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Project: **OUR LADY OF SION STEAMD & ADMIN CENTRE**

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Report No.: **Rp 001 R01 20210964**

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Document Control

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EXECUTIVE SUMMARY

It is proposed to develop a new STEAMD and Admin Centre at Our Lady of Sion College in Box Hill. The project includes the demolition of the existing building and construction of a new centre.

Environmental noise limits have been developed taking into consideration the applicable legislation and guidelines.

It is expected that mechanical services noise emissions from the development can achieve the regulatory noise limits with the use of appropriate acoustic treatments. Further acoustic review will be required as the mechanical design progresses.

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1.0 INTRODUCTION

It is proposed to develop a new STEAMD and Admin Centre at Our Lady of Sion College in Box Hill. The project includes a three-level building with admin offices and classrooms.

William Ross Architects Pty Ltd has engaged Marshall Day Acoustics Pty Ltd (MDA) to conduct an environmental noise assessment for the proposed development to accompany the town planning application.

This report has been prepared to assess the potential acoustic impacts from the proposed development and details our findings and recommendations.

A glossary of acoustic terms used throughout this report is provided in Appendix A.

2.0 SITE AND PROJECT DESCRIPTION

2.1 Development site

Our Lady of Sion College is located at 1065 Whitehorse Road, Box Hill. The new centre will be located in the southern area of the campus adjacent Whitehorse Road.

The site is bounded by the following:

- Existing school buildings to the north
- Dorking Road to the east with a primary school and church beyond
- Whitehorse Road to the south with residential dwellings beyond
- Graham Place to the west with residential dwellings beyond.

The nearest existing residential receivers are located approximately 60m to the south. Note that learning rooms in schools are also considered noise sensitive receivers under the Noise Protocol. St Francis Xavier's Catholic Primary School is located approximately 58m to the east.

Our assessment has included residential receivers as well as the Primary School.

An aerial photo of the site and surrounding areas is shown in Figure 1.

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Figure 1: Subject site (Source: Nearmap)



The subject site and adjacent land are zoned Residential, Road and Special Use. The relevant planning map is provided in Appendix B.

2.2 Project description

The proposed centre will include the following spaces:

- Student foyer
- Classrooms
- Office/meeting rooms
- Breakout spaces
- Amenities.

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The outdoor condensing units will be located on the roof in a dedicated plant area. The generator is proposed to be located to the east of the new building.

The latest drawings dated March 2022 prepared by Williams Ross Architects have been reviewed as part of this assessment. The proposed site plan is shown in Figure 2.

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Figure 2: Proposed site plan



3.0 BACKGROUND NOISE MEASUREMENTS

Background noise levels at the southern side of the site were measured between Wednesday 17 November to Saturday 27 November 2021. Figure 1 includes an aerial view of the monitoring location and surrounds.

A summary of the minimum measured noise levels for the day, evening and night period are shown in Table 1.

Table 1: Measured background noise levels, LA90 dB

Period	Minimum
Day	53
Evening	50
Night	38

Detailed noise logging results for each day and a photograph of the monitor set-up is provided in Appendix C.

These noise levels have been used to calculate the environmental noise limits at the site.

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4.0 VICTORIAN LEGISLATION AND GUIDELINES

A summary of the relevant Victorian noise legislation and guidelines is provided in Table 2. Further details are provided in Appendix D.

