MARSHALL DAY Acoustics

54 GREEN LANE
NOISE TO BOUNDARY

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Project: **54 GREEN LANE**

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			12/05/2021	H. Bartley	B. Wood
	01	Address client comments	17/05/2021	H.Bartley	B.Wood
	02	Updated methodology	12/08/2021	H.Bartley	S. Arden

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1.0 INTRODUCTION

Ruru Homes has requested that Marshall Day Acoustics prepares a noise compliance assessment to satisfy Tasman Resource Management Plan (TRMP) rule 17.5.2.1 (C) to undertake light industrial activities at 54 Green Lane. Motueka.

During the first stage of the development, small homes would be manufactured to the north-east of the subject site with the capacity to build up to 9 homes simultaneously. Materials would be transported to and from site via an independent driveway. Stage 2 of the development would see manufacturing of small homes expanded to the north-west and the capacity to build 18 homes simultaneously.

This report outlines the assessment of compliance for the associated operational noise. Noise relating to the construction of the development has not been considered in this report.

A glossary of acoustic terminology used in this report is included as Appendix A.

2.0 SITE AND ACTIVITY DESCRIPTION

2.1 Subject Site

The subject site is located at 54 Green Lane, Motueka. It is zoned Rural 1, as defined by the TRMP. The surrounding noise sensitive sites are also zoned Rural 1. Activities contributing to the existing surrounding noise climate include the Motueka airport and Golden Bay Fruit packing facility.

The subject site is shown in Figure 1. Within Figure 1, we have identified the closest receivers potentially affected by noise, and their corresponding zoning in the TRMP.

2.2 Assessment Locations

For the purpose of this assessment, operational noise levels have been predicted and assessed at the notional boundary of dwellings, in accordance with the relevant requirements of the TRMP.

The identified assessment locations closest to the subject site are as follows:

<u>All sites zoned Rural 1</u>

- Lot 1 DP 7957 (47 Green Lane)
- Lot 5 DP 1512 (49 Queen Victoria Street)
- Lot 6 DP 1512 (51 Queen Victoria Street)
- Lot 7 DP 1512 (53 Queen Victoria Street)
- Lot 8 DP 1512 (55 Queen Victoria Street)
- Lot 9 DP 1512 (63 Queen Victoria Street)
- Lot 10 DP 1512 (65 Queen Victoria Street)
- Lot 14 DP 1512 (44 Green Lane)
- Lot 20 DP 1512 (45 Green Lane)

Other sites in the area may be exposed to noise from the activity. However, noise levels would be less than those at our assessment locations due to increased distances and screening from intervening buildings.

2.3 Activity Description

The proposal is to develop a construction site for the construction of ‘small units’. This is an expansion of the existing production of Ruru Homes manufacturing business which is located

elsewhere. The aim is to meet demand and help address the housing supply shortage and affordability crisis in Tasman and nationally.

During stage 1, the manufacturing of the small units is proposed to initially occur outside in the north-eastern area of the subject site (see figure 2). Up to nine small homes would be manufactured on site at a time, with up to 30 active builders.

Stage 2 of the proposal is scheduled to commence in July 2022 and would see the construction expanded to the north-west area the subject site. A storage facility would be erected either between the construction areas or along the northern boundary. All construction activities would occur outside. Up to 18 small homes would be manufactured on site at a time, with up to 60 active builders.

Figure 2 displays the subject site layout. The subject site would include a staff carpark. From discussion with the Client, we understand that 60 vehicle movements would occur between the hours of 7am – 9am and again between 3pm – 5pm via the main access way to the south of the subject site.

Approximately 3 – 4 homes would be stored in the south-west area of the subject site, waiting for collection or delivery. No manufacturing works would occur on these units.

Manufacturing hours would be 7am to 5pm Monday to Friday and 7am to 3pm Saturdays. No construction activities would occur on Sundays.

