

Before an Independent Hearings Panel
Appointed by Waimakariri District Council

under: the Resource Management Act 1991

in the matter of: Submissions and further submissions on the Proposed
Waimakariri District Plan and Variation 1

and: Hearing Stream 12: Rezoning requests (larger scale)

and: **Crichton Developments Limited**
(Submitter 299)

Statement of evidence of Jeremy Trevathan (Acoustics) on behalf
of Crichton Developments Limited in relation to Gladstone Road
rezoning request

Dated: 5 March 2024

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STATEMENT OF EVIDENCE OF JEREMY TREVETHAN ON BEHALF OF CRICHTON DEVELOPMENTS LIMITED

INTRODUCTION

- 1 My full name is Jeremy William Trevathan.
- 2 I am the Principal Acoustic Engineer and Managing Director of Acoustic Engineering Services Limited (AES), an acoustic engineering consultancy with offices in Auckland, Wellington and Christchurch.
- 3 I hold the degrees of Bachelor of Engineering with Honours and Doctor of Philosophy in Mechanical Engineering from the University of Canterbury. I am an Associate of the New Zealand Planning Institute, and a Member of the Acoustical Society of New Zealand (ASNZ). I am the AES Member Representative for the Association of Australasian Acoustical Consultants (AAAC), a judge for the Association of Consulting Engineers of New Zealand (ACE NZ) Innovate Awards, and a member of the MBIE College of Assessors. I was a member of the ASNZ working group advising the Ministry for the Environment (MfE) regarding the National Planning Standards (2019).
- 4 I have more than 17 years' experience in the field of acoustic engineering consultancy and have been involved with a large number of environmental noise assessment projects throughout New Zealand. I have provided expert evidence before Council Hearings Panels, the Environment Court and Boards of Inquiry.

CODE OF CONDUCT

- 5 Although this is not an Environment Court hearing, I note that in preparing my evidence I have reviewed the Code of Conduct for Expert Witnesses contained in Part 9 of the Environment Court Practice Note 2023. I have complied with it in preparing my evidence. I confirm that the issues addressed in this statement of evidence are within my area of expertise, except where relying on the opinion or evidence of other witnesses. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

SCOPE OF EVIDENCE

- 6 I have been asked to comment on the relief sought by Crichton Developments Limited (*Crichton*) (Submitter 299) in relation to the proposed Waimakariri District Plan (*Proposed Plan*). Specifically, the request to rezone land at 145-167 Gladstone Road, Woodend (*site*) from Rural Lifestyle Zone (*RLZ*) to Large Lot Residential Zone (*LLRZ*) (*the Proposal*).
- 7 My evidence will address:

- 7.1 The expected noise levels from the New Zealand Transport Agency / Waka Kotahi (NZTA) State Highway and proposed physical mitigation;
 - 7.2 Internal noise levels and controls;
 - 7.3 External noise levels within residential outdoor areas; and
 - 7.4 Vibration levels.
- 8 In preparing my evidence, I have reviewed:
- 8.1 Submission on the Proposed Waimakariri District Plan titled *145 and 167 Gladstone Road, Woodend*, as prepared by Inovo Projects Ltd and dated the 30th of November 2021.

EVIDENCE

- 9 **Expected noise levels associated with the State Highway**
- The NZTA Designation for the Woodend Bypass (the *NZTA Designation*) is located over the eastern portion of the site. The design of this future road is still not developed, and therefore there are a number of factors which will affect the resultant noise levels emitted. However, based on the available information in order to provide an indication of the potential noise levels over the site, I have undertaken computational desktop modelling using the Calculation of Road Traffic Noise (*CoRTN*) algorithm applied with SoundPLAN (v8.2) 3D noise modelling software. My analysis is based on the following assumptions:
- 9.1 I understand the NZTA Designation is expected to carry around 80% of the vehicles that currently pass through Woodend each day on Main North Road (State Highway 1).¹ I have applied a 3% per year increase to the most recently available (Annual Average Daily Traffic) AADT information for Main North Road (State Highway 1) until 2024. The final AADT that I have used in my modelling is 15,813.
 - 9.2 I have assumed that all heavy vehicles which currently pass through Woodend on State Highway 1 will be rerouted to the NZTA Designation, which I expect to be a conservative estimate. The final heavy vehicle traffic flow percentage I have used in my modelling is 15.8%.

