



MARSHALL DAY
Acoustics 

RIDGEBURN DEVELOPMENT
NOISE ASSESSMENT

Rp 001 R02 20251036 | 20 February 2026

Project: **RIDGEBURN DEVELOPMENT**

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Report No.: **Rp 001 R02 20251036**

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TABLE OF CONTENTS

1.0	SUMMARY	5
2.0	QUALIFICATIONS AND EXPERTISE	5
3.0	EXPERT WITNESS CODE OF CONDUCT	5
4.0	PROPOSED DEVELOPMENT	5
4.1	The proposed development includes different activities	5
4.2	The existing site is rural land	6
5.0	EXISTING NOISE ENVIRONMENT	7
5.1	We measured noise in the area for seven days	7
5.2	The area is characterised by existing noise sources	8
6.0	NOISE PERFORMANCE STANDARDS	8
6.1	District Plan noise limits set out what is permitted in the area	8
7.0	PREDICTED NOISE LEVELS	8
7.1	We have predicted noise levels using SoundPLAN	9
7.2	Noise from commercial/retail sources will be controlled to a reasonable level	9
7.3	The WWTP will be designed to comply with the noise limits	11
7.4	Residential areas generate a background level of noise	12
8.0	CONSTRUCTION NOISE AND VIBRATION	12
8.1	Recommended construction noise criteria are in NZS 6803:1999	12
8.2	A detailed construction methodology has not yet been confirmed	12
8.3	Construction activity will be staged	13
8.4	Predicted Noise Levels	13
8.5	Noise levels will be significantly lower than 70 dB most of the time	14
8.6	A management plan will be developed if night works are required	14
8.7	Vibration criteria consider amenity and cosmetic building damage	14
8.8	We predict that construction vibration will be insignificant	14
9.0	NOISE ASSESSMENT	15
9.1	Activity on the site can comply with the District Plan noise rules	15
9.2	Potential reverse sensitivity effects are consistent with the existing land use	15
9.3	Construction can comply with appropriate noise and vibration criteria	15
9.4	Noise effects will be reasonable and have been mitigated as far as practicable	15

APPENDIX A GLOSSARY OF TERMINOLOGY

APPENDIX B NOISE MONITORING DATA

APPENDIX C NOISE SOURCE DATA USED FOR NOISE MODEL

APPENDIX D PREDICTED NOISE LEVELS - RESIDENTIAL MURMUR

APPENDIX E CONSTRUCTION NOISE AND VIBRATION STANDARDS

1.0 SUMMARY

We have assessed the potential noise from the proposed Ridgeburn development, at Morven Ferry Road, near Arrowtown against the relevant noise criteria for activity on the site.

Based on the mitigation measures included in the site design, we predict that noise from commercial/retail and carpark areas within the development can comply with the relevant noise limits at all nearby receivers. We predict that noise from vehicles on the development entrance road will exceed the noise limit at one receiver.

We consider that the overall noise effects from the proposed development are reasonable and reflect the size and nature of the development.

A glossary of technical terms is included in Appendix A.

2.0 QUALIFICATIONS AND EXPERTISE

My name is Brendon Shanks, and I am an Associate at Marshall Day Acoustics Ltd (MDA). MDA is a specialist acoustics consultancy of about 100 professional acoustics consultants, founded in 1981, with offices in New Zealand, Australia, Hong Kong/China, and France.

I hold the qualifications of degrees of Bachelor of Science and Bachelor of Music from the University of Otago. I am a member of the Acoustical Society of New Zealand and the Institute of Acoustics (UK). I have 18 years' experience as an acoustics consultant.

3.0 EXPERT WITNESS CODE OF CONDUCT

Although this Project is not being considered before the Environment Court, I confirm that I have read the Code of Conduct for expert witnesses as contained in section 9 of the Environment Court Practice Note 2023. I agree to comply with that Code. I am satisfied that the matters which I address in this Noise Assessment Report are within my area of expertise, except where I state that I am relying on information provided by another person or expert. I have not omitted to consider material facts known to me that might alter or detract from the opinions I express.

4.0 PROPOSED DEVELOPMENT

The proposed development would establish a large residential subdivision with some commercial areas.

