Environmental Noise Assessment

Data Centre Connection (Dedicated Connection) 435-503 Mount Atkinson Road, Truganina, VIC 3029

February 2025
Job Ref: N22450.2

Health, Safety & Noise Specialists

Simplifying Safety and Environmental Compliance

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N22450.2 ENA MVC Services Data Centre Connection (Dedicated Connection) 2025 V1

SUMMARY

JTA Health, Safety & Noise Specialists have performed an Environmental Noise Assessment of the proposed Data Centre Connection (Dedicated Connection) at 435-503 Mount Atkinson Road, Truganina. The assessment is to determine the noise impact of the proposed new infrastructure being installed during the construction and operational phases.

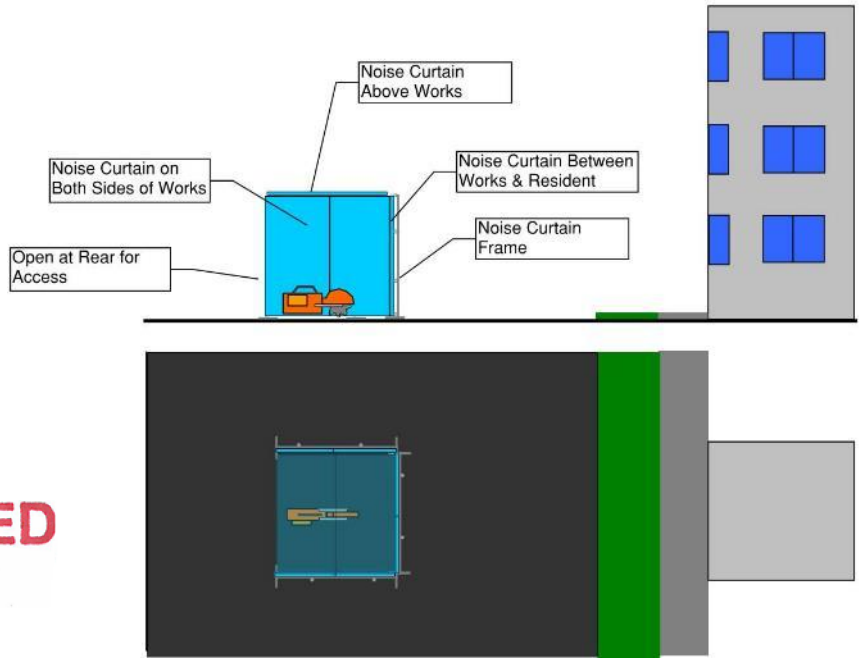
The environmental noise assessment for the operational was performed following the requirements of the Noise limit and assessment protocol for controlling noise from commercial, industrial, and trade premises and entertainment venues (Noise Protocol), which is incorporated into the environmental protection. EPA and other regulations and guidelines relevant to construction noise are used to establish project construction noise limits.

The outcomes of the assessment are summarised below.

- The noise propagation modelling indicates that the construction noise emissions are compliant with the noise emission requirements of the project targets.
- The noise propagation modelling indicates that the operational emissions are compliant with the noise emission requirements of the Noise Protocol.

To reduce the impact on residents for the construction noise phases, the following recommendations are provided:

- Investigate quieter alternative methods of concreting and piling, such as through water jet cutting to cut concrete and hydraulic jacking methods for piling.
- Implementing a portable noise curtain barrier for smaller equipment, such as sawing, will greatly reduce the impact of these high-level noise sources on residents. An example of such an arrangement is presented on the following page.



To enable easy portability, the noise curtains could be mounted on wheels. Care should be taken to ensure as little air gaps are present between curtain panels and the ground as possible.

Suitable noise curtain products can be obtained from FlexShield. An example of this product being used in a similar application in the field is presented below:

When construction noise levels exceed the project noise criteria specified, management controls should be considered for residents.

1 INTRODUCTION

JTA Health, Safety & Noise Specialists performed an Environmental Noise Assessment at the site of the proposed Data Centre Connection (Dedicated Connection) at 435-503 Mount Atkinson Road (the subject site). Daniel Saltzman of MVC Services commissioned the Environmental Noise Assessment on behalf of AusNet Services.

The environmental noise assessment for the operational was performed following the requirements of the noise limit and assessment protocol for controlling noise from commercial, industrial, and trade premises and entertainment venues (Noise Protocol), which is incorporated into the environmental protection. EPA and other regulations and guidelines relevant to construction noise are used to establish project construction noise limits.

The Environmental Noise Assessment included an assessment of site operational and construction noise as follows:-

- Ambient (L_{Aeq}) and background Noise Levels (L_{A90}) were measured at the nearest noise-sensitive receivers and at the subject site.
- Determination of Zoning Levels and calculation of the Effective Noise Limits for the relevant noise-sensitive locations for operational noise emissions.
- Predict the noise levels associated with the new infrastructure to calculate the effective noise levels associated with the construction phase and future site operations.
- Comparison of Effective Noise Levels with Noise Limits to determine compliance with the requirements of the Noise Protocol Part I for operational noise.
- Comparison of Effective Noise Levels with Noise Limits to determine compliance with the project requirements for construction noise.
- Preparation of a report detailing the conditions during the assessment, the assessment results and a comparison with the relevant Noise Limits.

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2 SITE DESCRIPTION

2.1 Proposed Development

The proposed development is the establishment of the Data Centre Connection (Dedicated Connection). This project comprises the following:

- 220kV connection to the Shared Connection 220kV switchyard
- Approximately 600m Underground 220kV cable between TNTS and the Data Centre
- 220kV / 33kV substation at 435-503 Mount Atkinson Road

TNTS site scope – cable connection

An underground trench will be constructed within TNTS and an under-road crossing of Mount Alexander Rd for a 220kV connection from TNTS to the 435-503 Mount Atkinson Road substation.

The cable scope includes:

- 3 x 220 kV 180 MVA power cable feeders and associated civil works (including a section of HDD installation under the future Mt Atkinson Rd), conduits, and cable termination structures.

The indicative cross section and connection route is shown below.

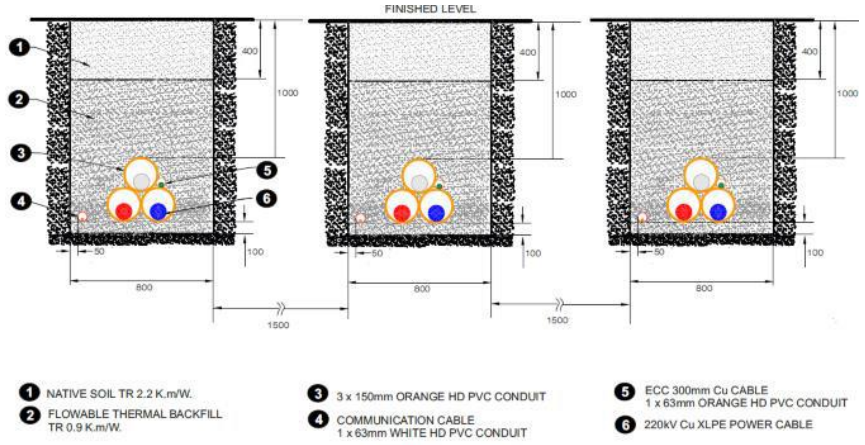


Figure 1: Dedicated Connection preliminary cross section of the 220kV underground trench

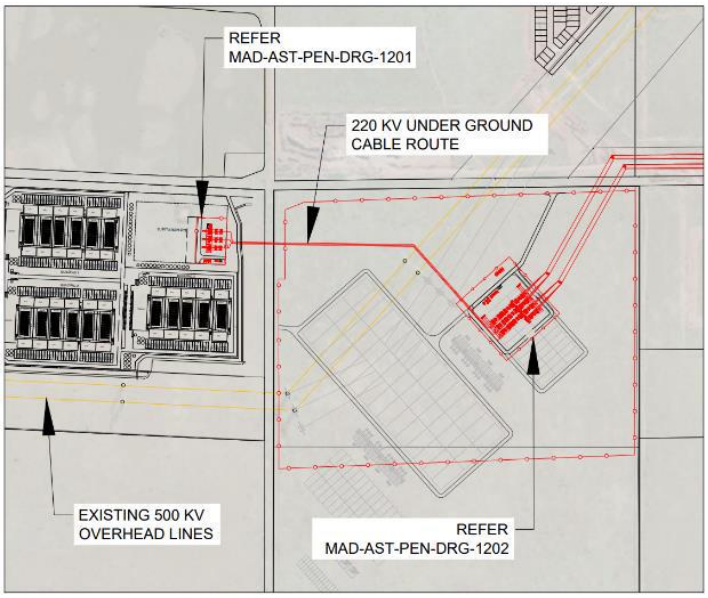


Figure 2: Dedicated Connection 220kV cable route

Customer site substation scope

The Customer Substation is located within the northeast corner of the LOGOS site and requires significant further development. The output voltage from the Customer Substation will be 33kV.

The Customer site substation scope includes:

- 3 x 220/33kV 180 MVA transformers and associated surge arrestors, footings, bunding, and firewalls.
- 3 x 220kV isolators (one connecting each transformer).
- Protection and control, monitoring, SCADA and communications modification.
- Miscellaneous site infrastructure including cable trenches, oil treatment, fencing, security and lighting.

The proposed Customer site substation layout is shown below.

