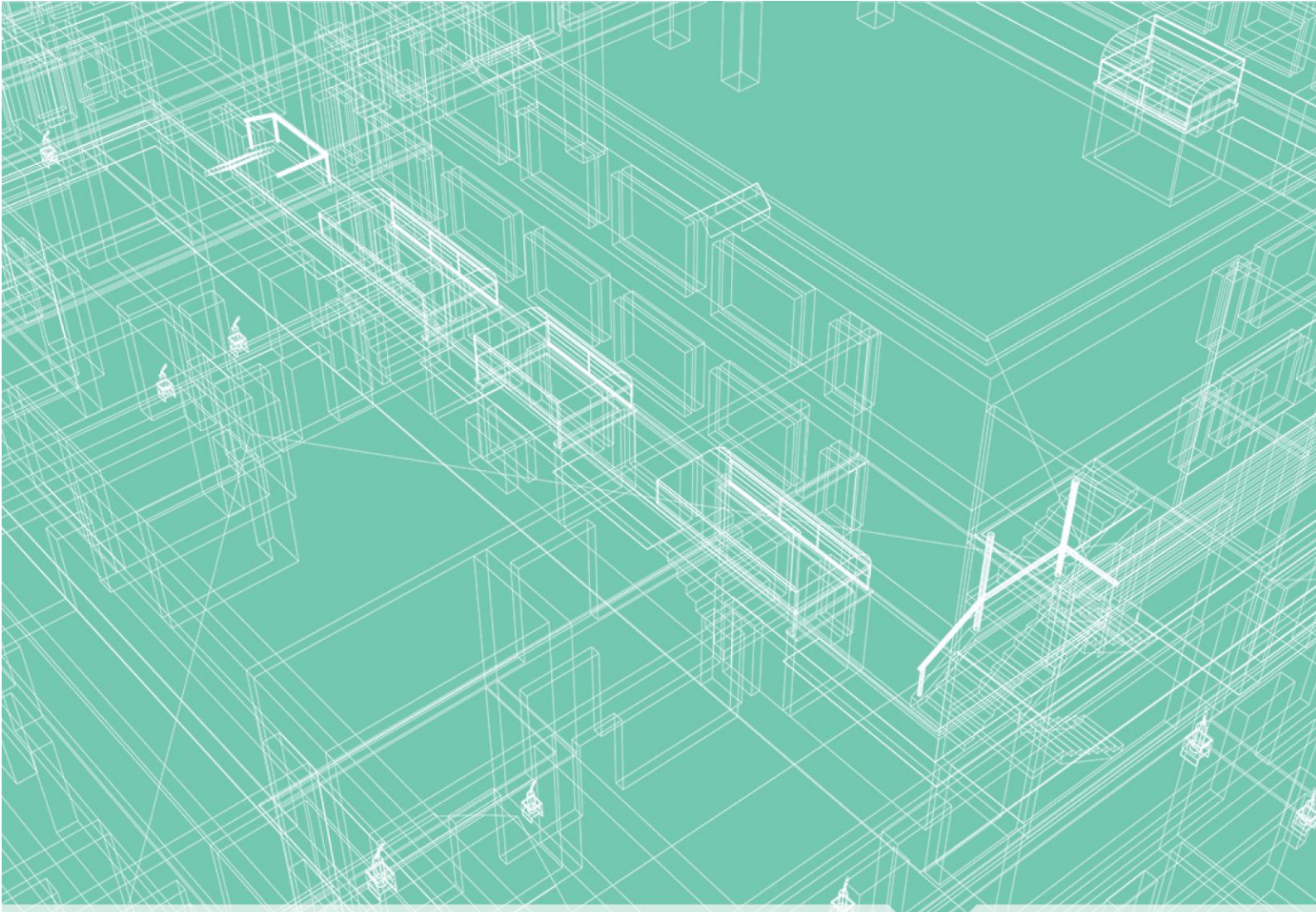

NOISE IMPACT ASSESSMENT FOR DEVELOPMENT APPLICATION

UNIVERSITY OF NSW FACULTY OF MEDICINE BIOMEDICAL SCIENCE CENTRE

JHA

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DOCUMENT CONTROL SHEET

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CONTENTS

1 INTRODUCTION

JHA Consulting Engineers has been engaged by the University of NSW (UNSW), to provide acoustic engineering services for the Development Application of a proposed stand-alone Biomedical Science Centre (BSC) in Wagga Wagga. The development will form part of the Rural Clinical School located within the Wagga Wagga Base Hospital adjacent to the site.

The proposed development consist of the following:

- Administration
- Support & central Services
- Student Facilities
- Academic and Professional Staff Facilities
- Tuition Areas
- Wet Laboratory Facilities
- Simulation & Clinical Skills Laboratory Suite
- Bio-Science Dry Laboratory

An acoustic assessment has been undertaken and is detailed in this report along with the findings. It has been prepared as part of the Development Application to be submitted to Wagga Wagga City Council.

The objectives of this acoustic assessment are:

- Identify noise sensitive receivers that will potentially be affected by the operation of the proposed development.
- Carry out noise surveys to determine existing ambient and background noise levels on site.
- Establish the appropriate noise level and vibration criteria in accordance with the relevant standards, guidelines and legislation for the following noise emissions:
  - Mechanical plant from the development to the surrounding receivers.
  - Traffic generation on the surrounding road network
  - Loading dock activities
- Determine whether the relevant criteria can be achieved based on proposed operations. Where applicable, provide recommendations for any necessary acoustic control measures that will need to be incorporated into the development or use in order to ensure with the assessment criteria.

This report provides:

- A statement of compliance with the relevant statutory criteria for the use of the proposed development within the vicinity of the nearest potentially affected receivers.
- Recommendations for noise mitigation measures for the proposed development in order to meet the relevant criteria when compliance is not achieved.

The following documentation has been used for the preparation of this report:

- Architectural drawings of the proposed development prepared by Budden Nangle Michael & Hudson Architects
- Noise data collected on site through the use of noise loggers and a hand held spectrum analyser.
- Traffic Impact Assessment prepared by EMM dated 16 April 2020

This document and related work has been prepared following JHA Consulting Engineers Quality and Environmental Management Systems, which are based on AS/NZS ISO 9001:2016 and ISO 14001:2016 respectively.

2 DESCRIPTION OF THE PROPOSAL

The proposed new Biomedical Science Centre (BSC) in Wagga Wagga is located on a block of land which is bound by the Wagga Wagga Base Hospital to the South and West, Edward Street (and Sturt Highway) to the North, and a hotel and residences to the East. Directly across Edward Street to the North is predominantly residences, and South-East of the site are residential properties. Refer to Figure 1 for the site location and nearest noise sensitive receivers and measurement locations.

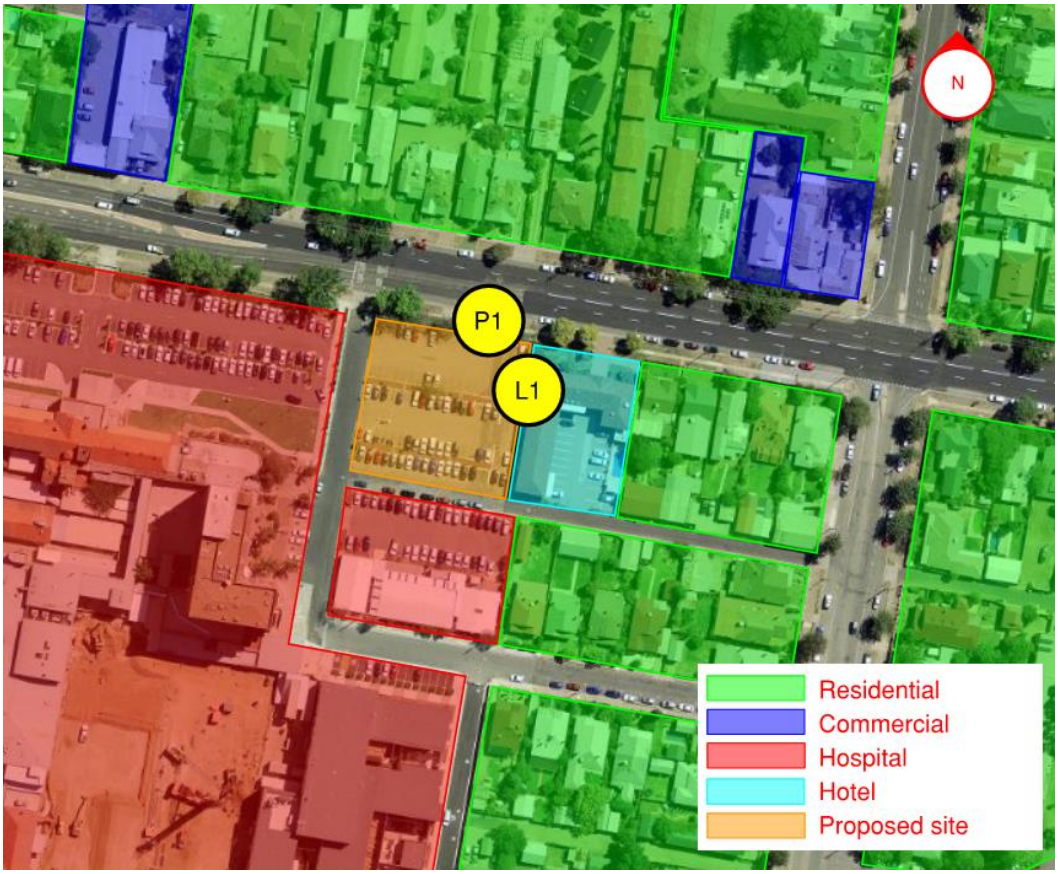


Figure 1: Aerial view of site showing the location of the site and receivers

The above noise sensitive receivers represent the worst-case scenario, therefore, compliance at these locations will result in compliance at all other affected receiver locations for external noise emissions.

