

23 October 2020

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The Hawthorndale Care Village Charitable Trust  
C/- WSP  
via email: luke.mcsoriley@wsp.com

Dear Luke

**RMA/2020/80 0 - Hawthorndale Care Village  
Acoustics Assessment**

## 1 Introduction

The Hawthorndale Care Village Charitable Trust is proposing to develop an aged care facility in Invercargill. Altissimo Consulting has been engaged to perform an acoustic assessment to support the resource consent process. This assessment has considered the following:

- Application and AEE (WSP report dated 15 May 2020)
- s92 request dated 26 May 2020
- Relevant submissions resulting from the public notification.

We note the s92 requests the following information.

*A noise assessment addressing the potential effects on the adjoining properties. There is potential for noise emissions from the site, including noise from vehicles, mechanical plant, deliveries and loading activities and rubbish removal to adversely affect occupants of adjoining properties, particularly during night-time hours.*

In a subsequent email, this requirement was clarified as follows:

*a noise assessment report, (prepared by a suitably qualified person) that estimates the noise levels at the property boundaries, and includes details of any mitigation measures required to ensure effects on the adjoining properties are acceptable.*

## 2 Criteria

### 2.1 District Plan

The proposed activity is located within the Residential 1 Zone under the Invercargill City District Plan, and the AEE has assessed the activity as non-complying.

The district plan contains the following permitted activity standards when measured and assessed in accordance with NZS 6801:2008 and NZS 6802:2008 (Noise R1). As noted above, the application is non-complying, and therefore noise cannot determine the overall activity status. Standards exist in terms of the time average ( $L_{Aeq}$ ) which is the primary assessment metric, and the maximum sound level ( $L_{AFmax}$ ) which considers noise from 'clangs and bangs' which are significantly above the average level.

**Table 1 Permitted activity standard (Rule Noise-R2)**

Location	Day time (0700-2200h)		Night time (2200-0700h)	
	L <sub>Aeq</sub>	L <sub>AFmax</sub>	L <sub>Aeq</sub>	L <sub>AFmax</sub>
Any location within any other site within the residential zone	55 dB	80 dB	40 dB	70 dB

## 2.2 National Planning Standards

The first set of National Planning Standards were introduced in April 2019. They require district plans to be updated within a specified timeframe such that all plan rules to manage noise emissions must be in accordance with the mandatory noise measurement methods and symbols in the following:

- New Zealand Standard 6801:2008 Acoustics – Measurement of environmental sound
- New Zealand Standard 6802:2008 Acoustics – Environmental noise

The District Plan is consistent with these standards, other than NZS 6802:2008 recommends that an L<sub>AFmax</sub> limit is not applied during the day unless there are specific circumstances that warrant this.

## 2.3 Other guidance

Guidance for appropriate noise limits provided in NZS 6802:2008, which recommends the following criteria as upper limits of acceptable noise. The daytime criteria are the same as the district plan, and the night time standard is 5 dB more lenient.

- 55 dB L<sub>Aeq (15min)</sub> during the day and, at night,
- 45 dB L<sub>Aeq (15min)</sub> and
- 75 dB L<sub>AFmax</sub>

On this basis, we consider the district plan limits are reasonable.