Table 2: Key noise legislation and guidelines

Publication	Description
<i>Environment Protection Act 2017</i> (the Act)	The Act provides the overarching legislative framework for the protection of the environment in Victoria. It establishes a general environmental duty to minimise the risks of harm to human health or the environment from pollution or waste, including noise, so far as reasonably practicable. The Act does not specify noise limit values but prohibits the emission of unreasonable or aggravated noise from non-residential premises.
<i>Environment Protection Regulations 2021</i> (Regulations)	The objectives of the Regulations are to further the purposes of, and give effect to, the Act. Part 5.3, Division 1 states that prediction, measurement, assessment, or analysis of noise within a noise sensitive area for the purposes of the Act or these Regulations, must do so in accordance with the Noise Protocol (see below). Division 3 stipulates requirements that are specific to commercial, industrial and trade premises. The Division defines assessment time periods, minimum noise limit values, management of cumulative noise from multiple premises, noise sensitive areas where assessment requirements apply, definition of frequency spectrum as a prescribed factor, and a definition for unreasonable and aggravated noise. Refer to Appendix D2 for further detail.
EPA Victoria Publication 1826 <i>Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues</i> (Noise Protocol)	The Noise Protocol defines the method for setting the noise limits for new and existing commercial, industrial and trade premises and entertainment venues in