

Ventilation Fan Noise Assessment,
67 Howards Road, Burringbar

(Lot 3 on DP1191595)

ENVIRONMENTAL NOISE IMPACT REPORT

Prepared for

Pocket Herbs & Produce Pty Ltd

16 May 2017

crgref: 17053 report REV 1

1.0 INTRODUCTION

This report is further to our report dated 16/05/2017, and in response to a request for further information from Tweed Shire Council dated 23/05/2017. Council issued a letter regarding noise complaints associated with ventilation fan operations (see letter in Appendix A of this report).

In undertaking the above, noise monitoring was conducted for the site and through modelling; predictions of the proposed onsite activity noise emissions were produced. Based upon the predicted noise impact levels, recommendations regarding acoustic treatment have been provided.

2.0 DESCRIPTION OF THE DEVELOPMENT

The parcel of land is described as Lot 3 on DP1191598 and is occupied by a plant nursery that produces edible herbs. The production is located in an existing greenhouse, constructed of plastic, and has operable walls and roof to facilitate ventilation. Electric axial fans in metal cowlings are suspended above the production area, and operate 24 hours per day. In response to the noise complaints, the Operator is replacing the existing fans with new speed controllable models. See Appendix A for photographs of the existing and proposed fans.

The site is bounded by Howards Road to the northeast, agricultural land across Howards Road, with a dwelling immediately adjacent to the north west at 75 Howards Road on Lot 2 on DP848007. The topography of the site and surrounding parcels of land rises up towards the north. For site location refer to Figures 1 and 2 in Appendix A.

Noise testing of the existing fan type was undertaken, and it was concluded that noise levels would significantly exceed the determined noise limit criteria. The existing fans are not variable speed, and have simple blade profiles that are not efficient.

Noise from operation of the ventilation fan system has been assessed in accordance with the “*NSW Industrial Noise Policy*” to ensure an acceptable level of acoustical amenity can be achieved. As the dwellings adjacent at 75 Howards Road is the nearest to the subject site, we have focussed on this receiver.

3.0 AMBIENT NOISE SURVEY

3.1 Instrumentation

The following equipment was used to record ambient noise levels at the subject site locale.

- Rion NC 73 Calibrator; and
- Rion NL 21 Environmental Noise Logger.

All instrumentation used in this assessment hold current calibration certificate from a certified NATA calibration laboratory.

3.2 Background Noise Monitoring Methodology

A logger was located towards the northwestern boundary of the subject site. The microphone was in a free-field location, approximately 1.2m above ground and was chosen to reflect acoustical conditions at the adjacent dwelling. The logger was screened by an onsite shed to the greenhouse building, and fan noise was not audible. Refer to Figure 2 in Appendix A for the logger location.

The logger was set to record noise statistics in 15 minute blocks continually between Friday 17/03/2017 and Friday 22/03/2017. A major weather event occurred during the testing session, and the recorded shut down on the Sunday night. For this reason, we have assessed against the minima background noise levels.

All measurements were conducted generally in accordance with Australian Standard AS 1055:1997 – “Acoustics-Description and measurement of environmental noise”. The operation of the sound level logging equipment was field calibrated before and after the measurement session with no significant drift from the reference signal recorded.

3.3 Background Noise Monitoring Results

Table 1 presents the measured noise levels at the logger location. Graphical presentation of the measured levels is in Appendix C. Rating Background Levels (RBLs) were not calculated in accordance with the “NSW Industrial Noise Policy” due to weather effects.

Background Noise	Measured Level L _{A90} dB(A)		
	Daytime (7am to 6pm)	Evening (6pm to 10pm)	Night (10pm to 7am)
Friday 17/03/17	34	38	31
Saturday 18/03/17	36	32	23
Sunday 19/03/17	-	-	23
Determined Background	35	30	23

Table 1: Measured background noise levels at the logger location.

