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CONSULTING ACOUSTICAL ENGINEERS

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Environmental Noise Assessment

Proposed Change of Use of Commercial Office Space
Senior School Campus
194 – 198 Lakemba Street, Lakemba, NSW

REPORT No
7946-1.1R Rev B

DATE ISSUED
26 March 2024

Prepared For:
ES Design
Level 1, Suite 10, 1 Cooks Avenue
Canterbury NSW 2193

Attention: Mr Michel Toubia

Revision History

Report	Date	Prepared	Checked	Comment
Final	18/03/2024	William Wang	Stephen Gauld	
Rev A	25/03/2024	William Wang	Stephen Gauld	
Rev B	26/03/2024	William Wang	Stephen Gauld	Updated Drawings

Document R\7946-1.1R REV B, 15 pages plus attachments

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TABLES

1.0 CONSULTING BRIEF

Day Design Pty Ltd was engaged by ES Design to carry out an environmental noise assessment for the proposed change of use of a commercial space into a senior school campus at 194-198 Lakemba Street, Lakemba, NSW. The scope of work is as follows:

- Review the architectural drawings
- Inspect the site in Lakemba
- Prepare a site plan identifying the development and nearby noise sensitive locations
- Measure the background noise levels at critical locations and times
- Establish acceptable noise level criteria
- Quantify noise emissions from the School sites
- Calculate the level of noise emission, taking into account building envelope transmission loss, screen walls, ground absorption and distance attenuation
- Provide recommendations for noise emission control (if necessary)
- Prepare an Environmental Noise Assessment Report.

2.0 PROJECT DESCRIPTION

The ground floor level of a commercial building is proposed to be fit out as a senior campus at 194-198 Lakemba Street, Lakemba, NSW.

The proposed fit out will provide the following spaces:

- 10 x classrooms;
- 1 x science room;
- 1 x tech room;
- 1 x staff room;
- 8 x offices;
- Amenities;
- Comms room; and
- Reception.

We have been informed a total of 60 students will occupy the senior campus. Chapter 10 of Canterbury-Bankstown Development Control Plan 2023 indicates a maximum 5.6 m^2 per student for classroom space. A theoretical maximum of 95 students may occupy the site.

The senior campus will be in use from 8 am to 4 pm Monday to Friday.

Long term ambient noise measurements have been taken on the site as shown in Figure 1. Ambient noise levels are presented in Section 3 of this report. These locations have been chosen to represent the acoustic environment at the nearby residential neighbours.

Existing residences are located around the site. Figure 1 and Table 1 show the assessment locations for residential and commercial premises used in this assessment. These locations are representative of the nearest affected premises, with the residential premises located further away likely to experience a lower noise impact from the school as a result of distance attenuation.

Table 1 Residential Receptor Locations

Location	Address	Type	Direction
R1	227 Lakemba Street	Residential	North
R2	2 Croydon Street	Residential	East
R3	7 Croydon Street	Residential (Future)	South
R4	206 Lakemba Street	Commercial	West
R5	Level 1, 194-198 Lakemba Street	Commercial	Above
R6	188 Lakemba Street	Commercial	East

Acceptable noise limits are derived from the EPA's Noise Policy for Industry for intrusive noise impacts from mechanical plant and indoor noise, at each residence, and The Association of

Australasian Acoustical Consultants (AAAC) *Technical Guideline for Child Care Centre Noise Assessment* noise criteria for children in outdoor areas.

Noise levels from students in the breakout space, inside the classrooms and mechanical plant have been calculated at the nearest residential and commercial premises and are presented in Section 5.0.

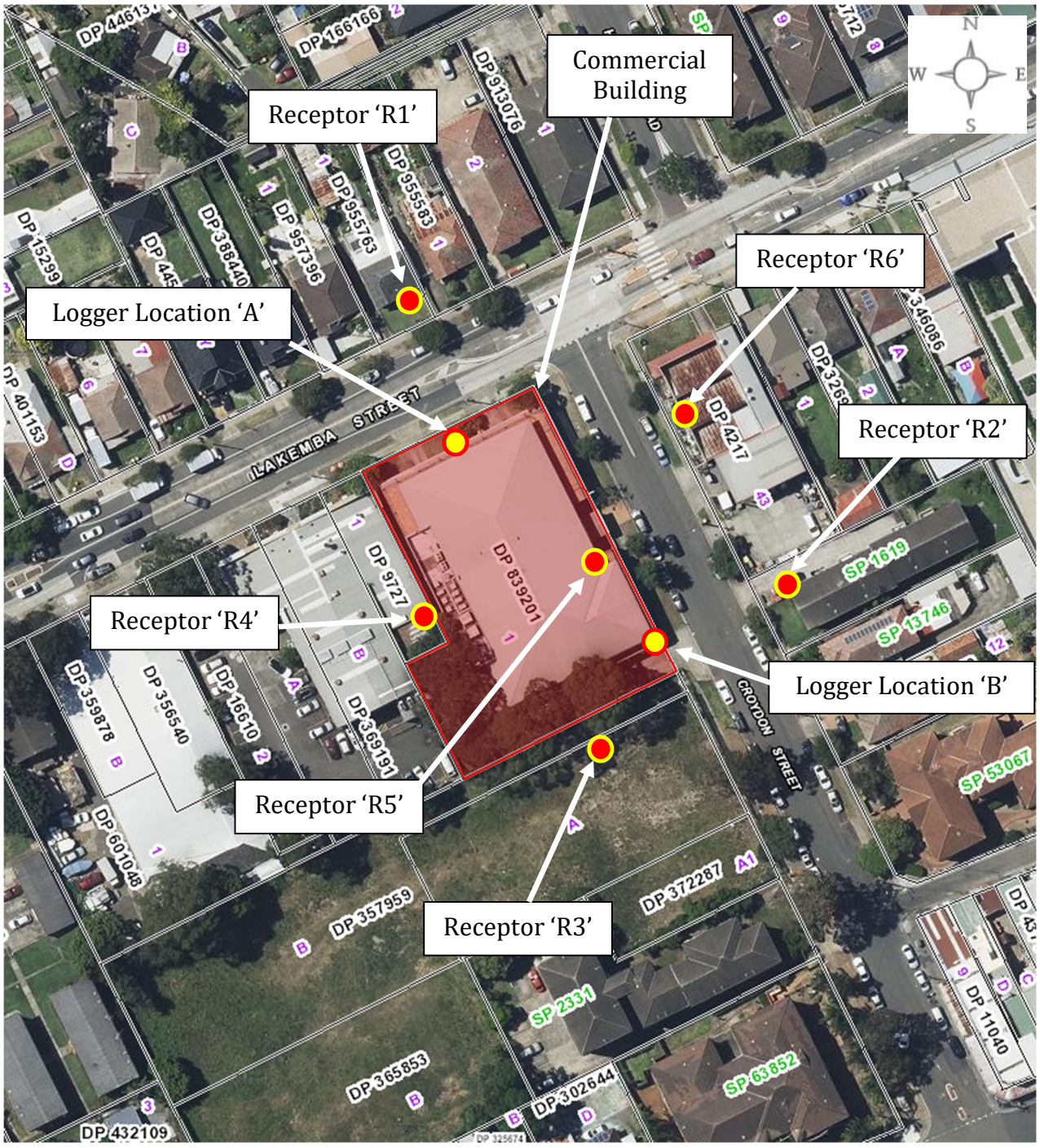


Figure 1 : Location Plan – 194 – 198 Lakemba Street, Lakemba, NSW

3.0 NOISE EMISSION CRITERIA

3.1 Background Noise Level

In order to assess the severity of a possible environmental noise problem in a residential area it is necessary to measure the ambient background noise level at the times and locations of worst possible annoyance. The lower the background noise level, the more perceptible the intrusive noise becomes and the more potentially annoying.

The ambient L_{90} background noise level is a statistical measure of the sound pressure level that is exceeded for 90% of the measuring period (typically 15 minutes).