Victoria. It also outlines the steps that must be followed to undertake an assessment (measurement or prediction) of the effective noise level within a noise sensitive area or at an alternative assessment location. Refer to Appendix D3 for further detail.

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5.0 MECHANICAL SERVICES

5.1 Noise protocol limits

External noise from mechanical services such as from air-conditioning, ventilation, exhaust, and refrigeration equipment, as well as power generators, are required to comply with the requirements of the Noise Protocol. The Noise Protocol sets outdoor noise limits at noise sensitive areas for the day, evening, and night period.

Table 3 details the Noise Protocol limits that would apply to the centralised plant from the site.

A full derivation is provided in Appendix D3.

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Table 3: Noise Protocol limits

Period	Day	Time	Zoning level, dB	Measured background noise level, dB LA90	Background relative to zoning level	Noise limit, dB Leff
Day	Monday – Saturday	0700 to 1800 hrs	56	53	High	59
Evening	Monday – Saturday	1800 to 2200 hrs	49	50	High	53
	Sunday and Public Holidays	0700 to 2200 hrs				
Night	Monday – Sunday	2200 to 0700 hrs the next day	44	38	Neutral	44

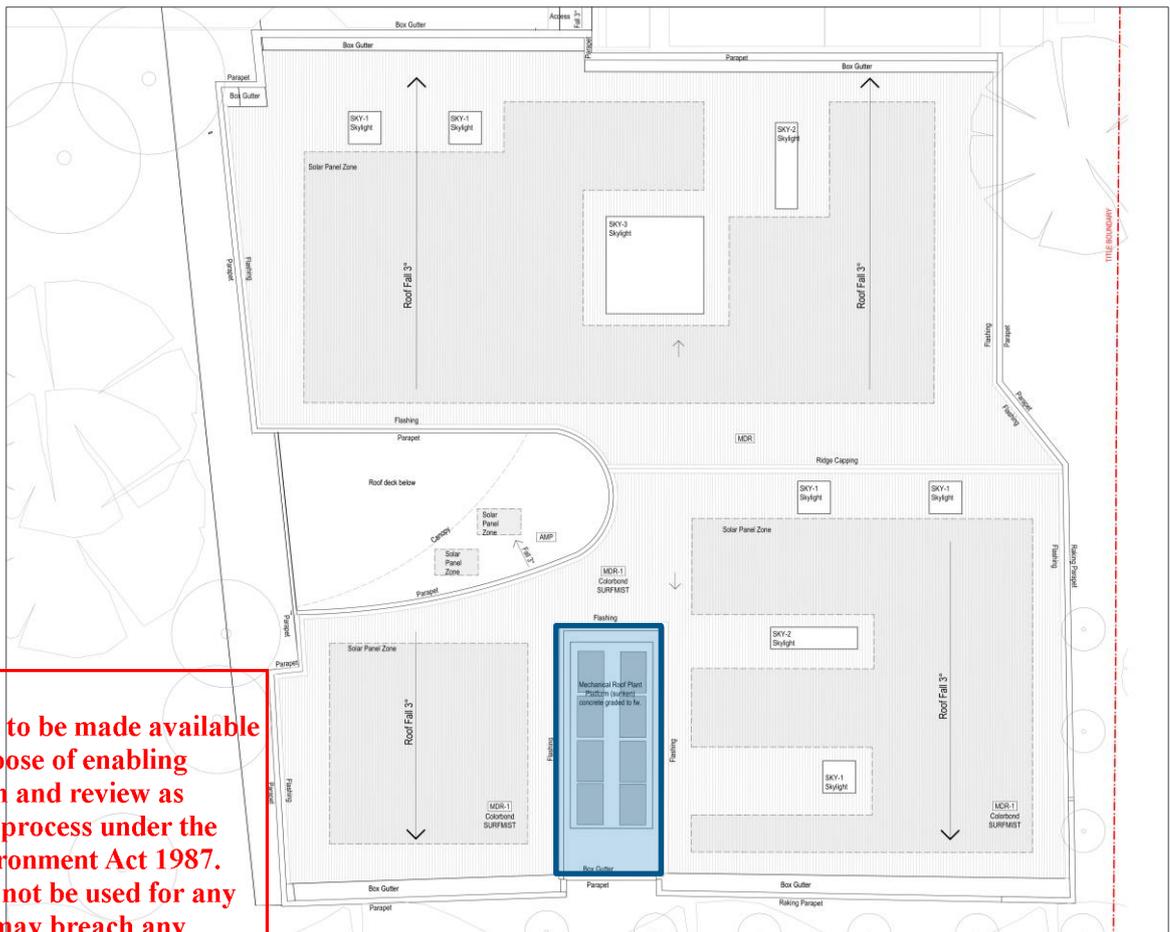
The Noise Protocol states that where a noise source under consideration is equipment used solely in relation to emergencies, the relevant noise limits applying to the testing or maintenance of such equipment is increased by 10 dB for a day period and by 5 dB for all other periods. This has been utilised when assessing the generator.