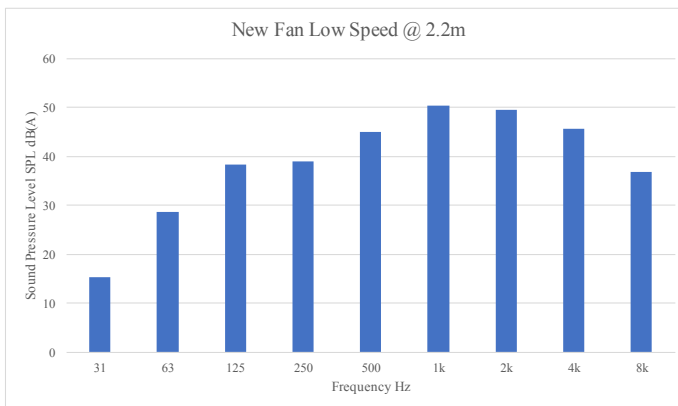
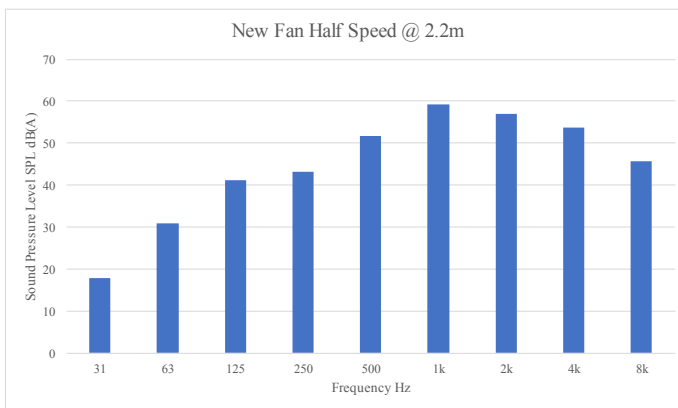
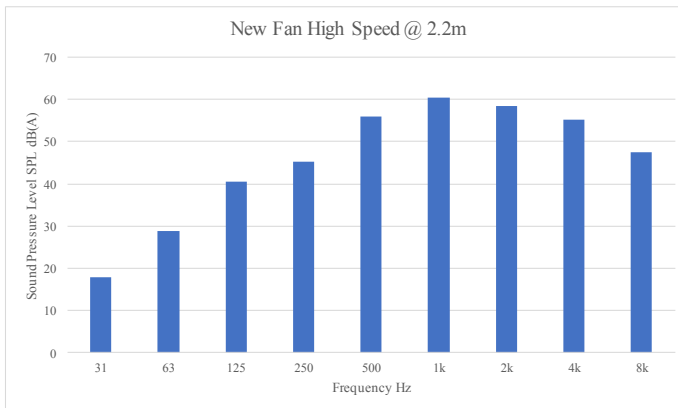
It is concluded that the daytime level of 35 dB(A) and evening level of 30 dB(A) are reasonable, and that the night time level of 23 should be adjusted up to 30 dB(A) in accordance with the requirements of the “NSW Industrial Noise Policy” (re: Section 3.1.2, Page 24 of the Policy).

3.4 Fan Noise Measurements

Fan source noise levels were recorded in octave band frequencies on Friday 17/03/2017, with the following levels recorded:

Fan Speed	Measured Level L_{Aeq} dB(A) @ 2.2m
High Speed	64
Half Speed	63
Low Speed	55

Table 2: Measured fan noise levels.



The existing fans emit approximately 3 dB higher noise levels when compared to the high speed noise emissions from the new fans. It is also noted that the existing fans emit a significant tonal component not evident in the new fans (the new fans emit a more broadband sound) – for this reason, we have not applied an tonality correction to the new fans.

4.0 NOISE ASSESSMENT CRITERION

Noise associated with the commercial premises is regulated by the “NSW Industrial Noise Policy” and is as follows:

- Control of intrusive noise impacts – The limit criteria for this assessment is as follows:
 - $L_{Aeq, 15 \text{ min}} \leq \text{rating background level}^1 + 5 \text{ dB};$
 - Daytime (7am – 6pm Mon-Sat; 8am – 6pm Sun) 40 (RBL 35 + 5) dB(A) L_{eq} ;
 - Evening (6pm – 10pm) 35 (RBL 30 + 5) dB(A) L_{eq} ;
 - Night (remaining periods) 35 (RBL 30 + 5) dB(A) L_{eq} .
- Maintaining noise level amenity for residential premises. This is achieved by ensuring that the proposed development complies with the noise limit criteria set in Table 2.1 of the Policy. If we assume that the area is within a Rural Area (as defined in the Policy), the following applies:

Type of Receiver	Indicative Noise Amenity Area	Time of Day	Recommended L_{Aeq} Noise Level, dB(A) <i>(see Note 8 in Section 2.2.1)</i>	
<i>(see Notes in Section 2.2.1)</i>			Acceptable <i>(See Note 11)</i>	Recommended Maximum <i>(See Note 11)</i>
Residence	Rural	Day	50	55
		Evening	45	50
		Night	40	45

Table 2: Amenity Criterion Prescribed in the New South Wales EPA “Industrial Noise Policy”.

The overall resulting criterion for the development is determined by comparing the amenity and intrusive noise criteria, and applying the lower of the two criteria. From the data and our calculations, the project noise assessment criterion is as follows:

- Daytime (7am – 6pm) 40 dB(A) L_{eq} ;
- Evening (6pm – 10pm) 35 dB(A) L_{eq} ;
- Night (10pm – 7am) 35 dB(A) L_{eq} .

