

MEL1 - Spotswood

Environmental Noise Impact
Assessment

GreenSquare DC Pty Ltd

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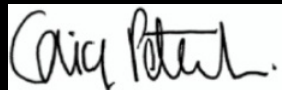
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Executive Summary

Aurecon has been engaged by GreenSquare DC to undertake the acoustic design and environmental noise impact assessment of the proposed project, to be located at 44-76 Simcock Avenue, Spotswood, VIC 3015.

This planning permit application is facilitated under the Development Facilitation Program (DFP) to the Department of Transport and Planning (DTP) for the use and development of land at 44-76 Simcock Avenue, Spotswood, for a Utility Installation, i.e., data data centre.

The proposed site is located within an Industrial Zone (Type 1). The nearest sensitive receivers are within Neighbourhood Residential Zone (Schedule 7) and General Residential Zone (Schedule 1). The surrounding zones are Transport (Type 1-3); Public Park and Recreation; or Industrial (Type 3). Nearby businesses include Visy Glass Melbourne; Emma Mclean Kindergarten; Toll Fuels Melbourne; Inner City Landscapes; and Westgate Golf Club.

EPA Victoria Publication 1826.5: *Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues* (Noise Protocol) has been utilised for the assessment. Noise limits were derived for each noise sensitive area (NSA) based on existing measured background levels and zoning levels.

A 3D computational noise model has been developed of the project and its surrounds using SoundPLAN v9.1. The model includes the neighbouring buildings and the topography of the surrounding area. The model incorporates the key items of noise generating equipment included in the design including evaporative chillers, substation transformers, standby power generators and generator test load banks. Noise emissions from the proposed development have been predicted to the surrounding Noise Sensitive Areas (NSAs) based on the conceptual design.

With appropriate noise mitigation measures, effective noise levels are predicted to comply with the applicable noise limits at the existing NSAs.

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Glossary and Abbreviations

Term	Definition
The Act	Victorian Environment Protection Act 2017
Background Noise Level	The A-weighted sound pressure level that is exceeded for 90 per cent of the measurement period, L_{A90} .
Background relevant area	A noise sensitive area within a rural area where background levels may be higher than usual. This includes areas where freeway or highway traffic is a significant audible background noise source.
Commercial, industrial and trade premises	As defined in the Environment Protection Regulations 2021: Any premises except the following — (a) residential premises (other than common plant under the control of an owners' corporation) (b) a street or road, including every carriageway, footpath, reservation and traffic island on any street or road (c) a railway track used by rolling stock in connection with the provision of a freight service or passenger service— (i) while travelling on a railway track or tramway track; or (ii) while entering or exiting a siding, yard, depot or workshop (d) a railway track used by rolling stock in connection with the provision of a passenger service, while in a siding, yard, depot or workshop and is — (i) powering up to commence to be used in connection with the provision of a passenger service; or (ii) shutting down after being used in connection with the provision of a passenger service (e) the premises situated at Lower Esplanade, St Kilda and known as "Luna Park" and being the whole or part of the land particularly described in Certificate of Title Volume 1204 Folio 109 Note: The maintenance, cleaning or loading of rolling stock stabled in a siding, yard, depot or workshop are included within the meaning of commercial, industrial and trade premises.
Decibel	Sound pressure levels are expressed in decibels as a ratio between the measured sound pressure level and the reference pressure.
dB(A)	The A-weighted sound pressure level in decibels, denoted dB(A) is the unit generally used for the measurement of environmental, transportation or industrial noise. The A-weighting scale approximates the sensitivity of the human ear when exposed to normal levels and correlates well with subjective perception of typical sounds. An increase or decrease in sound level of approximately 10 dB(A) corresponds to a subjective doubling or halving in loudness. A change in sound level of 3 dB(A) is considered subjectively just noticeable, and a change of 1 to 2 dB(A) is subjectively not noticeable.
Frequency	The rate of repetition of a sound wave. The unit of frequency is Hertz (Hz), defined as one cycle per second. Human hearing ranges approximately from 20 Hz to 20,000 Hz. Octave bands are the most commonly used frequency bands. For more detailed analysis each octave band may be split into three one-third octave bands or narrow frequency bands.
$L_{Aeq,T}$	The equivalent continuous A-weighted sound pressure level is the value of the A-weighted sound pressure level of a continuous steady sound that has the same acoustic energy as a time-varying A-weighted sound pressure level when determined over the same measurement period, T.
L_{A90}	A-frequency weighted sound pressure level, measured using the fast time-weighting, that is exceeded for 90 per cent of the time interval considered.

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Term	Definition
Noise Sensitive Area	As defined in the Environment Protection Regulations (2021): – (a) that part of the land within the boundary of a parcel of land that is • within 10 metres of the outside external walls of any of the following buildings: (A) a dwelling (including a residential care facility but not including a caretaker's house); (B) a residential building; (C) a noise sensitive residential use, or • within 10 m of the outside of the external walls of any dormitory, ward, bedroom, or living room of one or more of the following buildings: (A) a caretaker's house; (B) a hospital; (C) a hotel; (D) a residential hotel; (E) a motel; (F) specialist disability accommodation; (G) a corrective institution; (H) a tourist establishment; (I) a retirement home (J) a residential village • within 10 m of the outside of the external walls of a classroom or any room in which learning occurs in the following buildings (during their operating hours): (A) a childcare centre; (B) a kindergarten; (C) a primary school; (D) a secondary school (b) subject to paragraph (c), in the case of a rural area only, that part of the land within the boundary of (i) a tourist establishment or (ii) a campground or (iii) a caravan park, or (c) despite paragraph (b), in the case of rural area only, where an outdoor entertainment event or outdoor entertainment venue is being operated, that part of the land within the boundary of the following are not noise sensitive areas for the purposes of that event or venue: (i) a tourist establishment or (ii) a campground or (iii) a caravan park.
Noise Protocol	EPA Victoria Publication 1826.5, Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues, September 2025.
Noise Regulations	Victorian Environment Protection Regulations 2021
Sound Power Level (SWL)	The sound power of a source is the amount of acoustic energy being generated per unit time by the source and does not change with distance. The sound power level is defined as 10 times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power of 1 Pico Watt. Sound power level cannot be directly measured using a microphone. The sound power level of a machine may vary depending on the actual operating load.
Sound Pressure Level (SPL)	The sound pressure level is the sound level experienced at a distance from the generating source, relative to a standard reference pressure of 20µPa (20x10 ⁻⁶ Pascals) on a decibel (dB) scale.
Tonality	Tonal noise (such as humming, droning, whining or squealing), is sound characterised by a prominent discrete frequency or frequencies. Tonal noise has a more prominent frequency than non-tonal noise.

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1 Introduction

This noise impact assessment report has been prepared to support a planning permit application under the Development Facilitation Program (DFP) to the Department of Transport and Planning (DTP) for the use and development of land at 44-76 Simcock Avenue, Spotswood, VIC 3015, for purpose-built data centre, associated infrastructure and earthworks. The land is located in Spotswood, in the Hobsons Bay Local Government Area. The subject site is noted in Figure 1-1 below.



Figure 1-1 Project Site, adjacent Local Government Areas and surrounding road infrastructure.

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2 Project Description

2.1 Project Site

The developer seeks approval to allow the development and use the subject site for the purpose of a data centre Figure 2-1 for the allocated project area.

The site has an established planning history and is currently subject to the following planning approvals:

- PA230665 (January 2025): Development of four warehouses, removal of easements, and reduction in car parking requirements.
- PA230945 (December 2023): Removal of an easement.
- PA210039 (VCAT April 2024): Subdivision into four lots and removal of native vegetation.

Notwithstanding the above, the current proposal is being assessed as a stand-alone application through the DFP pathway. The previously approved warehouse and subdivision outcomes will not be pursued, and the site is instead proposed to be developed as a staged data centre, in accordance with the application documents accompanying this submission. Additionally, early preparatory works across the site are being progressed separately through a Section 72 amendment to Planning Permit PA230665.

As a part of the amendment for the development of the data centre, a noise impact assessment has been undertaken with respect to Victorian Regulations.

The project comprises of the following:

- Ten 3-storey high data centre buildings, designed to be delivered in 10 phases, with associated site infrastructure to support the building's function. Refer to Figure 2-2.
- An electrical supply authority substation consisting of two 220/33kV transformers and associated equipment.
- Two technical buildings incorporating office accommodation, staff facilities, storage and loading dock
- Secondary loading areas.
- Car parking facilities.
- Secure entry facility and internal (private) roads and footpaths providing access to each data centre building.
- Associated landscaping.
- Security fencing around the entire site.

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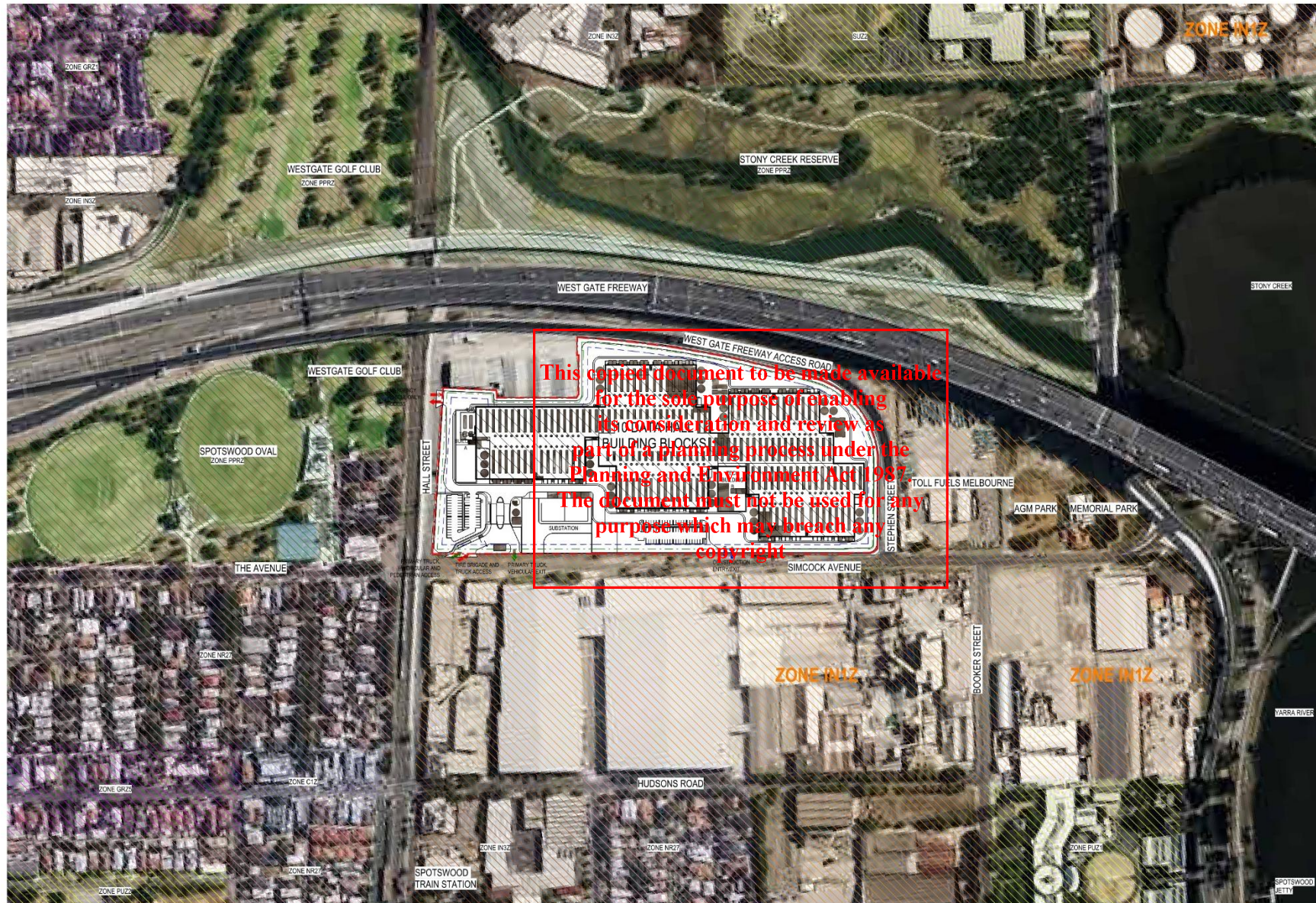
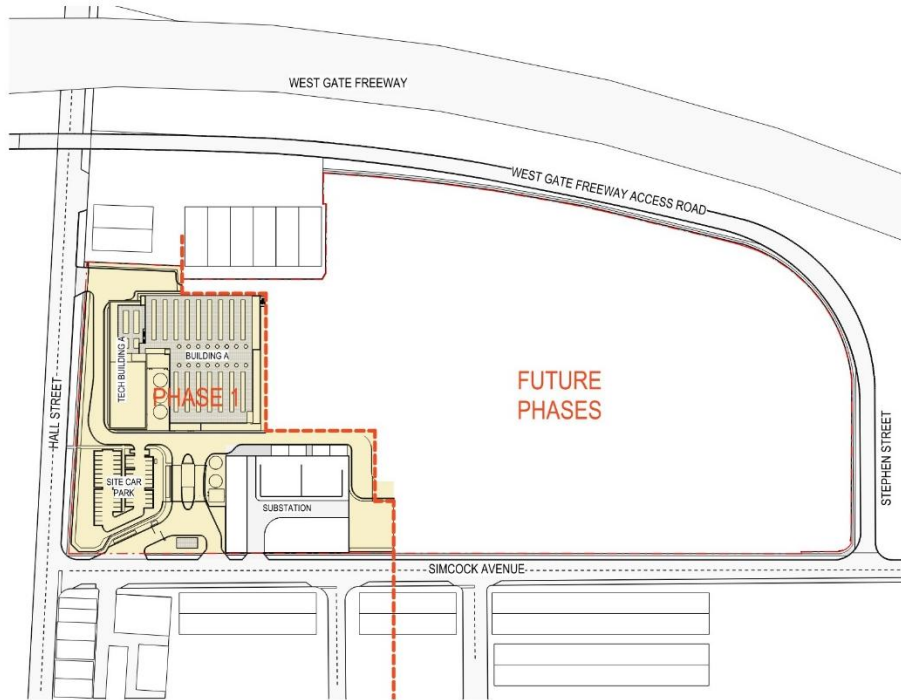
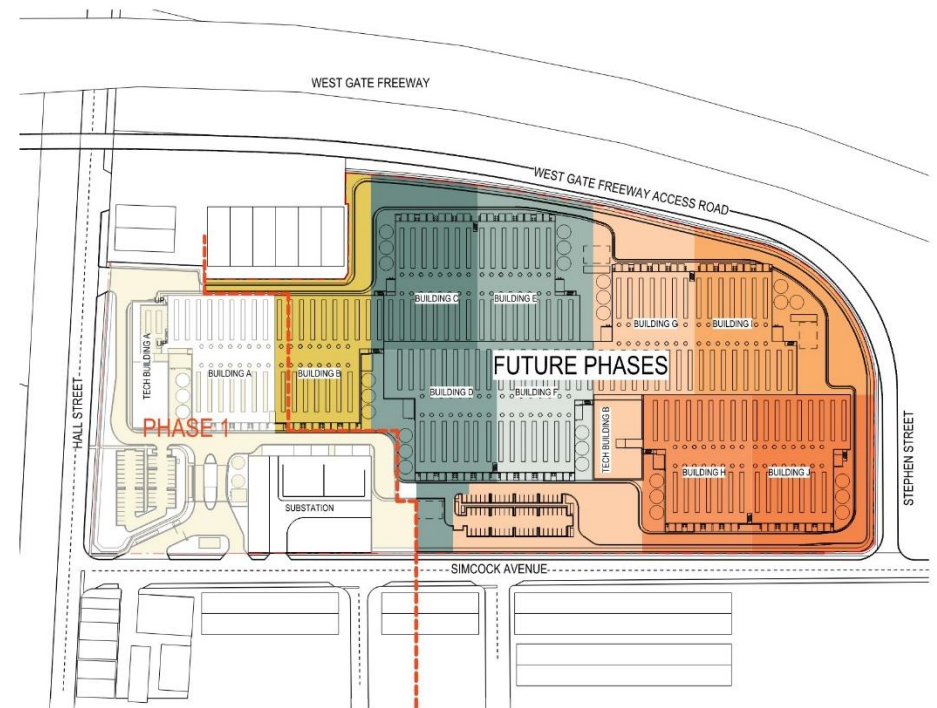


