Bladon Bronka Acoustics

Tahimana, Stagecoach Road

Acoustic Design Report

Project No. 22001

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Client: Tahimana Limited
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1. Introduction

Bladon Bronka Acoustics Ltd (BBA) has been appointed to acoustically assess the proposed Tahimana residential development at Stagecoach Road, Upper Moutere, Tasman. The Tahimana project has been referred to the Fast-track Approvals Act 2024 ("FTAA") process.

The project is to subdivide and develop land for the purpose of establishing a residential and rural lifestyle development on approximately 70 hectares of land off Stagecoach Road, Tasman, in the Tasman District. The project will include works within the Stagecoach Road, Dicker Road and Williams Road reserves.

The project will include:

a) subdivision to create approximately 145 allotments, including 4 allotments for reserve, roading and services, and enable construction of approximately 141 residential units across a range of densities
b) development of an open space network including a public reserve and walkways, and upgrades to shared pathways
c) landscape planting and restoration and enhancement of waterways and wetlands
d) associated infrastructure, including for three waters services and transport (including external road upgrade works).

The acoustic assessment is required to demonstrate compliance with the Reverse Sensitivity requirement relating to noise from the nearby SH60 operated by Waka Kotahi NZ Transport Agency.

This report details the results of the 3D road traffic noise modelling and the façade sound insulation requirements necessary to comply with the Waka Kotahi reverse sensitivity criteria.

2. Site Location

The proposed residential lots are located approximately 90-170m east of SH60, which runs north to south adjacent to the site. The site location (identified as lot 1 and 3 DP 450728) in relation to SH60 is presented in Figure 1.

The site layout showing the proposed residential lots is presented in Appendix A. The nearest proposed dwellings are located approximately 90m from the State Highway edge line and are partially screened due to the sloping topography of the land.

The Graphic Attachment to Landscape Assessment Report details that the dwellings nearest the State Highway on the western boundary will be limited to a maximum height of 5.5m and will therefore be single storey only.

Figure 1.Site location in relation to SH60 (outlined in Blue)

3. Reverse Sensitivity Requirements

Waka Kotahi have been consulted in regards to satisfying the Waka Kotahi Reverse Sensitivity requirements for residential dwellings located near a state highway. The standard conditions of consent (agreed with NZTA) are set out below and are considered appropriate for a land use consent enabling new residential buildings to be located in the state highway effects area.

3.1. Waka Kotahi Standard Consent Conditions

1. Any dwelling on the site must be designed, constructed and maintained to achieve a design noise level of 40 dB $L_{Aeq(24h)}$ inside all habitable spaces.

2. If windows must be closed to achieve the design noise level in [condition 1], the building must be designed, constructed and maintained with a ventilation and cooling system. For habitable spaces the system must achieve the following:
   - 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 $L_{Aeq(30s)}$ when measured 1 m away from any grille or diffuser.
   - 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 $L_{Aeq(30s)}$ when measured 1 m away from any grille or diffuser.
   - 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 $L_{Aeq(30s)}$ when measured 1 m away from any grille or diffuser.

3. A design report prepared by an acoustics specialist must be submitted to the [council officer] demonstrating compliance with [conditions 1 and 2], prior to construction or alteration of any dwelling. The design must take into account future permitted use of the state highway; for existing roads this is achieved by the addition of 3 dB to existing measured or predicted levels.

A summary of the acoustic performance requirements is summarised below:

- Habitable rooms must be designed to achieve an internal noise level of **40dB $L_{Aeq(24hr)}$**
- Internal noise must be achieved based on traffic noise including a **+3dBA factor of safety**

- Any HVAC system must be designed to achieve **30/35dB $L_{Aeq(30sec)}$** at 1m from any grille or diffuser for the respective Clause G4/6 air changes per hour ventilation rates (where windows must be closed to achieve the internal noise criterion)