Further to the above, Australian Standard AS2107: 2016 “Acoustics – Recommended design sound levels and reverberation times for building interiors” provides design targets for inside dwellings as follows:

Item	Type of occupancy/activity	Design sound level ($L_{Aeq,t}$) range	Design reverberation time (T) range, s
7	RESIDENTIAL BUILDINGS <i>(see Note 5 and Clause 5.2)</i>		
	Houses and apartments in inner city areas or entertainment districts or near major roads—		
	Apartment common areas (e.g. foyer, lift lobby)	45 to 50	—
	Living areas	35 to 45	—
	Sleeping areas (night time)	35 to 40	—
	Work areas	35 to 45	—
	Houses and apartments in suburban areas or near minor roads—		
	Apartment common areas (e.g. foyer, lift lobby)	45 to 50	—
	Living areas	30 to 40	—
	Sleeping areas (night time)	30 to 35	—
	Work areas	35 to 40	—
	Houses in rural areas with negligible transportation—		
	Sleeping areas (night time)	25 to 30	—

¹ The rating background level is the overall single figure background level representing each assessment period (day/evening/night over the whole monitoring period).

5.0 PREDICTED NOISE IMPACTS

Noise impacts have been assessed at the following receivers:

- 47 Howards Road, to the immediate southeast, approximately 100m from the existing greenhouse. This receiver is on land at the same relative level as the subject site.
- 74 Howards Road, to the north across the road, approximately 150m from the existing greenhouse. This receiver is on land elevated above the subject site.
- 75 Howards Road, to the immediate west, approximately 69m from the existing greenhouse. This is the nearest receiver, on land at the same relative level as the subject site.
- 76 Howards Road, to the east across the road, approximately 100m from the existing greenhouse. This receiver is on land elevated above the subject site.

The dwelling at 75 Howards Road is the nearest, being approximately 69m from the existing operational greenhouse. Our assessment (applied at the nearest part of the dwelling façade) is viewed as a worst case scenario, due to the minimum distance separation applied (assuming standard distance attenuation of 6dB per doubling of distance, and a +2.5 dB façade reflection correction), and the other dwellings in the locale will be exposed to noise levels lower than what is predicted at 75 Howards Road. No screening in our prediction modelling has been included from buildings, and due to the lightweight nature of the greenhouse building, no correction has been applied for the difference between inside and outside the greenhouse (the greenhouse does contain only high frequency, which does make an audible change to the noise, but does not affect the overall sound pressure levels. Due to the close proximity, we have not applied meteorological effects that affect noise propagation.

An example calculation is attached to this report.

We predict the following impacts at the most exposed part of the dwelling at 75 Howards Road under each operational Fan Group (see Section 6 for description of fan groupings). We have also included assessment criteria under the *Industrial Noise Policy* (façade impact), and levels inside dwellings from Australian Standard AS2107: 2016 “*Acoustics – Recommended design sound levels and reverberation times for building interiors*”.

Fan Group & Speed	Impact at Façade	Inside, Windows Open
Night Group 1, Low Speed	35	28
Night Group 2, Low Speed	35	28
Criteria	35	25 – 30 bedrooms
Day Group 1, High Speed	45	38
Day Group 2, High Speed	45	38
Day All Fans On, Low Speed	38	31
Criteria	40	30 – 40 living rooms

Table 3: Predicted Noise Impact Levels at Nearest Dwelling Under Various Fan Groupings and Fan Speeds

The fan layout use was based upon the provided layout (attached in Appendix B).

6.0 RECOMMENDED ACOUSTIC TREATMENTS

To gain compliance with the noise limits, the following is recommended (refer to the diagram below for fan numbering). Note that the recommendations assume that the new fans replace all the old units.

- During the evening and night period (between 6pm to 7am), fans are to be run at **low speed** in the following separate groups:

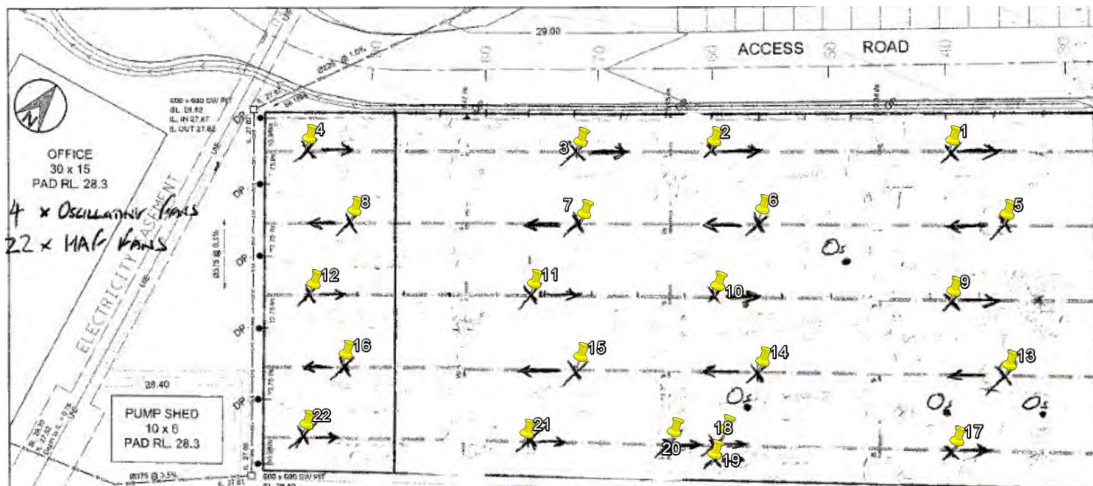
NIGHT GROUP 1 1, 2, 5, 6, 9, 13, 14, 17 – 22.