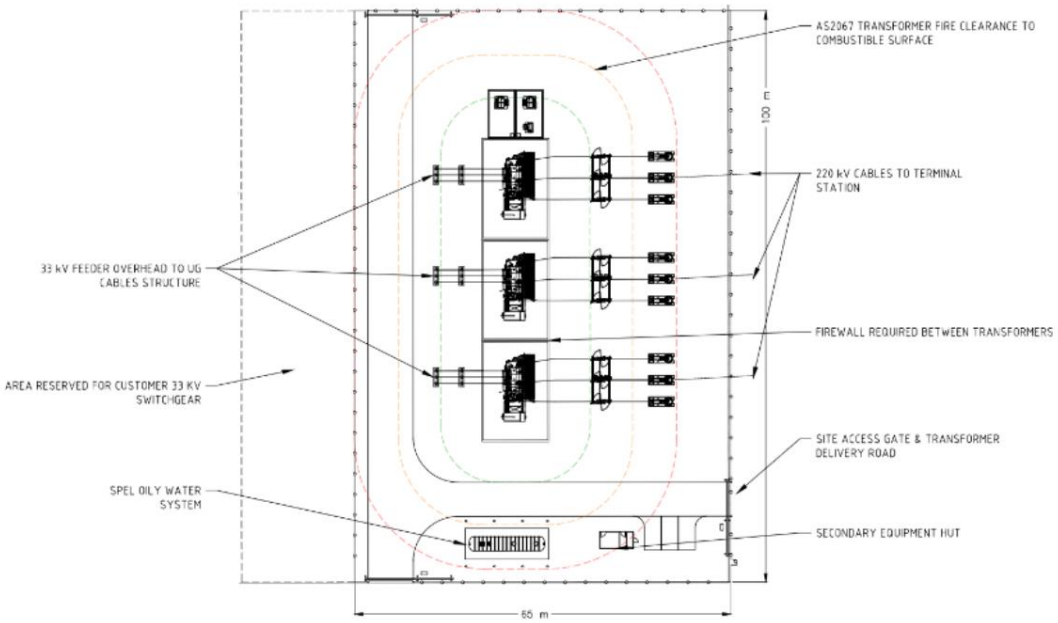


Figure 3: Customer site substation indicative layout

2.2 Location

The subject site is zoned as an Urban Growth Zone 9 (UGZ9 under the Noise Protocol), as the planning map extract below shows. Running the northeast is the power line easement (SUZ11 – Class 3). Immediately to the north and west of the site is an Urban Growth Zone (UGZ9 under the Noise Protocol), and to the east and south of the site is a Special Use Zone (SUZ3 under the Noise Protocol). A Rural Conservation Zone (RCZ under the Noise Protocol) lies further south of the site. The subject lies within the Melton Local Government Area.

The nearest residential noise-sensitive receivers (NSRs) are located in the developing residential areas to the northeast, and the commercial noise-sensitive receivers are located in the areas to the east, west, and south. Further to the south, the nearest residential NSRs are at 800m approximately from the subject site.

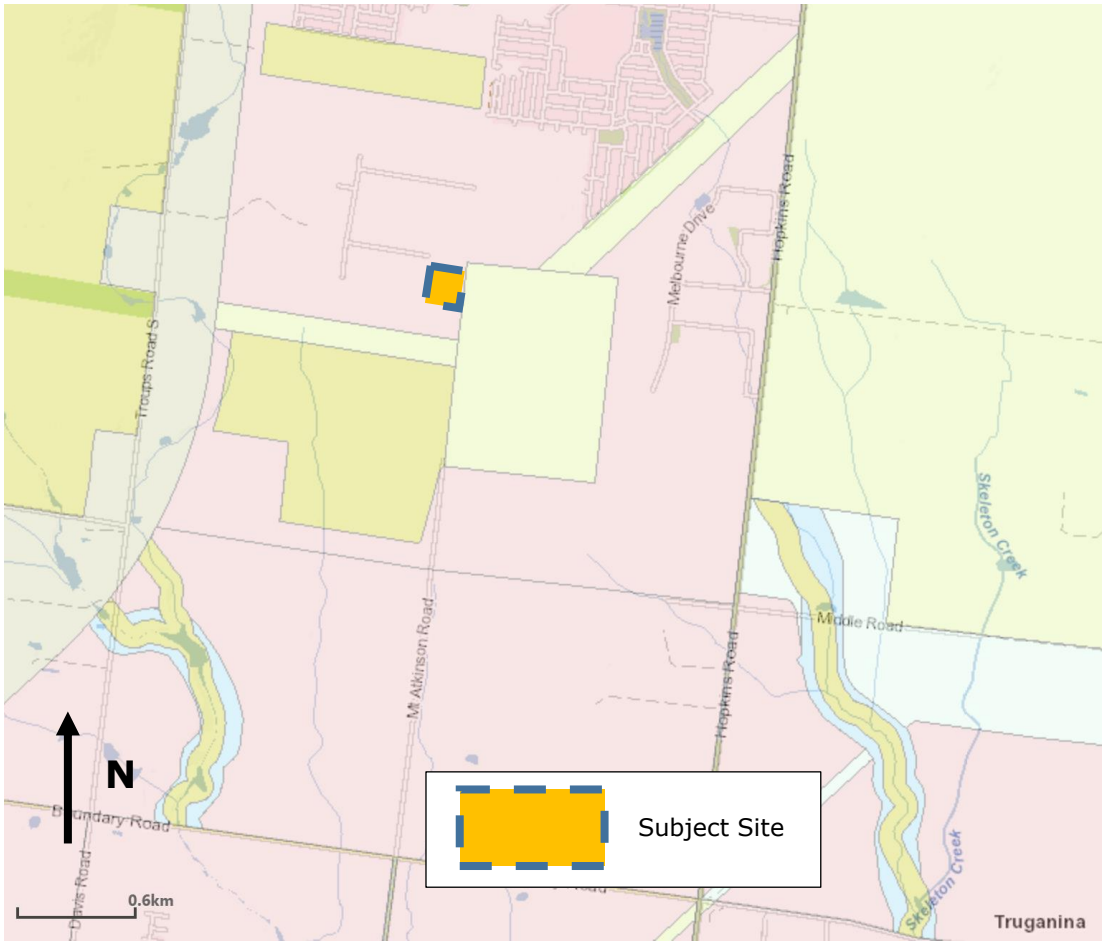


Figure 4: Planning Zones

2.3 Noise Sensitive Receivers (NSR's)

The following residential and commercial locations have been selected as representative locations for compliance status for the SoundPLAN modelling.

- 3-13 Willard Street - Residential
- 26 Yellowstone Drive - Residential (developed)
- 70 Yellowstone Drive - Residential (under development)
- Melbourne Drive - Industrial developed)
- Riding Boundary Road (possible future development)
- 619-653 Hopkins Road - Residential (developed)
- 692-714 Troups Road - Residential (developed)

The figure below shows the locations of the noise sensitive receivers (green circles are residential and yellow circles are industrial locations).

Figure 5: Noise Sensitive Receiver Locations

3 METHODOLOGY

3.1 References

The assessment methodology has been developed with reference to the following legislation, standards and guidelines:-

- Section 25(1) of the Environment Protection Act 2017 ('The Act').
- EPA Victoria Publication 1826.4 - Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues (Noise Protocol).
- EPA Publication 1997 June 2021 Technical guide: Measuring and analysing industry and music noise.
- EPA Victoria Publication 1820: Construction - Guide to Preventing Harm to People and the Environment (2020)
- EPA Victoria Publication 1834: Civil Construction, Building and Demolition Guide (2020)
- Noise Control Guideline 1254.2 (May 2021)
- EPA Publication 480: Environmental Guidelines for Major Construction Sites (1996)
- AS 1055:2018: Acoustics – Description and Measurement of Environmental Noise.
- City of Melbourne, Noise & Vibration Management Guidelines

3.2 Construction Noise Limits

3.2.1 EPA Publication 1834 - Civil Construction, building and demolition guide

The EPA Publication 1834 - Civil Construction, building and Demolition Guide discusses noise and vibration management and mitigation suggestions such as restricting high-activity works to certain periods and consultation with affected residents.

Generally, it provides less detail than EPA Publication 1834 and instead provides more general overarching guidance concerning noise and vibration emissions.

The EPA Publication 1834 states that noise levels should not be above background noise levels inside any adjacent residence between 10 p.m. and 7 a.m.

3.2.2 EPA Regulations & Environmental Protection Act

The EPA Regulation 2021 discusses that for commercial, industrial or trade premises, noise sources associated with construction is to be inaudible during the night-time period inside residential premises.

In addition, the Regulation discusses unreasonable and aggravated noise from these activities.

The Environment Protection Act 2017 provides broad guidance concerning EPA's responsibilities and powers and does not provide further insight into managing construction noise.

These legislation items are used with other policy and guidance documents to determine if offensive or injurious noise pollution has occurred and provide power to issue infringements.

3.2.3 The City of Melbourne Noise & Vibration Management Guidelines

The *City of Melbourne Noise & Vibration Management Guidelines* were developed to provide direction on addressing residual noise and vibration impacts on amenity so far as is reasonably practicable and appropriate.

These guidelines specify a range of engagement measures to be implemented for this purpose and criteria for determining when these measures are to apply.

Although a project may not directly be a part of the City of Melbourne area, the criteria for assessing non-residential premises are included. The requirements allow for a 'minimum to moderate level of interference with normal activities involving speech'. This level represents the upper limit for reasonable impacts. Noise above this level is considered significantly detrimental to speech and may be deemed a nuisance if appropriate noise management and consultative actions are not implemented.

At locations where predicted (or measured) residual construction noise levels exceed the noise guideline levels at non-residential premises, the engagement and mitigation measures shall apply.

Table 3.1: Commercial Premises Guideline Noise Levels and Management Measures

Period	Guideline noise levels	Management Measures
Normal Working Hours		
Monday – Friday: 7 a.m. – 7 p.m. Saturday: 8 a.m. – 3 p.m.	L_{eq} of 75 dB(A) Measured outdoors	These levels indicate the point at which noise may have an unreasonable interference with activities involving speech. Therefore, all feasible and reasonable efforts should be made to reduce noise within these levels.

