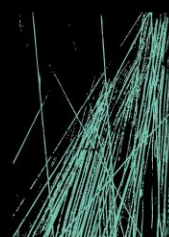


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ACOUSTIC REPORT FOR REF / DA

## **RAIR FAIRY MEADOW**



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# 1 INTRODUCTION

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NSW Ambulance is improving infrastructure across NSW rural areas to ensure they continue to enhance the high-quality emergency medical care delivered to the community now and into the future.

JHA Consulting Engineers has been engaged by Mace to provide acoustic services for a proposed ambulance station refurbishment for the Rural Ambulance Infrastructure Reconfiguration (RAIR) program in Fairy Meadow, NSW.

The proposed development involves the construction of a new ambulance station, with an ambulance plantroom and ancillary spaces. An acoustic assessment has been undertaken and it is detailed in this report along with the findings and recommendations.

The objectives of this acoustic assessment are:

- Identify the external noise and vibration sources that will potentially affect the proposed development.
- Carry out noise surveys to determine the 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 issues:
  - Noise emissions from mechanical plant from the development to the surrounding receivers.
  - Noise emissions from traffic generated by the proposed development.
  - Noise emissions from the use of the wash bay.
  - Noise intrusion.
- Carry out an acoustic assessment to determine whether the relevant criteria can be achieved and, where applicable, comment on noise control measures required to achieve compliance with the relevant noise level criteria.
- Provide recommendations for Construction Noise and Vibration Planning.

This report provides:

- A statement of compliance with the relevant statutory criteria for 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.
- Recommendations for noise and vibration criteria and best practices during construction phase.

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

- Architectural drawings of the proposed development prepared by DJRD Architects.
- Noise data collected on site through the use of a noise logger plus a hand-held analyser.

This document and related work have been prepared following JHA Consulting Engineers Quality Management System, which is based on AS/NZS ISO 9001:2015 and ISO 14001:2015 Environmental Management Systems.

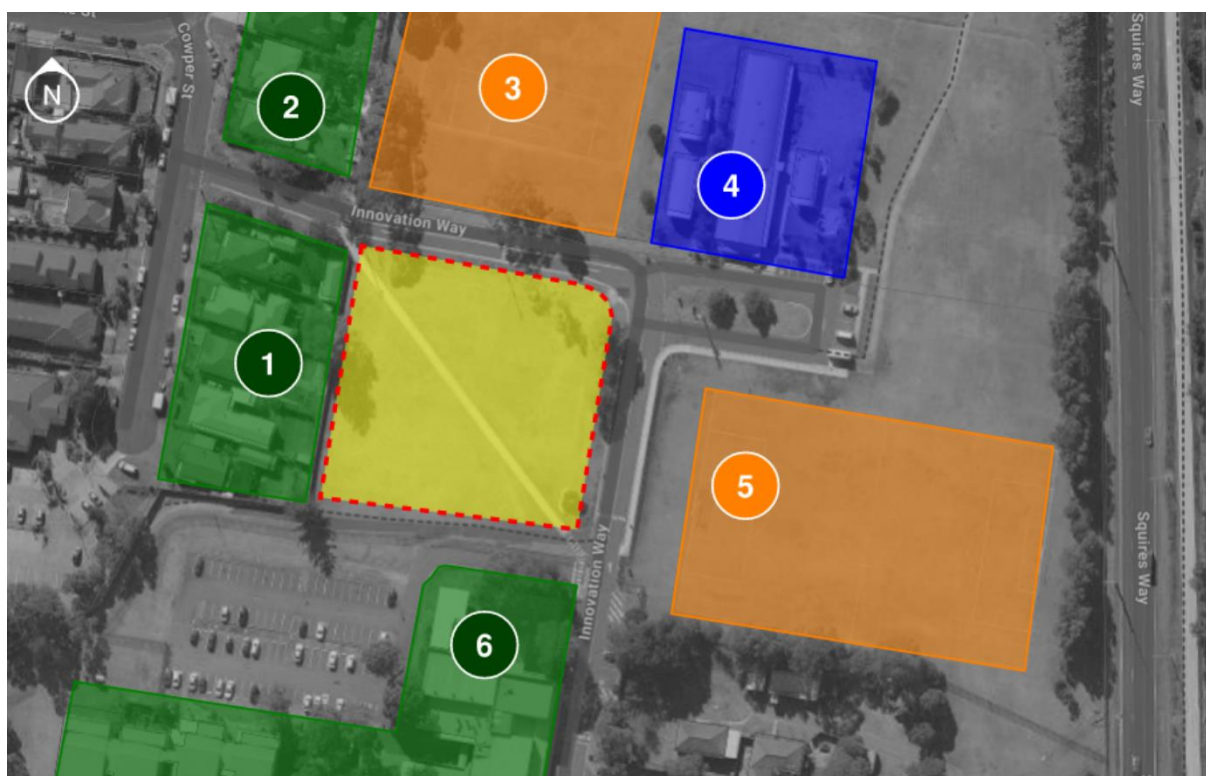
## 2 DESCRIPTION OF THE PROPOSAL

Fairy Meadow is a suburb in the City of Wollongong, New South Wales, located in the Illawarra region, 4 kilometres from the Wollongong city centre and 65 kilometres from Sydney. It belongs to the Local Government Area of the City of Wollongong.

The proposed development site is located in the north-western section of 7 Squires Way, Fairy Meadow—legally known as Lot 1/DP1172135 being located within a special activities area within the Innovation Campus of Wollongong University.

The site is surrounded by residential and educational buildings, recreational areas and large open conservation spaces in a suburban residential environment with continuous traffic flows along Squires Way during peak periods. The proposed development will operate 24 hours per day, 7 days per week.

The noise sensitive receivers surrounding the site are residential, educational and recreational. Figure 1 shows the proposed site location (red dotted line with yellow shadow), residential receivers (green shadow), active recreational receivers (orange shadow) educational receivers (blue shadow).



**Figure 1:** Aerial view of site showing the location of the proposed development and sensitive receivers.

It is noted that if noise impacts associated with the proposed development are controlled at the nearest noise sensitive receivers, then compliance with the recommended criteria at all noise sensitive receivers will be achieved. For the residential catchments, the nearest residential receiver will be used for assessment purposes.

A summary of the nearest sensitive receivers surrounding the site location is shown in Table 1, including the approximate distances between closest lot boundaries.

<i>ID</i>	<i>Sensitive Receiver</i>	<i>Receiver Type</i>	<i>Distance (m)</i>
1	25 – 33 Cowper Street	Residential	<5
2	19 – 23 Cowper Street	Residential	20
3	Sports Ground	Active Recreational	15
4	Kids Uni (UoW) Day care	Educational	30
5	Sports Ground	Active Recreational	35
6	Campus East Accommodation (UoW)	Residential	30

**Table 1:** Nearest sensitive receivers surrounding the site location plus approximate distances.

The proposed development involves the construction of a new ambulance station with ancillary spaces which will comprise:

- 8 ambulance bays.
- Staff carpark.
- Vehicle wash bay.
- Equipment preparation and storage spaces.
- Office spaces.
- Meeting Room.
- Relief rooms.
- Amenities and common areas.
- Gym.

Figure 2 shows the diagram of the Ambulance Station layout (Source: DJRD Architects).

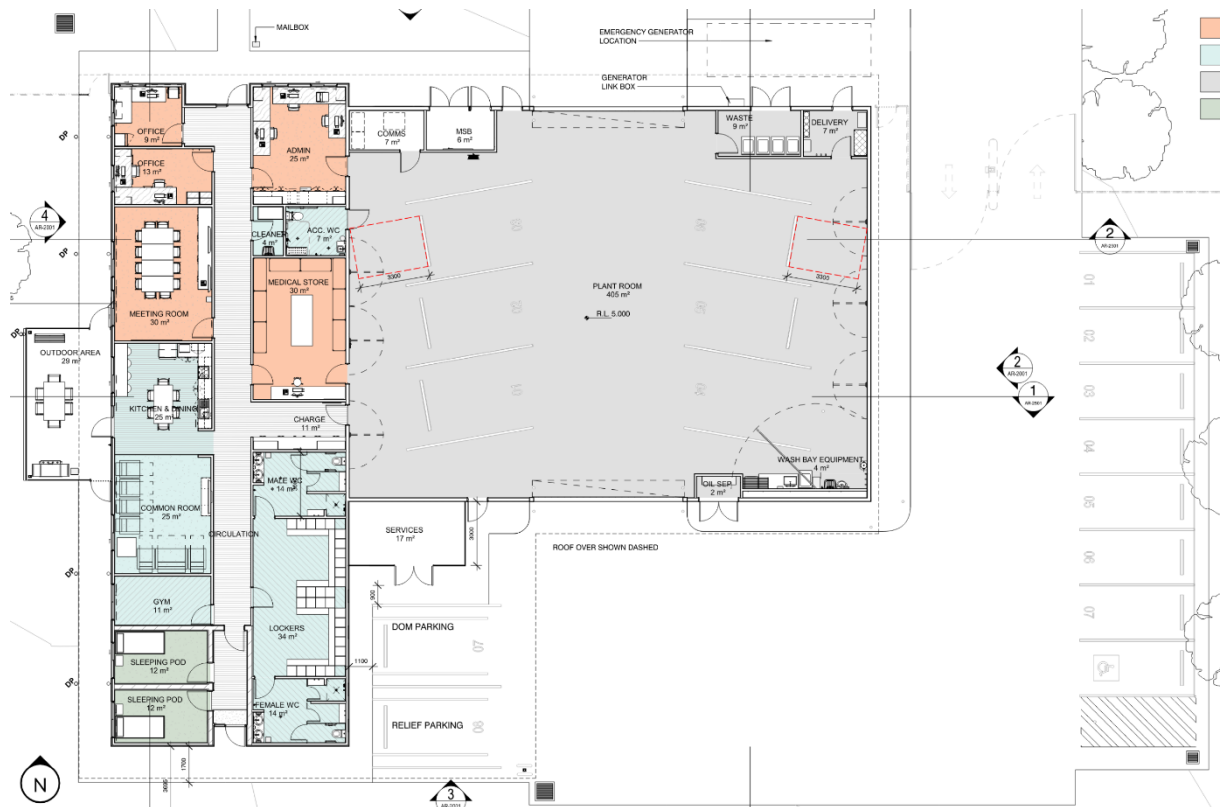


Figure 2: Ambulance Station layout.