NIGHT GROUP 2 3, 4, 7, 8, 10, 11, 12, 15, 16, 17.

- During the day period (between 7am to 6pm), all fans may be in operation if run at low speed.
- During the day period (between 7am to 6pm), fans are to be run at **high speed** in the following groups:

DAY GROUP 1 5, 9, 13, 17, 19

DAY GROUP 2 10, 14, 17, 18, 20



- The fans be controlled electronically, with timers set to control the different day and evening/night fan combinations.
- The fan controller must hold the programming in the event of a power failure.
- Following installation of the new fans and controller, a noise level test be undertaken to confirm that noise emissions are within the determined noise limit criteria.

7.0 DISCUSSION & CONCLUSION

Based upon our testing, it was determined that noise from the existing ventilation system exceeded the determined noise limit criteria. For this reason, recommendations have been provided regarding replacement of the fan system and running fans at controlled speeds and numbers of fans operating simultaneously.

Subject to the recommended fan speeds and numbers being operated, noise from the ventilation system in the existing building will meet the determined noise limits of 35 dB(A) L_{eq} at night, and 40 dB(A) L_{eq} in the daytime.

It is noted that a second greenhouse is under construction. Once ventilation requirements are determined, further acoustical analysis will be required to determine the additive impact of both greenhouse ventilation systems in operation. Given this second greenhouse is closer to the dwelling adjacent, and the additive effect of the existing ventilation system is taken into account, more stringent controls will apply than what have been determined at the current greenhouse. We are advised that given the higher efficiencies of the new fans, less fans may be required than that recommended. Special attention will need to be given to this aspect when assessing the new greenhouse.

Report Compiled By:



JAY CARTER BSc
Director

APPENDIX A

Council Advice of Complaint and Subject Site Location and Surrounds

Council Reference: ILL16/1463
Your Reference:



1 March 2017

Red 01/3/17

Customer Service | 1300 292 872 | (02) 6670 2400

Iain Reynolds
Pocket Herbs & Produce Pty Ltd
PO Box 54 BURRENBAR NSW 2483

tsc@tweed.nsw.gov.au
www.tweed.nsw.gov.au

Fax (02) 6670 2429
PO Box 816
Murwillumbah NSW 2484

Please address all communications
to the General Manager

ABN: 90 178 732 496

Dear Mr Reynolds

Noise complaint – nursery – 67 Howards Road BURRENBAR

I refer to your letter dated 13 February 2017 in response to Council correspondence dated 25 January 2017 concerning noise complaints from local residents neighbouring the above property.

The measures you have taken, and continue to initiate, to ameliorate the noise emissions are noted. However Council continues to receive ongoing complaints about the level and duration of noise, particularly from the fans.

Condition 48 of Development Consent DA13/0712 states that:

"Upon receipt of a noise complaint that Council deems to be reasonable, the operator/owner is to submit to Council a Noise Impact Study (NIS) carried out by a suitably qualified and practicing acoustic consultant. The NIS is to be submitted to the satisfaction of the General Manager or his delegate. It is to include recommendations for noise attenuation. The operator/owner is to implement the recommendations of the NIS within a timeframe specified by Council's authorised officer."

Council is now satisfied that the current noise emissions are deemed to be unreasonable. In accordance with condition 48, you are now directed to engage an acoustic engineer to prepare an independent assessment in the form of a Noise Impact Study (NIS) and advise on how best to ameliorate the noise.

This report is required to be lodged with Council within 30 days from the date of this letter.

You specified in your letter certain measures you are currently implementing such as the importation of three plastic case/bladed fans, installing multifans combined with a day/night controller, reduced number of fans, oscillating fans near the 'problem crops', different fan speeds and relocating some of the more disease prone plants so as to reduce noise impacts, particularly at night. Council encourages you to continue to trial, modify and improve operations to assist in noise attenuation.

For further information regarding this matter, please contact me direct on (02) 6670 2688.

Yours faithfully

Steve Bishop
COMPLIANCE OFFICER

Figure No. 1: Subject Site Location (Google Maps).