4. Noise Predictions

In order to predict the maximum potential noise levels at each façade of the proposed development, a 3D noise model has been created using internationally recognised 3D noise modelling software CadnaA (Computer Aided Noise Abatement). The software calculates noise propagation in accordance with *ISO 9613-2: Acoustics — Attenuation of sound during propagation outdoors — Part 2: General method of calculation*. Calculation settings for the software include:

- C0 = 0 for slightly enhanced meteorological noise propagation
- G = 1.0 for soft ground conditions

Traffic noise levels across the site have been predicted using the Calculation of Road Traffic Noise (CRTN) methodology with adaptations for New Zealand road surfaces. The relevant inputs for the calculation have been obtained from NZTA Mobile Roads and include:

- Est Dec 2024 AADT: 7394
- 6% Heavy goods vehicles
- Speed 100km/h
- Road surface: Racked in Reseal Grade 3/5

Additionally, noise measurements were taken at 4 locations across the site boundary on the afternoon of 17 January 2022. These measurements were used to verify the noise model predictions.

Road traffic noise predictions have also been provided with a +3dB safety factor in accordance with the Waka Kotahi guidelines.

Input data for the surrounding area has been sourced from the Tasman District Council, with the site layout information and proposed ground contours for the development based on the latest drawings (Staig & Smith – 04/08/2025).

Outputs from the 3D noise model showing the predicted noise contours (including the +3dB adjustment) at 1.5m height (ground floor) and 4.5m height (first floor) are presented in Appendix B. These show maximum noise levels of 59 dBA at 1.5m and 61 dBA at 4.5m at the most exposed sites.

5. Façade Design Assessment

Traffic noise levels have been predicted across the proposed development, taking into account a +3dB correction in accordance with the reverse sensitivity Condition 3. Maximum noise levels of up to 61 dB $L_{Aeq(24hr)}$ are predicted at the boundaries of the most exposed sites (at first floor level).

A slightly open window being used for natural ventilation provides an outside to inside noise reduction of 15dBA from traffic noise. On this basis, any façade experiencing traffic noise level of higher than 55dB $L_{Aeq(24hr)}$ must have windows closed in order to achieve the internal noise criteria of 40dB $L_{Aeq(24hr)}$. This does not mean windows cannot be openable, but an alternative method of ventilation must be provided to allow them to remain closed if desired by the occupant.

Properties with habitable rooms located within the ≥55 dBA (orange) and ≥60 dBA (red) noise contours exceed the level at which natural ventilation can typically be utilised while still achieving the internal noise criteria. Therefore, windows must be shut to habitable rooms located within these contours, further details are provided in Section 6.

Noise levels for areas in lower noise contours (grey 50 dBA and yellow 45 dBA) are below 55dB $L_{Aeq(24hr)}$ and will all achieve the internal noise criteria with windows open for ventilation purposes.

No dwellings are proposed to be located within areas exceeding the ≥65 dBA noise contour.

At the time of writing, specific building designs are not available and therefore detailed façade noise break-in levels cannot be calculated. However, a conservative outside to inside traffic noise reduction has been calculated assuming a typical lightweight building envelope construction, set out as follows, as well as a typical traffic noise spectrum. Other equivalent constructions will also be suitable.

External walls

- 18mm timber weatherboard cladding
- 90x45mm timber studs at 600mm centres
- 90mm polyester or fibreglass insulation (8-15kg/m^3)
- 10mm Standard GIB internal plasterboard lining
- R_w+C_{tr} 27dB

Glazing

- 4mm glass / 12mm airspace / 4mm glass - double glazing
- The performance of the glazing is dependent on the glass, seals and frame as a combined system. To guarantee performance, the glazing manufacturer should provide acoustic test data from the whole glazing system (not just glass)
- R_w+C_{tr} 28dB

Roof

- 0.4mm profiled metal roof
- Timber truss roof construction
- Roof cavity of ≥240mm
- ≥240mm polyester or fibreglass insulation (8-15kg/m^3)
- 10mm Standard GIB ceiling
- R_w+C_{tr} 29 dB

With windows and doors closed, typical lightweight facades such as the above example constructions will provide an outside to inside noise reduction of at least 22 dBA. These constructions are therefore adequate to achieve the internal noise criterion of 40dB $L_{Aeq(24hr)}$ for all habitable rooms with a predicted external traffic noise level of ≤61dB $L_{Aeq(24hr)}$ (including +3dB safety factor for road traffic increase).

