Norman Disney & Young
A TETRA TECH COMPANY

Report

Carras & Co

Grenada North Noise Assessment
Acoustic Services

CONFIDENTIAL

Revision: 1.0 – For Information **Issued**: 5 October 2022

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1 INTRODUCTION

1.1 Purpose

The purpose of this report is to provide a State Highway Noise Assessment for the proposed development at Lots 1-16 DP 393192, Jamaica Drive, Grenada North, Wellington.

1.2 Required and Recommended Design Standards

This report has been written with reference to the following recommended document, which set out various acoustic criteria for the development.

Recommended:

- Preliminary feedback from Waka Kotahi regarding reverse sensitivity

1.3 Authority

Authority to undertake this report was provided by Kevin Alkema on behalf of Carras & Co.

1.4 Information Sources

This report was written with reference to the following documents:

- Cuttriss Road Layout (drawing number 22771 P2 Revision C)

1.5 Revision History

Revision	Date Issued	Comment
1.0	5 October 2022	For Information

2 PROPOSED DEVELOPMENT

The proposed development at Lots 1-16 DP 393192, Jamaica Drive, involves the subdivision of land to create 214 vacant sites as depicted in Figure 1 below.

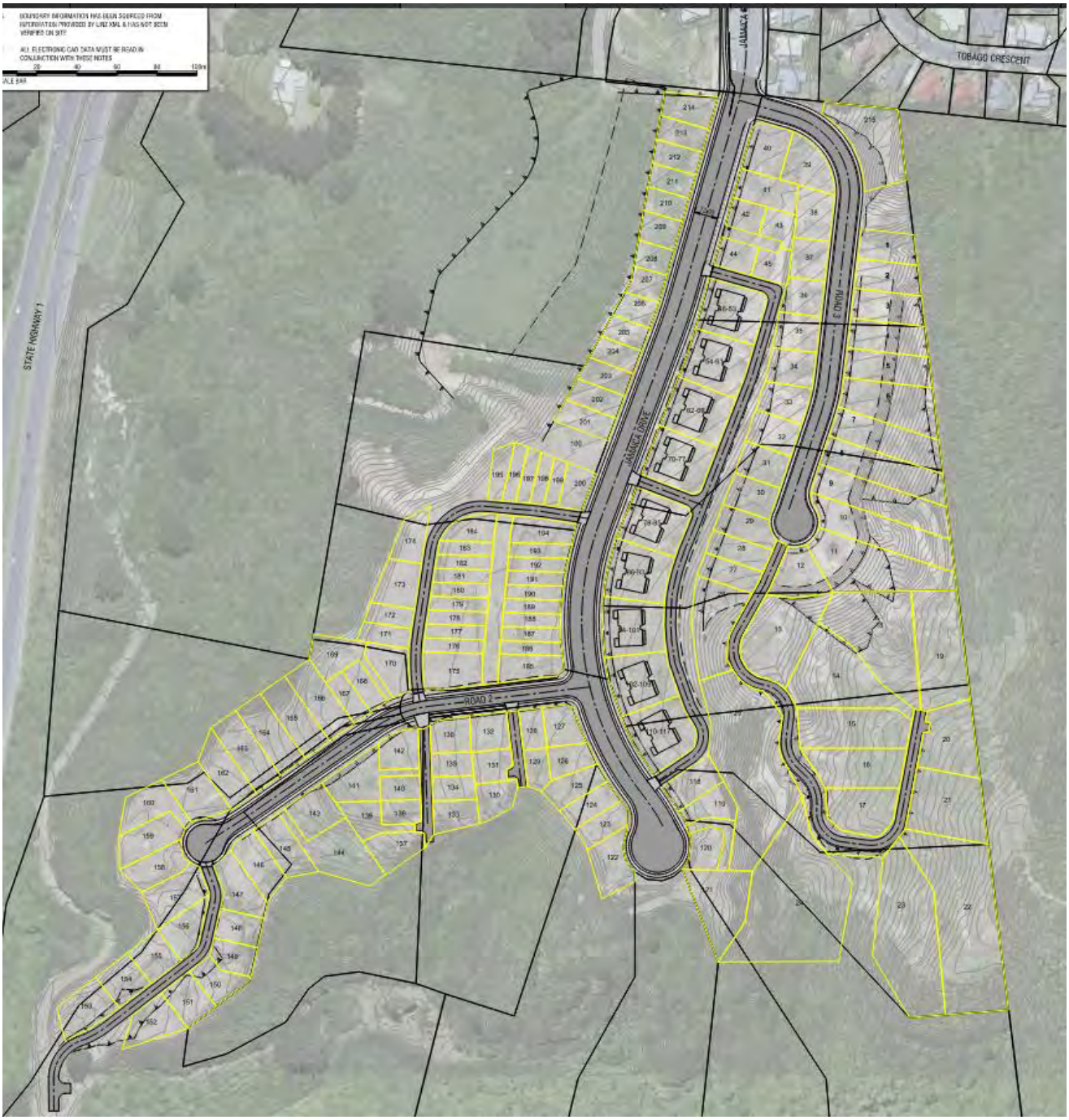

Figure 1: Proposed Development at Lots 1-16 DP 393192, Jamaica Drive

3 CRITERIA

8 of the lots created by the subdivision at Lots 1-16 DP 393192, Jamaica Drive, occur within the 100m of the state highway network (State Highway 1). The following preliminary feedback has been provided by Waka Kotahi regarding reverse sensitivity.