3.3 Operational Noise Limits

Environmental Protection Act ('The Act')

Control of Noise emissions from the site is regulated in Section 25(1) of the Environment Protection Act 2017 ('The Act'), which defines the General Environmental Duty (GED) as follows:-

"A 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."

Detailed criteria for assessing noise emissions are not included in General Environmental Duty.

The Act prohibits unreasonable or aggravated noise emissions from non-residential premises and includes general definitions of unreasonable and aggravated noise.

Environmental Protection Regulations ('The Regulations')

The assessment adopts the criteria, guidance and assessment procedures for noise emissions as detailed in the Environment Protection Regulations 2021 (The Regulations), guideline documentation referred to in The Act, and guidelines published by the EPA.

Noise Protocol

The Government of Victoria sets out its policies to control and reduce environmental pollution through the EPA Victoria Publication 1826 Noise Limit and Assessment Protocol for the Control of Noise from Commercial, Industrial and Trade Premises and Entertainment Venues (Noise Protocol), incorporated into the Environmental Protection Regulations 2021 (the Regulations). Noise Protocol aims to protect people from commercial, industrial and trade noise or noise from entertainment venues that may affect the beneficial uses of noise-sensitive areas, including normal domestic and recreational activities, particularly sleep at night.

The protocol determines noise limits for new and existing commercial, industrial and trade premises as defined by the Regulations. It sets the methodology for assessing the effective noise level to determine unreasonable noise and compliance with the regulations.

Part I of the protocol outlines the methodology for setting noise limits for commercial, industrial and trade premises in Victoria's urban and rural areas.

The Background Noise Levels and Noise Level from a facility are measured at a point within a "Noise Sensitive Area", usually the nearest residence or a site of complaint. The noise level is adjusted where necessary for factors that increase the annoyance of the noise, such as tone, intermittency, and impulsive components. The final level, the Effective Noise Level, is compared with the Noise Limit to determine compliance.

The Noise Protocol uses the periods detailed below.

- Day period: Monday to Saturday (except public holidays), from 7 a.m. to 6 p.m.
- The evening period: Monday to Saturday, from 6 p.m. to 10 p.m.
- Sunday and public holidays, from 7 a.m. to 10 p.m.
- Night period: 10 p.m. to 7 a.m. the following day.

The site and the noise-sensitive receivers lie within the City of Melton Local Government Area. The site and most of the noise-sensitive receivers lie within the Melbourne Metropolitan Urban boundary, so the urban area assessment method was generally used. Note that the Troups Road residential receivers to the west lie within a rural area, so the rural area assessment method is to be used for these receivers.

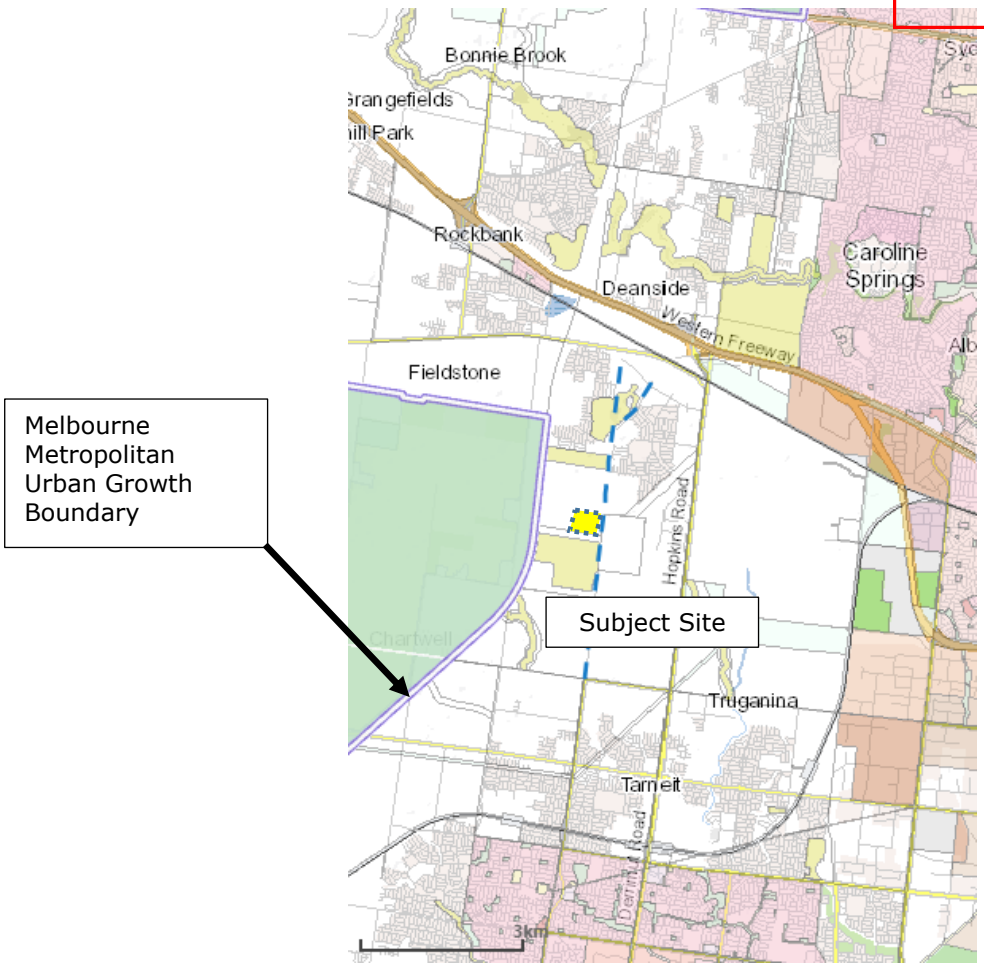


Figure 6: Location of Site with Urban Planning Area

3.4 Noise Measurements

Unattended measurements were conducted at the boundary of the site using a Svan 958A Type 1 sound level meter with built-in real-time integrating/averaging and octave band facilities. The sound level meter was positioned outdoors, fixed to a tripod approximately 1.5 meters above ground level, at least 4 meters from any reflective surface. The sound level meters was calibrated before and following the assessment using an external acoustic calibrator. No significant drift in calibration was measured.

The table below outlines the noise equipment utilised during the assessment and associated calibration details.

Table 3.2 - Noise Equipment and Calibration Details		
Make/Model	**Serial Number**	**Calibration Due Date**
Sound Level Meter		
SVAN 958A	92847	10/03/2025
SVAN 958A	92803	21/03/2025
Acoustic Calibrator		
Quest QC-10	QE3040129	12/11/2025

3.5 Noise Propagation Modelling

As new plant is being proposed, noise modelling has been used to predict the impacts of the new plant.

Noise modelling of site-emitted noise levels has been conducted using SoundPLAN software. The SoundPLAN model implements the ISO 9613-2 outdoor noise propagation model. Refer to section 6 for additional modelling details.

4 OBSERVATIONS

4.1 Existing Noise Environment

The noise sources observed adjacent to the site include noise from from commercial activities at the adjacent commercial sites (vehicle movements, excavators, rock hammers, horns and alerters), local traffic (road and aeroplane) and noise from wildlife (birds and insects).

Based on the noise data from the logging survey, the representative background noise levels are summarised in the table below.

Table 4.1 – Noise Measurements at the NSRs

Location	Period	Date	Background Noise Level L_{A90} dB(A)	Observations
Truganina Site	Day	14/1/25-21/1/25	42	Daytime – local construction, local traffic and industrial noise. Evening/Night – hum from parked trucks on industrial estate roads
	Evening		39	
	Night		37	

4.2 Weather Conditions

Weather conditions during the initial survey were observed to be generally dry, with periods of moderate and elevated winds. Refer to the summary table of daily weather conditions below from the Bureau of Meteorology weather station at Laverton North. Data from periods with elevated winds or significant rain events were excluded using the BOM half-hourly weather data for the Laverton North weather station.

The following weather conditions were experienced during the assessment:

Table 4.2 – Weather Observations

Day	Date	Temperature			Wind Speed	
		Minimum (°C)	Maximum (°C)	Rainfall (mm)	9 a.m. (km/h)	3 p.m. (km/h)
Tuesday	14/01/25	18.6	25.7	0.2	9	20
Wednesday	15/01/25	17.3	25	0	11	28
Thursday	16/01/25	11	22.3	0.4	13	24
Friday	17/01/25	15.7	22.1	0	20	31
Saturday	18/01/25	16.2	29	0	19	19
Sunday	19/01/25	13.7	34.2	0	7	22
Monday	20/01/25	16.8	33.3	0	7	17
Tuesday	21/01/25	18.6	31	0	7	22

4.3 Operational Noise Limits

Representative noise limits for noise sensitive receivers located in the vanicity of the Data Centre Dedicated Connection during operational phase is based on the background levels measured at the boundary of the subject site. On site observations indicate similar ambient activities at nearby noise sensitive receivers and at the site boundary with local traffic movements as the main ambient activity.

Noise Limits based on the representative background levels are presented in Table 4.3.

Table 4.3 – Calculation of Noise Limit

Location	Period	Influencing Factor	Zoning Level	Background Level dB(A)	Low/Neutral/ High Background?	Noise Limit dB(A)
3-13 Willard Road	Day	0.50	59	42	Low	55
	Eve		53	39	Low	49
	Night		48	37	Low	45
26 Yellowstone Drive	Day	0.50	59	42	Low	55
	Eve		53	39	Low	49
	Night		48	37	Low	45
70 Yellowstone Drive	Day	0.71	63	42	Low	57
	Eve		56	39	Low	50
	Night		51	37	Low	47
Riding Boundary Road	Day	0.51	59	42	Low	55
	Eve		53	39	Low	49
	Night		48	37	Low	45
619-653 Hopkins Road	Day	Used minimum planning levels				45
	Eve					40
	Night					35
692-714 Troups Road	Day					45
	Eve					40
	Night					35

5 NOISE MODELLING

The predicted noise levels due to construction works and operational noise have been modelled using SoundPLAN, and they have been assessed at the nearest noise-sensitive receivers and compared against the project noise level criteria for each project stage. The construction works will be conducted during the day-time periods.