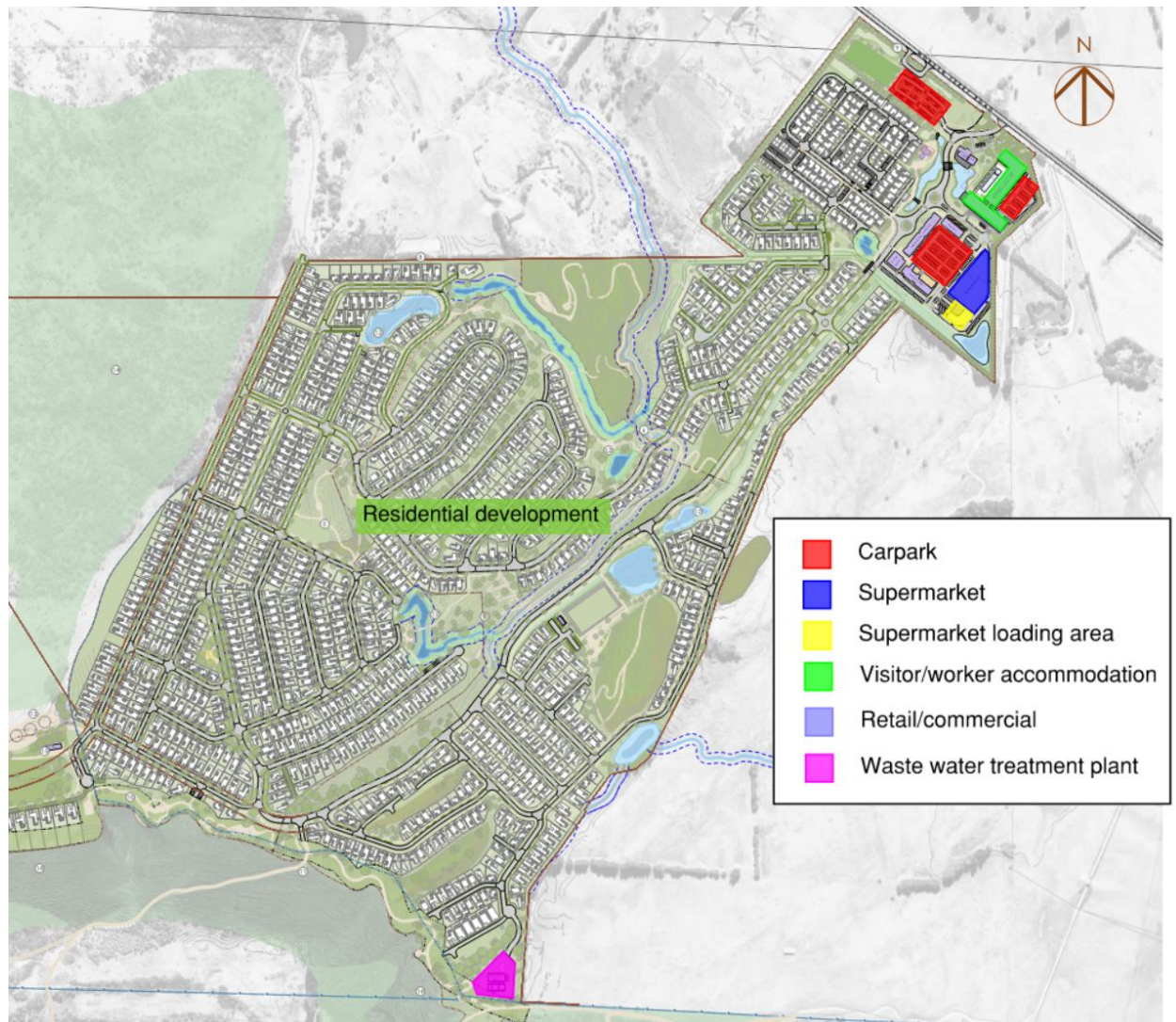
4.1 The proposed development includes different activities

The proposed development includes:

- 1210 dwellings – including 180 medium density affordable dwellings
- Commercial buildings – including daycare, office space, gym and community hall
- Visitor/Worker accommodation building with outdoor swimming pool
- Retail area – including large supermarket and eateries
- Waste water treatment plant (WWTP)

Figure 1 shows the masterplan indicating the key areas of the development.