2.1 ACOUSTIC MATTERS

The following acoustic matters have been identified in relation to the proposed development:

- Noise intrusion from vehicle movements on Edward Street into the sensitive spaces
- External noise emissions from mechanical services to surrounding sensitive receivers
- External noise emissions from substation
- Increase in traffic noise on the road networks due to additional generated vehicles

There items have been addressed in this report.

3 SITE MEASUREMENTS

3.1 GENERAL

Attended and unattended noise surveys were conducted at the locations shown in Figure 1 in order to establish the ambient and background noise levels of the site and surrounds. Noise surveys have been carried out in accordance with the method described in the AS/NZS 1055:2018 *'Acoustics – Description and measurement of environmental noise'*.

3.2 ATTENDED NOISE MONITORING

Short-term noise monitoring was carried out on the 3rd of April 2020 at position P1 to obtain third-octave band traffic noise levels that the site is exposed to. The measurement was carried out with a NTI XL-2 hand-held Sound Level Meter (SLM) (Serial Number A2A-13742-E0). The calibration of the SLM was checked before and after each use and no deviations were recorded.

The SLM microphone was mounted 1.5 metres above the ground and a windshield was used to protect the microphone. Measurements were undertaken in the free-field – i.e. more than 3 metres away from any building façade or vertical reflective surface.

Noise was generally dominated by vehicle movements along Edward Street. A summary of the results of the short-term noise monitoring are shown in Table 1.

Measurement location	*Date/time*	*Measured Noise Levels (15mins) dB(A)*			*Comments*
		L_{Aeq}	L_{Amax}	L_{A90}	
P1	03/04/2020 9:09am	65	80	54	Vehicle movements and construction noise from new hospital

Table 1: Results of the short-term noise monitoring.

3.3 UNATTENDED NOISE MONITORING

A noise logger was installed at the location L1 shown in Figure 1 which was secure and considered to be representative of the typical ambient and background noise levels for the area. The noise monitoring was carried out from 27th of March to 3rd of April 2020 with a Rion NL-52 noise logger (Serial Number 01254316).

The noise logger recorded L_{A1}, L_{A10}, L_{Aeq} and L_{A90} noise parameters at 15-minute intervals during the measurement period. The calibration of the noise logger was checked before and after use and no deviations were recorded. The noise logger microphone was mounted 1.5 meters above the ground and a windshield were used to protect the microphone.

Weather conditions were monitored for the duration of the noise surveys and were typically calm and dry with some wind events having been noted to occur during the measurement periods. As stated in the NSW NPI methodology, any data likely to be affected by rain, wind or other extraneous noise has been excluded from the calculations (shadowed in the Appendix A graphs).

The detailed results of the long-term noise monitoring are presented graphically in Appendix A. The results of the unattended noise monitoring are summarised in Table 2 as the Rating Background Level (RBL) noise levels for day, evening and night-time periods – as per NSW NPI methodology.

Location	*LAeq-period dB(A)*			*Rating Background Levels (RBL), dB(A)*		
	Day 7am-6pm	*Evening 6pm-10pm*	*Night 10pm-7am*	*Day 7am-6pm*	*Evening 6pm-10pm*	*Night 10pm-7am*
L1	67	64	61	62	54	45

Table 2: Results of long-term noise monitoring.

4 RELEVANT NOISE STANDARDS AND GUIDELINES

4.1 STANDARDS AND GUIDELINES

The following standards and guidelines are considered relevant to the project and have been referenced in developing the project noise level criteria.

Planning:

- City of Wagga Wagga Local Environment Plan 2010 (CWW-LEP 2010).
- City of Wagga Wagga Development Control Plan 2010 (CWW-DCP 2010).

Internal Noise Intrusion

- AS/NZS 2107:2016 Acoustics – Recommended Design Sound Levels and Reverberation Times for Building Interiors

External Noise Emissions:

- Environmental Planning and Assessment (EP&A) Act 1979.
- Protection of the Environmental Operations (POEO) Act 1997.
- NSW Department of Environment Climate Change and Water (DECCW) Noise Guideline for Local Government (NGLG) 2013.
- NSW Environmental Protection Authority (EPA) Noise Policy for Industry (NPI) 2017.
- NSW DECCW Road Noise Policy (RNP) 2011.

4.2 PROTECTION OF THE ENVIRONMENTAL OPERATIONS (POEO) ACT 1997

The Protection of the Environment Operations (POEO) Act 1997 has the objective to protect, restore and enhance the quality of the NSW environment. Abatement of noise pollution is underpinned by the definition of "offensive noise" as follows:

"...

(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 is likely to be harmful to) a person who is outside the premises 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.

..."

Noise Guide for Local Government (NGLG) 2013, provides a consideration checklist to determine an "offensive noise".

4.3 ENVIRONMENTAL PLANNING AND ASSESSMENT (EP&A) ACT 1979

The Environmental Planning and Assessment Act 1979 (EP&A Act) provides the regulatory framework for the protection of the environment in NSW. The EP&A Act is relevantly about planning matters and ensuring that "environmental impact" associated with the proposed development is properly considered and reasonable before granting development consent to develop.

The assessment of "environmental impact" relies upon the identification of acceptable noise criteria which may be defined in a Development Control Plan, or derived from principles using guidelines like NSW EPA Noise Policy for Industry (NPI 2017) or Noise Guide for Local Government (NGLG 2013).

4.4 INTERNAL NOISE LEVELS

4.4.1 AUSTRALIAN STANDARD 2107:2016

In the absence of any mandatory noise criteria for internal noise levels, AS/NZS 2107:2016 provides recommended internal noise levels for the internal spaces applicable to the proposed development. Refer to Table 3 for the recommended internal noise goals due to external noise sources such as traffic.

Type of occupancy / activity	*Design sound level ($L_{Aeq,t}$) range, in dB(A)*
Office areas	35-45
Laboratories working	40-50
Laboratories teaching	35-45
Lecture rooms up to 50 seats	30-35
Lecture theatres without speech reinforcement	30-35
Lecture theatres with speech reinforcement	30-40
Conference rooms	35-40
Professional and Administrative offices	35-40
Interview/Counselling rooms	40-45
Surgeries/treatment/procedures room	40-45

Table 3: Internal noise level ($L_{Aeq,t}$) range as per AS2107:2016.

4.5 EXTERNAL NOISE EMISSIONS

4.5.1 CITY OF WAGGA WAGGA COUNCIL LEGISLATION

Relevant Planning Documents of City of Wagga Wagga Council Legislation have been reviewed for any noise requirement or criteria.

City of Wagga Wagga Development Control Plan has been reviewed and no specific requirements relating to external noise emissions have been found.

4.5.2 NSW EPA NOISE POLICY FOR INDUSTRY

The NSW EPA Noise Policy for Industry (NPI) 2017 assesses noise from industrial noise sources - scheduled under the POEO. Mechanical noise from the development shall be addressed following the recommendations in the NSW NPI.

The assessment is carried out based on the existing ambient and background noise levels addressing the following:

- Intrusiveness Criteria, to control intrusive noise into nearby sensitive receivers.
- Amenity Criteria, to maintain the noise level amenity for particular land uses.

These criteria are established for each assessment period (day, evening and night) and the more stringent sets the Project Noise Trigger Level (PNTL's).

4.5.2.1 Intrusiveness Criteria

The NSW NPI defines the intrusiveness criteria as follows:

"The intrusiveness of an industrial noise source may generally be considered acceptable if the level of noise from the source (represented by the L_{Aeq} descriptor), measured over a 15 minute period, does not exceed the background noise level by more than 5 dB when beyond a minimum threshold."

Based on the intrusiveness criteria definition and the measured background noise levels on site, Table 4 shows the intrusiveness criteria for the residential noise sensitive receivers.

Indicative Noise Amenity Area	*Period*	*Rating Background Level, dB(A)*	*Intrusiveness Criteria, $L_{Aeq,15min}$ dB(A)*
Residential (Zone R3)	Day	62	67
	Evening	54	59
	Night	45	50

Table 4: Determination of the intrusiveness criterion for residential noise sensitive receivers.

4.5.2.2 Amenity Criteria

The NSW NPI states the following to define the amenity criteria:

"To limit continuing increases in noise levels from application of the intrusiveness level alone, the ambient noise level within an area from all industrial noise sources combined should remain below the recommended amenity noise levels specified in Table 2.2 where feasible and reasonable. The recommended amenity noise levels will protect against noise impacts such as speech interference, community annoyance and some sleep disturbance."

