MARSHALL DAY Acoustics

DUNSANDEL CHICKEN BROILER SHEDS
NOISE ASSESSMENT

Rp 001 R01 20240747| 1 August 2024

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Project: **DUNSANDEL CHICKEN BROILER SHEDS**

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Report No.: **Rp 001 R01 20240747**

Document Control

Status:	Rev:	Comments	Date:	Author:	Reviewer:
Approved			1 August 2024	J. Gaviria	J. Farren
Approved	R01	Minor amendment	1 August 2024	J. Gaviria	J. Farren

SUMMARY

This report provides a noise assessment of the proposed chicken broiler sheds in Dunsandel, to accompany a resource consent application to Selwyn District Council.

We understand the proposed activity will consist of eight sheds and the dominant noise sources will be the ventilation fans located in the end and side walls of each shed. Vehicle movements will also occur on site during the daytime.

We have assessed the noise emissions for separate daytime and night-time scenarios when the fans are running at 100% load for daytime and 50% for night-time.

Additionally, we have also assessed the potential construction noise at nearby residential receivers against the Partially Operative Selwyn District Plan limits.

Our analysis indicates:

- Noise emissions from the proposed activity are predicted to comply with the daytime and night-time limits of the Partially Operative Selwyn District Plan at the notional boundary of the nearest rural dwellings.
- The ventilation fans will not normally operate at night but, running at 50% capacity, our predictions show they will comfortably comply with the more stringent night-time notional boundary noise limit of 45 dB $L_{Aeq(15min)}$.
- As a result of the large separation distances between the construction activity and the nearest dwellings, worst-case construction noise is unlikely to be higher than approximately 60 dB L_{Aeq} and therefore comfortably comply with the 70 dB L_{Aeq} and 85 dB L_{max} limits.

Based on the above, we confirm the proposed activities can comply with the Partially Operative District Plan permitted activity noise limits. Noise effects will be acceptable in the context of the rural residential noise amenity anticipated by the District Plan.

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1.0 INTRODUCTION

Marshall Day Acoustics (MDA) has been engaged to undertake a noise assessment of the proposed chicken broiler farm at 227 Hunters Road, Dunsandel, as part of a resource consent application to the Selwyn District Council.

Our assessment focuses on the potential noise emissions associated with the proposal assessed against the Partially Operative Selwyn District Plan limits. During operation, the ventilation fans will be the primary noise source. Additionally, we have assessed the potential construction noise at nearby residential receivers.

A glossary of acoustics terminology is provided in Appendix A.

2.0 PROJECT DESCRIPTION

Figure 1 illustrates the proposed location of the sheds and the nearest residential dwellings, which are also listed in Table 1. Both the site and the nearest dwellings are zoned *General Rural Zone (GRUZ)* under the Partially Operative Selwyn District Plan.

Figure 1: Aerial view of the proposed and existing site and surrounding dwellings