Figure 2-1 Project Site Location Plan, Application Area, and Surrounding Infrastructure



1 PHASE 1
1:1500



2 FUTURE PHASES
1:1500

PHASING LEGEND

PHASE 1 BUILDING A, TECH BUILDING A	PHASE 2 BUILDING B	PHASE 7 BUILDING G, TECH BUILDING B
SUBSTATION PART OF PHASE 1 NOT INCLUDED IN THIS APPLICATION	PHASE 3 BUILDING C	PHASE 8 BUILDING I
	PHASE 4 BUILDING D	PHASE 9 BUILDING H
	PHASE 5 BUILDING E	PHASE 10 BUILDING J
	PHASE 6 BUILDING F	

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Figure 2-2 Site Staging Plan with Building Naming

3 Surrounding Environment

3.1 Existing Noise Sensitive Areas and Receptors

The development site is located in Spotswood, Victoria. The site is bounded by the West Gate Freeway (WGF) to the north and the Werribee and Williamstown Metro train line to the west with Spotswood train station 500m to the south.

Permit application PA230665 was previously approved in January 2025 for the development of four warehouses with 24/7 operation. GreenSquare DC now intends to lodge a planning permit application under the Development Facilitation Program (DFP) to the Department of Transport and Planning (DTP) for the use and development of land at 44–76 Simcock Avenue, Spotswood, for a Utility Installation, i.e., Data Centre.

The development site neighbours properties including industrial sites, commercial buildings, residences, transport infrastructure, and educational facilities. Noise Sensitive Area (NSAs) were identified based on aerial imagery and during site observations. The closest indicative noise sensitive receptors are detailed below.

- 79 Hope St, Spotswood (NSA1) and 47 Hudsons Rd, Spotswood (NSA2) are located within the Hobsons Bay Precinct within residential zoning with industrial zoning immediately surrounding them.
- 2 Carder Place, Yarraville (NSA3), located in the City of Maribyrnong north of the development site within residential zoning.

These key sensitive receptors are located closest to the data centre location and are representative of their respective NSAs. The receptor addresses and their distance to the site boundary are shown in Table 3.1.

Table 3.1 Noise Sensitive Areas and associated Nearest Indicative Noise Sensitive Receptors.

Noise Sensitive Area	Nearest Indicative Noise Sensitive Receptor associated with NSA	Zone Receptor is within	Definition of Receptor	Approximate Distance to Site Boundary (m)	Direction in relation to Site
NSA 1	79 HOPE ST, SPOTSWOOD VIC 3015	NEIGHBOURHOOD RESIDENTIAL ZONE (NRZ)	RESIDENCE	60	West
NSA 2	47 HUDSONS RD, SPOTSWOOD VIC 3015	NEIGHBOURHOOD RESIDENTIAL ZONE (NRZ)	RESIDENCE	240	South
NSA 3	2 CARDER PLACE, YARRAVILLE VIC 3013	GENERAL RESIDENTIAL ZONE (GRZ)	RESIDENCE	325	North

The overall site and existing NSAs are shown in Figure 3-1.

During site inspections, road traffic noise from WGF was audible at all NSAs. At NSA1 and NSA2, the operational rail noise from the Werribee and Williamstown trainline was also audible. Multiple industrial buildings adjacent to these NSAs were audible during the site inspections.

Site observations during all measurement periods indicated that the WGF was the most significant noise source. Further details regarding the site observations and background noise measurements are detailed in Section 5 of this report.

The area surrounding the project site includes a number of commercial and industrial facilities. These include, but are not limited to, manufacturing, fuel terminals, vehicle servicing, and other warehouse-based industries.

Operational noise from nearby industries, such as Visy Glass, were audible during the night period, indicating that operation is 24/7.

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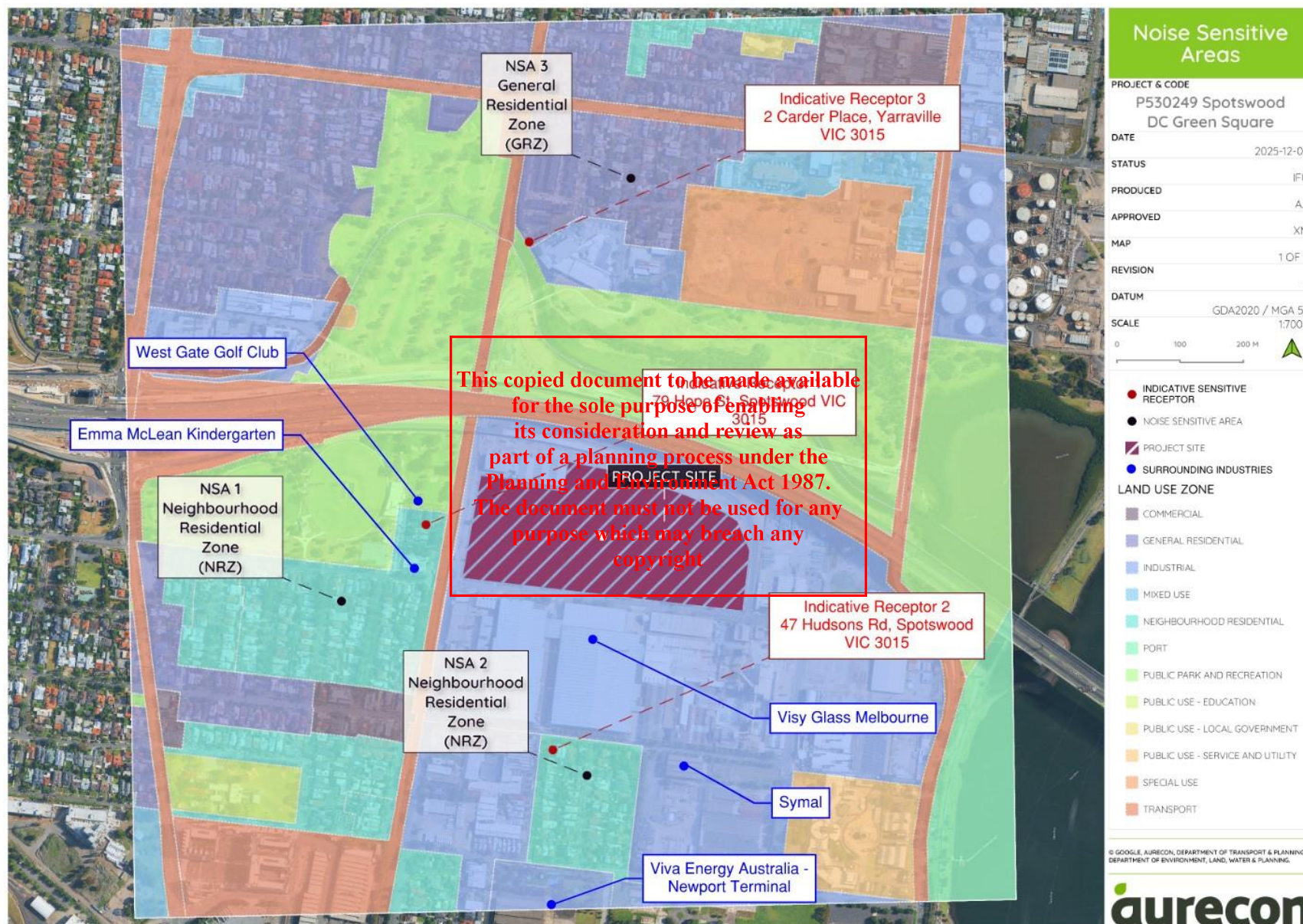


Figure 3-1 Noise Sensitive Areas

4 Regulatory Framework

The proposed site is to comply with the amended Environment Protection Act 2017 (the Act) and the Victorian Environment Protection Regulations 2021 (the Regulations).

Subordinate legislation under the Act includes EPA Publication 1826.5 *Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues*, September 2025 (Noise Protocol). The noise limits determined using the methodology in the Noise Protocol apply to the average industrial noise level (not including noise associated with other non-industrial noise sources) over a 30-minute period.

4.1 General Environmental Duty

The Act mandates that businesses have a General Environmental Duty (GED) to manage their activities to minimise the risk of environmental damage. Under the Act the GED requires that *'any person who is engaging in an activity that may give rise to risks of harm to human health or the environment from pollution or waste must minimise those risks, so far as reasonably practicable'*.

The requirement to demonstrate that the GED is being complied with is in addition to compliance with the noise limits set out in the Noise Protocol. Businesses must be able to demonstrate that they are both applying the GED and complying with the applicable noise limits.

Victorian EPA Guideline 1856 'Reasonably Practicable' provides guidance concerning what must be considered when assessing the proportionate controls to mitigate or minimise the risk of harm. These measures include a hierarchy of controls, defined as follows:

- Eliminate risk: *Can you eliminate the risk?*
- Likelihood of the risk: *What's the chance that harm will occur?*
- Degree of harm (consequence): *How severe could the harm be on human health or the environment?*
- State of knowledge: *What do you know, or what can you find out, about the risks your activities pose?*
- Available suitable controls: *What technology, processes or equipment are available to control the risk and what controls are suitable for use in your circumstances?*
- Costs of suitable controls: *How much does the control cost to put in place compared to how effective it would be in reducing the risk?*

Guideline 1856 requires that these factors need to be considered together to determine what is reasonably practicable to control risks of environmental damage.

