

Memorandum

To: Dean Chrystal & David Smith, Hearing Panel for the Hurunui District Council

CC: Damienne Donaldson, Davis Olgilvie & Partners Ltd

From: Tracy Hilliker, Acoustic Engineering Services

File Reference: AC22032 – 04 – R1

Date: Tuesday, 13 June 2023

Project: UWC Limited 64 Amberley Beach Road and 187 Carters Road, Amberley
Stages 3 – 6 ‘The Clearing’ Subdivision
Response to Minute 3

Pages: 7

Meeting

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Memorandum

File Note

Dear Commissioners,

Re: Minute 3: Memorandum relating to acoustic questions and other matters

Introduction

My name is Tracy Anne Hilliker, and I am an Associate Principal Acoustic Engineer at Acoustic Engineering Services Limited (AES), an acoustic engineering consultancy with offices in Auckland, Wellington and Christchurch.

I hold a degree of Bachelor of Engineering with Honours in Mechanical Engineering from the University of Canterbury. I am a Member of the Acoustical Society of New Zealand (ASNZ) and am also a Councillor and Vice President – South Island for the ASNZ. I have fifteen 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.

My role in the proposal to date has been as technical reviewer and supervisor for all noise modelling, monitoring and analysis. Working with my colleague Mr Robin Chen of AES, I was responsible for reviewing and providing input to the acoustic assessment titled *The Clearing Subdivision, Stages 3 – 6, Carters Road, Amberley, Hurunui – State Highway noise and vibration review*, AES file reference AC22032 – 02 – R1, dated the 21st of March 2022 (herein referred to as the acoustic report) which accompanied the application. I have also subsequently responded to questions raised by the Applicant’s team, as they prepared evidence for this hearing.

Whilst this is a Council hearing, I acknowledge that I have read and agree to comply with the Environmental Court’s Code of Conduct for Expert Witnesses, contained in the Environment Court Practice Note 2023. My qualifications as an expert are set out above. Other than where I state that I am relying on the advice of another person, I confirm that the issues addressed in this response are within my area of expertise. I have

not omitted to consider material facts known to me that might later or detract from the opinions that I express.

Background

I have compiled a response to the series of questions directed to Mr Chen, as raised in the Hurunui District Council Commissioners’ Minute 3 relating to the acoustic assessment, and other matters which arose during the hearing on the 29th of May 2023.

My response is based on the following documentation:

- Scheme plan titled *The Clearing – Stage 3 – 6*, Revision D, as prepared by Davis Ogilvie & Partners Limited, and dated May 2023
- Email between Wayne Gallot (Senior Transport Engineer, Novo Group Limited) and Damienne Donaldson (Principal Planner, Davis Ogilvie & Partners Ltd), RE: [#DO42542] *Acoustic Questions*, dated 3:07 pm Friday 2nd June 2023
- Email between Gary Stevenson (Civil Engineer, Davis Ogilvie & Partners Ltd) and Damienne Donaldson (Principal Planner, Davis Ogilvie & Partners Ltd), RE: [#DO42542] *Acoustic Questions*, dated 2:36 pm Friday 2nd June 2023

I note that the acoustic assessment which accompanied the application was based on the Master Plan titled *The Clearing – Stages 3 – 6 Proposed Development*, Issue H, as prepared by Davis Ogilvie & Partners, and dated February 2022. Compared to the latest scheme plan (May 2023), there have been some minor lot boundary position changes across roadside lots 253 – 259, as shown in figure 1 below. I also note that lots 257 and 258 are omitted. The layout updates are not expected to change any previous conclusions. Nonetheless, for the purposes of my response below, where there is a change in lot position/number, my response refers to the most recent plan.

