



MARSHALL DAY
Acoustics 

**WAIMAKARIRI DISTRICT PLAN REVIEW - NOISE
DELIVERABLE 2 - NOISE MONITORING**

Rp 002 R01 20181370 | 8 October 2019



Project: **WAIMAKARIRI DISTRICT PLAN REVIEW - NOISE**

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1.0 INTRODUCTION

This report discusses the results of noise monitoring undertaken by Marshall Day Acoustics at a number of specific sites in the Waimakariri District. These sites were identified in our *Deliverable 1* report (Rp 001 R01 20181370 dated 26 February 2019)) as areas that warranted individual consideration of noise.

The monitoring discussed in this report is intended to provide brief noise 'snapshots' from each site, sufficient to assist in rule development and/or zoning provisions as part of the review of the Waimakariri District Plan. With that in mind, the monitoring does not constitute a definitive assessment of compliance at any of the sites.

A glossary of acoustics terminology is provided in Appendix A. The details of each noise survey period are provided in Appendix B.

2.0 DAIKEN MDF PLANT

2.1 Discussion

The operative District Plan includes a specific noise rule which applies to the Business 3 zone where the MDF plant is located.

31.12.1.3	<p>Activities in the Business 3 Zone shall not exceed the following noise limits, within measurement time intervals in the time-frames stated, at any point within the notional boundary of the dwellinghouse located at 126 Beatties Road (GPS 43.264 Latitude South; 172.626 Longitude East), or at any point within any Residential Zone:</p> <ul style="list-style-type: none"> a) Daytime: 7am to 7pm Monday to Saturday, and 9am to 7pm Sundays and Public Holidays: 55dBA L₁₀. b) Other times: 45dBA L₁₀. c) Daily 10pm to 7am the following day: 75dBA L_{max}.
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We understand that this rule was developed as part of a Plan change some years ago. The aim at that time was to give certainty to the plant by accurately specifying the assessment location. This overcomes the uncertainty which exists when rules refer to notional boundaries, as these can change over time.

2.2 Night-time Noise Levels

Our night-time visit was undertaken on the evening of 1 April 2019. At the time of our visit, both of the cyclones at the plant were operating, suggesting that the facility was at, or close to, maximum capacity. There was almost no evidence of activity outside of the plant buildings, and hence our measurements reflect plant operation with little truck or log yard activity.

Brief measurements were made at several locations to provide an overview of noise in the area, not just at the compliance location. We have recorded both L_{A10} sound levels as required in the Operative Plan, and L_{Aeq} sound levels as proposed under the District Plan review.

The results of our survey can be summarised as follows.

Figure 1: Daiken MDF Plant Measurement Locations (Base map courtesy of Google)



Measurement Location

Measured Sound Level (dB re 2 x 10⁻⁵ Pa)

	L_{A10}	L_{Aeq}
1. 126 Beatties Road	50	48
2. Directly opposite main plant buildings	56	55
3. Western end of site	46	45
4. 150m west of position 3	42	41
5. South of rail, Beatties Road	49	47
6. South of plant, Beatties Road	39	38

2.3 Daytime Noise Levels

Our daytime visit occurred on Tuesday 2 April. Only one cyclone was operating when we arrived, with the second one starting up shortly afterwards.

Although there were some trucks entering and exiting the site during our visit, it was unclear whether the log yard was operating at typical capacity.

At the time of our daytime survey, there was a light southerly wind, which could result in slightly elevated noise levels at the compliance location.

Measurement Location	Measured Sound Level (dB re 2×10^{-5} Pa)	
	L_{A10}	L_{Aeq}
1. 126 Beatties Road – 1 cyclone operating	54	52
1. 126 Beatties Road – 2 cyclones operating	58	56

2.4 Comments

At the District Plan compliance location (Position 1, 126 Beatties Road), the plant appears to be exceeding the permitted night-time noise standard of 45 dB L_{A10} by about 5 dB when both cyclones are operating.