Figure 1: Proposed development masterplan

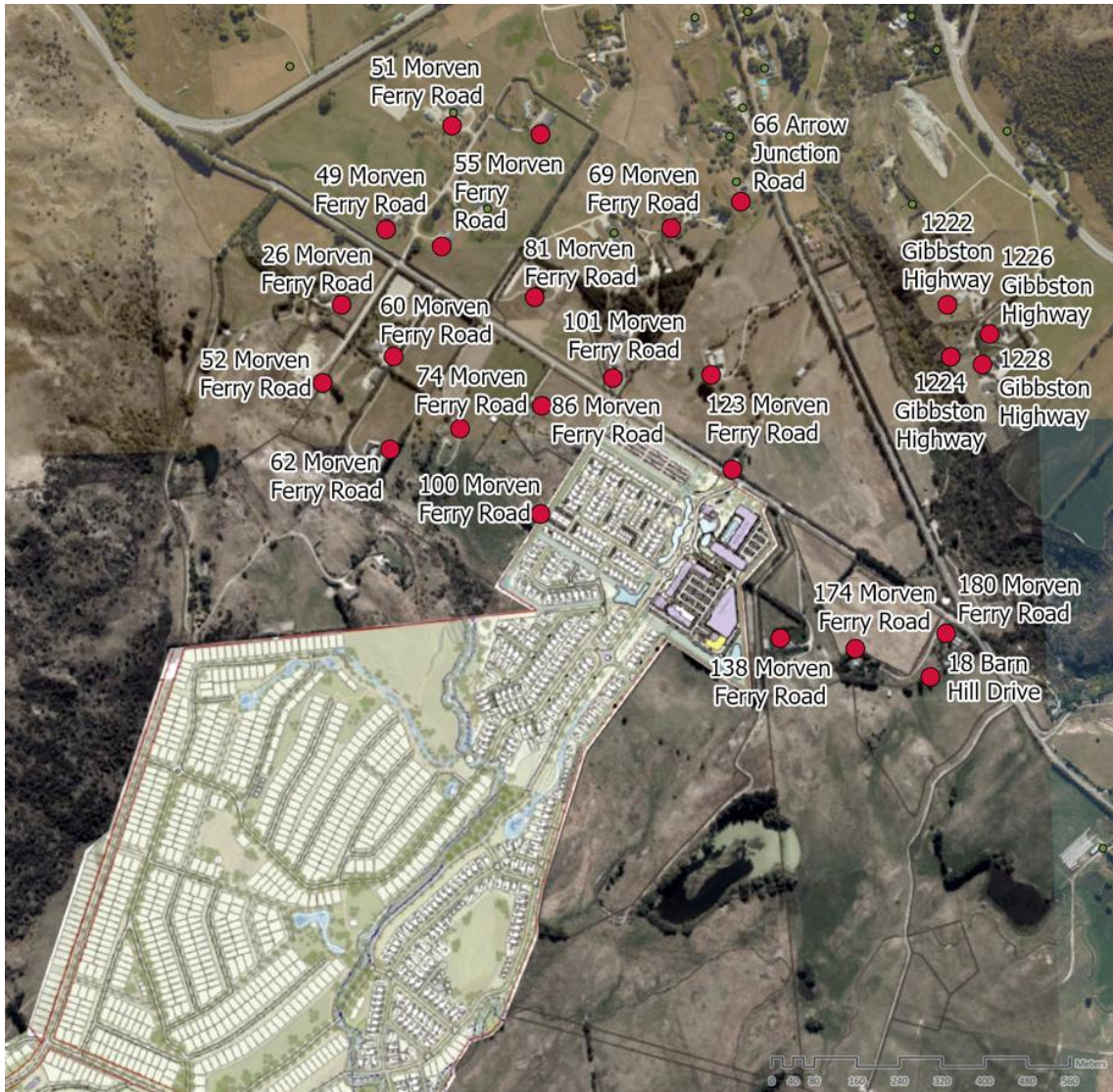


4.2 The existing site is rural land

The land for the proposed development is currently used for rural activity. The site and surrounding area are zoned as rural type in the Queenstown Lakes District Plan (QLDP) – ‘Rural General Zone’ in the Operative District Plan, ‘Rural’ and ‘Wakatipu Rural Amenity Basin Zone’ in the Proposed District Plan.

There are several dwellings on lifestyle block sections in the area. The nearby noise sensitive receivers are indicated in Figure 2.

Figure 2: Nearby receivers



5.0 EXISTING NOISE ENVIRONMENT

We have assessed the existing noise environment by conducting noise monitoring at the site.

5.1 We measured noise in the area for seven days

We conducted noise monitoring for seven days at a location on the proposed site that is representative of the closest noise sensitive receivers to the development. A summary of the measured noise levels is presented in Table 1. Full details of the monitoring results are provided in Appendix B.

Table 1: Summary of measured noise levels

Time period	Measured noise level (dB)	
	L _{Aeq}	L _{A90}
Daytime	46	39
Night-time	44	34

5.2 The area is characterised by existing noise sources

Observations on site and analysis of the noise data indicate that noise levels in the area were influenced by the following sources:

- Rural machinery (farm equipment – intermittent)
- Infrequent vehicle movements on local roads
- Distant road traffic
- Aircraft overflight
- Bird noise
- Light wind noise in vegetation

The existing rural activity is at relatively low scale and intensity. The noise sources in the area are typically intermittent and as a result there are periods of relatively low noise in the area during both the daytime and night-time.

6.0 NOISE PERFORMANCE STANDARDS

We have reviewed the noise performance standards that relate to activity on the site.

6.1 District Plan noise limits set out what is permitted in the area

The noise limits from rule 5.3.5.2 of the Operative QLDP and rule 36.5.1 of the Proposed QLDP for the area surrounding the proposed development are summarised in Table 2.

Table 2: QLDP noise limits

Time period	Noise level received at the notional boundary ¹ of a dwelling on another site	
	Operative District Plan (Rural General)	Proposed District Plan (Rural Zone and Wakatipu Basin Rural Amenity Zone)
Daytime (08:00 – 20:00)	50 dB LAeq(15 min)	50 dB LAeq(15 min)
Night-time (20:00 – 08:00)	40 dB LAeq(15 min)	40 dB LAeq(15 min)
	70 dB LAFmax	75dB LAFmax

The QLDP noise limits apply to “non-residential activities”. This indicates that noise from typical residential activity should not be assessed against these standards. However, they do provide a guide for what is permitted from other noise sources.

Noise from vehicle movement on public roads is not assessed against the QLDP noise rules because it is specifically permitted by rule 36.4.1.

7.0 PREDICTED NOISE LEVELS

We have developed a noise model of the site to predict noise from the different noise sources associated with the proposed development. The noise model includes the following sources:

¹ A line 20m from the façade of any residential unit or the legal boundary, whichever is closer to the residential unit

- Vehicle movements on private roads and in carpark areas at the commercial and park and ride areas – required to comply with limits
- Noise from supermarket operation – loading area, mechanical plant (indicative at this stage) – required to comply with limits
- General residential noise from the wider subdivision – not required to comply with limits

We have assessed different scenarios based on the source and location of the noisy activity.

7.1 We have predicted noise levels using SoundPLAN

We have used the noise modelling package SoundPLAN to predict noise levels. Calculations in SoundPLAN are based on ISO 9613-2:2024 “Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation”. This method has the scope to consider a range of factors affecting the sound propagation including:

- The magnitude of the noise source in terms of sound power
- The distance between source and receiver
- The presence of obstacles such as screens or barriers in the propagation path
- The presence of reflecting surfaces
- The hardness of the ground between the source and receiver
- Attenuation due to atmospheric absorption, and
- Meteorological effects such as wind gradient, temperature gradient and humidity.

In ISO 9613, the effect of meteorological conditions is significantly simplified by calculating the average downwind sound pressure level. The Standard adopts the conservative approach of assuming that wind is always blowing from the noise sources to the receiver locations. The equations and calculations also hold for average propagation under a well-developed moderate ground-based temperature inversion, such as commonly occurs on clear, calm nights.

7.2 Noise from commercial/retail sources will be controlled to a reasonable level

We have predicted noise from sources associated with the commercial/retail area of the development (e.g. supermarket and carpark areas). These predictions are based on measurements and data from similar developments. The site has been designed to ensure that noise from these areas achieves a reasonable noise level at the nearby dwellings.

7.2.1 We have assessed noise from peak periods in carparking areas

The traffic assessment has provided details of estimated peak hour trip generation for the various elements of the development. Based on this, we have assessed the noise from vehicles in the three main carpark areas during the peak hour. We understand that the peak hour movements may occur between 7am and 8am, which is during the night-time period of the QLDP noise rule.

Table 3: Carpark vehicle movements (peak hour)

Carpark	Estimated vehicle movements (Peak hour)
Park and Ride	177
Worker/Visitor Accommodation	599
Retail/Offices	100

7.2.2 Mitigation measures have been included for retail/commercial noise sources

As well as noise from the car park, the retail/commercial area will include noise from mechanical plant and deliveries, particularly for the supermarket.