¹ NZ Transport Agency, "Woodend Corridor designation to be notified". Media release. 23 Jan 2014. <https://www.nzta.govt.nz/media-releases/woodend-corridor-designation-to-be-notified/>

- 9.3 I have assumed a low noise road surface such as Open Grade Porous Asphalt or Asphalt Concrete will be used (in line with discussions with NZTA²).
- 9.4 A +3 dB increase has been applied to predicted traffic noise levels to allow for future increases in traffic. In the absence of any changes in vehicle fleet emissions or road surface improvements over time, this would equate to a doubling in vehicle movements.
- 9.5 I have assumed that the NZTA Designation will contain a dual carriageway with two lanes on each side, and with a speed limit of 100 km/hr.
- 9.6 I have assumed the highway would travel along the centre of the NZTA Designation at current ground level, and have not attempted to include any possible cut or fill, or the detail which is likely to be associated with the Gladstone Road overpass.
- 10 Overall, I expect these assumptions to be conservative based on the available information; however, as above, the road is yet to be designed and therefore the resultant noise levels ultimately remain indicative only.
- 11 This modelling indicates that the site would receive noise levels similar to those in the noise contours shown in figure 1 - ranging from 52 dB LAeq(24h) (western-most end) to 65 dB LAeq(24h) at the edge of the NZTA Designation.

² Meeting between Georgia Brown and NZTA representatives, 7 December 2023

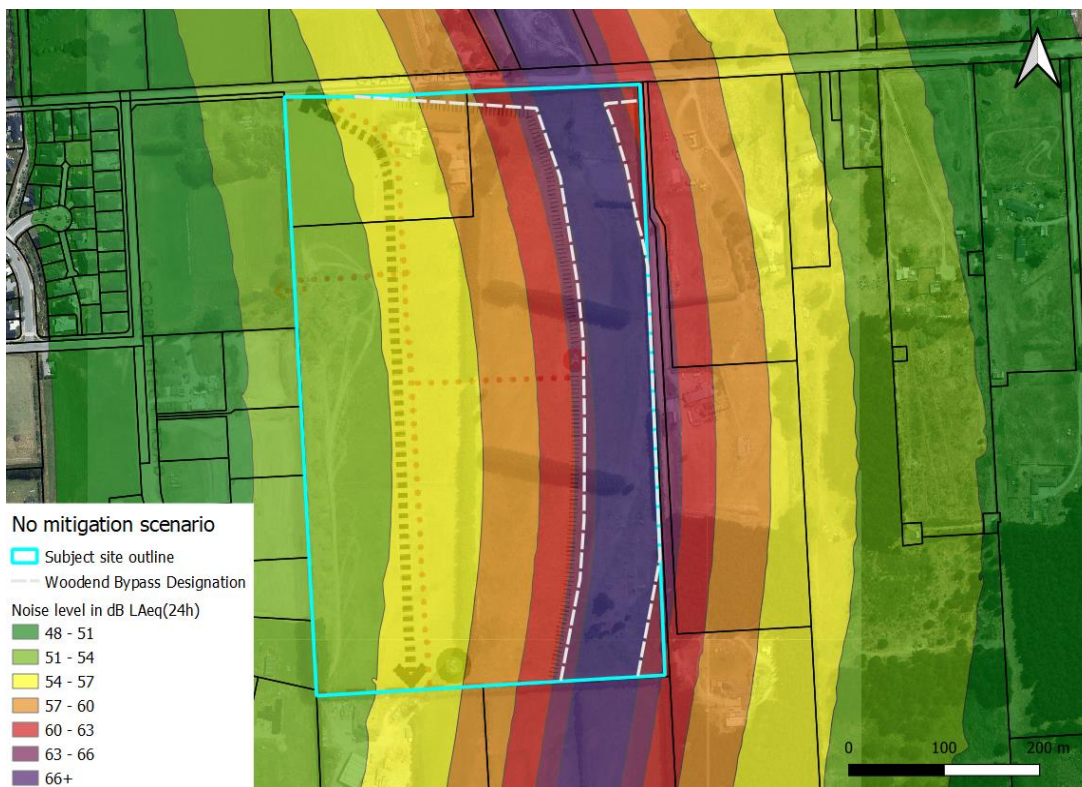


Figure 1 – Indicative noise levels across the subject site with no mitigation

- 12 Based on this modelling, it was determined that the most practical physical mitigation that could be installed on the site by Crichton Developments would be a three-metre-high acoustic barrier along the western side of the NZTA Designation. This has been adopted by Crichton as part of the Proposal and is shown on the Outline Development Plan.³
- 13 With this mitigation in place, I expect the site would receive noise levels similar to those shown in the noise contours in Figure 2 – a level of 51 dB LAeq(24h) to 57 dB LAeq(24h) for the majority of the site at 1.5 metres above ground level. Small areas of the lots at the north-east and south-east corners of the site may receive up to 58 dB LAeq(24h) – however the acoustic barrier design could also be improved in these areas, if more detail was available as to the likely form of the development in the NZTA Designation.