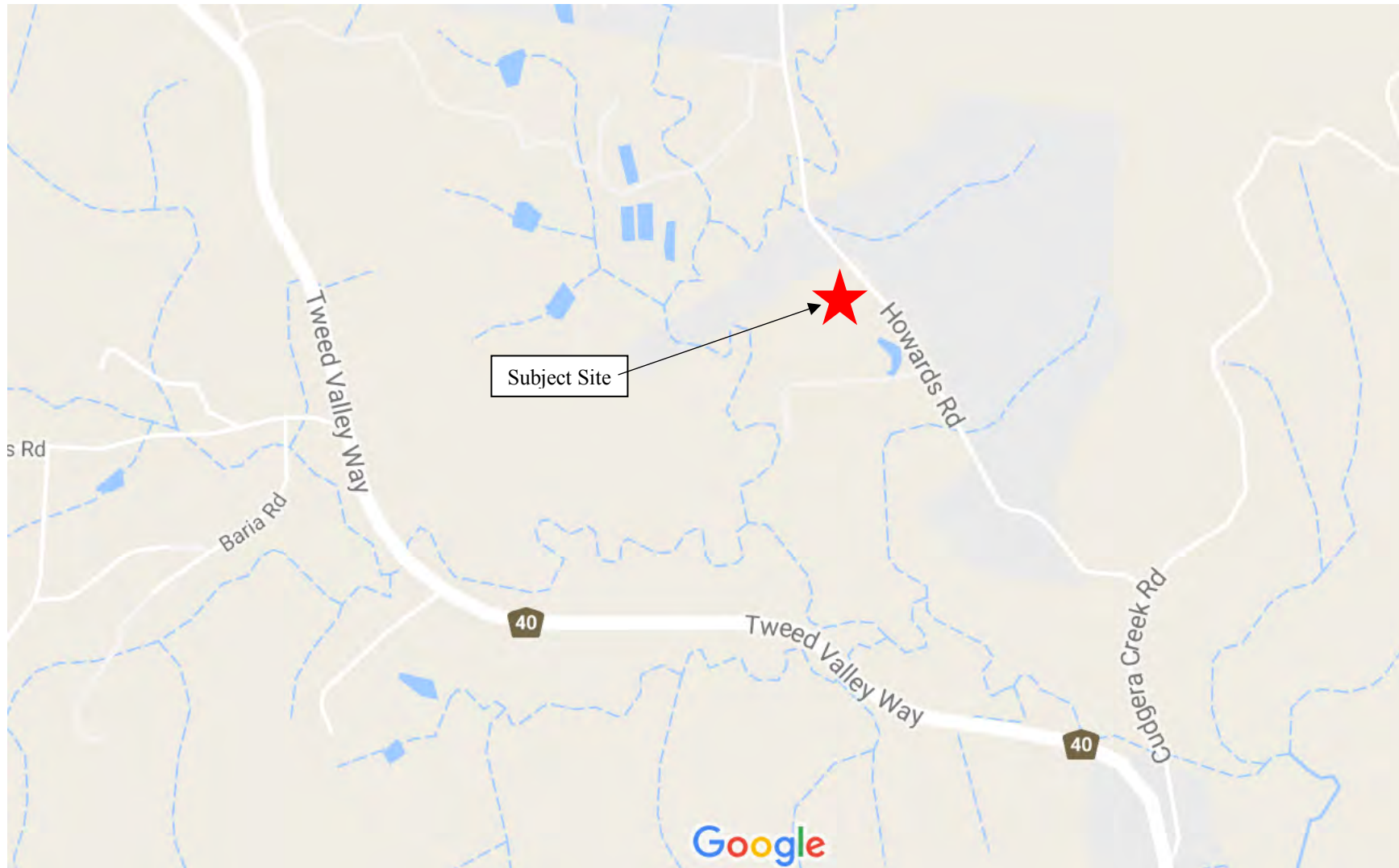


Figure No. 2: Subject Site, Surrounding Environs and Logger Location (Google Maps).