Based on the amenity criteria definition, Table 5 shows the amenity criteria for the noise sensitive receivers around site.

Indicative Noise Amenity Area	*Period*	*Recommended Amenity Noise Level (L_{Aeq}), dB(A)*	*Amenity Criterion, $L_{Aeq,15min}$ dB(A)*
Residential (Suburban R3)	Day	55	53 (55-5+3)
	Evening	45	43 (45-5+3)
	Night	40	38 (40-5+3)
Hotel	Day	60	58 (60-5+3)
	Evening	50	48 (50-5+3)
	Night	45	43 (45-5+3)
Hospital	Noisiest 1-hour period when in use	35 (Internal) 50 (External)	48 (50-5+3) (External)
Commercial	When in use	65	63 (65-5+3)

Table 5: Determination of the amenity criterion for noise sensitive receivers.

4.5.2.3 Project Noise Trigger Levels

The PNTL's are shown in Table 6 and have been obtained in accordance with the requirements of the NSW NPI. These shall be assessed to the most affected point on or within the noise sensitive receiver boundary.

Indicative Noise Amenity Area	*Period*	*Intrusiveness Criterion, $L_{Aeq,15min}$ dB(A)*	*Amenity Criterion, $L_{Aeq,15min}$ dB(A)*
Residential	Day	67	53
	Evening	59	43
	Night	50	38
Hotel	Day	-	58
	Evening	-	48
	Night	-	43
Hospital	Noisiest 1-hour period when in use	-	48 (External)
Commercial	When in use	-	63

Table 6: Determination of PNTL's (light grey highlight) for noise sensitive receivers.

4.5.3 NSW ROAD NOISE POLICY (RNP)

Road traffic noise impact is assessed in accordance with the NSW OEH Road Noise Policy (RNP) 2011. The NSW Road Noise Policy (RNP) establishes criteria for traffic noise from:

- Existing roads,
- New road projects,
- Road development projects,
- New traffic generated by developments.

For existing residences and other sensitive land uses affected by additional traffic on existing roads generated by land use developments, any increase in the total traffic noise level should be limited to 2dB above the existing noise levels. An increase of up to 2dB represents a minor impact that is considered barely perceptible to the average person.

In cases where existing traffic noise levels are above the noise assessment criteria, the primary objective is to reduce these through feasible and reasonable measures to meet the assessment criteria.

5 NOISE INTRUSION ASSESSMENT

A noise assessment has been conducted based on the external noise sources impacting upon the facades of the proposed new facility. The assessment has been conducted in order to provide recommendations on the performance of the glazing in order to meet the internal noise levels as per AS2107:2016, as the glazing is generally the weakest element of the facade.

The dominant external noise source was considered to be from Edward Street vehicle movements, and noise levels for the assessment were obtained through a combination of noise logger data and attended measurements.

Refer to Figure 2 to Figure 4, and Table 7 for proposed glazing thicknesses to the sensitive spaces within the development, in order to meet AS2107 recommended internal noise levels. The minimum Rw rating has been provided, which includes the glass and frame together. A typical glazing configuration has been provided for each Rw rating. Note that the glazing is for minimum required for acoustic purposes only, and other requirements need to be met.

Weighted Sound Reduction Index (R_w)	*Fixed Single Glazing System*	*Fixed Double Glazing System*
32	6.38mm Laminated	6mm/12mm air gap/6mm
35	10.38mm Laminated	6mm/12mm air gap/10mm

Table 7: Recommended glazing for residences

These glazing recommendations are preliminary and should be used as an estimate only. Further analysis needs to be conducted during detailed design to ensure the internal noise goals are met.