We have predicted noise from typical rooftop plant and deliveries associated with a large supermarket. The noise source data is based on our experience with other large supermarket developments and is detailed in Appendix C.

We have assumed that screening will be provided to the roof top plant, and that appropriate plant will be chosen. Mitigation measures will be developed in greater detail as the design of the supermarket progresses. These will be designed to ensure that noise levels at the notional boundary of the closest existing dwelling will be less than 40 dB L_{Aeq} .

A 2m high solid boundary fence has been included in the design to mitigate noise from deliveries and loading activity to the supermarket. In addition, it is assumed that deliveries and loading activity will only occur during the recommended daytime hours (8am-8pm).

7.2.3 Predicted noise from commercial activities and carparking

The predicted peak hour noise levels at the notional boundary of the nearby dwellings are shown in Table 4.

Table 4: Predicted noise levels – Retail/commercial and car parks

Receiver (notional boundary)	Predicted peak hour noise level (dB L_{Aeq})
88 Arrow Junction	33
86 Morven Ferry Rd	33
81 Morven Ferry Rd	27
74 Morven Ferry Rd	28
69 Morven Ferry Rd	24
66 Morven Ferry Rd	24
62 Morven Ferry Rd	27
60 Morven Ferry Rd	26
55 Morven Ferry Rd	23
53 Morven Ferry Rd	24
52 Morven Ferry Rd	25
51 Morven Ferry Rd	22
49 Morven Ferry Rd	23
26 Morven Ferry Rd	23
180 Morven Ferry Rd	30
174 Morven Ferry Rd	33
138 Morven Ferry Rd	40
128 Barn Hill Dr	30
123 Morven Ferry Rd	36
1228 Gibbston Highway Rd	25

Receiver (notional boundary)	Predicted peak hour noise level (dB L _{Aeq})
1226 Gibbston Highway Rd	25
1224 Gibbston Highway Rd	26
1222 Gibbston Highway Rd	24
101 Morven Ferry Rd	35
100 Morven Ferry Rd	33

7.2.4 Predicted noise from roads in the development exceeds the noise limits at one receiver

The main arterial road within the development runs up the centre of the site in the northern section. This ensures a sufficient setback distance and shielding to most of the adjacent sites.

We predict that noise from traffic within the development site will be between 35 dB L_{Aeq} and 45 dB L_{Aeq} during the daytime and less than 35 dB L_{Aeq} during the night-time at most of the nearby receivers. The noise model has not included shielding from individual dwellings in the residential areas, so the predicted levels will likely be even lower at most receivers.

The dwelling at 123 Morven Ferry Road is located opposite the site entrance where all vehicles will enter the development. We predict that noise from vehicles on the entrance road would be up to 55 dB L_{Aeq} at the notional boundary of this dwelling during peak periods. The peak periods include 7am-8am which is in the night-time period of the QLD noise rule. Therefore, the predicted traffic noise from the development entrance exceeds the night-time noise limit of 40 dB L_{Aeq} by up to 15 decibels at this location.

The most effective noise mitigation option to reduce noise would be a noise barrier between the road and the receiver. It is not practicable to include this as part of the development, as it would block access to the site.

7.3 The WWTP will be designed to comply with the noise limits

The WWTP for the development will be located at the southern edge of the site. Detailed design of the plant has not yet been undertaken. The design will ensure that noise from the plant complies with the recommended noise limits at the closest residential sites in the proposed development and notional boundaries of existing dwellings. The closest proposed residential sites are around 60m from the WWTP site.

We anticipate that noise from the WWTP operation will be consistent day or night, so compliance with the night-time noise limit of 40 dB L_{Aeq} would be required.

The preliminary design indicates that the main noise sources will be enclosed in the main building. The sound insulation performance of the building envelope will be designed to ensure that noise from these sources is adequately controlled.

Outdoor noise sources may include aerators, blowers and pumps. We anticipate that these could be adequately controlled using appropriate plant selection, enclosures and/or noise barriers.

The WWTP location is approximately 90m from the closest position of the existing Twin Rivers Trail, though at this position, the trail is shielded by the topography. Based on this, we expect that noise from the WWTP would be less than 35 dB L_{Aeq} at the trail, which is an appropriately low noise level.

7.4 Residential areas generate a background level of noise

A large residential subdivision, such as the proposed development, will generate a level of background noise from combined day-to-day activity on all the sites. This will include noise from vehicle movements on smaller roads and driveways within the subdivision, domestic sources such as heat pumps, and typical residential activities (e.g. lawn mowing).

The introduction of a large residential development will change the noise environment in the immediate vicinity. To understand this, we have conducted noise monitoring near the edge of a similar scale sub-division (Hanley's Farm) over the period of a week. We have used the measured noise levels to calibrate the noise model with a level of "residential murmur" and predict the likely change in noise environment as a result of the general residential activity.

Noise levels from this non-descript activity are variable and this assessment is therefore intended to only provide an indication of the potential change in noise environment from the introduction of large scale residential activity.

The predicted noise level from this "residential murmur" is generally between 35 and 45 dB L_{Aeq} during the daytime at the nearby receivers (up to 50 dB L_{Aeq} at the closest dwelling - 100 Morven Ferry Road) and 30 to 43 dB L_{Aeq} at night. While this is similar to the existing noise levels measured around the site, the character of the noise would change from largely natural and agricultural sounds to residential and human sounds.

Cumulative noise from all general residential activity (including vehicles on driveways) is not required to comply with any noise criteria. However, as detailed in Section 7.2, noise from internal roads must comply with the QLDP noise limits. With the exception of noise from the main accessway at 123 Morven Ferry Road (discussed in Section 7.2), we anticipate that noise generated by the internal roads would comfortably comply with the relevant QLDP limits.

