acousticworks

Proposed Industrial Warehouse Development
311 South Street
Marsden Park

ACOUSTIC REPORT




Client:
Dexus
c/- Archile Projects
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Reference:
1021124 R01J 311 South Street Marsden Park ENV.docx

Date Issued:
2 May 2022

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24/11/2021	R01A	Michael Gunning	Greg Pearce	GP
24/11/2021	R01B	Michael Gunning	Greg Pearce	GP
16/12/2021	R01C	Michael Gunning	Greg Pearce	GP
21/12/2021	R01D	Michael Gunning	Greg Pearce	GP
01/02/2022	R01F	Michael Gunning	Greg Pearce	GP
03/02/2022	R01G	Michael Gunning	Greg Pearce	GP
08/04/2022	R01H	Michael Gunning	Greg Pearce	GP
02/05/2022	R01I	Michael Gunning	Greg Pearce	GP
02/05/2022	R01J	Michael Gunning	Greg Pearce	GP

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1. Executive Summary

The following report is in response to a request by Dexus for an environmental noise assessment for a State Significant Development Application for a proposed warehouse, logistics and facilities hub development located at 311 South Street, Marsden Park. The purpose of the assessment is to determine if the proposed development layout is acoustically viable and what acoustic measures, if any, are necessary.

The environmental noise assessment was conducted in accordance with Blacktown City Council requirements and the NSW Department of Planning and Environment's Secretary's Environmental Assessment Requirements (SEARs) (Application Reference: SSD-29668067) which requires the following matters to be addressed:

> *"11. Noise and Vibration:*
> *Provide a noise and vibration assessment prepared in accordance with the relevant EPA guidelines. The assessment must detail construction and operational noise and vibration impacts on nearby sensitive receivers and structures and outline the proposed management and mitigation measures that would be implemented."*

Table 1 provides a summary of the SEARs requirements and the locations within this report that they are addressed:

Table 1: SSD-29668067 SEARS requirements

Condition	Section References
Detail construction and operational noise and vibration impacts on nearby sensitive receivers and structures	Operational noise: Sections 8, 10 Operational vibration: Section 9 Construction Noise and Vibration: In separate report
Outline the proposed management and mitigation measures that would be implemented	Section 11

The acoustic assessment considers the cumulative impact of all stages of the proposed development to sensitive receivers in the vicinity of site and concludes that the proposed masterplan for warehouses and logistic hub is satisfactory with the provided recommendations. The review indicates that the current stage proposed of the master plan is considered viable with recommendations provided in Section 11 for the 24 hour operation of the site.

2. Introduction

The following report is in response to a request by Dexus for an environmental noise assessment for a State Significant Development Application for a proposed warehouse, logistics and facilities hub development located at 311 South Street, Marsden Park. The environmental noise assessment was conducted in accordance with Blacktown City Council requirements and the NSW Department of Planning, Industry and Environment's *Secretary's Environmental Assessment Requirements* (SEARs). To facilitate the assessment, unattended noise monitoring was conducted in the vicinity of nearby sensitive receivers to establish the criteria for onsite activities.

This updated report has been provided in response to comments received by the Department (received by Acoustic Works 17/01/2022) and includes further details and revised modelling in response to the comments.