The Rating Background Level (RBL) is defined by the NSW EPA as the median value of the (lower) tenth percentile of L_{90} ambient background noise levels for the day, evening or night time periods, measured over a number of days during the proposed days and times of operation. The places of worst possible annoyance are the residences identified in Table 1. These potentially affected locations can be seen in Figure 2. The times of greatest annoyance will be during the day time when the senior campus is proposed to operate.

Two environmental noise loggers were placed on the site as shown on Figure 1. Logger Location 'A', while located on the site, is representative of any residential premises fronting Lakemba Street and considered a suitable monitoring location. Logger Location 'B', while located on the site, was located facing the residential preemies on Croydon Street. The acoustic environment between the logger location and the residential location is considered to be identical and considered a suitable monitoring location.

The measured noise levels are presented in the attached Appendix B and also in Table 2.

Table 2 Ambient Noise Levels – Lakemba

Location	Time Period	L_{90} Rating Background Level (dBA)	Existing Ambient L_{eq} Noise Level (dBA)
Location 'A' – 194-198 Lakemba Street, Lakemba (Front of site, first floor facing Lakemba Street)	Day (7 am to 6 pm)	**54**	**65**
	Evening (6 pm to 10 pm)	**52**	**65**
	Night (10 pm to 7 am)	**41**	**61**
Location 'B' – 194-198 Lakemba Street, Lakemba (Rear of site, first floor facing Croydon Street)	Day (7 am to 6 pm)	**49**	**59**
	Evening (6 pm to 10 pm)	**49**	**58**
	Night (10 pm to 7 am)	**42**	**55**

Atmospheric conditions were ideal for noise monitoring. Noise measurements were therefore considered reliable and typical for the receptor area.

The noise dominating the environment was road traffic on Lakemba Street, which carries constant volumes of traffic, being a collector road between Wiley Park and Campsie.

3.2 SEPP (Transport and Infrastructure) 2021

The NSW Department of Planning and Environment (DoPE) published the State Environmental Planning Policy (SEPP) (Transport and Infrastructure) 2021 on 1 March 2022, which consolidated the SEPP (Education and Child Care Facilities) 2017. The relevant parts of the SEPP to this proposal have been extracted and are revised below.

Chapter 3 Education establishments and child care facilities

Part 3.4 Schools - specific development controls

3.36 Schools – development permitted with consent

(2) Development for a purpose specified in section 3.40 (1) or 3.41 (2) (e) may be carried out by any person with development consent on land within the boundaries of an existing school.

(9) A provision of a development control plan that specifies a requirement, standard or control in relation to development of a kind referred to in subclause (1), (2), (3) or (5) is of no effect, regardless of when the development control plan was made.

'Schedule 6 Schools – Complying development' of the SEPP requires the following regarding noise:

'6 Noise

A new building or (if the development is an alteration or addition to an existing building for the purpose of changing its use) an existing building that is to be used for the purpose of a school or school-based child care must be designed so as not to emit noise exceeding an L_{Aeq} of 5 dB(A) above background noise when measured at any lot boundary.'

Also, 'Schedule 8 Schools – design quality principles' of the SEPP requires the following:

'Principle 5. Amenity

Schools should provide pleasant and engaging spaces that are accessible for a wide range of educational, informal and community activities, while also considering the amenity of adjacent development and the local neighbourhood.'

The representative Rating Background Levels were as shown in Table 2 above. Therefore the acceptable L_{eq} noise intrusiveness noise level for broadband noise at these locations are as shown in Table 3.

Table 3 Acceptable Intrusive Noise Levels – Lakemba

Location	Time Period	L_{90} Rating Background Level (dBA)	Acceptable Intrusive Noise Level (dBA)
Residences facing Lakemba Street	Day (7 am to 6 pm)	**54**	(54 +5 =) **59**
	Evening (6 pm to 10 pm)	**52**	(52 +5 =) **57**
	Night (10 pm to 7 am)	**41**	(41 +5 =) **56**
Residences facing away from Lakemba Street	Day (7 am to 6 pm)	**49**	(49 +5 =) **54**
	Evening (6 pm to 10 pm)	**49**	(49 +5 =) **54**
	Night (10 pm to 7 am)	**42**	(42 +5 =) **47**

3.3 Project Specific Noise Emission Criteria

When all the above factors are considered, we find that the most stringent noise criterion at the nearby residential premises is shown in Table 4.

Table 4 Project Specific Noise Levels – Lakemba

Location	Time Period	Project Specific Noise Level (dBA)
Receptors facing Lakemba Street	Day (7 am to 6 pm)	**59**
	Evening (6 pm to 10 pm)	**57**
	Night (10 pm to 7 am)	**56**
Receptors facing away from Lakemba Street	Day (7 am to 6 pm)	**54**
	Evening (6 pm to 10 pm)	**54**
	Night (10 pm to 7 am)	**47**

These criteria apply at the most-affected point on or within the residential property boundary. For upper floors, the noise is assessed outside the nearest window.

4.0 SCHOOL NOISE EMISSION

The main sources of noise from the proposed senior campus will be from students occupying the classrooms, the breakout area and mechanical plant. Calculations are based on the building layout provided by ES Design shown in Appendix C.

We have been informed a total of 60 students will occupy the senior campus. Chapter 10 of Canterbury-Bankstown Development Control Plan 2023 indicates a maximum 5.6 m^2 per student for classroom space. A theoretical maximum of 95 students may occupy the site.

The senior campus will be in use from 8 am to 4 pm Monday to Friday.

4.1 Students in Outdoor Areas

Students have a small breakout area at the rear of the building to be utilized between classes.

In order to model the worst case scenario of noise emission from student's outdoors, we have assessed the high occupancy scenario of the school students in the breakout area.

Sound power levels of students talking are based on adult voices in Harris[1] and in our noise level database gathered over many years, and are presented in Table 5.

Table 5 L_{10} Sound Power Levels – Outdoor Areas

Description	dBA	L_{10} Sound Power Levels (dB) at Octave Band Centre Frequencies (Hz)							
		63	125	250	500	1k	2k	4k	8k
One man talking with raised voice	**69**	58	58	64	69	64	60	55	48
One man talking normally	**63**	54	54	60	63	56	52	48	43
Group of 60 People – 12 with raised voices, 18 talking normally, 30 listening/not talking	**81**	71	71	77	81	76	72	67	60

[1] Handbook of Acoustical Measurements and Noise Control, Third Edition, Cyril M. Harris, McGraw-Hill Inc, New York, (Page 16.2)

4.2 Senior Campus General Learning Areas

The proposed Senior Campus will contain 10 general learning areas and 2 specialty learning areas. These rooms are not expected to generate high levels of noise during use. The rooms will be used as classrooms with teachers leading students through school material. We have assumed no music or drama will take place at this campus.

A schedule of the sound power levels for loudest activities that may occur within the Senior Block is presented in Table 6.

Table 6 Senior Block Activity L_{eq} Sound Power Levels

Description	Sound Power Levels (dB) at Octave Band Centre Frequencies (Hz)								
	dBA	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
Teacher Talking Loudly	**80**	59	61	70	77	76	72	65	56
Students Talking Normally	**63**	54	54	60	63	56	52	48	43
Class of 1 Teacher and 10 Students	**80**	65	66	73	78	76	72	66	58

The above activities are likely to occur only during the daytime, during school hours and is therefore compared against the daytime criteria. Although the proposed number of students for the site is 60 students, we have based our assessment over the worst case scenario of 95 students within the building.

The existing buildings external façade is fixed glazing at ground floor level. We have assumed that the external doors will be kept closed during use of the classrooms, with the classrooms to be air conditioned by the existing base building condenser units.