## 3 SITE MEASUREMENTS

### 3.1 GENERAL

A noise survey was conducted in the location shown in Figure 3 to establish the ambient and background noise levels of the site and surroundings. The noise survey has been carried out in accordance with the method described in the AS/NZS 1055:2018 'Acoustics – Description and measurement of environmental noise'.



Figure 3: Aerial view of the site (red dashed line) showing the location of the long-term measurements – L1, and short term measurements – S1, S2.

### 3.2 ATTENDED NOISE MONITORING

Short-term noise monitoring was carried out to obtain representative third-octave band noise levels of the site. On Thursday 17<sup>th</sup> and Thursday 24<sup>th</sup> of March 2022, short-term noise measurements were carried out during day-time. Short-term noise measurements were carried out with an 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 1.5m from the ground on a tripod and a windshield was used to protect the microphone. Weather conditions were calm and dry during the attended noise monitoring. A summary of the results of the short-term noise monitoring are shown in Table 2.

Location	Date and Time	Parameter	Sound Pressure Level, dB re 20 $\mu$ Pa								
			Overall dB(A)	Octave Band Centre Frequency, Hz							
				63	125	250	500	1k	2k	4k	8k
S1	17/03/2022	L <sub>A10,15min</sub>	55	64	60	57	47	50	48	41	32
	11.11am – 11.26am	L <sub>Aeq,15min</sub>	54	62	59	55	46	48	47	41	35
		L <sub>A90,15min</sub>	47	55	51	49	40	42	39	31	22
S2	24/03/2022	L <sub>A10,15min</sub>	71	68	64	64	65	67	65	56	46
	11.42am – 11.57am	L <sub>Aeq,15min</sub>	67	66	61	61	61	63	61	53	43
		L <sub>A90,15min</sub>	48	56	49	47	42	45	40	35	21

**Table 2:** Results of short-term noise monitoring.

### 3.3 UNATTENDED NOISE MONITORING

Long-term noise monitoring was carried out from Thursday 17<sup>th</sup> March to Thursday 24<sup>th</sup> of March 2022 with a Rion NL-52 noise logger (Serial Number 1254316). The noise logger recorded L<sub>A1</sub>, L<sub>A10</sub>, L<sub>Aeq</sub> and L<sub>A90</sub> 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 logger location was secure and considered to be representative of the typical ambient and background noise levels of the surrounding residential receivers. The noise logger microphone was mounted 1.5 meters above the ground and a windshield was used to protect the microphone. Weather conditions were monitored during the duration of the noise survey and generally were calm and dry during the unattended noise monitoring.

The detailed results of the long-term noise monitoring are presented graphically in Appendix A. As stated in the NSW NPI, any data likely to be affected by rain, wind or other extraneous noise has been excluded from the calculations (shaded in the Appendix A graphs).

The Rating Background Levels (RBLs) have been established in general accordance with the methodology described in the NSW NPI – i.e. 10<sup>th</sup> percentile background noise level (L<sub>A90</sub>) for each period of each day of the ambient noise level. The median of these levels is then presented as the RBL for each assessment period.

These RBLs are shown in Table 3 together with the ambient noise levels (L<sub>Aeq</sub>) measured for each period.

Location	Rating Background Levels, dB(A)			L <sub>Aeq</sub> Ambient Noise Levels, dB(A)		
	Day	Evening	Night	Day	Evening	Night
	7am-6pm	6pm-10pm	10pm-7am	7am-6pm	6pm-10pm	10pm-7am
L1	46	47	41	54	55	49

**Table 3:** Results of unattended long-term noise monitoring.

## 4 RELEVANT NOISE STANDARDS AND GUIDELINES

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### 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.

- Regulatory Framework:
  - Environmental Planning and Assessment (EP&A) Act 1979.
  - Protection of the Environment Operations (POEO) Act 1997.
- Planning Framework:
  - Wollongong Local Environment Plan 2009.
  - Wollongong Development Control Plan 2009.
- Operational Noise
  - Protection of the Environment Operations. Noise Regulation Controls (NRC) 2008.
  - NSW EPA Noise Policy for Industry (NPI) 2017.
  - NSW Department of Environment Climate Change and Water (DECCW) Noise Guide for Local Government (NGLG) 2013.
  - NSW DECCW Road Noise Policy (RNP) 2011.
- External Noise Intrusion
  - NSW Health Infrastructure 'Engineering Services Guideline' (ESG) Update July 2017.
- Construction Noise and Vibration
  - NSW DECCW Interim Construction Noise Guideline (ICNG) 2009.
  - NSW DECC Assessing Vibration: A Technical Guideline 2006.
  - NSW Road Maritime Service (RMS) Construction Noise and Vibration Guideline 2016.
  - Australian Standard AS 2436:2010 '*Acoustics – Guide to Noise Control on Construction, Maintenance & Demolition Sites*'.
  - NSW EPA, Draft Construction Noise Guideline 2020.

### 4.2 REGULATORY FRAMEWORK

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).

The Protection of the Environment Operations (POEO) Act 1997 has the objective of protecting, restoring and enhancing the quality of 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.

" ...

### 4.3 WOLLONGONG CITY COUNCIL LEGISLATION

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

The Wollongong Environmental Plan (W-LEP 2009) sets the Land Zoning as shown in Figure 4 as per information extracted from the W-LEP map 8450\_COM\_LZN\_025\_020\_20101015. The site is categorised as Special Activities Innovation Campus (SP1).

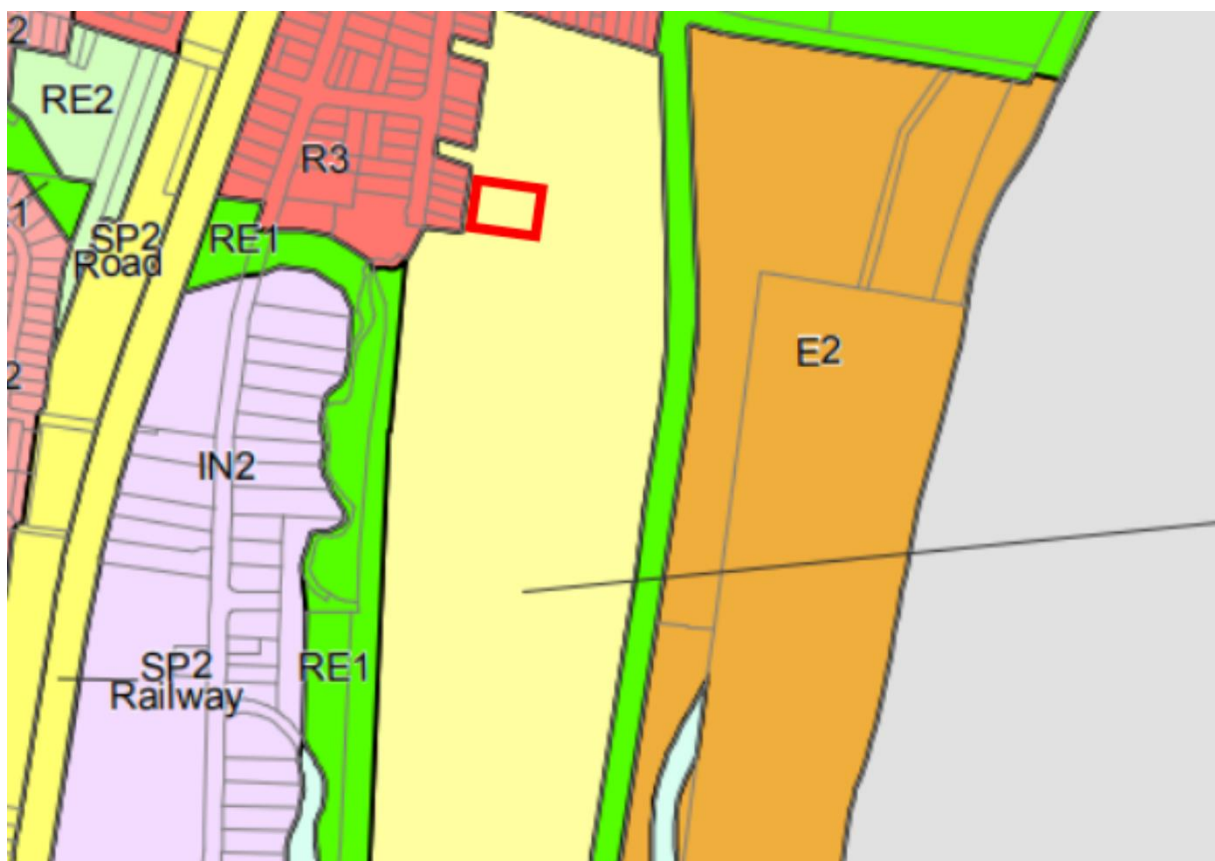


Figure 4: Land Zoning of the site (red outline) and surroundings.

Wollongong Development Control Plan (W-DCP 2009) has been reviewed for any relevant noise requirements or criteria for the proposed development. There are no specific noise level criteria, but rather sections of the W-DCP 2009 provide general planning strategies.

## 4.4 NSW EPA NOISE POLICY FOR INDUSTRY

The NSW EPA Noise Policy for Industry 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).

### 4.4.1 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 5dB 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 noise sensitive receivers.

Indicative Noise Amenity Area	Period	Measured Rating Background Level ( $L_{A90}$ ), dB(A)	Intrusiveness Criteria, dB(A)
Suburban Residential (R3)	Day	46	51
	Evening	47	51*
	Night	41	46

**Table 4:** Determination of the intrusiveness criterion for residential noise sensitive receivers. **Note\*:** Indicates criteria noise levels ammended as per the NSW NPI – the project intrusiveness noise levels for evening should be no greater than for the day.

### 4.4.2 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 and the land zoning, Table 5 shows the amenity criteria for the noise sensitive receivers.



<i>Indicative Noise Amenity Area</i>	<i>Period</i>	<i>Recommended Amenity Noise Level (<math>L_{Aeq}</math>, dB(A))</i>	<i>Amenity Criterion, dB(A)</i>
<i>Suburban Residential (R3)</i>	Day	55	53 $L_{Aeq,15min}$ (55-5+3)
	Evening	45	43 $L_{Aeq,15min}$ (45-5+3)
	Night	40	38 $L_{Aeq,15min}$ (40-5+3)
<i>School Classroom</i>	Noisiest 1-hour when in use	35 (internal)* 45 (external)	43 $L_{Aeq,15min}$ (45-5+3)
<i>Active Recreation</i>	When in use	55	53 $L_{Aeq,15min}$ (55-5+3)

**Table 5:** Determination of the amenity criterion for noise sensitive receivers. Note\*: Where reference is made to an internal noise level, an external noise level 10dB above the internal noise levels are applied which should achieve the internal noise level where a window is adequately opened to provide natural ventilation.