3. Site Description

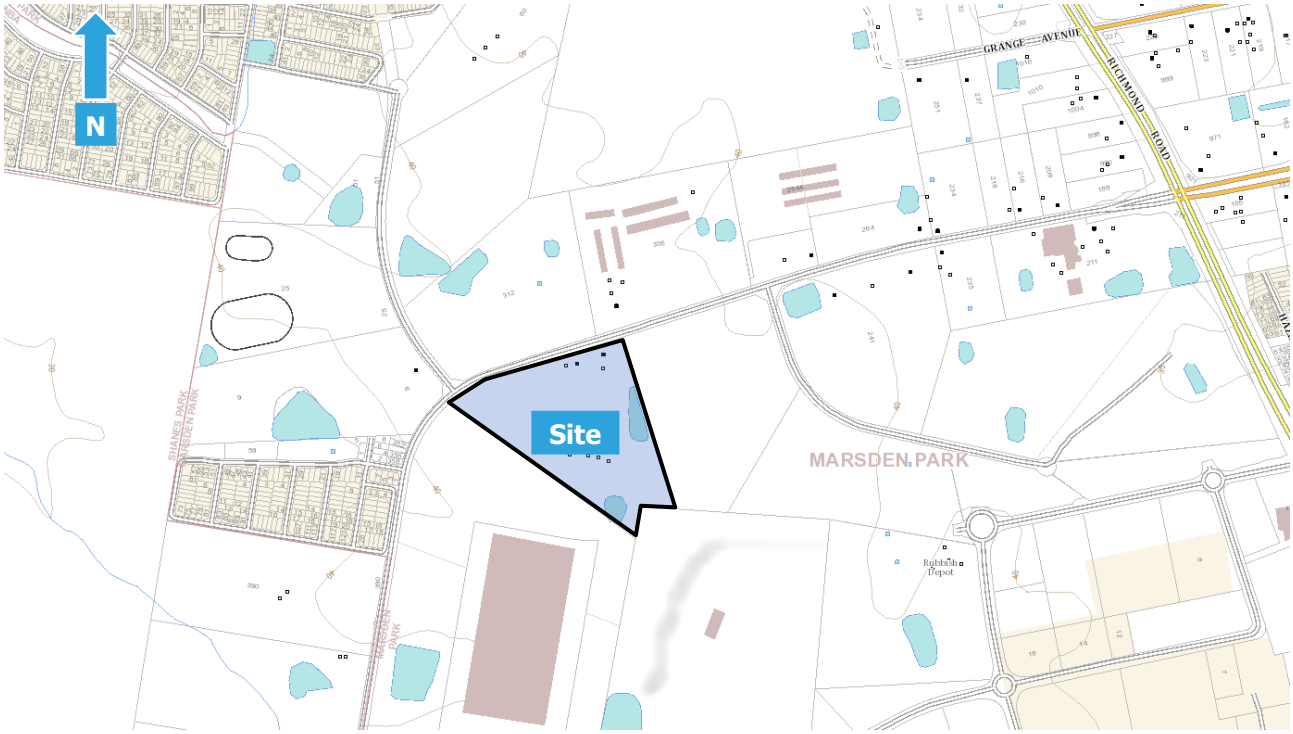
3.1 Site Location

The site is described by the following:

311 South Street, Marsden Park
Lot 31 on DP 262886

Refer to Figure 1 for site location.

Figure 1: Site Location (Not to Scale)



A comprehensive site survey was conducted on the 15th November 2021 which identified the following:

- The site is located in B7 - Business Park as defined in the State Environmental Planning Policy (Western Sydney Employment Area) Amendment 2020.
- The site is currently vacant.
- A residential development is under construction to the east.
- Residential developments are located to the north and west of the site.
- Existing and proposed industrial developments are located to the south of the site.

3.2 Proposal

The State Significant Development Application proposes to construct an estate consisting of two warehouse buildings with loading docks and a total of 327 car parking spaces provided over 4 parking lots.

Figure 2: Site Layout

The proposed plan is as follows with Figure 2 providing a graphical representation.

Unit 1
- Warehouse GFA of 15,950m^2
- Office space GFA of 390m^2
- Truck access via South Street
- Car access via new collector road to the east.

Unit 2A
- Warehouse GFA of 4,450m^2
- Office space GFA of 370m^2
- Truck access via South Street
- Car access via new collector road to the east.

Unit 2B
- Warehouse GFA of 5,100m^2
- Office space GFA of 470m^2
- Truck access via South Street
- Car access via new collector road to the east.

Unit 2C
- Warehouse GFA of 5,000m^2
- Office space GFA of 290m^2
- Truck access via South Street
- Car access via new collector road to the east.

Unit 2D
- Warehouse GFA of 5,000m^2
- Office space GFA of 290m^2
- Truck access via South Street
- Car access via new collector road to the east.

Unit 2E
- Warehouse GFA of 5,400m^2
- Office space GFA of 290m^2
- Truck access via South Street
- Car access via new collector road to the east.

Note if the site layout changes, further assessment may be required to determine the viability of the development site for 24-hour operation.

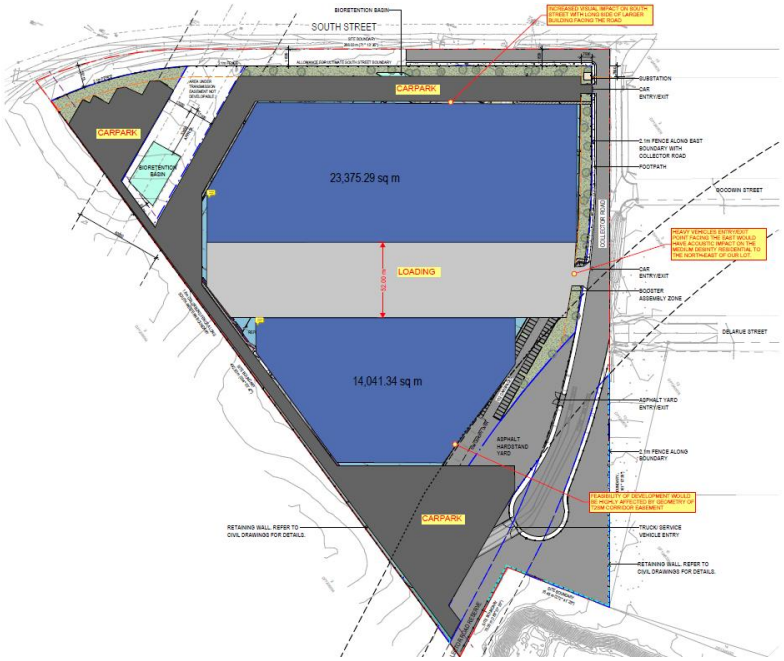
3.2.1 Advice regarding alternate site layout

The Department of Planning, Industry and Environment has previously requested the rotation of the buildings on site by 90 degrees, such that the central hardstand is aligned east/west instead of north/south. Acoustic Works provides the following advice in response to DPIE's request:

- While this layout would provide more acoustic screening to the northern residential receivers, it would result in increased noise impacts to the eastern residential receivers which are currently undetermined in size and height.
- If buildings exceeding 2 storeys in height are proposed on the medium-density residential zone to the east, barriers exceeding 10 metres in height would be required to achieve compliance, including acoustic gates of the same height where vehicles enter and exit the site.
- The northern residential receivers are predominantly two-storey residential dwellings and townhouses, meaning that compliance can be achieved with a much shorter barrier.