5.2 Centralised plant

The centralised plant serving the development has not yet been confirmed but is expected to include air-conditioning units, air-to-air heat exchanger and exhaust fans.

The equipment is expected to be located in the rooftop plant area on the new building, highlighted in Figure 3.

Figure 3: Rooftop plant area



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Noise level data for the equipment has not been supplied at the time of writing.

It is predicted that with appropriate selection of equipment, location and acoustic treatment, the noise limits can be achieved. Proprietary noise control treatments such as localised barriers, attenuators or acoustic enclosures will be included where required to achieve the Noise Protocol noise limit for noise egress from the site. Allowance shall be made for a solid barrier to the southern side of the plant deck, extending a minimum of 1 metre above the top of the condensing units.

To reduce noise into the buildings, a concrete slab and appropriate vibration isolation shall be provided for the plant.

A more detailed assessment of the mechanical services design will be undertaken as the design and plant selections emerge.

5.3 Generator

The generator that will be utilised at the development has been confirmed by BRT Consulting Pty Ltd. The noise level data for the equipment is provided in Table 4, and the location in Figure 4.

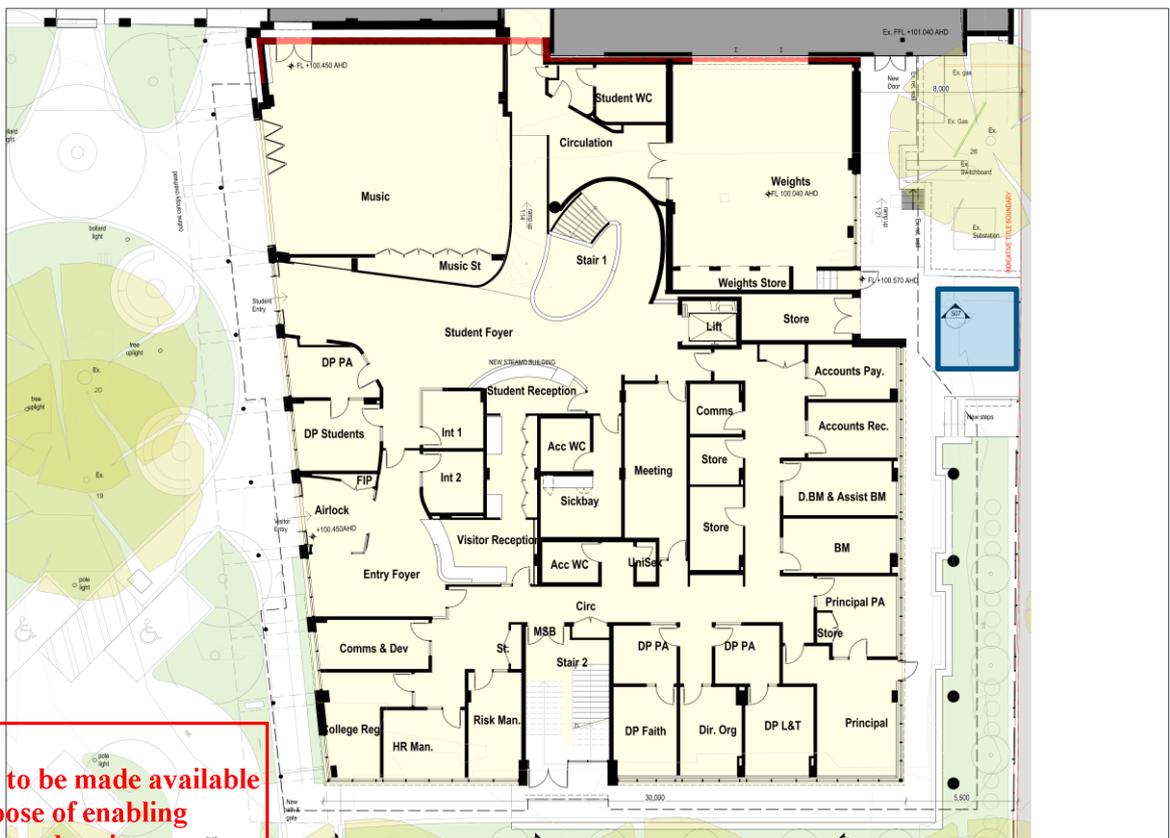
The generator will only be used during emergencies in the event of a power outage. It has been assumed that the generator would only operate during the day period (during school hours).

Table 4: Generator noise data

Description	Octave Band Centre Frequency (Hz)*							A
	63	125	250	500	1000	2000	4000	
Decon Corporation DG500PEEU3, Lp at 7m	67	72	71	68	65	64	61	72

* The spectrum has been derived based on a measurement of a similarly sized Generator

Figure 4: Generator location



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It is predicted that with the current generator selected and its location, the noise limits can be achieved at all noise sensitive receivers during the day period. Additional treatment may be required if the generator will operate outside school hours.

6.0 SUMMARY

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Environmental noise limits have been developed taking into consideration the applicable legislation and guidelines.

It is expected that mechanical services noise emissions from the development can achieve the regulatory noise limits with the use of appropriate acoustic treatments. Further acoustic review will be required as the mechanical design progresses.