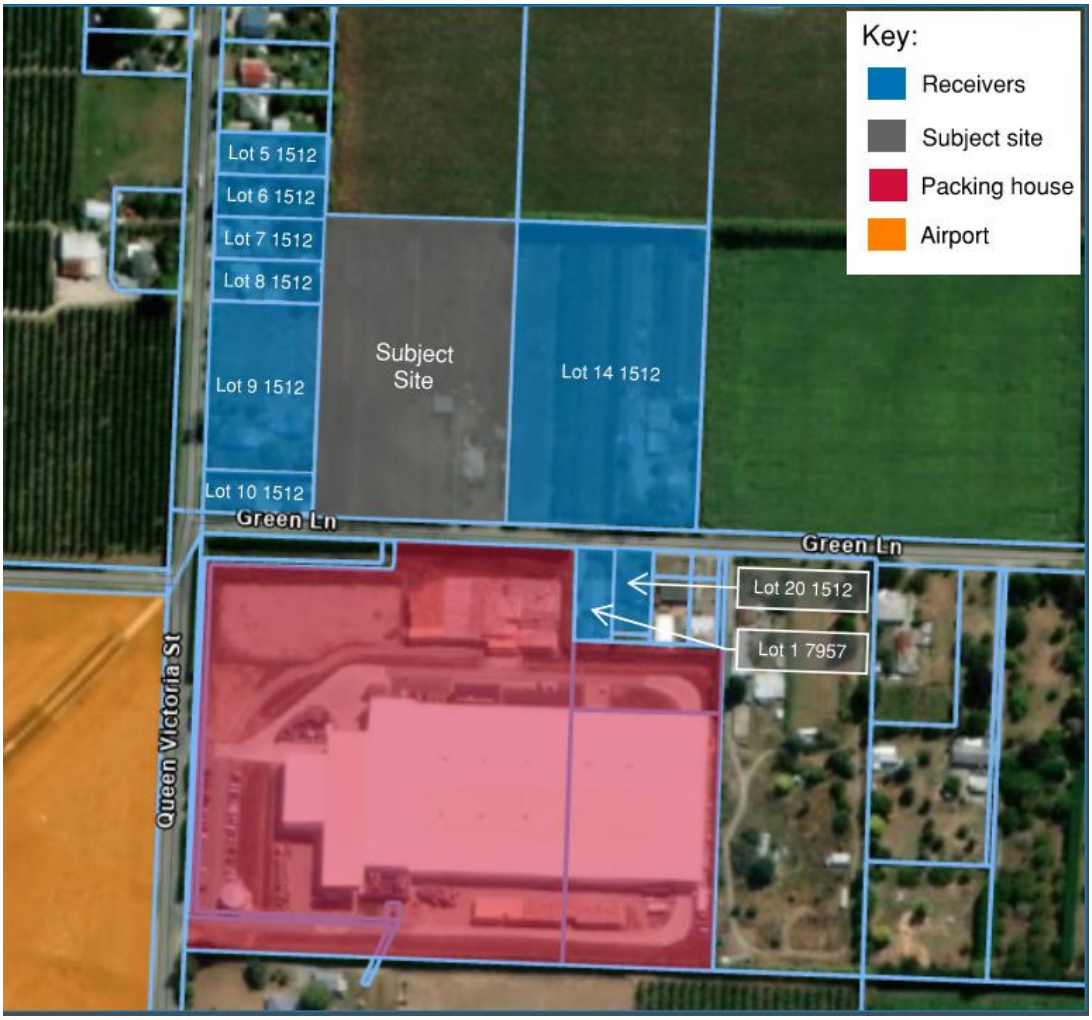