Based on the above, Acoustic Works recommends that this layout is not used for the site, with the layout presented in Section 3.2 adopted.

Figure 3: Alternate site layout (as requested by DPIE)



3.3 Acoustic Environment

The surrounding area is primarily affected by road traffic from the surrounding road network and existing industrial land uses.

4. Equipment

The following equipment was used to record noise levels:

- 2 x Rion NL42 Environmental Noise Monitors (SN# 00509261 & 01259207)
- Pulsar Model 105 Ltd Sound Calibrator (SN # 57417)

The Environmental Noise Monitor holds current NATA Laboratory Certification and was field calibrated before and after the monitoring period, with no significant drift from the reference signal recorded.

5. Receivers and Noise Monitoring Locations

5.1 Receiver Locations

The nearest sensitive receiver locations were identified as follows;

1. South Street separates the site from two approved residential subdivisions to the north at 306 & 312 South Street, approximately 50 metres from the northern site boundary. The majority of approved dwellings in the subdivision are proposed to be two storeys high.
2. Land zoned Medium Density Residential is located adjacent the eastern site boundary, with a large portion of this land reserved for construction of a Sydney Metro rail line.
3. A aged care lifestyle development is located approximately 870m to the south of the site.
4. A completed residential subdivision is located approximately 200m to the west of the site.
5. A completed residential subdivision is located approximately 820m to the north of the site.
6. A completed residential subdivision is located approximately 1.3km to the east of the site.

Figure 4: Receiver and noise monitoring locations

Although multiple dwellings are grouped for all receivers, to ensure a conservative assessment all calculation of noise impacts were assessed to the worst-affected point within 30 metres of a dwelling in the nominated area. The receivers nominated in Figure 4 include the nearest and worst-affected sensitive receivers to the site in the immediate area as well as further receivers that may be affected by long-term cumulative noise impacts.

5.2 Unattended Noise Monitoring

Two Rion NL42 environmental noise monitors was placed at 10 Dortmund Crescent (Monitor A) and 66 Watkin Crescent (Monitor B) as shown in Figure 4 to measure ambient noise levels. These locations were chosen as they were considered representative of the nearest residential receivers. The monitor was located in free field positions with the microphones approximately 1.4 metres above ground surface level. The monitor was set to record noise levels between the 15th to 23rd November 2021

The acoustic environment at Monitor A was dominated by noise from the natural environment and occasional traffic noise from South Street, with noise from the surrounding road network faintly audible.

The acoustic environment at Monitor B consisted primarily of noise from the natural environment, with occasional noise from passive recreational activities on the grassy area across the street.

The environmental noise monitors were set to record noise levels in "A" weighting, Fast response using 15 minute statistical intervals. Ambient noise monitoring was conducted in accordance with Australian Standard AS1055:2018 *Acoustics – Description and measurement of environmental noise*. For the unattended noise monitoring locations refer to Figure 4.

6. Existing background noise levels

The following tables present the measured existing ambient noise levels from the unattended noise survey. Any periods of inclement weather or extraneous noise are omitted from the measured data prior to determining the overall results.

6.1 Meteorological conditions

A brief summary of meteorological observations during the unattended noise monitoring survey were obtained from the Bureau of Meteorology website (http://www.bom.gov.au/climate/data), shown in Table 2 below. Reference for the unattended noise survey was conducted in accordance with the full daily data obtained from the Bureau of Meteorology for all time periods to ensure the recorded levels are valid in accordance with the Noise Policy for Industry.

Table 2: Meteorological conditions – Horsley Park

Day	Date	Rainfall* (mm)	Wind			
			9am		3pm	
			Speed (km/h)	Direction	Speed (km/h)	Direction
Monday	15/11/2021	0	24	W	41	WNW
Tuesday	16/11/2021	0	9	SSW	9	NNE
Wednesday	17/11/2021	0	4	SW	11	NNE
Thursday	18/11/2021	0	6	SE	7	NNW
Friday	19/11/2021	0	9	NNW	22	NE
Saturday	20/11/2021	0	6	SSE	11	ENE
Sunday	21/11/2021	7.2**	13	SW	17	SSW
Monday	22/11/2021	23.0**	19	S	24	ESE

*Note for a given date the rainfall figures represent the rain measured between 9am the previous day and 9am on the given date (e.g. for Monday 22nd November, 23.0mm fell between 9am Sunday 21st and 9am Monday 22nd)

** Note that the bulk of the rain reported for the 21st and 22nd November occurred on the 21st.

6.2 Ambient background noise levels

6.2.1 Noise Monitor A (Receivers 1 to 4)

The measured rating background noise levels (RBL) were determined in accordance with the NSW Noise Policy for Industry, with levels for the monitoring location presented in Table 3.

Table 3: Measured RBL noise levels – Noise Monitor A

Day	Date	RBL dB(A) (Receivers 1 to 4)		
		Day	Evening	Night
Monday	15/11/2021	x	29.7	24.5
Tuesday	16/11/2021	38.6	36.7	30.1
Wednesday	17/11/2021	38.0	38.9	32.4
Thursday	18/11/2021	38.9	39.7	36.5
Friday	19/11/2021	38.1	38.3	27.5
Saturday	20/11/2021	38.9	35.7	31.8
Sunday	21/11/2021	38.7*	42.3*	37.1*
Monday	22/11/2021	41.8*	42.3*	38.2
RBL		39	39	32

*Note rainfall recorded on the 21st and 22nd of November was found to have affected the measured noise levels, therefore the affected time periods were omitted.
In accordance with the request by the Department of Planning, Industry and Environment (DPIE) (received by Acoustic Works on 17/02/2022), the average L_{Amax} noise levels for each time period are presented below.