5.1 Modelling Methodology

The proposed works noise emissions were predicted by incorporating the relevant noise sources into a noise propagation model prepared for the site. The construction works schedule comprises the following scenarios.

- Scenario 1: Site establishment, clearing and access roads
- Scenario 2: Earthworks, clearing and trenching
- Scenario 3: Civil, building and barrier works, foundation and footing
- Scenario 4: Equipment and structures, pit and conduit works
- Scenario 5: Site clean-up and commissioning

The construction works were modelled at multiple locations along the works route for each scenario. The noise modelling was conducted using the software SoundPLAN, which implements the algorithms for ISO 9613-1 and ISO 9613-2. The model accounts for the following factors:

- Source sound power levels, source directivity, tonality and orientation;
- Distance attenuation, including source and receptor heights;
- Barrier effects due to structures and other buildings;
- Ground effects;
- Atmospheric attenuation;
- Meteorological effects and
- Percentage of time noise sources are operating.

The noise model includes the following:

- Residential dwellings and Non-residential buildings;
- Topography and ground absorption of the local area; and
- Noise sources associated with the construction and operational phases.

Noise source data was obtained from the JTA database, manufacturer data, and literature. Appendix I provides a 3D model image of the local area.

5.2 Construction Noise Sources

The sound power levels used in the noise propagation model to predict the emitted noise levels from the subject site during construction phases are detailed in Tables 5.1.

As the project is at the concept stage, the levels and stages listed below represent the design noise levels. If the proposed plant noise levels and/or construction methodology/locations deviate significantly from those listed below, the noise assessment should be reviewed, and appropriate controls should be introduced as required.

Table 5.1: Construction Noise Sources

Stage		Construction Activity	Equipment	No.	% use hour	LW Sound Power Level dB(A)
1	Site preparation, establishment, clearing and access roads	Clearing and grading works	Excavator 10T	1	75	99
			Chainsaw	1	10	99
			Truck mounted crane	1	50	94
			Mobile crane	1	50	94
			Power tools	4	10	112
			Franna	1	25	99
			Grader	2	75	112
			Jackhammer	1	25	110
			Dozer	2	75	111
			Vibratory roller 20T	2	75	109
			Dump truck 25T	4	50	111
2	Earthworks, clearing and trenching	Levelling ground, Vegetatation clearing and trenching	Excavator 40T	2	75	109
			Dump truck 25T	4	50	111
			Dozer	2	75	111
			Rockbreaker 10T	1	10	118
			Vibratory roller 20T	2	75	109
3	Civil, building and barrier works, foundation and footing	Pads and footings, piling	Concrete truck and pump	4	100	106
			Delivery truck	4	50	110
			Truck-mounted crane 100T	2	50	104
			Franna	2	50	99
			Jackhammer	1	25	110
			Concrete saw	1	25	108
			Angle grinder	4	25	110
			Excavator 40T	2	75	109
			Piling Rig	1	50	111
4	Equipment and structures, pit and conduit works	Concreting, pads and footings, piling, install grounding grid	Truck-mounted crane 100T	2	50	94
			Delivery truck	2	50	110
			Power tools	2	10	112
			Dozer	2	75	111
			Dump truck 25T	2	50	111
			Concrete truck and pump	2	100	106
			Angle grinder	2	25	110
5	Site clean-up and commissioning	Site rehabilitation and landscaping, removal of temporary material	Power tools	4	50	99
			Excavator 40T	1	50	109
			Vibratory roller 20T	1	50	109
			Delivery truck	2	25	110
			Truck-mounted crane 50T	2	25	94
			Dozer	1	75	111
			Franna	1	25	99

5.3 Operational Noise Sources

Equipment sound power levels were used in the noise propagation model to predict the emitted noise levels from the subject site.

As the plant selection is preliminary at this stage, the levels listed below represent the design noise levels. If the proposed plant noise levels and/or locations deviate significantly from the levels listed below, the noise assessment should be reviewed, and appropriate controls should be introduced as required.

Table 5.2 – Equipment Operation Noise Levels

Equipment	Sound Power Level Lw dB(A)		Customer Site Substation
	100% Rated Volts-dB(A)	100% Rated Volts, load and cooling Combined-dB(A)	
220/33kV 180 MVA transformers	90	100	3
Antenna	85	85	1
Generator	95	95	1
Smoke Exhaust Fan	80	80	1
AC	75	75	1

6 RESULTS

6.1 Construction Noise

6.1.1 Scenario 1 : Site Preparation, Establishment, Clearing And Access Roads

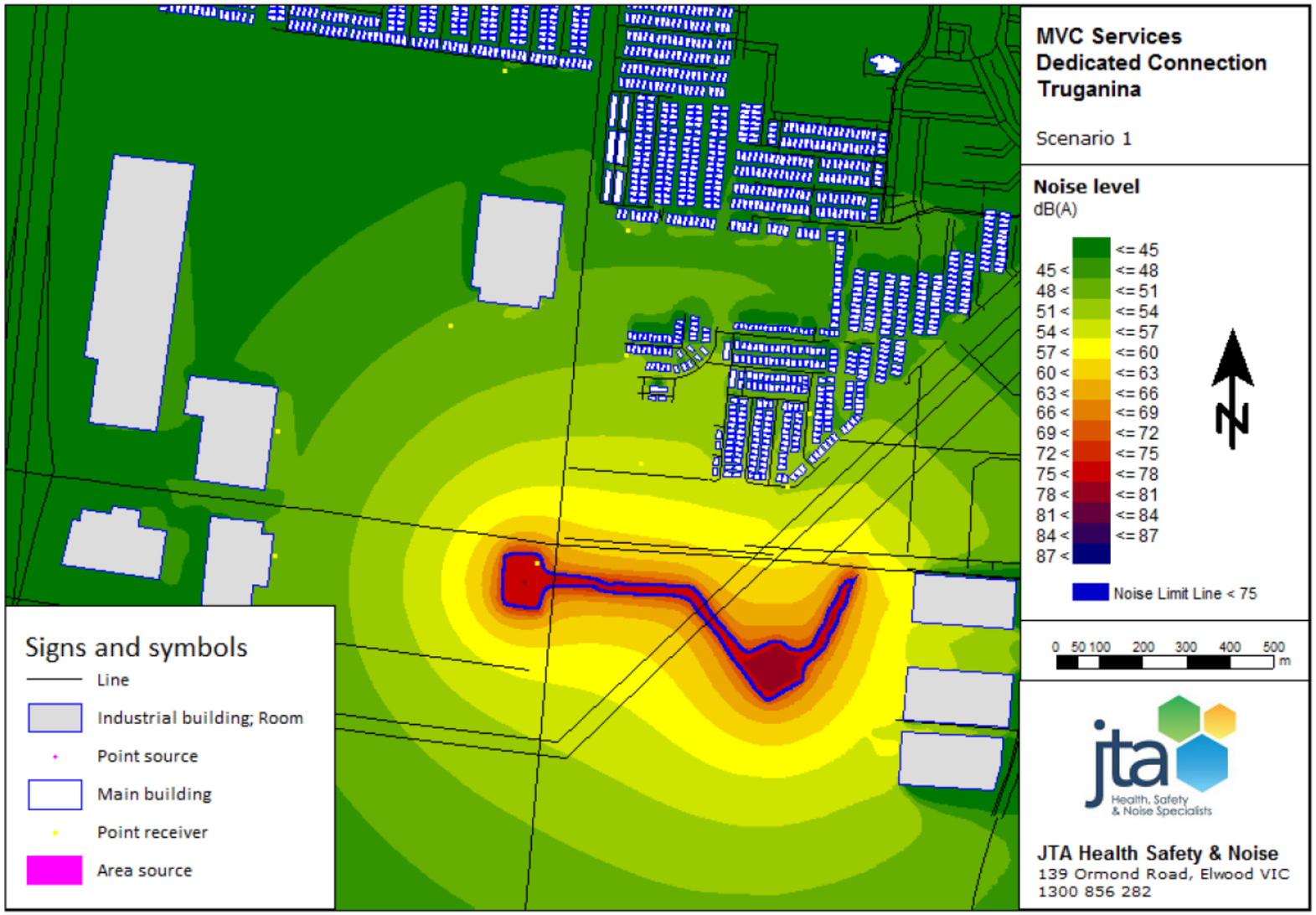


Figure 7 : Noise Contour Map – Scenario 1

No daytime exceedances are predicted.

Recommend implementing noise control measures such as:-

- Maximising distance of equipment from the receivers where possible,
- Scheduling equipment used to minimise multiple noise sources operating in close proximity and at the same time and
- Using low-noise equipment or alternative methods where possible.