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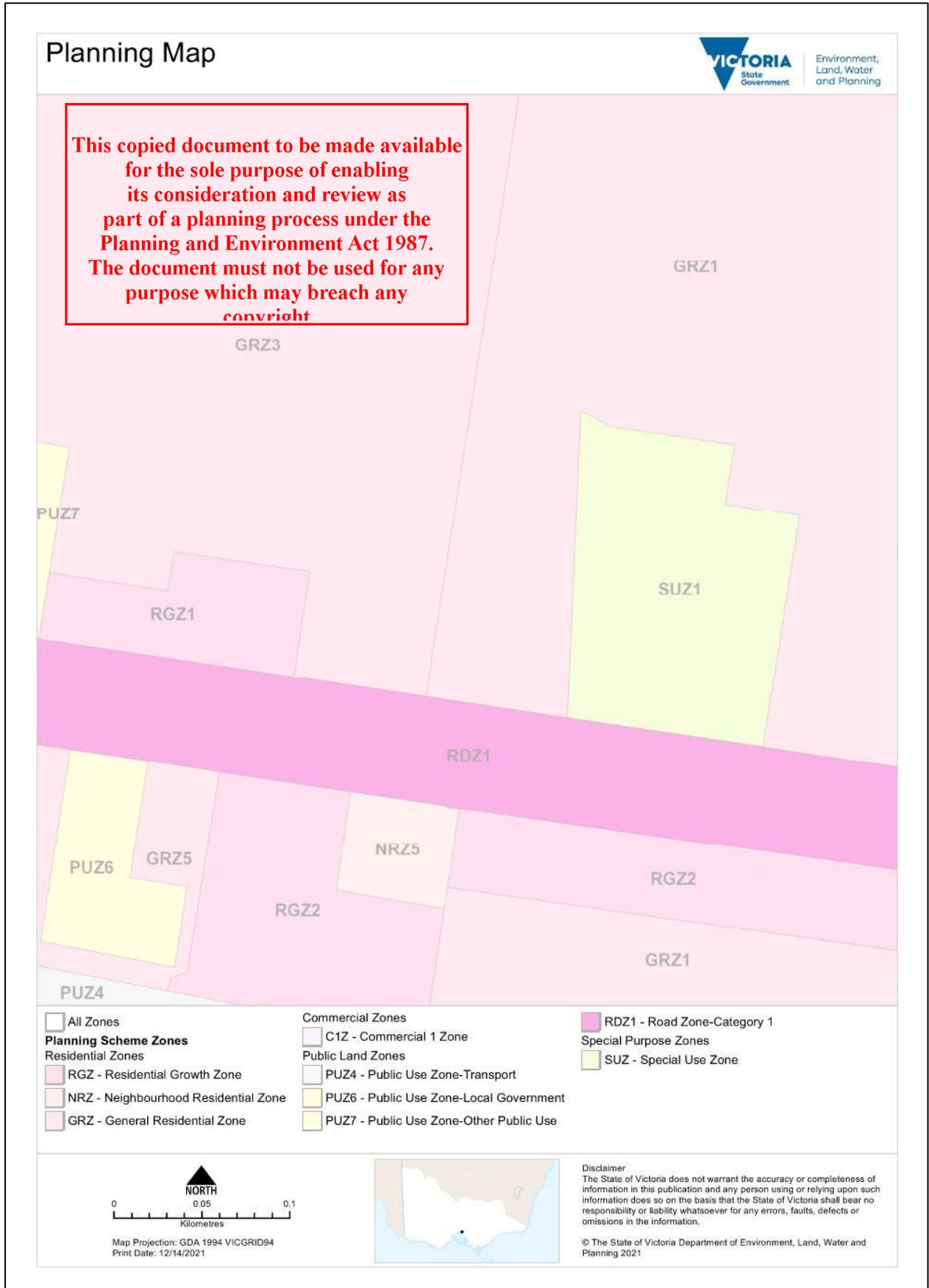
APPENDIX A GLOSSARY OF TERMINOLOGY

A-weighting	The process by which noise levels are corrected to account for the non-linear frequency response of the human ear.
Ambient	The ambient noise level is the noise level measured in the absence of the intrusive noise or the noise requiring control. Ambient noise levels are frequently measured to determine the situation prior to the addition of a new noise source.
dB	<u>Decibel</u> The unit of sound level. Expressed as a logarithmic ratio of sound pressure P relative to a reference pressure of $P_r=20 \mu\text{Pa}$ i.e. $\text{dB} = 20 \times \log(P/P_r)$
Frequency	The number of pressure fluctuation cycles per second of a sound wave. Measured in units of Hertz (Hz).
Hertz (Hz)	Vibration can occur over a range of frequencies extending from the very low, such as the rumble of thunder, up to the very high such as the crash of cymbals. The frequency of vibration and sound is measured in hertz (Hz). Once hertz is one cycle per second. Structural Vibration is generally measured over the frequency range from 1 Hz to 500 Hz (0.5 kHz).
L_w (or SWL)	Sound Power Level. The level of total sound power radiated by a sound source.
L_{A90}	The A-weighted noise level equalled or exceeded for 90% of the measurement period. This is commonly referred to as the background noise level.
L_{Aeq}	The equivalent continuous (time-averaged) A-weighted sound level. This is commonly referred to as the average noise level.
L_{eff}	The effective noise level of commercial or industrial noise determined in accordance with the Noise Protocol. This is the L_{Aeq} noise level over a half-hour period, adjusted for the character of the noise. Adjustments are made for tonality, intermittency and impulsiveness.
Octave Band	A range of frequencies where the highest frequency included is twice the lowest frequency. Octave bands are referred to by their logarithmic centre frequencies, these being 31.5 Hz, 63 Hz, 125 Hz, 250 Hz, 500 Hz, 1 kHz, 2 kHz, 4 kHz, 8 kHz, and 16 kHz for the audible range of sound.