4.2 Noise Protocol

The EPA Publication 1826.5 *Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues* (Noise Protocol) provides framework for environmental planning and decision making and a clear set of publicly agreed environmental objectives. The Noise Protocol specifies the following procedures to determine unreasonable and aggravated noise under the Regulations:

- Set noise limits.
- Assess noise emitted from existing commercial, industrial and trade premises, entertainment venues and outdoor entertainment events.
- Evaluate anticipated noise emissions from development proposals (new commerce or trade premises, or proposed extensions from existing premises new entertainment venues or proposed extensions of existing venues) and proposed outdoor entertainment events.

4.3 Victorian Environment Protection Regulations 2021

4.3.1 Time Periods

Airborne noise from fixed infrastructure must comply with the Environment Protection Regulations 2021 (the Regulations) and the GED under the Act and subordinate legislation including the Noise Protocol. The time periods defined in the Regulations are summarised in Table 4.1.

Table 4.1 Time Periods.

Period	Day	Time
Day	Monday to Saturday	7am - 6pm
Evening	Monday to Saturday	6pm - 10pm
	Sunday / Public Holidays	7am - 10pm
Night	Monday to Sunday / Public Holidays	10pm - 7am

4.3.2 Emergency Equipment

Part 117 of the 2021 Victorian Environment Protection Regulations define the noise sources which need to be considered when assessing noise from commercial, industrial and trade premises, and notes the following:

117. Noise sources that must not be taken into account in this Division

(1) In this Division, when the level of noise emitted from commercial, industrial and trade premises is assessed, the following sources of noise must not be taken into account—

(xi) equipment used in relation to an emergency;

(2) In this regulation—*emergency* has the same meaning as in the Emergency Management Act 2013. Note: for the purposes of section 166 of the Act, noise emitted by an item prescribed by this regulation may be unreasonable having regard to paragraphs (a)(i)–(v) of the definition of unreasonable noise in section 3(1) of the Act.

The Noise Protocol provides further guidance in Part 4A.

3. Noise limits – Emergency equipment

(37) Where the noise source under consideration is equipment used solely in relation to emergencies, the relevant noise limit applying to the testing or maintenance of such equipment, as determined in clauses 1 to 15 or clauses 16 to 36 above, is increased by 10 dB for a day period and by 5 dB for all other periods.

(38) For the purpose of clause 37, equipment used in relation to emergencies includes –

c. a standby generator means a generator of electrical power used as an alternative to the mains supply in emergencies, or for a maximum period of 4 hours per month for maintenance purposes;

On this basis, we interpret the revised regulations as follows:

- During an emergency (i.e. with all generators operating simultaneously), noise emissions from the emergency generators is not required to comply with the noise limits set out in the noise protocol. However, a General Environmental Duty exists to minimise the risk of harm from noise as far as is reasonably practicable as stated in Section 8.1.
- During testing (generally a single generator, and during the day period only), a relaxation of the noise limits is applied (10 dB during the day and 5 dB during the evening / night).

However, noise emissions from emergency generator equipment must still be assessed against the General Environmental Duty, with the likelihood of risk of environmental harm considered based on likelihood of risk, degree of harm, and the cost / availability of suitable controls.

4.3.3 Effective Noise Level Adjustments

The Noise Protocol Part I-B Section 2 states that the effective noise level is determined for noise from commercial, industrial and trade premises, as a 30-minute equivalent sound pressure level $L_{Aeq,30min}$. It is adjusted, where relevant for the noise character, i.e., duration, tonality, impulse and intermittency. Guidance in the Noise Protocol is as follows for tonality:

3.4 Adjustments for noise character

Tonality Adjustment

(82) *When the noise is tonal in character then an adjustment is made based on observations of the noise.*

(83) *The following adjustments apply –*

- a. *when the tonal character of the noise is just detectable then $A_{tone} = +2$ dB;*
- b. *when the tonal character of the noise is prominent then $A_{tone} = +5$ dB.*

(84) *When a tone is present, but observations do not provide certainty with regards to the value to apply for the tonal adjustment, the adjustment may be determined using the objective tonal method in accordance with Annex C.*

4.4 EPA Technical Guideline 1997

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4.4.1 Urban and Rural Area Method

The EPA Victoria Publication 1997 *Technical Guide Measuring and analysing industry noise and music noise* (the Guideline) provides guidance on the assessment of noise under the measurement, prediction, analysis and reporting conducted in accordance with Part 5.3 of the Regulations. Section 3 of the Guideline specifies that the Noise Protocol method depends on the location of the NSA, not the location of the noise-emitting premises (the project site). The Urban Area Method applies if the noise sensitive area is within a major urban area. The Rural Area Method applies if the noise sensitive area is not within a major urban area.

The Noise Protocol prescribes two methods to establish noise limits – the Urban Area Method and the Rural Area Method. The EPA provides map definitions of major urban areas, which includes land within Melbourne's urban growth boundary, and larger towns and cities in regional Victoria.

4.4.2 Managing Noise from Multiple Sites

Part 119 of the Environment Protection Regulations states that:

"If 2 or more commercial, industrial and trade premises (whether existing or proposed) emit, or are likely to emit, noise that contributes to the effective noise level, a person in management or control of one or more of those premises must take all reasonable steps to ensure that the contribution from each of the premises, when combined, does not exceed the noise limit for the noise sensitive area."

Therefore, where there is more than one premises contributing to the noise at an NSA, each premises would need to contribute a level lower than the applicable noise limit to avoid the cumulative noise level exceeding the noise limit.

EPA Technical Guide 1997 (the Guideline) provides a methodology for assessing industry noise for multiple premises. The Guideline notes:

- The contribution of the proposed development should be abated to meet, for each of the day, evening, or night period, a level set below the relevant noise limit by $10 \times \log_{10}(N)$ decibels, where N is the total number of existing and likely contributing industry premises.

Table 4.2 demonstrates the reduction required based on the number of contributing premises.

Table 4.2 Example of values of $10 \times \log_{10}(N)$ from the Guideline.

N	$10 \times \log_{10}(N)$
1	0.0 dB
2	3.0 dB
3	4.8 dB
4	6.0 dB
5	7.0 dB

N	$10 \times \log_{10}(N)$
6	7.8 dB
7	8.5 dB
8	9 dB
9	9.5 dB
10	10.0 dB

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5 Noise Survey

5.1 Noise Monitoring Methodology

Aurecon has undertaken short-term, attended, noise measurements for the day, evening, and night periods at three locations within proximity of the proposed project. This methodology has been undertaken in accordance with the noise survey methodology set out in the Noise Protocol.

Due to site access restrictions and the risk of extraneous noise from existing industry activity, unattended long term noise logging was not considered feasible as part of the project. A cumulative noise adjustment has been applied to the final noise limits to account for any industrial noise observed during site investigations.

The background noise measurements were undertaken using a Bruel & Kjaer 2270 Sound Level Meter (Instrument serial number 3029475).

All equipment used for the noise measurements are NATA certified and the calibration certificates haven provided in Appendix C.

5.2 Measurement Locations

The attended measurements undertaken on during the day, evening, and night periods, on the 13th of October 2025 and the 15th of October 2025. Observations were made to understand the current acoustic environment.

Alternative measurement locations were selected where the location nearest to the NSA are inaccessible, obstructed, or if there are extraneous noise sources that would cause the background level measurements to be non-indicative of their respective NSA. The following locations were chosen as representative of the respective noise sensitive receptors:

- Measurement location 1 for NSA 1 (79 Hope St, Spotswood, VIC 3015)
- Measurement location 2 for NSA 2 (47 Hudsons Rd, Spotswood, VIC 3015)
- Measurement location 3 for NSA 3 (Stony Creek Reserve, Yarraville, VIC 3013)

All measurement locations are shown in Figure 5-1.

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Figure 5-1 Measurement Locations juxtaposed with Land Use Zoning

5.3 Measurement Results

The summary of the noise measurements including the observations are shown in Table 5.1.

Table 5.1 Noise Survey Results.

NSA Name and associated Sensitive Receptor Address	Measurement Time and Date	Measurement Start Time, Duration	Average (dB(A))		Main Noise Sources Observed
			L _{Aeq}	L ₉₀	
NSA 1 79 Hope St, Spotswood VIC 3015	DAY (7am – 6pm) 13 10 2025	10:51 AM 15 minutes	60	54	- Westgate Freeway road traffic noise – Potentially affected by West Gate Tunnel Works - Rail Noise
		11:49 AM 15 minutes			
	EVENING (6pm – 10pm) 13 10 2025	06:04 PM 15 minutes	60	54	- Westgate Freeway road traffic noise – Potentially affected by West Gate Tunnel Works - Rail Noise
		07:29 PM 15 minutes			
	NIGHT (10pm – 7am) 15 10 2025	01:00 AM 15 minutes	52	46	- Westgate Freeway road traffic noise – Potentially affected by West Gate Tunnel Works - Toll truckyard - VISY manufacturing plant operation
		02:08 AM 15 minutes			
NSA 2 47 Hudsons Rd, Spotswood VIC 3015	DAY (7am – 6pm) 13 10 2025	11:27 AM 15 minutes	55	47	- Motorcycle fairings operation - Level crossing
		12:39 PM 15 minutes			
	EVENING (6pm – 10pm) 13 10 2025	06:28 PM 15 minutes	54	45	- Westgate Freeway road traffic noise – Potentially affected by West Gate Tunnel Works - Level crossing
		07:38 PM 15 minutes			
	NIGHT (10pm – 7am) 15 10 2025	01:20 AM 15 minutes	52	40	- Westgate Freeway road traffic noise – Potentially affected by West Gate Tunnel Works - Toll truckyard - VISY manufacturing plant operation
		02:28 AM 15 minutes			
NSA 3 2 Carder Pl, Yarraville VIC 3013	DAY (7am – 6pm) 13 10 2025	10:24 AM 15 minutes	62	60	Westgate Freeway road traffic noise – Potentially affected by West Gate Tunnel Works
		12:13 PM 15 minutes			
	EVENING (6pm – 10pm) 13 10 2025	06:52 PM 15 minutes	60	58	Westgate Freeway road traffic noise – Potentially affected by West Gate Tunnel Works
		08:01 PM 15 minutes			
	NIGHT (10pm – 7am) 15 10 2025	01:43 AM 15 minutes	53	47	Westgate Freeway on-ramp construction work.
		02:51 AM 15 minutes			

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6 Noise Limits

6.1 Noise Protocol Methodology

Land use zoning of the site and surrounds is presented in Figure 6-1.

The project site is located within Industrial Zone 1 (IN1Z). NSA1 and NSA2 are located within a Neighbourhood Residential Zone (NRZ), and NSA3 is located within a General Residential Zone (GRZ).

All assessed NSAs are located within the Urban Area Boundary. As a result, the Urban Area methodology was used to derive noise limits, as per the Noise Protocol. All NSA locations and their respective zones are presented in Figure 6-1.

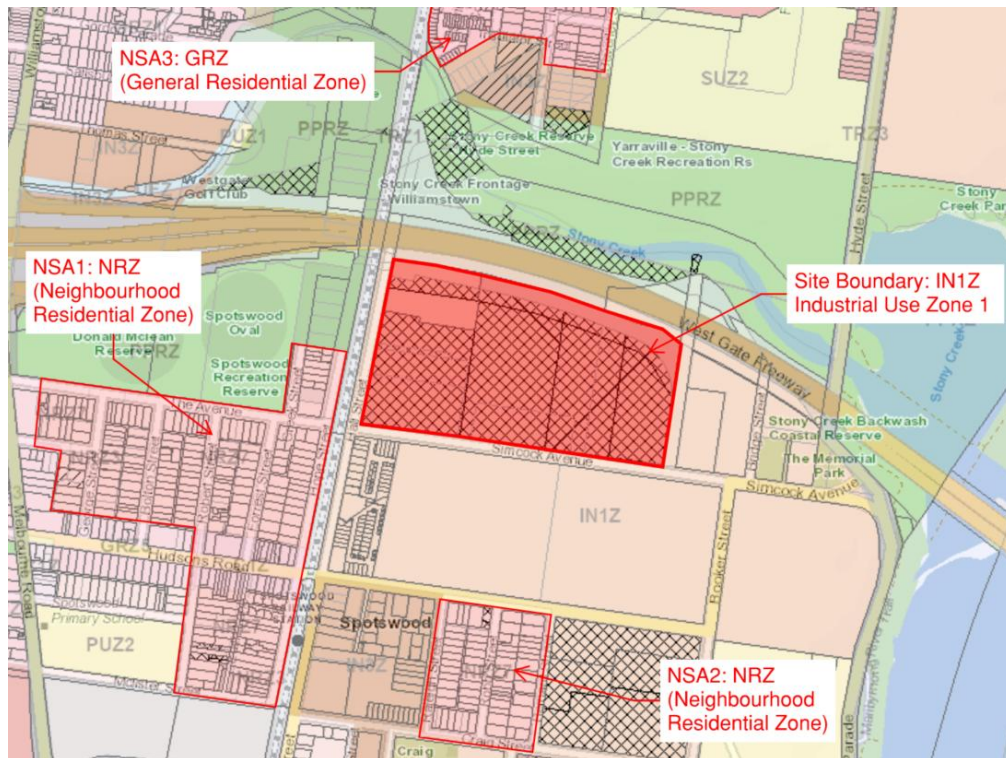


Figure 6-1 Land use zoning surrounding the project site.