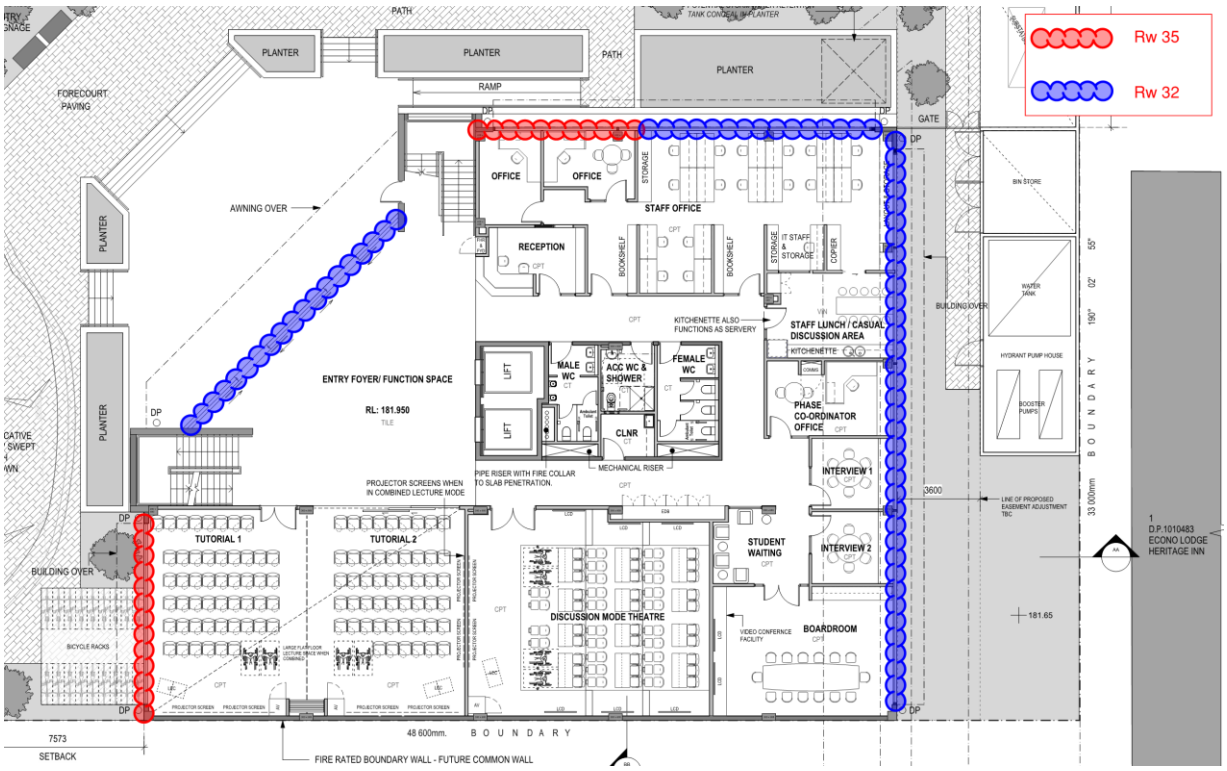


Figure 2: Ground floor glazing

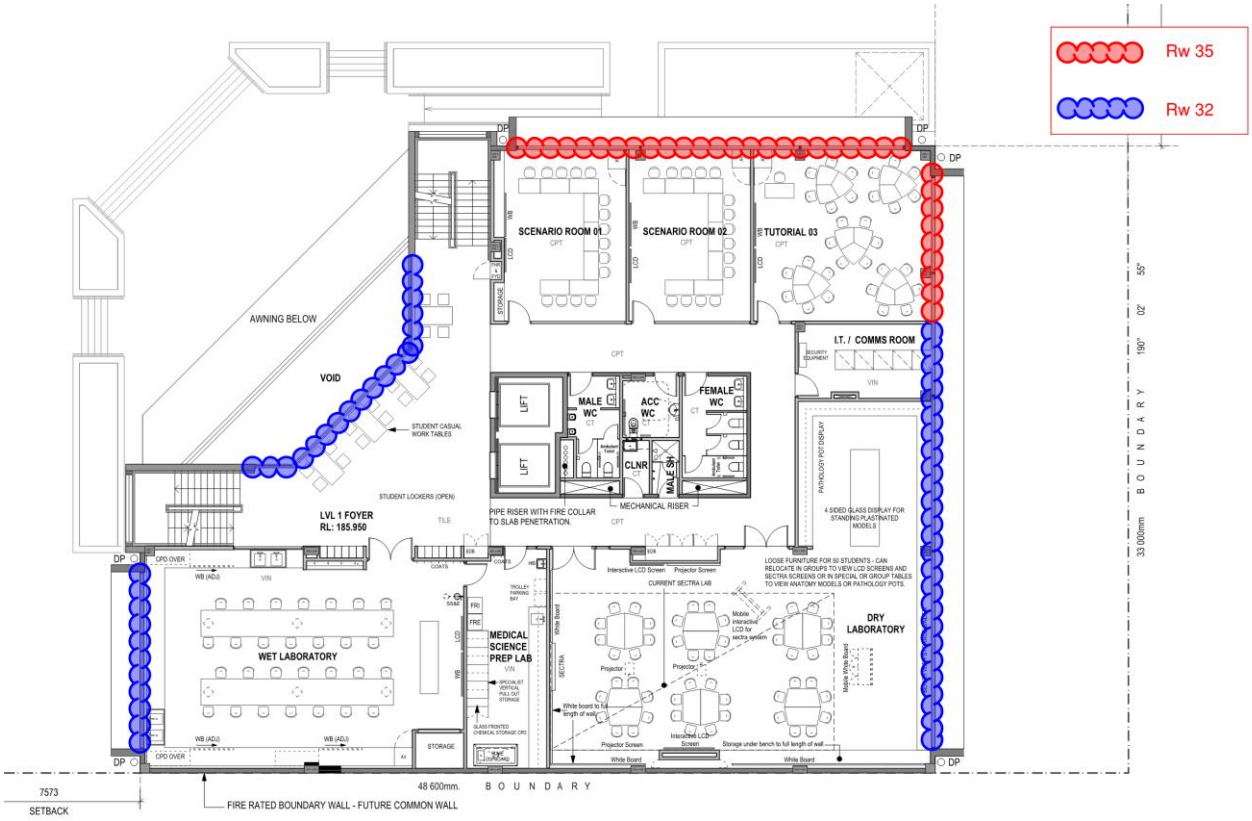


Figure 3: Level 1 glazing

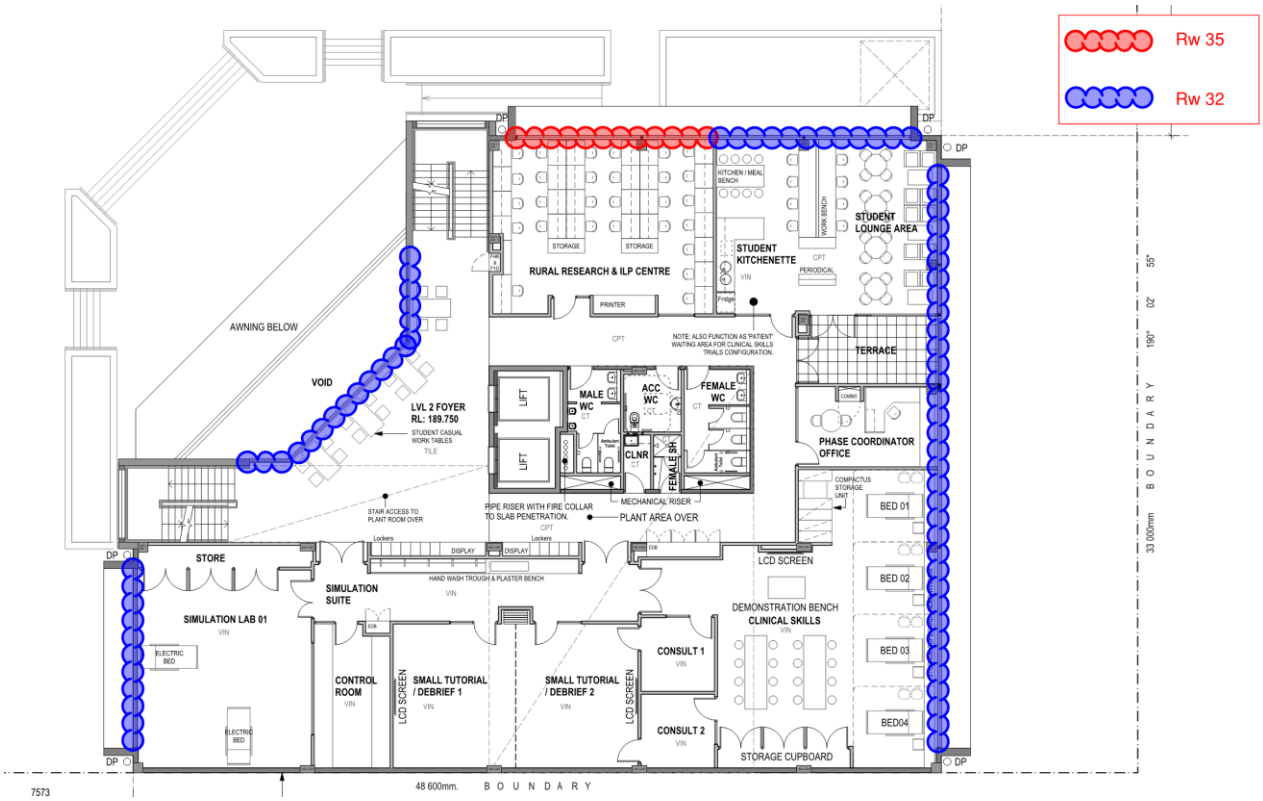


Figure 4: Level 2 glazing

6 NOISE EMISSIONS ASSESSMENT

6.1 EXTERNAL MECHANICAL PLANT

External mechanical plant noise should be controlled to ensure external noise emissions are not intrusive and do not impact on the amenity of the noise sensitive receivers. At this stage, a preliminary mechanical plant selection has been made; therefore it is not possible to undertake a detailed assessment. A preliminary noise assessment of the proposed mechanical services has been undertaken. Noise controls will need to be considered during the design process to ensure that the cumulative noise levels from plant to the nearest sensitive receivers meets the noise level criteria. Usual design noise controls that may need to be implemented will typically include, but are not limited to:

- Strategic location and selection of plant to ensure the cumulative noise levels at the receiver boundaries is met.
- Selection of appropriate quiet plant.
- Silencers on selected mechanical plant.

The preliminary mechanical noise sources for the proposed development include air-conditioning equipment and exhaust and supply fans used to service the internal spaces. These noise sources have been used to predict the worst-case scenario noise impact of the proposed use of the site to the surrounding receivers. The assessment has been conducted with exhaust fans running during the night, but the VRVs and AHU not operating at night time between 10pm and 7am.

Note that emergency services such as booster pumps are located in a hydrant pump house, and are not assessed under this criteria as they are emergency operation. There is not expected to be any noise amenity issues associated with this, but should be reviewed during detailed design phases when details are known regarding the pump house.

The main mechanical sources will be located of a roof top plant room, and will include the following:

- VRV units
- Air Handling Unit
- Laboratory, Kitchen and toilet exhaust fans
- Outside air fans

The preliminary mechanical plant and their associated sound power levels are listed in Table 8.

ID	*Sound Power Level, dB re 1pW*								
	Overall dB(A)	*Octave Band Centre Frequency, Hz*							
		63	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*
VRVs	85	84	84	87	85	77	73	70	84
AHU (radiated SWL)	83	89	83	81	78	74	64	60	60

Table 8: Sound power levels of preliminary external mechanical plant.

Based on the implementation of the equipment with the sound power levels above, and the implementation of acoustic mitigation measures, the noise emissions are expected to meet the requirements of the NSW NPI to the surrounding receivers.

6.1.1 MITIGATION MEASURES

The following acoustic mitigation measures are required to meet the noise emissions limits:

- Install an acoustic barrier around the rooftop plant area as shown in Figure 5. The barrier is to extend at least 300mm above the top of the VRVs, and also 100mm above the top of the AHU when installed (the taller of the two is to dictate the barrier height), and be constructed from a material with a surface density no less than 22kg/m^2, such as 12mm fibre cement. Where acoustic louvres are required, they shall be equivalent to ACRAN 400. Refer to Table 9 for the minimum insertion loss values.
- VRVs must be run on a low noise mode at any time between 10pm and 7am, with an overall reduction in noise of at least 8dB.

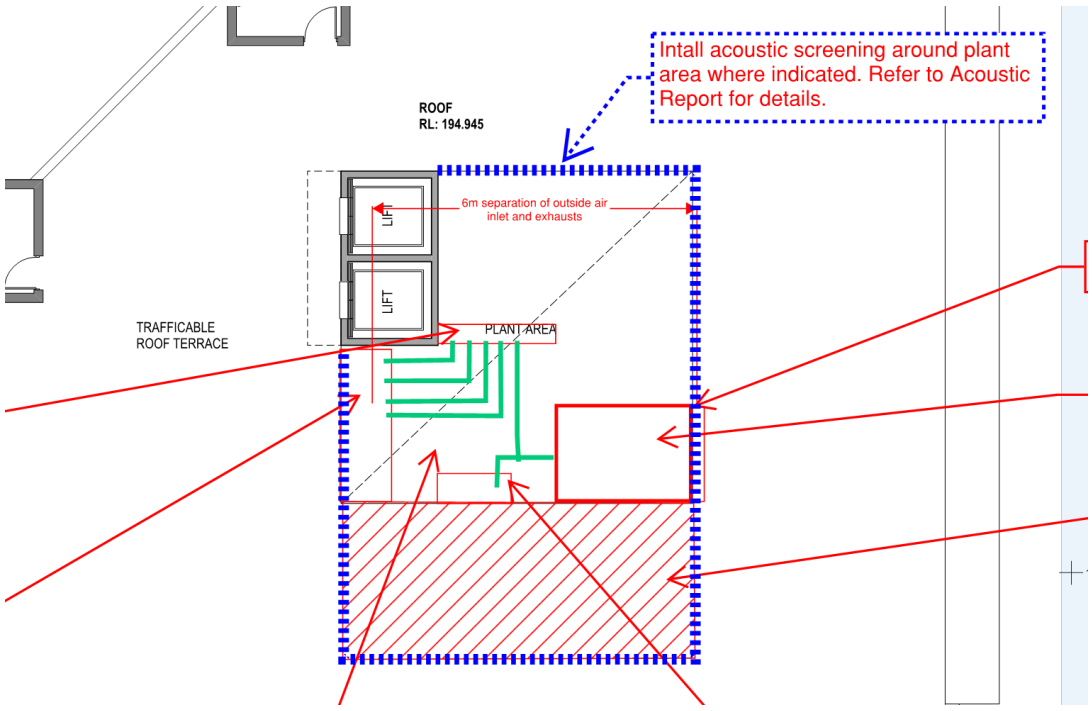


Figure 5: Rooftop plant acoustic barrier

Acoustic Louvre	*Insertion Loss (IL) dB*						
	125	*250*	*500*	*1k*	*2k*	*4k*	*8k*
ACRAN 400	9	14	19	21	24	24	24