During the day, the plant seems to just comply with the daytime noise standard of 55 dB L_{A10} with one cyclone operational. When both are operating, noise levels are about 3 dB above the daytime standard. Daytime levels may be slightly lower under prevailing easterly wind conditions, although this reduction would easily be offset if activity in the log yard increased.

As expected, noise levels vary at other locations, depending on proximity to the plant. The western end of the site is quieter than the eastern end, reflecting the concentration of the main noise sources towards the east.

3.0 WOODFORD GLEN

3.1 Discussion

We visited the area around Woodford Glen on the evening of 29 March 2019 to undertake measurements during an event billed as “*Modified Invasion & Canterbury SuperStock Championship*”.

The aim of our monitoring was to get an initial indication of the magnitude of noise levels received at various properties in the area, to assist when considering the possibility of noise rules.

Because some of the measurements are a considerable distance from the site, environmental conditions such as wind speed and direction could have a noticeable effect on noise levels. In addition, there is likely to be some variability in noise from different events at Woodford Glen. As such, these results should be treated with caution.

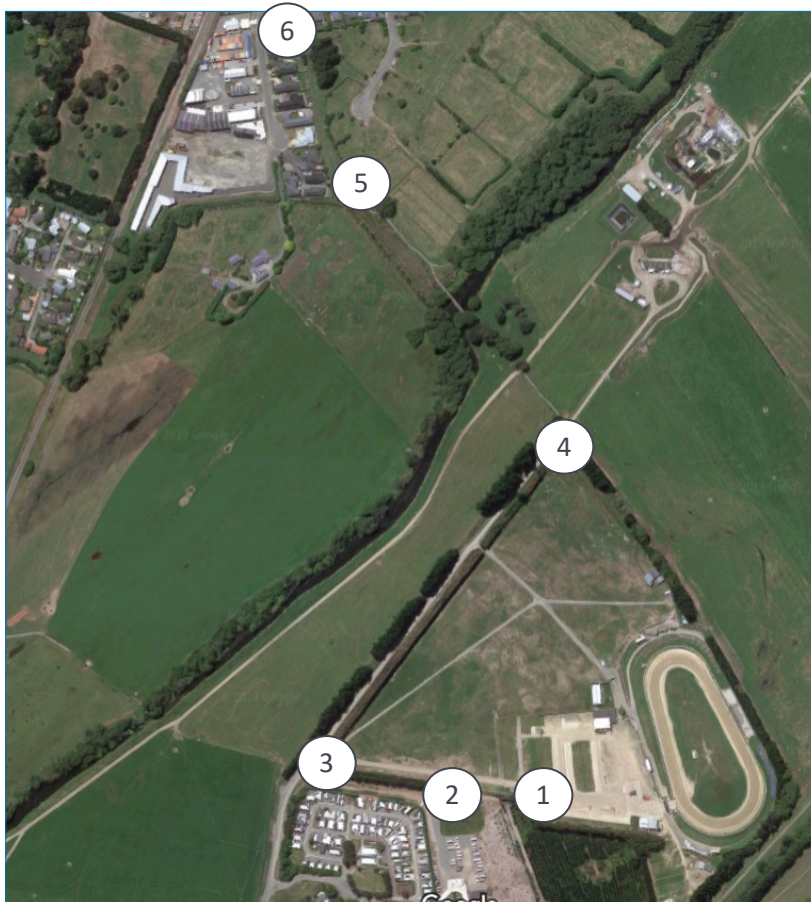
3.2 Measurement Procedure

Because the level of noise varies from race to race depending on the class of cars racing, we set up an unattended noise logger on the boundary of the Woodford Glen site, reasonably close to the pits area. We then undertook hand-held measurements at a number of other locations. The hand-held measurements were then rationalised with reference to the logger results, to give an indication of the likely noise level at each location during different classes of racing.

3.3 Measurement Results

The results of our measurements can be summarised as follows.