Table 4: Measured L_{Amax} noise levels – Noise Monitor A

Day	Date	Average L_{max} dBA		
		Day	Evening	Night
Monday	15/11/2021	-	69	62
Tuesday	16/11/2021	73	67	64
Wednesday	17/11/2021	72	69	64
Thursday	18/11/2021	75	68	65
Friday	19/11/2021	71	69	62
Saturday	20/11/2021	70	69	65
Sunday	21/11/2021	70*	69*	64*
Monday	22/11/2021	72*	70*	61
RBL		72	69	63

*Note rainfall recorded on the 21st and 22nd of November was found to have affected the measured noise levels, therefore the affected time periods were omitted.

6.2.2 Noise Monitor B (Receivers 5 & 6)

The measured rating background noise levels (RBL) were determined in accordance with the NSW Noise Policy for Industry, with levels for the monitoring location presented in Table 3.

Table 5: Measured RBL noise levels – Noise Monitor B

Day	Date	RBL dB(A) (Receivers 5 & 6)		
		Day	Evening	Night
Monday	15/11/2021	x	32.6	23.7
Tuesday	16/11/2021	38.3	41.3	29.2
Wednesday	17/11/2021	37.8	43.3	31.9
Thursday	18/11/2021	38.9	41.6	33.4
Friday	19/11/2021	38.4	43.1	30.9
Saturday	20/11/2021	37.8	41.0	35.2
Sunday	21/11/2021	42.2*	40.6*	34.7*
Monday	22/11/2021	43.2*	40.7	31.5
RBL		38	41	32

*Note rainfall recorded on the 21st and 22nd of November was found to have affected the measured noise levels, therefore the affected time periods were omitted.

In accordance with the request by DPIE received by Acoustic Works on 17/02/2022, the average L_{Amax} noise levels for each time period are presented below.

Table 6: Measured L_{Amax} noise levels – Noise Monitor B

Day	Date	Average L_{max} dBA		
		Day	Evening	Night
Monday	15/11/2021	-	71	65
Tuesday	16/11/2021	73	72	66
Wednesday	17/11/2021	76	68	67
Thursday	18/11/2021	76	72	66
Friday	19/11/2021	75	72	66
Saturday	20/11/2021	76	74	70
Sunday	21/11/2021	75	71	66
Monday	22/11/2021	75	69	64
RBL		75	71	66

*Note rainfall recorded on the 21st and 22nd of November was found to have affected the measured noise levels, therefore the affected time periods were omitted.

7. Noise Criteria

The relevant noise criteria was determined in accordance with the Blacktown Development Control Plan (DCP) (2015), SEARs requirements and the NSW Noise Policy for Industry 2017.

7.1 Blacktown City Council Growth Centre Precincts

The development is located in the Marsden Park Industrial Precinct within the Blacktown City Council Local Government Area (LGA). Therefore, the Blacktown City Council Growth Centre Development Control Plan (GCDCP) 2010 was referenced. Refer to Figure 5 and Figure 6 for a visual reference of the site's location within the Indicative Layout Plans for the Growth Centre.

Note the plans below do not include land reserved for construction of a Sydney Metro line.