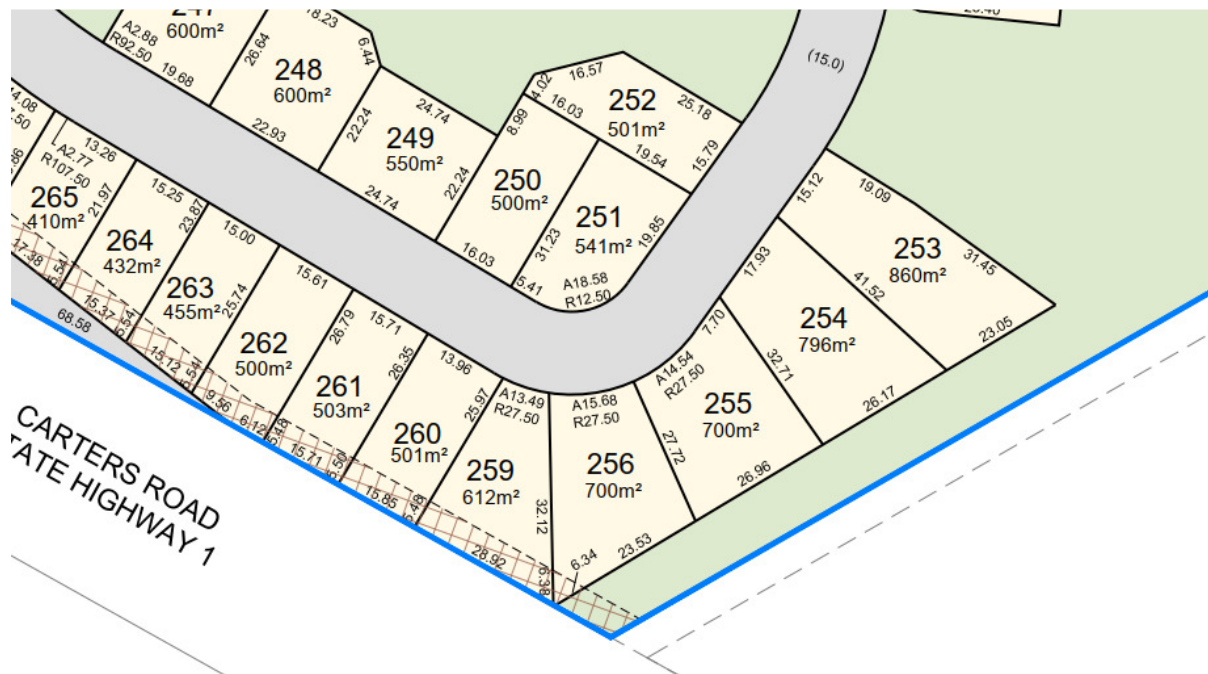


Figure 1 – May 2023 subdivision plan lot excerpt (with lot 257 – 258 omission)

Please find my response below to the various questions raised.

4i	<i>Have the noise and vibration assessments been undertaken based on the current speed environment on State Highway 1 (SH1)?</i>
Yes – the traffic noise and vibration assessments have been based on the current speed limit on this section of State Highway 1, being 80 km/hr.	
4ii	<i>Does planting on the bund further aid in the performance of the proposed acoustic barrier?</i>
No, foliage does not provide any appreciable noise shielding unless very dense (completely blocking a line of sight), and more than 10 meters thick. Planting has not been relied on to provide noise attenuation.	
4iii	<i>With reference to 4.1.1 of the acoustic report – given the noise levels for a two-storey building are well in excess of the 57 dB LAeq (24hr) limit for these lots (lots 257 – 279) – should the restriction on building two storey houses extend much further into the site assuming they have line of site with the State Highway?</i>
<p>I have recommended that two-storey buildings are avoided on lot 256 and lots 259 – 279, as significant upgrades would be required to the upper-level façades of these dwellings in order to meet the NZTA internal noise level guidelines, due to the upper-level façades receiving high noise levels (up to 69 dB LAeq(24h)) because there is reduced attenuation from the acoustic bund/fence.</p> <p>However, noise levels received at other lots (apart from those outlined above) are much lower due to the increased setback from the State Highway, and in practice, due to additional shielding that will occur from the development of closer lots. Computational noise modelling indicated that worst-case noise levels of up to 64 dB LAeq(24h) could be expected for lots not adjacent to the State Highway. However, in these circumstances, the degree of sound insulation to any upper-level façades required to meet the NZTA internal noise level guidelines would be less (likely small upgrades over standard residential construction). I therefore do not see any reason to restrict two-storey dwellings on lots located within the development that are further set-back from the State Highway.</p>	
4iv	<i>Under 4.1 reference is made to “a ventilation and cooling system is expected to be required for the dwellings on Lots 257-279”. Is this considered to be a necessary condition of consent?</i>
<p>I have not reviewed any specific dwelling design for the lots located closest to the State Highway. Nonetheless, due to anticipated external noise levels and acoustic mitigation proposed (as outlined in the assessment) I expect that a ventilation and cooling system will be required to ensure appropriate internal noise levels are achieved within habitable spaces.</p> <p>I therefore support the requirement as a Condition of Consent for lot 256 and lots 259 – 279.</p> <p>The basis of any condition relating to ventilation and cooling systems could reference that of the Waka Kotahi (NZTA) Guide to the management of effects on noise sensitive land use near the state highway network (version 1.0, dated September 2015) as was outlined in section 4.1 of the acoustic report, reproduced below:</p> <ul style="list-style-type: none"> ▪ Ventilation must be provided to meet Clause G.04 of the New Zealand Building Code. At the same time the sound of the system must not exceed 30 dB LAeq(30s) when measured 1.0 metre 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 (more than is specified in clause G.04). At the same time the sound of the system must not exceed 35 dB LAeq(30s) when measured 1.0 metre away from any grille or diffuser. 	