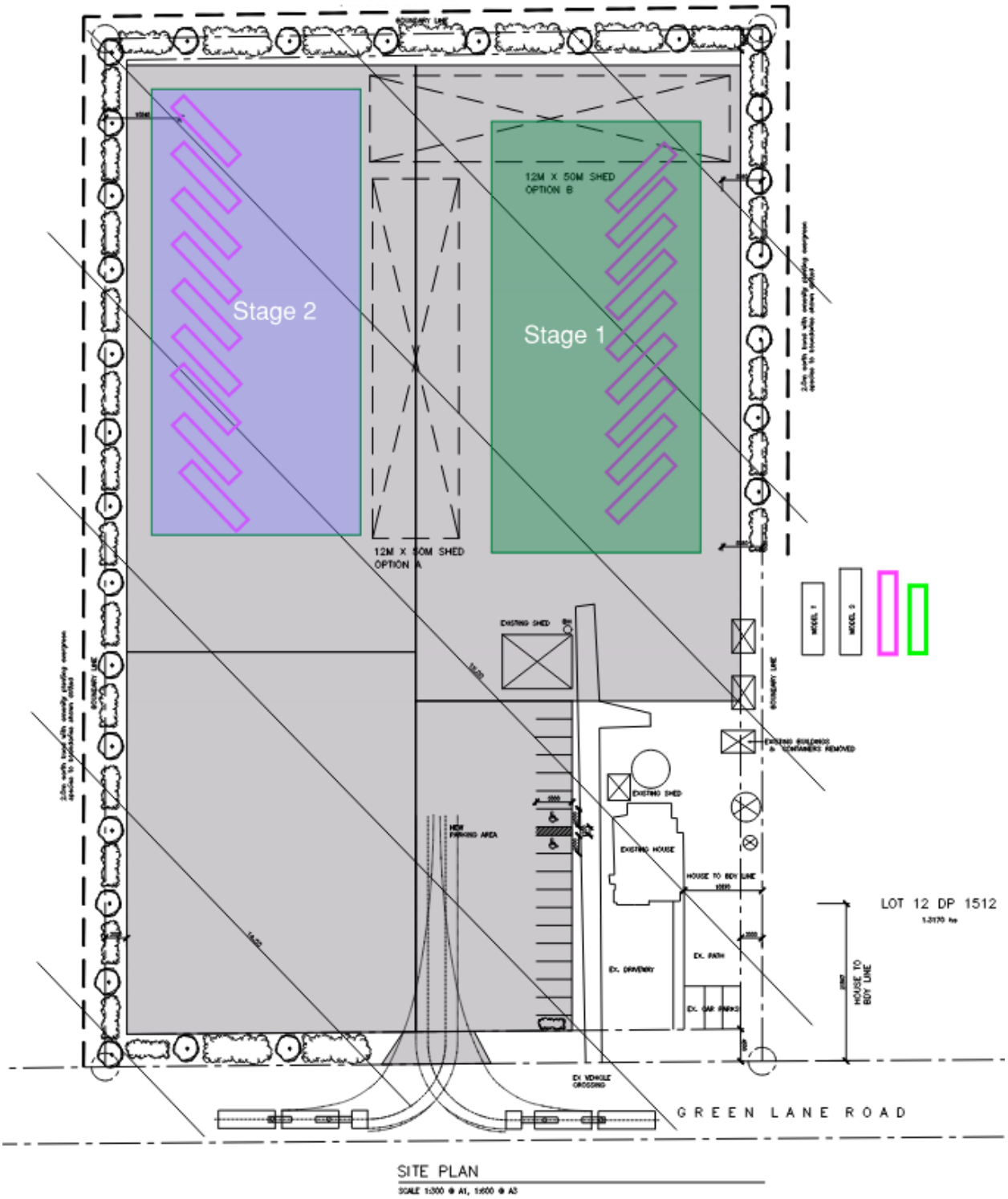