6.1.2 Scenario 2: Earthworks, Clearing And Trenching

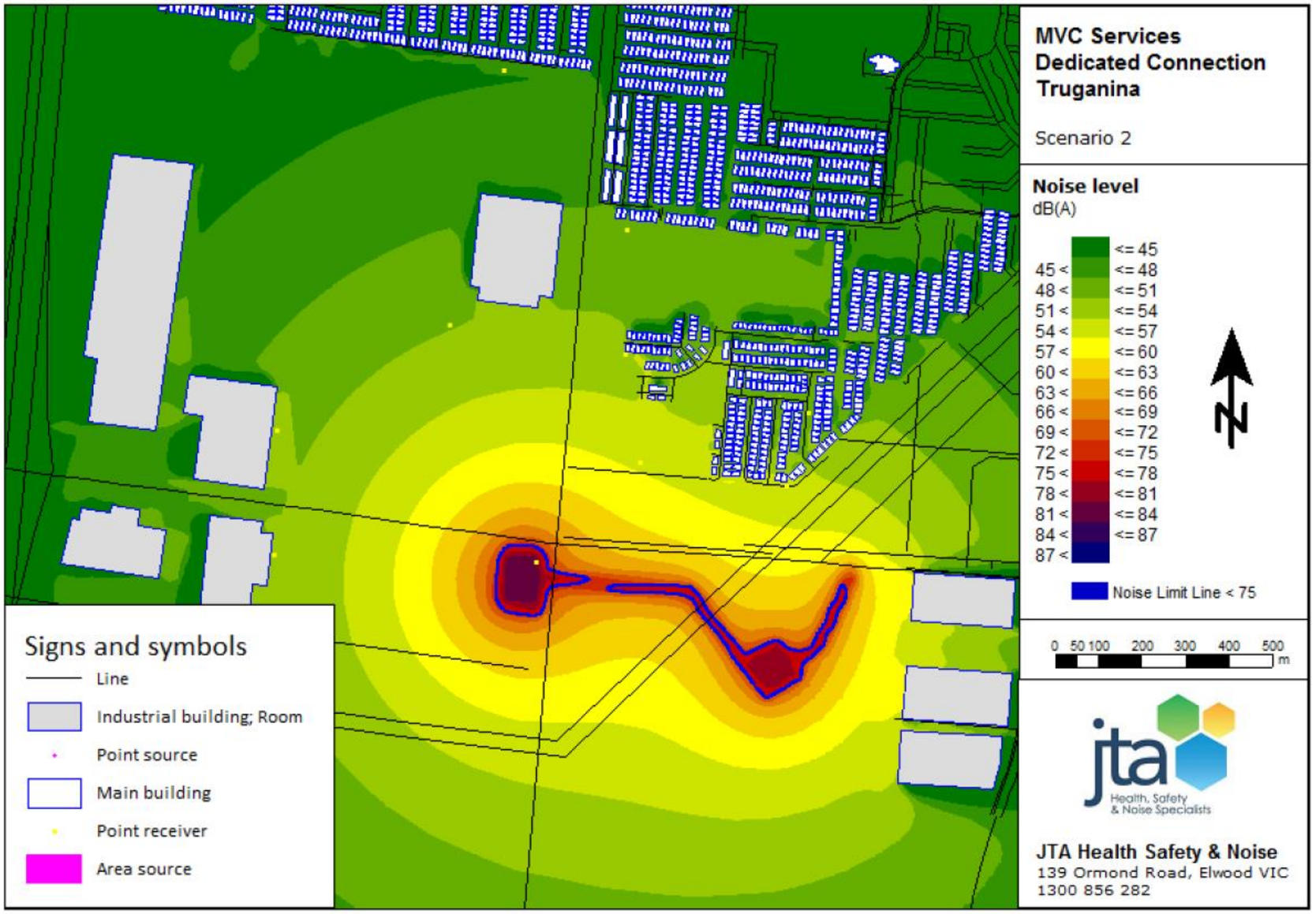


Figure 8: Noise Contour Map – Scenario 2

No daytime exceedances are predicted.

Recommend implementing noise control measures such as:-

- Maximising distance of equipment from the receivers where possible,
- Scheduling equipment used to minimise multiple noise sources operating in close proximity and at the same time and
- Using low-noise equipment or alternative methods where possible.

6.1.3 Scenario 3: Civil, Building And Barrier Works, Foundation And Footing

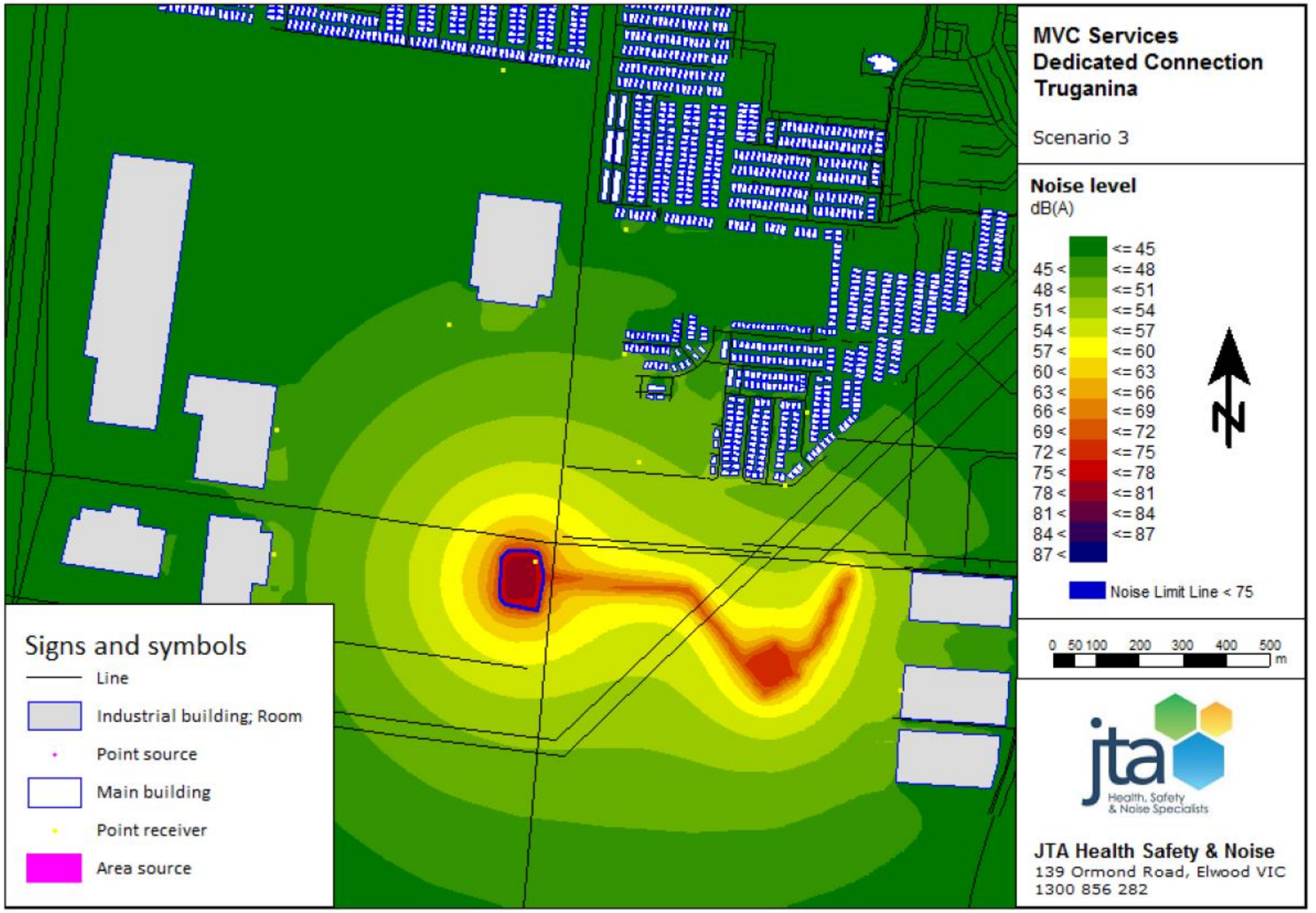


Figure 8: Noise Contour Map – Scenario 3

No daytime exceedances are predicted.

Recommend implementing noise control measures such as:-

- Maximising distance of equipment from the receivers where possible,
- Scheduling equipment used to minimise multiple noise sources operating in close proximity and at the same time and
- Using low-noise equipment or alternative methods where possible.