- *Waka Kotahi consider reverse sensitivity may have an effect on some of the properties, as they are within 100m of the state highway network. We request that this please be considered as part of your application, and an acoustic report is submitted to assess any noise effects. Our standard wording for a reverse sensitivity condition is below:*

This consent notice shall read as follows:

A. New buildings or alterations to existing buildings containing noise sensitive activities, in or partly within 40 metres from the state highway edgeline must be designed, constructed and maintained to achieve road-traffic vibration levels complying with class C of NS 8176E:2005.

B. New buildings or alterations to existing buildings containing noise sensitive activities, in or partly within 100 metres from the state highway edgeline must be designed, constructed and maintained to achieve the indoor design noise levels from road-traffic set out in (reference table below).

BUILDING TYPE	OCCUPANCY/ACTIVITY	MAXIMUMINDOORDESIGN NOISE LEVEL $L_{Aeq(24h)}$
Residential	Living spaces, sleeping spaces (including visitor accommodation and retirement accommodation)	40 dB
Education	Assembly halls	35 dB
	Conference rooms, drama studios	40 dB
	Lecture rooms and theatres, music studios	35 dB
	Libraries	45 dB
	Sleeping areas in educational facilities	40 dB
	Teaching areas	40 dB
Health	Overnight medical care, wards	40 dB
	Clinics, consulting rooms, theatres, nurses' stations	45 dB
Cultural buildings	Places of worship, marae	35 dB

Note: Excludes areas not deemed to be habitable spaces as defined by schedule 1 of the Building Regulations 1992.

a. If windows must be closed to achieve the design noise levels in [B], the building must be designed, constructed and maintained with a ventilation and cooling system. For habitable spaces a ventilation cooling system must achieve the following:

i. Ventilation must be provided to meet clause G4 of the New Zealand Building Code. At the same time, the sound of the system must not exceed 30 dB LAeq(30s) when measured 1 m away from any grille or diffuser.
ii. The occupant must be able to control the ventilation rate in increments up to a high air flow setting that provides at least 6 air changes per hour. At the same time, the sound of the system must not exceed 35 dB LAeq(30s) when measured 1 m away from any grille or diffuser.
iii. The system must provide cooling that is controllable by the occupant and can maintain the temperature at no greater than 25°C. At the same time, the sound of the system must not exceed 35 dB LAeq(30s) when measured 1 m away from any grille or diffuser.

C. A design report prepared by a suitably qualified and experienced acoustics specialist must be submitted to the [council officer] demonstrating noise and vibration compliance prior to the construction or alteration of any building containing a noise sensitive activity in or partly

in the state highway buffer area or effects area. The design must take into account the future permitted use of the state highway; for existing roads this is achieved by the addition of 3 dB to existing measured or predicted noise levels.

The development on Lots 1-16 DP 393192, Jamaica Drive, involves the subdivision of land for residential development, therefore, a maximum design noise level of 40 dB $L_{Aeq\ (24hr)}$ is the appropriate criteria to apply for living and sleeping areas.

4 STATE HIGHWAY NOISE ASSESSMENT

A State Highway noise assessment was conducted between 16 and 23 September 2022 with the installation of a noise logger at the most affected site from State Highway noise. The approximate measurement location is as show in Figure 2 below.