Figure 2: Woodford Glen Measurement Locations (Base map courtesy of Google)



Measurement Location	Measured Sound Level (dB L_{Aeq} re 2×10^{-5} Pa)	
	Loudest race	Quietest race
1. Logger Location, site boundary near pits	82	74
2. Closest occupied part of campground	79	72
3. Road boundary of campground	76	70
4. Northern site boundary	68	60
5. Closest residential boundary to north	71	64
6. Kaikanui Street, at entry to public walkway	57	48

N.B. the table presents the average noise levels in terms of the parameter L_{Aeq} . For reference, L_{A10} noise levels during race events are typically 3 dB higher than the L_{A10} over the same measurement period.

3.4 Comments

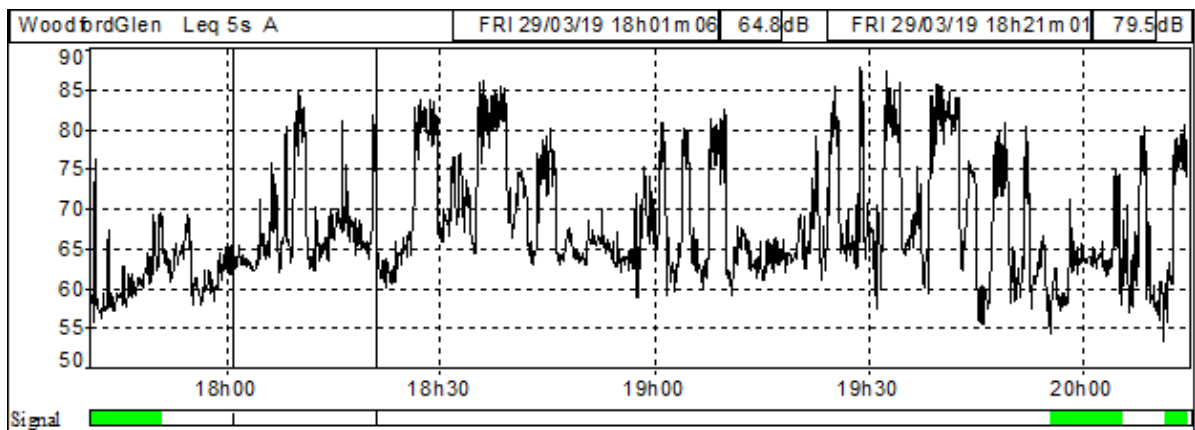
Campground noise levels are above 75 dB L_{Aeq} during the loudest races.

The most exposed residents to the north of the site, in Kaikanui Street, receive noise levels around 70 dB L_{Aeq} during the loudest races.

Based on our survey, the loudest races occupied around 25–30% of the total event duration. The quietest races occupied about 20% of the duration. The balance of the event is made up of cars entering and leaving the track before and after races, with occasional vehicle noise and public address announcements audible at much lower noise levels than during racing.

Figure 3 provides an indication of how the noise profile at the logger locations varied over the course of the evening. The trace shows periods of increased noise level activity interspersed with periods of relative quiet.

Figure 3: Variation of noise level over time at logger location, dB L_{Aeq} (5 secs)



4.0 OXFORD SAWMILL

4.1 Discussion

The site of the sawmill in Mill Road, Oxford, shares its southern boundary with several residential properties. Despite having existed for many years, the site remains zoned Rural in the Operative District Plan.

We visited the area on 2 April 2019 to obtain indicative noise levels near the southern boundary of the sawmill.