6.1.4 Scenario 4: Equipment And Structures, Pit And Conduit Works

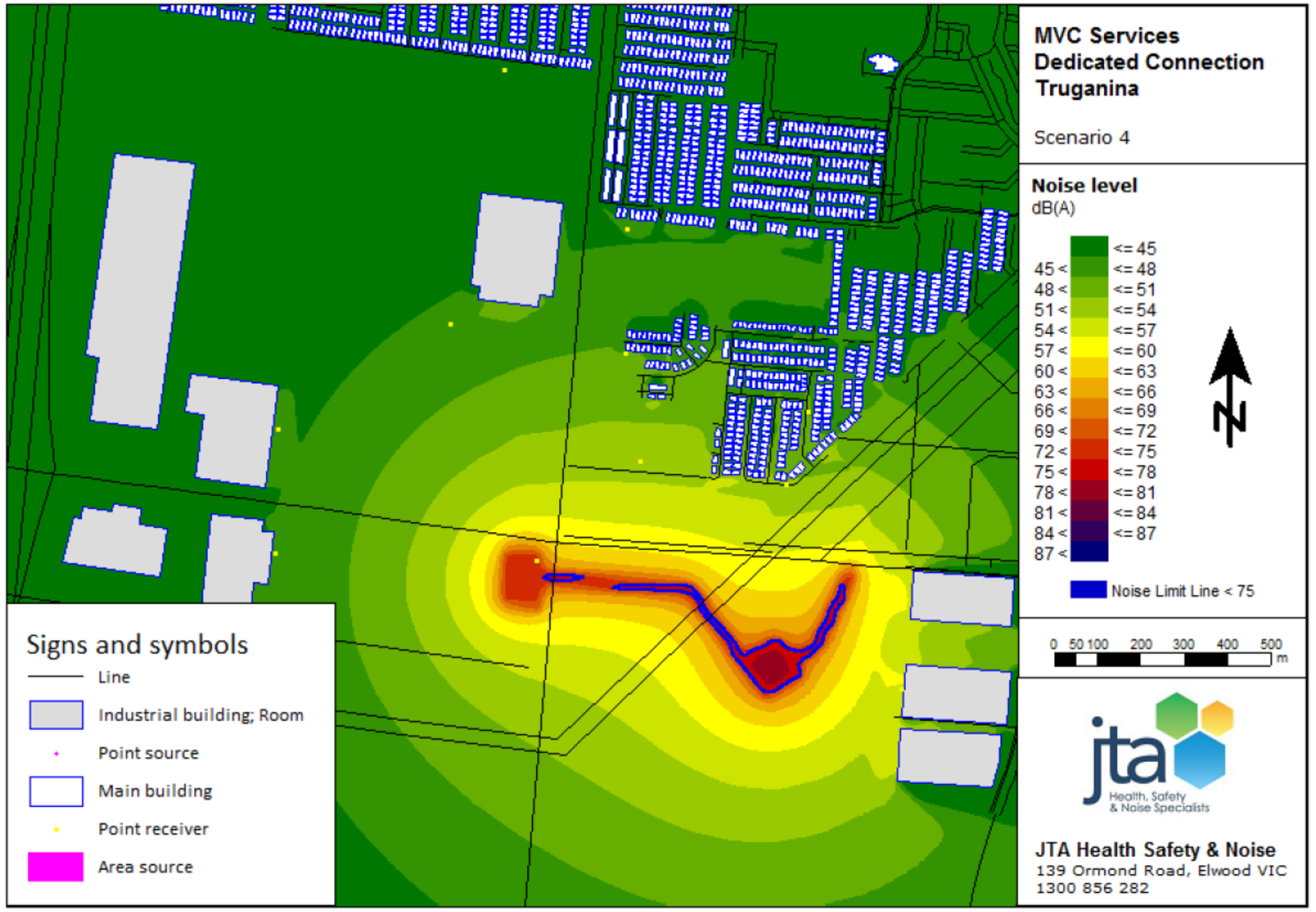


Figure 9: Noise Contour Map – Scenario 4

No daytime exceedances are predicted.

Recommend implementing noise control measures such as:-

- Maximising distance of equipment from the receivers where possible,
- Scheduling equipment used to minimise multiple noise sources operating in close proximity and at the same time and
- Using low-noise equipment or alternative methods where possible.

6.1.5 Scenario 5: Site clean-up and commissioning

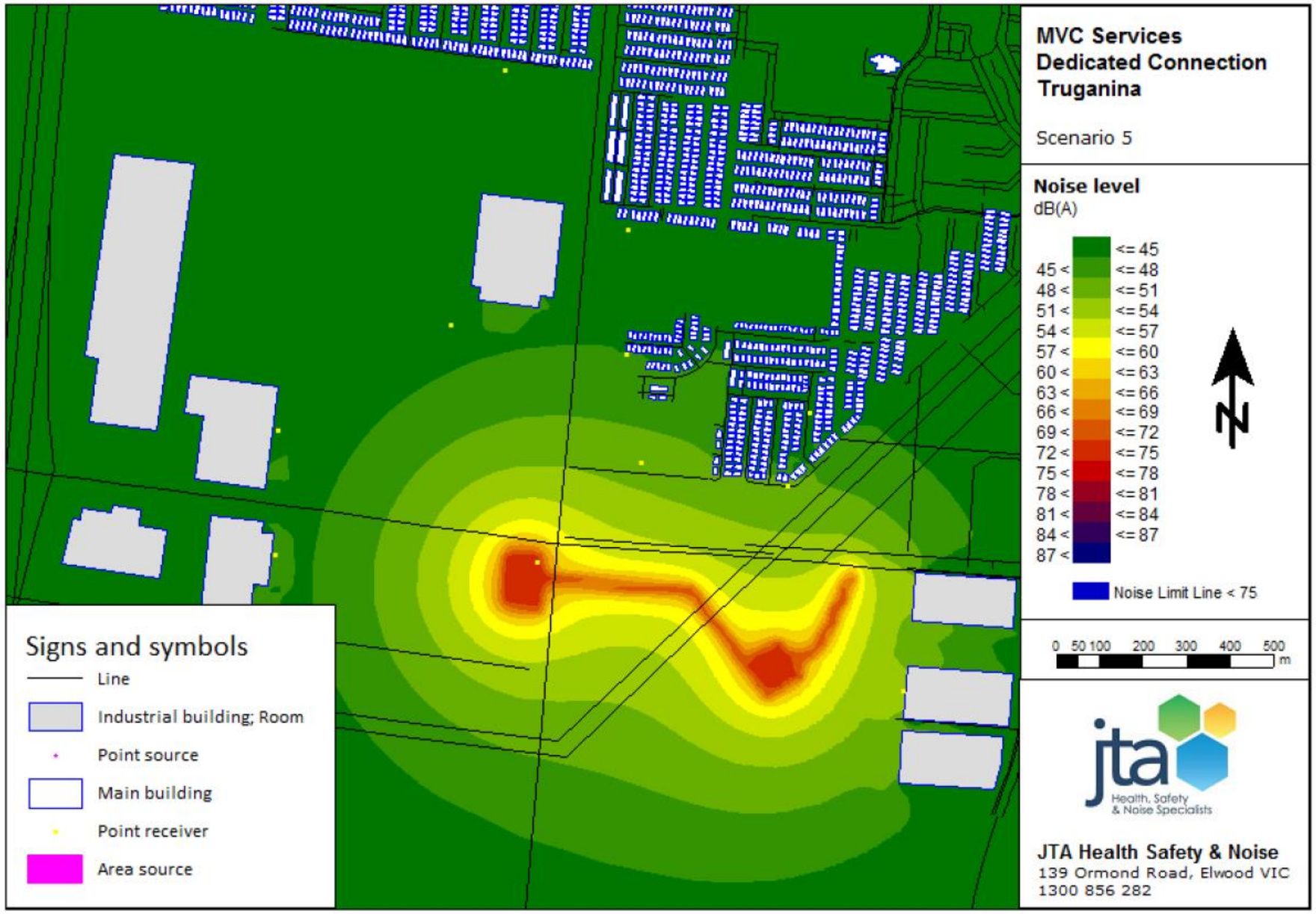


Figure 10: Noise Contour Map – Scenario 5

No daytime exceedances are predicted.

Recommend implementing noise control measures such as:-

- Maximising distance of equipment from the receivers where possible,
- Scheduling equipment used to minimise multiple noise sources operating in close proximity and at the same time and
- Using low-noise equipment or alternative methods where possible.

6.2 Operational Noise

Compliance Status

A comparison of the Effective Noise Levels with the new terminal station operating against the night-time Noise Limits is presented in the table below. The night noise limits have been selected as these are the most stringent.

Table 9 – Effective Noise Levels

Location	Period	Noise Limit dB(A) Night	Effective Noise Level dB(A)[1]	Compliance with Noise Protocol?
3-13 Willard Road	Night	45	29	Yes
26 Yellowstone Drive	Night	45	29	Yes
70 Yellowstone Drive	Night	50	32	Yes
Riding Boundary Road	Night	45	36	Yes
619-653 Hopkins Road	Night	35	20	Yes
692-714 Troups Road	Night	35	27	Yes

[1] Includes +2dB for moderate tonality.

The noise contour map is shown overleaf.