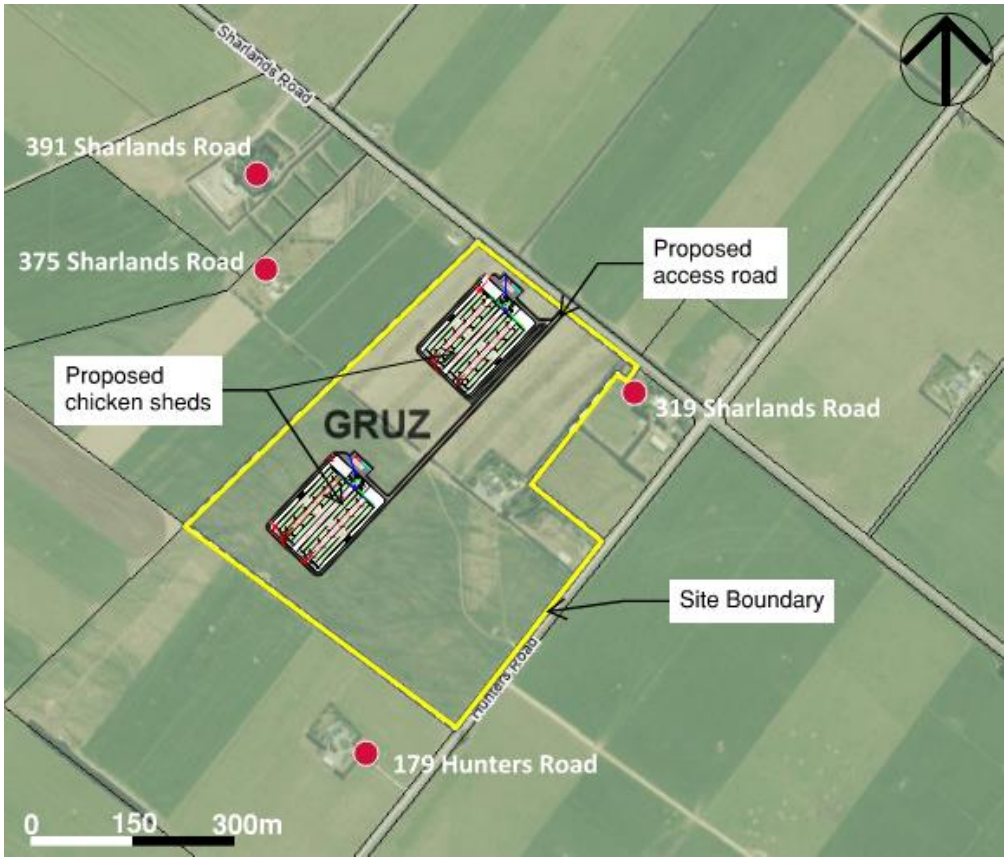


Table 1: Receiver locations and distance to proposed chicken broiler sheds

Pos. No.	Address/location	Approximate distance from the proposed broiler sheds centre to notional boundary (m)
1	391 Sharlands Road	370
2	375 Sharlands Road	285
3	319 Sharlands Road	350
4	179 Hunters Road	780

The proposed project involves the establishment, use, and maintenance of eight new chicken broiler sheds, each approximately 128 metres long, 15 metres wide, and 4.5 metres high. Engineering drawings are provided in Appendix C and Appendix D.

We understand that controlled ventilation systems are crucial for reducing the temperature inside the sheds. The fans can operate year-round, but they are most commonly used during the summer months and primarily during the daytime.

Vehicle access to the site is from the north via Sharlands Road, with estimated daily generation of 26 staff vehicles and 1 heavy vehicle.

3.0 APPLICABLE DISTRICT PLAN NOISE LIMITS

3.1 General rural zone noise limits

Both the site and the surrounding properties are zoned *General Rural Zone (GRUZ)* in the Partially Operative Selwyn District Plan. The applicable noise limits are set out in Rule NOISE-R1 which refers to noise limits in *NOISE-REQ1,* and are summarised in Table 2.

Table 2. Partially Operative Selwyn District Plan noise standards

Receiving zone and assessment location	Daytime -07:00 to 22:00 hours (inclusive)	Night-time (All other times)
GRUZ At the notional boundary* of any noise sensitive activity within any site receiving noise	55 dB $L_{Aeq(15min)}$	45 dB $L_{Aeq(15\ min)}$ 70 dB L_{AFmax}

* *A line 20 metres from any side of a dwelling, or the legal boundary where this is closer to the dwelling* as defined in NZS6802-2008 *Acoustics Environmental Noise*

3.2 Construction noise limits

The Partially Operative Selwyn District Plan also requires construction activities to be assessed against Rule NOISE-R2 which refers to the noise limits in *NOISE-REQ2*. We have reproduced these limits in Table 3. Whilst the Rule does not provide any definition of construction duration, we have assumed the reference relates to the durations in New Zealand Standard NZS 6803: 1999 *Acoustics - Construction Noise*.

