

Appendix E

Acoustic Assessment – Malcolm Hunt and Associates

Assessment of Environmental Noise Effects

Mossy Creek Farm Park

252 Takarau Gorge Road
Wellington

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Glossary of Noise Terms

dB[A]

A weighted Decibel. A measurement of sound which has its frequency characteristics modified by a filter [A-weighted] so as to more closely approximate the frequency bias of the human ear.

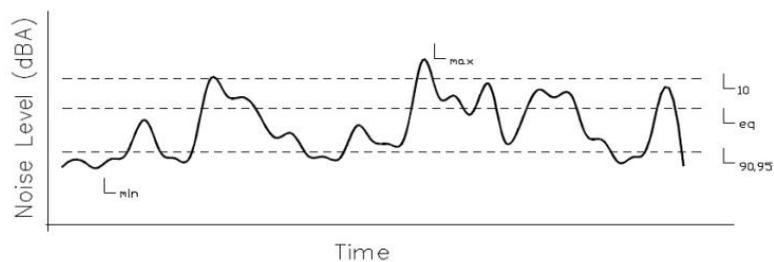
L_{max} or L_{max}

The single highest sampled level of sound. Used in night time emission limits as a means of ensuring sleep protection.

L_{eq} or L_{eq}

The time-averaged sound level [or equivalent sound level] that has the same mean square sound pressure level as the time-varying sound level under consideration. Commonly referred to as an "energy average" measure of sound exposure.

L_x as function of Time



NZS 6801:1991

NZ Standard 'Measurement of Environmental Noise'

NZS 6802:1991

NZ Standard 'Assessment of Environmental Noise'

Sound Pressure

Sound Pressure Level is defined as varying pressure fluctuations caused by sound waves. The ear converts these fluctuations into what we call audible sound, which is the sensation [as detected by the ear] of very small rapid changes in the air pressure above and below a static value. This "static" value is atmospheric pressure.

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Table of Contents

| | | |
|----|---|----|
| 1 | INTRODUCTION | 4 |
| 2 | THE APPLICATION SITE | 4 |
| 3 | AMBIENT BACKGROUND SOUND | 5 |
| 4 | PROPOSED ACTIVITIES & SOUND LEVELS | 7 |
| 5 | NOISE SOURCES | 8 |
| 6 | NOISE PREDICTIONS | 10 |
| | 6.1 Prediction Results | 12 |
| 7 | APPLICABLE NOISE CRITERIA | 13 |
| | 7.1 Resource Management Act | 13 |
| | 7.2 District Plan | 13 |
| 8 | ASSESSMENT | 14 |
| | 8.1 Special Audible Characteristics | 15 |
| | 8.2 Construction Noise | 15 |
| 9 | NOISE MITIGATION MEASURES | 15 |
| 10 | SUMMARY | 16 |

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MalcolmHuntAssociates



1 Introduction

The Applicant [**Ms Misty Mossman**] is applying for land use consent to establish activities collectively described as a 'Farm Park' on a site at 252 Takarau Gorge Road in the rural area near Wellington City. **Malcolm Hunt Associates** [MHA] have been commissioned to review the noise-related aspects of the proposal and to prepare this *Assessment of Environmental Noise Effects* for the proposed activities in accordance with the Forth Schedule of the Resource Management Act 1991. The Act requires that such reports include details as corresponds with the scale and significance of the effects that the activity may have on the environment [Section 88 [2] of the RMA].

The objective is to describe potential nature and scale of noise effects arising from the proposed activities, as may affect existing surrounding land uses and to assess these in the context of the relevant standards and guidelines. This acoustic report sets out;

- Information on noise-related aspects of the activity and site and the expected noise emission levels and characteristics;
- An assessment of noise from the proposed activities, as received in the surrounding environment;
- An assessment of these noise levels in terms of the Wellington City District Plan;
- Recommended noise mitigation measures;

MHA have based this assessment on measurements taken elsewhere of similar activities taking place in rural areas. We have visited the site and taken daytime ambient sound level readings. The author has experience in assessing similar recreational activities. All drawings in this report are schematic and not to scale. Refer to the Application for full detailed drawings and details. Distances adopted within the predictions have been sourced from WCC GIS.

2 The Application Site

The subject site is located at 252 Takarau Gorge Road and is located to the north of Takarau Gorge Road, between Makara Road and Ohariu. The area is predominantly rural. Land use activity near the site is comprised of rural activities and rural lifestyle blocks, with some tourist and recreational land uses located to the north east at Ohariu. The subject site (and all local sites) are accessed via Takarau Gorge Road which is a two-way road generally aligned north east / south west and is subject to 60km/h speed limit.

Figure 1 below illustrates the site boundary and closest existing rural residential sites at which noise effects have been assessed within this report. Other, more distant residences, will receive lower levels of activity noise than the assessment sites described below. These residences represent the main noise receiving sites at which noise is assessed. The assessment below assesses activity noise against a further relevant district plan noise rule applied additionally at the site boundary (marked as shown).



Figure 1 Application site showing the location of the closest rural dwellings, also showing 'Site A' where ambient sound levels were measured on 29 July 2019.

Under NZ standards and the WCC District Plan, noise effects in rural areas are assessed at a location termed the 'notional boundary' or in the case of the district plan 'conceptual boundary'. The assessment of noise effects is therefore based on the levels of activity noise received at 20 metres to existing dwellings in the area, other than any dwellings on the same site.

The following rural residences have been identified as the closest rural residences existing in the area (located as shown in **Figure 1**).