Figure 5: Site Location within Marsden Park Industrial Precinct

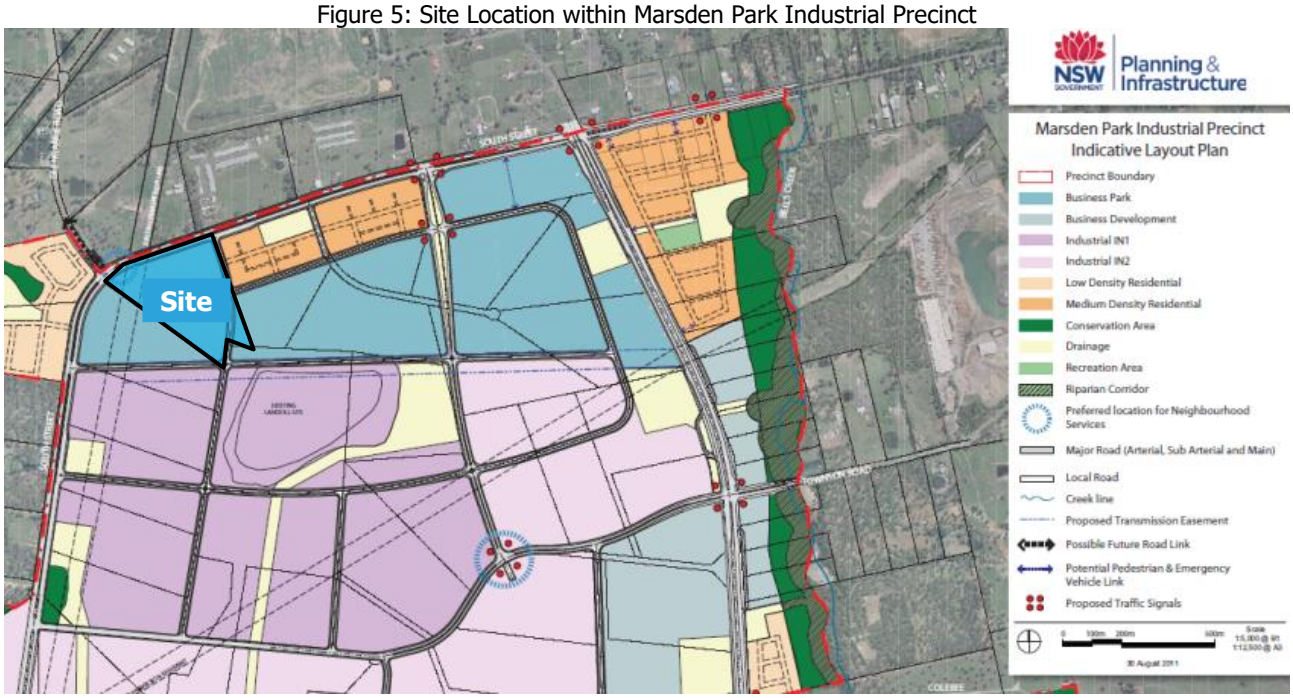
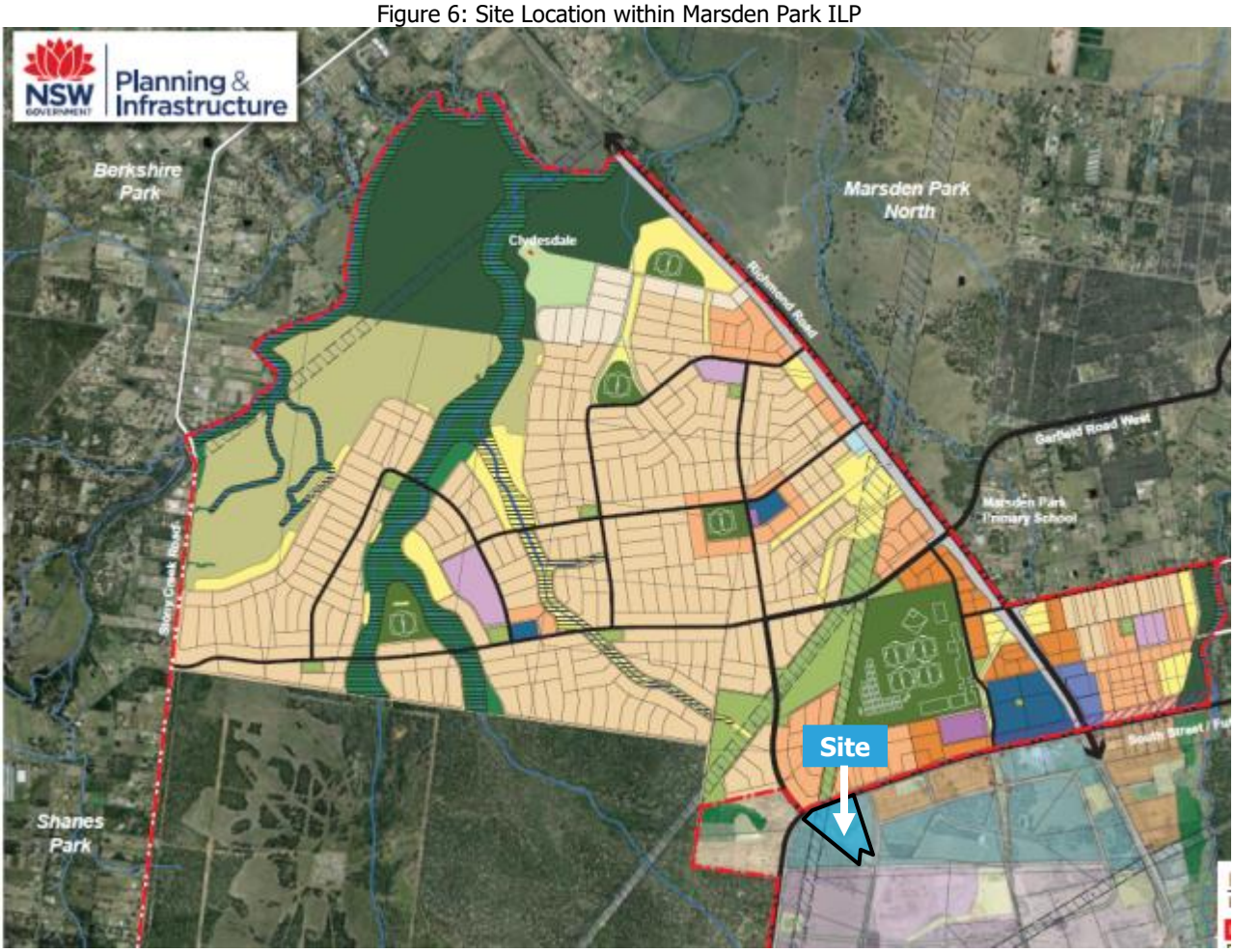


Figure 6: Site Location within Marsden Park ILP



The Blacktown City Council GCDCP (DCP) 2015 nominates acoustic privacy controls for new residential developments, but does not nominate specific criteria for industrial developments. As no specific acoustic criteria are nominated, reference is made to other applicable Australian Standards and State Government policies.