More details on the predicted noise levels are shown in Appendix D.

8.0 CONSTRUCTION NOISE AND VIBRATION

We have assessed the likely noise and vibration from earthworks activity and for the construction of the major retail/commercial and visitor/worker accommodation buildings. Details of the construction methodology and timeframes have not yet been developed. However, we anticipate that typical construction activities can comfortably comply with appropriate noise and vibration standards.

8.1 Recommended construction noise criteria are in NZS 6803:1999

Construction noise must be measured and assessed according to New Zealand Standard NZS 6803:1999 "Acoustics – Construction Noise" (NZS 6803). The noise criteria apply at 1m outside the façades of buildings, and only while buildings are occupied.

The construction noise criteria from NZS 6803 are 70 dB L_{Aeq} and 85 dB L_{AFmax} during the daytime works period. Full tables of noise criteria from NZS 6803 are included in Appendix E.

8.2 A detailed construction methodology has not yet been confirmed

Details of the construction program and methodology have not yet been fully developed. However, the anticipated construction works are summarised in Table 5.

We understand that noisy works will typically be undertaken during daytime hours (from 7am – 7pm, Monday to Friday, and 7:30am – 6pm on Saturdays).

Table 5: Summary of anticipated construction activities

Activity	Equipment
Site earthworks	Excavators, scraper, truck movements, bulldozer operating across the site
Concrete pad	Concrete pours at building platforms Concrete batching plant on site (TBC)
Piling (if required)	Requirement for piling and piling methodology is yet to be confirmed.
Building construction	Mobile crane, truck deliveries, hand tools operating at building platform area

8.3 Construction activity will be staged

The development will be completed in stages and construction activity would occur several phases. As a result, construction of later stages may occur when dwellings from the early stages are already occupied. Significant earthworks on land adjacent to early stages will be completed prior to occupation to minimise construction effects on future residents of the development.

We do not anticipate that that the phased development would have a noticeable impact on existing receivers in the area.

8.4 Predicted Noise Levels

Table 6 provides indicative construction noise levels for typical activities anticipated on the site. They are considered representative of the activities proposed. However, in practice, construction noise levels are inherently variable due to factors such as equipment selection, methodology and operator skill/care.

Table 6: Sound power levels at compliance setback distances at 1m from a building façade²

Equipment	Sound power level (dB L _{WA})	Setback to achieve compliance ³	
		70 dB L _{Aeq} (daytime)	45 dB L _{Aeq} (night-time)
Bored piling rig *	111	50m	>200m
Impact piling rig (with casing and dolly) *	114	69m	>200m
Excavator (40T)	105	28m	>200m
Static (non-vibratory) roller	103	25m	160m
Bulldozer (41T)	108	40m	>200m
Hand tools	103	25m	160m
Mobile Crane (100T) operating	99	16m	110m
Truck and trailer unit delivery ⁴	98	14m	100m
Concrete batching plant	108	40m	>200m

* The necessity for piling or a piling methodology has not been confirmed. We have assessed typical methods, and these can readily comply with the relevant noise standards.

² In accordance with the requirements of NZS 6803: 1999, inclusive of 3 decibels façade reflection

³ Based on weekday noise limits, without barrier shielding

⁴ Includes 5 decibels of averaging allowing for the time component of deliveries.

Based on the anticipated noise sources on site and the site layout, we predict that construction activities can comply with the daytime construction noise criteria at all nearby noise sensitive receivers. Night-time construction activity is not proposed unless absolutely necessary.

8.5 Noise levels will be significantly lower than 70 dB most of the time

We anticipate that the setbacks to nearby receivers will ensure compliance with the daytime noise limit of 70 dB L_{Aeq} at all nearby dwellings. This may require the use of localised/temporary noise barriers when undertaking earthworks within 40m of an occupied dwelling.

However, it is anticipated that noise levels would be significantly lower than 70 dB for most of the time. This is due to the setback distances typically being greater than those indicated in Table 6.

8.6 A management plan will be developed if night works are required

If construction activity is required at night – for example, for extended concrete pours – a construction noise management plan will be developed to ensure that the best practicable option is adopted to reduce noise.

8.7 Vibration criteria consider amenity and cosmetic building damage

We recommend that construction vibration is measured and assessed in accordance with German Standard DIN 4150-3:2016 “*Vibrations in buildings – Part 3: Effects of vibration on structures*”.

Relevant criteria to protect buildings from the risk of any, including cosmetic, damage are 15 mm/s Peak Particle Velocity (PPV) for short term (transient) vibration and 5 mm/s PPV for long term (continuous) vibration. (Note that vibration levels needed to cause structural damage are magnitudes higher.)

British Standard BS 5228-2:2009 “*Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration*” provides guidance on the amenity effects of vibration. The descriptions are reproduced below, and are supplemented with our own descriptions for 2mm/s and 5mm/s (to bridge the gap between 1 and 10 mm/s in the Standard):

- 0.14mm/s PPV Just perceptible in the particularly sensitive environments
- 0.3 mm/s PPV Just perceptible in normal residential environments
- 1 mm/s PPV Typically acceptable with prior notification
- 2 mm/s PPV Clearly perceptible but typically acceptable (during daytime only) in dwellings and workplaces if it occurs intermittently, and with effective prior engagement.
- 5mm/s PPV Highly unsettling in dwellings and workplaces. If prolonged, some occupants may want to leave the building. Computer screens will shake, and items could fall off shelves if they are not level.
- 10 mm/s PPV Likely to be intolerable for any more than a very brief period

To protect people’s amenity, we recommend a criterion of 2 mm/s PPV.

8.8 We predict that construction vibration will be insignificant

We predict that vibration from the proposed construction activities may be just perceptible at the closest receivers (less than 1 mm/s PPV) for the highest vibration sources.