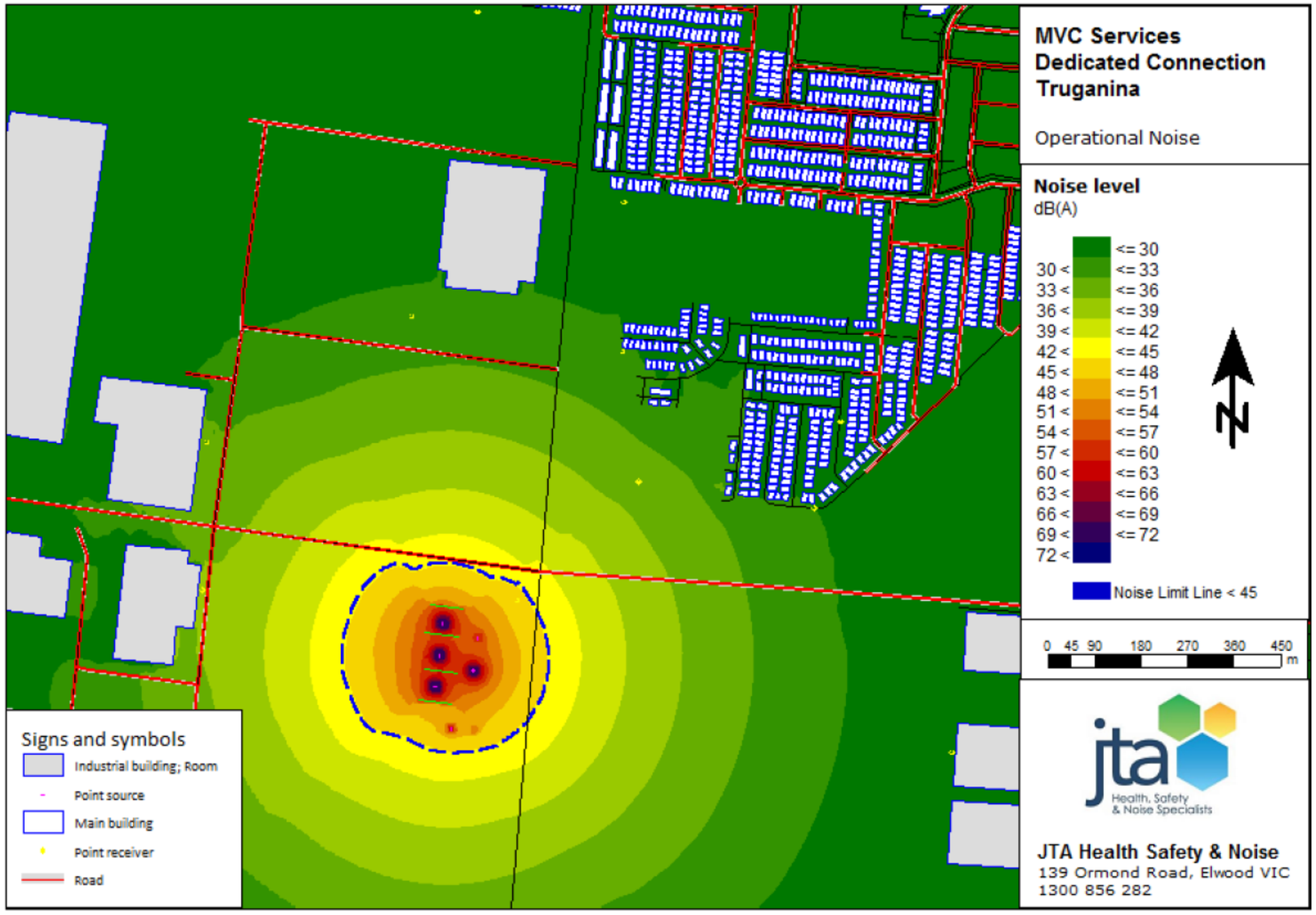


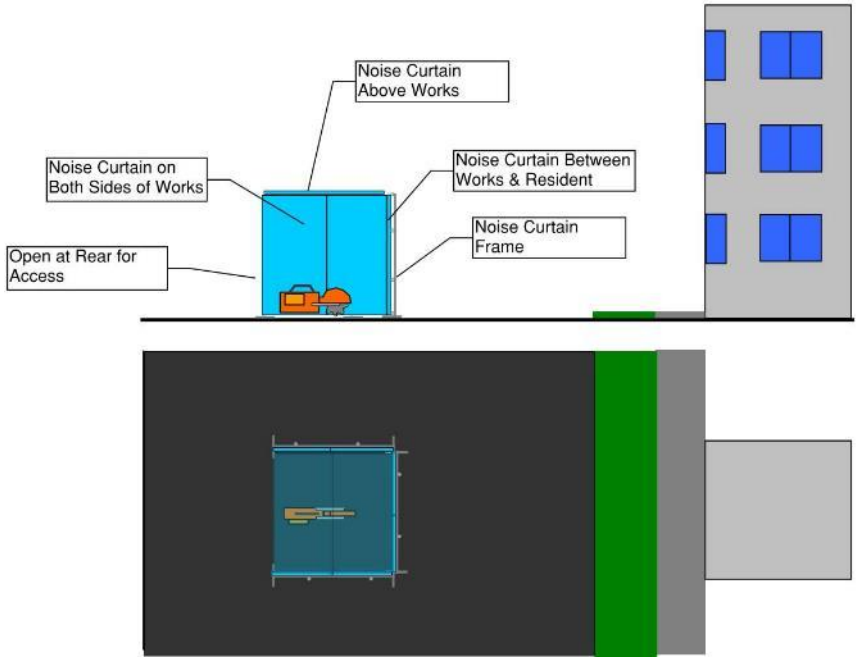
Figure 11: Noise Contour Map – Operational Noise

7 DISCUSSION AND RECOMMENDATIONS

- It is recommended that the noise levels be measured during commissioning to confirm compliance.
- The noise propagation modelling indicates that the construction noise emissions are compliant with the noise emission requirements of the project targets.
- The noise propagation modelling indicates that the operational emissions are compliant with the noise emission requirements of the Noise Protocol.

To reduce the impact on residents for the construction noise phases, the following recommendations are provided:

- Investigate quieter alternative methods of concreting and piling, such as through water jet cutting to cut concrete and hydraulic jacking methods for piling.
- Implementing a portable noise curtain barrier for smaller equipment, such as sawing, will greatly reduce the impact of these high-level noise sources on residents. An example of such an arrangement is presented on the following page.

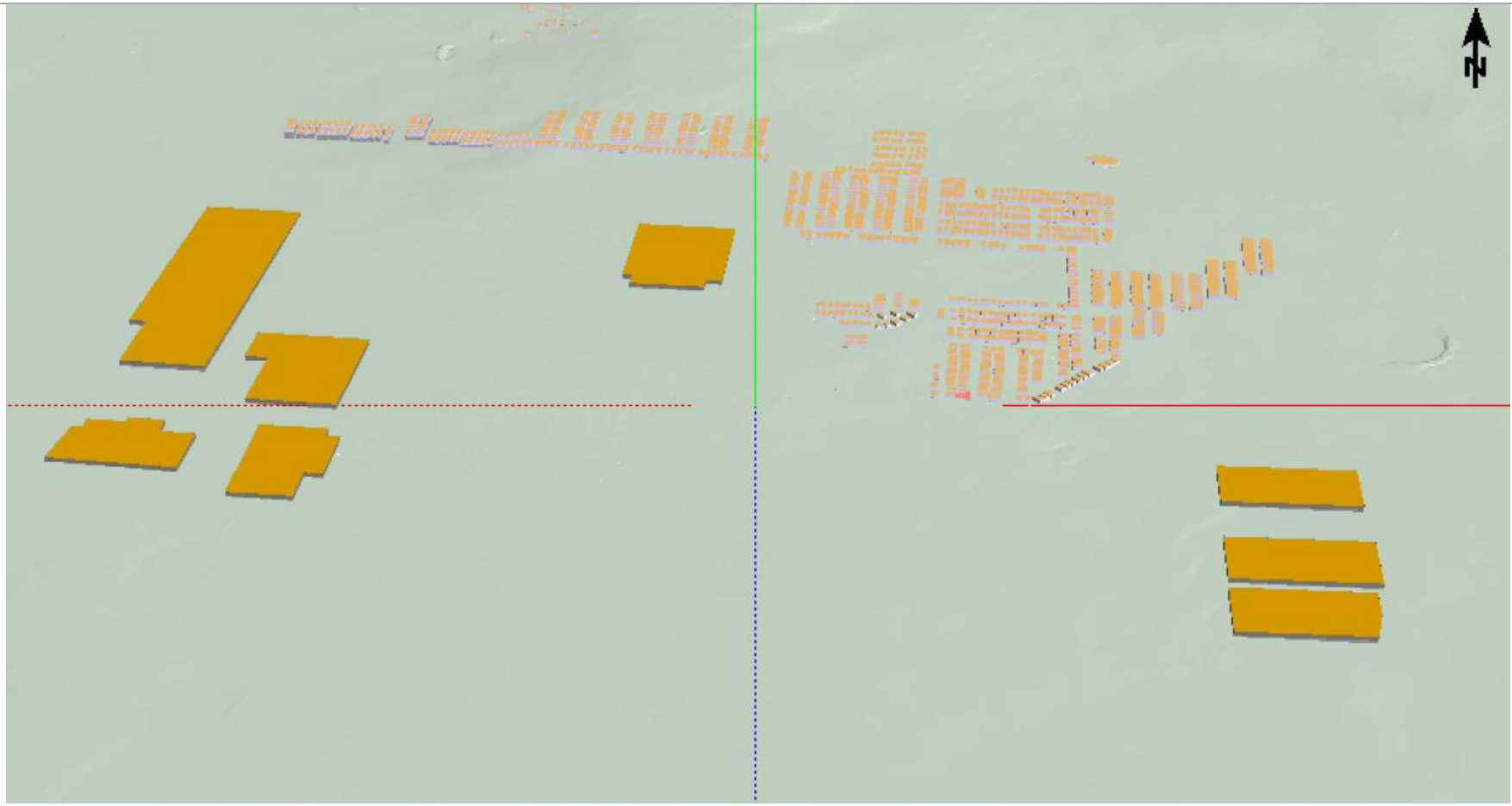


To enable easy portability, the noise curtains could be mounted on wheels. Care should be taken to ensure as little air gaps are present between curtain panels and the ground as possible.