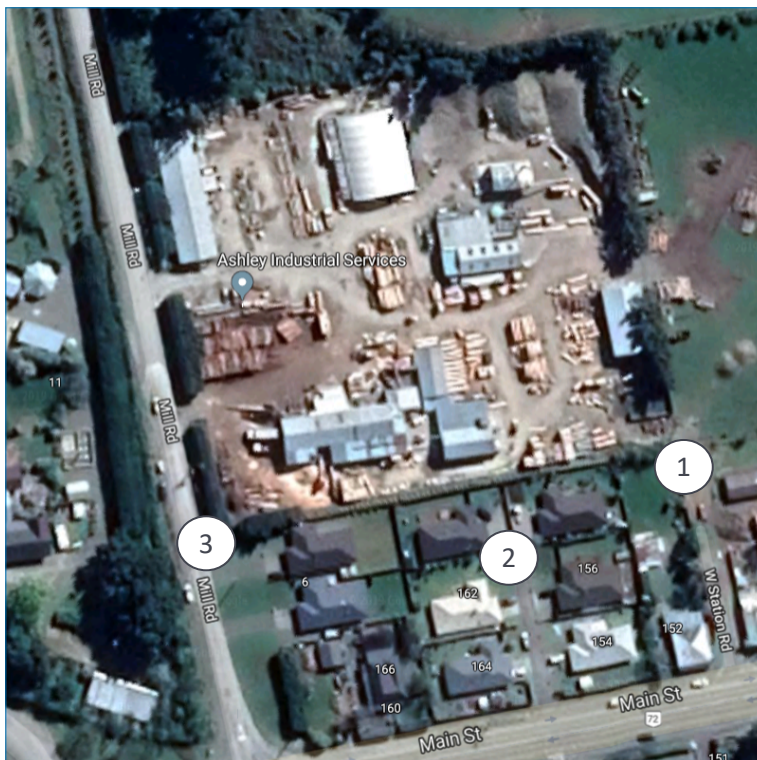
The sawmill operators were not aware of our visit, and we are not aware of what level of capacity the mill was operating at during the survey. At times, the primary saw was only operating for parts of our measurement, although this may represent normal operation with breaks between cuts.

Significantly more monitoring would be required to accurately determine the level of noise received at the adjoining residential properties.

4.2 Measurement Results

The results of our measurements can be summarised as follows.

Figure 4: Oxford Sawmill Measurement Locations (Base map courtesy of Google)



Measurement Location	Measured Sound Level (dB re 2 x 10 ⁻⁵ Pa)	
	L _{A10}	L _{Aeq}
1. West Station Road—saw running intermittently ¹	51	49
2. Right of way—saw running intermittently	50	47
3. Mill Road, south-west corner of site—saw running ²	58	56

Notes: 1. Intermittently means that the saw wasn't audible for all of the measurement period.

2. Running means that the saw was operating for the entire measurement.

4.3 Comments

One of the key differences in the measurement data, is the length of time that the main saw was operating. We anticipate that an assessment over an extended period would result in noise levels slightly lower noise levels at location 3, but higher noise levels at locations 1 and 2. In addition, position 2 is not at the site boundary, and this position therefore underestimates noise in this general direction.

As already noted, we are not aware of what plant was operating during our visit. However, on the basis of this brief snapshot, we conclude that the sawmill is likely producing noise levels of around 55 dB L_{A10} (52 dB L_{Aeq}) at the residential boundary. This is slightly higher than the operative daytime noise standard of 50 dB L_{A10} .

5.0 MCALPINES SAWMILL, RANGIORA

In our *Deliverable 1* report, we recommended undertaking noise monitoring around the McAlpines sawmill in Rangiora, to get an indication of whether there is a need for reverse sensitivity noise rules in the adjoining rural area.

On further investigation, we have determined that McAlpines own the rural land adjoining their sawmill site. As a result, the company has complete control over any development which might occur on that land, and reverse sensitivity noise rules are therefore not required.

On this basis, we have not undertaken noise monitoring in this area.

6.0 SUTHERLANDS SAWMILL, KAIAPOI

6.1 Discussion

Sutherlands sawmill in Kaiapoi adjoins the Rivertown Retirement complex on its northern boundary, and there are a number of residential properties to the east of the mill across the rail line.