## 3 Hours of operation

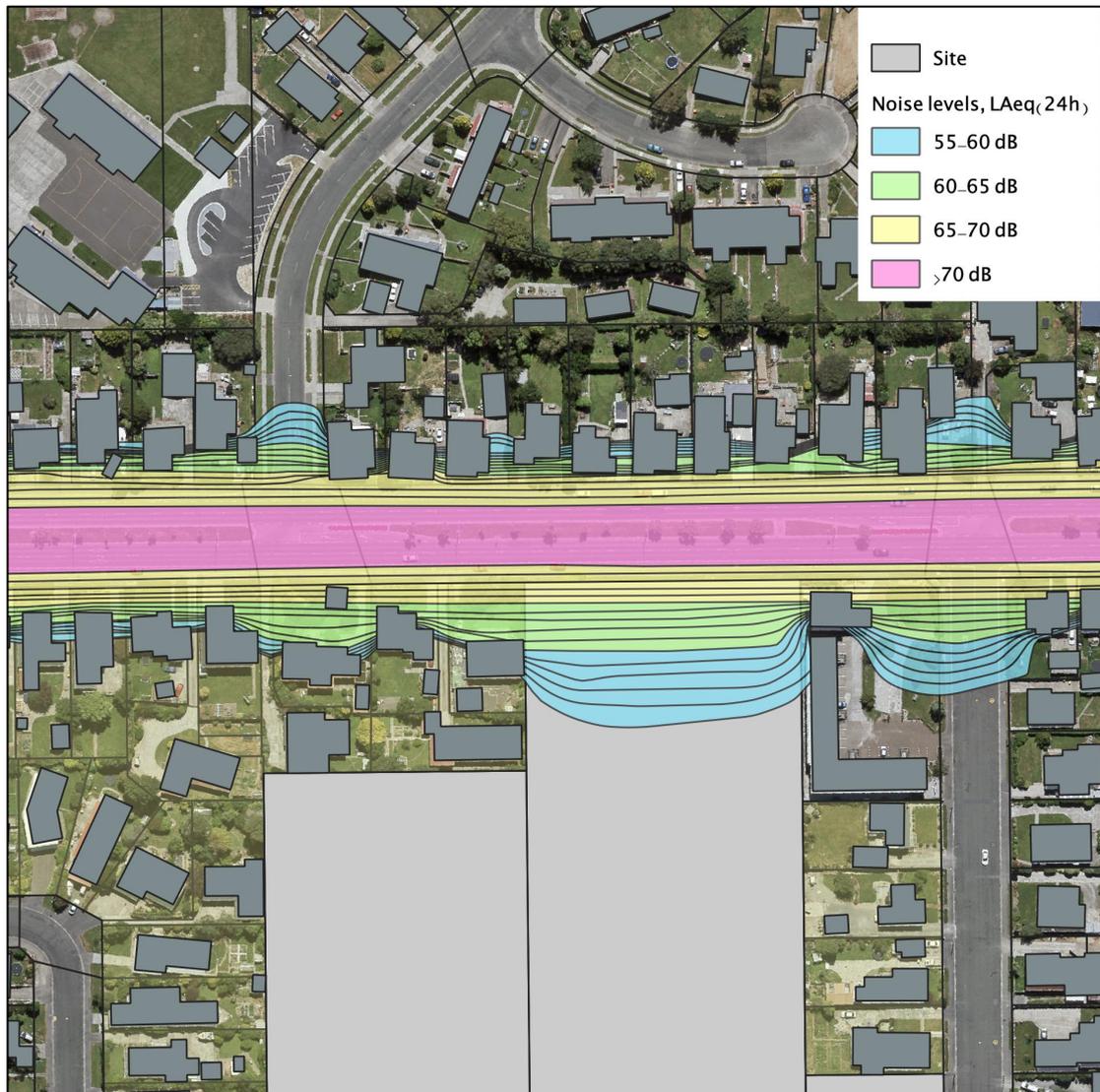
As the proposed activity is predominantly a residential land use the HCV will operate 24 hours a day, 7 days a week, 365 days a year. HCV will operate visitor hours which will be set when the Village is completed and operational. These hours may alter and as such for the purposes of this resource consent application resource consent is sought for 24 hours a day 7 days a week.

## 4 Existing environment

The site fronts Tay Street (State Highway 1) to the north, which has approximately 5700 vehicles per day travelling on it, with 3% heavy vehicles. Modelling of road-traffic noise was performed for Waka Kotahi<sup>1</sup> in 2018/19, with the resulting noise contours presented in Figure 1.