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APPENDIX B PLANNING MAP



APPENDIX C BACKGROUND NOISE MEASUREMENTS

Background noise levels at the southern end of the site were measured using a 01dB Duo smart noise monitor (S/N: 10499) fitted with a windshield.

The microphone was mounted on a tripod at a height of approximately 1.5 m above local ground level and under free field conditions. Measurements were obtained using the 'F' response time and A-weighting frequency network. The equipment was checked before and after the survey and no significant drift in calibration was observed.

Consecutive measurements were obtained from Wednesday 17 November to Saturday 27 November 2021. The prevailing noise environment when consultants attended the site to install and collect the equipment was dominated by local traffic noise.

Figure 5 shows a photograph of the monitor setup.

Figure 5: Photograph of noise monitor setup



Table 5 details the average measured noise levels obtained from the logger for each time period. Weather data information has been taken from the BOM weather station at Melbourne (Olympic Park). Periods of high winds and significant rainfall have been removed from the data.

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Table 5: Average measured background level, dB LA90

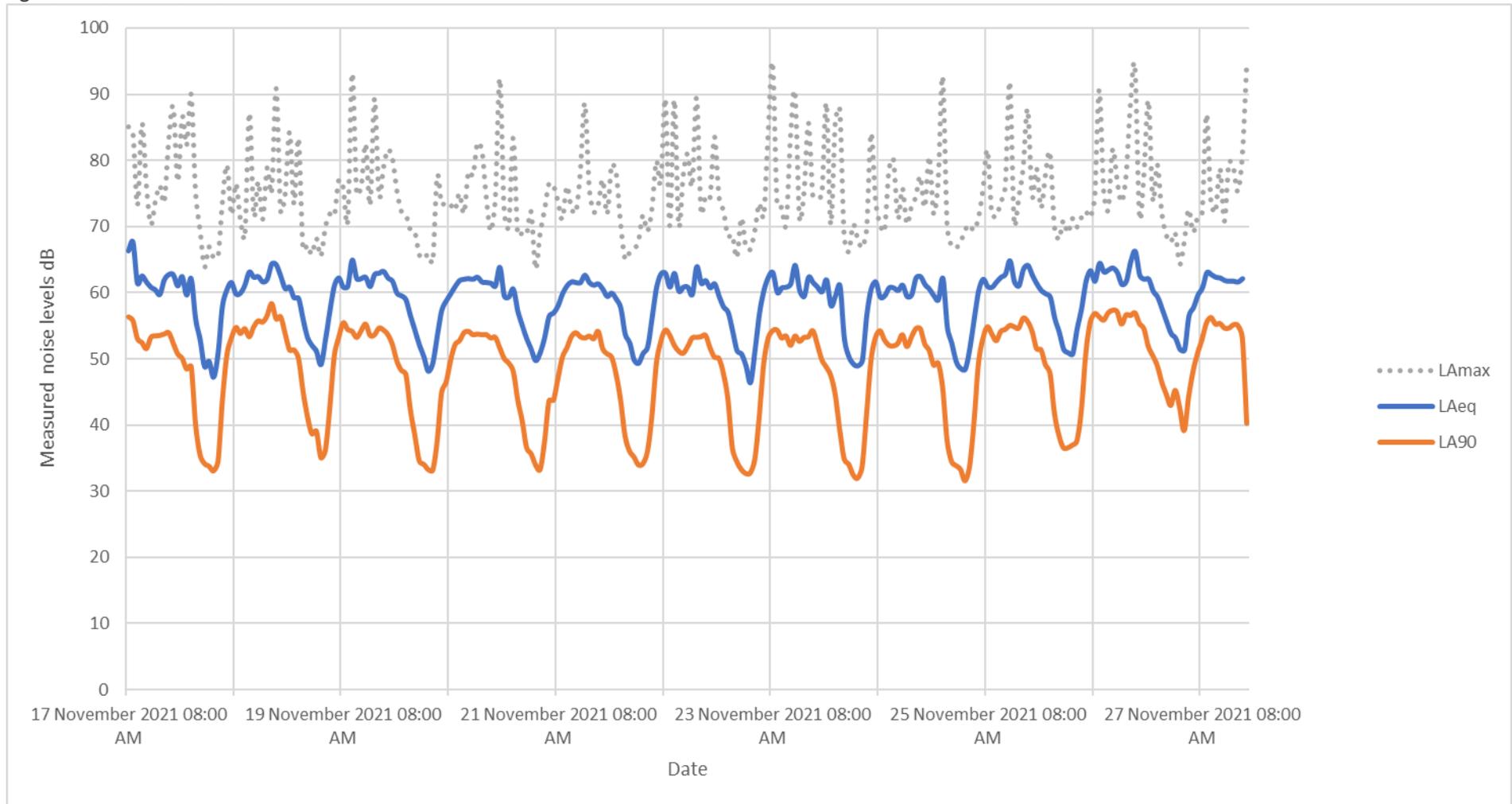
Date	Day	Period	
		Evening	Night
Wednesday 17 November 2021	54	50	39
Thursday 18 November 2021	55	53	42
Friday 19 November 2021	54	51	38
Saturday 20 November 2021	53	51	39
Sunday 21 November 2021	N/A	51	39
Monday 22 November 2021	53	50	38
Tuesday 23 November 2021	53	50	38
Wednesday 24 November 2021	53	51	38
Thursday 25 November 2021	55	52	41
Friday 26 November 2021	57	53	45
Saturday 27 November 2021	54	N/A	N/A
Minimum	53	50	38

The measurement results are shown graphically in Figure 6.

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Figure 6: Measurement results