We understand that construction activities for this project are expected to last approximately 26 weeks and will be conducted during daytime hours. Therefore, the "long-term" noise limits specified in the standard are applicable to this project.

Table 3: NOISE-TABLE6 Construction noise limits for residential units in GRUZ

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

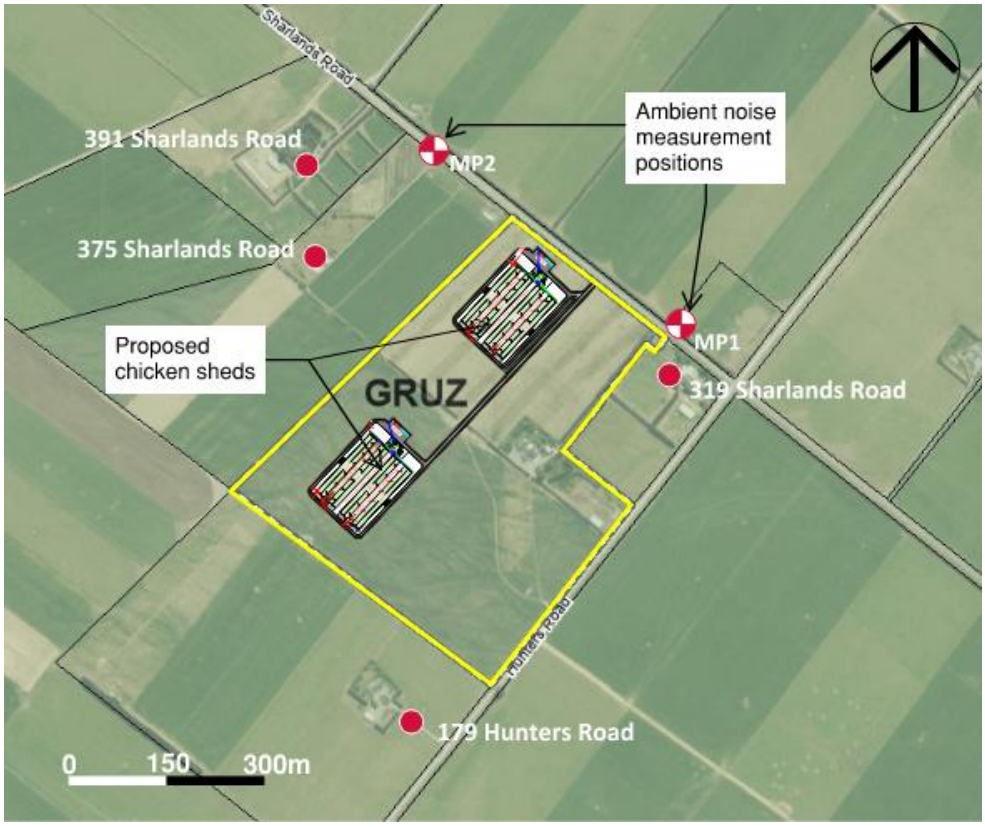
NZS 6803 definitions of duration:
Typical – Construction work at any one location for more than 14 calendar days but less than 20 weeks
Short-term – Construction work at any one location for up to 14 calendar days
Long-term – Construction work at any one location with a duration exceeding 20 weeks

4.0 EXISITING NOISE ENVIRONMENT

Attended night-time noise measurements were carried out on 23 July 2024 between 2200 and 2300 hrs, during which the ambient noise level was measured at the positions marked MP1 and MP2 as shown in Figure 2 below.

Position MP1 was chosen to be representative of the noise environment experienced by the nearest dwellings located at 319 Sharlands Road and 179 Hunters Road, and position MP2 was chosen to be representative of the dwelling located at 375 Sharlands Road.

Figure 2: Aerial view of measurement positions



The weather at the time of the survey was overcast with little wind present, and therefore within the allowable meteorological window prescribed in the New Zealand Standard NZS 6801:2008 *Acoustics – Measurement of environmental sound.*

The measured noise levels are shown in Table 4 below and survey details are provided in Appendix C.