<sup>1</sup> AECOM (2019) National Land Transport (Road) Noise Map

It can be seen that properties fronting Tay St currently experience road-traffic noise up to 65 dB  $L_{Aeq(24h)}$ .



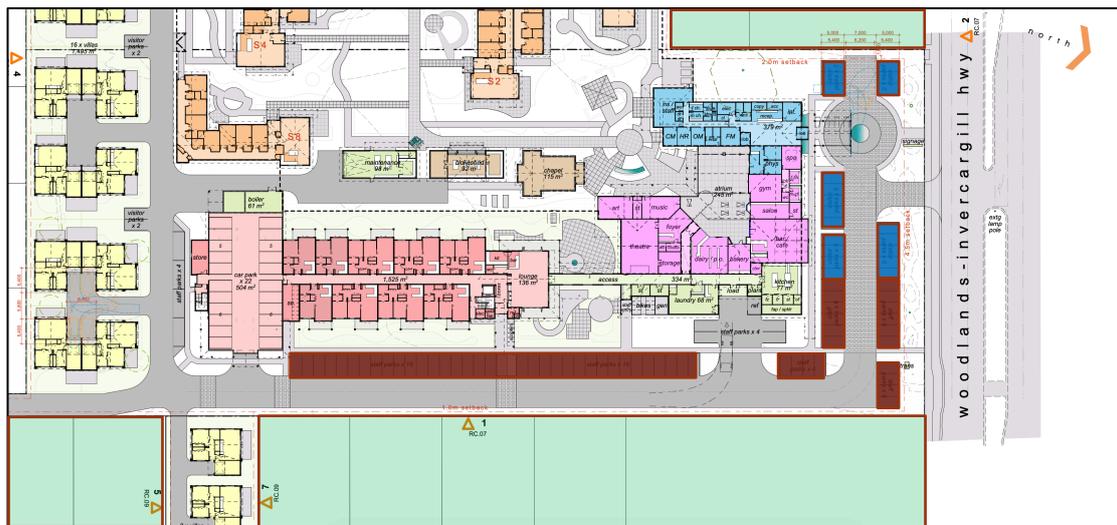
**Figure 1** Road-traffic noise contours

There are no other significant noise sources known in the area.

## 5 Predicted sound levels

### 5.1 Vehicles

The proposal includes a combination of visitor and staff parking on the Tay Street frontage, and additional staff parking and an access road on the eastern site boundary. The layout of the car park is shown in Figure 2, with staff parks highlighted brown, and visitor parks blue.



**Figure 2 Car parking**

The car parks that are most likely to affect residents are those on the eastern side of the development, as shown in Figure 2. Access is provided both from Tay Street (SH1) to the north, and Fairview Avenue to the south. The southern access is proposed to be for residents only.

The relationship between the parking and the neighbouring properties can be seen in Figure 3.



**Figure 3 Car park render (neighbouring properties to left of hedge)**

The number of traffic movements per day was assessed in the application as between 380 and 440, with a peak of 67 vehicles per hour. For this assessment we have assumed a peak of 20 movements in a 15-minute period.

There will be some concentration in vehicle movements during staff shift changes (Table 2).

**Table 2 Staff shifts**

Shift	Start	Staff #	Finish
1	7am	18	1pm – 3pm*
2	8am – 9am	15	1pm – 5pm*
3	2.45pm	18	9pm – 11pm*
4	9pm	4 - 5	7am

\*Staff finish times are staggered, staff leave at different times within these time periods.

Predictions of sound levels from vehicle movements have been based on previous sound level measurements of cars parking in an open surface car park in Christchurch, including the sound of doors shutting. These measurements are shown in Table 3.

**Table 3 Vehicle movement source levels**

Activity	Distance	Sound level (L <sub>AE</sub> )
Vehicle parking	2.5m	76 dB
Vehicle leaving	2.5m	84 dB
Total parking and leaving		85 dB

The measurement data and calculations have been conducted in terms of the time average (L<sub>Aeq</sub>) and sound exposure (L<sub>AE</sub>) parameters as these allow addition of sources. We note that this calculation is conservative as the parking runs over a length of approximately 100m, and parking manoeuvres and doors closing etc. will be distributed.