4.3 Mechanical Plant

The location and type of mechanical plant has not yet been selected for the Senior Campus. The base building condenser units will supply air conditioning to the internal spaces. Any new mechanical plant will only operate during day time hours, Monday to Friday. We have assumed the new plant will be located on the western side of the building in close proximity to the new science room and toilets.

The sound power level for typical equipment used at school sites is presented in Table 7.

Table 7 Mechanical Plant L_{eq} Sound Power Levels

Description	dBA	Sound Power Levels (dB) at Octave Band Centre Frequencies (Hz)							
		63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
Extraction Fan (Large)	**90**	91	89	89	87	87	81	71	68
Supply Air Fan	**83**	74	76	77	80	80	73	69	61
Toilet Exhaust Fan	**59**	48	48	56	57	54	53	45	38

4.4 Cumulative Predicted Noise Levels

The predicted level of noise from all elements of the senior campus was used as a worst case scenario and is calculated to be as shown in Table 8 at the worst affected receptors.

Table 8 Cumulative Predicted L_{eq} Noise Levels – Senior Campus

Receptor Location	Predicted L_{eq} Noise Level (dBA)	Acceptable L_{eq} Noise Level (dBA)	Compliance
R1 - 227 Lakemba Street			
- Outdoor Breakout Area	18		
- GLAs	33		
- Mechanical plant	27		
Cumulative Noise Level	34	59	Yes
R2 - 2 Croydon Street			
- Outdoor Breakout Area	43		
- GLAs	34		
- Mechanical plant	27		
Cumulative Noise Level	44	54	Yes
R3 - 7 Croydon Street			
- Outdoor Breakout Area	52		
- GLAs	36		
- Mechanical plant	41		
Cumulative Noise Level	52	54	Yes
R4 - 206 Lakemba Street			
- Outdoor Breakout Area	42		
- GLAs	52		
- Mechanical plant	57		
Cumulative Noise Level	58	54	**No (+ 4 dB)**
R5 - Level 1, 194 – 198 Lakemba Street			
- Outdoor Breakout Area	49		
- GLAs	44		
- Mechanical plant	47		
Cumulative Noise Level	52	54	Yes
R6 - 188 Lakemba Street			
- Outdoor Breakout Area	42		
- GLAs	34		
- Mechanical plant	34		
Cumulative Noise Level	43	54	Yes

The above predicted noise levels in Table 8 typically meet the acceptable noise level, with the exception of the commercial property to the west adjacent to the western boundary due to mechanical plant noise.

As mechanical plant selection is not typically carried out until detail design stage, we recommend a detailed acoustic assessment be carried out prior to construction to ensure the noise emission from mechanical plant meets the acceptable noise criteria.

5.0 NOISE CONTROL RECOMMENDATIONS

We have modelled the proposed senior campus based on preliminary architectural drawings by ES Design and calculated the level of noise emission from the site.

The noise control recommendations provided are required to reduce the level of noise emission to meet the acceptable noise criteria.

5.1 Mechanical Plant

For typical mechanical plant equipment with sound power levels not exceeding those listed in Table 7, it is reasonable and feasible to acoustically treat the plant area or equipment itself so that noise will not impact the neighbouring properties.

Once mechanical plant selection has been finalised, a detailed acoustic assessment should be made, prior to the issue of a Construction Certificate (or during the detailed design stage). We recommend that the mechanical services engineers select mechanical plant equipment with the lowest sound power levels to reduce the amount of acoustic treatment necessary to achieve the noise criteria at nearby receivers.

We offer to provide detailed noise controls when specifications of the mechanical plant equipment have been finalised.

An example of acoustic treatment for the ventilation fans would be in the form of selecting in-line fans, with internally insulated ductwork installed on either side, lined with 50 mm thick high density insulation (min. density 32 kg/m^3) for a minimum length of 3 metres.

5.2 Breakout Area

We recommend that a maximum of 60 students be permitted to use the outdoor breakout area at any one time.

5.3 Operating hours

We recommend that the operating hours be limited to the daytime period, being 7 am to 6 pm Monday to Friday, 8 am to 6 pm Saturdays, Sundays and Public Holidays.

The senior campus is proposed to operate from 8 am to 4 pm Monday to Friday and will be considered acceptable during these times.

5.4 Construction Disclaimer

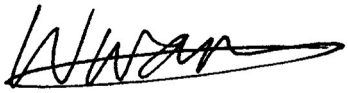
Recommendations made in this report are intended to resolve acoustical problems only. We make no claim of expertise in other areas and draw your attention to the possibility that our recommendations may not meet the structural, fire, thermal or other aspects of building construction.

We encourage clients to check with us before using materials or equipment that are alternative to those specified in our Acoustical Report.

6.0 NOISE ASSESSMENT STATEMENT

Day Design Pty Ltd was engaged by ES Design to carry out an environmental noise assessment for the proposed change of use of a commercial space into a senior school campus at 194-198 Lakemba Street, Lakemba, NSW.

Measurements and calculations show that, provided the noise control recommendation in Section 5 are satisfactorily implemented, the proposed senior campus to be located at 194-198 Lakemba Street, Lakemba will be able to meet the acceptable noise level requirements of the SEPP (Transport and Infrastructure) 2021 as detailed in Section 3 of this report.



William Wang, BE (Mechatronics), MIEAust, MAAS

Senior Acoustical Engineer

for and on behalf of Day Design Pty Ltd

AAAC MEMBERSHIP

Day Design Pty Ltd is a member company of the Association of Australasian Acoustical Consultants, and the work herein reported has been performed in accordance with the terms of membership.

Attachments:

- Appendix A – Noise Survey Instrumentation
- Appendix B – Ambient Noise Surveys
- Appendix C – Architectural Drawings
- AC108-1 to 4 – Glossary of Acoustical Terms

NOISE SURVEY INSTRUMENTATION

Noise level measurements and analysis in this report were made with instrumentation as follows:

Table A Noise Instrumentation

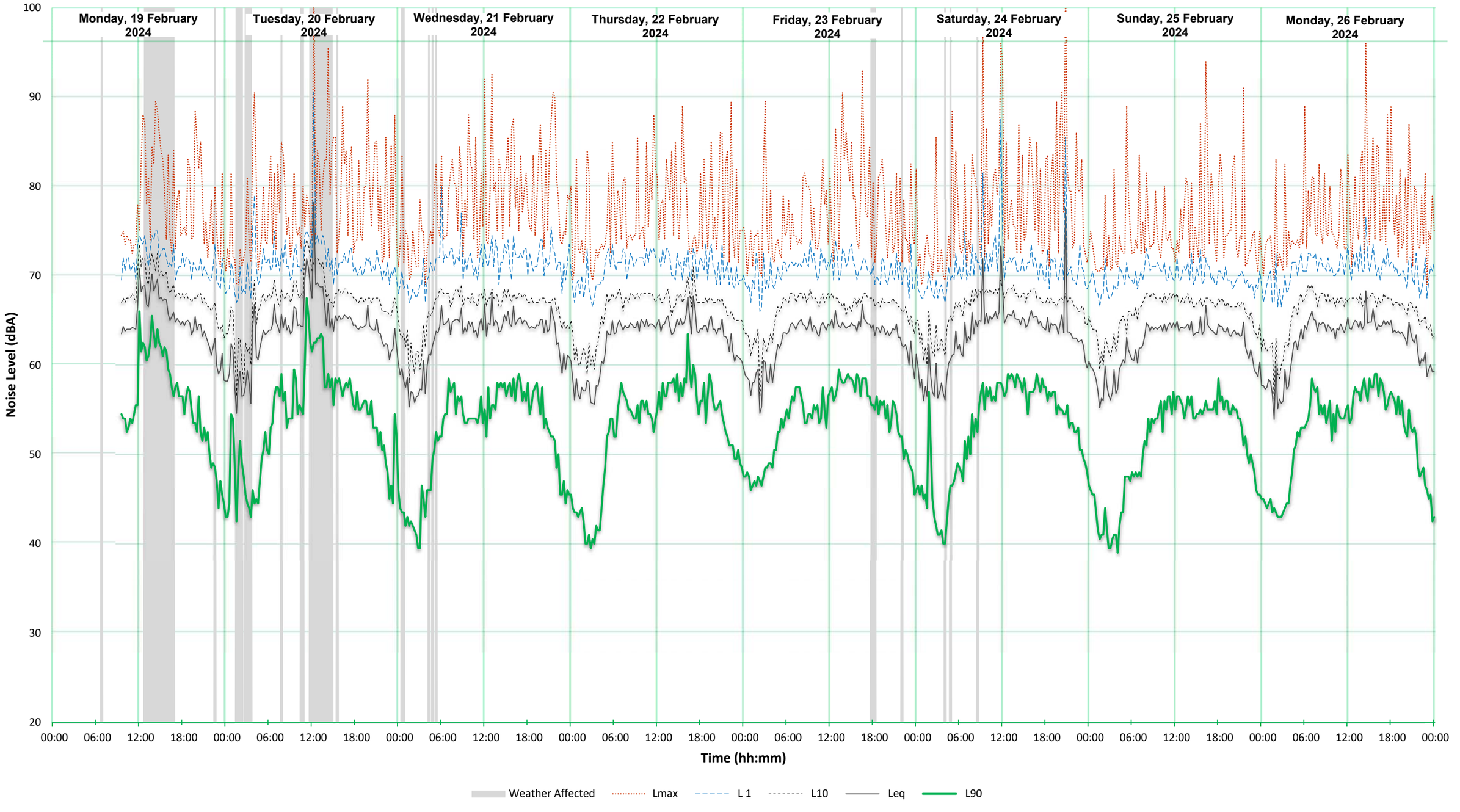
Make	Model	Description	Serial No.
B & K	4231	Microphone Calibrator	2721949
Infobyte	iM4	Noise Logger with HF Filter	117
Microtech Gefell	MK250	0.5" Microphone & "C" option	117
Infobyte	iM4	Noise Logger with HF Filter	123
Microtech Gefell	MK250	0.5" Microphone	123
NTi Audio	NTi XL2	Noise Logger with 1/3 Octaves	A2A-18470-E0
XL2-DD6	MA220 MC2230	Preamplifier 0.5" Capsule	9415 A18780

The Nti Audio XL2 Sound Level Meter is a real-time precision integrating sound level meter with octave and third octave filters, that sample noise at a rate of 10 samples per second and provides L_{eq}, L_{10} and L_{90} noise levels using both Fast and Slow response and L_{peak} noise levels on Impulse response time settings. The meter is frequency weighted to provide dBA, dBC or Linear sound pressure level readings as required. Results are normally downloaded to computer for rapid processing.

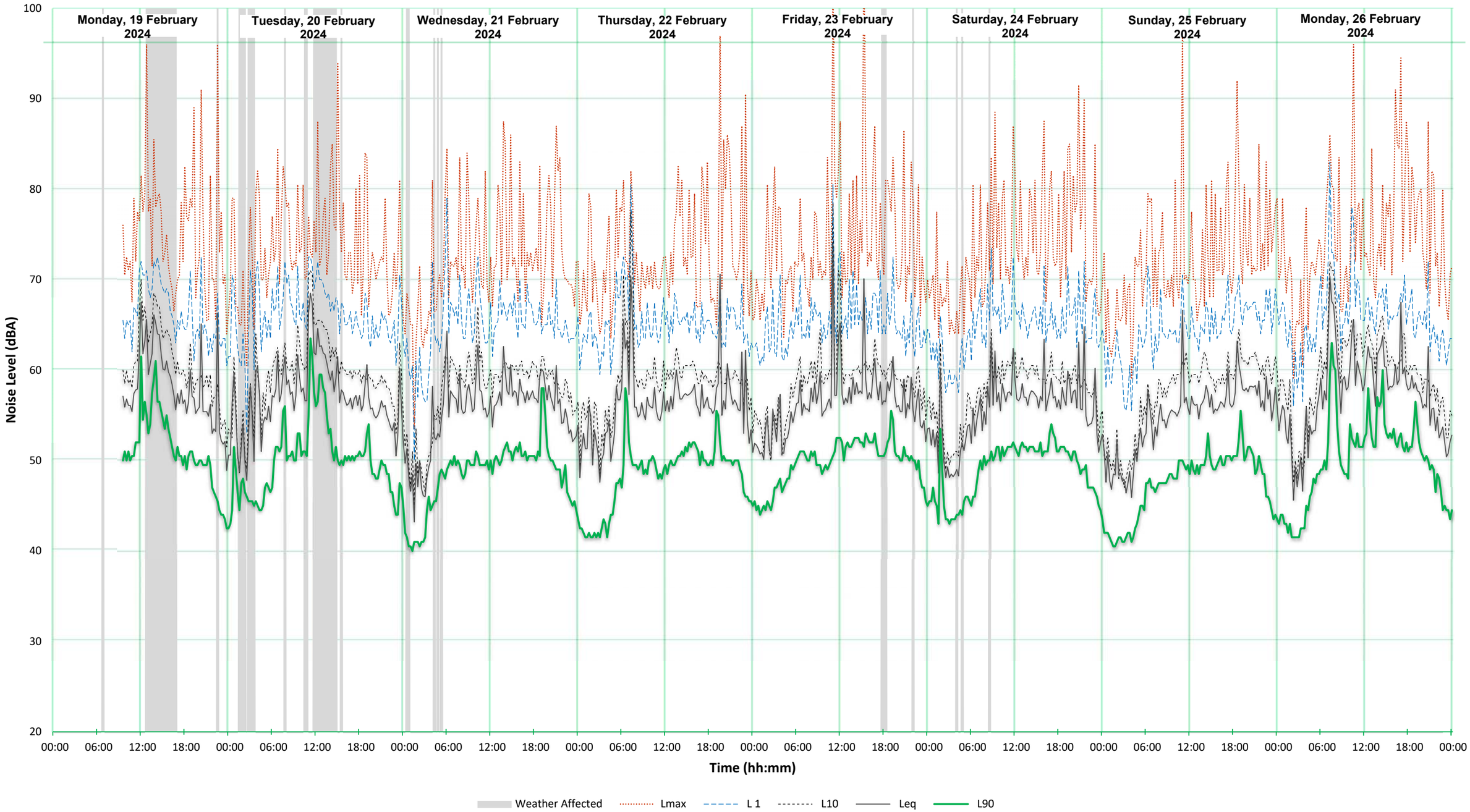
An environmental noise logger is used to continuously monitor ambient noise levels and provide information on the statistical distribution of noise during an extended period of time. The Infobyte Noise Monitor iM4 is either a Type 2 precision environmental noise monitor meeting all the applicable requirements of AS1259 for an integrating-averaging sound level meter.

All instrument systems had been laboratory calibrated using instrumentation traceable to Australian National Standards and certified within the last two years thus conforming to Australian Standards. The measurement system was also field calibrated prior to and after noise surveys. Calibration drift was found to be less than 0.3 dB during attended measurements and within 1 dB for long term unaddtended measurements. No adjustments for instrument drift during the measurement period were warranted.