Predicted levels from all activity would comfortably comply with building protection criteria contained in DIN 4150-3 and also the recommended amenity level.

9.0 NOISE ASSESSMENT

We have assessed the proposed development against the relevant noise rules and the existing noise environment in the area.

9.1 Activity on the site can comply with the District Plan noise rules

We predict that activity on the site (excluding general residential noise) will comply with the District Plan noise limits with appropriate mitigation measures in place. The noise modelling indicates that rooftop plant will need to be suitably designed, chosen and mitigated to comply with the recommended night-time criterion.

Other noise sources, such as deliveries and loading areas, are adequately controlled by the mitigation and management measures e.g. noise barrier at the boundary and limiting deliveries to daytime hours.

9.2 Potential reverse sensitivity effects are consistent with the existing land use

The introduction of residential sites to the area has the potential to result in reverse sensitivity effects. This primarily relates to noise from rural activities that may occur near the new dwellings. Noisy farm machinery has the potential to exceed the daytime noise limits within 100m of the residential sites. However, we consider that the intensity and scale of existing activity in the area is such that these effects would be insignificant.

Furthermore, the area already includes a significant number of lifestyle block residential sites that represent sensitive receivers for noisy activity. Based on this, we do not consider that the development would significantly increase the risk of reverse sensitivity in the area.

9.3 Construction can comply with appropriate noise and vibration criteria

We have predicted that construction noise and vibration can comfortably comply with the relevant criteria during daytime. Should night-time works be required on limited occasions, a management plan will be required, and the activity would need to be carefully managed to achieve compliance.

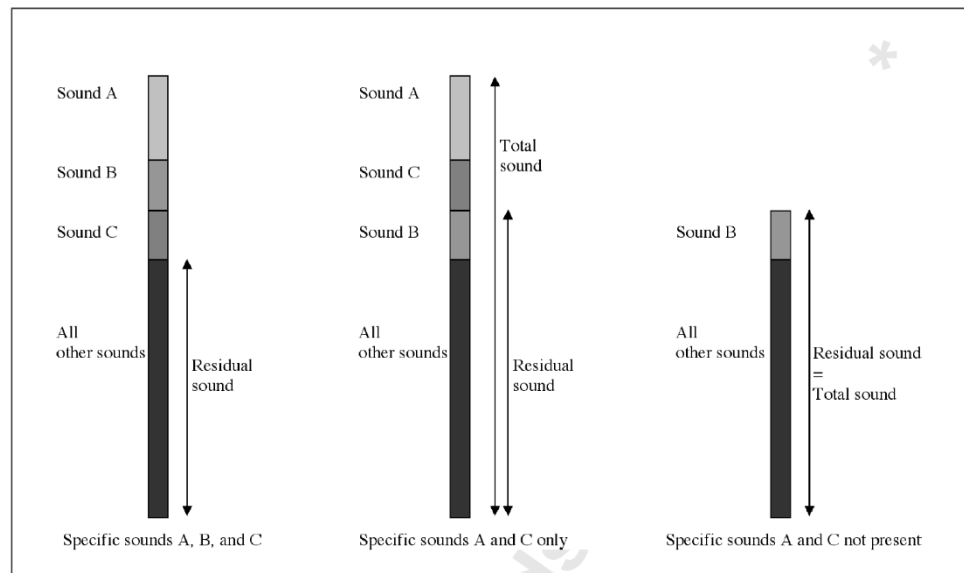
9.4 Noise effects will be reasonable and have been mitigated as far as practicable

We anticipate that the predicted noise levels will be audible at times and will result in a change in the ambient noise environment in the rural areas immediately adjacent to the site. However, based on guidance from the QLDP noise rules, we consider that the noise levels are reasonable for the area.

Furthermore, we consider that the mitigation measures that have been included in the design of the site, demonstrate that the best practicable option to reduce noise has been adopted.

APPENDIX A GLOSSARY OF TERMINOLOGY

Background sound	The sound that is continuously present in a room or outdoor location. Often expressed as the A-weighted sound level exceeded for 90 % of a given time period i.e. L_{A90} .
Noise	A subjective term used to describe sound that is unwanted by, or distracting to, the receiver.
Notional boundary	A line 20 metres from any side of a dwelling, or the legal boundary where this is closer to the dwelling. This definition is from NZS 6802:2008.
Total sound Or Ambient sound	The totally encompassing sound in a given situation at a given time, from all sources near and far, including the Specific Sound. See also Residual Sound.



This definition is from NZS 6802:2008.

A-weighting	A set of frequency-dependent sound level adjustments that are used to better represent how humans hear sounds. Humans are less sensitive to low and very high frequency sounds. Sound levels using an “A” frequency weighting are expressed as dB L_A . Alternative ways of expressing A-weighted decibels are dBA or dB(A).
dB	Decibel. The unit of sound level.
L_{A90}	The A-weighted sound level exceeded for 90 % of the measurement period, measured in dB. Commonly referred to as the background noise level.
L_{Aeq}	The equivalent continuous A-weighted sound level. Commonly referred to as the average sound level and is measured in dB.
L_{Amax}	The A-weighted maximum sound level. The highest sound level which occurs during the measurement period. Usually measured with a fast time-weighting i.e. L_{AFmax}
L_w	Sound Power Level. The calculated level of total sound power radiated by a sound source. Usually A-weighted i.e. L_{WA} .