	<ul style="list-style-type: none"> 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 1.0 metre away from any grille or diffuser.
4v	<p><i>Outdoor living areas are referred to in 4.1.2. What level of noise might be expected on the west side of a dwelling i.e. between the dwelling and the bund? Are there further mitigation measures that might reduce that noise level in this area?</i></p>
<p>As indicated in figure 4.2 of the acoustic report, noise levels of 60 to 65 dB L_{Aeq} could be expected on the western portion of a site (between a dwelling and acoustic bund/fence). Ultimately, the noise levels received will depend on dwelling placement on the site, traffic flow and time of day.</p> <p>The following additional mitigation measures could be employed to further reduce noise in these areas:</p> <ul style="list-style-type: none"> Designing and orienting outdoor areas to the north-east such that they are shielded from road noise by other structures (i.e. the dwelling, garage, other ancillary buildings such as a sleepout). Additional localised fencing around outdoor areas. Higher acoustic barrier (bunding and fence) between the State Highway and lots. 	
4vi	<p><i>In 4.2 reference is made to two-storey buildings potentially requiring “increased acoustic construction upgrades, more in line with those outlined in table 1”. Which are the lots potentially impacted by this?</i></p>
<p>The identified lots are:</p> <ul style="list-style-type: none"> 239 – 243 247 – 251 254 280 – 284 286 289 – 292 	
4vii	<p><i>To what extent would noise and vibration from SH1 reduce if the speed environment were reduced to 50 kph along the SH1 site frontage as is proposed if the retirement village intersection were constructed.</i></p>
<p><u>Noise</u></p> <p>I understand from email correspondence between Wayne Gallott (Novo Group Limited) and Damienne Donaldson (Davis & Ogilvie Ltd) that the current proposal for Carters Road is to retain the existing 50 km/hr to 80 km/hr speed limit change point just north of the planned new intersection, but with a change in speed limit from 80 km/hr to 60 km/hr from this location, to just south of the Grays Road intersection adjacent to the subdivision site. I have therefore assessed the expected effects if the speed limit were to be reduced to 60 km/hr instead of 50 km/hr.</p> <p>Based on a speed decrease to 60 km/hr, the following figure 2 below illustrates the difference or decrease in noise level across the subdivision with the change in speed limit on the State Highway adjacent to the subdivision.</p>	