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APPENDIX D LEGISLATION AND GUIDELINES

D1 General Environmental Duty

The General Environmental Duty (GED) is outlined in Part 3.2 of the Environmental Protection Act 2017 (the Act) which came into effect 1 July 2021.

The GED requires anyone engaging in an activity posing a risk of harm to human health and/or the environment from pollution (including noise) and waste, to minimise those risks to prevent harm as far as reasonably practicable. Commercial premises are therefore required to continue to review and eliminate or reduce the risk of harm from any emission of noise as far as reasonably practicable, even if they are compliant with the Noise Protocol.

The GED applies wherever there is a risk of harm, regardless of whether the noise emitted has caused complaints or caused harm to people or the environment.

The GED is applied first to eliminate or reduce the risk of harm to human health and the environment from noise so far as reasonably practicable. Any residual noise remaining after actions are taken to meet the GED is then managed as per the unreasonable noise definitions in section 166 of the Act (i.e. complying with the Noise Protocol).

D2 Environmental Protection Regulations

The objectives of the Regulations are to further the purposes of, and give effect to, the Act. The Regulations also define outdoor sensitive areas, commercial, industrial and trade premises, as well as indoor, outdoor and live entertainment venues and events.

Part 5.3 of the Regulations sets out requirements that are specific to environmental noise. Division 1 states that the prediction, measurement, assessment or analysis of noise within a noise sensitive area for the purposes of the Act or the Regulations must be conducted in accordance with the Noise Protocol (see below). Division 3 stipulates requirements that are specific to commercial, industrial and trade premises. Division 4 applies to music noise from entertainment venues and events.