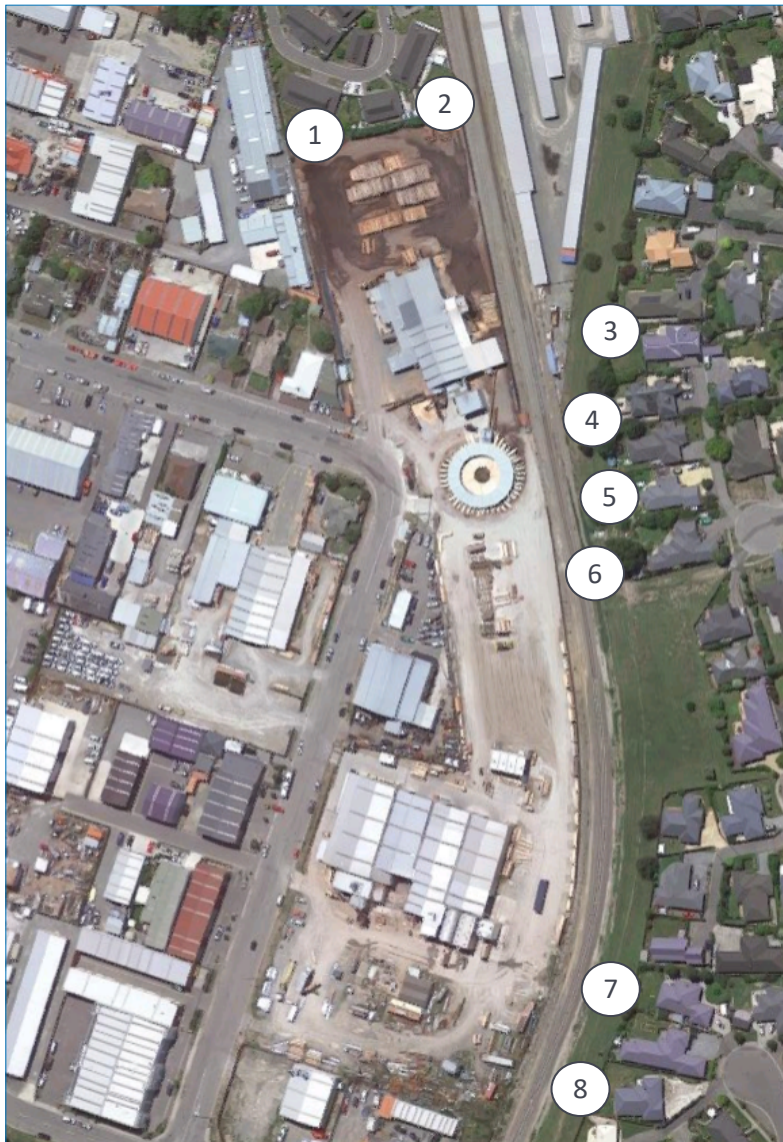
We visited the site on 3 April 2019 to obtain a snapshot of noise from the sawmill in the surrounding areas.

As with the Oxford sawmill, we did not announce our visit to the mill operators. As far as we know, they were not aware of our presence, and equally, we cannot definitively confirm what plant was operating at capacity at the time of our visit. More detailed measurements would be required to accurately detail noise emissions from the site.

6.2 Measurement Results

The results of our noise survey can be summarised as follows.

Figure 5: Kaiapoi Sawmill Measurement Locations (Base map courtesy of Google)



Measurement Location	Measured Sound Level (dB re 2 x 10 ⁻⁵ Pa)	
	L _{A10}	L _{Aeq}
1. Backyard of unit 58-150—trucks and debarker dominant	57	55
2. Backyard of unit 55-150—trucks and debarker dominant	55	53
3. East of rail, back of 17 Williamson Lane—debarker and main mill dominant	61	59
4. East of rail, back of 18 Williamson Lane—main mill dominant	66	64
5. East of rail, back of 20 Williamson Lane—main mill dominant	66	63
6. East of rail, behind 21 Charters Street—main mill dominant	65	63
7. East of rail, behind 6 Counihan Place—kilns processing dominant	57	55
8. East of rail, behind 4 Counihan Place—kilns processing dominant	55	54

6.3 Comments

Our measurements indicate that noise levels at residential properties surrounding the Kaiapoi sawmill range from 55 to 66 dB L_{A10} (53 to 64 dB L_{Aeq}). These levels are significantly higher than the permitted 50 dB L_{A10} daytime noise standard for residential sites in the operative District Plan.