Table 4: Measured ambient noise levels night-time.

Monitoring Location	Start time	Measured noise levels	
	(hh:mm)	dB $L_{Aeq(15min)}$	dB L_{AFmax}
MP1, adjacent to 319 Sharlands Road	22:01	32	53
MP2, adjacent to 391 Sharlands Road	22:18	35	48

The existing night-time noise environment is typical of a rural setting with the ambient background noise controlled by birds and distant light vehicle movements.

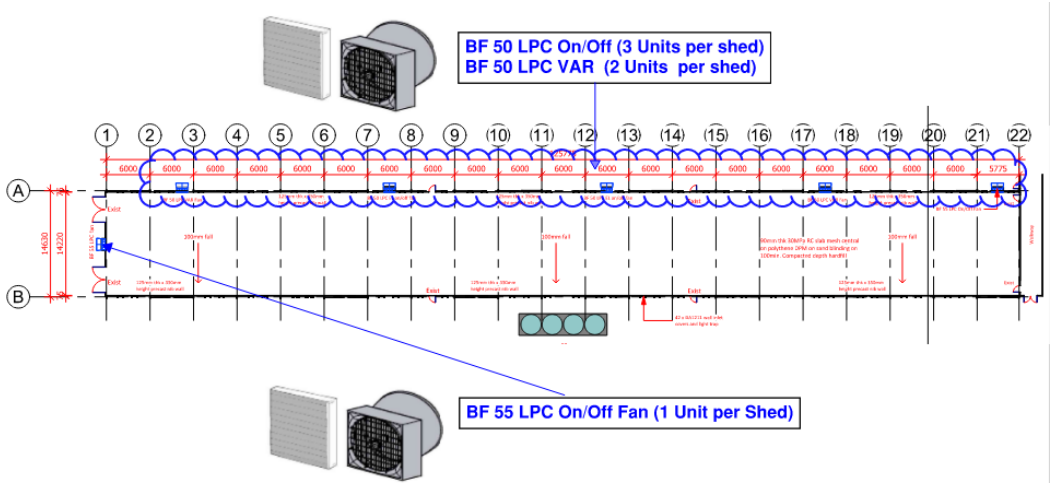
5.0 PREDICTED OPERATIONAL NOISE LEVELS

Below we discuss the noise generation associated with each noise source.

5.1 Fan noise

All eight sheds will be equipped with identical ventilation systems. The design includes installing five BF 50 LPC units along the long walls and one BF 55 LPC unit on the end wall of each shed. This configuration is illustrated in Figure 3, with detailed engineering drawings provided in Appendix C and Appendix D.

Figure 3: Plan view of chicken shed with proposed ventilation system



The fan manufacturer SKOV had provided noise level data for each unit and this is shown in Appendix E. Source sound levels used for our calculations are summarised in Table 5 below:

Table 5: Input noise data provided by manufacturer SKOV for the proposed sheds

Item	Fan Type	Sound level at 2 metres dB L_{Aeq}	No. of Fans per shed
1	BF 55 LPC (end wall)	79	1
2	BF 50 LPC VAR and BF 50 LPC ON/OFF (side wall)	74	5

Our calculations assume fans are operating at 100% capacity during the day, reducing to 50% at night. Fan noise levels will be approximately 8dB quieter at 50% capacity. We understand that night-time operation is unlikely to be a regular feature for the activity –i.e. potentially in use during warm evenings in summer - and therefore represents a conservative assessment.

The fans have a broadband frequency characteristic and, as such, would not attract a special audible characteristics (SAC) penalty when assessed under NZS 6802:2008 *Acoustics - Environmental Noise*.

5.2 Traffic noise

We understand staff vehicle movements could reach up to 26 movements during the peak hour, translating to approximately 7 movements within a 15-minute period.