³ Outline development plan titled *Crichton Development – 145-167 Gladstone Road, Woodend*, as prepared by Novo Group Limited, received via email on the 20th of February 2024

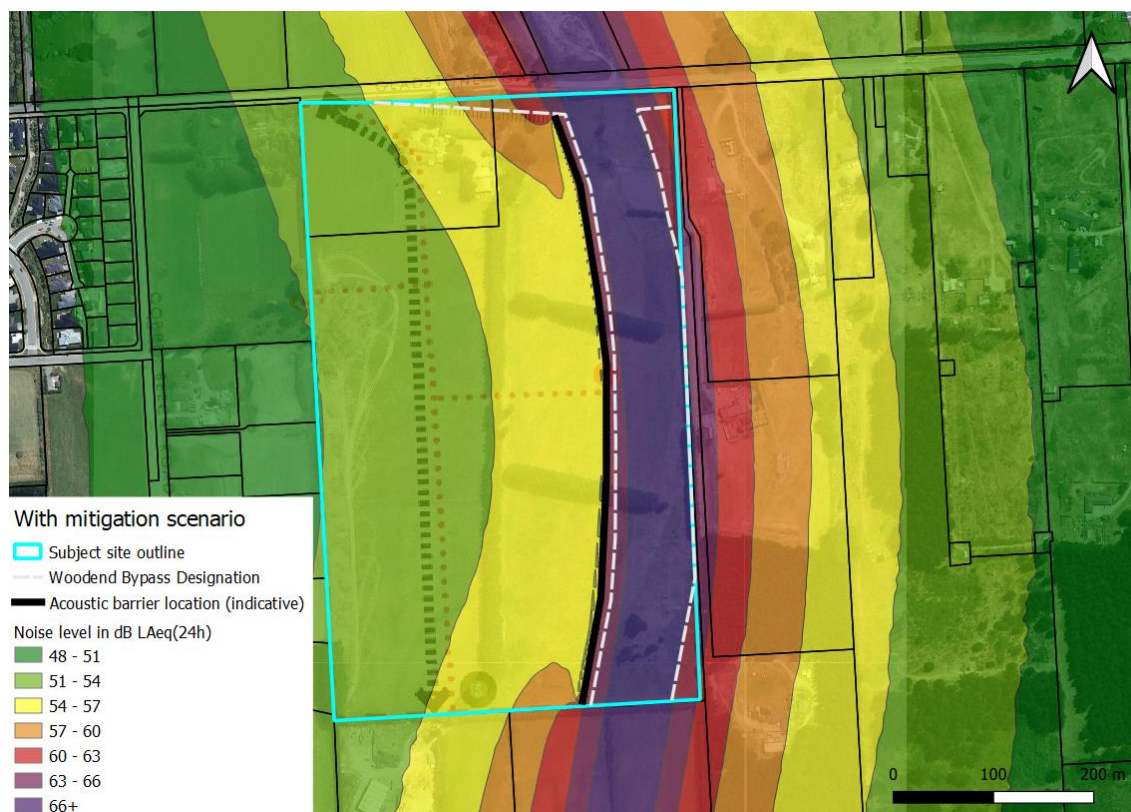


Figure 2 – Indicative noise level across the subject site with mitigation

14 Based on this modelling and mitigation I have further considered the following three key issues:

- 14.1 Noise within internal habitable spaces of dwellings;
- 14.2 Noise in the outdoor living areas associated with dwellings;
and
- 14.3 Road traffic vibration levels received at dwellings.

Internal noise levels

15 The Proposed Plan includes a sound insulation requirement (either via an internal noise level requirement or a façade reduction method) for dwellings within 100 metres of a State Highway (including this NZTA Designation), a refined form of which has been agreed in a Joint Witness Statement (*JWS*) from the acoustic experts.⁴

16 Overall, I agree that this is an appropriate method to control the internal noise levels within the future dwellings. I note that, with the acoustic barrier included in the Proposal, minimal upgrades will be required to achieve the required internal noise levels for any single level dwellings on the site, as the external levels are modest. The

⁴ Camp, S., Chiles, S., Styles, J. 'Joint Witness Statement – NOISE-R16' In the matter of the Proposed Waimakariri District Plan. 24 October 2023.

Rule and proposed Draft Construction Schedule appear to anticipate new dwellings constructed in areas where outdoor traffic noise levels are higher than will be the case on the site.

- 17 If two-storey dwellings were proposed, the expected noise levels at the upper-level façade would be higher (as the barrier would provide less shielding). However, I expect the internal noise level requirement to still be able to be readily achieved, as the expected external noise levels (potentially up to 65 dB LAeq(24h)) are not unusual for dwellings being located to adjoining roads. This is illustrated by the fact that the Draft Construction Schedule proposed in the JWS would readily ensure appropriate internal noise levels for the upper level of such dwellings.