- 184 Takarau Gorge Road, Ohariu - Rural, Open Space B
- 238 Takarau Gorge Road, Ohariu - Rural
- 234 Takarau Gorge Road, Ohariu - Rural
- 231 Takarau Gorge Road, Ohariu - Rural
- 283 Takarau Gorge Road, Ohariu - Rural, Open Space B
- 210 Takarau Gorge Road, Ohariu – Rural

The noise assessment below is based on potential noise effects received at the above locations, being the most affected dwelling sites in the area.

3 Ambient Background Sound

The area is generally rural in nature with few manmade noise sources except that generated by vehicles and rural equipment noise. Ambient sound levels are not a direct consideration of the noise assessment processes recommended within the relevant NZ Standards or the district plan, however they do form a useful basis for assessing potential "intrusiveness" of potential nuisance noise, often defined as the degree by which the normally occurring ambient sound level is exceeded by the sounds under investigation.

Daytime ambient sound levels were measured at Site A (Figure 1) during a site visit on 29 July 2019. Typical daytime sound level measurements were carried out at a site adjacent to Takarau Gorge Road in general accordance with the procedures set down in *NZS 6801:20018 "Acoustics – Measurement of Environmental Sound"*, This Standard provides guidance on the technical aspects of noise measurement. Field calibration was checked before and after measurements.

Photos A and B illustrate the site and surrounding rural area



Photo A: View of site from Takarau Gorge Road.

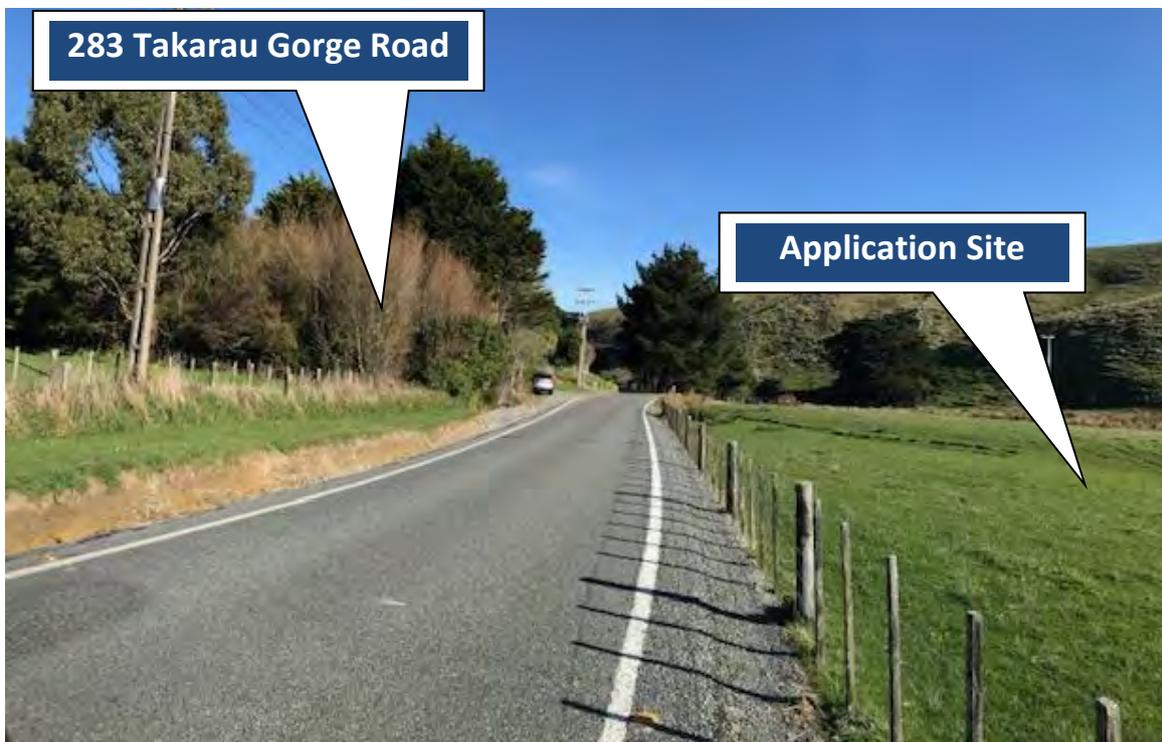


Photo B: View of site from Takarau Gorge Road

Weather conditions throughout the monitoring were generally calm and favourable (<2 m/sec wind from north). Rain was avoided. Measurements were carried out using a Bruel and Kjaer 2260 Investigator with a 90 mm windshield positioned over the microphone for all readings.

A summary of measured daytime (1.30pm to 2.10pm) ambient sound levels is provided as follows;