Table 9: Acoustic louvre insertion loss

Further to the recommendations above, typical design noise controls that may need to be implemented will typically include, but are not limited to:

- Selection of appropriate quiet plant.
- Acoustic noise control measures to be put in place to minimise noise impacts such as:
  - In-duct attenuation
  - Noise enclosures as required
  - Sound absorptive panels

Acoustic assessment of all mechanical plant shall continue during the detailed design phase of the project in order to confirm any noise control measures to achieve the relevant noise criteria at the nearest noise sensitive receivers

6.2 LOADING BAY

The proposed BSC has a loading bay located on the West side of the site. An assessment of noise produced from the loading bay to the nearest sensitive receiver has been conducted, using typical loading dock activities and a single medium rigid vehicle, within any 15 minute period. There is no on-site waste collection, this is proposed to occur kerb side on Sturt Highway, and therefore this has not been included in the assessment.

The assessment has calculated noise from the movement of an MRV moving to and from the loading dock, including door slams and engine starts/stops, and typical unloading/loading noise levels at the location of the loading bay. It is proposed to conduct loading bay deliveries between 7am and 6pm, during the day time. Refer to Table 10 for the predicted noise levels.

There is no specific criteria to address noise from loading bays, so the intrusiveness criteria from the NSW NPI has been adopted, as background + 5dB is a typical approach to determine if noise is intrusive.

Calculation	*Residential Receivers*
Sound Power Level loading/unloading dB(A)	99
Sound Power Level MRV entering/exiting dB(A)	101
Resulting Sound Pressure Level at Residential Receiver ($L_{Aeq\ 15min}$ dB(A))	50
Intrusiveness Noise Criteria Evening Compliance	59 / Yes

Table 10: Noise impact assessment of loading dock

Based on the results of the noise assessment, the predicted noise levels to the nearest most affected residential receivers would comply with the intrusiveness day time criteria from the NSW NPI. It is recommended to operate the loading bay during day time or evening only to reduce the potential for noise impacts.

6.3 SUBSTATION

The noise emissions of the proposed substation have been predicted to the nearest most affected receiver, in order to determine if the noise levels will meet the NSW NPI noise limits. The most affected receiver is the Hotel to the East.

The noise assessment has been based on the following information:

- Substation location as shown on the Architectural drawings
- Noise information provided in the Ausgrid EGN-422 noise calculator using a 1000kVA transformer.

Refer to Table 11 for the results of the noise assessment conducted for the night time.

Calculation	*Overall A-weighted noise level, in dB(A)*
1000kVA Substation	64
Distance attenuation and directivity, dB	-25
L_{Aeq} Noise Level resulting at the nearest receiver	39
NPI Criteria Night-time / Complies (Yes/No)	43 / Yes

Table 11: Substation noise predictions

Based on the results of the assessment, noise emissions from the substation will meet the NSW NPI limits to the surrounding receivers.

6.4 TRAFFIC GENERATION

Traffic generated from the use of the proposed development has the potential increase road traffic noise levels, particularly during peak hour movements to and from the development. The traffic impact report for the proposed development prepared by EMM provides an analysis of the additional traffic from the proposed development.

As noted in Section 4.5.3, when considering land use redevelopment and the impact on sensitive land uses (residential / hospitals /) the NSW Road Noise Policy (RNP) states that an increase up to 2.0dB in relation to existing noise levels is anticipated to be insignificant.

The proposed development does not have on-site car parking and based on the traffic report only some students and staff would use a vehicle and other means of transportation are expected. Vehicles would use existing on-street car parking. The traffic report states that there is expected to be an additional car parking demand in the locality of 15 cars.

As per information received, the increase of traffic noise levels due to the proposed development, will be less than 2dB. Therefore, the traffic increase due to the proposed development will not result in any noticeable change in traffic noise levels and is expected to meet the NSW Road Noise Policy recommendations.

7 SUMMARY AND CONCLUSIONS

A noise assessment has been carried out for the proposed new Biomedical Science Centre for the UNSW located in Wagga Wagga. This report forms part of the documentation package to be submitted to Wagga Wagga City Council as part of the Development Application.

This report establishes relevant noise level criteria, details the acoustic assessment and provides comments and recommendations for the proposed development.

The noise assessment has adopted methodology from relevant guidelines, standards and legislation to assess noise impact. The noise impacts have been predicted at the nearest noise sensitive receiver boundaries, taking in account distance attenuation, building reflections and directivity.

At this stage, a preliminary mechanical plant selection has been made. Therefore, a detailed noise assessment has not been able to be carried out. However, a preliminary noise impact assessment has been carried out, based on the location of the mechanical plantroom on the roof of the building and the overall noise data provided. Acoustic screening is required around the rooftop plant as per the details in this report to meet the noise emissions criteria to surrounding receivers.

A noise assessment has been conducted based on the proposed loading bay. Based on the results of the assessment, the movement of a single MRV within a 15 minute period to conduct loading/unloading is not expected to exceed the day or evening intrusiveness criteria from the NSW NPI to residential receivers.

Traffic noise impact due to the likely generated vehicle movements of the proposed development – based on the information provided in the traffic report – is anticipated to be insignificant, as the noise levels will not increase more than 2dB at the sensitive noise receivers, therefore compliance with the NSW RNP should be met.

The information presented in this report shall be reviewed if any modifications to the features of the development specified in this report occur, including and not restricted to selection of mechanical plant, modifications to the building and introduction of any additional noise sources.

Based on the information presented in this report, relevant objectives will be satisfied and therefore approval is recommended to be granted.

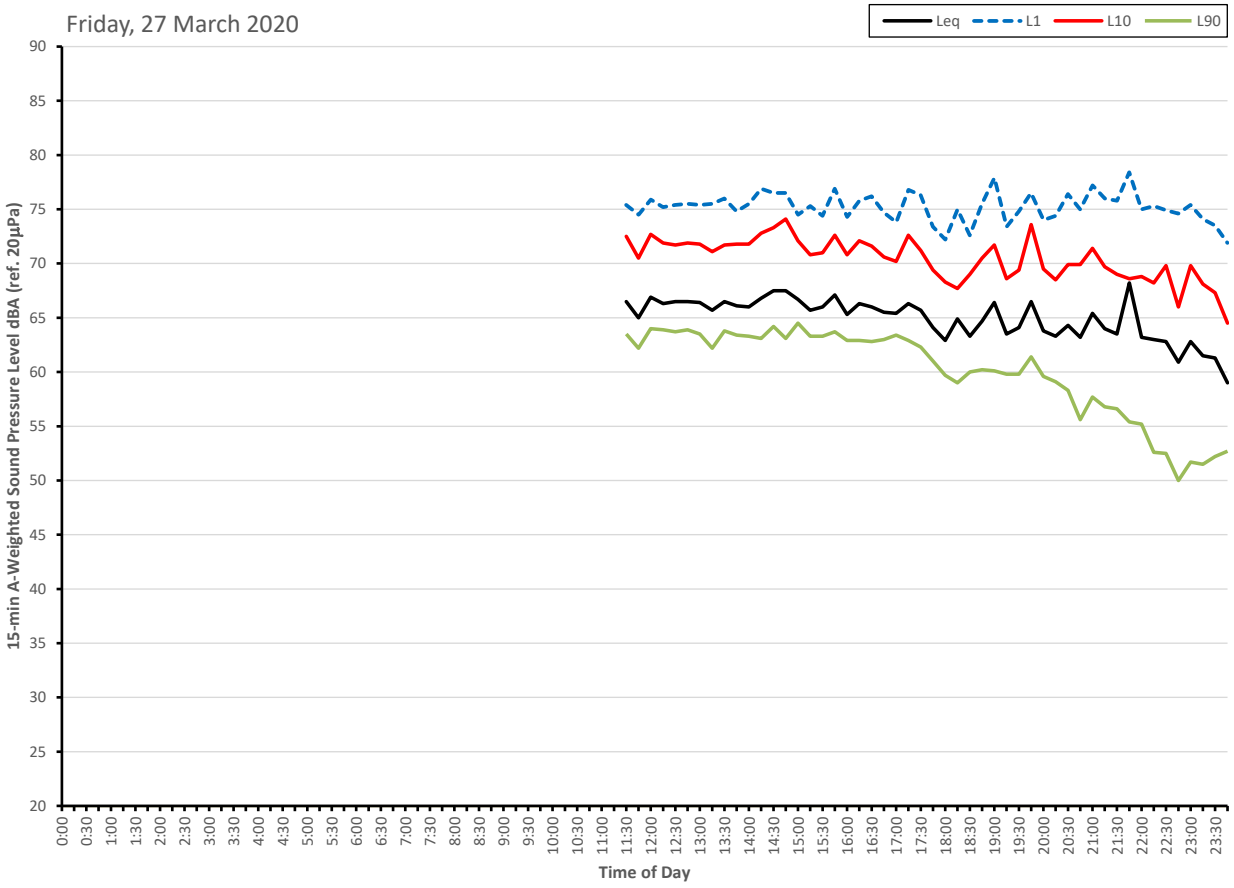
APPENDIX A: LONG TERM NOISE MONITORING

L_{A1} – The L_{A1} level is the noise level which is exceeded for 1% of the sample period. During the sample period, the noise level is below the L_{A1} level for 99% of the time. This measure is commonly referred to as the maximum noise level.