Noise levels are predicted at the nearest point in the neighbouring properties consistent with the district plan, however most neighbouring dwellings are set back 10-15m from the boundary fence. A typical scenario has also been calculated assuming 5 vehicle movements in a 15-minute period (20 per hour).

**Table 4 Sound level calculation – parking movements (peak hour)**

Calculation step	Value	Peak	Typical
Source level (L <sub>AE</sub> ) at 2.5m		85 dB L <sub>AE</sub>	
Number of events in 15 minute period	20 peak 5 Typical	+13	+7
Distance adjustment	15 m		-16
Barrier	-5 m		-5
Time adjustment	15 mins		-30
<b>Sound level at receiver</b>		<b>48 dB L<sub>Aeq(15min)</sub></b>	<b>42 dB L<sub>Aeq(15min)</sub></b>

Note: calculation has not been rounded until final step

Predictions of the maximum sound level from car doors closing has also been performed, as detailed in Table 5.

**Table 5** Sound level calculation – car doors closing

Calculation step	Value	Sound level adjustment
Source level (at 3m)		75 dB $L_{AFmax}$
Distance adjustment	15 m	-13 dB
Barrier	-5	-5 dB
<b>Sound level at receiver</b>		<b>57 dB <math>L_{AFmax}</math></b>

It can be seen from Table 4 that during the day, compliance with the permitted activity standards (55 dB  $L_{Aeq(15min)}$  and 80 dB  $L_{AFmax}$ ) is readily achieved.

It is expected that vehicle movements on the eastern car parks can be avoided after 2200h by afternoon shift worker using the staff parks on the Tay Street frontage near the main entrance, or adjacent the Monarch Hotel. Night shift staff would be able to use the visitor parking overnight. This will be promoted through operational management plans.

Should there be unplanned vehicle movements after hours on the eastern boundary, we have considered the potential sound levels at the dwelling facades rather than the site boundary. Predicted sound levels are presented in Table 6. Given that outdoor spaces are not likely to be used, this is an appropriate assessment location. As shown in Table 5, maximum sound levels from car doors closing readily comply with the 70 dB  $L_{AFmax}$  criterion.

**Table 6** Sound level calculation – parking movements (night time to dwelling facade)

Calculation step	Value	Sound level adjustment
Source level ( $L_{AE}$ ) at 2.5m		85 dB
Number of events	5	+7
Distance adjustment	25 m	-20
Barrier	-5 m	-5
Time adjustment	15 mins	-30
<b>Sound level at receiver</b>		<b>37 dB <math>L_{Aeq(15min)}</math></b>