APPENDIX A GLOSSARY OF TERMINOLOGY

SPL or L_p	<u>Sound Pressure Level</u> A logarithmic ratio of a sound pressure measured at distance, relative to the threshold of hearing (20 μ Pa RMS) and expressed in decibels.
dB	<u>Decibel</u> The unit of sound level. Expressed as a logarithmic ratio of sound pressure P relative to a reference pressure of $P_r=20 \mu\text{Pa}$ i.e. $\text{dB} = 20 \times \log(P/P_r)$
dBA	The unit 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.
C-weighting	The process by which noise levels are corrected to account for non-linear frequency response of the human ear at high noise levels (typically greater than 100 decibels).
$L_{Aeq}(t)$	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, e.g. (8 h) would represent a period of 8 hours, (15 min) would represent a period of 15 minutes and (2200-0700) would represent a measurement time between 10 pm and 7 am.
$L_{A10}(t)$	The A-weighted noise level equalled or exceeded for 10% of the measurement period. This is commonly referred to as the average maximum noise level. The suffix "t" represents the time period to which the noise level relates, e.g. (8 h) would represent a period of 8 hours, (15 min) would represent a period of 15 minutes and (2200-0700) would represent a measurement time between 10 pm and 7 am.
L_{Amax}	The A-weighted maximum noise level. The highest noise level which occurs during the measurement period.
L_{Cpk}	The peak instantaneous C-weighted pressure level recorded during the measurement period. Typically measured or estimated at a worker's ear during any noisy event.
L_{dn}	The day night noise level which is calculated from the 24 hour L_{Aeq} with a 10 dB penalty applied to the night-time (2200-0700 hours) L_{Aeq} .

APPENDIX B SURVEY DETAILS

Daiken MDF Plant

The key details of the noise survey are as follows:

Date: 1 April 2019, 2200—2330 hrs

2 April 2019, 1345—1430 hrs

Personnel: Markus Schmid, Marshall Day Acoustics

Weather: 1 April: 15°C, clear, negligible wind.

2 April: 12°C, overcast with onset of light drizzle, moderate southerly wind.

Instrumentation: Brüel & Kjær Type 2250 analyser, serial 2683036, calibration due 03/10/2020
Brüel & Kjær Type 4231 calibrator, serial 2574264, calibration due 03/10/2019

Woodford Glen

The key details of the noise survey are as follows:

Date: 29 March 2019, 1730--1930 hrs

Personnel: Stuart Camp and Markus Schmid, Marshall Day Acoustics

Weather: 16°C, 10% cloud, moderate wind from the north-east, gusty at times

Instrumentation: Brüel & Kjær Type 2250 analyser, serial 2683036, calibration due 03/10/2020
Brüel & Kjær Type 4231 calibrator, serial 2574264, calibration due 03/10/2019
01dB CUBE Noise Monitoring Terminal, serial 11191, calibration due 20/12/2019

Oxford Sawmill

The key details of the noise survey are as follows:

Date: 2 April 2019, 0820—0945 hrs

Personnel: Markus Schmid, Marshall Day Acoustics

Weather: 9°C, 90% cloud, negligible wind

Instrumentation: Brüel & Kjær Type 2250 analyser, serial 2683036, calibration due 03/10/2020
Brüel & Kjær Type 4231 calibrator, serial 2574264, calibration due 03/10/2019

Sutherlands Sawmill

The key details of the noise survey are as follows:

Date: 2 April 2019, 1220—1500 hrs

Personnel: Markus Schmid, Marshall Day Acoustics

Weather: 14°C, overcast, moderate wind from the north-west

Instrumentation: Brüel & Kjær Type 2250 analyser, serial 2683036, calibration due 03/10/2020
Brüel & Kjær Type 4231 calibrator, serial 2574264, calibration due 03/10/2019

All survey periods

Calibration: Field calibration of the equipment was carried out before measurements, and the calibration checked after measurements. Observed change less than 0.1 dB.