Furthermore, the number of trucks visiting the site for egg collection will typically be 1 per day. Our calculations assume 1 movement in a fifteen-minute period. A forklift will also be located on site and be used occasionally during the day. We have assumed continuous forklift operation over a 15 minute period.

Table 6: Sound levels of traffic noise sources

Item	Noise source	Source noise data
1	Heavy truck on access road	84 dB L_{AE} at 10m
2	Light vehicles on access road	69 dB L_{AE} at 6m
3	Forklift	55 dB L_{Aeq} at 28m

5.3 Predicted noise levels

For our calculations, we have assumed the following day and night-time operational scenarios outlined in Table 7.

Table 7: Assumed daytime and night-time scenarios

Daytime	Night-time
• All fans operating at 100% • Light vehicle movements: 7 per 15 mins • Heavy vehicle movements:1 per 15 mins • 1 forklift operating	• All fans operating at 50%

All scenarios are conservative and represent the worst-case situations, that in practice are unlikely to occur at the same time. The predicted noise levels for daytime and night-time period at the notional boundaries of the nearest dwellings are shown in Table 8.

Table 8: Predicted operational noise levels for daytime and night-time at notional boundaries

Position	Assessment location	Predicted daytime noise level, dB $L_{Aeq(15\ min)}$	Daytime noise limit dB $L_{Aeq(15\ min)}$	Daytime Complies? Yes/No	Predicted night-time noise level, dB $L_{Aeq(15\ min)}$	Night-time noise limit dB $L_{Aeq(15\ min)}$	Night-time complies? Yes/No
1	391 Sharlands Road	41	50	✓	33	45	✓
2	375 Sharlands Road	46	50	✓	38	45	✓
3	319 Sharlands Road	44	50	✓	36	45	✓
4	179 Hunters Road	44	50	✓	35	45	✓

As presented in Table 8, conservative levels of activity on site will comfortably comply with the relevant noise limits when assessed at the notional boundary of all rural receivers.

Our assessment indicates that noise emissions will also comfortably comply with the applicable maximum noise limit of 70 dB L_{Amax}.

6.0 CONSTRUCTION NOISE

We expect that construction on site will include mobile plant (excavators, heavy vehicle deliveries, concrete trucks etc) in addition to hand tools (saws, rattle guns, hammering etc.)

As a result of the large separation distances between the construction activity and the nearest dwellings, worst case construction noise is unlikely to be higher than approximately 60 dB L_{Aeq}. As a result, all construction noise during normal working hours of 0730 to 1800 hours Monday to Saturday, will comfortably comply with the applicable NZS 6803 noise limits of 70 dB L_{Aeq} and therefore comply with the permitted activity standard in rule NOISE-R2.

7.0 NOISE ASSESSMENT

Based on our assessment, noise from the proposed chicken sheds with ventilation fans, and the anticipated traffic movements, will comply the applicable Partially Operative District Plan notional boundary noise standards for both daytime and night-time operation, with a significant margin of safety at night.

Construction noise is also expected to comply with the applicable Partially Operative District Plan limits.

Noise effects will be acceptable in the context of the rural residential noise amenity anticipated by the District Plan.

APPENDIX A GLOSSARY OF TERMINOLOGY

SPL or L_P	Sound Pressure Level. 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 - The unit 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	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.
$L_{Aeq\,(t)}$	The equivalent continuous (time-averaged) A-weighted sound level. This is commonly referred to as the average sound level. The suffix "t" represents the time period to which the sound 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 sound level. The highest sound level which occurs during the measurement period.
NZS 6801:2008	New Zealand Standard NZS 6801:2008 *"Acoustics – Measurement of environmental sound"*
NZS 6802:2008	New Zealand Standard NZS 6802:2008 *"Acoustics – Environmental Noise"*
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.