## 5.2 External plant

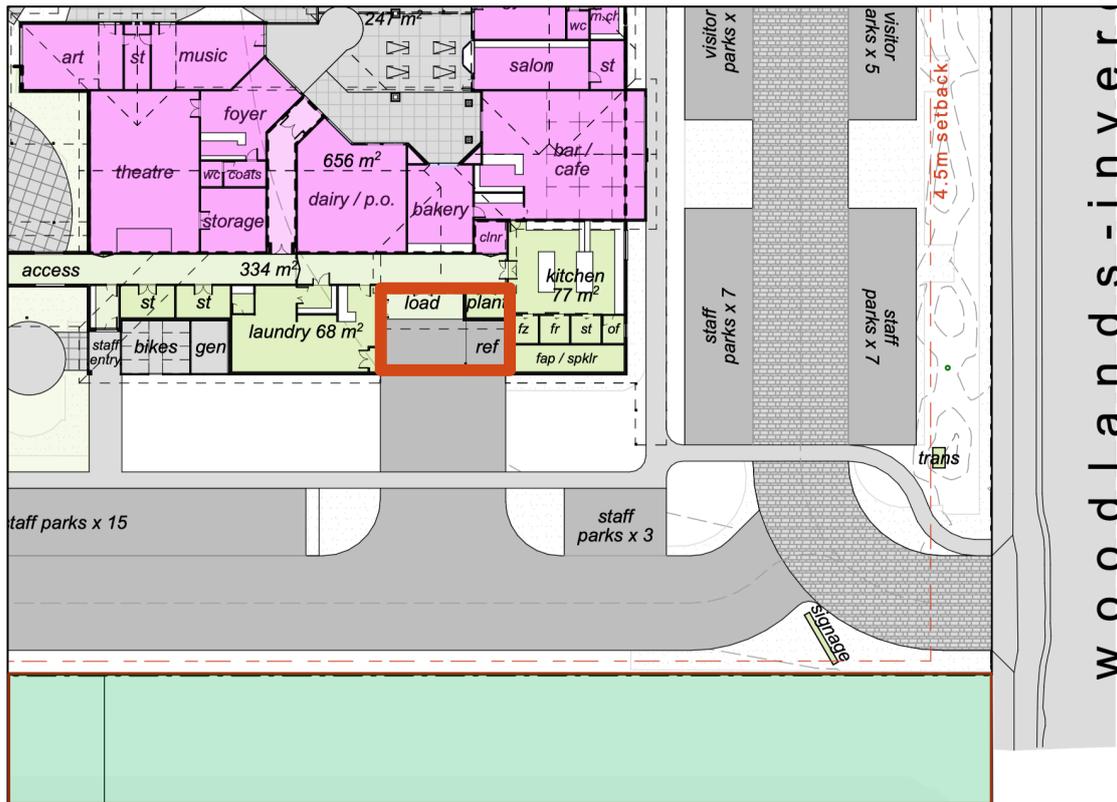
The independent living spaces on southern boundary are likely to have heat pumps with individual outside compressors. These will be specified with a maximum sound power level (labelled on the unit) to meet the night time noise limit. These will be identical in scale and effect to any heat pump servicing residential dwellings within the residential zone.

The current plans show a boiler located within a plant room 43m from southern boundary and 45m to eastern boundary. Depending on the size, the boiler room may have internal sound levels in the order of 80 dB. The room and any ventilation paths will need to be treated to ensure that noise levels are reasonable at living spaces with the village (e.g. below 55 dB). This will result in sound levels at the property boundary significantly below the night-time noise limits.

Depending on the final services strategy, the care houses and village buildings may have common service areas with multiple condensers. These should be screened both visually and acoustically such that noise levels within the site do not exceed 55 dB. On this basis, noise levels should not exceed 40 dB at neighbouring properties.

**5.3 Deliveries and loading activities**

A dedicated loading / unloading bay near the main State highway 1 Tay Street access. Couriers are likely to also use the reception at the main entrance of the administration block. This is shown in Figure 4.



**Figure 4 Loading bay**

Predicted sound levels are shown in Table 7 for the eastern boundary.

**Table 7 Predicted sound levels from loading activities**

Calculation step	Value	Sound level adjustment
Source level at 10m		65 dB L <sub>Aeq(15min)</sub>
Distance adjustment	22 m	-7 dB
Barrier	-5 mins	-5 dB
<b>Sound level at receiver</b>		<b>53 dB L<sub>Aeq(15min)</sub></b>

Delivery activity would not occur at night.

**5.4 Rubbish collection**

Rubbish collection from independent living will be through standard council collection.

Waste collection from the remainder of the Village would also occur during day time and is not anticipated to give rise to any significant noise effects, and similar noise levels to loading activities.

**6 Construction effects**

The construction of HCV will involve the operation of machinery generating noise and vibration at various stages of development and the generation of noise from general construction activity. Construction activity and any noise associated with it will be temporary and limited to the duration of the construction period.