Located at 194-198 Lakemba Street, Lakemba, NSW (Front Balcony)



Located at 194-198 Lakemba Street, Lakemba, NSW (Rear Balcony)



DEVELOPMENT APPLICATION

7946-1 Appendix C

DRAWING SCHEDULE

ISSUE DETAILS

A	14.03.2024	ISSUED FOR DEVELOPMENT APPLICATION

ADDITIONAL INFORMATION DA

A01	OWNER'S CONSENT FORM
A02	SURVEY PLAN
A03	SECTION J REPORT
A04	STORMWATER PLAN
A05	TRAFFIC IMPACT STATMENT
A06	STATEMENT OF ENVIRONMENTAL EFFECTS
A07	SOCIAL IMPACT STATMENT
A08	ACOUSTIC REPORT

COMMERCIAL DEVELOPMENT

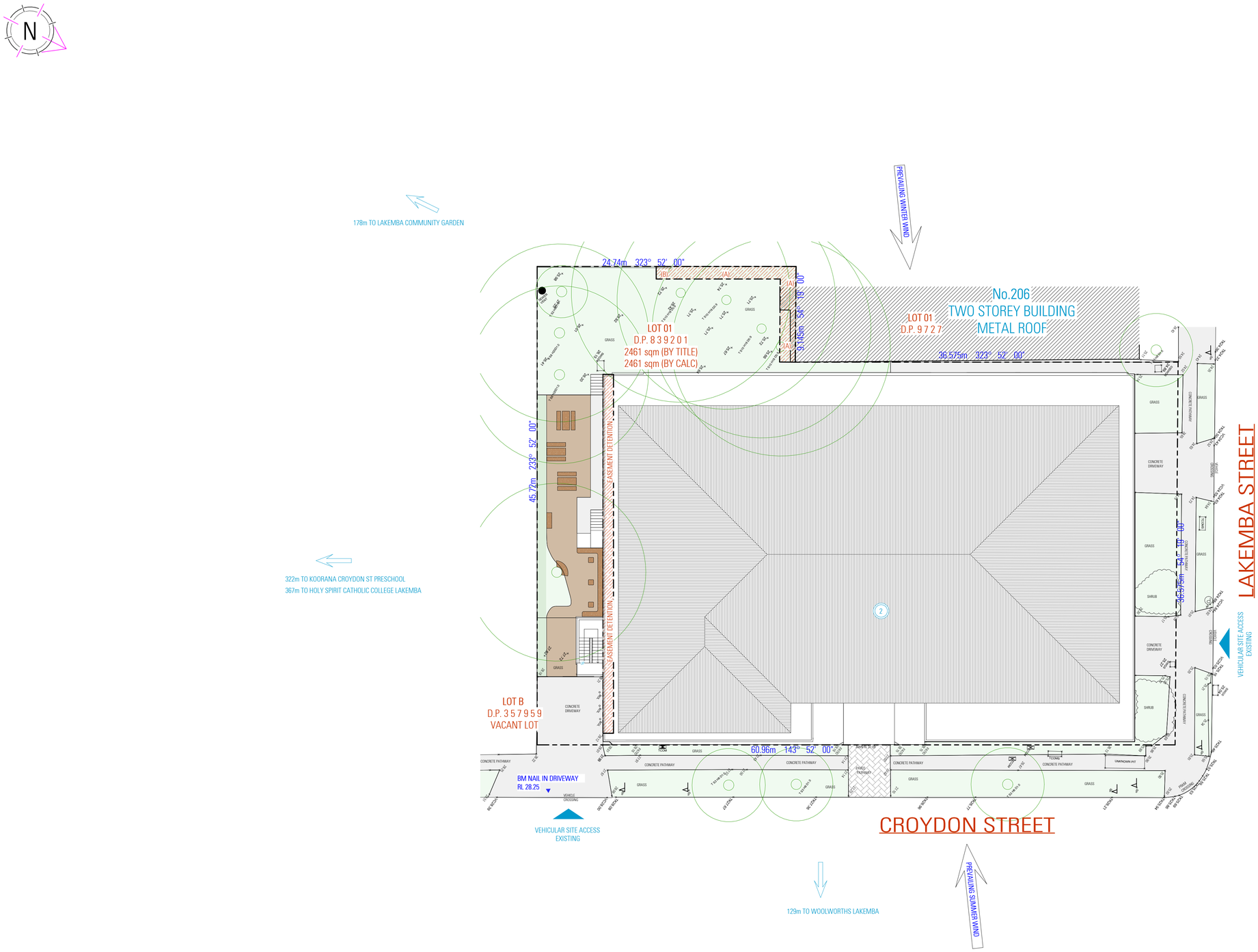
194-198 LAKEMBA STREET,
LAKEMBA NSW 2195

ACCREDITED
BUILDING DESIGNER

es.au

KEY	ITEM	SYMBOL
	NUMBER OF STOREYS	1 2
	POSSIBLE OVERLOOKING	
	PRIVATE OPEN SPACE	
	REDUCED LEVELS	25.00
	SITE	

SITE DETAILS	
SITE LENGTH (APPROX.)	61.2 m
SITE WIDTH (APPROX.)	36.5 m
SITE AREA	2461 m²



SITE ANALYSIS PLAN

NOT FOR CONSTRUCTION

NOTES
1. ALL DIMENSIONS ARE IN MILLIMETERS
2. VERIFY ALL DIMENSIONS ON SITE
3. DO NOT SCALE. USE FIGURED DIMENSIONS ONLY
4. VERIFY ALL DISCREPANCIES WITH THE DESIGNER
5. ALL WORKS TO COMPLY WITH THE NATIONAL CONSTRUCTION CODE (B.C.A) & AUSTRALIAN STANDARDS

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COMMERCIAL DEVELOPMENT
194-198 LAKEMBA STREET, LAKEMBA NSW 2195

DESIGN MICHEL TOUBIA
DRAFTED JOYCE RAFFOUL

DRAWING
SITE ANALYSIS PLAN

SCALE 1 : 200 / A1
ISSUE A 14.03.2024

DWG No. 24012 - 001

LEGEND

KEY	ITEM	SYMBOL
	EXISTING BUILDING	
	PROPOSED WORKS	
	OUT OF SCOPE	

NOT FOR CONSTRUCTION

PROPOSED BASEMENT FLOOR PLAN

NOTES
1. ALL DIMENSIONS ARE IN MILLIMETERS
2. VERIFY ALL DIMENSIONS ON SITE
3. DO NOT SCALE, USE FIGURED DIMENSIONS ONLY
4. VERIFY ALL DISCREPANCIES WITH THE DESIGNER
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COMMERCIAL DEVELOPMENT
194-198 LAKEMBA STREET, LAKEMBA NSW 2195

DESIGN MICHEL TOUBIA
DRAFTED JOYCE RAFFOUL

DRAWING
EXISTING BASEMENT FLOOR PLAN
SCALE 1 : 100 / A1
ISSUE A 14.03.2024
DWG No. 24012 - 100

N

KEY	ITEM	SYMBOL
	EXISTING BUILDING	
	PROPOSED WORKS	
	OUT OF SCOPE	

24.74m 323° 52' 00"

LOT 01
D.P. 839201
2461 sqm (BY TITLE)
2461 sqm (BY CALC)

LOT 01
D.P. 9727

No.206
TWO STOREY BUILDING
METAL ROOF

9.145m 54° 19' 00"

36.575m 323° 52' 00"

EXISTING LANDSCAPE AREA TO BE RETAINED

GRASS

EXISTING TREES TO BE RETAINED AND PROTECTED DURING WORKS

GATE
NO ACCESS

1000 H HANDRAILS

PROPOSED CONCRETE PATHWAY

PROPOSED SCREEN PLANTING

PROPOSED WASTE BINS

45.72m 233° 52' 00"