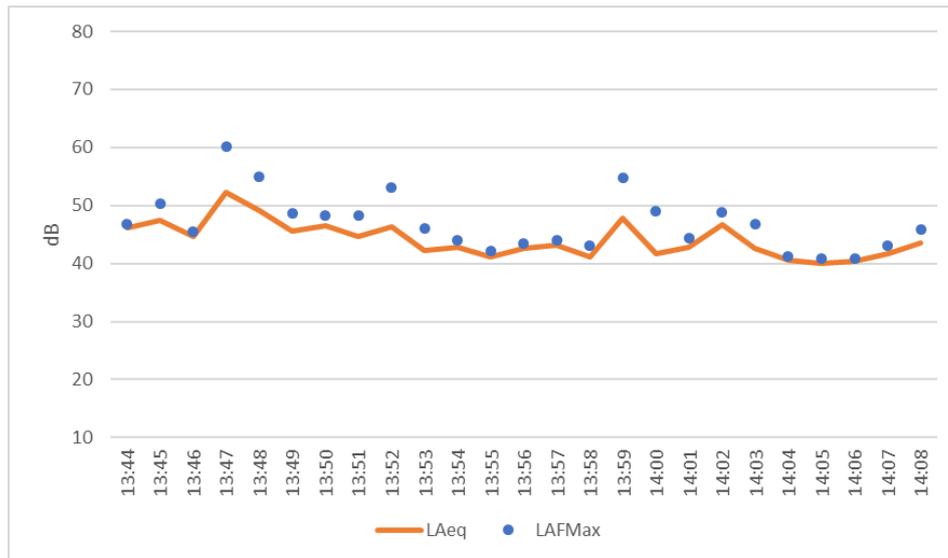


Figure 2 Ambient sound levels measured at Site A (Figure 1)) during daytime on 29 July 2019.

| | LAeq | LAFMax |
|---------|----------------|----------------|
| Maximum | 52.3 dB | 60.2 dB |
| Minimum | 40.0 dB | 43.8 dB |
| Mean | 44.1 dB | 47.0 dB |

The measurement results establish whilst there are some periods with little or no individual sound events, there are periods when the maximum sound levels exceed the average sound level by up to 10 dB. The above results of ambient sound level measurements have informed the process of establishing appropriate noise criteria and recommended noise-related conditions of consent, as set out below in this report.

4 Proposed Activities & Sound Levels

The applicant proposes to establish a ‘farm park’ activity on a rural site adjacent to Takarau Gorge Road. The concept, as described in the Application, is to provide a park with indoor and outdoor family-based activities with rural-based children’s character-based themes and attractions, designed to appeal for people of all ages and abilities, though primarily planned for children and their caregivers. A key theme is providing interactions with animals in the outdoor environment with opportunities for learning and connection. We are informed the design, construction and management will be environmentally and socially sustainable.

The proposal includes;

- an additional residential dwelling to the north west of the existing dwelling with a newly formed access located south west of the existing access to 252 Takarau Gorge Road; and
- Provision of an eco-friendly park with new access, with associated recreational activities. These activities are understood to include:
 - domesticated animal interaction;
 - a playground area, games and puzzles, a croquet lawn and a low hedge maze;
 - a café;
 - a bookshop;
 - a picnic area;
 - bush walks;
 - literary related competitions and events; and
 - children’s parties.

Figure 3 below illustrates the site and proposed development which shows the activity areas as proposed by the applicant. The noise assessment has been based on the proposed activities laid out in this manner.

Access to the car park associated with the activities outlined above is to be provided along the northern kerb line of Takarau Gorge Road. This access is proposed to be located approximately 230 metres south west of the formed access at 252 Takarau Gorge Road.

This report is primarily aimed at assessing noise effects associated with all commercial aspects of the proposal as noise associated with domestic activities are not usually assessed under district plan permitted activity noise standards. However the assessment below does include a discussion on noise associated with domestic activities associated with the extended dwelling including vehicle noise (as generated by vehicles operating on the site). The location of the dwelling to be extended and road access assumed within this noise assessment is as set below in **Figure 3**.

Noise-making aspects of the activity forming the basis of predictions of expected noise received at sensitive receiver sites in the area are based on typical upper levels of sound emitted by people outdoors (children and adults), on-site vehicle sounds, sounds of domesticated animals (such as rabbits, guinea pigs, alpacas, sheep, goats, donkeys, pigs, and poultry), playground equipment as well as indoor and outdoor sounds associated with the proposed café and bookshop, indoor theatre space (including fixed plant).

Levels of cumulative noise expected at nearby receivers have been based on 'source' sound ascribed to each of the following main activity areas (also shown in **Figure 3**):

- A. Studio & cafe
- B. Garden Room
- C. Car park
- D. Picnic Area
- E. Pony Rides
- F. Maze / Chess Area
- G. Mini Golf

5 Noise Sources

Noise sources associated with proposed activity areas are summarised as follows;

Vehicle Activity

- Light vehicles movements associated with visitors cars, occasional buses;
- Light / medium vehicles movements associated with deliveries.

People Sounds

- People sounds, visitors interacting with animals, readings – all as unamplified vocal communications including sounds due to outdoor children's parties.
- Staff leaving and entering the site;
- People outdoors in car park, café areas, staff in outdoor areas etc;

Fixed Plant

- Heat pump
- Café extract system

Indoor sounds

- Indoor groups attending readings etc.
- Children parties (if held indoors)
- Café patrons indoors
- Low level amplified sounds (indoors only)

-  Stream
-  Drain
-  Fence - existing boundary
-  Fence - sheep netting
-  Fence - 7 wire boundary
-  Fence - 1.5m 13 wire fence
-  Fence - 1.8m netting
-  Fence - 1.3m picket fence
-  Gate
-  Minor path (1.2m wide)
-  Main path (2m wide)
-  Timber bridge
-  Culvert
-  New building
-  Existing building
-  House extension
-  Water tank
-  Carpark - stage 1
-  Carpark - stage 2
-  New pond
-  Pa
-  New native planting
-  Public garden
-  Grazing paddock (non-public)
-  Toilets
-  Playhouses
-  Picnic shelter
-  Gazebo
-  Animal shelter
-  Access track
-  Water supply - pumphouse
-  Electricity - existing overhead line
-  Bing Live



Figure 3 Site layout of proposed development, showing activity areas as proposed by the applicant.