Photograph Sheet 1



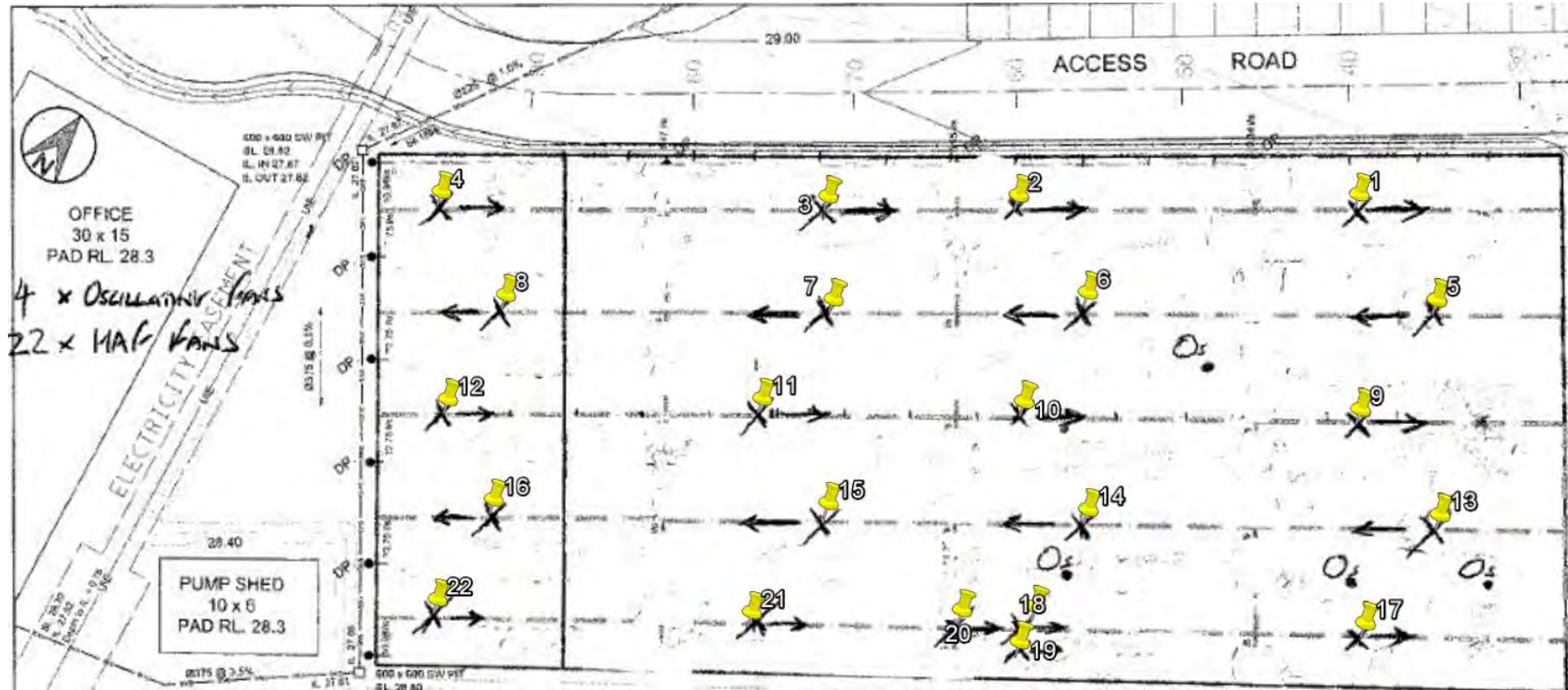
Photograph 1: Existing fans used in the facility