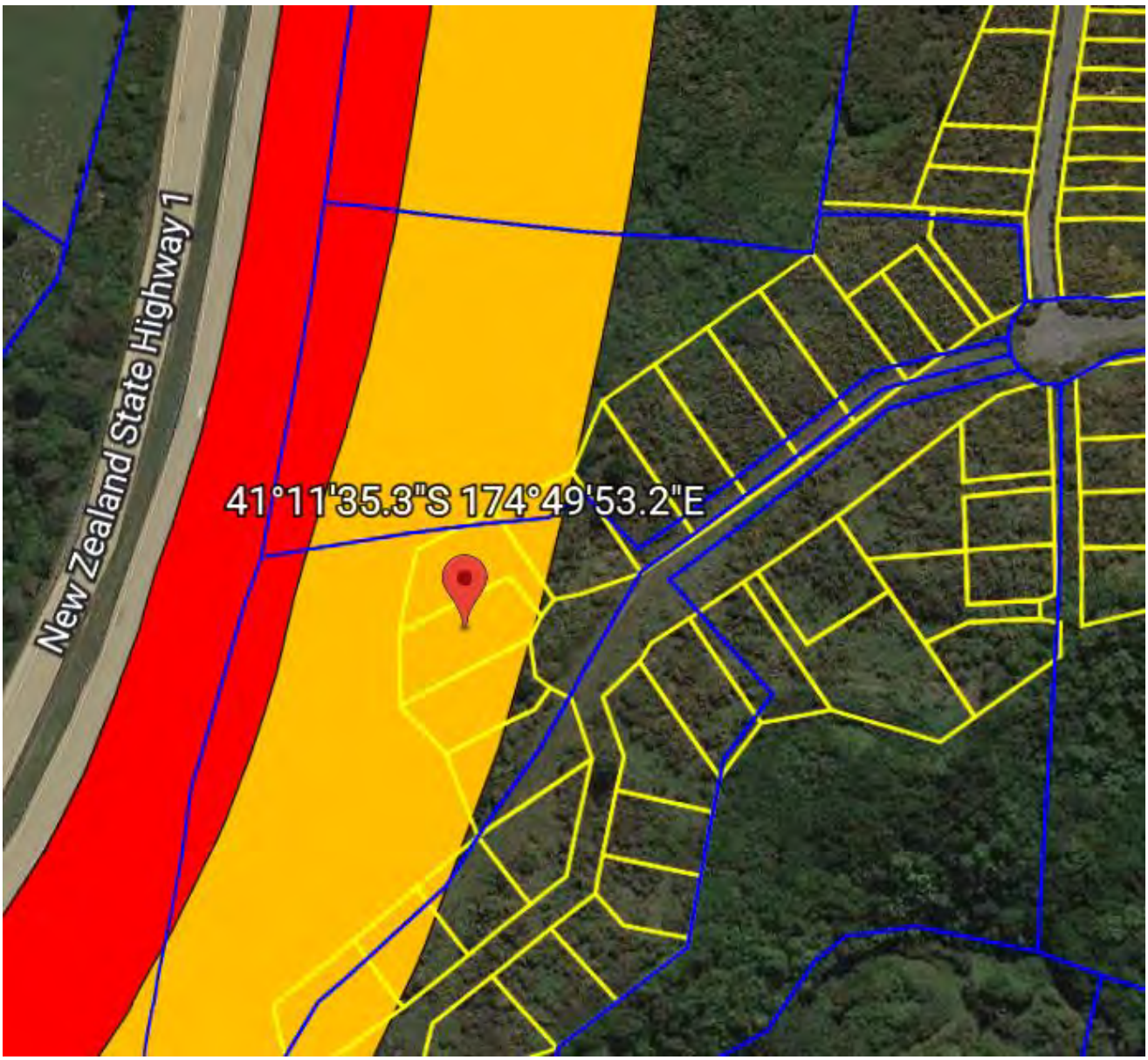

Figure 2: State Highway Noise Assessment Noise Logger Location

The average measured noise spectrum across the 7-day measurement period is listed in Table 1 below. Noise levels at the nominal facades have been predicted based on these measured levels.

Table 1: Measured Spectrum from State Highway Noise Assessment

Time and Date	Source	Measured External Traffic Noise Spectrum L_{eq} (dB) over Octave Band Centre Frequency (Hz)								Overall Level $L_{Aeq\ (24\text{-}hr)}$ (dB)
		63	125	250	500	1k	2k	4k	8k	
9:30am 16/09/2022 – 9:00am 23/09/2022	State Highway 1 (24-hr)	67	59	52	51	51	45	35	30	55

5 INTERNAL NOISE LEVEL CALCULATIONS

For the 8 lots created by the subdivision at Lots 1-16 DP 393192, Jamaica Drive, which occur within the 100m of the state highway network (State Highway 1), we have based our internal noise level calculations for living and sleeping areas on the following assumptions.