6 Noise Predictions

Acoustic predictions have been carried out in order to assess future worst case operational noise effects expected in the area. The method has been to ascribe expected noise likely to be emitted from the site during typical busy operations. These noise emission levels have been established for key activity areas with the focus on overall cumulative sound received at the conceptual boundary of the closest dwellings. The predictions of received LAeq(15 min) sound levels at these locations (assessed in accordance with NZS6802:2008) enables a comparison with relevant noise criteria as a means of assessing the potential acceptability of this level of noise effects. LAeq sound levels have been based on 15-minute measurement periods. NZS6802:2008 states at Section 5.2 that “*Appropriate measurement time intervals depend on the nature of the sound environment, and the relative dominance and characteristics of the specific source under investigation. When using the simple method to determine a rating level, the measurement time interval should generally be 15 minutes*”.

Noise generated by light vehicles and buses using the car park has been investigated based on the Traffic Engineer’s report which predicts maximum use of the car park at 96 visits per day (184 movements) with a maximum of 5 movements per 15 minutes at peak times. As below, car park noise emissions are based on a level of projected use for exceeding this.

Acoustic effects of sound propagation from the site has been based on *ISO 9613-2:1996 Acoustics - Attenuation of sound during propagation outdoors-- Part 2: General method of calculation* which predicts sound under meteorological conditions favourable for the propagation of sound. This means enhanced sound propagation under a light following wind in all directions, although this cannot occur in real life [hence worst case]. The ISO 9613-Part2:1996 method predicts equivalent continuous A-weighted sound levels received at nominated distances taking into account the normal dispersion of sound with distance as well as air absorption (based on temperature and humidity).

The assumed LAeq values adopted for the investigation (as measured at 10 metres) were assigned to each of the following category of noise sources;

- Vehicles On-Site (10 cars and 1 x 25 seater bus)
- Children (x12)
- Adults (x8)
- Animals /Pets
- Fixed plant

The LAeq(15 min) following have been adopted as source values for each of the main activity area as follows;

| | 10m Sound Level LAeq(15 min) |
|---|-------------------------------------|
| Vehicles On-Site (at 15 km/hr) | 60 dB |
| Children (x12) | 58 dB |
| Adults (X8) | 53 dB |
| Animals /Pets | 44 dB |
| Fixed Plant (kitchen extract & heat pump) | 48 dB |

The methods adopted to predict sound levels conform with the recommendations of NZS6801:2008 *Acoustics – Measurement of Environmental Sound*. Modelling of noise has taken account of distance. Predictions have been carried out using on the following base equation:

$$L_p = L_p(10m) - 20 \text{ Log}_{10} [10/R] \quad \text{[Equation 1]}$$

Where;

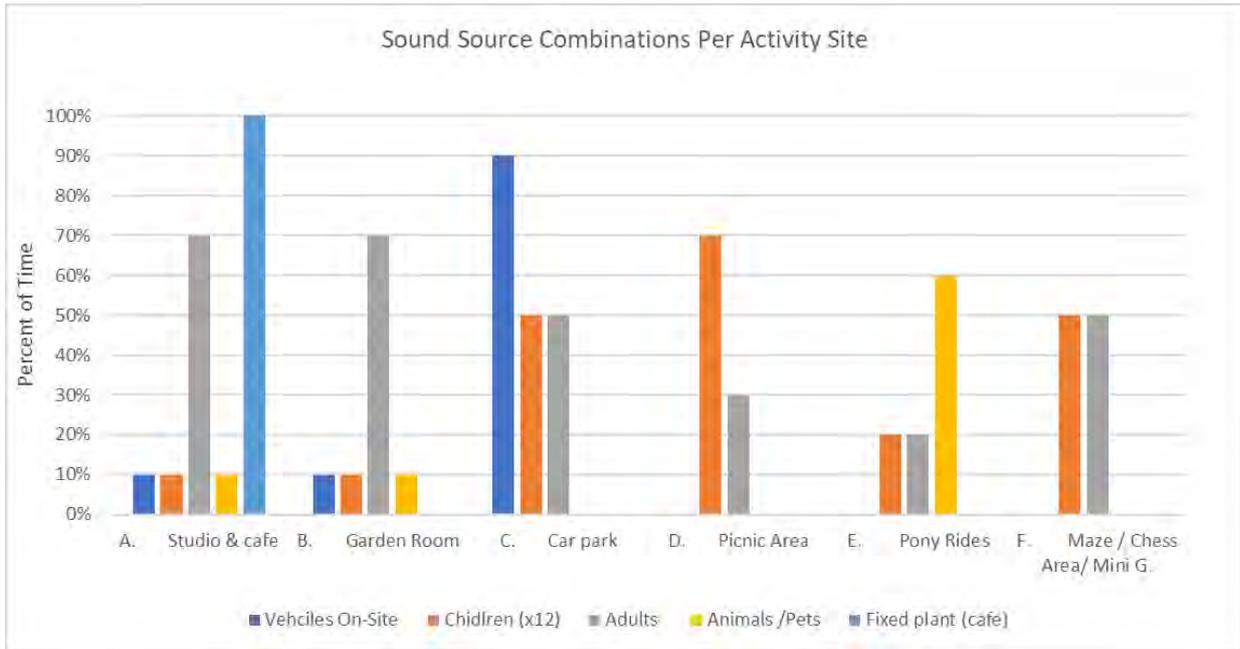
L_p = The sound pressure level of noise received [in dBA] at distance R