L_{A10} – The L_{A10} level is the noise level which is exceeded for 10% of the sample period. During the sample period, the noise level is below the L_{A10} level for 90% of the time. The L_{A10} is a common noise descriptor for environmental noise and road traffic noise. This measure is commonly referred to as the average maximum noise level.

L_{A90} – The L_{A90} level is the noise level which is exceeded for 90% of the sample period. During the sample period, the noise level is below the L_{A90} level for 10% of the time. This measure is commonly referred to as the background noise level.

L_{Aeq} – The equivalent continuous sound level (L_{Aeq}) is the energy average of the varying noise over the sample period and is equivalent to the level of a constant noise which contains the same energy as the varying noise environment. This measure is also a common measure of environmental noise and road traffic noise.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Leq
L1
L10
L90
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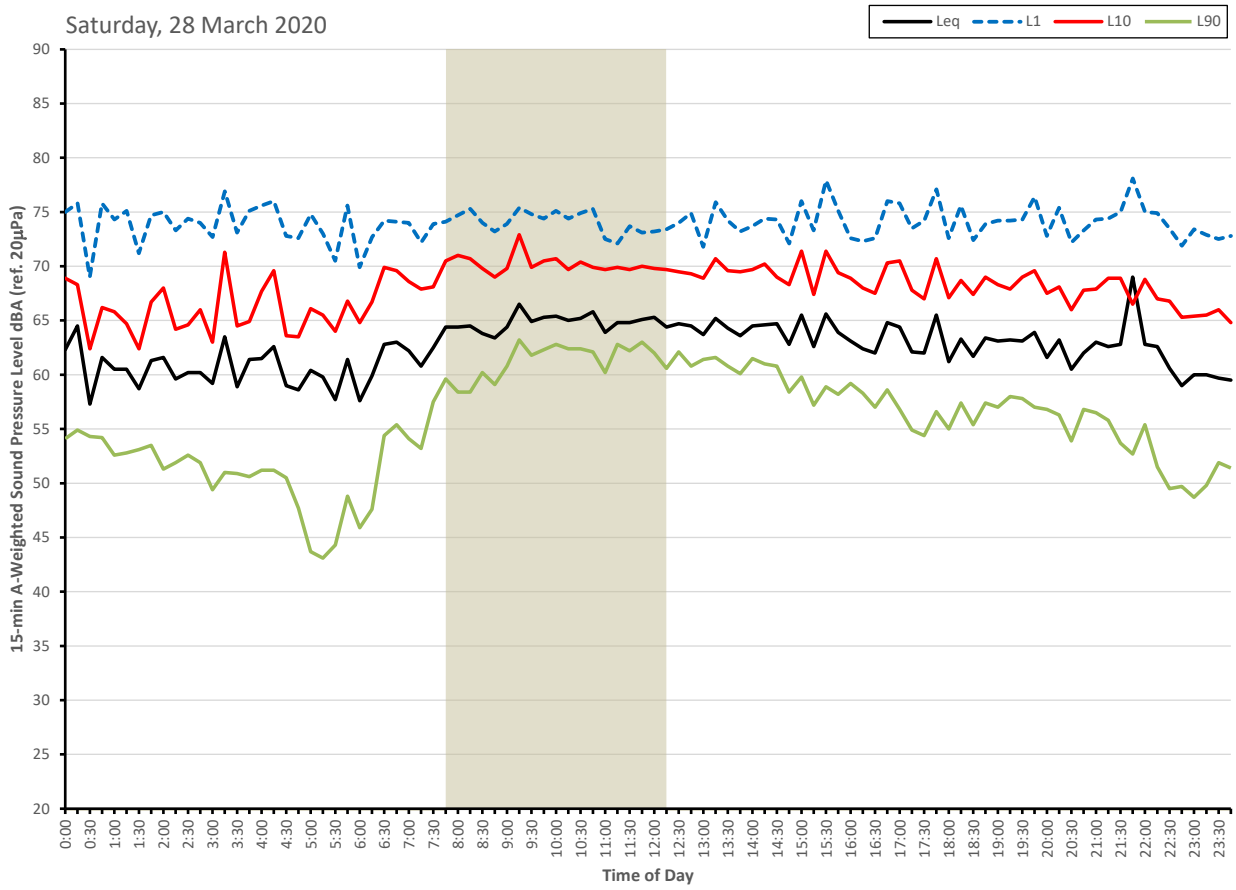
Time of Day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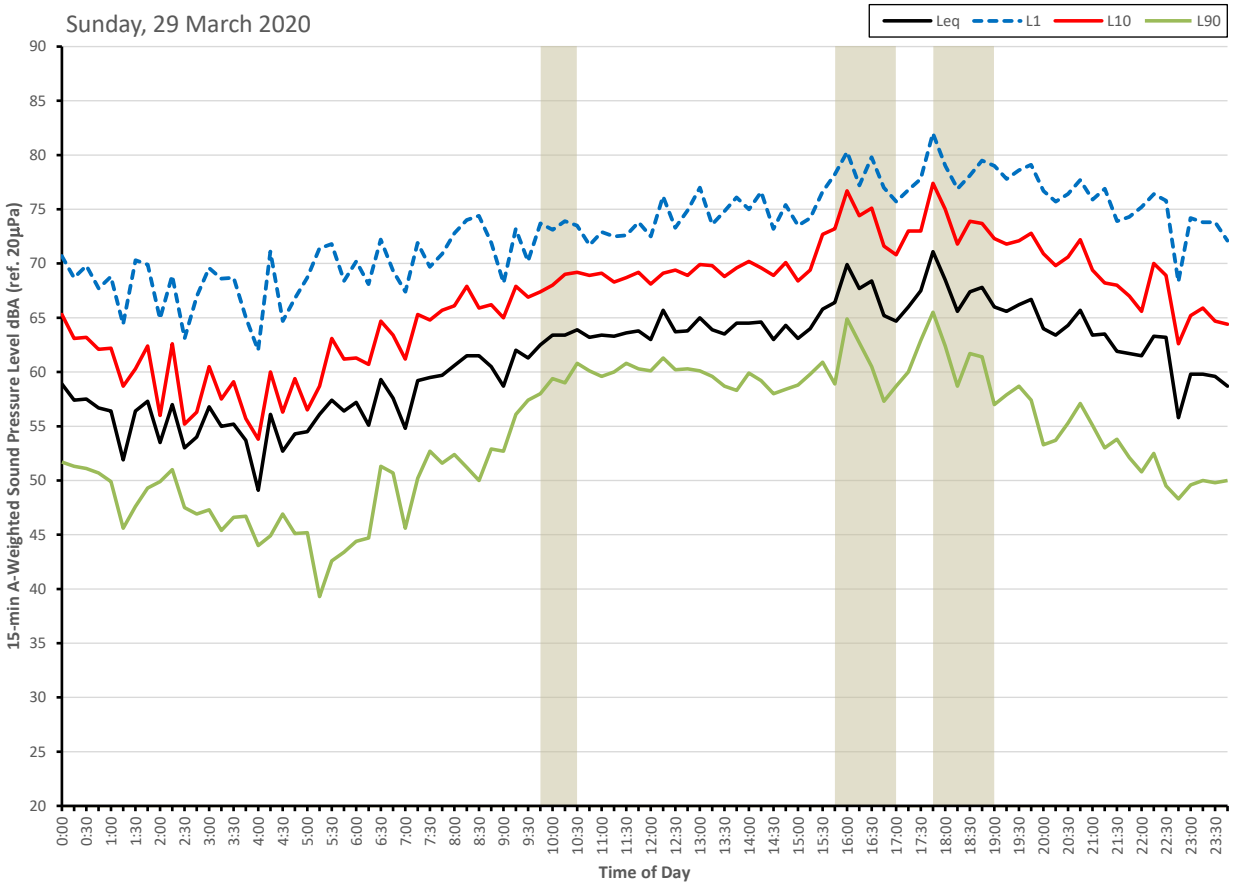
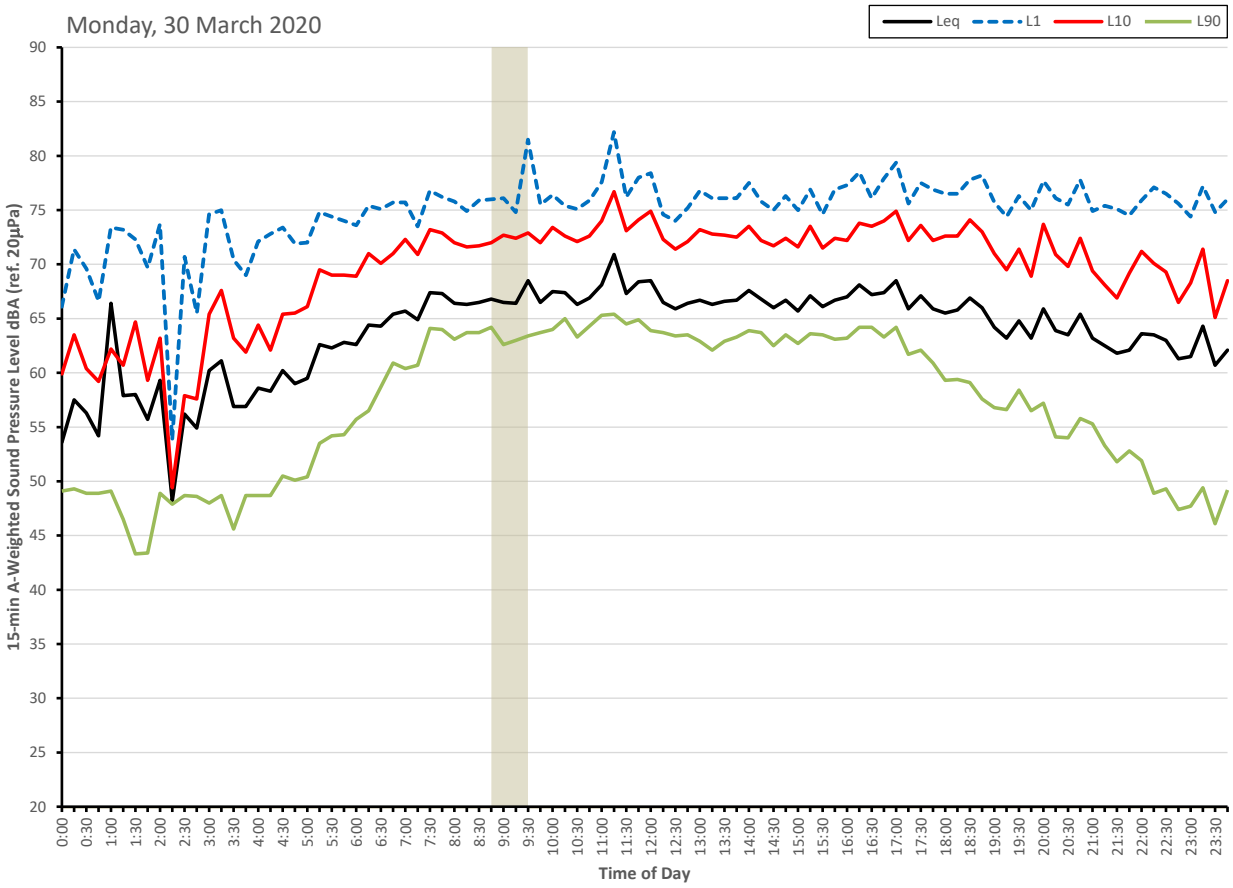
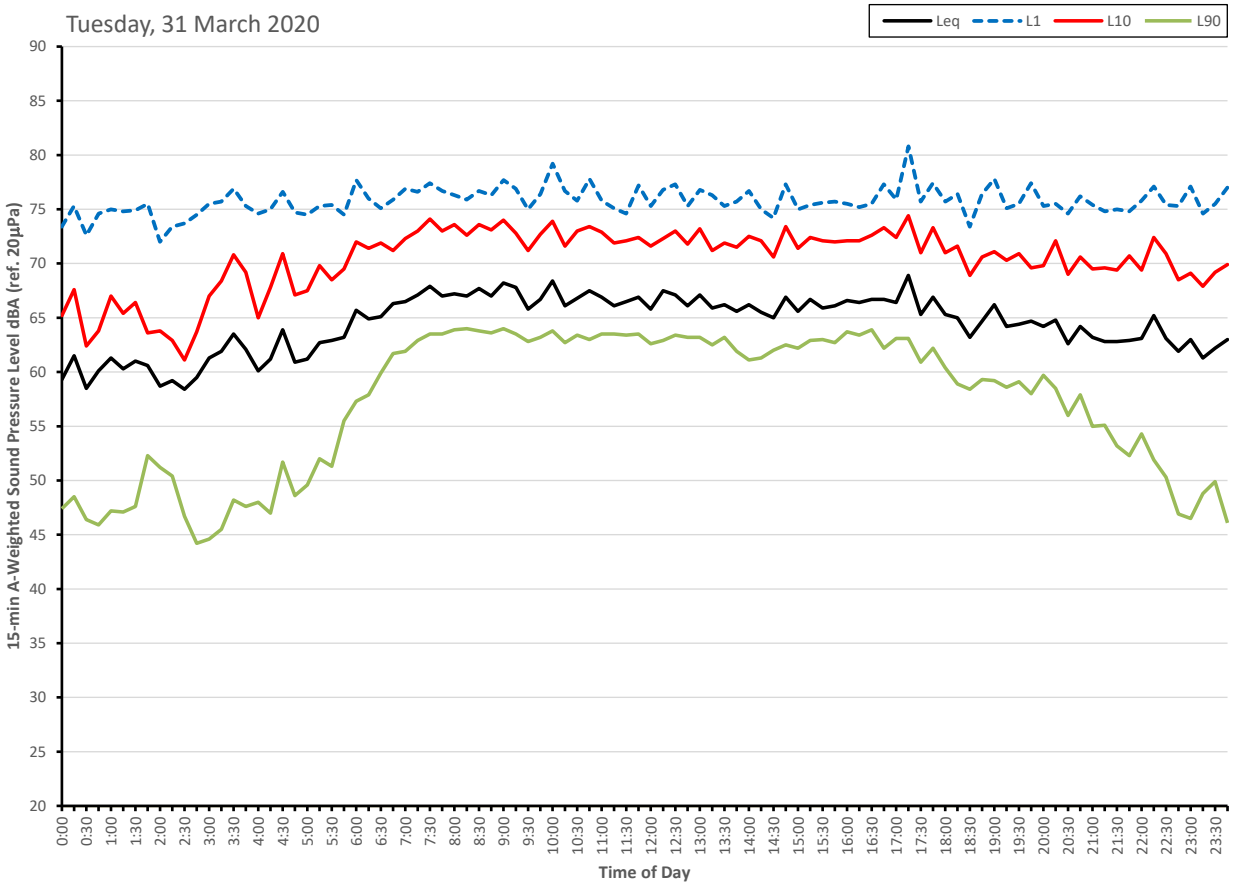
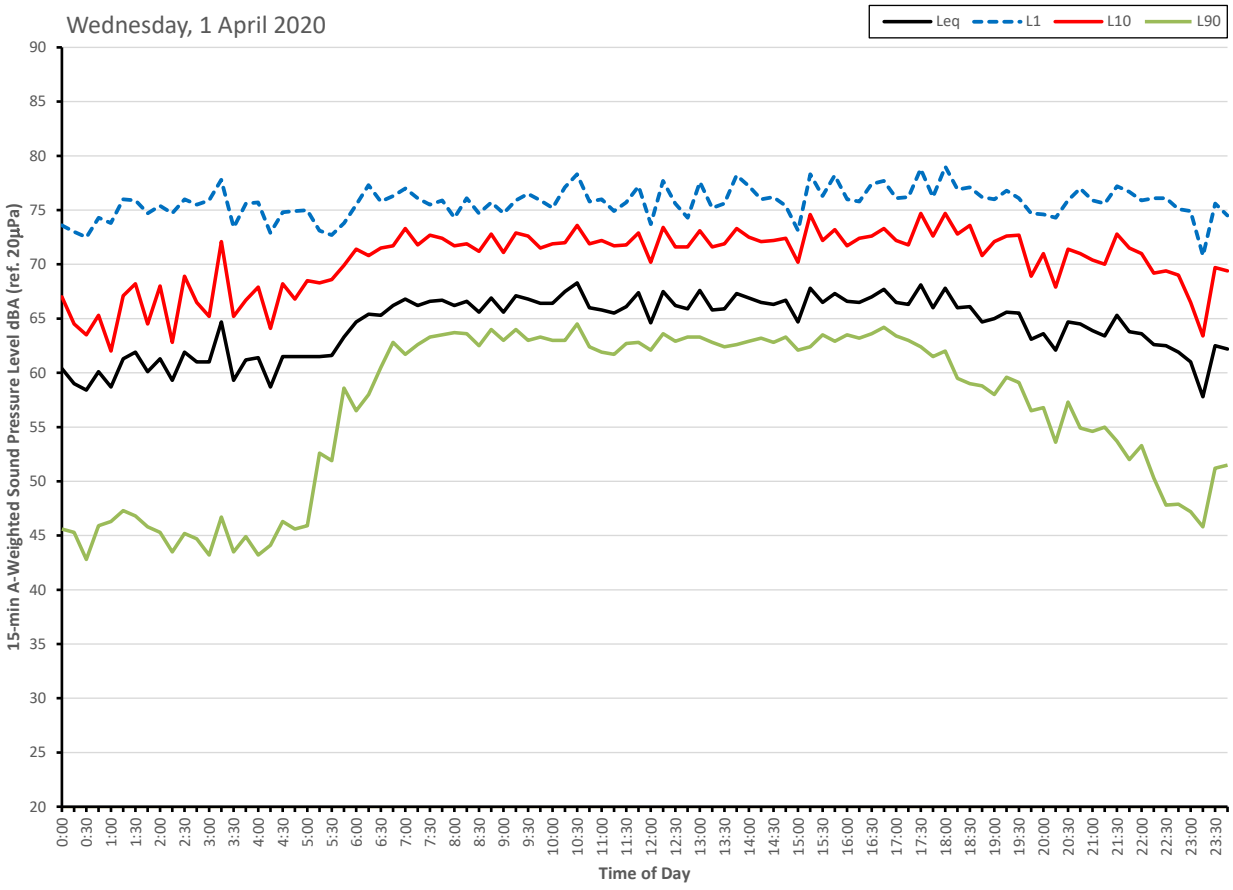
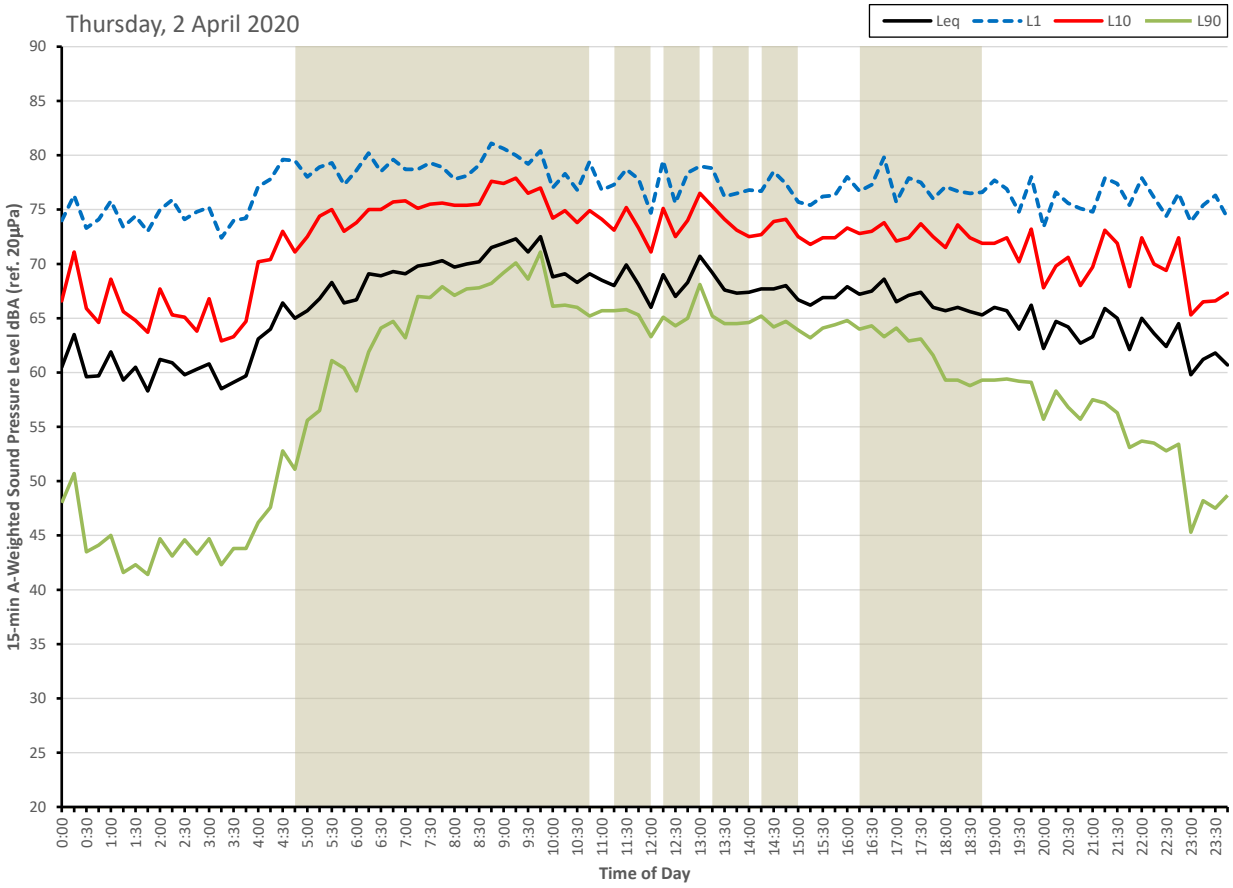
L90
15-min A-Weighted Sound Pressure Level dBA (ref. 20µPa)
Time of Day