OUTDOOR STUDENT STUDY AREA WITH TABLES AND LONG BENCH FOR GROUP LEARNING

PROPOSED RESIN BOUND GRAVEL SURFACE AND INCLUSIVE FURNITURE

PLATFORM LIFT

OUTDOOR BREAK SPACE 125sqm

1800 H FENCE

PROPOSED CUSTOM BENCH

EXISTING TREE TO BE RETAINED AND PROTECTED DURING WORKS

PROPOSED WASTE BINS

LOW MIXED PLANTING

6320

NO ACCESS

GATE

LOT B
D.P. 357959
VACANT LOT

CONCRETE DRIVEWAY

SCIENCE ROOM 67.33 m²

CLASSROOM 10 45.18 m²

CLASSROOM 09 46.26 m²

OFFICE 06 11.89 m²

OFFICE 07 11.89 m²

OFFICE 08 11.89 m²

CLASSROOM 08 59.12 m²

CLASSROOM 07 59.07 m²

CLASSROOM 06 66.56 m²

CLASSROOM 05 77.28 m²

RESOURCES 15.75 m²

COMMS ROOM 13.73 m²

TECHROOM 91.36 m²

STAFF

BASEMENT DETENTION

FIRE STAIRS

EXIT

OFFICE 05 11.24 m²

OFFICE 04 25.31 m²

CLASSROOM 04 41.84 m²

CLASSROOM 03 41.65 m²

CLASSROOM 02 45.87 m²

CLASSROOM 01 52.25 m²

OFFICE 01 12.58 m²

OFFICE 02 13.06 m²

OFFICE 03 13.41 m²

No.194-198
TWO STOREY OFFICE BUILDING
WITH BASEMENT PARKING

BUILDING LOBBY - NOT PART OF APPLICATION

RECEPTION

FRONT DESK

LINE OF CEILING ABOVE

LINE OF BALCONY ABOVE

LINE OF AWNING ABOVE

FFL 28.200

BOT STEP 27.29
AWN RL 31.09

CONCRETE COLUMN (TYPICAL)

60.96m 143° 52' 00"

CONCRETE PATHWAY

CONCRETE DRIVEWAY

GRASS

SHRUB

CONCRETE PATHWAY

VEHICLE CROSSING

PRAM CROSSING

TCOMS

UNKNOWN PIT

PAVED PATHWAY

BM NAIL IN DRIVEWAY
RL 28.25

EXISTING TREES TO BE RETAINED AND PROTECTED DURING WORKS

LAKEMBA STREET

CROYDON STREET

NOT FOR CONSTRCUTION

PROPOSED GROUND FLOOR PLAN

NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS
2. VERIFY ALL DIMENSIONS ON SITE
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4. VERIFY ALL DISCREPANCIES WITH THE DESIGNER
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COMMERCIAL DEVELOPMENT