6.2 Base Noise Limits

As defined in the Environment Protection Regulations 2021 Part 118(2) the lowest decibel value that may be set as the noise limit is:

- In case of noise emitted in a major urban area:
 - Day period: 45 dB(A)
 - Evening period: 40 dB(A)
 - Night period: 35 dB(A)

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6.3 Noise Protocol Limits Assessment

Determination of noise limits are based on the urban area methodology from the Noise Protocol. The methodology includes an assessment of the background noise level in the environment together with the type of land use at the nearest NSA.

6.3.1 NSA Noise Limits in Major Urban Area

For this project, day, evening, and night-time period background noise measurements were conducted.

This approach was adopted on the basis that night-time periods generally represent the lowest background levels and the most stringent noise criteria. The measured night period background noise level will be used to establish the night-time noise limit.

The site zoning and derivation of the Zoning Levels for the Urban Area NSAs is presented in Appendix A. The noise limits for NSA 1 to NSA 3 have been established and are provided in Table 6.1.

Table 6.1 Noise Limit Derivation for NSA 1-3 without Cumulative Adjustment.

NSA	Time	Zoning Level ¹	Existing Background Level dBL _{A90} ²	Background Level Type	Noise Limit (dBL _{Aeq, 30mins}) ³	
					Building Services, operating in Normal Mode	Emergency Testing (two standby Generators, two standby Load Banks)
NSA 1	Day (7am – 6pm)	56	54	HIGH	60	70
	Evening (6pm – 10pm)	50	54	HIGH	57	62
	Night (10pm – 7am)	45	46	HIGH	49	54
NSA 2	Day (7am – 6pm)	60	47	LOW	58	68
	Evening (6pm – 10pm)	54	45	NEUTRAL	54	59
	Night (10pm – 7am)	49	40	NEUTRAL	49	54
NSA 3	Day (7am – 6pm)	53	60	HIGH	66	76
	Evening (6pm – 10pm)	47	58	HIGH	61	66
	Night (10pm – 7am)	42	47	HIGH	50	55

1. The zoning levels were based on the proportion of land type use within the circles according to Noise Protocol.

2. Average background (L_{A90}) levels are as measured.

3. Established in accordance with the Noise Protocol approach. Noise Protocol notes that, "...the noise limit shall be increased by 10 dB for day period and by 5 dB for other periods," for the testing of the standby generators.

4. Background noise levels assumed to be neutral relative to the zoning level.

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6.3.2 Summary of Base Noise Limits

Based on the Urban Method set out in the Noise Protocol, the following limits in Table 6.2 are derived for the identified NSAs.

Table 6.2 Summary of Noise Limits without Cumulative Adjustment.

NSA	Time	Noise Limit (dBL _{Aeq, 30mins})	
		Building Services, operating in Normal Mode	Emergency Testing (two standby Generators, two standby Load Banks)
NSA 1	Day (7am – 6pm)	60	70
	Evening (6pm – 10pm)	57	62
	Night (10pm – 7am)	49	54
NSA 2	Day (7am – 6pm)	58	68
	Evening (6pm – 10pm)	54	59
	Night (10pm – 7am)	49	54
NSA 3	Day (7am – 6pm)	66	76
	Evening (6pm – 10pm)	61	66
	Night (10pm – 7am)	50	55

6.3.3 Cumulative Noise Adjustment

The derived noise limits represent the cumulative noise level received at the NSA consisting of the contribution of all surrounding commercial and industrial properties. The Noise Protocol requires a 'equal sharing' principle, whereby the noise limit is 'shared' by all noise generating industry in the area.

Figure 6-2 below highlights the identified commercial and industrial properties in the area that have the potential to generate noise that may contribute to the overall level at the identified NSAs.

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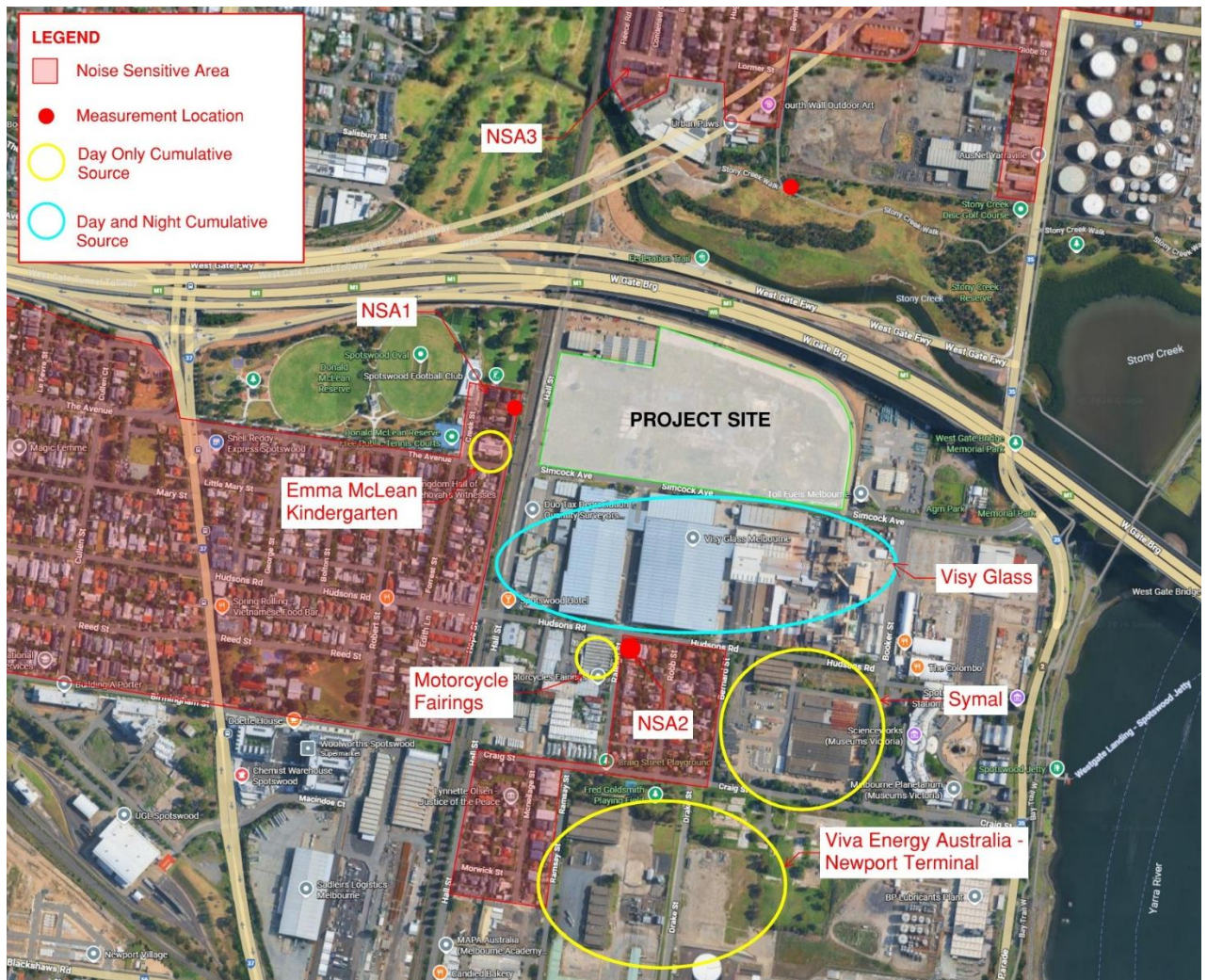


Figure 6-2 Identified surrounding Commercial and Industrial sites.

Reviewing the properties that are considered likely to generate noise at the NSAs, the following adjustments in Table 6.3 are proposed to each NSA. Any future expansion would need to consider the cumulative noise impact to the environment.

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Table 6.3 Summary of Noise-Generating sites and adjustment to Noise Limit.

NSA	Address	Industrial Source		Number of contributing Industries	Adjustment to Noise Limit dB(A)
NSA 1	79 HOPE ST, SPOTSWOOD VIC 3015	DAY	- Greensquare DC Spotswood - Emma Mclean Kindergarten - Visy Glass	3	-5
		EVENING	- Greensquare DC Spotswood - Visy Glass	2	-3
		NIGHT	- Greensquare DC Spotswood - Visy Glass	2	-3
NSA 2	47 HUDSONS RD, SPOTSWOOD VIC 3015	DAY	- Greensquare DC Spotswood - Visy Glass - Motorcycles Fairings - Viva Energy Australia - Newport Terminal - Symal	5	-7
		EVENING	- Greensquare DC Spotswood - Visy Glass	2	-3
		NIGHT	- Greensquare DC Spotswood - Visy Glass	2	-3
NSA 3	2 CARDER PLACE, YARRAVILLE VIC 3013	DAY	Greensquare DC Spotswood	1	0
		EVENING	Greensquare DC Spotswood	1	0
		NIGHT	Greensquare DC Spotswood	1	0

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6.3.4 Maximum Project Target Noise Limits

On this basis, the established noise limits for each of the noise sensitive areas will be reduced by the above values. The recommended maximum project target noise limits for the site are detailed in Table 6.4.

Table 6.4 Maximum Project Target Noise Limits.

Recommended Maximum Project Contribution, L_{eq} dB(A)							
NSA	Address	Typical			Emergency Equipment Testing		
		Day	Evening	Night	Day	Evening	Night
NSA 1	79 HOPE ST, SPOTSWOOD VIC 3015	56*	54	46	66	59	51
NSA 2	47 HUDSONS RD, SPOTSWOOD VIC 3015	51	51	46	61	56	51
NSA 3	2 CARDER PLACE, YARRAVILLE VIC 3013	66	61	50	76	66	55
Notes:							
* Numbers presented in the table, are rounded to the nearest whole number							

7 Noise Emission Predictions

7.1 Equipment Schedule

The proposed design of the data centre includes noise emitting equipment:

- Evaporative Chillers
- Electrical supply authority Substation.
- Containerised Standby Generators.
- Temporary Load Banks.

Typically, all equipment other than the emergency generators and load banks are expected to be operational 24/7 and are required to meet the most stringent night period noise limit. Testing of generator equipment is expected to occur two units at a time with two load banks and occur during the day period on a Monday to Saturday only.

Table 7.1 details the acoustic data utilised for the predictions based on the current mechanical and electrical design.

For the operational noise impact assessment, two phases of the site's development were assessed as follows (see Figure 2-2 for building naming):

- Phase 1: Building A only (westmost data centre building) – to predict noise impacts for the first operational data centre building.
- Phase 10: All 10 data centre buildings A to J – to predict noise impacts for all planned data centre buildings.

The data centre was modelled based on the architectural design drawings, as shown in Figure 7-1 and Figure 7-2.