As no properties are predicted to be subject to noise levels greater than 62 dB $L_{Aeq(24hr)}$, no building envelope construction upgrades are anticipated to be required in order to achieve the Waka Kotahi internal noise criterion of 40dB $L_{Aeq(24hrs)}$ for habitable rooms.

6. Ventilation/Cooling

In order to achieve the requirement set out in Conditions 1 & 2 of the standard Waka Kotahi conditions, all properties within the 55 dB noise contours shown in Appendix B, will require alternative methods of ventilation/cooling to meet the internal noise criterion of 40dB $L_{Aeq(24hr)}$ (open window used for ventilation provides a reduction of 15dBA).

In accordance with Waka Kotahi Condition 2, for all habitable rooms requiring windows to be closed, the HVAC system must be designed to achieve the following, when measured at 1m from the grille or diffuser:

- Ventilation system to meet G4: 30 dB $L_{Aeq(30sec)}$
- Ventilation providing 6 air changes: 35 dB $L_{Aeq(30sec)}$
- Air conditioning / Cooling: 35 dB $L_{Aeq(30sec)}$

Upon receipt of the HVAC system design and plant selections, BBA can review the system against the internal noise level criteria.

7. Recommended Conditions of Consent

Due to maximum predicted noise levels of 61dB at the most exposed sites (including +3dBA to account for future increase in road noise), the 40dB $L_{Aeq(24hr)}$ internal noise criterion will be achieved with a factor of safety with typical lightweight façade constructions and standard double glazing (outlined in Section 5). Therefore Conditions 1 & 3 of the standard Waka Kotahi conditions of consent are expected to be satisfied for all proposed sites.

To satisfy the ventilation requirement, the following is proposed as a condition of resource consent:

1. All habitable spaces located within the 55dB $L_{Aeq(24hr)}$ noise level contour (shown in Appendix B), must be provided with a ventilation and cooling system achieving the following:
    a. 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 $L_{Aeq(30s)}$ when measured 1 m away from any grille or diffuser.
    b. 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 $L_{Aeq(30s)}$ when measured 1 m away from any grille or diffuser.
    c. 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 $L_{Aeq(30s)}$ when measured 1 m away from any grille or diffuser.

8. Conclusions

The residential development proposed by Tahimana Ltd at Stagecoach Road, Upper Moutere, Tasman is subjected to reverse sensitivity noise assessment due to the proximity to SH60. Waka Kotahi have identified a number of site conditions intended to manage reverse sensitivity effects associated with existing state highway noise.