7.2 Secretary's Environmental Assessment Requirements (SEARs)

The Secretary's Environmental Assessment Requirements (SEARs) outline the requirements for the construction and operational use of the proposed development. The issued SEARs specifies the following (ref: SSD-29668067):

> *"11. Noise and Vibration:*
> *Provide a noise and vibration assessment prepared in accordance with the relevant EPA guidelines. The assessment must detail construction and operational noise and vibration impacts on nearby sensitive receivers and structures and outline the proposed management and mitigation measures that would be implemented."*

As a specific criterion for vibration is not specified, further reference was made to *Assessing Vibration: A Technical Guide 2006,* the *NSW Noise Policy for Noise, NSW Road Noise Policy* and the *NSW Interim Construction Guideline.*

7.3 Assessing Vibration: A Technical Guideline 2006

7.3.1 Types of vibration

There are three types of vibration as classified in the guide;

- Continuous - vibration continues uninterrupted for a defined period (usually throughout daytime and/or night-time). This type of vibration is assessed on the basis of weighted RMS (root mean squared) acceleration values.
- Impulsive - rapid build up to a peak followed by a damped decay that may or may not involve several cycles. The duration is short, typically less than 2 seconds. Impulsive vibration (no more than three occurrences in an assessment period) is assessed on the basis of acceleration values.
- Intermittent - interrupted periods of continuous (e.g. a drill) or repeated periods of impulsive vibration (e.g. a pile driver), or continuous vibration that varies significantly in magnitude. Assessed on the basis of vibration dose values.

7.3.2 Acceptable values for continuous and impulsive vibration (1-80Hz)

The relevant criteria for continuous and impulsive vibration are as follows;

Table 7: Preferred weighted RMS vibration acceleration values

Type	Location	Assessment period	Preferred values m/s^2		Maximum values m/s^2	
			z-axis	x- and y-axes	z-axis	x- and y-axes
Continuous vibration	Critical areas	Day or night time	0.005	0.0036	0.01	0.0072
	Residences	Day time	0.01	0.0071	0.02	0.014
		Night time	0.007	0.005	0.014	0.01
	Offices, schools, educational institutions and places of worship	Day or night time	0.02	0.014	0.04	0.028
	Workshops	Day or night time	0.04	0.029	0.08	0.058
Impulsive vibration	Critical areas	Day or night time	0.005	0.0036	0.01	0.0072
	Residences	Day time	0.3	0.21	0.6	0.42
		Night time	0.1	0.071	0.2	0.14
	Offices, schools, educational institutions and places of worship	Day or night time	0.64	0.46	1.28	0.92
	Workshops	Day or night time	0.64	0.46	1.28	0.92

7.3.3 Acceptable values for intermittent vibration

Intermittent vibration is assessed using the vibration dose value (VDV) root-mean-quad method. VDV accumulates the vibration energy received over the daytime and night-time periods. The vibration dose methodology is as per standard BS 6472–1992.

7.4 Noise Policy for Industry

Assessment of noise in accordance with NSW EPA Noise Policy for Industry (2017) has two main components: intrusiveness and amenity criteria. These are compared to each other (after conversion of amenity noise level to LAeq,15min equivalent level) to determine the overall project noise trigger level.

7.4.1 Intrusiveness noise level

The intrusiveness noise level is based on the $L_{Aeq\ (15\ min)}$ associated with commercial activity being less than or equal to the measured L_{A90} Rating Background Level + 5dB as per section 2.3 of the policy.

7.4.2 Amenity noise level

The amenity noise level is determined in accordance with Section 2.4 of the policy based on the land use and relevant noise criteria specified in Tables 2.2 and 2.3. The Noise Policy for Industry sets out acceptable noise levels for various locations. Determination of which residential receiver category applies is described in Table 2.3 of the policy.

Table 8: Receiver Category

Receiver category	**Typical planning zoning – standard instrument**	**Typical existing background noise levels**	**Description**
Rural residential	RU1 – primary production RU2 – rural landscape RU4 – primary production small lots R5 – large lot residential E4 – environmental living	Daytime RBL <40 dB(A) Evening RBL <35 dB(A) Night RBL <30 dB(A)	**Rural** – an area with an acoustical environment that is dominated by natural sounds, having little or no road traffic noise and generally characterised by low background noise levels. Settlement patterns would be typically sparse. Note: Where background noise levels are higher than those presented in column 3 due to existing industry or intensive agricultural activities, the selection of a higher noise amenity area should be considered.
Suburban residential	RU5 – village RU6 – transition R2 – low density residential R3 – medium density residential E2 – environmental conservation E3 – environmental management	Daytime RBL<45 dB(A) Evening RBL<40 dB(A) Night RBL <35dB(A)	**Suburban** – an area that has local traffic with characteristically intermittent traffic flows or with some limited commerce or industry. This area often has the following characteristic: evening ambient noise levels defined by the natural environment and human activity.
Urban residential	R1 – general residential R4 – high density residential B1 – neighbourhood centre (boarding houses and shop-top housing) B2 – local centre (boarding houses) B4 – mixed use	Daytime RBL> 45 dB(A) Evening RBL> 40 dB(A) Night RBL >35 dB(A)	**Urban** – an area with an acoustical environment that: • is dominated by 'urban hum' or industrial source noise, where urban hum means the aggregate sound of many unidentifiable, mostly traffic and/or industrial related sound sources • has through-traffic with characteristically heavy and continuous traffic flows during peak periods • is near commercial districts or industrial districts • has any combination of the above.