#### 4.4.3 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.

<i>Indicative Noise Amenity Area</i>	<i>Period</i>	<i>Intrusiveness Criterion</i>	<i>Amenity Criterion</i>
<i>Suburban Residential (R3)</i>	Day	51	53
	Evening	51	43
	Night	46	38
<i>School Classroom (External)</i>	Noisiest 1-hour when in use	---	43
<i>Active Recreation</i>	When in use	---	53

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

#### 4.5 POEO NOISE REGULATION CONTROLS

The POEO Noise Regulation Controls streamlines the handling of common neighbourhood noise problems by providing more specific controls than the general powers provided under the POEO Act. The provisions of the regulation are aimed at residential activities and equipment, rather than those on commercial or industrial premises.

Part 4 deals with common neighbourhood noise problems such as the times of use of air conditioners, heat pump water heaters, pneumatic tools, swimming pool pumps, power tools, building intruder alarms and loud music. This part mainly applies to council enforcement / authorised officers and Police officers, but OEH enforcement / authorised officers also have powers in relation to some provisions.

The regulation applies different methods of control to different neighbourhood noise problems. These controls are:

- Preventing the use of certain articles where they can be heard during noise sensitive periods (e.g. night time).
- Placing limits on how long an article can emit noise (e.g. alarms).
- Prohibiting the use of certain articles where they emit 'offensive noise' (e.g. off-road trail bikes).

Although the clause below refers to residential premises, it is understood that it could be applied as a good practice plus establish a noise control. Power tools and equipment noise management is described as follows:

" ...

*Clause 51 – Use of power tools on residential premises*

*(a) the person causes or permit a power tool to be used on residential premises in such a manner that it emits noise that can be heard within any room in any other residential premises (that is not a garage, storage area, bathroom, laundry, toilet or pantry) whether or not any door or window to that room is open:*

*(a) before 8 am or after 8 pm on any Saturday, Sunday or public holiday, or*

*(b) before 7 am or after 8 pm on any other day.*

*..."*

Therefore, noise from power tools shall be inaudible during the above listed time periods and shall not be 'offensive noise' (as per POEO Act definition) for other time periods.

## 4.6 TRAFFIC NOISE

Road traffic noise impact is assessed in accordance with the introduced 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.

## 4.7 NSW HEALTH INFRASTRUCTURE ESG

Section 13 of the NSW Health Infrastructure Engineering Services Guideline provides acoustic design for healthcare buildings considering internal noise levels, reverberation times plus sound insulation performances that should be achieved for the Ambulance Station.

Therefore, the criteria and guides outlined in the ESG shall be adopted for this project, particularly during the design stage.

## 4.8 CONSTRUCTION NOISE AND VIBRATION

### 4.8.1 NOISE CRITERIA

The ICNG suggest construction noise management levels that may minimise the likelihood of annoyance being caused to noise sensitive residential receivers depending on the duration of works. The management levels for long-term duration works are as follows:

- Within recommended standard hours.

The  $L_{Aeq,15min}$  level measured at the most exposed boundary of any affected residential receiver when the construction site is in operation must not exceed the background noise level by more than 10dB(A). This noise level represents the point above which there may be some community reaction to noise.

However, in the case of a highly noise affected area, the construction noise level ( $L_{Aeq,15min}$ ) at the most exposed boundary of any affected residential receiver when the construction site is in operation should not exceed 75dB(A). This level represents the point above which there may be strong community reaction to noise.

- Outside recommended standard hours.

The  $L_{Aeq,15min}$  level measured at the most exposed boundary of any affected residential receiver when the construction site is in operation must not exceed the background level by more than 5dB(A). It is noted that a strong justification is required for works outside the recommended standard hours.

In order to establish the airborne construction noise criteria, noise levels from the unattended noise monitoring have been used for the noise sensitive receivers – refer to Section 3. Table 7 below summarises the airborne construction noise criteria for most the affected noise sensitive receivers surrounding the development site.

<i>Sensitive Receiver</i>		<i>Airborne Construction Noise Criteria, <math>L_{Aeq}</math> dB(A)</i>	
		<i>Within Standard Hours</i>	<i>Outside Standard Hours</i>
<i>Residential</i>	Noise affected / External	RBL + 10	RBL + 5
	Highly noise affected / External	75	N/A

**Table 7:** ICNG construction airborne noise criteria for noise sensitive receivers surrounding the site.

Table 8 summaries the airborne construction noise criteria for educational facilities surrounding the development site.

<i>Land Use</i>	<i>Management Level, <math>L_{Aeq}</math> dB(A)</i>
<i>Educational Institutions</i>	Internal Noise Level 45dB(A)
	External Noise Level 55dB(A)

**Table 8:** ICNG construction airborne noise criteria for educational.

Where reference is made to an internal noise level, an external noise level 10dB above the internal noise levels are applied which should achieve the internal noise level where a window is adequately opened to provide natural ventilation.

The ICNG recommends internal ground-borne noise maximum levels at residences affected by nearby construction activities. Ground-borne noise is noise generated by vibration transmitted through the ground into a structure and can be more noticeable than airborne noise for some sensitive receivers. The ground-borne noise levels presented below from the ICNG are for residential receivers during evening and night-time periods only, as the objective is to protect the amenity and sleep of people when they are at home.

- Evening:  $L_{Aeq,15min}$  40dB(A) (internal)
- Night:  $L_{Aeq,15min}$  35dB(A) (internal)

The internal noise levels are assessed at the centre of the most affected habitable room.

## 4.8.2 VIBRATION CRITERIA

### 4.8.2.1 Structural Building Damage

Ground vibration from construction activities can damage surrounding buildings or structures. For occupied buildings, the vibration criteria given in previous section for Human Comfort shall generally form the limiting vibration criteria for the Project.

For unoccupied buildings, or during periods where the buildings are unoccupied, the vibration criteria for building damage suggested by German Standard DIN 4150.3:2016 '*Vibration in Buildings – Effects on Structures*' are to be adopted. Guideline values from DIN 4150.3:2016 are presented in Table 9.

Structural type	Vibration velocity, mm/s (Peak Particle Velocity - PPV)				
	Foundation			Plane of floor uppermost full storey in horizontal direction	Floor slabs, vertical direction
	1Hz to 10Hz	10Hz to 50Hz	50Hz to 100Hz	All frequencies	All frequencies
Type 1: Buildings used for commercial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40	20
Type 2: Residential buildings and buildings of similar design and/or occupancy	5	5 to 15	15 to 20	15	20
Type 3: Structures that because of their particular sensitivity to vibration, cannot be classified under Type 1 and 2 and are of great intrinsic value (e.g. heritage buildings)	3	3 to 8	8 to 10	8	20

**Table 9:** DIN 4150.3:2016 Guideline values of vibration velocity (PPV) for evaluating the effects of short-term vibration.

#### 4.8.2.2 Human Comfort

The Department of Environment and Climate Change (DECC) developed the document 'Assessing Vibration: A Technical Guideline' in February 2006 to assist in preventing people from exposure to excessive vibration levels within buildings. It is based on the guidelines contained in BS 6472.1:2008 'Guide to evaluation of human exposure to vibration in buildings – Vibration sources other than blasting'.

The guideline does not address vibration induced damage to structures or structure-borne noise effects. Vibration and its associated effects are usually classified as continuous (with magnitudes varying or remaining constant with time), impulsive (such as shocks) or intermittent (with the magnitude of each event being either constant or varying with time). Vibration criteria for continuous and impulsive vibration are presented in Table 10 below, in terms of vibration velocity levels.

Place	Time	r.m.s. velocity, mm/s [dB ref 10 <sup>-6</sup> mm/s]			
		Continuous Vibration		Impulsive Vibration	
		Preferred	Maximum	Preferred	Maximum
Residences	Day-time	0.20 [106 dB]	0.40 [112 dB]	6.00 [136 dB]	12.00 [142 dB]
	Night-time	0.14 [103 dB]	0.28 [109 dB]	2.00 [126 dB]	4.00 [132 dB]
Offices, schools, educational and worship	When in use	0.40 [112 dB]	0.80 [118 dB]	13.00 [142 dB]	26.00 [148 dB]

**Table 10:** Continuous and impulsive vibration criteria applicable to the site.

When assessing intermittent vibration comprising a number of events, the Vibration Dose Value (VDV) it is recommended to be used. Table 11 shows the acceptable VDV values for intermittent vibration.

Place	Time	Vibration Dose Values, m/s <sup>1.75</sup>	
		Preferred	Maximum
Residences	Day-time	0.20	0.40
	Night-time	0.13	0.26
Offices, schools, educational and worship	When in use	0.40	0.80

**Table 11:** Intermittent vibration criteria applicable to the site.



## 5 NOISE EMISSIONS ASSESSMENT

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Noise break-out from the proposed Ambulance Station has the potential to impact on existing noise sensitive receivers. For the purpose of this noise impact assessment, the noise sources are assumed as follows:

- Noise emissions from mechanical plant from the Ambulance Station to the surrounding receivers.
- Noise emissions from traffic generated by the proposed development.
- Noise emissions from wash bay.

Each of these noise sources has been considered in the noise impact assessment. The acoustic assessment has considered the following:

- Noise levels have been considered as continuous over assessment time period to provide the worst-case scenario.
- Distance attenuation, building reflections and directivity.
- Lowest measured background noise levels at the nearest noise sensitive receiver have been used to provide a worst-case scenario.

### 5.1 EXTERNAL MECHANICAL PLANT

Noise from the proposed development mechanical plant should be controlled to ensure external noise emissions are not intrusive and do not impact on the amenity of the sensitive receivers.