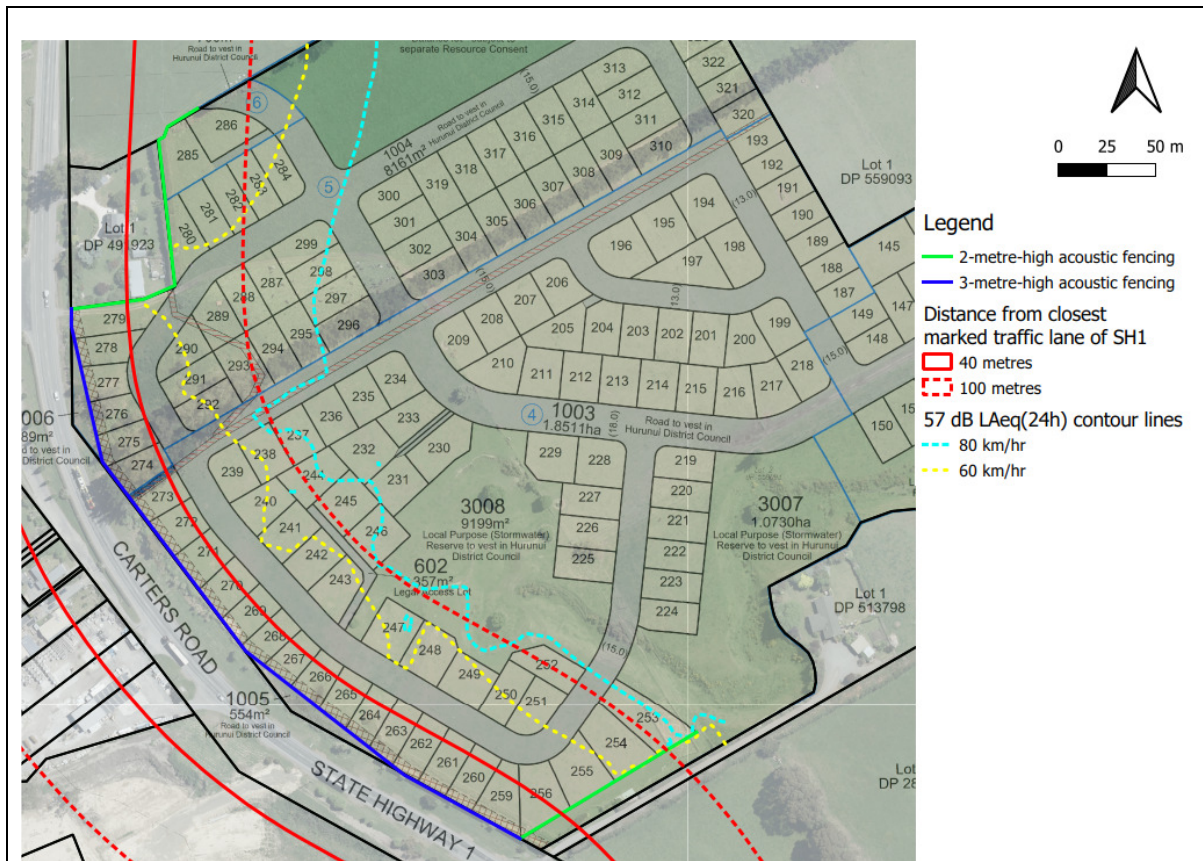


Figure 2 – 57 dB $L_{Aeq}(24h)$ noise contour for 80 km/hr and 60 km/hr speed limits on SH1

This shows that where the speed limit is reduced to 60 km/hr:

- Noise levels would decrease in the order of 1 – 2 dB $L_{Aeq}(24h)$ across the subdivision at the assessed lots.
- An estimated further 14 lots would receive noise levels of 57 dB $L_{Aeq}(24h)$ or less at ground floor level. Dwellings constructed on these lots would not require any mitigation controls (sound insulation upgrades) to ensure appropriate internal noise levels received within habitable spaces.
- All other lots within the buffer and effect zones (42 lots) may require slightly reduced acoustic sound insulation upgrades in order to meet the NZTA internal noise level requirements, compared to the situation where the speed limit is 80 km/hr, since the noise levels predicted to be incident on the façade of each dwelling may be slightly lower (by up to 2 dB). The extent of upgrades required will still be largely dependent on building design (i.e., building orientation, light-weight vs heavy construction elements, areas of glazing, and the like).
- We still recommend that two-storey buildings are not constructed on road-side lots 256 and 259 – 279, as the upper-level façade would receive noise levels in the order of 67 – 68 dB $L_{Aeq}(24h)$ since there is less attenuation provided by the acoustic bund/fence design. Two storey- dwellings are expected to require significant acoustic upgrades to the dwelling construction in order to meet NZTA internal noise level guidelines.