APPENDIX B NOISE MONITORING DATA

Date: 4 December – 12 December, 2025

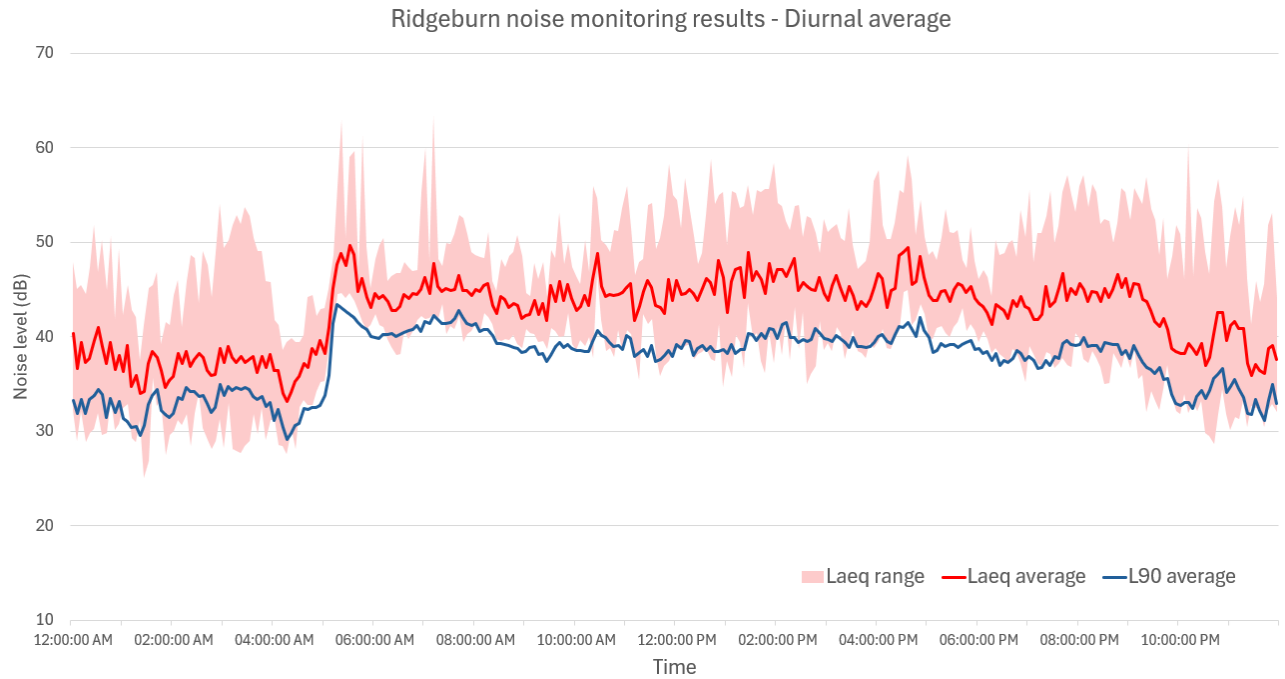
Instrumentation: Noise logger: NTi XL2, serial A2A-22499-E1
Calibration due: 24/11/27

Calibrator: B&K 4230 serial 458944
Calibration due: 1/04/26



Table 7: MP1 Noise monitoring results

Date	Measured noise level (dB)			
	Day		Night	
	L _{Aeq}	L _{A90}	L _{Aeq}	L _{A90}
4/12/2025	43	37	40	30
5/12/2025	50	42	43	34
6/12/2025	43	36	42	35
7/12/2025	50	41	48	35
8/12/2025	45	37	47	36
9/12/2025	47	39	46	33
10/12/2025	49	42	43	36
11/12/2025	45	39	42	36



APPENDIX C NOISE SOURCE DATA USED FOR NOISE MODEL

Table 8: Sound power levels of proposed equipment

Item	Plant and equipment	Sound power (dB L _w)
1	Delivery truck to supermarket	98
2	Cars in car parks	86
3	Fork lift (supermarket loading area)	91
4	Typical supermarket rooftop plant (HVAC unit, exhaust fan, supply fan, outdoor heat pump inverter) ¹	78

¹ 10 decibel reduction applied to HVAC unit for shielding

APPENDIX D PREDICTED NOISE LEVELS - RESIDENTIAL MURMUR

Receiver	Predicted noise level (dB L _{Aeq})	
	Daytime (8am-8pm)	Night-time (8pm-8am)
88 Arrow Junction	43	36
86 Morven Ferry Rd	44	37
81 Morven Ferry Rd	40	33
74 Morven Ferry Rd	41	34
69 Morven Ferry Rd	37	30
66 Morven Ferry Rd	37	30
62 Morven Ferry Rd	39	32
60 Morven Ferry Rd	38	31
55 Morven Ferry Rd	36	29
53 Morven Ferry Rd	37	30
52 Morven Ferry Rd	36	29
51 Morven Ferry Rd	36	29
49 Morven Ferry Rd	36	29
26 Morven Ferry Rd	36	29
180 Morven Ferry Rd	38	31
174 Morven Ferry Rd	38	31
138 Morven Ferry Rd	40	33
128 Barn Hill Dr	37	30
123 Morven Ferry Rd	48	41
1228 Gibbston Highway Rd	36	29
1226 Gibbston Highway Rd	36	29
1224 Gibbston Highway Rd	37	30
1222 Gibbston Highway Rd	36	29
101 Morven Ferry Rd	45	38
100 Morven Ferry Rd	50	43

APPENDIX E CONSTRUCTION NOISE AND VIBRATION STANDARDS

Construction noise must be measured and assessed according to New Zealand Standard NZS 6803:1999 “Acoustics – Construction Noise”. The noise limits apply at 1m outside the façades of buildings, and only while they are occupied.

The construction noise limits from NZS6803:1999 are 70 dB L_{Aeq} and 85 dB L_{AFmax} during the daytime works period.