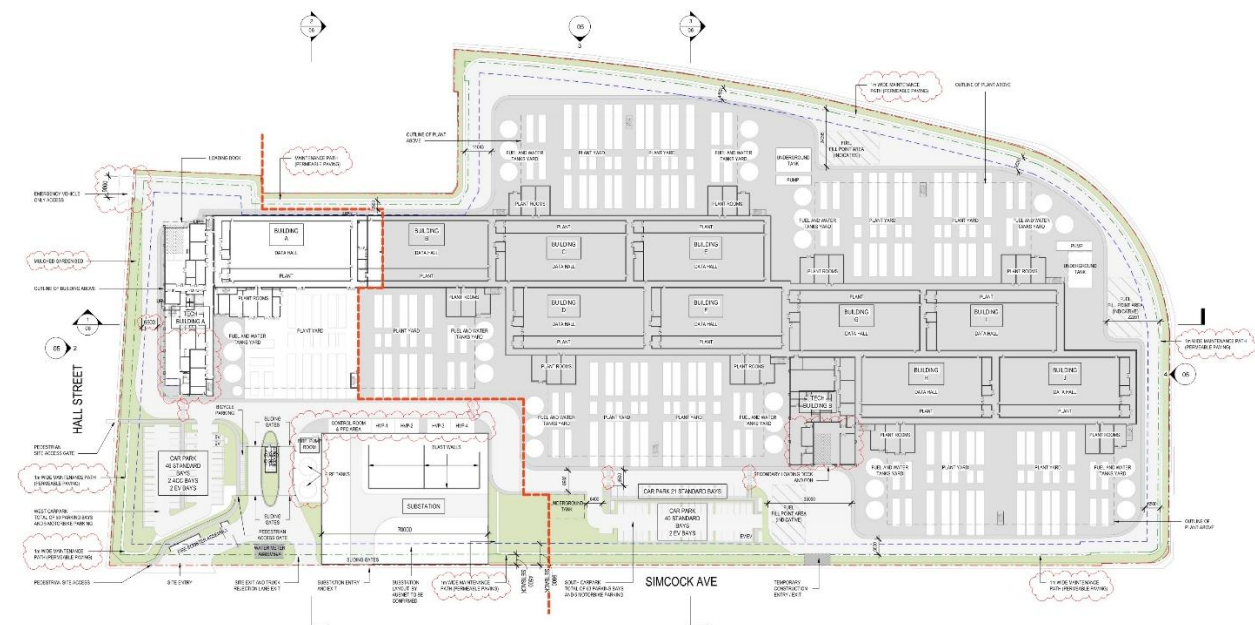


Figure 7-1 General Arrangement Plan – GF – Planning Application (MEL1-ST000-ARC-GBA-DRG-X-00-000009)

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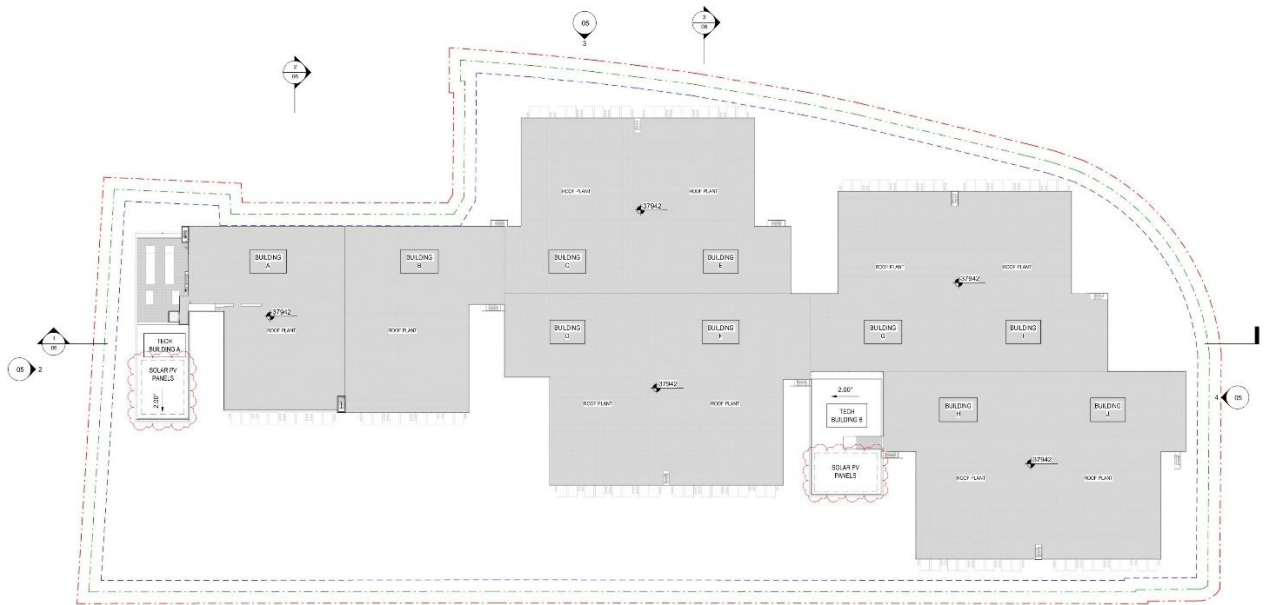


Figure 7-2 General Arrangement Plan – Plant & Roof Level – Planning Application (MEL1-ST000-ARC-GBA-DRG-X-00-000012)

Four scenarios have been assessed against the Noise Protocol as the development as follows:

- Typical Operation – Phase 1: Building A only. Operational equipment includes 14 evaporative chillers and 2 primary transformers.
- Emergency Test Operation – Phase 1: Building A only. Operational equipment includes 14 evaporative chillers, 2 transformers, 2 standby generators, and 2 temporary load banks, assuming the following:
 - A generator being tested on Tech Building A and Building A simultaneously as the worst-case scenario
 - Both load banks in operation next to Building A
- Typical Operation – Phase 10: All Buildings. Operational equipment includes 140 evaporative chillers and 2 primary transformers.
- Emergency Test Operation – Phase 10: All Buildings. Operational equipment includes 140 evaporative chillers, 2 transformers, 2 standby generators, and 2 temporary load banks, assuming the following:
 - A generator being tested on Building A and Building B simultaneously as the worst-case scenario
 - A load bank in operation next to Building A, and another next to Building B

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Table 7.1 Summary of Noise Sources on Site – All Buildings.

Source		Number of Items – All Buildings	Sound Power Levels (dB)								Total SWL dB(A)
			Octave Band Frequency, Hz								
			63	125	250	500	1k	2k	4k	8k	
Evaporative Chiller ¹		140									
		Typical Operation	81	81	80	78	81	76	76	83	86
		160 Units Total									
Generator ²	Inlet	2	124	123	112	85	69	70	84	98	109
	Outlet	Emergency Testing Operation	122	120	106	73	54	59	85	108	109
	Exhaust	210 Units Total	99	92	92	85	84	88	85	72	93
Load bank ³		2	113	115	114	109	101	98	95	92	111
Substation Transformer ⁴		2	92	94	89	89	83	78	73	66	89

1. Evaporative chiller indicative selection is a Trithermal TAEA1502B20B, which are speed limited low noise fans with diffusers with comprehensive sound insulation. These units have a 2x EF24102-208H, and 32x XLN-EC fans of 910mm diameter operating at a ambient dry-bulb temperature of 30°C. The chiller's sound power level (SWL) is 86 dB(A), as provided in the manufacturer's data sheet.

2. Generator selection is a Parratech C3000 D5. The generator container acoustic enclosure is rated to achieve 85 dB(A) at 1m. The SWL spectrum is derived from a Parratech MTU16V4000 DS2500 generator with an acoustic enclosure, as the noise spectrum included mitigation. This spectrum has been refined to reflect the required 85dBA @ 1m.

3. The temporary load bank is an JTP Power ST-3041 unit with an acoustic enclosure to reach 90dB(A) at 1m. A SWL derived from the manufacturer datasheet. The units have tonal characteristics. Unit used for Emergency Testing only.

4. Transformer unit sound power level was provided by the client for a 360MVA transformer. A SWL 89dBA per is based on an equivalent 400MVA class from NEMA TR-1 Table 1. A 1/1 Octave spectrum has been empirically derived in lieu of this data. In lieu of 1/3 octave data, it is assumed that the units have tonal characteristics.

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One third spectrum data for the evaporative chillers, transformers, containerised generators and load banks was not available to inform this analysis. In lieu of 1/3 octave noise data, the substation transformers and load banks have been assumed to emit tonal characteristics as a conservative assumption. As per the Noise Protocol, an adjustment of +2dB to the predicted noise level is applied when the tonal character of the noise is just detectable, and +5dB when the tonal character of the noise is prominent. The penalty has been applied to the predicted noise level to determine the effective noise level.

As part of this assessment, a +2dB penalty has been applied to the typical operation scenarios. As the evaporative chillers are the dominant noise source due to the source noise level and quantity, the substation transformers may have tonal characteristics and may only be just detectable at the NSAs.

A +5dB penalty has been applied to the emergency testing scenario as the load banks may have tonal characteristics and is predicted to be prominent at the NSAs.

Refer to Table 7.2 to Table 7.5 for the predicted effective noise levels with the application of the tonality adjustments.

At the time of assessment, equipment manufacturer noise test data was not available to assess low frequency noise from the data centre as per EPA Publication 1996. A detailed assessment of low frequency will be undertaken at subsequent design stages when detailed equipment data is available for low frequency noise for typical and emergency testing scenarios. Noise emissions will be controlled to within the EPA 1996 Guideline limits and with respect to the GED.

Ongoing review of the proposed equipment will be undertaken as the design progresses to review the need for any annoyance adjustments in accordance with the Noise Protocol methodologies and non-compliance with the noise limits.

The noise data presented in this report has been modelled and mitigated to achieve compliance at the NSAs. If the equipment selections change and have higher noise levels, additional mitigations may be required to achieve compliance.

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7.2 Noise Modelling

Calculations of noise emissions during the typical and emergency operation scenarios operations have been undertaken using SoundPLAN v9.1. The project consists of 3-level high data halls, tech buildings, and adjoining equipment gantry that will incorporate the standby generators and the evaporative chillers. The generators are proposed to incorporate discharge chimneys for exhaust of warm air during operation. A 3D image of the modelled data centre building and surrounds are shown in Figure 7-3.

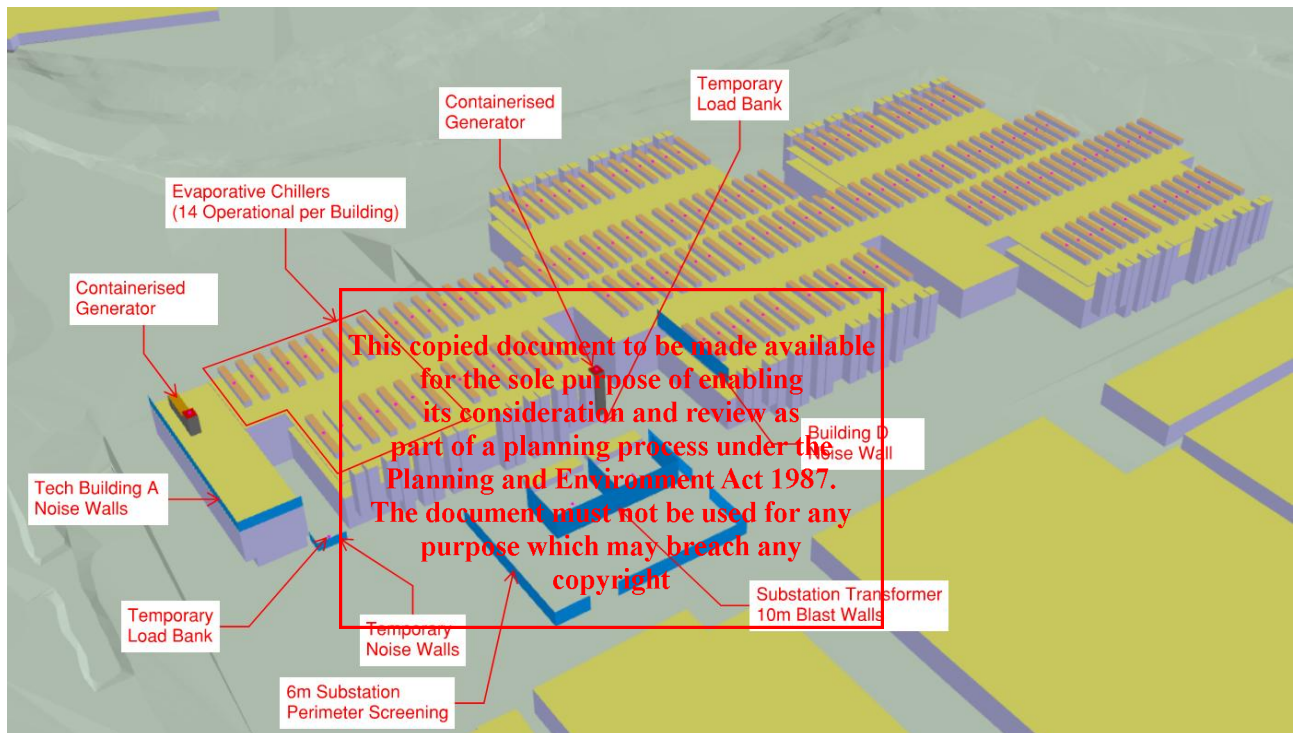


Figure 7-3 3D model of Data Centre building and surrounds.

7.3 Assumptions and Limitations

The following assumptions and limitations apply to the assessment:

- In all typical operation scenarios, all equipment operates at 100% capacity continuously, except for the standby generators and the load bank.
- For the emergency testing scenario, two generators and two load banks will be operated.
- In lieu of 1/3 octave noise data, the substation transformers and load banks have been assumed to emit tonal characteristics as a conservative approach. An additional +2dB has been applied to the typical operational scenarios to acquire the effective noise level, as per the Noise Protocol, as the tonal characteristics from the substation transformers are predicted to be only just detectable at the NSAs. An additional +5dB penalty has been applied to the emergency testing scenario predicted noise levels to acquire the effective noise level, as the tonal characteristics from the load banks are predicted to be prominent at the NSAs. Further review of equipment manufacturer data may be required during subsequent design stages.