194-198 LAKEMBA STREET, LAKEMBA NSW 2195

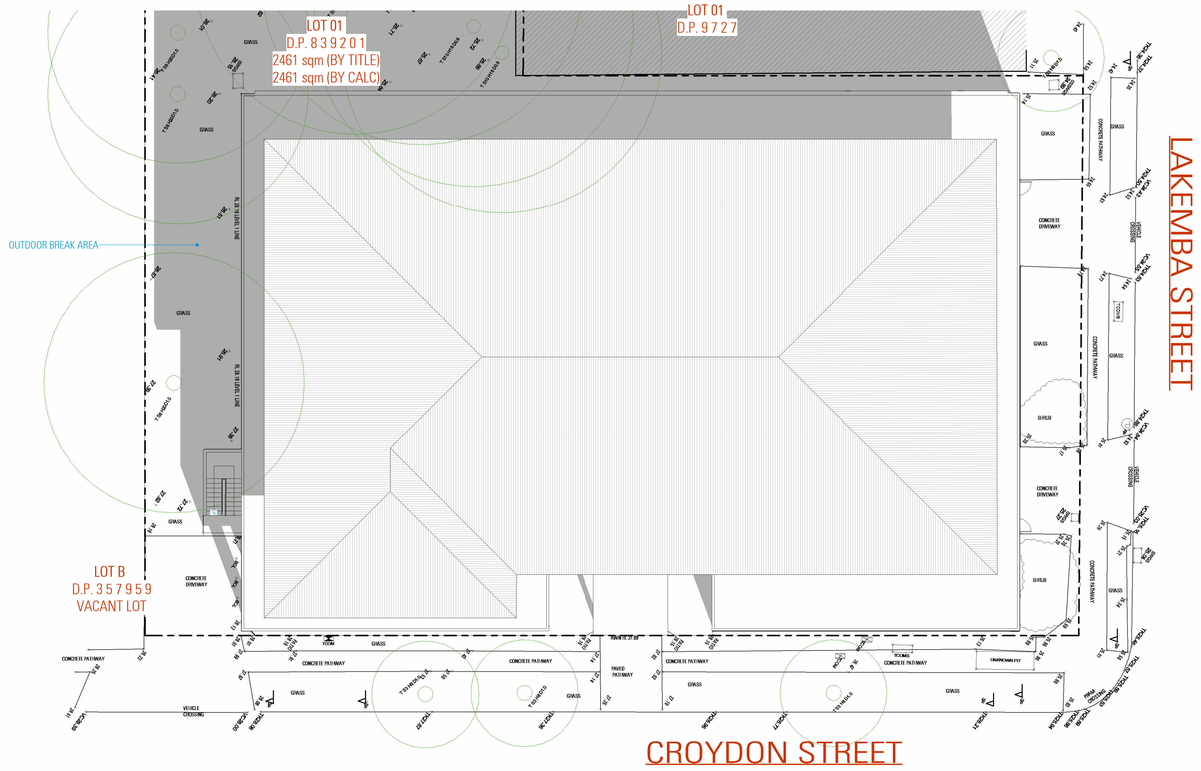
DESIGN MICHEL TOUBIA
DRAFTED JOYCE RAFFOUL

DRAWING
PROPOSED GROUND FLOOR PLAN

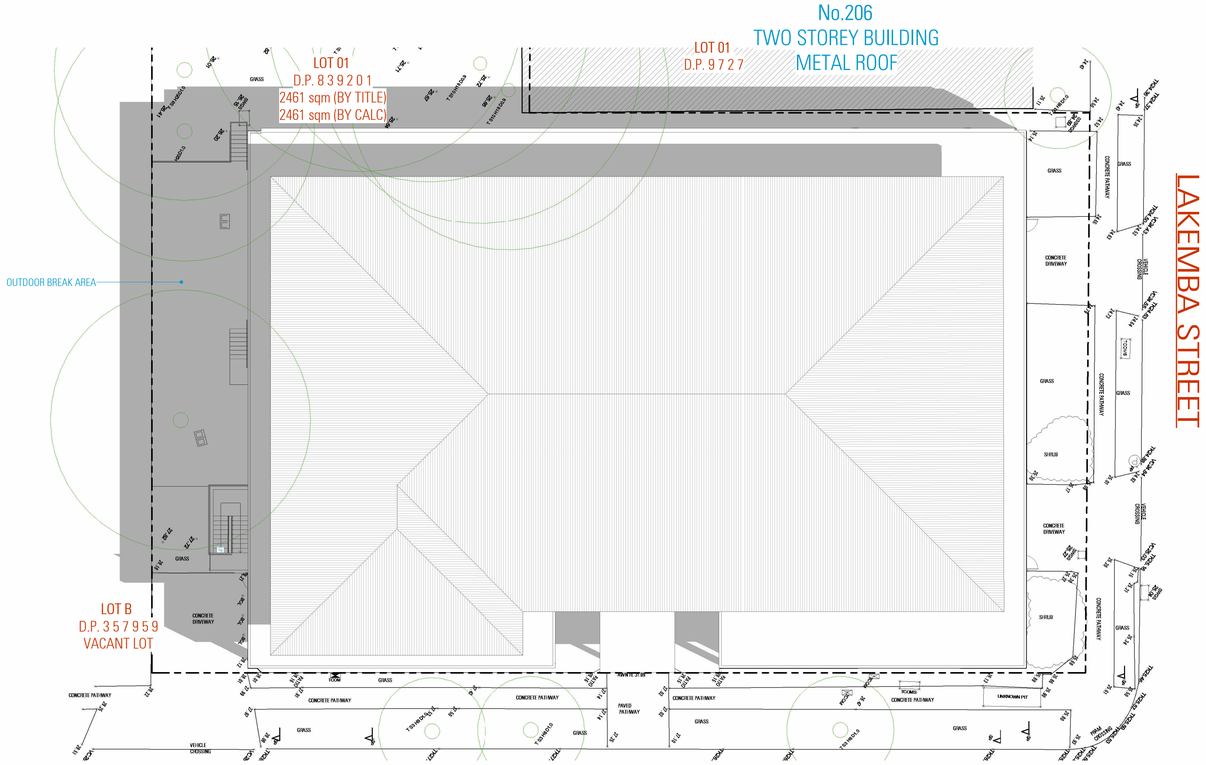
SCALE 1 : 100 / A1
ISSUE A 14.03.2024

DWG No. 24012 - 201

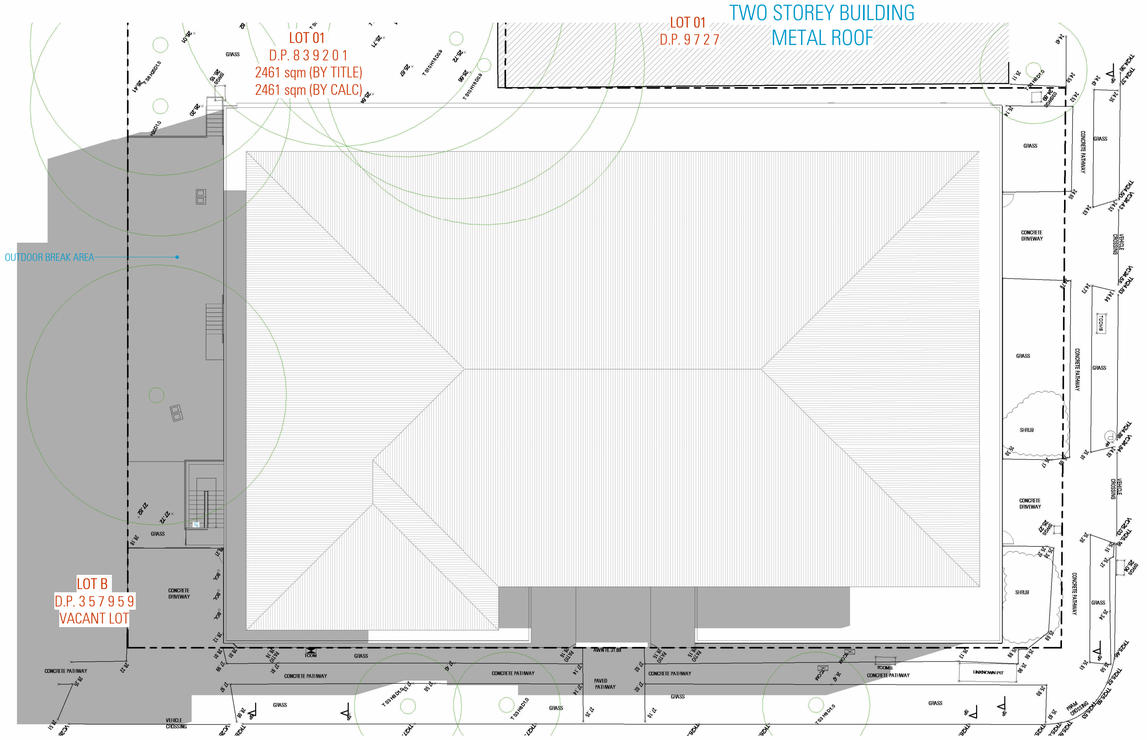
SHADOW DIAGRAMS - 21st JUNE



SHADOW DIAGRAM 9AM



SHADOW DIAGRAM 12PM



SHADOW DIAGRAM 3PM

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SHADOW DIAGRAMS - 21st JUNE

SCALE 1 : 200 / A1
ISSUE A 14.03.2024

DWG No. 24012 - 900

PROPOSED SIGNAGE

PROPOSED SIGN LOCATION

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DRAWING
PROPOSED SIGNAGE

SCALE NTS / A1
ISSUE A 14.03.2024

DWG No. 24012 - 901

ACOUSTICAL – Pertaining to the science of sound, including the generation, propagation, effects and control of both noise and vibration.

AMBIENT NOISE – The ambient noise level at a particular location is the overall environmental noise level caused by all noise sources in the area, both near and far, including road traffic, factories, wind in the trees, birds, insects, animals, etc.

AUDIBLE – means that a sound can be heard. However, there are a wide range of audibility grades, varying from "barely audible" to "just audible", "clearly audible" and "prominent". Chapter 83 of the NSW Environment Protection Authority – Environmental Noise Control Manual (1985) states:
"noise from a particular source might be offensive if it is clearly audible, distinct from the prevailing background noise and of a volume or character that a reasonable person would be conscious of the intrusion and find it annoying or disruptive".

It follows that the word "audible" in an environmental noise context means "clearly audible".

BACKGROUND NOISE LEVEL – Silence does not exist in the natural or the built-environment, only varying degrees of noise. The Background Noise Level is the average minimum dBA level of noise measured in the absence of the noise under investigation and any other short-term noises such as those caused by cicadas, lawnmowers, etc. It is quantified by the L_{A90} or the dBA noise level that is exceeded for 90 % of the measurement period (usually 15 minutes).

- **Assessment Background Level (ABL)** is the single figure background level representing each assessment period – day, evening and night (ie three assessment background levels are determined for each 24hr period of the monitoring period). Determination of the assessment background level is by calculating the tenth percentile (the lowest tenth percent value) of the background levels (L_{A90}) for each period (refer: NSW Industrial Noise Policy, 2000).
- **Rating Background Level (RBL)** as specified by the Environment Protection Authority is the overall single figure (L_{A90}) background noise level representing an assessment period (day, evening or night) over a monitoring period of (normally) three to seven days.

  The RBL for an assessment period is the median of the daily lowest tenth percentile of L_{90} background noise levels.

  If the measured background noise level is less than 30 dBA, then the Rating Background Level (RBL) is considered to be 30 dBA.

DECIBEL – The human ear has a vast sound-sensitivity range of over a thousand billion to one. The decibel is a logarithmic unit that allows this same range to be compressed into a somewhat more comprehensible range of 0 to 120 dB. The decibel is ten times the logarithm of the ratio of a sound level to a reference sound level. See also Sound Pressure Level and Sound Power Level.

Decibel noise levels cannot be added arithmetically since they are logarithmic numbers. If one machine is generating a noise level of 50 dBA, and another similar machine is placed beside it, the level will increase to 53 dBA, not 100 dBA. Ten similar machines placed side by side increase the sound level by 10 dBA, and one hundred machines increase the sound level by 20 dBA.

dBA – The human ear is less sensitive to low frequency sound than high frequency sound. We are most sensitive to high frequency sounds, such as a child's scream. Sound level meters have an inbuilt weighting network, termed the dBA scale, that approximates the human loudness response at quiet sound levels (roughly approximates the 40 phon equal loudness contour).

However, the dBA sound level provides a poor indication of loudness for sounds that are dominated by low frequency components (below 250 Hz). If the difference between the "C" weighted and the "A" weighted sound level is 15 dB or more, then the NSW Industrial Noise Policy recommends a 5 dBA penalty be applied to the measured dBA level.

dBC – The dBC scale of a sound level meter is similar to the dBA scale defined above, except that at high sound intensity levels, the human ear frequency response is more linear. The dBC scale approximates the 100 phon equal loudness contour.

EQUIVALENT CONTINUOUS NOISE LEVEL, L_{Aeq} – Many noises, such as road traffic or construction noise, vary continually in level over a period of time. More sophisticated sound level meters have an integrating electronic device inbuilt, which average the A weighted sound pressure levels over a period of time and then display the energy average or L_{Aeq} sound level. Because the decibel scale is a logarithmic ratio the higher noise levels have far more sound energy, and therefore the L_{Aeq} level tends to indicate an average which is strongly influenced by short term, high level noise events. Many studies show that human reaction to level-varying sounds tends to relate closely to the L_{Aeq} noise level.