The mechanical plant will operate continuously during all day periods. At this stage, a preliminary selection of the external mechanical plant has been provided and a noise assessment at the nearest noise sensitive receivers has been carried out based on the noise data from the manufacturers. The selected units and their noise levels are listed below:

- Condenser Unit Daikin REYQ18TAY1 – 62dB(A) @1m (as per Daikin product information sheet)

The following assumptions have been made in the noise assessment:

- The location of the external plant is as per Figure 5.
- The nearest noise sensitive receivers are: The UoW Campus East Accommodation (to the south), 29 Cowper Street (to the west), UoW Kids Uni (to the north-east) and a football oval (to the east).
- Building reflections and directivity.

The noise assessment of the mechanical plant is summarised in Table 12.

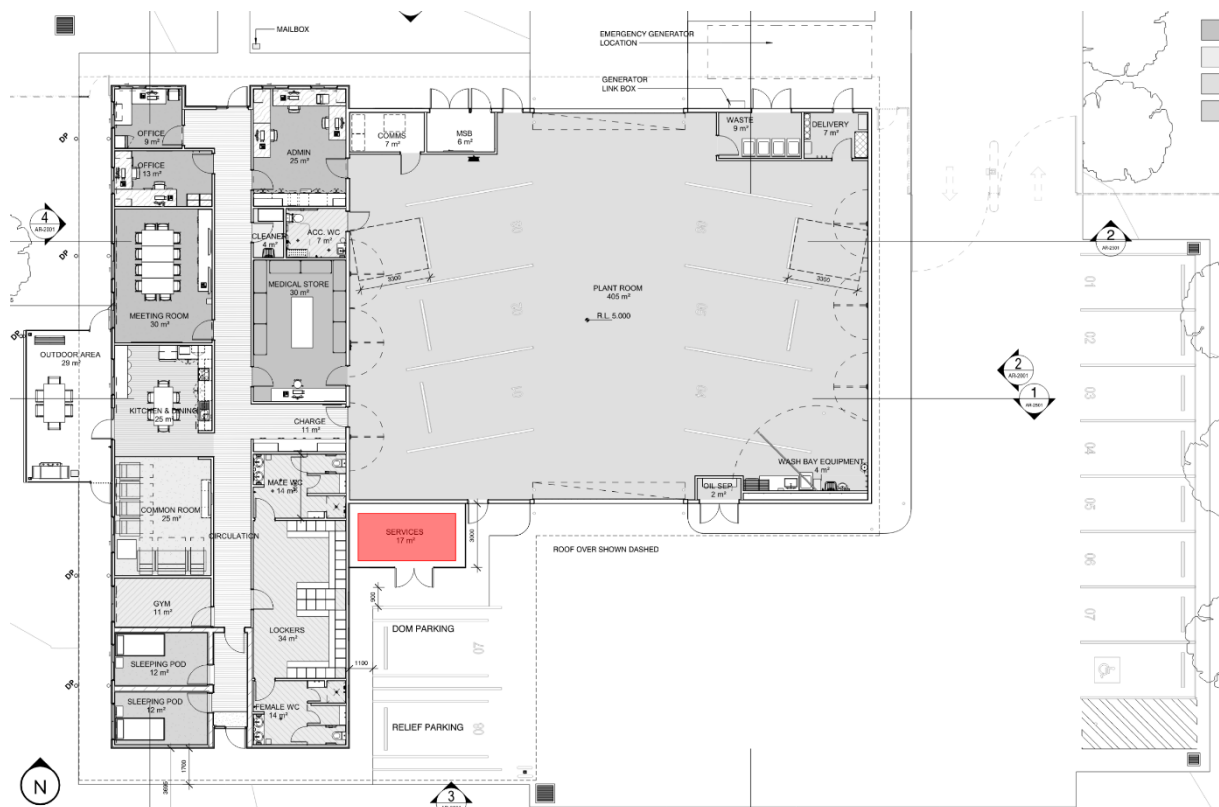


Figure 5. Proposed location of the external mechanical plant (red shadow).

Calculation	Overall A-weighted noise level, in dB(A)			
	UoW Campus East Accommodation	29 Cowper Street	Kids Uni	Sports Ground
$L_{Aeq}$ CU @1m	62	62	62	62
Distance attenuation, dB	-31	-27	-37	-35
Building attenuation / reflections / directivity, dB	+3	-7	-7	+3
$L_{Aeq,15min}$ resulting at residential receiver	34	28	18	30
Daytime criteria NPI / Complies?	51 / <b>Yes</b>	51 / <b>Yes</b>	43 / <b>Yes</b>	53 / <b>Yes</b>
Night-time criteria NPI / Complies?	38 / <b>Yes</b>	38 / <b>Yes</b>	---	---

Table 12: Noise assessment of external mechanical plant to the nearest noise sensitive receivers.

Based on this assessment and the NSW NPI noise level criteria in Table 6, the mechanical plant will meet the noise level criteria at the nearest noise sensitive receivers.

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 level at the receiver boundaries is met.
- 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 louvres as required
- Noise barriers as required

Acoustic assessment of all mechanical plant shall continue during the detailed design phase of the project in order to confirm any noise control measures. If new or replacing external mechanical plant is proposed, then an acoustic assessment of all mechanical plant shall continue during the detailed design phase of the project in order to confirm any noise control measures.

## 5.2 VEHICLE NOISE EMISSIONS

The potential noise sources associated with the proposed vehicles operations will be:

- Noise generated by vehicles movements, particularly ambulances dispatched for emergencies during night-time.
- Noise generated by ambulance sirens.
- Noise generated by staff vehicles movements.

It is expected that vehicle movements will be moving slowly and the number of vehicles movement will be low compared with the existing traffic flows.

### 5.2.1 AMBULANCE MOVEMENTS

There is provision for 8 ambulance vehicles within the proposed development. Based on this low number, it is understood that ambulance movements will only slightly increase the traffic flows. Therefore, it can be stated that there will be no significant increase in the existing ambient and background noise levels road traffic as a result of the development.

As noted in Section 4.6.2, when considering land use development and the impact on sensitive land uses the NSW Road Noise Policy (RNP) states that an increase up to 2dB in relation to existing noise levels is anticipated to be insignificant.

Therefore, traffic noise associated with the ambulance movements is expected to meet the NSW RNP recommendations.

### 5.2.2 AMBULANCE SIRENS

Regarding the use of ambulance sirens on site – when ambulances depart to attend incidents – it is not specifically addressed in relevant regulations. When in use, noise levels from ambulance sirens will be audible at the nearest residential receivers.

Events identified as Priority One events (Life Threatening Emergencies), require that warning devices must be used, including warning lights and sirens. The NSW Ambulance *Emergency Driving and Use of Warning Policy Directive 2016-033* states that:

*"NSW Ambulance personnel who drive a vehicle under emergency response conditions shall use safety equipment provided by NSW Ambulance for that purpose which includes warning devices: lights and sirens. Lights can be used in isolation without the use of a siren if the driver of the vehicle deems the circumstances are safe to do so and can justify reasonable cause to do so."*

Based on the above, it is understood that ambulance drivers will make a judgement call on whether to use ambulance sirens on case-by-case basis. It is further understood that it is the practice of Paramedics to minimise the use of sirens when it will cause a noise disturbance and the sirens are deemed unnecessary.

For reference, Appendix A contains the NSW Ambulance *Emergency Driving and Use of Warning Policy Directive 2016-033*.

### 5.2.3 STAFF MOVEMENTS

There is provision for 8 staff carparks in the proposed development. Based on this, it is understood that staff movements will only slightly increase the traffic flows to the expected traffic levels in the area. Therefore, it can be stated that there will be no significant increase in road traffic as a result of the development due to the additional staff carparks.

As noted in Section 4.6.2, when considering land use development and the impact on sensitive land uses the NSW Road Noise Policy (RNP) states that an increase up to 2dB in relation to existing noise levels is anticipated to be insignificant.

Therefore, traffic noise associated with the development is expected to meet the NSW RNP recommendations.

### 5.3 AMBULANCE WASH BAY

Based on the architectural layout, the wash bay is located internally within the building, and therefore the building façade will provide significant noise reduction to the nearest noise sensitive receivers. Distance attenuation will further reduce the noise levels. It is expected that the pressure washer will not be used continuously. Therefore, noise levels from the wash bay are anticipated to be in compliance with the noise level criteria and will not impact the nearest noise sensitive receivers.

The internal location of the ambulance wash bay is shown below in Figure 6.

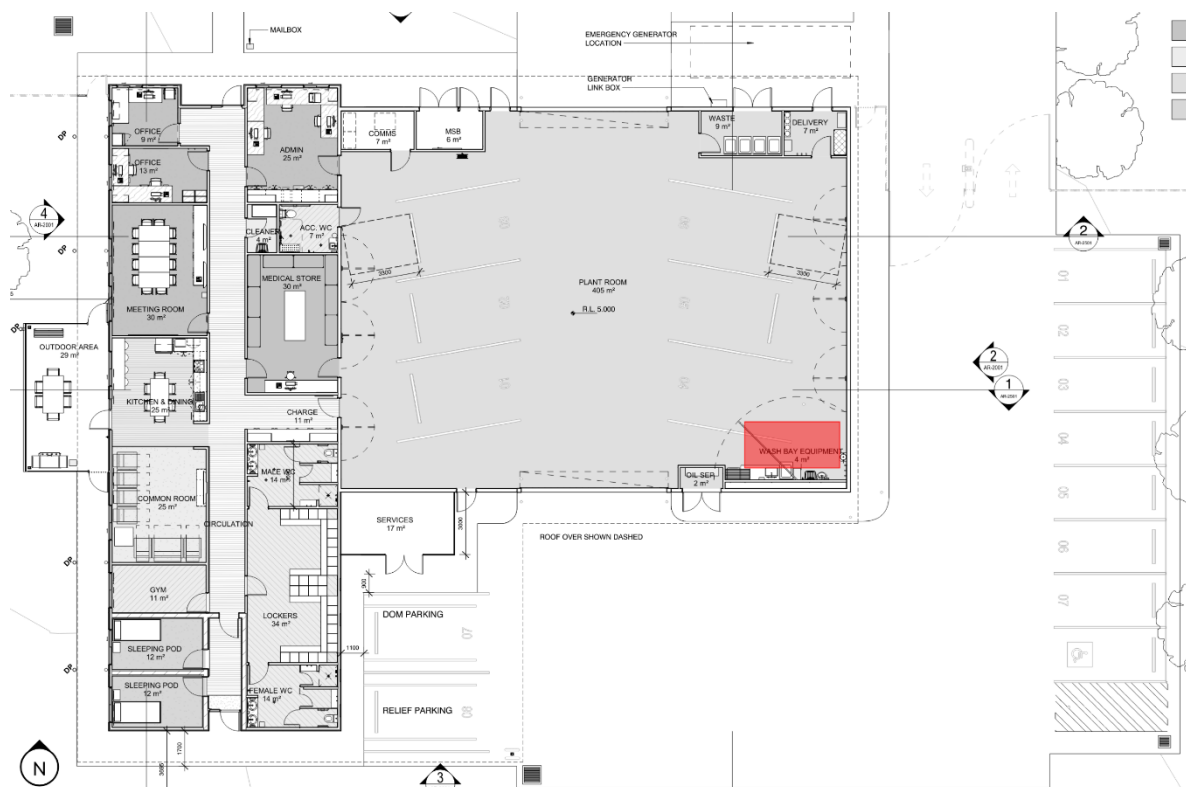


Figure 6. Proposed location of the internal wash bay (red shadow).