Outdoor noise levels

- 18 There is no specific protection provided for residential outdoor noise levels adjoining State Highways in the Proposed Plan, and no discussion of this issue within the associated JWS.
- 19 As outlined above, the current indicative modelling suggests that noise levels will be 57 dB LAeq(24h) or less over the majority of the site.
- 20 Relevant guidance includes:
- 20.1 The NZTA Guidance document⁵ states that the 'effects area' (where sound insulation rules apply) is between 57 and 64 dB LAeq(24h). No additional controls are recommended outside the effects area and therefore it is implied that, where noise levels are below 57 dB LAeq(24h), the noise levels would be appropriate for residential use without further consideration.
- 20.2 NZS6806:2010 *Acoustics – Road-traffic noise – New and altered roads* recommends an external noise criterion of 57 dB LAeq(24h) for residential buildings.
- 21 Therefore, the current indicative modelled noise levels over the majority of the site are of an order that would typically be considered acceptable for residential outdoor areas in the vicinity of roads, with no further mitigation.
- 22 With an alternative RLZ, while at a lower density, dwellings could be constructed on the subject site with no bund in place, and experience higher noise levels. This is currently the case for many existing dwellings adjoining busy roads throughout the Waimakariri District, and new dwellings which could be constructed 'as of right' on other sites adjoining the NZTA Designation of various zonings, or in the vicinity of other roads in the District.

⁵ NZ Transport Agency, 'Guide to the Management of Effects on noise sensitive land near to the state highway'. Version 1.0, September 2015.

- 23 Therefore, even if the final noise levels over the site were to increase slightly over those currently modelled (or, for example, be higher on the balconies for two storey dwellings facing towards the NZTA Designation), I would still expect external noise levels to remain within the range where noise effects on outdoor living would not typically be a determinative factor in a decision about whether a site was suitable for more intensive residential development.

Vibration

- 24 With regard to vibration, the NZTA Guidance document states that the new buildings in or partly in the State Highway buffer area must be designed, constructed and maintained to achieve road-traffic vibration levels complying with class C of NZ 8176E:2005 *Vibration and shock - Measurement of vibration in buildings from land-based transport and guidance to evaluation of effects on human beings (NS 8176.E:2005)*.
- 25 NS 8176.E:2005 recommends that vibration levels in new residential buildings comply with Class C classification of 0.3 mm/s $v_{w,95}$, outlined in NS 8176.E:2005. If this is met, then it is expected that potential reverse sensitivity effects associated with road traffic vibration will be adequately mitigated.
- 26 Based on previous vibration measurements that I have undertaken, and the data published within the NZTA Guidance document, these vibration limits are typically readily achieved if dwellings are at least 15 – 20 metres from the road surface, unless there is an obvious defect in the design or maintenance of the roadway.
- 27 Given the width of the NZTA Designation, the portion of the site to be used for bunding, the lot sizes associated with LLRZ, and the likely site access configurations which would arise from the roading layout shown in the ODP, I consider it unlikely that vibration will be an issue in this case.

CONCLUSION

- 28 Due to the location of the NZTA Designation the future noise and vibration effects on this site are of relevance, in particular the internal noise levels, external noise levels in outdoor areas, and vibration levels.
- 29 While the design of the proposed State Highway is yet to be developed, based on the available information I have completed computational modelling to determine the possible noise levels over the site. This modelling includes a three-metre high acoustic barrier alongside the NZTA Designation, which was determined to be the most practical solution to provide a meaningful noise reduction to any future residential sites. Crichton Developments has now adopted this acoustic barrier as part of the Proposal.

- 30 Based on the expected noise levels with the proposed mitigation, I have concluded that the potential internal noise levels within habitable spaces of dwellings on the site will be able to be appropriately controlled with the existing provisions within the Proposed Plan.
- 31 While no protection is currently provided within the Proposed Plan for residential outdoor areas, I have also concluded that the expected external noise levels would be in a similar order to what is considered acceptable in the NZTA Guidance, and NZS6806, and below what is routinely experienced in other areas within the Waimakariri District. While outdoor levels could be higher than I have modelled (subject to the final design of the road within the NZTA Designation) and/or would be higher in a more unusual arrangement such as a second storey balcony looking towards the NZTA Designation, they will remain within the range where noise effects on outdoor living would remain acceptable.
- 32 Provided that the roadway within the NZTA Designation is designed and maintained in line with good practice, I expect that the vibration levels when received at any potential future residential dwelling would be low.

Dated: 5 March 2024

Jeremy Trevathan