MARSHALL DAY Acoustics

SIKH TEMPLE
ASSESSMENT OF NOISE EFFECTS

Rp 001 R01 20240601 | 5 December 2024

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Project: **SIKH TEMPLE**

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SUMMARY

Marshall Day Acoustics has assessed the potential noise effects associated with the operation of a proposed Sikh temple at 517 Hamptons Road, Rolleston.

The site and immediately adjacent properties are zoned as Rural. The nearest residential dwellings are located approximately 180 m – 430 m away from the proposed Sikh temple.

We have predicted noise emissions to the nearest sensitive receivers based on sound levels from amplified music worship and singing collected at similar religious facilities. Our conservative calculations show the proposed activities will comply with the Partially Operative District Plan permitted activity noise limits form the zone. As a result, we consider that any adverse noise effects will be acceptable.

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1.0 INTRODUCTION

Marshall Day Acoustics has been engaged perform a noise assessment for the proposed Sikh temple located at 517 Hamptons Road, Rolleston, following a request for additional information (RFI) from the Selwyn District Council.

This report includes the following:

- Description of the proposed activity.
- Summary of relevant District Plan noise provisions.
- Prediction of noise levels based on the activities described in the land use consent application .

A glossary of terminology is provided in Appendix A.

2.0 SITE DESCRIPTION

The proposed site and immediately surrounding properties are located within the General Rural Zone (GRUZ) and are shown in Figure 1. There are several dwelling located around the proposed activity within approximately 180 to 430 metres on both Hamptons and Waterholes Roads.

The activity with greatest potential for noise generation is the devotional singing and music during the main service which is conducted on Sunday afternoons with approximately 290 people in attendance. The temple will also be open to its members seven days a week, with both a morning and evening prayer. The morning prayer will host approximately 20 members, and the evening prayer will host approximately 50 members. There will additionally be four special religious events occurring on site each year (Diwali, New Year and Guru Birthdays), which will have an anticipated attendance similar to the Sunday Service.

The facility will open from 4:00 am and close at 10 pm. Morning prayers occur between 4 am and 6:30 am. Evening prayers occur from 6 pm to 7.30 pm in Winter and 7 pm to 8.30 pm in Summer.

Travel to and from the temple is expected to be by private car with a majority of members carpooling. The proposed parking area will collectively accommodate 50 parking spaces, with overflow parking onto the unpaved area on site. The application states that between 116 peak vehicle movements can be expected after Sunday service when members depart the premises. Upwards of 8 vehicle movements are expected during morning prayers, and upwards of 20 vehicle movements are expected during evening service.

The noise generated by each aspect of the sites activities is discussed in Section 4.0

Figure 1: Site map showing surrounding residential dwellings

3.0 DISTRICT PLAN PERFORMANCE STANDARDS

Below we discuss both the operative and proposed District Plan noise limits.

3.1 Operative District Plan

The applicable noise limits from the Operative Selwyn District Plan (ODP) are summarised in Table 1. These limits apply at the notional boundary of any rural dwelling.

Table 1: Rural zone noise limits (excerpt from Rural Volume Rule 9.16 Table C9.3)

Hours	Noise Limit
7.30am – 8.00pm	60 dBA L_{10} 85 dBA L_{max}
8.01pm – 7.29am	45 dBA L_{10} 70 dBA L_{max}

3.2 Partially Operative District Plan

The applicable noise limits from the Selwyn Partially Operative District Plan (PODP) are summarised in Table 2.These limits apply at the notional boundary of any dwelling.

Table 2: Rural zone noise limits (excerpt from NOISE-REQ1 Zone Noise Limits)

Zone of the site generating noise	Zone of the site receiving noise	Assessment Location	Hours and Limits
GRUZ	GRUZ	At the notional boundary of any noise sensitive activity within any site receiving noise	0700 to 2200: 55 dB L_{Aeq} 2200 to 0700: 45 dB L_{Aeq} / 70 L_{Amax}

3.3 Discussion

We understand that decisions were made on the PODP on 19 August 2023 and these provisions have legal effect. Whilst some of the noise rules are subject to appeal, NOISE-REQ1 is not under appeal and the limits set out in Table 2 are applicable in this instance.

As morning prayer can occur prior to 0700 hrs, this activity will be assessed against the night-time noise limit of 45 dB L_{Aeq} / 70 L_{Amax}. The daytime noise limit of 55 dB L_{Aeq} will apply for all other activities between 0700 and 2200 hrs.

4.0 NOISE SOURCES

Noise emissions from the site will vary depending on time of day and type of service. Below we discuss the potential noise generation associated with temple operations:

1. Noise breakout from amplified music and a public address system within community hall.
2. Vehicle movements using the site access and parking facilities on site.