It is recommended to restrict pressure washer operations to day-time period whenever possible. As required by the NSW POEO NCR 2008, noise from all power tools, including the pressure washer, shall not be audible within any habitable room in any residential premises outside the proposed hours. The allowed operation time period is between 7am and 8pm Monday to Friday, and between 8am and 8pm on Saturday, Sundays and Public Holidays. Therefore, whenever reasonable, the pressure washer shall only be used during these hours.



## 6 NOISE INTRUSION

The noise level within the internal spaces of the proposed development will be a result of the combination of external noise and noise from the building services. Noise generated by building services, particularly the air-conditioning and ventilation systems, needs to be considered to ensure that the internal noise levels for each space of the Ambulance Station meet the ambient noise levels as per NSW Health Infrastructure ESG.

The external glazing to the spaces to the development shall consist of minimum 6mm float glass to achieve an acoustic rating of Rw30. Note that this is for acoustic purposes only, and other requirements are to be considered regarding glazing types.

In order to achieve these internal noise levels for each space, noise control treatments will need to be incorporated into the mechanical systems as required. Table 13 outlines the NSW Health Infrastructure ESG Criteria for Continuous Internal Noise Levels.

<i>Area Designation</i>	<i>Continuous Internal Noise Levels <math>L_{Aeq}</math> dB</i>	
	<i>Satisfactory</i>	<i>Maximum</i>
Dining	45	50
Meeting Room	35	40
Private Offices	35	40
Multi Person Office	40	45
Rest Rooms	40	45
Toilets / Showers / Locker Rooms	50	55

**Table 13:** Continuous Internal Noise Levels ( $L_{Aeq}$ ) as per NSW Health Infrastructure ESG.

## 7 CONSTRUCTION NOISE AND VIBRATION PLANNING

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Currently a detailed construction program is not yet fully defined. This section of the Construction Noise and Vibration Planning provides general recommendations only and provides applicable criteria together with feasible and reasonable noise and vibration control practices to be observed during the construction of the proposed development.

This preliminary advice in relation to construction noise and vibration management shall form the basis for the Contractor's Construction Noise and Vibration Management Plan (CNVMP) which shall identify any noise criteria exceedance once construction methods and stages are known.

Any noise from demolition and construction activities to be carried out on site must not result in '*offensive noise*' to any noise sensitive receiver. To this end, the Contractor employed to undertake the demolition and/or construction works is responsible for ensuring that any site noise and, in particular, any complaints shall be monitored, investigated, managed and controlled.

### 7.1 RELEVANT STANDARDS FOR CONSTRUCTION NOISE AND VIBRATION CRITERIA

Section 4.8 of this report contains the relevant legislation, codes and standards in addition to construction noise and vibration criteria for this project.

### 7.2 CONTROL ELEMENTS

#### 7.2.1 WORKING HOURS

The following construction hours are proposed as follows:

- Monday to Friday: 7am to 6pm.
- Saturday: 8am to 1pm.
- Sundays and Public Holidays: No excavation or construction works.

It is noted that the proposed construction hours are within the recommended NSW EPA hours. Noise control measures are to be implemented during these hours following consultation and engagement with the community.

It is recommended that high noise level works – i.e. piling, excavation, etc – shall be scheduled to not occur during shoulder periods of the recommended standard hours – i.e. 7am to 8am and 5pm to 6pm.

A detailed Construction Noise & Vibration Management Plan (CNVMP) shall further assess the noise impact of construction works, and shall include a protocol to minimise any potential noise impacts to identified sensitive receivers, and ensure that appropriate noise control measures are defined and implemented to comply with all relevant noise guidelines.

#### 7.2.2 MITIGATION MEASURES

In order to meet the noise and vibration requirements of the site, the Contractor will be required to engage a qualified acoustic consultant to assist in the compilation of a Construction Noise and Vibration Management Plan, and undertake noise and vibration monitoring for the duration of the project, if required by the CNVMP and / or Conditions of Consent.

### 7.2.2.1 General Control Elements

As a general rule, minimising noise and vibration should be applied as universal work practice at any time of day, but especially for any construction works to be undertaken at critical times outside normal daytime/weekday periods.

It is noted that the reduction of noise and vibration at the source and the control of the transmission path between the construction site and the receiver(s) are the preferred options for noise minimisation. Providing treatments at the affected receivers should only be considered as a last resort. Construction noise and vibration shall be managed by implementing the strategies listed below:

- *Plant and equipment.* In terms of both cost and results, controlling noise and vibration at the sources is one of the most effective methods of minimising the impacts from any work site activities. Work practices that will reduce noise and vibration at the source include:
  - Employing quieter techniques for all high noise activities such as rock breaking, concrete sawing, and using power and pneumatic tools.
  - Use quieter plant and equipment based on the optimal power and size to most efficiently perform the required tasks.
  - Selecting plant and equipment with low vibration generation characteristics.
  - Operate plant in a quietest and most effective manner.
  - Where appropriate, limit the operating noise of equipment.
  - Regularly inspecting and maintain plant and equipment to minimise noise and vibration level increases, to ensure that all noise and vibration reduction devices are operating effectively.
- *On site noise management.* Practices that will reduce noise from the site include:
  - Maximising the distance between noise activities and noise sensitive receivers. Strategically locate equipment and plant.
  - Undertaking noisy fabrication work off-site where possible.
  - Avoid the use of reversing beeping alarms or provide for alternative systems, such as broadband reversing alarms.
  - Maintaining any pre-existing barriers or walls on a demolition or excavation site as long as possible to provide optimum sound propagation control.
  - Constructing barriers that are part of the project design early in the project to afford mitigation against site noise.
  - Using temporary site building and material stockpiles as noise barriers. These can often be created using site earthworks and may be included as a part of final landscape design.
  - Installing purpose-built noise barriers, acoustic sheds and enclosures.
- *Work scheduling.* Scheduling work during periods when people are least affected is an important way of reducing adverse impacts. The following scheduling aspects may reduce impacts:
  - Provide respite periods, including restricting very noisy activities to daytime, restricting the number of nights that after-hours work is conducted near residences, or by determining any specific requirements, particularly those needed for noise sensitive receivers.
  - Scheduling activities to minimise impacts by undertaking all possible work during hours that will least adversely affect sensitive receivers and by avoiding conflicts with other scheduled events.
  - Scheduling work to coincide with non-sensitive periods.
  - Scheduling noisy activities to coincide with high levels of neighbourhood noise so that noise from the activities is partially masked and not as intrusive.

- Planning deliveries and access to the site to occur quietly and efficiently and organising parking only within designated areas located away from sensitive receivers.
- Optimising the number of deliveries to the site by amalgamating loads where possible and scheduling arrivals within designated hours.
- Designating, designing and maintaining access routes to the site to minimise impacts.
- *Consultation, notification and complaints handling.*
  - Provide information to neighbours before and during construction.
  - Maintain good communication between the community and Project staff.
  - Have a documented complaints process and keep register of any complaints.
  - Give complaints a fair hearing and provide for a quick response.
  - Implement all feasible and reasonable measures to address the source of complaint. Implementation of all reasonable and feasible mitigation measures for all works will ensure that any adverse noise impacts to surrounding receivers are minimised when noise goals cannot be met due to safety or space constraints.

#### **7.2.2.2 Additional Noise and Vibration Control Measures**

If, during construction, an item of equipment exceeds either the noise criteria at any location or the equipment noise level limits, the following noise control measures, together with construction best practices, shall be considered to minimise the noise impacts on the neighbourhood.

- Schedule noisy activities to occur outside of the most sensitive times of the day for each nominated receiver.
- Consider implementing equipment-specific screening or other noise control measures recommended in Appendix C of AS 2436:2010.
- Limit the number of trucks on site at the commencement of site activities to the minimum required by the loading facilities on site.
- When loading trucks, adopt best practice noise management strategies to avoid materials being dropped from height into dump trucks.
- Avoid unnecessary idling of trucks and equipment.
- Ensure that any miscellaneous equipment (extraction fans, hand tools, etc.) not specifically identified in the CNVMP incorporates silencing/shielding equipment as required to meet the noise criteria.

Implementation of all reasonable and feasible mitigation measures for all internal works will ensure that any adverse noise impacts to surrounding noise sensitive receivers are minimised when noise goals cannot be met due to safety or space constraints.

## 8 MANAGEMENT AND COMPLIANCE

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Limiting noise nuisance from a premise generally requires management on an ongoing basis. Strategies for the proposed development should consider the following:

- Whenever possible, the pressure washer and other power tools shall be operated between 7am to 8pm during Monday and Friday and between 8am to 8pm on Saturdays, Sundays and Public Holidays.
- Use of ambulance sirens within the Ambulance Station lot and surroundings shall be minimised whenever possible.
- To minimise impact on the surrounding amenity, Waste Collection movements are recommended to occur during the day-time.



## 9 SUMMARY AND CONCLUSIONS

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A noise assessment has been carried out for the proposed development of a RAIR Ambulance Station at 7 Squires Way in Fairy Meadow, NSW. This report forms part of the documentation package to be submitted to NSW Health Infrastructure as part of the DA / REF 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 selection of the external mechanical plant has been provided and a noise assessment at the nearest noise sensitive receivers has been carried out based on noise data from the manufacturers. Based on the assessment results, the mechanical plant will meet the noise level criteria at the nearest noise sensitive receivers. If new or replacing external mechanical plant is proposed, then an acoustic assessment of all mechanical plant shall continue during the detailed design phase of the project in order to confirm any noise control measures.