$L_p(10m)$ = The sound pressure level measured at 10 metres from the source[s] [in dBA]

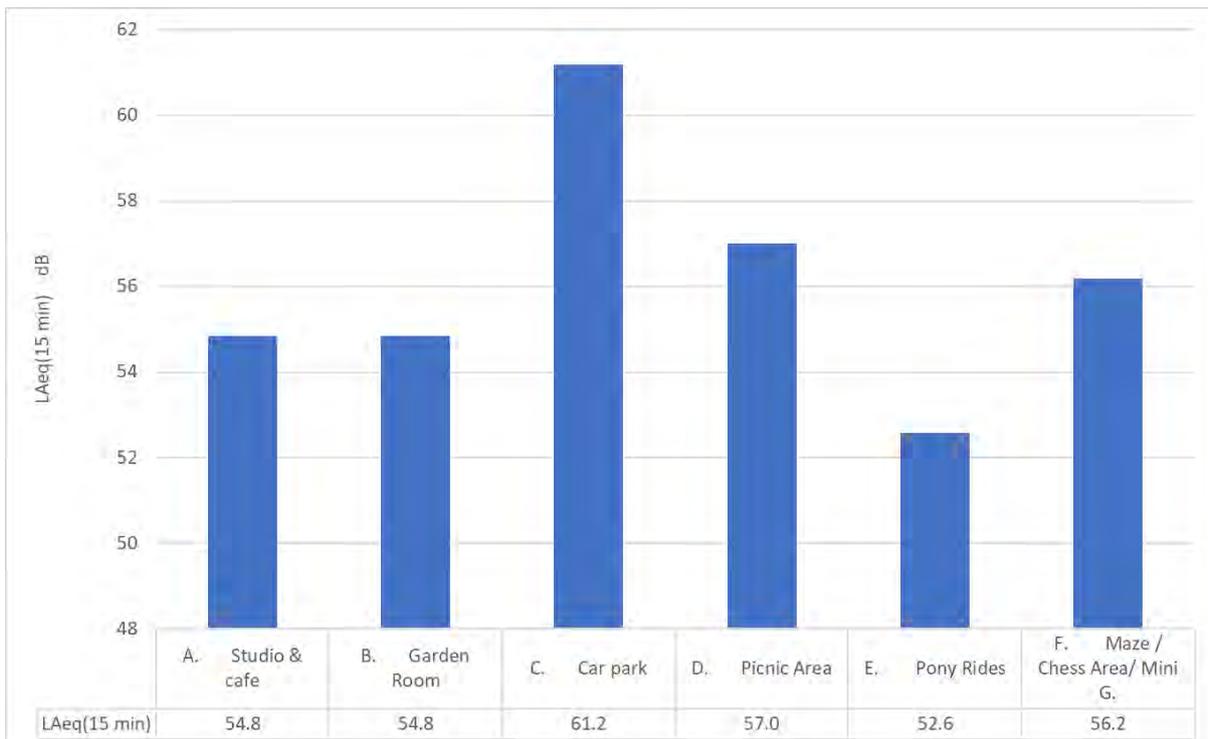
R = The distance between the source and the receiver in metres

Not all activities will take place continuously during operating hours. ‘Percent of time’ assumed for the various sound sources have been used to derive an overall 10 metre sound level for each activity area A to F, based on the mix of

sources at each activity location on the site. The assumed percentage of time values used in this calculation are shown as follows;



Based on the above sound levels at 10 metres and combinations of sources for each site, the following LAeq(15 min) 10m sound levels were calculated for each key activity area;



These 'activity noise levels' have been used within predictions of cumulative LAeq(15 min) sound levels received at conceptual boundary of the closest nearby dwellings, shown in Figure 1 (above).

The calculations have assumed ‘inverse square’ sound propagation from each activity area, traversing over undulating terrain taking into account distance and air absorption only (no acoustic screening effects by terrain, structures or vegetation).