Figure 1: Site and surroundings *(Base image source: google maps)*



3.0 NOISE PERFORMANCE STANDARDS

3.1 Operational Noise

The TRMP outlines the following rule in relation to noise generated within a rural zone:

17.5.2.1 (c) *Except in the Richmond West Development Area, noise generated by the activity, when measured at or within the notional boundary of any dwelling in a Rural zone (other than any dwelling on the site from which the noise is being generated), Rural Residential, Papakainga or Tourist Services zone, or at or within any site within a Residential Zone, does not exceed:*

Day: L_{eq} 55 dB(A)

Night: L_{eq} 40 dB(A) / L_{max} 70 dB(A)

N.B. *Day = 7am to 9pm Monday to Friday inclusive and 7am to 6pm Saturday*

Night = all other times, plus public holidays

Noise must be measured and assessed in accordance with the provisions of NZS 6801:2008 Acoustics - Measurement of Environmental Sound and NZS 6802:2008 Acoustics - Environmental Noise.

4.0 PREDICTED NOISE LEVELS

The following sections set out the predicted noise levels, resulting from the proposed activity.

4.1 Noise Prediction methodology

Operational noise has been predicted in general accordance with ISO 9613-2:1996[1] as implemented in SoundPLAN® environmental noise modelling software.

ISO 9613-2 considers a range of frequency dependent attenuation factors, including spherical propagation, atmospheric absorption, and ground absorption.

4.2 Noise Rating Level

As per NZS 6802:2008, the rating level is to be used for comparison with a noise limit. The rating level allows for adjustment of a predicted or measured noise level to account for the character and duration of the noise.

NZS 6802:2008 Section 6.3.1 and Appendix B4 include a requirement to impose a +5 dB penalty for sounds which have 'special audible characteristics' (SAC), which attract attention much more readily than more neutral noise sources. Due to the nature of the proposed activity, a +5 dB penalty has been applied to the predicted noise levels.

4.3 Noise Emissions from Activities

To establish the noise emissions from the activity, we have utilised noise data previously measured by us for vehicles, and comparable noise sources listed in BS:5228-1: 2009 *Code of practice for noise and vibration control on construction and open sites – Part 1: Noise* Appendices C & D for construction activities.

A detailed operational plant methodology is not available to us at this point. However, details of the typical site operations have been discussed with Ruru Homes[2] including percentage on-times for each plant item. Table 1 displays the anticipated tools and associated percentage on-time during the prescribed daytime timeframe (Section 3.1).

[1] ISO 9613-2:1996 "Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation"

[2] Email received from Ruru Homes 6th May 2021

Table 1: proposed tool list and percentage on-time

Equipment	Sound Power Level (dB L_{wA})	% on-time Daytime
Impact driver	94	33%
Circular Saw (Makita)	106	33%
Sander	89	33%
Forklift	84	20%
Nail Gun	107	33%
Skilsaw	98	5%
Electric Hand planer	103	10%
Multitool	91	15%
Grinder	107	25%

4.3.1 Stage 1

During stage 1, all construction activities would be carried out in the north-eastern area of the subject site. Indicative manufacturing locations are shown in Figure 2.

The predicted noise levels resulting from vehicle movements and the small unit's manufacture works, received at the assessment locations (see Figure 1) are summarised in Table 2.

Table 2: Stage 1 predicted noise rating

Assessment location	TRMP noise Limit L_{Aeq} (dB)	Predicted noise level L_{Aeq} (dB)	Predicted noise rating L_r L_{Aeq} (dB)
Lot 1 DP 7957	55	51	56
Lot 5 DP 1512	55	49	54
Lot 6 DP 1512	55	49	54
Lot 7 DP 1512	55	50	55
Lot 8 DP 1512	55	52	57
Lot 9 DP 1512	55	51	56
Lot 10 DP 1512	55	48	53
Lot 14 DP 1512	55	55	60
Lot 20 DP 1512	55	51	56

Exceedances of the TRMP daytime limit of up to 5 dB are predicted for Lots 6,7,8,14 DP 1512 during stage 1 operations. This indicates that without mitigation, the operation of the manufacturing facility would not be compliant with TRMP rule 17.5.2.1 C at these receivers.

Mitigation options are discussed in Section 4.3.3.

4.3.2 Stage 2

We understand from communications with Ruru Homes[3] that additional manufacturing of small homes will occur in the north-western area of the subject site. All manufacturing activities will remain outdoors with materials/tools stored with the sheds.

For the purpose of this assessment, operation of the grinder, circular saw and nail gun has been restricted to the stage 1 construction pad only. For the purposes of our assessment, we have assumed that the remaining tools listed in Table 1 would operate on the stage 2 construction pads simultaneously.

The predicted noise levels resulting from vehicle movements and the small unit's construction pad works, received at the assessment locations (see Figure 1) are summarised in Table 3.