- Concrete 10m blast walls were assumed to surround the primary transformers at the substation on the East, South and West sides, and one blast wall separating the two transformer units. These are assumed to have no gaps or holes in the noise walls.
- A 6m metal-panel screen was assumed on the perimeter of the substation, as discussed with the project team. These are located on the west, south and east sides, omitting where there is a vehicle entrance gate. These are assumed to have no gaps in the screen, except for where there are vehicle access gates.

The following acoustics considerations are beyond the scope of this study and have not been addressed:

- Environmental noise impact during construction phase.
- Noise emission from other small plant equipment or fans associated with the building which have not been specified at this stage.
- Noise emissions from any subsequent site development not entailed within the current scope.

7.4 Results

Noise emissions from the site have been predicted based on the proposed building layout and current plant selections at the nearest NSAs to the data centre buildings.

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7.4.1 Typical Operation

Preliminary noise modelling of the site showed marginal exceedances at the nearest noise sensitive receivers. A review of the predicted noise levels details that evaporative chillers are the dominant noise sources at all NSAs for typical operation. The evaporative chiller equipment data used for this analysis has a SWL of 86 dB(A), which is understood to be the lowest practical source noise levels for the equipment based on likely maximum operating duties. To further mitigate the noise levels at the nearest NSAs, solid screens were investigated and included in the model to screen line of sight and provide acoustic screening to the NSAs.

Figure 7-4 below shows the most onerous locations for the design of these noise barriers.

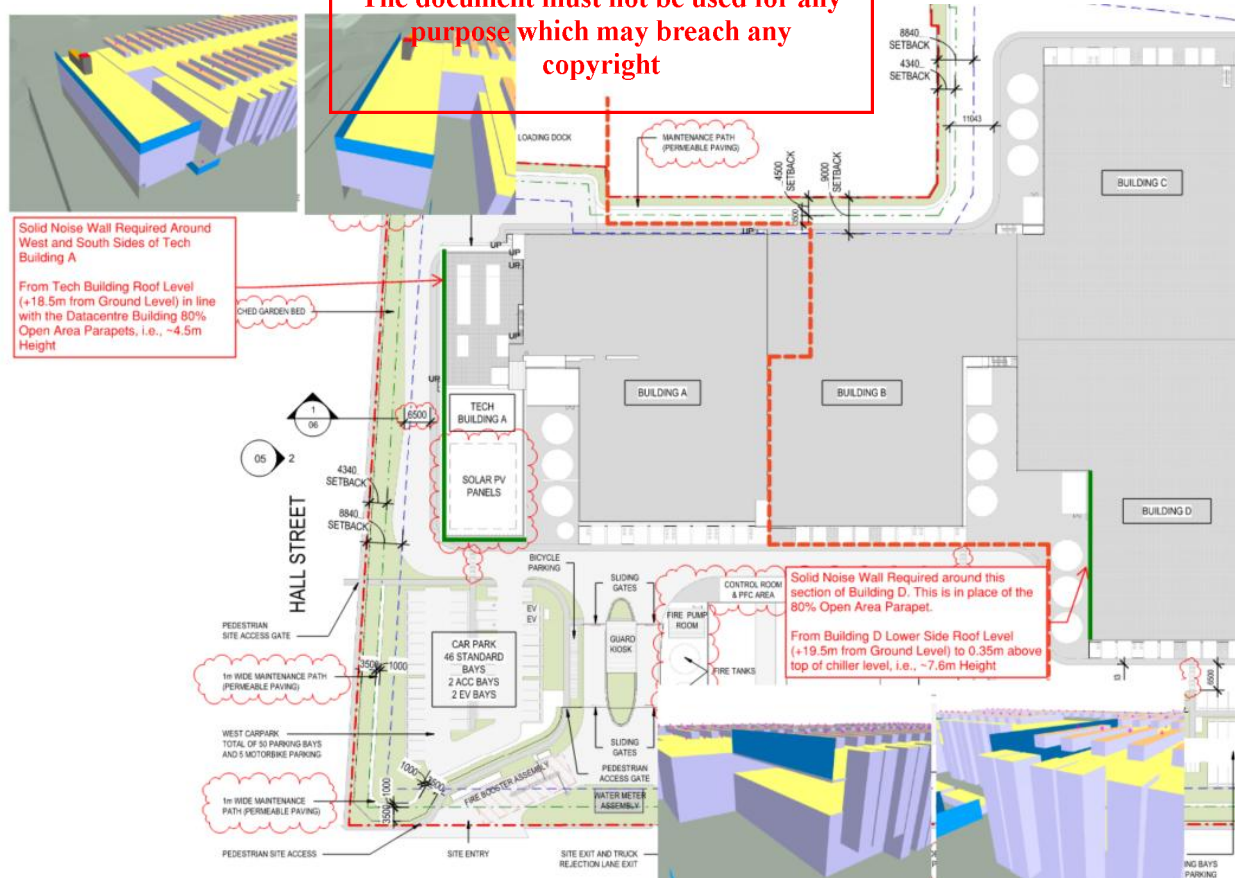


Figure 7-4 - Noise Model showing location and heights of required noise walls.

In addition to these noise barriers, the procured evaporative chillers must not exceed the design level to achieve compliance with the target noise limits. In future design stages, reviews of the noise emissions of the evaporative chillers are to be undertaken. If the procured evaporative chillers increase in noise levels, this will require a reassessment and additional mitigation may be required, as discussed in Section 7.5.2.

The predicted effective noise levels to the various identified NSAs during typical operation following mitigation for Building A only are summarised in Table 7.2. The predicted noise emissions to the various identified NSAs during typical operation for all ten data centre buildings only are summarised in Table 7.3.

Table 7.2 Noise Emission Predictions for Typical Operation – Building A Only, Night Period.

NSA Name	Worst-case Predicted Noise Level Receiver Address	Night Project Contribution Limit dB(A)	Predicted Noise Level, LAeq dB(A)	Effective Noise Level (LAeq dB(A))	Compliance	Dominant Noise Source
NSA 1	11 THE AVENUE, SPOTSWOOD VIC 3015	46	37	39	Y	Evaporative Chillers
NSA 2	194 HALL ST, SPOTSWOOD VIC 3015	46	33	35	Y	Evaporative Chillers
NSA 3	2 CARDER PLACE, YARRAVILLE VIC 3013	50	34	36	Y	Evaporative Chillers
Applied Adjustments: + 2 dB Tonality adjustment – Tonal character of the noise from the primary substation transformers is just detectable, as per Noise Protocol.						

Table 7.3 Noise Emission Predictions for Typical Operation – All Data Centre Buildings, Night Period.

NSA Name	Worst-case Predicted Noise Level Receiver Address	Night Project Contribution Limit dB(A)	Predicted Noise Level, LAeq dB(A)	Effective Noise Level (LAeq dB(A))	Compliance	Dominant Noise Source
NSA 1	11 THE AVENUE, SPOTSWOOD VIC 3015	46	40	43	Y	Evaporative Chillers
NSA 2	194 HALL ST, SPOTSWOOD VIC 3015	46	42	44	Y	Evaporative Chillers
NSA 3	2 CARDER PLACE, YARRAVILLE VIC 3013	50	40	42	Y	Evaporative Chillers
Applied Adjustments: + 2 dB Tonality adjustment – Tonal character of the noise from the primary substation transformers is just detectable, as per Noise Protocol.						

During the typical operation of both Building A only and the 10 building scenarios, the predicted effective noise level at NSA2 is compliant with the daytime emergency testing noise limits and is compliant by 2 dBA.

7.4.2 Generator Testing

An assessment of the noise emissions from two generators being tested with two load banks at the data centre building site has been undertaken. Generator testing is expected to be undertaken during the day period on a Monday to Saturday only to achieve compliance with the noise limits and GED. It is recommended that emergency testing not be conducted during the evening and night periods. A ~4m tall noise wall (temporary or permanent) around the load banks is required to achieve compliance with the day noise limits.

The predicted noise emissions to the various identified NSAs during emergency testing operation for Building A only are summarised in Table 7.4. The predicted noise emissions to the various identified NSAs during emergency testing operation for all ten Data Centre buildings are summarised in Table 7.5.

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Table 7.4 Noise Emission Predictions for Generator Testing Operation – Building A Only, Day Period.

NSA Name	Worst-case Predicted Noise Level Receiver Address	Day Project Contribution Limit dB(A)	Predicted Noise Level, LAeq dB(A)	Mitigated Effective Noise Level (LAeq dB(A))	Compliance	Dominant Noise Source
NSA 1	76 HOPE ST, SPOTSWOOD VIC 3015	66	61	66	Y	Load Bank
NSA 2	194 HALL ST, SPOTSWOOD VIC 3015	61	50	55	Y	Load Bank
NSA 3	2 CARDER PLACE, YARRAVILLE VIC 3013	76	52	57	Y	Load Bank
Applied Adjustments: + 5 dB Tonality adjustment – Tonal character of the noise from the temporary load banks are prominent, as per Noise Protocol.						

Table 7.5 Noise Emission Predictions for Generator Testing Operation – All Data Centre Buildings, Day Period.

NSA Name	Worst-case Predicted Noise Level Receiver Address	Day Project Contribution Limit dB(A)	Predicted Noise Level, LAeq dB(A)	Mitigated Effective Noise Level (LAeq dB(A))	Compliance	Dominant Noise Source
NSA 1	11 THE AVENUE, SPOTSWOOD VIC 3015	66	58	63	Y	Load Bank
NSA 2	16 RALEIGH ST, SPOTSWOOD VIC 3015	61	49	54	Y	Load Bank
NSA 3	2 CARDER PLACE, YARRAVILLE VIC 3013	76	52	57	Y	Load Bank
Applied Adjustments: + 5 dB Tonality adjustment – Tonal character of the noise from the temporary load banks are prominent, as per Noise Protocol.						

During the emergency testing of both the Building A only and the 10 building scenarios, the predicted effective noise level at NSA1 is approximately equal and complies with the daytime emergency testing noise limits.

7.4.3 Discussion

Based on the equipment data and mitigation measures described above, noise emissions to all existing and approved NSAs comply with the derived noise limits for the typical operation scenario.

The generator testing scenario requires additional mitigation to screen the load banks to achieve the operational target noise limit during the day period at all NSAs.

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7.5 Mitigation

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7.5.1 Required Mitigation

Typical Operation

As noted and discussed in section 7.4.1 above, the following mitigation measures are required to comply with relevant night time noise limits during typical operation:

- Equipment should be selected to achieve the noise limits set out in Table 7.1, if these are exceeded, additional mitigation will be required.
- Noise walls will be required to provide acoustic screening of evaporative chillers as shown in Figure 7-4

Emergency Testing Scenario

The predicted noise levels of the emergency testing scenarios with load banks are predicted to comply with the applicable target noise limits, without the additional tonality correction. If the load banks were to be reviewed to have tonal characteristics, a +5dBA correction to the effective noise level is applied to the predicted noise levels and mitigation must be considered to achieve compliance. Load bank unit selections will require review of their 1/3 octave noise data to determine if the units emit tonal characteristics in future design stages.

A 4m high, temporary or permanent noise wall to the west of the load bank locations has been proposed to minimise the propagation of noise from the load banks to NSAs to the west. The noise walls should have no gaps and should be placed around load bank. See Figure 7-5 of the proposed indicative locations with respect to the load bank locations. The recommended density of the noise walls surrounding the load banks is 15kg/m².

If the selected load bank units are to be temporary and noise walls are required, the temporary noise walls are to be loaded vinyl noise walls that will need to be designed and assembled at the same time as the load banks. These selections of noise wall will be investigated in future design stages.

The load banks may be relocated to positions where they are shielded by the existing buildings may assist with decreasing the noise predicted at the nearest NSAs to the west of the site. These could be between the tech building and the datacentre buildings, or between datacentre buildings.

With the incorporation of the above mitigations, Table 7.4 and Table 7.5 below predicts that the effective noise levels are compliant with the noise limits at the NSAs, including the tonality adjustments.