To determine the appropriate receiver category, the following observations were made:

- The surrounding residential receivers are zoned – R3: Medium Density Residential which corresponds with the typical planning zoning of the suburban category.
- The surrounding acoustic environment for all receivers is characterised by local traffic with characteristically intermittent flows and evening ambient noise levels dominated by the natural environment and human activity, corresponding to the description of the suburban category.

Therefore, all receivers would be assessed against the 'suburban' criteria.

7.4.3 Amenity noise levels in areas of high traffic

Areas affected by a certain level of traffic noise may be high enough to make noise from an industrial source effectively inaudible. In such cases the project amenity noise level may be derived from the $L_{Aeq,\ period}$ minus 15 dBA on the condition all of the following apply:

- Traffic noise is identified as the dominant noise source at the site
- The existing traffic noise level is 10 dB or more above the recommended amenity noise level for the area
- It is highly unlikely traffic noise levels will decrease in the future.

Applicability is to be determined for each assessment period.

7.4.4 Amenity noise levels in areas near an existing or proposed cluster of industry

To account for the cumulative impacts from multiple industrial noise sources to sensitive receivers near an existing or proposed cluster of industry, and it can be demonstrated that existing levels of industrial noise are more than 5dB below the relevant recommended amenity noise level, the following equation can be used to determine the project amenity level for an individual project:

$$\text{Individual project amenity noise level} = 10\log((10^{(ANL-5dB/10)})\div N)$$

Where
ANL = relevant recommended amenity noise level
N = number of proposed additional premises

Where it can be demonstrated that existing levels of industrial noise are more than 5dB below the relevant recommended amenity noise level, the formula can be modified as shown below:

$$\text{Individual project amenity noise level} = 10\log(10^{(ANL/10)}\div N)$$

- Each proposed masterplan development will undertake calculation to account for the cumulative (combined) noise impacts from onsite activities associated with their development including all individual lots within the site to sensitive receivers. The assessment takes into account the cumulative effect of the development without the need to adjust the amenity criteria for the masterplan development individual lots.
- The surrounding area may be considered as a greenfield area, with individual developments in the surrounding area comprised of multiple lots for each Development Application. Each assessment when assessed by the acoustic engineer will combined all noise sources from the

lots within the development site to determine the noise impacts, therefore accounting for the cumulative effect of their development regardless of the number of lots proposed within the site.

- Therefore, to determine the cumulative criteria, we need to consider the potential number of development sites, not the individual warehouses located within each development to calculate any adjustments to the criteria.
- The combined noise impact from each development takes into account the cumulative effect regardless of how many warehouse/buildings are located within the development site, the analysis includes all noise impacts occurring simultaneously in the analysis. Therefore, to calculate the adjustment for the cumulative criteria, consideration is required based on the number of developments in proximity to the receiver, not individual buildings.
- Once the cumulative criteria has been established using the above method, if induvial assessment for buildings within the development site are undertaken, then the cumulative criteria must be adjusted. You cannot use the same cumulative criteria used for the masterplan for a single building within the site, adjustment to the criteria must account for the number of building/lots within the site to ensure the induvial building/lot assessment complies with the criteria. This means the cumulative criteria must be adjusted based on the number of lots within the development site to ensure the overall site still complies with the criteria used for the masterplan assessment.

Based on the review of the area, there is the potential for up to 4 masterplan development sites to impact the immediate receivers considered in this assessment. This number will increase for receivers located at greater distances, but it should also be understood that noise from the sites will be further attenuated due to screening and increased separation distances, making noise impacts from the sites imperceptible. Based on the interactive mapping tool on the NSW Major Projects website, there is potential for up to 10 nearby masterplan developments sites to impact more distant receivers considered in this assessment.

7.4.5 Modifying factors

The Noise Policy for Industry includes correction factors such as tonal noise, low-frequency noise, intermittent noise and duration. Where two or more modifying factors are present, the maximum adjustment to a noise source level is 10dBA (excluding duration correction).

7.5 Project noise trigger level

To determine the project trigger noise level, the amenity noise level must first be standardised to an equivalent LAeq 15min in order to compare to the intrusiveness noise level. This is done in accordance with Sections 2.2 and 2.4 of the policy as follows;

$$L_{Aeq,15min} = L_{Aeq,\ period} + 3dB$$

To ensure that industrial noise levels (existing plus new) remain within the recommended amenity noise levels for an area, a project amenity noise level applies for each new source of industrial noise. Project amenity noise level for industrial developments = recommended amenity noise level minus 5dB(A).

Therefore, based on the measured data presented in Section 5.2, the project specific noise limits are determined.

7.5.1 Sleep disturbance noise level

Sleep disturbance is based on the maximum noise level of events from premises during the night-time period. The Noise Policy for Industry defines sleep disturbance as a noise from a premise at a residential location that exceeds:

- LAeq,15min 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, and/or
- LAFmax 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater,

7.5.2 Intrusiveness noise criteria

The intrusiveness noise levels are as follows;

Table 9: Intrusiveness noise levels

Time period	Criteria $L_{eq\ (15min)}$ dB(A)	
	Receivers 1 to 4	Recievers 5 & 6
Day (7am-6pm Mon-Sat; 8am-6pm Sun)	44	43
Evening (6pm-10pm)	44	46
Night (10pm-7am Sun-Fri, 10pm-8am Sat)	37	37

7.5.3 Cumulative Amenity Criteria

Based on Sections 2.4 and Section 2.4.2 of the policy, the recommended amenity noise criteria to the immediate receivers surrounding the site and accounting for the cumulative effect are shown in Table 10.