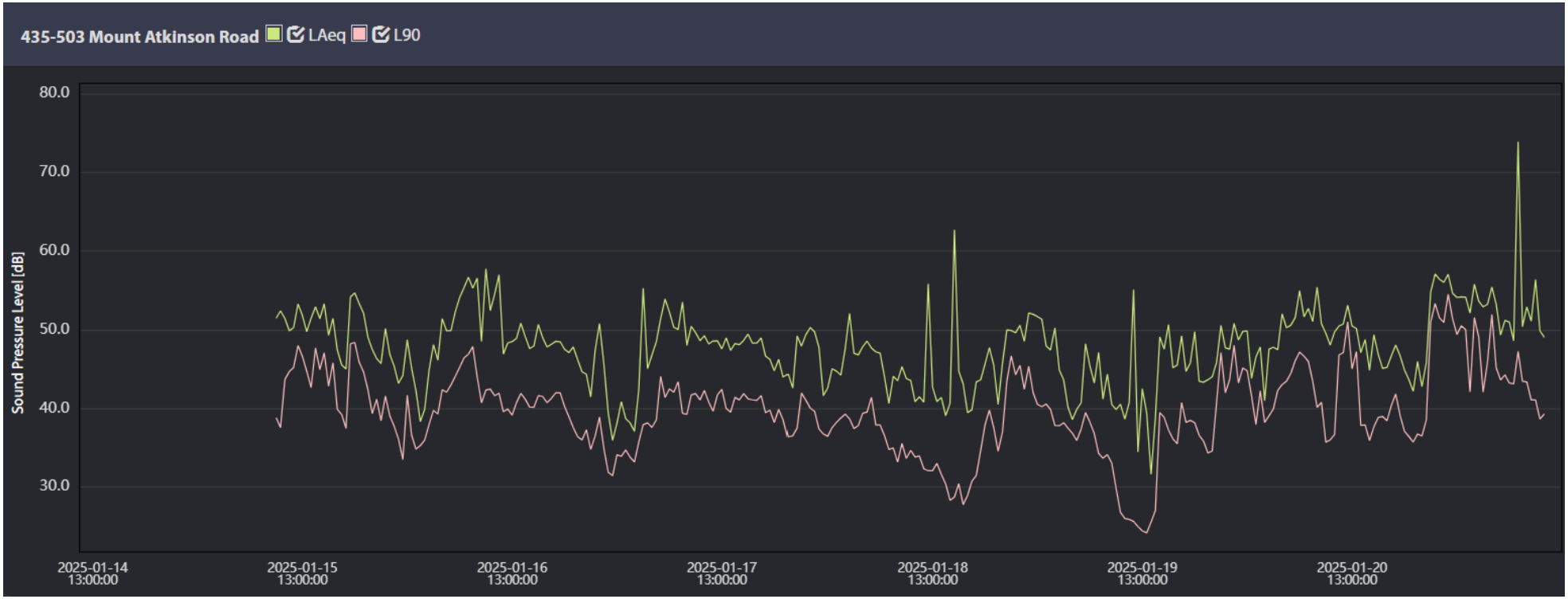
Suitable noise curtain products can be obtained from FlexShield. An example of this product being used in a similar application in the field is presented below:

When construction noise levels exceed the project noise criteria specified, management controls should be considered for residents.

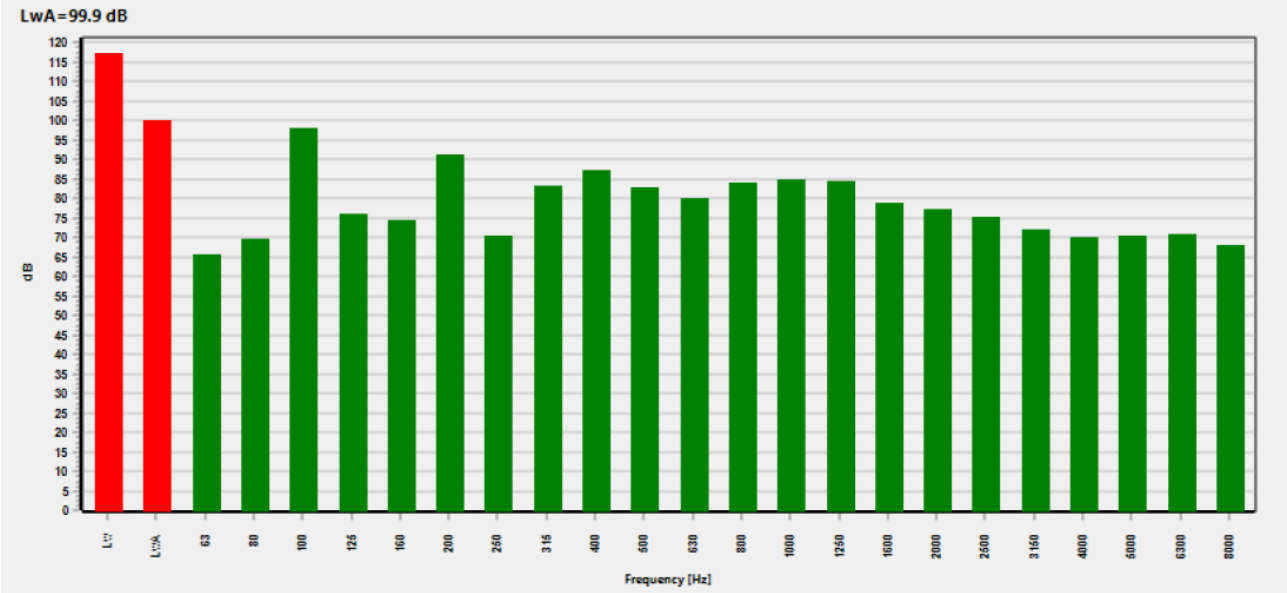
APPENDIX I – MODEL IMAGE



APPENDIX II – LOGGER DATA



APPENDIX III –Transformer Noise Spectrum



Frequncy spectrum obtained referenced from: Low-frequency and Tonal Characteristics of Transformer Noise - Paper Number 23, Proceedings of ACOUSTICS 2011

APPENDIX IV – GLOSSARY OF TERMS

Term	Definition
Background Noise	Background noise is the underlying noise environment in the local area excluding all transient events, in the absence of noise from the site under question. The background noise level is characterised by the L_{90} descriptor which means that only the average of the quietest 10% of noise measured will form the background noise level. This means that events such as dogs barking, car pass-bys or car horns will be excluded while the general hum of traffic, etc will be included.
Ambient Noise	Ambient noise is any sound other than the sound being monitored/assessed and is associated with that environment, being a composite of sounds from many sources, near and far. The ambient noise level is characterised by the L_{eq} descriptor which means that the logarithmic average of all noise measured will form the ambient noise level.
Extraneous Noise	Extraneous noise is any noise which is not part of the noise being measured/assessed i.e. from the facility, premises or venue. Extraneous noise can include any noise which masks the noise emissions from the site under question, with examples being wind on vegetation or on the microphone, aircraft noise, wildlife, etc.
Noise Protocol	The Noise Protocol manages the impact of noise from commercial, industrial and trade premises on residential and other noise-sensitive uses in Victoria. It prescribes noise limits and provides details on noise measurement procedures, including the measurement of background levels and adjustments to the noise level to account for more annoying characteristics to determine effective noise levels at noise sensitive receivers, usually nearby residential dwellings.
Noise Sensitive Receiver (NSR)	A Noise Sensitive Receiver (NSR) is an identified location where sensitive personal and/or activity are located, usually a dwelling where people sleep.
Effective Noise Level	The Effective Noise Level is the level of noise emitted from the commercial, industrial or trade premises and adjusted if appropriate for character and duration.
Octave & 1/3 Octave Bands	The spectrum of the sound split into distinct logarithmic frequencies in Hertz (HZ).
Tonal Noise	Tonal noise is defined as a significant variation between a 1/3 octave band relative to its adjacent bands. An example would be a whistle blowing, where a large portion of the sound energy is focused into a narrow part of the noise spectrum.
Noise Limit	The Noise Limit is defined as the maximum effective noise level allowed at a measurement point at a Noise Sensitive Receiver location.
Noise Logger	A noise logger is a long term noise monitoring device deployed into the field where it can operate with no direct control from a user for a significant amount of time (4 days to 2 weeks to infinite).
dB(A)	An expression of the relative loudness of sounds in air as perceived by the human ear. In the A-weighted system, the decibel values of sounds at low frequencies are reduced, compared with unweighted decibels, in which no correction is made for audio frequency. A unit of acoustic measurement electronically weighted to approximate the sensitivity of human hearing to sound frequency.
dB(C)	The C scale is practically linear over several octaves and is thus suitable for subjective measurements only for very high sound levels. Measurements made on this scale are expressed as dB(C).
dB(lin)	dB(lin) or dB(Z) is an unweighted value of sound over a spectrum.
Decibel	The decibel is a logarithmic unit, used for a wide variety of measurements in science and engineering. A unit of acoustic measurement. Measurements of power, pressure and intensity may be expressed in dB relative to standard reference levels.

Term	Definition
Impulse Noise	Impulse noise is noise that consists of a distinct single pressure peak, a sequence of single peaks, a single burst with multiple pressure peaks or a sequence of such bursts. Impulse noise may be the only noise present or may be superimposed on a background of a continuous noise. Impulse noise presents an additional noise hazard in that, if the peak level is sufficiently high an instantaneous injury may result.
L_{eq}	Equivalent continuous sound pressure level. The sound pressure level of a continuous steady sound that has the same sound energy as the actual time-varying sound.
L_{Max}	The maximum sound pressure level (LMax) is the highest sound pressure level measured over a given time constant or measurement period.
L_{A10}	The L_{A10} dB or L_{10} dB(A) is the A-weighted sound pressure level which exceeds for 10 percent of the time interval considered. i.e. the average of the noisiest 10 percent of measured values over a time period.
L_{A90}	The L_{A90} dB or L_{90} dB(A) is the A-weighted sound pressure level which is exceeded for 90 percent of the time interval considered. i.e. the average of the quietest 10 percent of measured values over a time period.
Sound Pressure Level	A measurement of sound pressure, expressed in decibels, with respect to the threshold of hearing. The threshold of hearing is usually defined as 20 micropascals, which is assigned a value of 0 decibels. Ambient sound pressure level – The all-encompassing sound/noise during typical operations within an environment e.g. workshop, office, factory floor Task specific sound pressure level measurements – generally performed at the operator position or a representative area of as piece of equipment.
Sound Power Level	The sound energy emitted by a sound source. i.e. where a sound wave energy is condensed to its point of origin. An example would be measuring a speaker at 10 metres is the sound pressure level, where if the sound wave sphere that is being generated by the speaker was shrunk back to the point of the speaker cone, that would be the sound power energy level. It could also be thought of as a balloon being inflated to a very large size is the sound wave growing from a point source, where the edge of the balloon skin is the edge of the sound wave front. If a small square was drawn onto the balloon when it is inflated, then if the balloon was to have air let out of it, the balloon would shrink and the square would get smaller and condense. If this was done all the way back to where the balloon had no air left then the square would be too tiny to see. This point is the Sound Power Level, where all the energy has been un-stretched back to one point.