FREE FIELD – This is a sound field not subject to significant reflection of acoustical energy. A free field over a reflecting plane is usually outdoors with the noise source resting on hard flat ground, and not closer than 6 metres to any large flat object such as a fence or wall; or inside an anechoic chamber.

FREQUENCY – The number of oscillations or cycles of a wave motion per unit time, the SI unit being the Hertz, or one cycle per second.

IMPACT ISOLATION CLASS (IIC) – The American Society for Testing and Materials (ASTM) has specified that the IIC of a floor/ceiling system shall be determined by operating an ISO 140 Standard Tapping Machine on the floor and measuring the noise generated in the room below. The IIC is a number found by fitting a reference curve to the measured octave band levels and then deducting the sound pressure level at 500 Hz from 110 decibels. Thus the higher the IIC, the better the impact sound isolation.

IMPACT SOUND INSULATION ($L_{nT,w}$) – Australian Standard AS ISO 717.2 – 2004 has specified that the Impact Sound Insulation of a floor/ceiling system be quantified by operating an ISO 140 Standard Tapping Machine on the floor and measuring the noise generated in the room below. The Weighted Standardised Impact Sound Pressure Level ($L_{nT,w}$) is the sound pressure level at 500 Hz for a reference curve fitted to the measured octave band levels. Thus the lower $L_{nT,w}$ the better the impact sound insulation.

IMPULSE NOISE – An impulse noise is typified by a sudden rise time and a rapid sound decay, such as a hammer blow, rifle shot or balloon burst.

INTRUSIVE NOISE LEVEL, L_{Aeq} – The level of noise from a factory, place of entertainment, etc. in NSW is assessed on the basis of the average maximum noise level, or the $L_{Aeq\ (15\ min)}$. This is the energy average A weighted noise level measured over any 15 minute period.

LOUDNESS – The degree to which a sound is audible to a listener is termed the loudness. The human ear perceives a 10 dBA noise level increase as a doubling of loudness and a 20 dBA noise increase as a quadrupling of the loudness.

MAXIMUM NOISE LEVEL, L_{Amax} – The rms maximum sound pressure level measured on the "A" scale of a sound level meter during a noise survey is the L_{Amax} noise level. It may be measured using either the Fast or Slow response time of the meter. This should be stated.

NOISE RATING NUMBERS – A set of empirically developed equal loudness curves has been adopted as Australian Standard AS1469-1983. These curves allow the loudness of a noise to be described with a single NR number. The Noise Rating number is that curve which touches the highest level on the measured spectrum of the subject noise. For broadband noise such as fans and engines, the NR number often equals the dBA level minus five.

NOISE – Noise is unwanted sound. Sound is wave motion within matter, be it gaseous, liquid or solid. "Noise includes sound and vibration".

NOISE REDUCTION COEFFICIENT – See: "Sound Absorption Coefficient".

OFFENSIVE NOISE - (Reference: Dictionary of the Protection of the Environment Operations Act 1997). *"Offensive Noise means noise:*

(a) that, by reason of its level, nature, character or quality, or the time at which it is made, or any other circumstances:

(i) is harmful to (or likely to be harmful to) a person who is outside the premise from which it is emitted, or

(ii) interferes unreasonably with (or is likely to interfere unreasonably with) the comfort or repose of a person who is outside the premises from which it is emitted, or

(b) that is of a level, nature, character or quality prescribed by the regulations or that is made at a time, or in other circumstances prescribed by the regulations."

PINK NOISE – Pink noise is a broadband noise with an equal amount of energy in each octave or third octave band width. Because of this, Pink Noise has more energy at the lower frequencies than White Noise and is used widely for Sound Transmission Loss testing.

REVERBERATION TIME, T_{60} – The time in seconds, after a sound signal has ceased, for the sound level inside a room to decay by 60 dB. The first 5 dB decay is often ignored, because of fluctuations that occur while reverberant sound conditions are being established in the room. The decay time for the next 30 dB is measured and the result doubled to determine the T_{60}. The Early Decay Time (EDT) is the slope of the decay curve in the first 10 dB normalised to 60 dB.

SOUND ABSORPTION COEFFICIENT, α – α Sound is absorbed in porous materials by the viscous conversion of sound energy to heat energy as the sound waves pass through it. Sound is similarly absorbed by the flexural bending of internally damped panels. The fraction of incident energy that is absorbed is termed the Sound Absorption Coefficient, α. An absorption coefficient of 0.9 indicates that 90 % of the incident sound energy is absorbed. The average α from 250 to 2000 Hz is termed the Noise Reduction Coefficient (NRC).

SOUND ATTENUATION – If an enclosure is placed around a machine, or a silencer is fitted to a duct, the noise emission is reduced or attenuated. An enclosure that attenuates the noise level by 30 dBA, reduces the sound energy by one thousand times.

SOUND EXPOSURE LEVEL (SEL) – The total sound energy of a single noise event condensed into a one second duration or in other words it is an L_{eq} (1 sec).

SOUND PRESSURE LEVEL, L_p – The level of sound measured on a sound level meter and expressed in decibels, dB, dBA, dBC, etc. $L_p = 20 \times \log (P/P_o)$ ... dB

where P is the rms sound pressure in Pascal and P_o is a reference sound pressure of 20 µPa. L_p varies with distance from a noise source.

SOUND POWER LEVEL, L_w – The Sound Power Level of a noise source is an absolute that does not vary with distance or with a different acoustic environment.

$L_w = L_p + 10 \log A$ ... dB, re: 1pW,
where A is the measurement noise-emission area in square metres in a free field.

SOUND TRANSMISSION CLASS (STC) – An internationally standardised method of rating the sound transmission loss of partition walls to indicate the decibels of noise reduction of a human voice from one side to the other. (Refer: Australian Standard AS1276 – 1979)

SOUND TRANSMISSION LOSS – The amount in decibels by which a random sound is reduced as it passes through a sound barrier. A method for the measurement of airborne Sound Transmission Loss of a building partition is given in Australian Standard AS1191 - 2002.

STATISTICAL EXCEEDENCE SOUND LEVELS, L_{A90}, L_{A10}, L_{A1}, etc – Noise which varies in level over a specific period of time (usually 15 minutes) may be quantified in terms of various statistical descriptors:

The L_{A90} is the dBA level exceeded for 90 % of the time. In NSW the L_{A90} is measured over periods of 15 minutes, and is used to describe the average minimum or background noise level.

The L_{A10} is the dBA level that is exceeded for 10 % of the time. In NSW the L_{A10} measured over a period of 10 to 15 minutes. It was until recently used to describe the average maximum noise level, but has largely been replaced by the L_{Aeq} for describing level-varying noise.

The L_{A1} is the dBA level that is exceeded for 1 % of the time. In NSW the L_{A1} may be used for describing short-term noise levels such as could cause sleep arousal during the night.

STEADY NOISE – Noise, which varies in level by 6 dBA or less, over the period of interest with the time-weighting set to "Fast", is considered to be "steady". (Refer AS 1055.1 1997)

WEIGHTED SOUND REDUCTION INDEX, R_w – This is a single number rating of the airborne sound insulation of a wall, partition or ceiling. The sound reduction is normally measured over a frequency range of 100 to 3,150 Hertz and averaged in accordance with ISO standard weighting curves (Refer AS/NZS 1276.1:1999).

Internal partition wall $R_w + C$ ratings are frequency weighted to simulate insulation from human voice noise. The $R_w + C$ is always similar in value to the STC rating value. External walls, doors and windows may be $R_w + C_{tr}$ rated to simulate insulation from road traffic noise. This is normally a lower number than the STC rating value.

WHITE NOISE – White noise is broadband random noise whose spectral density is constant across its entire frequency range. The sound power is the same for equal bandwidths from low to high frequencies. Because the higher frequency octave bands cover a wider spectrum, white noise has more energy at the higher frequencies and sounds like a hiss.