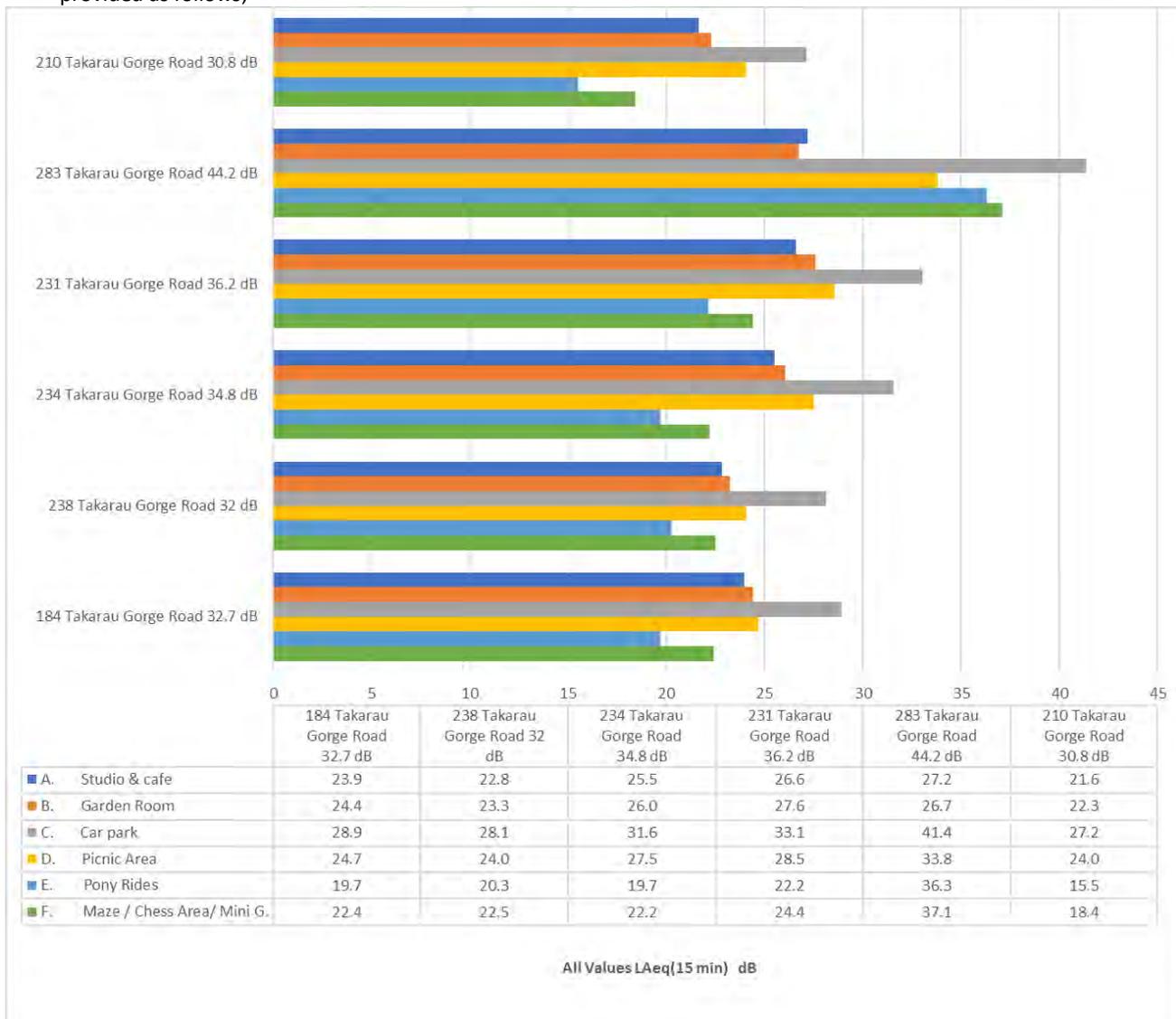
6.1 Prediction Results

Predicted cumulative LAeq(15 min) sound levels based on the above methodology and assumptions has resulted in the following predicted sound levels received at the six closest dwellings in the area;

| Noise Assessment Location | Predicted Worst Case Sound Pressure Level LAeq [15 minutes] dB |
|----------------------------------|--|
| 184 Takarau Gorge Road | 32.7 dB |
| 238 Takarau Gorge Road | 32.0 dB |
| 234 Takarau Gorge Road | 34.8 dB |
| 231 Takarau Gorge Road | 36.2 dB |
| 283 Takarau Gorge Road | 44.2 dB |
| 210 Takarau Gorge Road | 30.8 dB |

Table 1: Summary results of predicted worst case sound pressure levels Assessment as per District Plan at or within the notional boundary of adjacent rural- residential sites.

A breakdown of the combination of sound sources used in the calculation for each conceptual boundary location is provided as follows;



7 Applicable Noise Criteria

In assessing potential noise impacts on nearby sites the following guideline / criteria and Standards apply.

7.1 Resource Management Act

Noise is an environmental effect identified in the Resource Management Act as a matter to be included in any assessment of environmental effects. Noise is defined as unwanted sound and can affect the residential amenity of an area. What constitutes a "reasonable level" is not prescribed by the Act. As a guide, noise limits prescribed by the relevant New Zealand Standards to determine limits of acceptability.

The Resource Management Act [RMA, s.16] in particular is explicit in requiring the adoption of the "best practical option" to avoid unreasonable noise. The definition of the Best Practical Option under the Act means the best method for preventing or minimising adverse effects on the environment having regard, among other things to the nature of the discharge, financial implications and current technical knowledge.

7.2 District Plan

WCC district plan sets out only the following rules regarding emission of noise on sites located in the Rural Zone;

15.1.1.1 Noise

15.1.1.1.1

Noise emission levels resulting from noise associated with power generation, heating, ventilating or air conditioning systems, or water or sewage pumping/treatment systems and other similar domestic installations when measured at or within the boundary of any site, other than the site from which the noise is generated, in the Rural Area shall not exceed the following limits:

*7.00am to 7.00pm 55dB (LAeq(15min))
7.00pm to 7.00am 45dB(LAeq(15min));
and 7.00pm to 7.00am 75dB (LAFmax).*

15.1.1.1.2

Noise emission levels resulting from noise associated with power generation, heating, ventilating or air conditioning systems, or water or sewage pumping/treatment systems or other similar domestic installations when measured at or within any conceptual boundary of a residential building, other than the site from which the noise is generated, shall not exceed:

*Monday to Saturday 7am to 8pm 45dB (LAeq(15min))
All days 8pm to 7am 60dB (LAFmax)
At all other times 35dB (LAeq(15min))*

Importantly, these rules offer only limited guidance for assessing noise from the range of noise sources proposed (apart from fixed plant), as set out in Section 5 above. District Plan Rules 15.1.1.1 and Rule 15.1.1.2 only apply to noise "associated with power generation, heating, ventilating or air conditioning systems, or water or sewage pumping/treatment systems and other similar domestic installations".