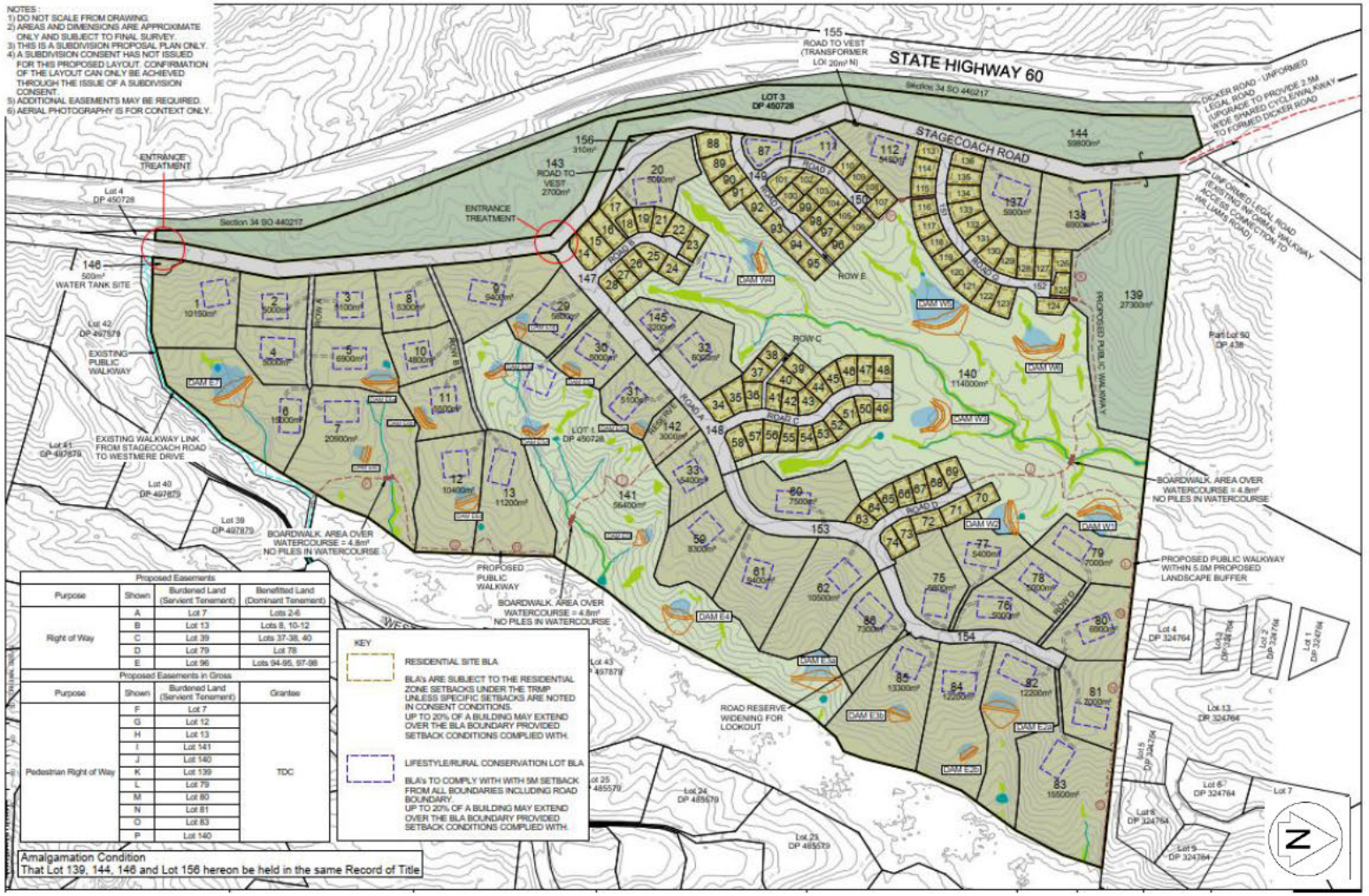
A survey was carried out on the subject site to establish existing traffic noise levels. The noise measurements were used to calibrate a 3D noise model for prediction of traffic noise levels across the site, taking into account a +3dB factor of safety for future traffic increases.

An assessment of noise levels at the proposed dwelling locations has been undertaken, identifying where windows will be required to be closed to achieve the internal noise criteria. These properties are all on the western extent of the site, closest to the state highway.