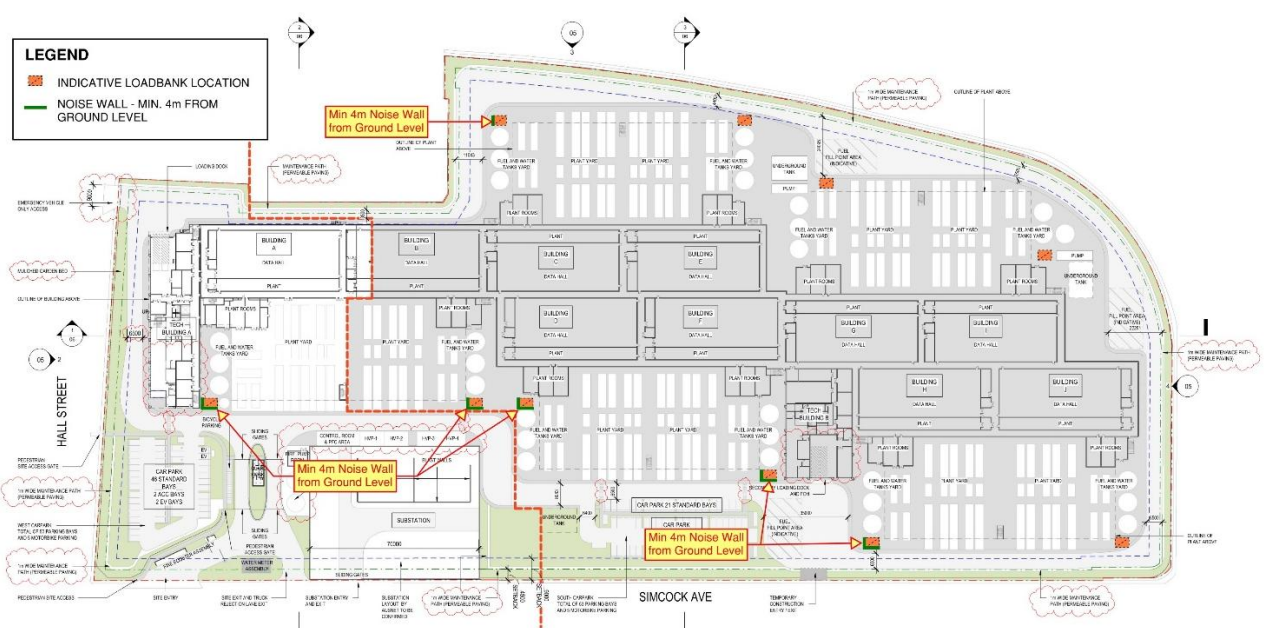


Figure 7-5 Emergency Testing – Load Bank Temporary Noise Wall Locations

7.5.2 Additional Considerations for Further Mitigation

To further reduce noise emissions from the data centre, additional rooftop mitigation would be required. These mitigations may need to be considered if the evaporative chiller selection has higher source noise levels than modelled within this assessment.

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8 Discussion

The current design, including integrated mitigation measures, is predicted to comply with the environmental noise limits of the nearest NSAs based on normal operation of the data centre which is assumed to be fully operational 24/7.

As per Table 7.2, Table 7.3, Table 7.4 and Table 7.5, the noise limits for the NSAs are achieved for all scenarios of Phase 1 of the development, i.e., Building A only, and Phase 10 of the development when all buildings will be operational.

The predicted compliance is based on the equipment data and mitigation measures discussed in this assessment. A re-assessment may be required based on the actual equipment procured and assessment of the equipment noise data.

The evaporative chillers are the primary contributors to the effective noise levels at the NSAs during the typical operational scenarios.

The evaporative chillers are the dominant noise source during typical operations. The current selection with a sound power level of 86 dBA, in combination with the recommended noise walls, meets the target noise limits outlined Section 6.3.4. The source noise levels for the equipment provided in this assessment must not be exceeded in order to achieve compliance. An increase in noise levels may result in an exceedance of the noise limits and require additional mitigation to achieve compliance, as discussed in Section 7.5.2

It is recommended that emergency testing is undertaken during the day period on Monday to Saturday, as defined within the Regulations, and testing must not exceed more than two generator units at any one time. To comply with the daytime emergency testing noise limits, the equipment must achieve the following noise targets, as presented in this report and below:

- Containerised Generators: 85dBA @ 1m per unit
- Temporary Load Banks: 90dBA @ 1m per unit (Unit must not have tonal noise characteristics)

If the temporary load banks do not have tonal characteristics, the emergency testing scenarios may comply with the daytime noise limits. As the design progresses, the selected units will require review to determine if the units are tonal. In the event the selected units are tonal, the load banks will require temporary noise walls to assist with achieving the daytime emergency testing noise limits. Noise walls with a minimum height of 4m is to be provided during emergency testing in the recommended locations as per Figure 7-5.

8.1 General Environmental Duty Implementation

Environmental noise emissions from industrial activities, if not adequately managed, have the potential to cause harm. Table 8.1 presents the consideration of the control measures outlined in Section 5.1 from Guideline 1856.

Table 8.1 Consideration of Measures to mitigate or minimise the Risk of Harm to Human Health.

Consideration	Implementation
1. Eliminate risk.	Data centre activities will inherently generate noise during operation. However, mitigation measures will be considered as part of the design, including specification of low noise equipment and noise walls as required.
2. Likelihood of risk; how often harm would occur.	The site will be designed to ensure that noise impacts from the proposed development would not exceed derived target noise limits from the Noise Protocol. Even though there are no specific noise limits for an emergency scenario, noise mitigation will be provided to the generators to reduce the associated noise impacts.
3. Degree of harm (consequence).	There are varying degrees of harm associated with noise, ranging from: ■ Hearing loss / permanent damage. ■ Sleep disturbance. ■ Audibility and annoyance. At noise levels exceeding 85 dB L_{Aeq}(8hr) / 140 dB L_{Cmax} irreversible hearing damage may occur. Harm associated with hearing loss / permanent damage is covered by Worksafe Victoria compliance codes² and is not expected to be exceeded on site. Harm associated with sleep disturbance includes changes in the pattern of sleep stages, reduction in the proportion of rapid eye movement (REM) sleep, reduced perceived sleep quality and aftereffects such as

Consideration	Implementation
	headache and tiredness. Sleep disturbance is generally only considered to occur when people are exposed to noise levels $> 30 \text{ dB } L_{Aeq(8hr)}$ or $> 45 \text{ dB } L_{Amax}$ inside bedrooms at night³. Provided that noise levels inside bedrooms do not regularly exceed these levels, impacts on sleep disturbance are generally considered to be acceptable. These levels are not expected to be exceeded at the nearby NSAs. The degree of audibility of noise depends on the level of noise emitted together with the ambient background noise levels. Where there is a low level of ambient noise at a receiver location, noise emissions are more likely be audible at times. This may occur where there is limited surrounding activity from roads and other noise sources. The audibility of noise can be classified as follows⁴: 0 to 3 dB above background noise levels: not audible. 3 to 5 dB above background noise levels: marginally audible. $> 5 \text{ dB}$ above background noise levels: generally audible. Other factors such as the frequency content, tonality, impulsiveness, and other characteristics may also impact the audibility of noise.
4. State of knowledge; awareness of risks the activities pose.	Undertaking detailed reviews of environmental noise emissions from the site (such as this report) is part of the general environmental duty to understand the likely noise emissions from the site and identify mitigation measures to reduce noise impacts.
5. Availability and suitability of controls.	It is considered that best practice to review available suitable controls to minimise risk associated with noise, would be in the development and maintenance of a site noise management plan. The site noise management plan would include but not be limited to: - Regular review of available technology assessing whether low-noise alternatives exist. - Regular equipment maintenance to reduce noise. - General plans for community consultation and procedures to address noise complaints. - Noise monitoring plans.
6. Cost and effectiveness of controls.	Costs associated with low noise equipment will be reviewed as the design progresses. It is considered that with appropriate management measures, risks of environmental harm can be appropriately managed. Low-cost noise mitigation measures have been considered in the mitigation process and has been recommended where possible.

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9 Conclusion

The report supports a DTP application for a purpose-built data centre on behalf of GreenSquare DC. A noise impact assessment has been undertaken with respect to Victorian Regulations.

A review of the environmental noise emissions from the proposed data centre site has been undertaken. Based on the current equipment schedule and selections, noise emissions to the existing NSAs in the area surrounding the development are predicted to comply with the maximum target noise limits established in accordance with EPA Publication 1826.5.

The predicted effective noise levels from the data centre's typical operating scenario are compliant at all NSAs for Phase 1 of construction, being Building A only, and Phase 10 of construction, being all ten buildings (the whole site).

The predicted effective noise levels from the data centre's emergency testing scenario complies with the project noise limits after the inclusion of temporary noise walls around the load banks in the event that the units are tonal. Future load bank selections require acoustic review with the appropriate noise data to assess if the units are tonal and if the temporary noise walls are required. It is recommended that no more than 2 generators are tested at any one time during the day period on Monday to Saturday only to achieve compliance.

The noise emitting equipment selected should be equal to or lower than the noise levels provided for this assessment. If equipment selections are higher in source noise levels than presented in this assessment, additional mitigations may be required to achieve the noise limits and comply with the Victorian legislation. Additional mitigations can be considered as in Section 7.5.2.

As the design progresses, additional acoustic review of the proposed equipment will need to be undertaken to determine if the target noise limits set out in this impact assessment are being achieved.

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A

Appendix A: Site Zoning and Influencing Factors

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Figure 9-1 Zoning surrounding Noise Measurement Locations 1 to 3.

B

Appendix B: Noise Contours

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GreenSquare DC MEL1 Spotswood

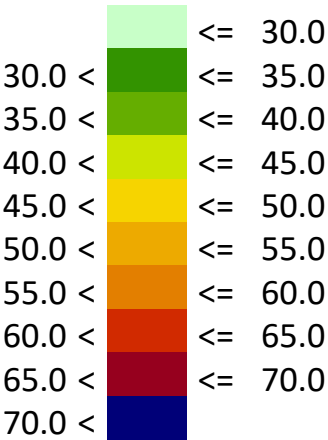
Typical Operations
Phase 1: Building A Only

- NOTES:**
- (1) PROPOGATION 1.5m ABOVE GROUND LEVEL.
 - (2) NOISE CONTOURS INCLUDE TONALITY CORRECTION APPLICABLE FOR THE SCENARIO
 - (3) ALL AREAS WITHOUT SHADING WERE NOT CALCULATED IN THE MODEL
 - (4) GRID MAP CONTOURS CALCULATED AT 10m. NOISE CONTOURS MAY VARY TO THE REPORT VALUES.

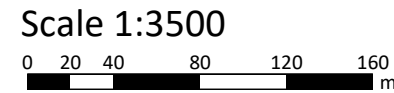
Legend

- Main building
- Auxiliary building
- Point Reciever
- Point Source
- Wall

Noise Level (dBLAeq)



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Typical Operations
Phase 10: All Datacentre Buildings

- NOTES:**
- (1) PROPOGATION 1.5m ABOVE GROUND LEVEL.
 - (2) NOISE CONTOURS INCLUDE TONALITY CORRECTION APPLICABLE FOR THE SCENARIO
 - (3) ALL AREAS WITHOUT SHADING WERE NOT CALCULATED IN THE MODEL
 - (4) GRID MAP CONTOURS CALCULATED AT 10m. NOISE CONTOURS MAY VARY TO THE REPORT VALUES.

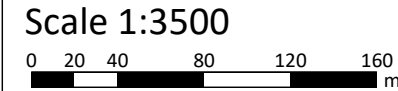
Legend

- Main building
- Auxiliary building
- Point Reciever
- Point Source
- Wall

Noise Level (dBLAeq)

	<=	30.0
30.0 <	<=	35.0
35.0 <	<=	40.0
40.0 <	<=	45.0
45.0 <	<=	50.0
50.0 <	<=	55.0
55.0 <	<=	60.0
60.0 <	<=	65.0
65.0 <	<=	70.0
70.0 <		