As Rules 15.1.1.1 and Rule 15.1.1.2 do not guide on assessing noise due to on-site vehicle activity people noise or other domestic activity likely to be associated with the extended dwelling or any of the proposed activities, we have deferred to the general guidance set out within NZS6802:2008. Clause 8.6.2 of that standard is set out as follows;

8.6.2 As a guideline for the reasonable protection of health and amenity associated with use of land for residential purposes, the noise limits in table 3 should generally not be exceeded at any point within the boundary of a residential site, for example, at any point within the notional boundary of a rural dwelling.

Table 3 – Guideline residential upper noise limits

| | |
|--|--|
| Daytime ⁽¹⁾ | 55 dB L _{Aeq(15 min)} |
| Evening ^(1,2) | 50 dB L _{Aeq(15 min)} |
| Night-time ⁽¹⁾ | 45 dB L _{Aeq(15 min)} |
| Night-time ⁽¹⁾ L _{max} | 75 dB L _{AFmax} |
| NOTE – | |
| (1) | The definition of times of day are a matter for the relevant local authority and should recognise that a period of not less than 8 hours needs to be provided for sleep to ensure at least the minimum acceptable degree of health protection. |
| (2) | Inclusion of an evening period and its hours of application are a matter for the relevant local authority. |
| (3) | This clause is not framed as a consent condition, rule or national environmental standard and should not be quoted for those purposes. See C8.1.3 for suggested format of consent conditions, rules or national environmental standards. |

This Standard does however enable noise limits to be set at lower limits. Clause 8.6.3 of NZS6802:2008 states;

8.6.3 *Authorities may set more stringent outdoor noise limits to afford more protection to residential and noise sensitive activities but this should only be after an assessment has been made of the expected health and amenity benefits of the increased levels of protection.*

Acknowledging the rural nature of the area (which the ambient sound level measurements show does include some rural noise-making activity) and the District Plan noise limits adopted for the control of mechanical noise sources, we have assessed potential noise effects against a noise limit regime set out as follows;

Noise from consented activities shall comply with the following noise limits when measured at or within the conceptual boundary of any residential dwelling existing at the date of this consent:::

| | |
|-------------------------------|---------------------------------|
| Monday to Saturday 7am to 7pm | 45dB (L _{Aeq(15min)}) |
| At all other times | 35dB (L _{Aeq(15min)}) |
| All days 7pm to 7am | 60dB (L _{AFmax}) |

8 Assessment

Section 16 of the RMA places a duty on all occupiers to adopt the best practicable option to ensure noise emitted from any site does not exceed a reasonable level. What constitutes a "reasonable level" is not defined by the Act. In addition, Section 17 of the RMA places a general duty to avoid, remedy or mitigate adverse environmental effects of activities.

The noise limits set out in the District Plan for permitted activities in the rural zone represent a reasonable level of noise effect for the proposed activities as they will protect the area to quite a high standard for daytime, even though the noise limits were originally designed to apply to mechanical noise sources (which are usually amendable to enclosure and screening to reduce noise). In the interests of applying a suitable noise assessment standard to avoid noise nuisance District Plan Rules 15.1.1.1 has been adopted as a basis for noise limits applying to the proposed activity within suggested noise conditions recommended below.

An assessment of noise levels predicted to be received at the conceptual boundary of the closest rural dwellings (Section 6.1 above) indicates the above limit for daytime and night time of Rules 15.1.1.1 and 15.1.1.2 can be achieved for cumulative noise from activities proposed for the site, when measured in assessed in accordance with the relevant

NZ Standards (NZS6801:2008 and NZS6802:2008).

The capacity of noise to induce annoyance depends upon its physical characteristics including spectral characteristics [frequency content] as well as its level. The overall noise effects of the activity complying with District Plan Rule 15.1.1.1 noise limits will ensure that, while some activity sound may be detectable off site [i.e. is at times audible], the activity compliant with these limits can be said to result in less than minor noise effects.

8.1 Special Audible Characteristics

The District Plan states that noise shall be assessed in accordance with NZS6802:2008. This standard applies a penalty for sounds containing audible characteristics of noise such as tonality or impulsiveness. We consider there are no significant sources of impulsive sound sources likely to be associated with the activities undertaken within. Regarding tonality, here too we do not consider tonal sounds as likely to arise from the site. Any amplified sound should be limited to personal listening devices, with the sounds of people, animals and vehicles on the site not likely to emit tonal sounds.

NZS6802:2008 sets out a test for the presence of tonality by comparing the levels of neighbouring one-third octave band sound levels in the measured sound spectrum. An adjustment for tonality is recommended to be applied if the sound level in a one-third octave band exceeds the arithmetic mean of the sound level in both adjacent bands by more than the values quoted in Appendix B to that standard. This method is available to assess sounds from the site, should any concerns arise in relation to special audible characteristics within sounds emitted from the site once operational.

8.2 Construction Noise

Construction activities have the potential to generate noticeable noise in the area. District Plan Rule 5.3.5.2 (v)(c) requires that construction noise be assessed using New Zealand Acoustic Standard 'NZS 6803: 1999 Acoustics Construction Noise'. Based on the information available and given the proposed size and scale of the development [including the separation distances involved, the layout of the site, and the likely nature of the construction works] daytime cumulative construction noise levels are predicted not to exceed noise limits set out within New Zealand Standard *NZS 6803:1999 Acoustics Construction Noise*. This is a reasonable expectation given the proposed plans for the site and the intended nature of the overall operation.