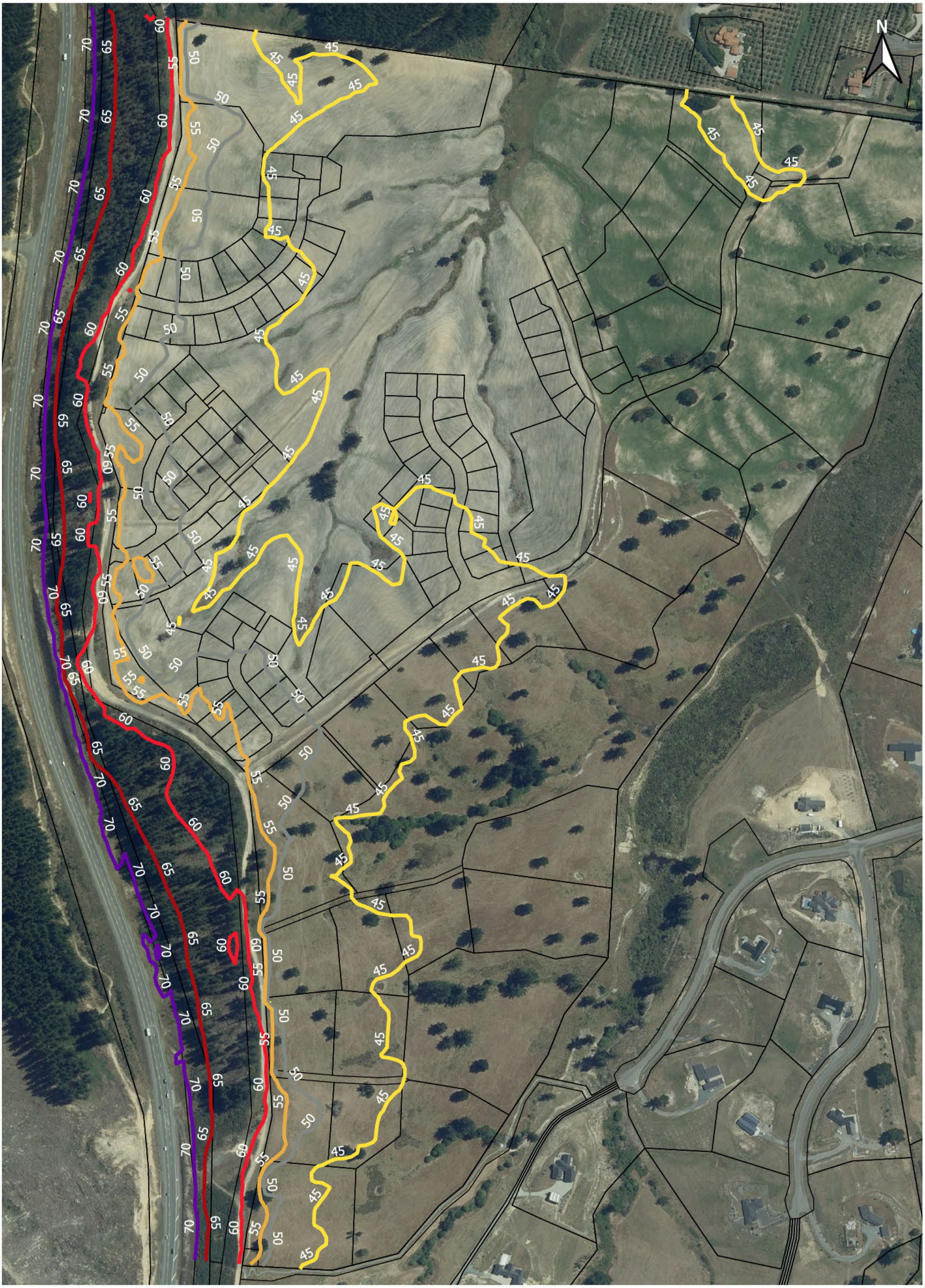
Accounting for typical lightweight façade constructions, the internal traffic noise criterion of the reverse sensitivity noise assessment will be achieved at all properties. The predicted noise levels are not such that specific mitigation measures or construction upgrades will be required.

For habitable rooms requiring windows to remain closed to achieve the internal noise criterion, alternative ventilation and cooling will be required. Verification of HVAC noise levels should be undertaken at detailed design stage to demonstrate compliance with the Waka Kotahi conditions.