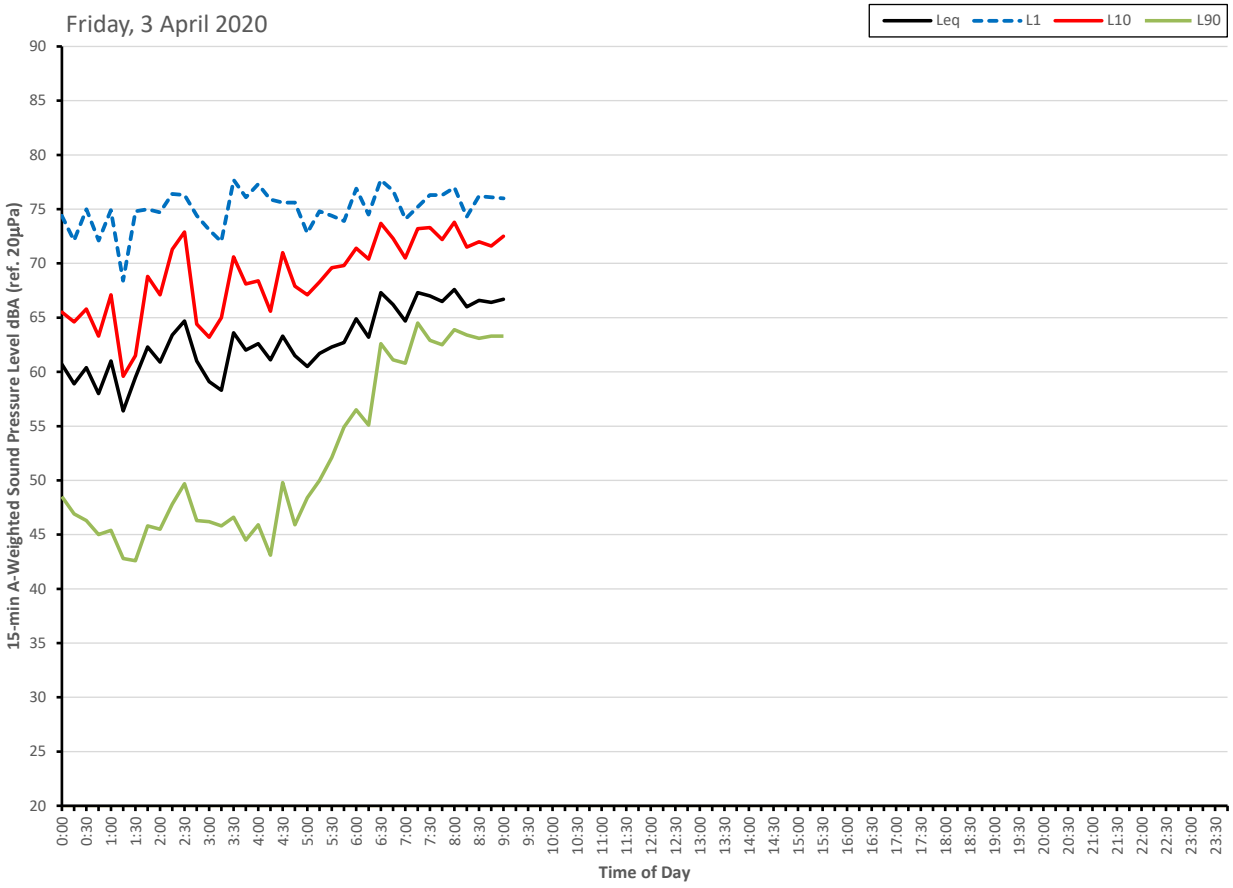

Sunday, 29 March 2020
Leq
L1
L10
L90
15-min A-Weighted Sound Pressure Level dBA (ref. 20µPa)
Time of Day


Monday, 30 March 2020
Leq
L1
L10
L90
15-min A-Weighted Sound Pressure Level dBA (ref. 20µPa)
Time of Day


Tuesday, 31 March 2020
Leq
L1
L10
L90
15-min A-Weighted Sound Pressure Level dBA (ref. 20µPa)
Time of Day


Wednesday, 1 April 2020
Leq
L1
L10
L90
15-min A-Weighted Sound Pressure Level dBA (ref. 20µPa)
Time of Day


Thursday, 2 April 2020
Leq
L1
L10
L90
15-min A-Weighted Sound Pressure Level dBA (ref. 20µPa)
Time of Day


Friday, 3 April 2020
Leq
L1
L10
L90
15-min A-Weighted Sound Pressure Level dBA (ref. 20µPa)
Time of Day