APPENDIX B NOISE SURVEY DETAILS

The key details of the noise survey are as follows:

Date: 23 July 2024 2200– 2300 hours

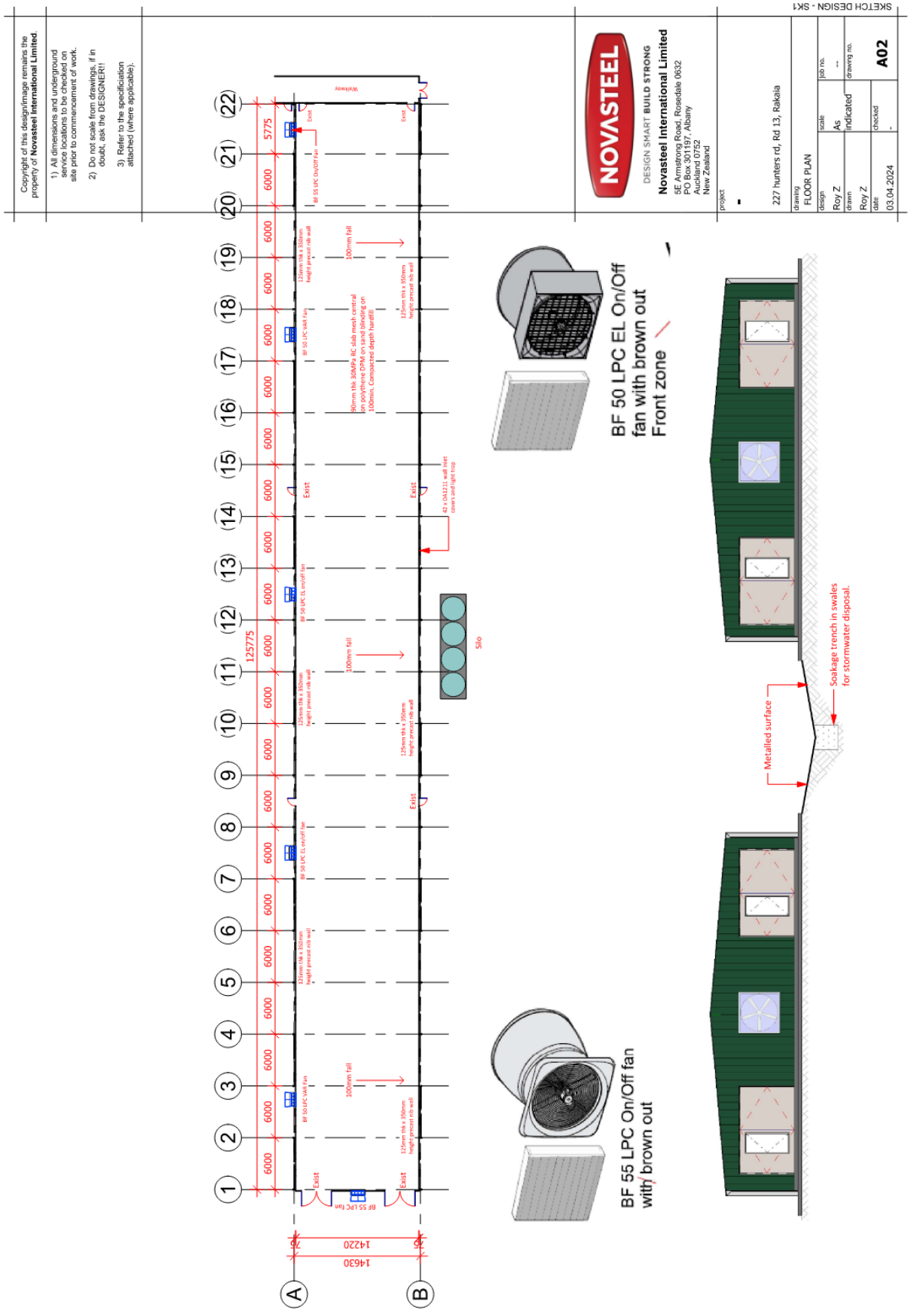
Personnel: Anton Wolf, Marshall Day Acoustics

Weather: 4°C, overcast skies, little wind present from north-west.