9 Noise Mitigation Measures

The provisions of Sections 16 and 17 of the Resource Management Act require that activities adopt methods to avoid, remedy or mitigate potential adverse noise effects. s.16 in particular is explicit in requiring the adoption of the "best practical option" to avoid unreasonable noise. s.17 requirements must also be adopted whether or not an activity complies with the District Plan, which includes compliance with the District Plan noise limits.

"...the best method for preventing or minimising the adverse effects on the environment having regard, among other things, to

- a) The nature of the discharge or emission and the sensitivity of the receiving environment to adverse effects; and*
- b) The financial implications, and the effects on the environment, of that option when compared with other options; and*
- c) The current state of technical knowledge and the likelihood that the option can be successfully applied."*

There are a number of mitigating features of the proposal which we consider are in-line with the requirements of the BPO for the site and activities. These features are summarised as follows:

9.1 Design, Buffers and Layout of the Site

The layout and design of the site should be followed as this has been shown to suitable limit noise effects experienced

off-site. A further assessment by a noise expert should be sought should any large scale re-organisation of activities on the site take place.

9.2 Hours of Operation

Although this assessment of noise effects is against the daytime noise performance standards of the district plan (7am to 7pm), we are advised of the business case is based around operating 9.30am-4.30pm seven days per week. However the applicant advises actual hours are likely to be 10am-4pm daily, for 5 or 6 days per week. Restricting the operations to less than the full daytime period defined by the district plan is considered a noise-mitigating aspect of the proposal.

9.3 People Based Noise

People-based activities are predicted to generate some sound that may, from time to time, be detectable within adjacent sites but the expected levels are not likely to be unreasonable, especially considering the proposed hours of operation. It is important to note these modest levels of sound produced on-site from people-based activities will be largely embedded within the existing daytime ambient sound levels found in the existing environment.

9.4 Buildings

The proposed buildings housing the bookshop, café etc. are likely to be reasonably effective in reducing noise emitted by activities carried out within. Standard timber framed structures with thermal glazing and self-closing doors would adequately to contain indoor sound sources associated with the proposed activity, with any residual noise from within buildings being assessed as being reduced to reasonable levels at all times.

9.5 On Site Vehicle Noise, Car Parking and Internal Routes

Noise generated from vehicle activity on site has been included with the calculations and our assessment as such sounds need to meet the District Plan noise limits applying on adjacent sites. The plans show provision for good internal vehicle circulation and manoeuvring without creating excessive noise. We recommend the car parking area be finished in a asphalt or similar surface, although this is not critical for controlling noise. The applicant has been advised that noise from on-site vehicle movements can be effectively managed by requiring all drivers to not exceed 15 km/hr whilst on-site and to avoid excessive engine revving, excessive use of horns or other audible devices.

9.6 Traffic Noise on Public Roads

Noise generated by vehicles using the roading network to or from the site is not a noise matter controlled by District Plan rules or New Zealand Standards. In any event, road traffic noise due to traffic generated by the development is likely to be noticeably less than road traffic already passing the site. The cumulative noise effects of vehicle traffic (existing + proposed traffic) are considered not significant for any of the nearby dwellings (including the dwelling located at 283 Takarau Gorge Road) as the increase will be in the order of 1 to 2 dB in terms of LAeq(24 hour)¹.

10 Summary

MHA have completed an *Assessment of Environmental Noise Effects* for the proposed development in accordance with the Forth Schedule of the Resource Management Act 1991 and based on information provided by the applicant.

The main noise sources have been identified as;

- Vehicle Activity
- People & Animal Sounds Outdoors
- Fixed Plant
- Indoor sounds

¹ In New Zealand, noise from vehicles on public roads affecting sensitive receiver sites is quantified in overall daily terms using the LAeq(24 hour) unit.

The proposed layout of the site and proximity to sensitive receiver sites in the local area have been considered within the predictions undertaken. The main activity areas adopted within the assessment are;

- A. Studio & cafe
- B. Garden Room
- C. Car park
- D. Picnic Area
- E. Pony Rides
- F. Maze / Chess Area / Mini Golf

Based on the noise prediction method described above, cumulative noise levels are not considered likely to exceed LAeq(15 min) 45 dB at any existing dwelling or 55 dB within any other nearby site. This is with peak use of the car park (10 vehicles & 1 mini bus per 15 minutes). LAeq(15 min) 45 dB is the permitted activity noise standard set out in the District Plan for various types of mechanical plant operating in the rural zone. This low level of sound represents a reasonable level for protection of daytime amenity when applied at any residence, especially compared to the upper recommendations of NZS6802:2008 for such sites (LAeq(15 min) 50 dB).

In the interests of applying a suitable noise standard to avoid noise nuisance District Plan Rules 15.1.1.1 has been adopted as a recommended condition limiting noise from the proposed on-site activities, which we recommend be worded as follows;

Noise from consented activities on the site shall comply with the following noise limits when measured at or within the conceptual boundary of any residential dwelling existing at the date of this consent;

Monday to Saturday 7am to 7pm 45dB (LAeq(15min))

At all other times 35dB (LAeq(15min))

All days 7pm to 7am 60dB (LAFmax)

Noise shall be measured in accordance with New Zealand Standard 6801:2008 Acoustics - Measurement of Environmental Sound and assessed in accordance with New Zealand Standard 6802:2008 Acoustics - Environmental Noise.

Providing the activity complies with the above recommended noise limit, we see no environmental noise-related reasons for withholding consent on noise grounds.

Malcolm Hunt Associates

3 December 2020