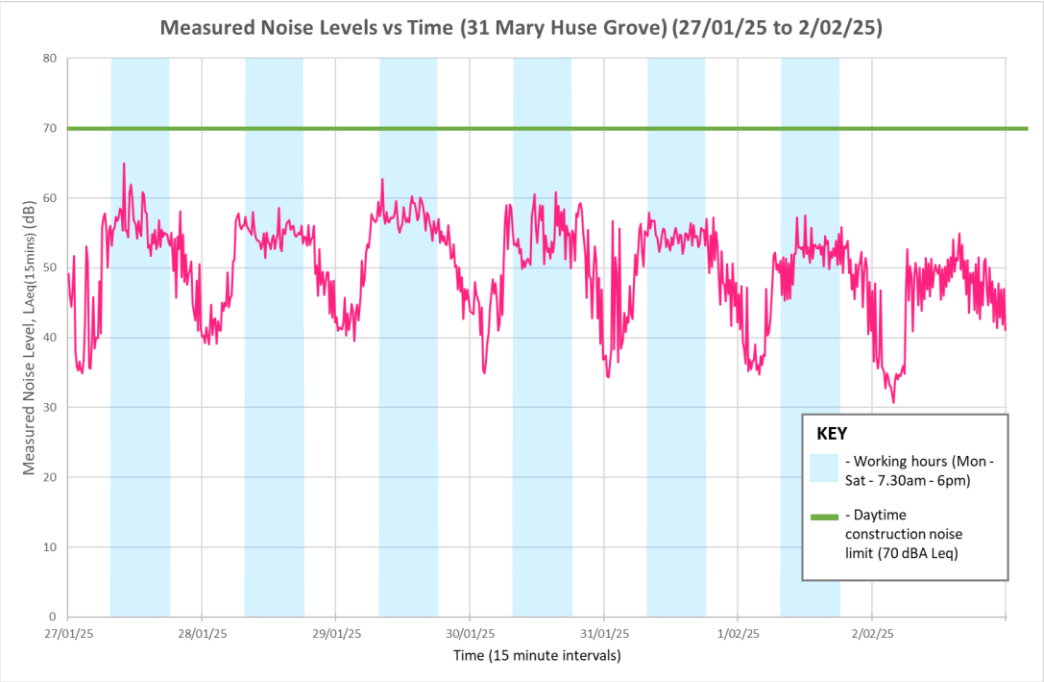

Figure 1: Measured noise levels at 31 Mary Huse Grove logger (ground level). Includes +3 dB adjustment.

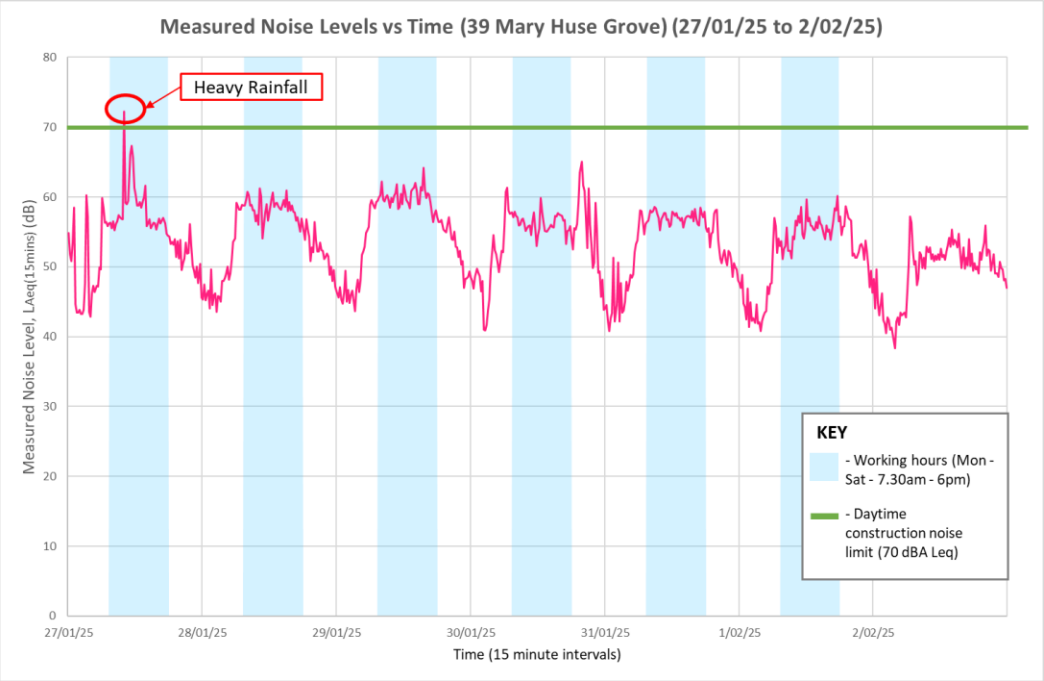

Figure 2: Measured noise levels at 39 Mary Huse Grove logger (first floor). Includes +3 dB adjustment.