Table 3: Stage 2 predicted noise rating

Assessment location	TRMP noise Limit L_{Aeq} (dB)	Predicted noise level L_{Aeq} (dB)	Predicted noise rating L_r (dB)
Lot 1 DP 7957	55	51	56
Lot 5 DP 1512	55	52	58
Lot 6 DP 1512	55	55	61
Lot 7 DP 1512	55	59	63
Lot 8 DP 1512	55	61	67
Lot 9 DP 1512	55	52	61
Lot 10 DP 1512	55	51	59
Lot 14 DP 1512	55	54	59
Lot 20 DP 1512	55	51	56

Exceedances of the TRMP daytime noise limits of up to 7 dB are predicted for lot 6,7,8,9,10 & 14 DP 1512 during stage 2 operations. This indicates that without mitigation, the operation of the manufacturing facility is not compliant with TRMP rule 17.5.2.1 C, for these receivers. Mitigation options are discussed in Section 4.3.3.

4.3.3 Mitigated Design

We understand that earthworks associated with the construction pads can be converted into earth bunding up to a height of 2 metres, around the perimeter of the subject site. This would provide

[3] Email received from Ruru Homes 6th May 2021

noise mitigation from manufacturing activities, received at the assessment locations. Table 4 summarises the mitigated Noise Rating L_r for stage 1 & 2.

Table 4: Mitigated noise rating

Assessment location	TRMP noise Limit (dB)	Mitigated noise rating L_r Stage 1 (dB)	Mitigated noise rating L_r Stage 2 (dB)
Lot 1 DP 7957	55	54	55
Lot 5 DP 1512	55	54	57
Lot 6 DP 1512	55	54	59
Lot 7 DP 1512	55	54	60
Lot 8 DP 1512	55	56	61
Lot 9 DP 1512	55	54	60
Lot 10 DP 1512	55	55	58
Lot 14 DP 1512	55	56	57
Lot 20 DP 1512	55	54	54

With the included noise mitigation, during stage 1, a marginal exceedance of up to 1 dB is predicted for Lot 8 DP 1512 & Lot 14 DP 1512 only, all other receivers are compliant. During stage 2, exceedances of up to 4 dB are predicted for Lot 5, 6, 10 & 14 DP 1512.

Receivers experiencing noise levels exceeding the district plan by up to 2 dB would typically observe an imperceptible difference in level when compared to a noise source generating at the noise limit, while an exceedance of 3-4 dB would typically just be perceptible.

Exceedances of up to 5 – 6 dB are predicted at Lot 7, 8, 9 DP 1512. This is likely to be a noticeable difference in level when compared to a source generating at the noise limit.

Manufacturing activities occurring at heights e.g. nail guns on two-story small homes are unlikely to observe the benefits from an effective barrier, due to line of sight remaining to receivers. Therefore, noise manufacturing activities should remain up to 1.5m off the ground, or located away from the site boundary.

5.0 CONCLUSION

Exceedances of TRMP rule 17.5.2.1 C are predicted during stage 1 & 2 operations of the smart homes manufacturing facility. Utilising excavated soil to form a 2-metre-high earth bund around the site perimeter would reduce the noise received at the assessment locations. However, exceedances are still predicted at multiple properties across both stages.

APPENDIX A GLOSSARY OF TERMINOLOGY

SPL or L_P	Sound Pressure Level A logarithmic ratio of a sound pressure measured at distance, relative to the threshold of hearing (20 μPa RMS) and expressed in decibels.
SWL or L_{WA}	Sound Power Level A logarithmic ratio of the acoustic power output of a source relative to 10^{-12} watts and expressed in decibels. Sound power level is calculated from measured sound pressure levels and represents the level of total sound power radiated by a sound source.
dB	Decibel The unit of sound level. Expressed as a logarithmic ratio of sound pressure P relative to a reference pressure of Pr=20 μPa i.e. dB = 20 x log(P/Pr)
dBA	The unit of sound level which has its frequency characteristics modified by a filter (A-weighted) so as to more closely approximate the frequency bias of the human ear.
A-weighting	The process by which noise levels are corrected to account for the non-linear frequency response of the human ear.
L_{Aeq}	The equivalent continuous (time-averaged) A-weighted sound level. This is commonly referred to as the average noise level.
L_{AFmax}	The A-weighted maximum noise level. The highest noise level which occurs during the measurement period.