I understand that the change to the speed environment was previously proposed to be 50 km/hr rather than 60 km/hr as assessed above. Based on the current traffic count data and road surface, the difference in noise levels between 50 km/hr and 60 km/hr is less than 1 dB $L_{Aeq(24h)}$, which subjectively would not be perceptible. Based on the latest site plan (May 2023), compared to 60 km/hr, four additional lots (lots 241, 250, 251, 284) would receive noise levels of 57 dB $L_{Aeq(24h)}$ or less, and therefore not require any additional acoustic controls.

Vibration

Based on vibration monitoring conducted on site, I expect vibration effects to be adequately mitigated provided that no dwelling is built within 20 metres from the road edge of SH1. On the updated scheme plan (May 2023), the presence of a no-build 'acoustic bund/fence area' on road-side lots means that no dwellings can reasonably be expected to be built within 20 metres of SH1 in practice, and therefore vibration effects are expected to be appropriately managed.

The reduction in speed limit from 80 km/hr to 60 km/hr is expected to decrease vibration levels resulting from vehicle movements on SH1 (and may result in vibration effects on dwellings being appropriate at less than 20 metres from SH1), but this is not easily quantified. Since, on the latest site plan, dwellings would not be built within 20 metres of SH1, I recommend that the previous 20 metre control is retained.

4viii Are there implications here of a lower speed limit on the acoustic barrier requirements (i.e. would it still be necessary) and offset of dwellings from SH1? Would other recommendations e.g. vibration mitigation still be required?

As outlined above a reduction in speed to 60 km/hr will not significantly reduce the noise propagation from vehicles travelling on SH1 (up to 2 dB). For the current layout, even with a reduced speed limit, I still recommend the 3.0 metre acoustic barrier (bund/fence combination) is retained, to ensure that the extent of acoustic upgrades required across the site to meet NZTA internal noise level requirements is practical.

4ix Please explain the reference to "no vegetation buffer" for lots 265-267 and 276 - 278 i.e. what is the relevance of this?

'Vegetation buffer' refers to the 'no build' buffer for road-side lots, which was annotated on the Master Plan scheme plan (Feb 2022) that the acoustic assessment was based on. The 'vegetation buffer' did not extend through lots 265 - 267 and 276 - 278, which could otherwise have been interpreted that dwellings could potentially be built within 20 metres of the State Highway, and would otherwise require mitigation for vibration effects.

The updated Scheme Plan (May 2023) indicates a no-build 'acoustic bund/fence area' buffer zone for all nominated road-side lots. Since no dwelling can practically be built within 20 metres of SH1, the reference to a 'no vegetation buffer' is therefore no longer relevant.

4x With reference to table 5.1 of the noise report – noting that there will be over 2m of fill to the Dry Gully area near SH1 are the vibration reports likely to be different to that tested where fill has been used?

Vibration levels vary based on the type of soil / fill it travels through. Based on information provided by Gary Stevenson (Civil Engineer, DO), I understand that the proposed fill material for the Dry Gully area will be "engineered fill with compaction that achieves 95% Maximum Dry Density as determined by laboratory testing of the material. Essentially this material will be comparable to surrounding in situ soils in performance".

Based on the above, and in consideration of fill material being comparable to surrounding in situ soils, I do not anticipate that there will be an appreciable difference in vibration propagation from vehicles travelling on State Highway 1 compared to that outlined in the acoustic report.

I trust this information is of assistance.

Ngā mihi,



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Associate Principal Acoustic Engineer
Acoustic Engineering Services Ltd