- Nominal façade locations are at approximately the noise logger location for the basis of our calculations.
- Sleeping areas have the following dimensions, glazing area, surface finishes and contents.
    - Dimensions: 2.4m high, 3.0m wide, 4.0m long
    - Glazing Area: 2.4m wide x 1.2m high
    - Surface finishes: Plasterboard ceilings and walls, carpet and underlay floor finish
    - Contents: Double bed
- Living areas have the following dimensions, surface finishes and contents.
    - Dimensions: 2.4m high, 6.0m wide, 8.0m long
    - Glazing Area: 3.0m wide x 2.4m high
    - Surface finishes: Plasterboard ceilings and walls, hard floor finish (timber, tile)
    - Contents: Two double sofas
- A nominal non-glazed façade build-up as follows has been assessed for the basis of our calculations.
    - 7.5mm cement sheet (or equivalent rigid air barrier)
    - 140mm timber stud at 600mm centres with 140mm 14kg/m3 polyester or glasswool insulation
    - 13mm standard plasterboard
- A nominal double glazed façade build-up as follows have been assessed for the basis of our calculations.
    - 4mm float glass / 12mm air gap / 4mm float glass
- A +3 dB correction has been applied to our calculations as per the following excerpt from the Waka Kotahi preliminary feedback.
    - *C. A design report prepared by a suitably qualified and experienced acoustics specialist must be submitted to the [council officer] demonstrating noise and vibration compliance prior to the construction or alteration of any building containing a noise sensitive activity in or partly in the state highway buffer area or effects area. The design must take into account the future permitted use of the state highway; for existing roads this is achieved by the addition of 3 dB to existing measured or predicted noise levels.*

5.1 Calculation Results – Ventilation via Openable Windows

With an assumed façade opening of 0.1m^2 to provide appropriate ventilation via openable windows and the assumptions noted in the previous section, results from our calculations are as per Table 2 below. This assumed area is relatively low, and a larger area may be required (which would result in more noise).

Table 2: Predicted Internal Noise Levels with Windows Open

Room Type	Predicted Internal Noise Level $L_{Aeq(24\text{-}hr)}$	Nominated Criteria $L_{Aeq(24\text{-}hr)}$
Sleeping Area	45 dB	40 dB
Living Area	44 dB	40 dB

It is evident from the predicted internal noise levels above, that the 8 lots which occur within the 100m of State Highway 1 are expected to exceed the nominated criteria set-out in the preliminary feedback provided by Waka Kotahi **with ventilation via openable windows**.

5.2 Calculation Results – Windows Closed (Forced Ventilation)

With windows closed (ventilation achieved via a forced vent system) and the assumptions noted in the previous section, results from our calculations are as per Table 3 below.

Table 3: Predicted Internal Noise Levels with Windows Closed

Room Type	Predicted Internal Noise Level $L_{Aeq(24\text{-}hr)}$	Nominated Criteria $L_{Aeq(24\text{-}hr)}$
Sleeping Area	37 dB	40 dB
Living Area	37 dB	40 dB

It is evident from the predicted internal noise levels above, that for the 8 lots which occur within the 100m of State Highway 1 are expected to comply the nominated criteria set-out in the preliminary feedback provided by Waka Kotahi **with windows closed and ventilation via a forced ventilation system**.

5.3 Forced Ventilation Requirements

It should be noted, where windows are to be closed to achieve the nominated internal noise levels from State Highway noise, the following excerpt applies from the Waka Kotahi preliminary feedback regarding reverse sensitivity.

> *a. If windows must be closed to achieve the design noise levels in [B], the building must be designed, constructed and maintained with a ventilation and cooling system. For habitable spaces a ventilation cooling system must achieve the following:*
>
> *i. Ventilation must be provided to meet clause G4 of the New Zealand Building Code. At the same time, the sound of the system must not exceed 30 dB LAeq(30s) when measured 1 m away from any grille or diffuser.*
> *ii. The occupant must be able to control the ventilation rate in increments up to a high air flow setting that provides at least 6 air changes per hour. At the same time, the sound of the system must not exceed 35 dB LAeq(30s) when measured 1 m away from any grille or diffuser.*

iii. The system must provide cooling that is controllable by the occupant and can maintain the temperature at no greater than 25°C. At the same time, the sound of the system must not exceed 35 dB LAeq(30s) when measured 1 m away from any grille or diffuser.

6 SUMMARY

Based on NDY Acoustics' State Highway noise assessment at Lots 1-16 DP 393192, Jamaica Drive, are finding are as follows.

- 8 of the lots created by the subdivision occur within the 100m of the state highway network (State Highway 1).
- Preliminary feedback from Waka Kotahi notes the following criteria regarding reverse sensitivity, where residential developments occur within 100m of the state highway network.
    - Living and Sleeping Areas - a maximum design noise level of 40 dB $L_{Aeq\ (24hr)}$
- A State Highway 1 Noise Assessment was conducted between 16 and 23 September 2022 at the nominal façade of these 8 lots.
- Based on the assumption made in Section 5 of this report we note the following.
    - We predict internal noise levels are expected to exceed 40 dB $L_{Aeq\ (24hr)}$ with windows open.
    - We predict internal noise levels are expected to comply with 40 dB $L_{Aeq\ (24hr)}$ with windows closed.

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NDY QA SYSTEM

Revision No:	1.0
Revision Date:	5 October 2022
Reason Description:	For Information

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Filename:	rp221004w0010
File Location:	\\tt.local\NDY\wel\w\W931xx\W93136\001\J-\24_Reports

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