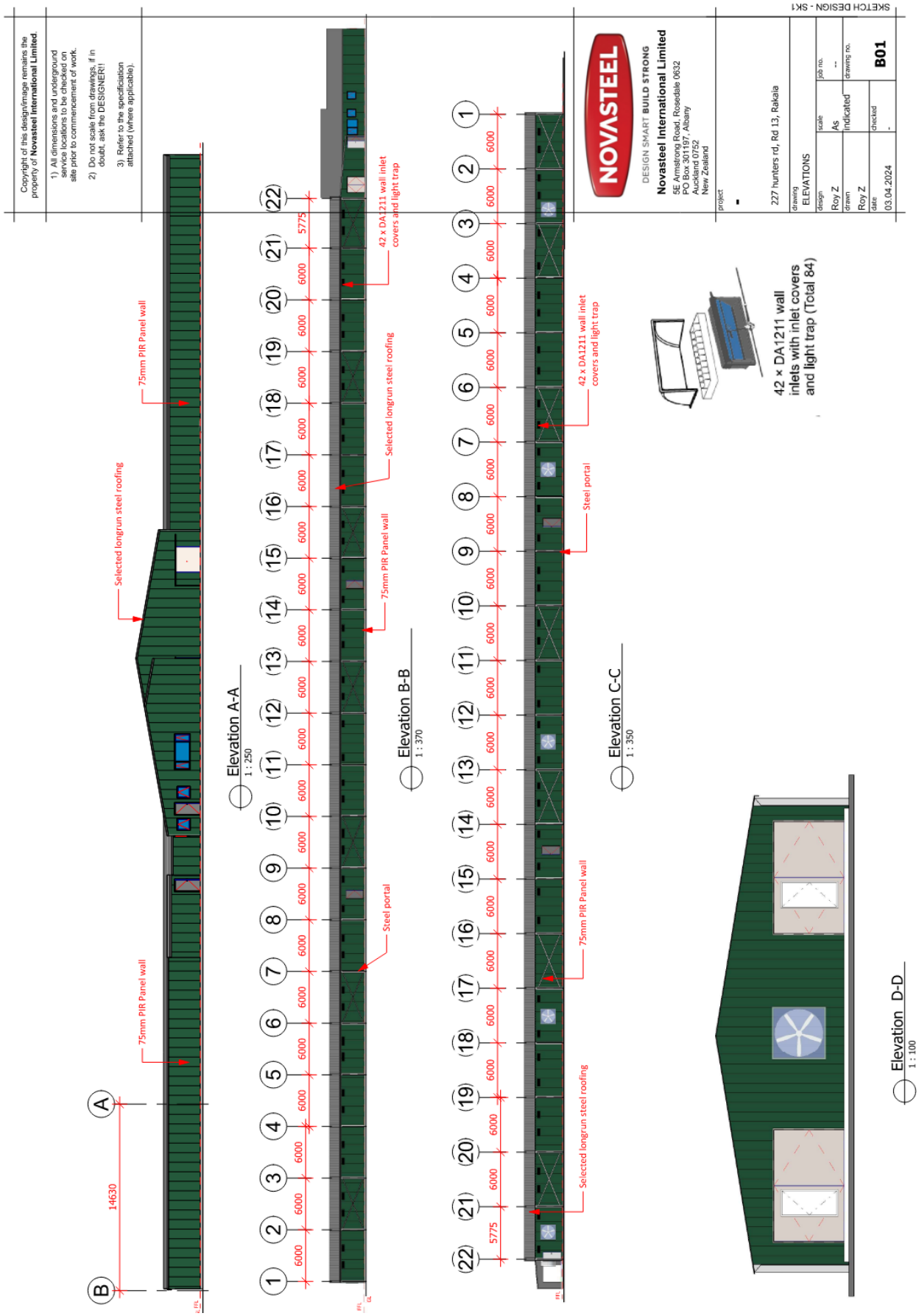
Instrumentation: NTi XL2-TA analyser, serial A2A-20483-E0, calibration due 04/04/2026
Brüel & Kjær Type 4231 calibrator, serial 1882775, calibration due 22/02/2025