Photograph 2: Proposed fans

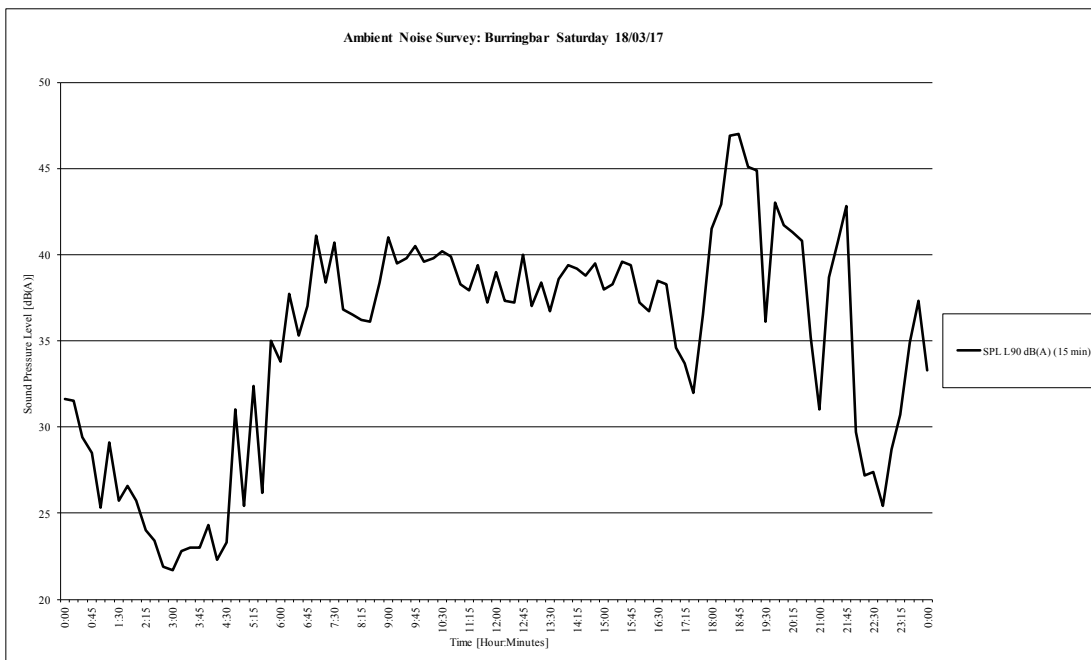
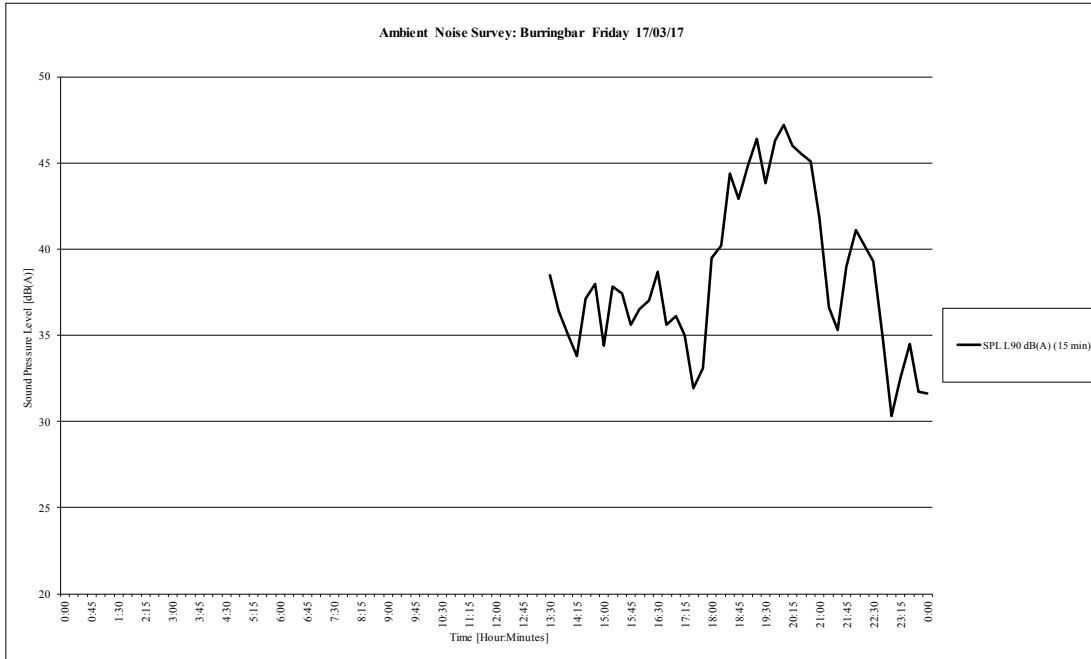
APPENDIX B