Each of these noise sources, including any assumptions made, are addressed below. We anticipate that for most of the day, there will be little or no noise generated at the site.

We have predicted noise levels arising from the proposed activity using commonly adopted methodology[1]. Source data has been derived from standard data gathered by Marshall Day Acoustics at similar religious and community facilities across New Zealand.

4.1 Community hall amplified music and P.A. breakout

The greatest potential for noise breakout will be from musical performance and signing that forms part of religious functions. Our assessment assumes that the internal reverberant sound levels will be in the order of 95 dB L_{Aeq} based on amplified instruments and voices

We have based our calculations on the dimensions and basic constructions outlined in the 'Application for Land Use Consent' plans dated 10 May 2024 and the 'Site and Building Plans' dated 2 December 2024. Whilst the building materials have not been specified at this stage of the project, we have assumed a conservative situation that relatively lightweight materials will be used with a minimum airborne sound insulation of 35 dB R_w. For example, external cladding on timber framing with insulation and plasterboard internal lining.

[1] ISO 9613-2:1996 "*Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation*"

4.2 Vehicle access and car park noise

The Application estimates a peak of 116 vehicle arrivals and departures associated with the main Sunday service. We have calculated noise levels from 116 cars manoeuvring in the car parking area and departing via the access road in a single 15-minute period, which we consider to be a conservative situation. We repeated this process for an anticipated peak of 8 cars during the morning service. Cars on the access road are assumed to generate a sound level of 75 dB L_{AE} at 3 metres. Car parking movements on site will typically generate 70 dB L_{AE} at 3 metres.

5.0 CALCULATED NOISE LEVEL

As noted above, our calculated noise levels have been compared to applicable PODP performance standards for the General Rural Zone (GRUZ). We have taken the conservative approach of assessing that musical noise sources will have Special Audible Character (SAC) when assessed under New Zealand Standard NZS 6802:1991 "Assessment of Environmental Sound" and have applied a 5 dB penalty. (We have not applied a duration correction that would be permitted under Section 6.4 of NZS 6802).

To assess the potential noise effects of the activity, Table 5 presents the predicted levels and PODP noise limits and noise sources. We note that we have conservatively assumed the same music noise levels in both the morning service (night-time) and main Sunday service (day-time).

Table 3: Predicted noise levels in dB L_{Aeq}

Sensitive Receiver	*Day-time Noise Criterion*	Community hall music break out*	Sunday Main Service Vehicles departing	*Night-time Noise Criterion*	Community hall music break out*	Morning Service Vehicles departing
875 Waterholes Rd	*55*	36	*46*	*45*	36	37
861 Waterholes Rd	*55*	35	*41*	*45*	35	39
1/851 Waterholes Rd	*55*	30	*40*	*45*	30	31
848 Waterholes Rd	*55*	37	*50*	*45*	37	41
2/839 Waterholes Rd	*55*	30	*42*	*45*	30	33
544 Hamptons Rd	*55*	37	*44*	*45*	37	35
488 Hamptons Rd	*55*	33	*41*	*45*	33	32

Note:
*Includes 5 dB correction applied for special audible characteristics as per NZS 6802

Table 3 indicates the calculated daytime and night-time activity noise levels are all predicted to comply with the applicable daytime and night-time permitted activity noise limits.

We further confirm that the 70 dB L_{Amax} limit is unlikely to be exceeded at any location.

APPENDIX A GLOSSARY OF TERMINOLOGY

Sound Pressure Level (L_P)	A logarithmic ratio of a sound pressure measured at distance, relative to the threshold of hearing (20 μPa RMS) and expressed in decibels.
dB	Decibel – A measurement of sound level expressed as a logarithmic ratio of sound pressure P relative to a reference pressure of Pr=20 μPa i.e. dB = 20 x log(P/Pr)
dBA	A measurement of sound level which has its frequency characteristics modified by a filter (A-weighted) so as to more closely approximate the frequency bias of the human ear.
A-weighting	The process by which noise levels are corrected to account for the non-linear frequency response of the human ear. All noise levels are quoted relative to a sound pressure of $2x10^{-5}$Pa
$L_{Aeq\ (t)}$	The equivalent continuous (time-averaged) A-weighted sound level. This is commonly referred to as the average noise level. The suffix "t" represents the time period to which the noise level relates
L_{Amax}	The A-weighted maximum noise level. The highest noise level which occurs during the measurement period.
L_{AE}	Exposure Level. An A-weighted measure of the total sound energy over a certain time period, compressed into 1 second. Used to describe the sound energy of a single event, such as a train pass-by or an aircraft flyover.
Special audible characteristics	Distinctive characteristics of a sound that make it more likely to cause annoyance or disturbance. A penalty of up to 5 decibels can be applied when assessing sounds with SAC Examples are tonality – a hum or a whine) and impulsiveness – bangs or thumps.