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

APPENDIX C PROPOSED SHEDS FLOOR PLAN



APPENDIX D PROPOSED SHEDS ELEVATIONS



APPENDIX E PROPOSED FANS TECHICAL DATA

BF 55 LPC -3

		435506 / 435512 BF 55 LPC -3 HF 400V3	435507 / 435513 BF 55 LPC -3 HF 400V3 TH
Air output at -40 Pa	m^3/h	55600	
Air output at -50 Pa	m^3/h	53100	
Air output at -60 Pa	m^3/h	50400	
Air output at -70 Pa	m^3/h	47100	
Air output at -80 Pa	m^3/h	44000	
Air output at -90 Pa	m^3/h	40400	
Air output at -100 Pa	m^3/h	36800	
Power consumption at -10 Pa	W	1890	
Specific output at -10 Pa	m^3/kWh	32900	
Specific energy at -10 Pa	Watt/1000 m^3/h	30	
Testing body		SKOV A/S	
Environment			
Temperature, operation	°C	0 to + 40	
Ambient temperature	°C	÷ 40 to + 40	
Storage temperature	°C	÷ 40 to + 70	
Ambient humidity, operation	% RH	10 - 95	
Protection class	IP	Motor controller: IP 66. Fan motor: IP 65	
*Fan noise (sound pressure), outside (2 m, 45 degrees)	dB (A)	79	
Shipment			
Fan housing crated HxWxD	mm	1586x706x660	
Fan motor crated HxWxD	mm	230x250x370	
Impeller crated HxWxD	mm	748x270x130	
Motor controller crated HxWxD	mm	215x235x375	
Mounting parts crated HxWxD	mm	550x155x145	
Fan housing weight	g	70000 / 119000	
Cone weight	g	18460	
Fan motor weight	g	23000	
Impeller weight	g	5641	
Motor controller weight	g	3959	
Mounting parts weight	g	3969	

*The noise levels are calculated sound pressure, L_p [dB(A)] at a distance of 2 m from the outflow of the exhaust unit, provided that the sound spreads in an ideal half ball.

**Based on measured sound effect, L_w [dB(A)]according to ISO 9614-2.

BF 50 LPC ON/OFF AND BF 50 LPC VAR

BF 50 LPC -3

		435421 BF 50 LPC -3 ON/OFF HF / 435422 BF 50 LPC -3 VAR HF	435424 BF 50 LPC -3 ON/OFF LE / 435423 BF 50 LPC -3 VAR LE
Air output at -50 Pa	m^3/h	39600 (43400)	33700 (37000)
Air output at -60 Pa	m^3/h	37500 (41100)	31100 (34200)
Air output at -70 Pa	m^3/h	35400 (38900)	28300 (31100)
Air output at -80 Pa	m^3/h	32800 (36200)	24800 (28000)
Air output at -90 Pa	m^3/h	30400 (33700)	-
Air output at -100 Pa	m^3/h	26400 (30500)	-
Power consumption at -10 Pa	W	1876 (1814)	1410 (1354)
Specific output at -10 Pa	m^3/kWh	25100 (28600)	29900 (34200)
Specific energy at -10 Pa	Watt/1000 m^3/h	40 (35)	33 (29)
Testing body		SKOV A/S	
Environment			
Temperature, operation	°C	÷ 10 to + 40	
Ambient temperature	°C	÷ 20 to + 40	
Storage temperature	°C	÷ 40 to + 60	
Ambient humidity, operation	% RH	10 - 95	
Protection class	IP	Motor controller: IP 66. Fan motor: IP 65	
Fan noise, outside (2 m, 45 degrees)	dB (A)	74	71
Shipment			
Shipping weight	g	75000	