Table 9: Construction noise levels for activities sensitive to noise⁵ (e.g. occupied dwellings)

Time of week	Time period	Typical duration ⁶		Short-term duration ⁷		Long-term duration ⁸	
		dB L_{Aeq}	dB L_{AFmax}	dB L_{Aeq}	dB L_{AFmax}	dB L_{Aeq}	dB L_{AFmax}
Weekdays	0630 – 0730	60	75	65	75	55	75
	0730 – 1800	75	90	80	95	70	85
	1800 – 2000	70	85	75	90	65	80
	2000 – 0630	45	75	45	75	45	75
Saturdays	0730 – 1800	75	90	80	95	70	85
	1800 – 0630	45	75	45	75	45	75
Sundays and public holidays	0730 – 1800	55	85	55	85	55	85
	1800 – 0630	45	75	45	75	45	75

Table 10: Construction noise levels for noise affecting any other activity¹ (e.g. occupied commercial building)

Time of week	Time period	Typical duration ⁶	Short-term duration ⁷	Long-term duration ⁸
		dB L_{Aeq}	dB L_{Aeq}	dB L_{Aeq}
All days	0730 – 1800	75	80	70
	1800 – 0730	80	85	75

Vibration Performance Standards - Cosmetic Building Damage

Construction vibration to be measured and assessed in accordance with German Standard DIN 4150-3:2016 “Vibrations in buildings – Part 3: Effects of vibration on structures”.

The short-term (transient)⁹ vibration limits in Figure 3 apply at building foundations in any axis.

⁵ The AUP defines activities sensitive to noise as ‘Any dwelling, visitor accommodations, boarding house, marae, Papakainga, integrated residential development, retirement village, supported residential care, care centres, lecture theatres in tertiary education facilities, classrooms in education facilities and healthcare facilities with an overnight stay facility’.

⁶ Construction work at any one location for more than 14 calendar days but less than 20 weeks

⁷ Construction work at any one location for up to 14 calendar days

⁸ Construction work at any one location with a duration exceeding 20 weeks

⁹ Short-term (transient) vibration is “vibration which does not occur often enough to cause structural fatigue and which does not produce resonance in the structure being evaluated”

The long-term (continuous)¹⁰ vibration limits apply at all floor levels, but levels are normally highest in horizontal axes on the top floor.

DIN 4150-3 limits are for avoiding cosmetic building damage, such as cracking in paint or plasterwork. Cosmetic building damage effects are deemed 'minor damage' in the Standard and can generally be easily repaired. The Standard states: "*Experience has shown that if these values are complied with, damage that reduces the serviceability of the building will not occur.*" Much higher vibration levels (i.e. an order of magnitude higher) would be needed for potential structural damage.

Figure 3: Short-term (transient)¹ vibration at building foundations (DIN 4150-3 2016: Figure 1)

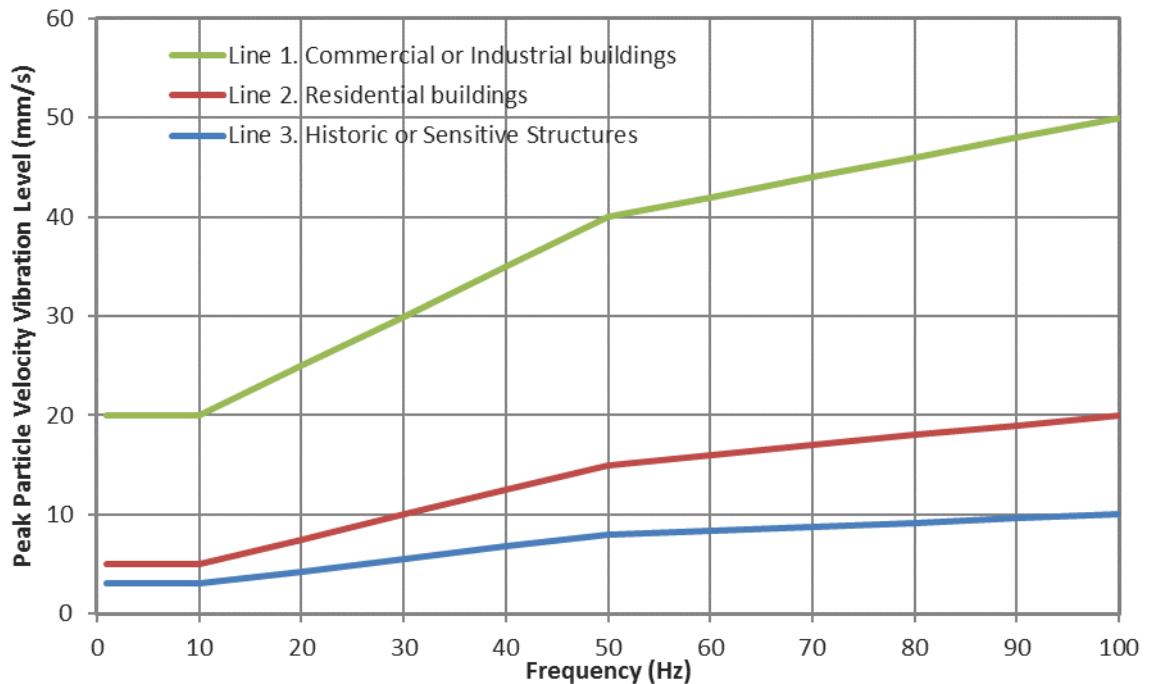


Table 11: Vibration at horizontal plane of highest floor (DIN 4150-3 2016: Tables 1 and 4)

Building Type	Peak Particle Velocity Vibration Level (mm/s)	
	Short-term (transient) ⁹	Long-term (continuous) ¹⁰
Line 1. Commercial or Industrial	40	10
Line 2. Residential	15	5
Line 3. Vibration sensitive	8	2.5

DIN 4150-3 states that Line 3 should be used for buildings "*that, because of their particular sensitivity to vibration, cannot be classified under Lines 1 and 2 and are of great intrinsic value (e.g. listed building)*".

¹⁰ Long-term (continuous) vibration includes types not covered by the short-term vibration definition