Existing ambient and background noise levels will not be significantly increased by vehicle movements from the Ambulance Station as there will only be any additional 8 Ambulance vehicles and 8 staff carpark spaces. For noise from ambulance sirens, it is recommended that their operation within the development and surroundings shall be addressed in the Management Plan and minimised whenever possible.

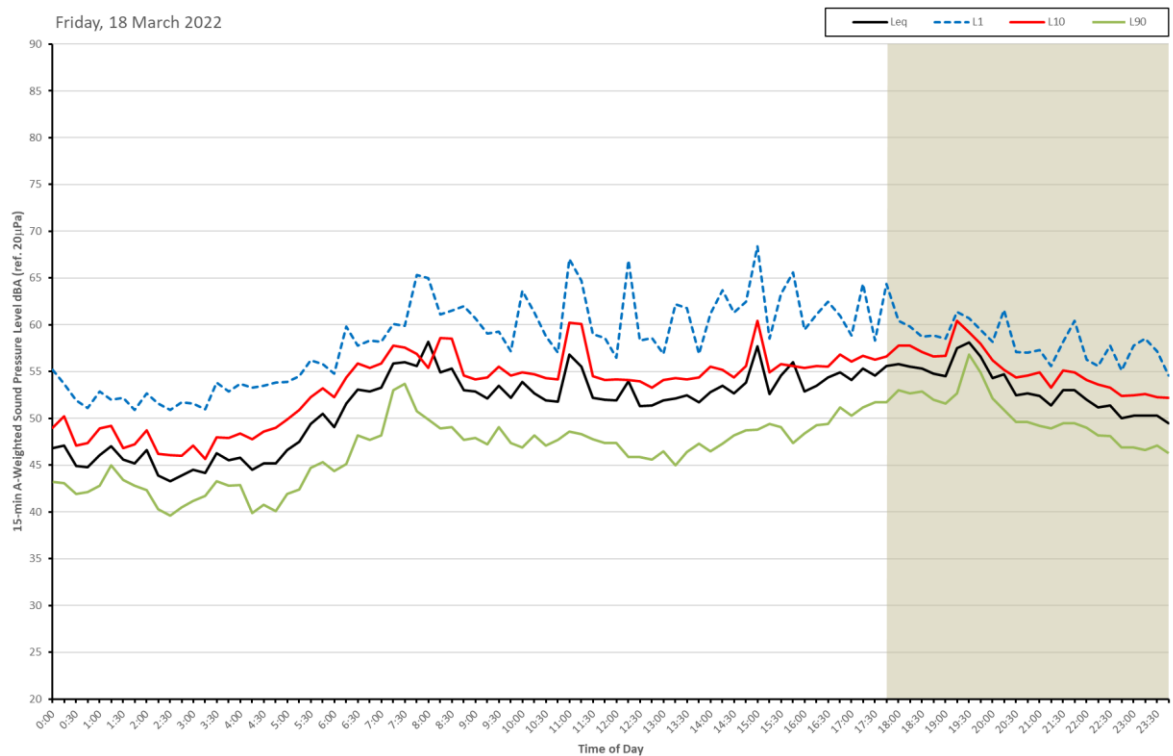
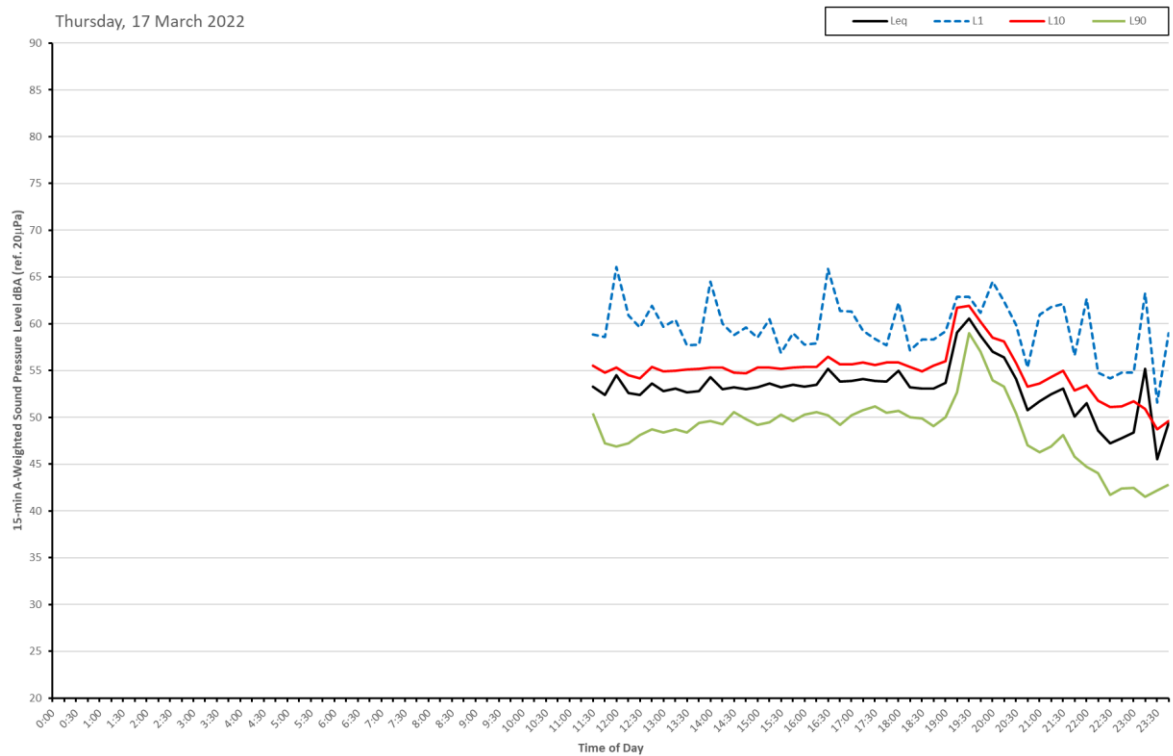
Wash bay operations are expected to comply with the relevant noise criteria as it is proposed within the ambulance plantroom and, therefore, the building façade will offer shielding to the nearest noise sensitive receivers. It is expected that the pressure washer will not impact the nearest noise sensitive receivers. However, it is recommended to restrict its use to 7am to 8pm during Monday to Friday and 8am and 8pm on Saturdays, Sundays and Public Holidays whenever reasonable.

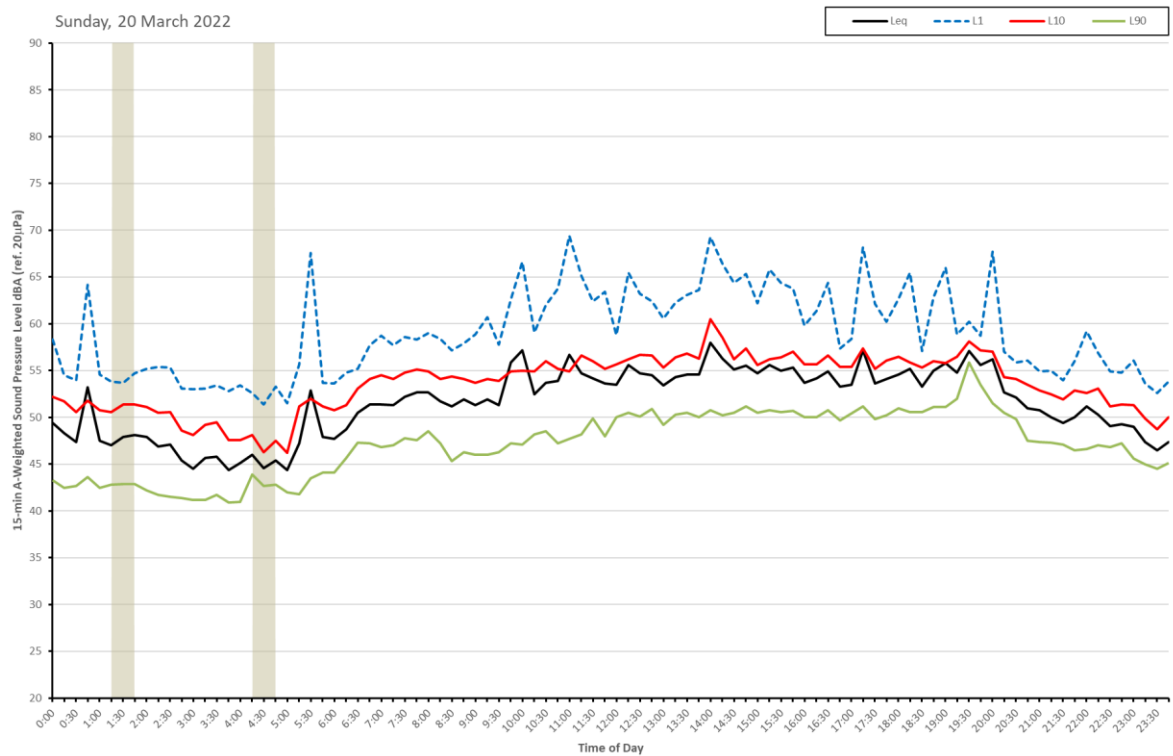
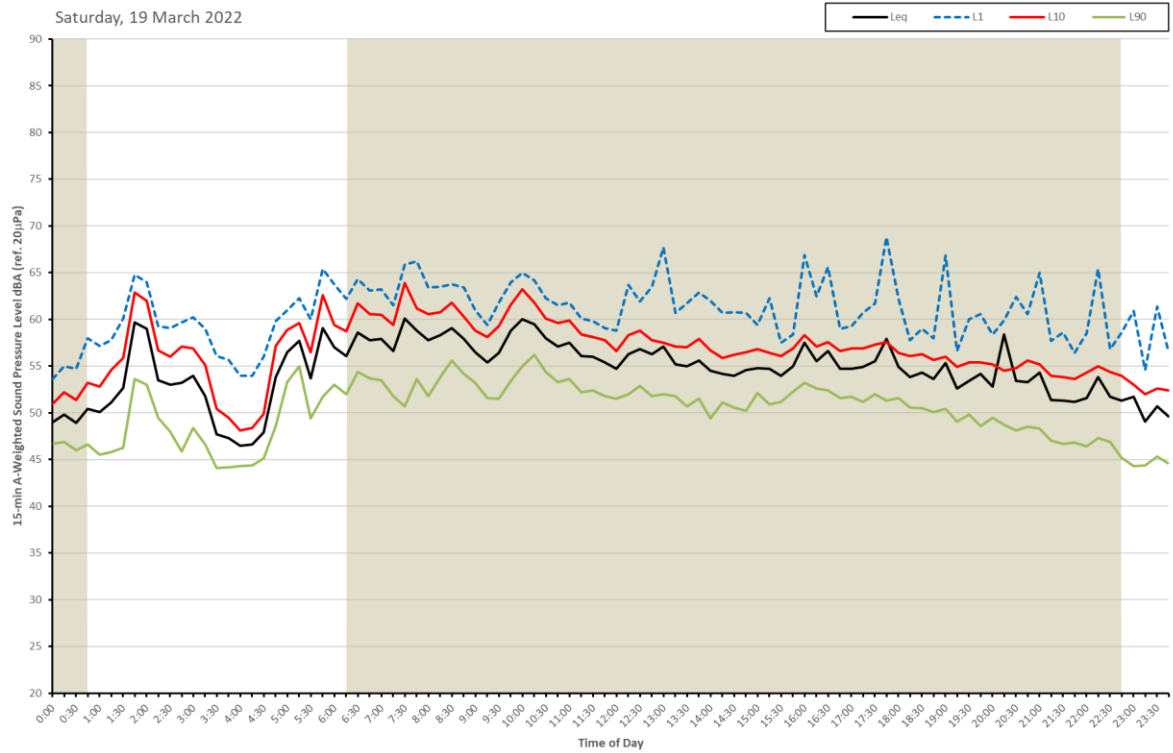
Preliminary construction noise and vibration management planning has been presented in this report and recommendations based on the relevant guidelines are provided. If, during construction works, an item of equipment exceeds the stated airborne noise and / or vibration criteria at any sensitive location, the additional noise / vibration control measures presented in this report or in the CNVMP, together with construction best practices, shall be considered to minimise noise and vibration impacts on the sensitive receivers.