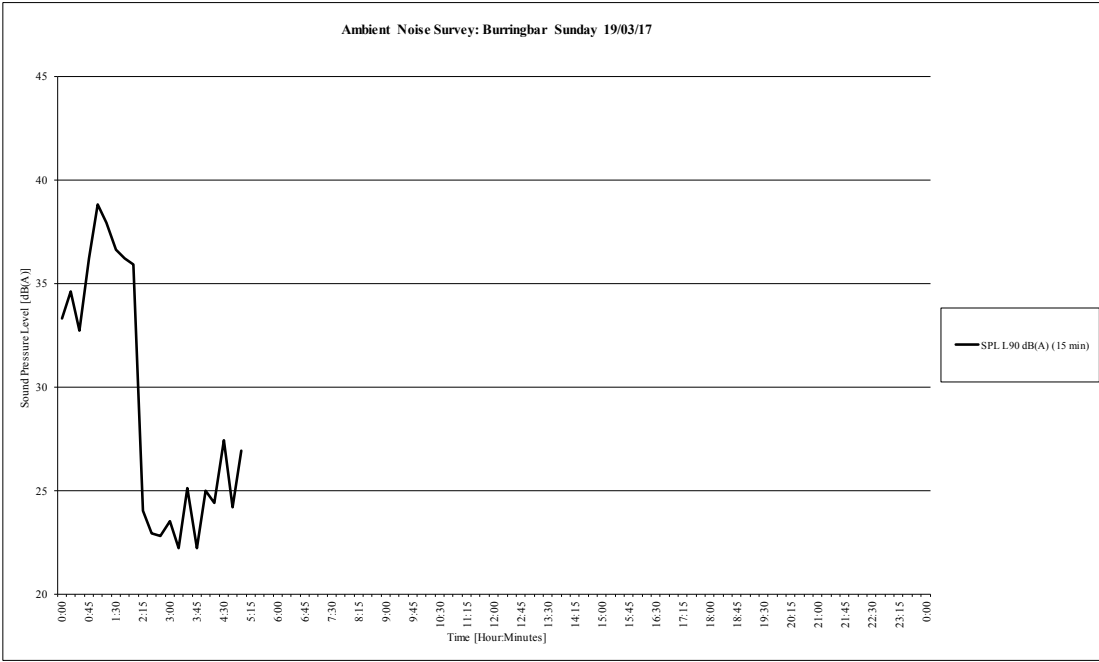
Ventilation Layout Plan



APPENDIX C

Measurement Results





FAN SOURCE LEVEL	54.6	dB(A)	Fan 12	54.6	dB(A)
Fan 1	54.6	dB(A)	Distance to receiver	83	m
Distance to receiver	91	m	Distance attenuation	-31.5	dB(A)
Distance attenuation	-32.3	dB(A)	Façade reflection	2.5	dB(A)
Façade reflection	2.5	dB(A)	Impact at façade	25.6	dB(A)
Impact at façade	24.8	dB(A)	Fan 13	54.6	dB(A)
Fan 2	54.6	dB(A)	Distance to receiver	109	m
Distance to receiver	80	m	Distance attenuation	-33.9	dB(A)
Distance attenuation	-31.2	dB(A)	Façade reflection	2.5	dB(A)
Façade reflection	2.5	dB(A)	Impact at façade	23.2	dB(A)
Impact at façade	25.9	dB(A)	Fan 14	54.6	dB(A)
Fan 3	54.6	dB(A)	Distance to receiver	99	m
Distance to receiver	75	m	Distance attenuation	-33.1	dB(A)
Distance attenuation	-30.7	dB(A)	Façade reflection	2.5	dB(A)
Façade reflection	2.5	dB(A)	Impact at façade	24.0	dB(A)
Impact at façade	26.4	dB(A)	Fan 15	54.6	dB(A)
Fan 4	54.6	dB(A)	Distance to receiver	93	m
Distance to receiver	70	m	Distance attenuation	-32.5	dB(A)
Distance attenuation	-30.1	dB(A)	Façade reflection	2.5	dB(A)
Façade reflection	2.5	dB(A)	Impact at façade	24.6	dB(A)
Impact at façade	27.0	dB(A)	Fan 16	54.6	dB(A)
Fan 5	54.6	dB(A)	Distance to receiver	89	m
Distance to receiver	99	m	Distance attenuation	-32.1	dB(A)
Distance attenuation	-33.1	dB(A)	Façade reflection	2.5	dB(A)
Façade reflection	2.5	dB(A)	Impact at façade	25.0	dB(A)
Impact at façade	24.0	dB(A)	Fan 17	54.6	dB(A)
Fan 6	54.6	dB(A)	Distance to receiver	112	m
Distance to receiver	87	m	Distance attenuation	-34.1	dB(A)
Distance attenuation	-31.9	dB(A)	Façade reflection	2.5	dB(A)
Façade reflection	2.5	dB(A)	Impact at façade	23.0	dB(A)
Impact at façade	25.2	dB(A)	Fan 18	54.6	dB(A)
Fan 7	54.6	dB(A)	Distance to receiver	103	m
Distance to receiver	81	m	Distance attenuation	-33.4	dB(A)
Distance attenuation	-31.3	dB(A)	Façade reflection	2.5	dB(A)
Façade reflection	2.5	dB(A)	Impact at façade	23.7	dB(A)
Impact at façade	25.8	dB(A)	Fan 19	54.6	dB(A)
Fan 8	54.6	dB(A)	Distance to receiver	105	m
Distance to receiver	77	m	Distance attenuation	-33.6	dB(A)
Distance attenuation	-30.9	dB(A)	Façade reflection	2.5	dB(A)
Façade reflection	2.5	dB(A)	Impact at façade	23.5	dB(A)
Impact at façade	26.2	dB(A)	Fan 20	54.6	dB(A)
Fan 9	54.6	dB(A)	Distance to receiver	102	m
Distance to receiver	102	m	Distance attenuation	-33.3	dB(A)
Distance attenuation	-33.3	dB(A)	Façade reflection	2.5	dB(A)
Façade reflection	2.5	dB(A)	Impact at façade	23.8	dB(A)
Impact at façade	23.8	dB(A)	Fan 21	54.6	dB(A)
Fan 10	54.6	dB(A)	Distance to receiver	98	m
Distance to receiver	92	m	Distance attenuation	-33.0	dB(A)
Distance attenuation	-32.4	dB(A)	Façade reflection	2.5	dB(A)
Façade reflection	2.5	dB(A)	Impact at façade	24.1	dB(A)
Impact at façade	24.7	dB(A)	Fan 22	54.6	dB(A)
Fan 11	54.6	dB(A)	Distance to receiver	96	m
Distance to receiver	86	m	Distance attenuation	-32.8	dB(A)
Distance attenuation	-31.8	dB(A)	Façade reflection	2.5	dB(A)
Façade reflection	2.5	dB(A)	Impact at façade	24.3	dB(A)
Impact at façade	25.3	dB(A)			

LOW SPEED ALL ON	38	dB(A)
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