There are well established management procedures in NZS 6803, as adopted by the district plan. The standard requires a Construction Noise Management Plan to be produced, detailing all relevant site controls. This will include hours of operation, site access, and communication with adjacent residents.

**7 Assessment**

A summary of predicted sound levels is presented in Table 8, along with compliance with the permitted activity standard. All activities readily comply with the daytime standard and are not expected to give rise to unreasonable noise effects at surrounding properties.

**Table 8 Summary of predicted sound levels**

Item	Predicted sound level	Frequency / Duration	Compliance with activity standard	
			Day (55)	Night (40)
Parking	48 dB LAeq(15min)	Peak movement during the day	✓	N/A
	42 dB LAeq(15min)	Other times with infrequent movements	✓	N/A
	57 dB LAFmax	Car doors closing	✓(80)	N/A
Loading / deliveries	53 dB LAeq(15min)	Daytime only Several times per week	✓	N/A
Plant	< 40 dB LAeq(15min)	Emissions will vary with building load	✓	✓

It is expected that vehicle movements from afternoon shift workers leaving after 2200h and night shift workers can be restricted to the Tay Street frontage, or adjacent the Monarch hotel. Nevertheless, sound levels when assessed at dwelling facades would meet the night time activity standard. While a technical non-compliance in terms of the assessment location, we consider effects would be reasonable on this basis.

## 8 Submissions

I have reviewed the submissions on this project, and list the issues raised relevant to noise in Table 9, including the desired relief.

**Table 9 Summary of noise issues raised in submissions**

Submission	Noise issues raised	Desired relief
Cade 628 & 630 Tay Street	No noise issues	Move entrance to Stuart Street More on-site parks
McNamara & Robinson 44 Stuart Street	Traffic, construction	Gate at 40 Fairview Ave to restrict access to residents  Speed restrictions of 25 km/h Physical traffic calming to control speed  Preclude construction traffic on Fairview Avenue
Kilgour 618 Tay Street	No noise issues	
Waka Kotahi	No noise issues	
Nicoll 613 Tay Street	Daytime disturbance (shift workers) Volume of people Deliveries	
Stirling 624 Tay Street	Traffic noise, specifically braking and accelerating out of the right hand bay into the development  Parking	No Turning bay on Tay Street Installation of double glazing to their property Move entrance to 32 Stuart Street

In regards to the Stirling submission, I note that noise from vehicles on public roads are excluded under N-R3.3.b of the District Plan and that Tay Street is classified as "regionally significant" under the One Network Road Classification. It has posted speed limit 50 km/h. I consider there will be negligible noise from passenger vehicles braking to stop in a right-turn, and such effects are appropriate for this location.

I understand that the relief sought by McNamara and Robinson has been agreed by the applicant and additional conditions of consent are promoted. Traffic calming in the form of speed humps generate additional noise, therefore I consider that landscape / visual cues may be more appropriate in this application.

The Nicholl property is adjacent the visitor carpark on Tay Street. Noise from vehicle movements during the day is likely to be indistinguishable from traffic noise on SH1. On this basis I consider operational noise effects to be minor. To address construction effects, this property should be specifically identified in the Construction Noise and Vibration Management Plan as being sensitive to daytime use and appropriate controls in place.

## 9 Conclusion

Sound from activity within the site will sometimes be audible outside at the neighbouring houses, but it will be at a reasonable sound level compatible with a residential area and should not interfere with normal domestic activities.

There is the potential for minor annoyance from vehicles using the internal road / car parks. This will predominantly be during shift changes. Management practices will be adopted to restrict staff vehicle movements after 2200h to the Tay Street frontage and adjacent the Monarch Hotel.

Noise effects from the additional traffic on Tay Street will be negligible, considering the existing levels of traffic on SH1. Noise from vehicles on public roads is permitted by the District Plan and the state highway network anticipates traffic at all times of the day.

Construction noise effects can be managed using standard industry practices defined in NZS 6803.

Your sincerely  
Altissimo Consulting Ltd



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