We note that the noise logger at 39 Mary Huse Grove had one instance where the noise level measured was greater than 70 dB $L_{Aeq(15mins)}$. Audio recordings confirmed that this was due to heavy rainfall, and not related to construction activities.

During the logging period, no infringements of the construction noise limits due to construction activities occurred at either noise logger.

We note that the noise levels measured at the 39 Mary Huse Grove are generally higher than at 31 Mary Huse Grove due to the logger's elevated and more exposed location. The noise levels measured at this logger have less variance, likely due to being more exposed to noise from vehicles on State Highway 2.

If required, we can provide analysis for specific events within the logging period, as we have done previously (document reference *Wr 01 20241413 HZ (Weekly Noise Monitoring Report (9 Jan to 15 Jan 2025))*.

VIBRATION MEASUREMENTS

Vibration Logger Location and Functionality

One indoor noise logger has been installed within 31 Mary Huse Grove. It is located in the room closest to the work site, and on the building foundations.

The logger measures the peak particle velocity (PPV) in mm/s per 1-second period. This is the peak velocity measured in any direction, and is the typical metric used to measure levels of vibration.

Reporting Period: 28 January to 2 February 2025

Vibration Performance Standards

There are no consent conditions which relate to vibration. Under the City of Lower Hutt District Plan, there are specific limits for vibration generated by construction activities, only that "*all activities that cause vibration shall be carried out in such a manner that no vibration is discernible beyond the site boundary*".

British Standard BS 5228-2:2009 "*Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration*" provides guidance on the amenity effects of vibration resulting from construction activities. We often refer to the standard when managing the effects of construction noise and vibration. The standard includes descriptions which could be used as a guide for defining "discernible". The values in BS 5228-2:2009 are more often used as trigger levels for consultation as part of the vibration management plan rather than limits.

The descriptions in BS 5228-2:2009 are reproduced below:

- 0.14 mm/s PPV Just perceptible in particularly sensitive environments
- 0.3 mm/s PPV Just perceptible in normal residential environments
- 1 mm/s PPV Typically acceptable with prior notification
- 10 mm/s PPV Likely to be intolerable for any more than a very brief period

For the summary of our measurements, we have applied 0.3 mm/s PPV to be the trigger level for perceptible vibrations, applicable to 31 Mary Huse Grove. Any measured vibration greater than this level, and during the site working hours, warrants examination if complaints have occurred.

Week Overview

Figure 3 overleaf provides a visual summary of the vibration levels measured over the reporting period. The green line denotes the 0.3 mm/s PPV trigger level.

The PPV values presented are for 30 second periods, and are the highest PPVs in each axis per period.

The vibration logger captures the cumulative vibration level of all vibration sources in the area. This includes vibration from construction activities, trains on the Hutt Valley Line, residential activities, etc.