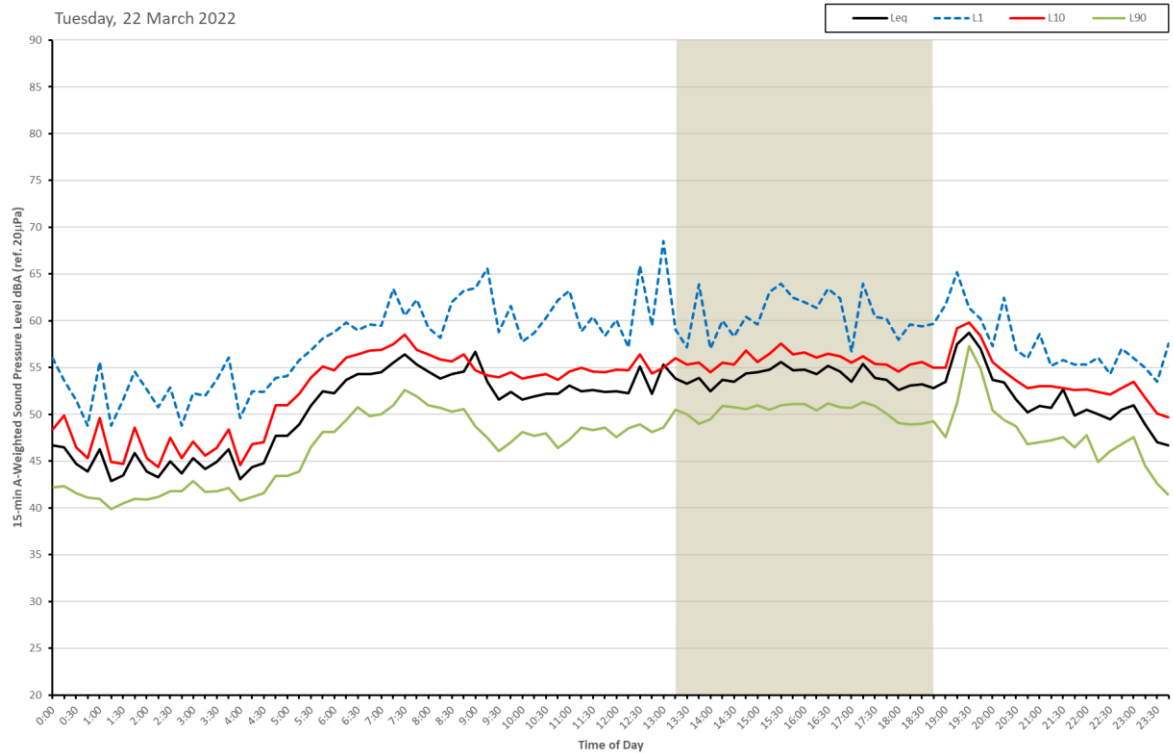
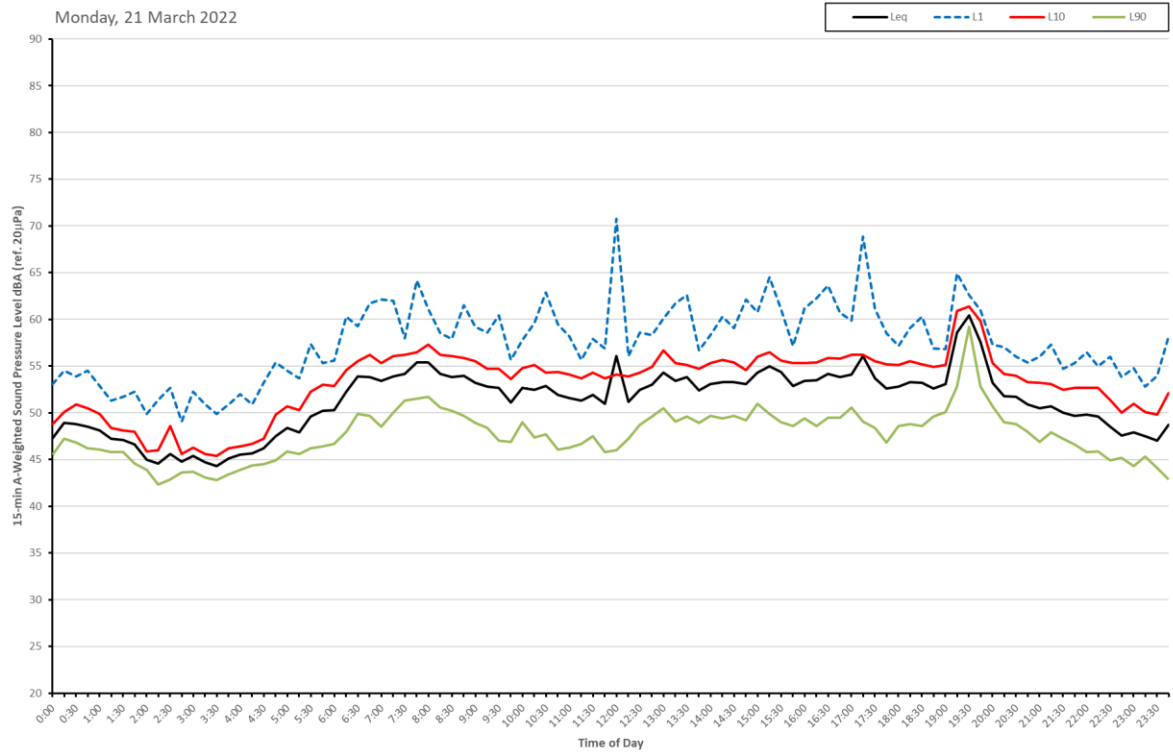
The information presented in this report shall be reviewed if any modifications to the features of the development specified in this report occur, including and not restricted to selection of mechanical plant, modifications to the building and introduction of any additional noise sources.