Appendix A: Proposed Site Plan

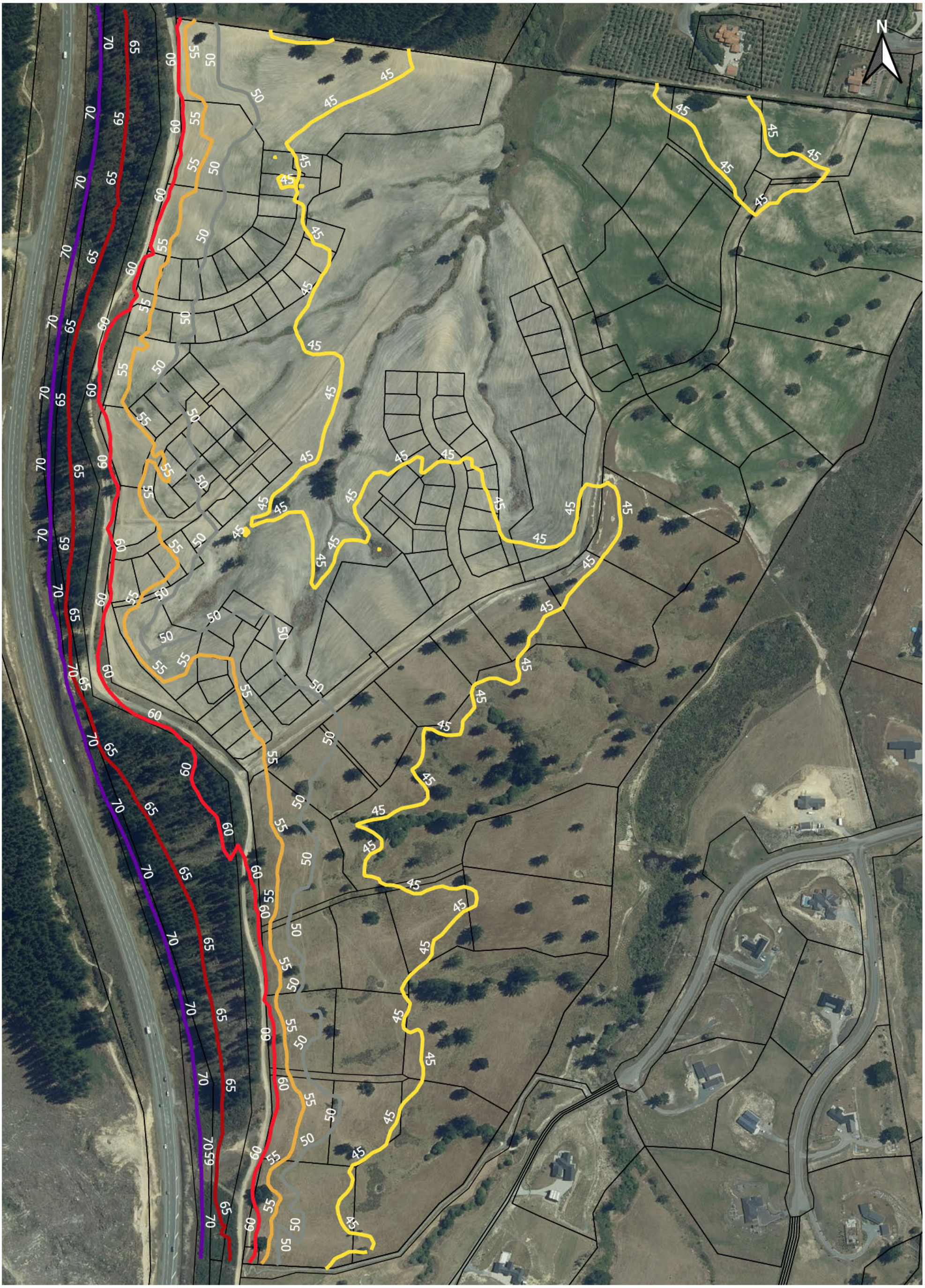


Appendix B: Predicted Noise Contours



Predicted traffic noise levels at 1.5m height (ground floor) - dB $L_{Aeq(24hr)}$
(includes +3dBA to account for future growth)

0 50 100 150 200 m



Predicted traffic noise levels at 4.5m height (first floor) - dB $L_{Aeq(24hr)}$
(includes +3dBA to account for future growth)

0 50 100 150 200 m