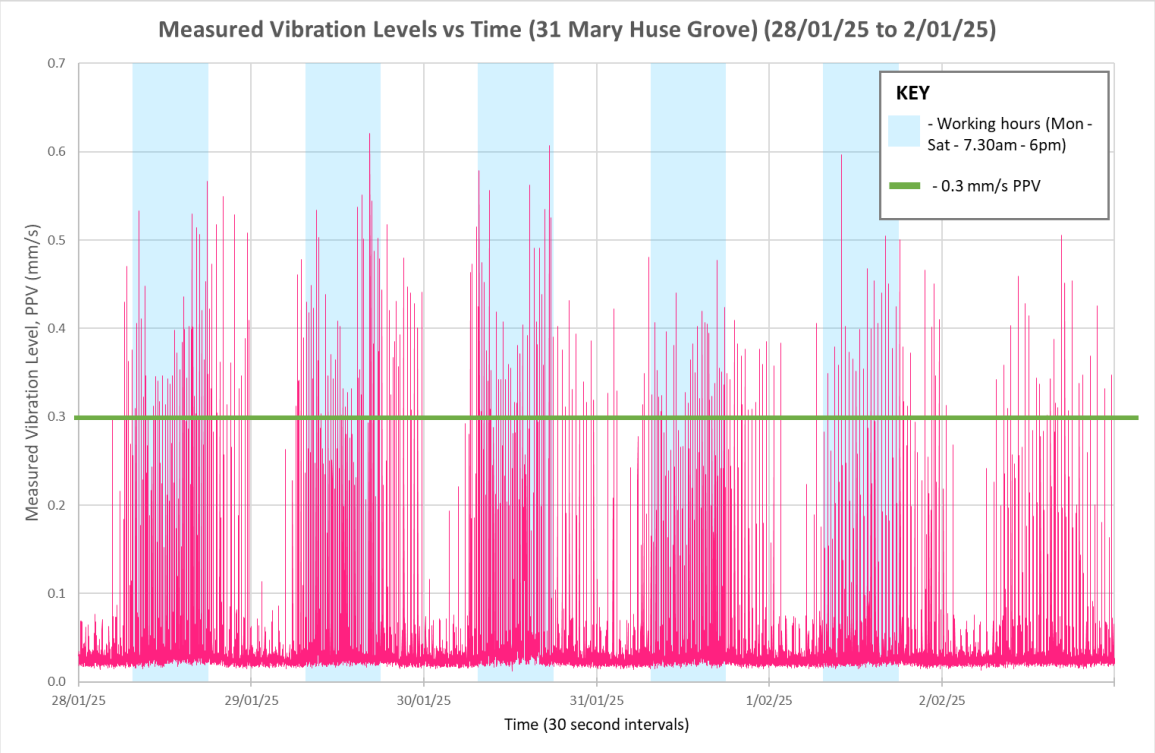

Figure 3: Measured vibration levels at 31 Mary Huse Grove (ground level foundations)

We note that there were many instances where vibration levels in excess of 0.3 mm/s PPV were measured. We have determined that the majority of these were due to train passes on the Hutt Valley Line. This is based on audio recordings, comparison with roller on-times, the duration of each event, and the regularity at which the events occur (coinciding with train timetables).

If required, we can provide analysis for specific events within the logging period.

APPENDIX A GLOSSARY OF TERMINOLOGY

Noise	A subjective term used to describe sound that is unwanted by, or distracting to, the receiver.
A-weighting	A set of frequency-dependent sound level adjustments that are used to better represent how humans hear sounds. Humans are less sensitive to low and very high frequency sounds. Sound levels using an "A" frequency weighting are expressed as dB L_A. Alternative ways of expressing A-weighted decibels are dBA or dB(A).
dB	Decibel. The unit of sound level.
L_{Aeq}	The equivalent continuous A-weighted sound level. Commonly referred to as the average sound level and is measured in dB. Often included with a period over which the sound level was averaged i.e. $L_{Aeq(15mins)}$.
L_{Amax}	The A-weighted maximum sound level. The highest sound level which occurs during the measurement period. Usually measured with a fast time–weighting i.e. L_{AFmax}.
Vibration	When an object vibrates, it moves rapidly up and down or from side to side. The magnitude of the sensation when feeling a vibrating object is related to the vibration velocity. Vibration can occur in any direction. When vibration velocities are described, it can be either the total vibration velocity, which includes all directions, or it can be separated into the vertical direction (up and down vibration), the horizontal transverse direction (side to side) and the horizontal longitudinal direction (front to back).
PPV	Peak Particle Velocity. The measure of the vibration amplitude, from zero to maximum. Used for building structural damage assessment.

APPENDIX B RELEVANT NOISE RULES AND LIMITS

Rule 14C 2.1(f) of the Plan requires that construction noise is to be assessed in accordance with New Zealand Standard NZS 6803P:1984. However, best practice is to apply the 1999 (most recent) version of this standard – New Zealand Standard NZS 6803:1999 "*Acoustics – Construction Noise*" ('NZS 6803:1999). This is common for consent applications in Lower Hutt. We note that the applicable limits in the 1999 version of the standard are slightly more stringent than in the 1984 version.

The applicable noise limits for the project works in Table 1 have been reproduced from NZS 6803:1999. The outlined periods are the noise limits applicable during the assumed working hours.

Table 1: Construction noise limits for activities sensitive to noise (e.g. occupied dwellings)

Time of Week	Time Period	Noise Limit for Long-Term Duration Works[1]	
		dB L_{Aeq}	dB L_{AFmax}
Weekdays	0630 – 0730	55	75
	0730 – 1800	70	85
	1800 – 2000	65	80
	2000 – 0630	45	75
Saturdays	0630 – 0730	45	75
	0730 – 1800	70	85
	1800 – 2000	45	75
	2000 – 0630	45	75
Sundays and public holidays	0630 – 0730	45	75
	0730 – 1800	55	85
	1800 – 2000	45	75
	2000 – 0630	45	75

The noise limits apply at 1 metre outside the façades of buildings, and only while they are occupied. As both noise loggers have been placed in free-field conditions, a +3 dB adjustment to all measured L_{Aeq} noise levels has been made prior to comparison with the noise limits, as per NZS 6803:1999.

[1] Construction work at any one location with a duration exceeding 20 weeks