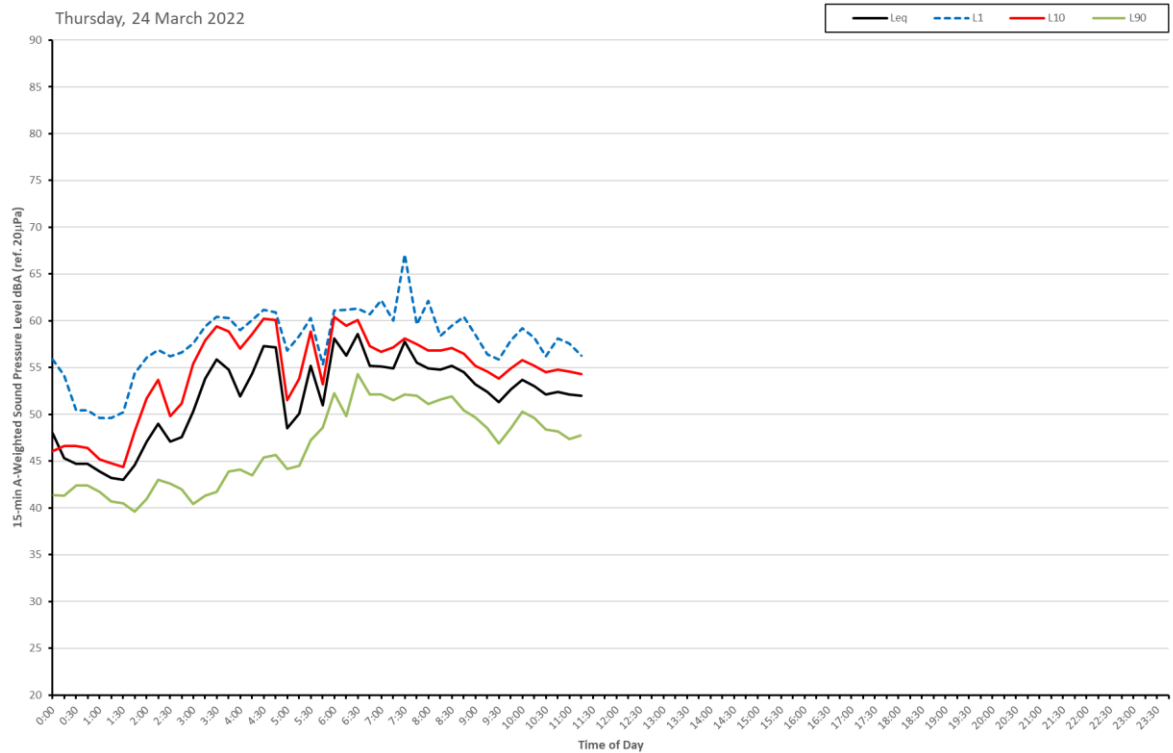
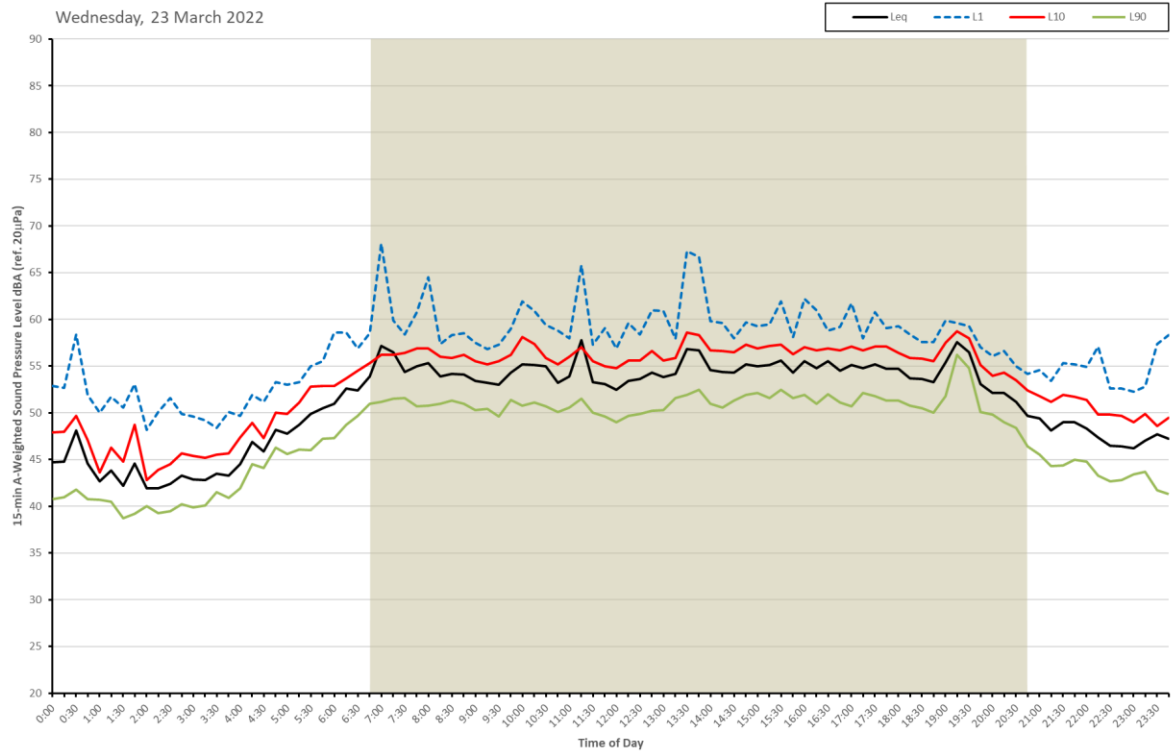
Based on the information presented in this report, relevant objectives will be satisfied and therefore approval is recommended to be granted.

## APPENDIX A: LONG-TERM NOISE MONITORING DATA









## APPENDIX B: NSW NSW AMBULANCE – EMERGENCY DRIVING AND USE OF WARNING DEVICES POLICY DIRECTIVE (PD2016-033)

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**EMERGENCY DRIVING AND USE OF WARNING DEVICES POLICY  
DIRECTIVE**

<b>Document No.</b>	PD2016-033	
<b>File No.</b>	16/623 (D16/23847)	
<b>Date issued</b>	13 January 2017	
<b>Contents</b>	<b>Policy Directive</b>	Policy Directive - Emergency Driving and Use of Warning Devices
	<b>Attachments</b>	Nil
<b>Directorate</b>	Service Delivery	
<b>Author Branch</b>	Service Delivery	
<b>Branch Contact</b>	Executive Staff Officer 9320 7873	
<b>Summary</b>	The purpose of this policy is to outline the correct use of warning devices for all operational staff.	
<b>Applies to</b>	All NSW Ambulance operational staff	
<b>Review Date</b>	February 2022	
<b>Previous Reference</b>	SOP2014-001	
<b>Status</b>	Active	
<b>Approved by</b>	Chief Executive	
<b>Related Documents</b>	<a href="#">Australian Road Rules Part 19 Rule 306 – Exemptions for Drivers of Emergency Vehicles</a> <a href="#">Roads &amp; Traffic Authority Vehicle Standards Information 10.366 Cat No. 45070588 Rev. 4.1</a> <a href="#">SOP2013-015 Self Responding to Incidents Policy</a> <a href="#">NSW Work Health and Safety Act 2011</a> <a href="#">SOP2013-014 Dispatch – Emergency Response Standards Policy</a> <a href="#">Fleet Manual Policy Directive PD2016-034</a> <a href="#">Fleet Manual Operating Procedure PRO2016-039</a>	

**Compliance** with this work instruction is **mandatory**



**Emergency Driving & Use of Warning Devices Policy Directive****1. Background**

This policy directive has been created to minimise risk to operational personnel and the Public and to ensure legal compliance under Road Traffic Act 1909 No. 5 and The Australian Road Rules 2008 whilst engaged in emergency response driving.

NSW Ambulance personnel driving a NSW Ambulance vehicle under emergency response conditions can claim exemptions in certain circumstances. Specifically the driver must be able to prove, in the circumstances:

- they were taking reasonable care; and
- it was reasonable that the rule should not apply; and
- If the vehicle is a motor vehicle that is moving - the vehicle is displaying a blue or red flashing light and sounding an alarm. Alternatively, displaying a blue or red flashing light only.

The Australian Road Rules refer to the driver of any emergency vehicle, where it is expedient and safe to do so, may:

- Drive in any direction on part of a public street or overtake or pass on either side of another vehicle, but only with due care
- Stop, leave standing or park the emergency vehicle at any time or place
- Exceed the speeds prescribed by the Traffic Act 1909 No. 5 only when safe to do so

**2. Use Of Warning Devices**

When driving a NSW Ambulance vehicle under emergency response conditions, the driver shall:

- Be solely responsible for the vehicle and afford maximum safety of its occupants and any other road users, at all times.
- Comply with requirements of the Traffic Act 1909 No. 5 and Australian Road Rules 2008.
- Drive at a speed and manner appropriate to traffic, road and prevailing weather conditions.
- Drive in a professional manner at all times.
- Not proceed through a railway or tram crossing when the warning signals are in operation unless directed to do so by an authorised person.



- Wear a seat belt at all times. Seat belts must be worn at all times in the rear patient compartment unless immediate lifesaving intervention is required.
- Not enter an intersection or junction that is controlled by a traffic sign, light or other road marking, at a speed where the driver cannot stop the vehicle in order to avoid a crash or causing a crash.
- On approach to a traffic light controlled intersection faced with a red light, the driver must slow down and stop if necessary until all other traffic has completely stopped. Once all other traffic has stopped, and it is safe to do so, enter and proceed through the intersection with caution.
- Particular care must be exercised when transiting through school zones as the unpredictability of children; especially at the sight of an emergency vehicle approaching is heightened.

### **2.1 Category One response**

- NSW Ambulance personnel who drive a vehicle under emergency response conditions shall use safety equipment provided by NSW Ambulance for that purpose which includes warning devices: lights and sirens. Lights can be used in isolation without the use of a siren if the driver of the vehicle deems the circumstances are safe to do so and can justify reasonable cause to do so.
- Blue or red flashing lights shall be activated at the commencement of all emergency drives. Blue or red flashing lights shall remain active when parked at the emergency scene, unless parked in a position that affords maximum safety without the need to display the lights.
- Where the highest clinical level paramedic responsible for the patient decides that the patient's condition warrants the use of emergency driving procedures during transfer (this decision must be communicated to the control centre immediately).
- A crew decision to upgrade the response in order to expedite to a location as described in SOP2013-014 for priority two (2) incidents (this decision must be communicated to the control centre immediately).
- The siren should be considered on the approach to any hazard, in particular:
  - Physical hazards such as junctions, roundabouts, bends or hill crests
  - Those created by the presence, position or movement of other road users
- Deactivation of the siren during an emergency drive should only be considered if the driver can justify reasonable cause to do so, there is no benefit to be gained from the use of the siren and there is no compromise to the safety of other road users.
- The driver's decision to use all warning devices will always be supported by NSW Ambulance should a complaint be received due to noise made when responding to an emergency



- When exceeding the prescribed speed limit:
  - Drive so that you are able to stop safely in the distance you can see to be clear
  - Drive at a speed which is appropriate to the conditions
  - Remember if you double your speed, quadruple your stopping distance
  - No emergency is so great to justify an accident

### **3. COLLISION**

Personnel involved in a collision must:

- Stop at the scene
- Notify control immediately
- Ensure safety of personnel
- Give all possible assistance to any person involved in the incident
- If extra resources are needed, notify control
- Give all "required particulars" to:
  - any other driver (or that driver's representative) involved in the collision; and
  - any other person involved who is injured (or that person's representative)
  - the owner of any property (including any vehicle) damaged in the collision (or the owner's representative), unless, in the case of damage to a vehicle, the particulars are given to the driver of the other vehicle
- The driver's responsibility
  - the driver must give the driver's required particulars, within the required time, to a police officer; that is not more than 90 minutes after the collision
  - present himself or herself to a police officer at the scene of the collision or at a police station for the purpose of providing particulars of the collision
  - submit to any requirement to undertake a test relating to the presence of alcohol or a drug in his or her blood or oral fluid



#### **4. SELF RESPONDING**

It is an organisational mandate that no self-responding to incidents is to occur, however, operational managers and on road supervisors may initiate a response within their geographic area of responsibility provided appropriate notification is given to the control centre so that a tasking record can be produced.

#### **REVISION HISTORY**

<b>Version (Document #)</b>	<b>Amendment notes</b>
12/2016 (PD2016-033)	Policy transferred to new template nil changes made
10 April 2014 (SOP2014-001)	Endorsed by Chief Executive. Updating of SOP to make requirement of using warning devices (lights / sirens) as AND / OR + examples of when one or the other might be used as opposed to both. Change to recognise that an Operational Manager can instigate a response to an incident but must advise the Control Centre
5 September 2012 (SOP2012-018)	Endorsed by the Chief Executive