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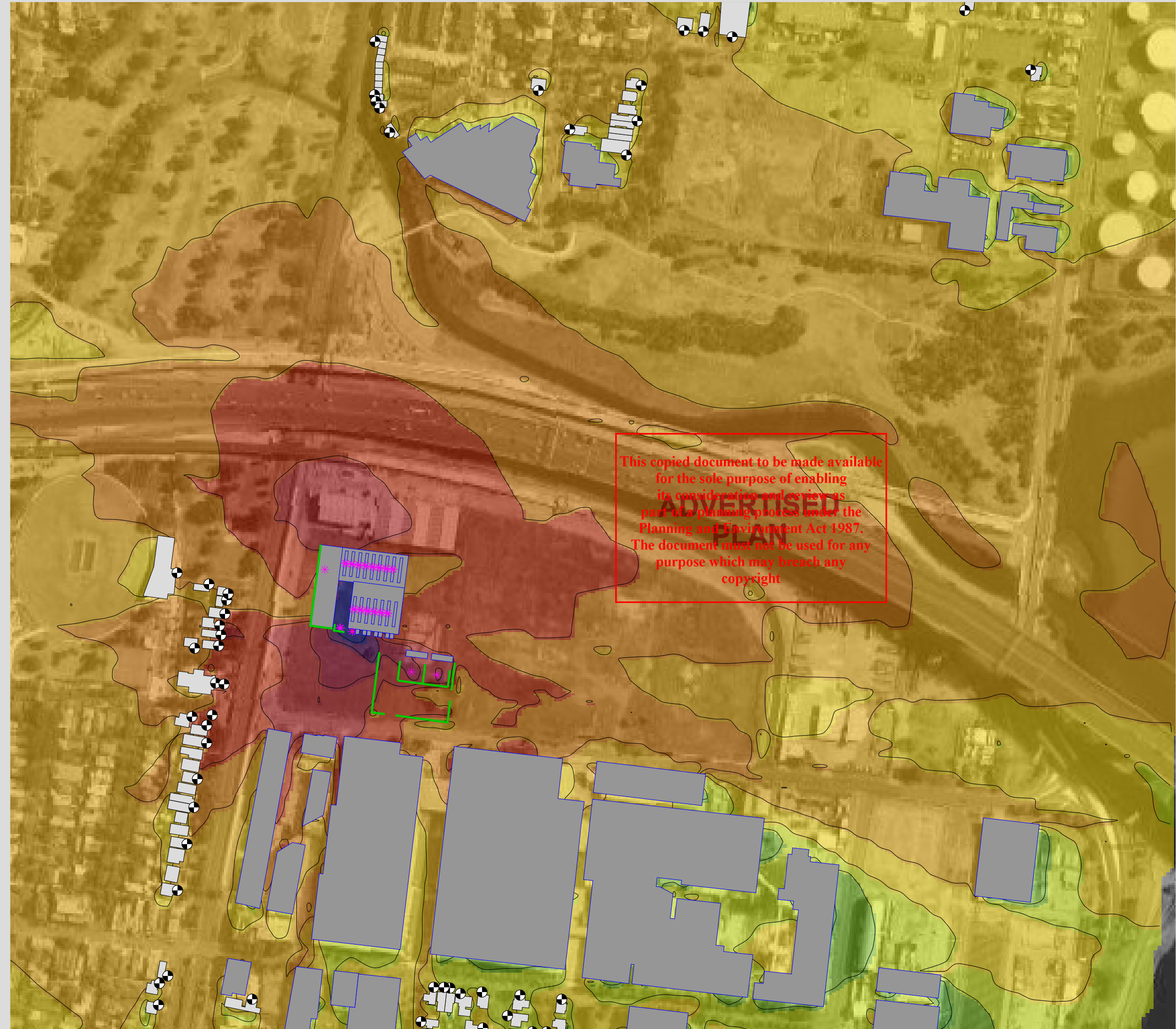
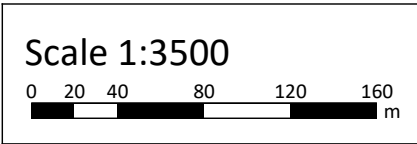
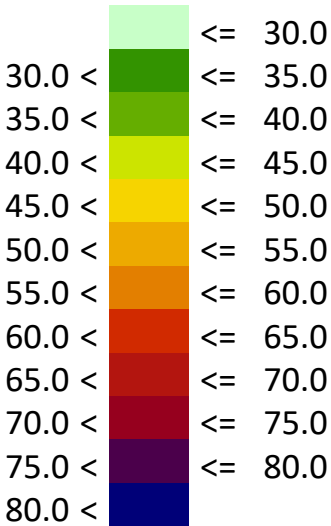
Emergency Testing Operations Phase 1: Building A Only

- NOTES:**
- (1) PROPOGATION 1.5m ABOVE GROUND LEVEL.
 - (2) NOISE CONTOURS INCLUDE TONALITY CORRECTION APPLICABLE FOR THE SCENARIO
 - (3) ALL AREAS WITHOUT SHADING WERE NOT CALCULATED IN THE MODEL
 - (4) GRID MAP CONTOURS CALCULATED AT 10m. NOISE CONTOURS MAY VARY TO THE REPORT VALUES.

Legend

- Main building
- Auxiliary building
- Industrial building; Room
- Point Reciever
- Point Source
- Outdoor Area Source
- Wall

Noise Level (dBLAeq)





GreenSquare DC MEL1 Spotswood

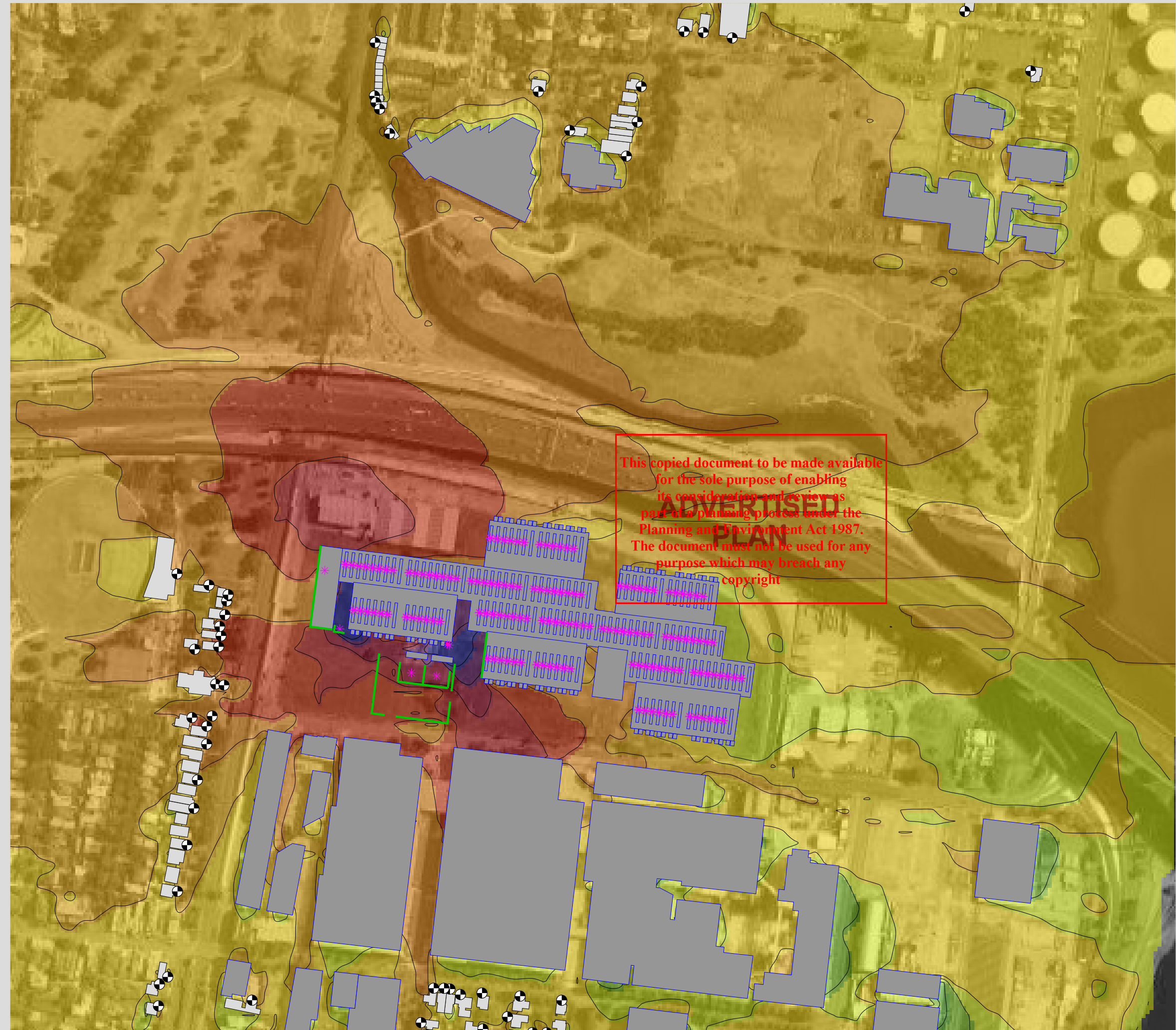
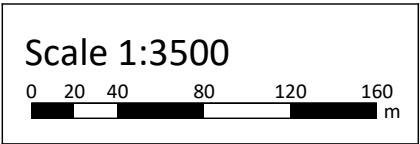
Emergency Testing Operations
Phase 10: All Datacentre Buildings

- NOTES:**
- (1) PROPOGATION 1.5m ABOVE GROUND LEVEL.
 - (2) NOISE CONTOURS INCLUDE TONALITY CORRECTION APPLICABLE FOR THE SCENARIO
 - (3) ALL AREAS WITHOUT SHADING WERE NOT CALCULATED IN THE MODEL
 - (4) GRID MAP CONTOURS CALCULATED AT 10m. NOISE CONTOURS MAY VARY TO THE REPORT VALUES.

- Legend**
- Main building
 - Auxiliary building
 - Industrial building; Room
 - Point Reciever
 - Point Source
 - Outdoor Area Source
 - Wall

Noise Level (dBLAeq)

	<=	30.0
30.0 <	<=	35.0
35.0 <	<=	40.0
40.0 <	<=	45.0
45.0 <	<=	50.0
50.0 <	<=	55.0
55.0 <	<=	60.0
60.0 <	<=	65.0
65.0 <	<=	70.0
70.0 <	<=	75.0
75.0 <	<=	80.0
80.0 <		



C

Appendix C: Calibration Certificates

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Octave Band Filter IEC 61260-3:2016 Calibration Test Report

Calibration Number C24652

Client Details	Aurecon
	Level 8, 850 Collins Street
	Docklands VIC, 3008
Filter Model Number :	Type 2270
Filter Serial Number :	4.7.6
Instrument Serial Number :	3029475
Microphone Serial Number :	3260624
Pre-amplifier Serial Number :	30129
Firmware Version :	4.7.6.244
Atmospheric Conditions	
Ambient Temperature :	24.3 °C
Relative Humidity :	41 %
Barometric Pressure :	99.75 kPa

Calibration Technician : Emanuel Eid **Secondary Check:** Cooper Sallway
Calibration Date : 28 Aug 2024 **Report Issue Date :** 29 Aug 2024

Approved Signature

Juan Agüero

Clause and Characteristic Tested	Result
Midband Relative Attenuation (Clause 10)	Pass
Linearity, Range and Overload (Clause 11)	Pass
Operating Ranged over Limit (Clause 12)	Pass
Relative Attenuation (Clause 13)	Pass

The filter submitted for testing successfully completed the periodic tests of IEC 61260-3, for the environmental conditions under which the tests were performed. As evidence was publicly available, from an independent testing organization responsible for approving the results of pattern-evaluation tests performed in accordance with IEC 61260-3, to demonstrate that the model of filter fully conformed to the class 1 specifications in IEC 61260-1:2014 the filter submitted for testing conforms to the class 1 specifications of IEC 61260-1:2014.

Electrical Tests		Uncertainties of Measurement -	
-5 dB < $\Delta A(\Omega)$ ≤ 40 dB		Environmental Conditions	
40 dB < $\Delta A(\Omega)$ ≤ 120 dB		Temperature	±0.1 °C
		Relative Humidity	±1.9 %
		Barometric Pressure	±0.11 kPa

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.



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Accredited for compliance with ISO/IEC 17025 - Calibration.

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Octave Band Filter
IEC 61260-3:2016
Calibration Certificate

Calibration Number C24652

Client Details Aurecon
Level 8, 850 Collins Street
Docklands VIC, 3008

Filter Model Number : Type 2270
Filter Serial Number : 4.7.6
Instrument Serial Number : 3029475
Microphone Serial Number : 3260624
Pre-amplifier Serial Number : 30129
Firmware Version : 4.7.6.244

Atmospheric Conditions
Ambient Temperature : 24.3 °C
Relative Humidity : 41 %
Barometric Pressure : 99.75 kPa

Calibration Technician : Emanuel Eid
Calibration Date : 28 Aug 2024

Secondary Check: Cooper Sallway
Report Issue Date : 29 Aug 2024

Approved Signatory :

Juan Agüero

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
Midband Relative Attenuation (Clause 10)	Pass	Operating Range Lower Limit (Clause 12)	Pass
Linearity, Range and Overload (Clause 11)	Pass	Relative Attenuation (Clause 13)	Pass

The filter submitted for testing successfully completed the periodic tests of IEC 61260-3, for the environmental conditions under which the tests were performed. As evidence was publicly available, from an independent testing organization responsible for approving the results of pattern-evaluation tests performed in accordance with IEC 61260-2, to demonstrate that the model of filter fully conformed to the class 1 specifications in IEC 61260-1:2014 the filter submitted for testing conforms to the class 1 specifications of IEC 61260-1:2014.

Uncertainties of Measurement -			
Electrical Tests		Environmental Conditions	
$-5 \text{ dB} < \Delta A(\Omega) \leq 40 \text{ dB}$	$\pm 0.12 \text{ dB}$	Temperature	$\pm 0.1 \text{ }^{\circ}\text{C}$
$40 \text{ dB} < \Delta A(\Omega) \leq 120 \text{ dB}$	$\pm 0.2 \text{ dB}$	Relative Humidity	$\pm 1.9 \text{ } \%$
		Barometric Pressure	$\pm 0.11 \text{ kPa}$

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.



This calibration certificate is to be read in conjunction with the calibration test report.

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