In particular, noise from these types of premises and venues is prescribed as unreasonable if it exceeds a noise limit or alternative criterion determined in accordance with the Noise Protocol (see below). Additional matters addressed in Divisions 3 and 4 include assessment time periods, minimum noise limit values, management of cumulative noise from multiple premises, noise sensitive areas where assessment requirements apply, definition of frequency spectrum as a prescribed factor, and a definition for aggravated noise.

D3 EPA Victoria Publication 1826 – The Noise Protocol

As per the Division 1, Regulation 113 of the Regulations, assessment of noise within a sensitive area must be conducted in accordance with EPA Victoria Publication 1826 *Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues* (the Noise Protocol). The Noise Protocol outlines the EPA's required approach to the determination of noise limits and to the measurement, prediction and analysis of noise.

D3.1 Noise limits for commercial, industrial and trade premises

The Noise Protocol provides two methods for deriving the relevant noise limits, the Urban area method and the Rural area method. The Urban area method is applicable to the proposed development.

The noise limits are calculated taking into account planning scheme land 'zoning types' within a 70 m and 200 m radius of a noise sensitive receiver. The Noise Protocol categorises land zones as type 1, 2 or 3. Zone type designations consider the nature of the permitted land uses and are generally as follows:

- areas such as residential, rural and open space are type 1;
- areas such as commercial, business and light industry are type 2; and
- areas such as general industry and major roads are type 3.

A prescribed formula is used to calculate a corresponding Zoning Level. Greater areas of type 2 and 3 land within a 200 m radius of a noise sensitive site result in higher Zoning Levels than a site with respectively larger areas of type 1 land.

The noise limit is equal to the ‘zoning level’ unless the background level at the noise sensitive site is categorised as low or high according to clause 4 of the Policy. If the background level is low or high, the Noise Limit is calculated from a formula taking into account both the Zoning Level and the Background Level.

The current land use zones around the subject site are shown in the planning map in Appendix B.

The limits are separately defined for the day, evening and night periods. The relevant noise limits applicable to this development are shown in Table 6.

The Noise Protocol states that where a noise source under consideration is equipment used solely in relation to emergencies, the relevant noise limits applying to the testing or maintenance of such equipment is increased by 10 dB for a day period and by 5 dB for all other periods. This has been utilised when assessing the generator.

Table 6: Environmental noise limits, dB L_{eff}

Period	Day	Time	Zoning level, dB	Measured background noise level, dB L_{A90}	Background relative to zoning level	Noise limit, dB L_{eff}
Day	Monday – Saturday	0700 to 1800 hrs	56	53	High	59
Evening	Monday – Saturday	1800 to 2200 hrs	49	50	High	53
	Sunday and Public Holidays	0700 to 2200 hrs				
Night	Monday – Sunday	2200 to 0700 hrs the next day	44	38	Neutral	44

D3.2 Assessing noise from commercial, industrial and trade premises

Noise from the facility that exceeds the noise limits is prescribed to be unreasonable by the Regulations. Part 7.6 of the Act in conjunction with Regulation 166 places the onus of compliance on industry by prohibiting the emission of unreasonable or aggravated noise.

For the purposes of this report and assessments of predicted noise levels, the noise limits apply up to 10 m from a dwelling, but within the property boundary.

Once a noise limit is established, an equivalent noise level (L_{Aeq}) due to the operation of the commercial premises is measured or predicted for a 30 minute operating period during the day, evening and night period as appropriate. If necessary, the L_{Aeq} noise level is adjusted for duration and noise character (tonality, impulsiveness and intermittency) to give the effective noise level (L_{eff}). If the L_{eff} level exceeds the noise limit, then remedial action will be required.

Consideration must be given to existing and future noise sensitive areas, factors that influence the propagation of sound (including atmospheric effects) and the cumulative contribution of noise from multiple existing and proposed sites.

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