Table 10: Amenity noise levels – Receivers 1 to 8

Time period	Recommended Amenity Noise Level	Adjusted (Cumulative) Amenity Criteria	
	Criteria $L_{eq(period)}$ dB(A)	Criteria $L_{eq(15min)}$* dB(A)	
	Receivers 1 to 6	Receivers 1 to 4	Receivers 5 to 6
Day	55	47	43
Evening	45	37	33
Night	40	31	28

To account for the cumulative impact of the multiple industrial developments planned in the surrounding area, the adjusted amenity criteria would apply to the nearby receivers.

*Note In accordance with Sections 2.2 and 2.4 of the policy, a +3dBA correction was added to convert $L_{Aeq,period}$ to $L_{Aeq,15min}$.

7.5.4 Project specific noise criteria (Receivers 1 to 4)

As the intrusiveness criteria is lower than the cumulative amenity criteria for the daytime period, the intrusiveness criteria has been used for this time period for a conservative assessment. Therefore the project noise trigger levels accounting for the cumulative effective of the site and surrounds are as follows:

Table 11: Project-specific criteria

Time period	Criteria $L_{eq(15min)}$ dB(A)	
	Receivers 1 to 4	Receivers 5 to 6
Day	44	43
Evening	37	33
Night	31	28

7.5.5 Sleep disturbance

The sleep disturbance noise levels are as follows;

Table 12: Sleep disturbance criteria

Time period	Receivers 1 to 6	
	Criteria $L_{eq(15min)}$ dBA	Criteria L_{AFmax} dBA
Night	40	52

7.6 NSW Road Noise Policy 2011

The NSW Road Noise Policy outlines the criteria for any increase in the total traffic noise level at the location due to a proposed project or traffic generating development. Therefore the following criteria applies:

Table 13: Road traffic noise assessment criteria for residential land uses

Road Category	Type of project/development	Total traffic noise level – dB(A)	
		Day (7am to 10pm)	Night (10pm to 7am)
Local roads	Existing Residences affected by **additional traffic** on existing freeways/arterial/sub-arterial roads generated by land use developments	$L_{Aeq,15hour}$ 55 (external)	$L_{Aeq,9hour}$ 50 (external)

In addition to the assessment criteria outlined in Tables 3-5 of the NSW Road Noise Policy, any increase in the total traffic noise level at a location due to a proposed project or traffic-generating development must be considered. Residences experiencing increases in total traffic noise level above the relative increase criteria in Table 6 of the policy should also be considered for mitigation as described in Section 3.4 of the policy, with the criteria presented in Table 15.

Table 14: Relative increase criteria for residential land uses

Road Category	Type of project/development	Total traffic noise level increase – dB(A)	
		Day (7am to 10pm)	Night (10pm to 7am)
Freeway/arterial/sub-arterial roads and transitways	New road corridor/redevelopment of existing road/land use development with the potential to generate additional traffic on existing road	Existing traffic $L_{Aeq(15hr)}$ + 12dB (external)	Existing traffic $L_{Aeq(9hr)}$ + 12dB (external)

For other existing sensitive land uses (as outlined in Table 4 of the policy) the relative increase criteria should be applied to the respective $L_{Aeq,period}$ for that land use type, except for open space. For projects where the main subject is a local road, the relative increase criterion does not apply.

8. Environmental Assessment

8.1 Onsite activities

Noise associated with the development was assessed using 3D SoundPLAN modelling generated in accordance with ISO 9613-2:1996 *Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation*, showing the predicted worst-case 15 minute noise impacts associated with typical warehouse activities such as trucks, forklifts, reverse alarms, mechanical plant and carpark activities. As SoundPLAN calculations return results in $L_{Aeq,period}$ format, a +3dB correction was applied to all results to convert them to $L_{Aeq,15min}$ in accordance with Section 2.2 of the Noise Policy for Industry (2017). Barrier screening, topographical screening, air absorption and ground absorption were calculated in accordance with ISO 9613-2. Predictions also include corrections for the prevailing historical meteorological conditions in accordance with ISO 9613-2: 1996 and Fact Sheet D of the Noise Policy for Industry. The SoundPLAN assessment was adjusted to include corrections for annoying noise characteristics in accordance with Fact Sheet C of the Noise Policy for Industry, with corrections included in the final results. For a conservative assessment, ground absorption was not modelled, with all ground surfaces modelled as reflective.

8.1.1 Itemised Noise Sources

To model noise levels from each warehouse, reference was made to the traffic impact assessment prepared by Positive Traffic Pty Ltd (ref:PT21076r01, dated 31/01/2022), which predicted a traffic generation of 225 trips (AM Peak Hour) and 242 trips (PM Peak Hour). To assess operational noise, the following assumptions were made:

- Peak hour traffic volumes were assumed to account for 10% of daily traffic volumes. therefore 2335 vehicles were assumed to be travelling to or from the site each day.
- Based on observations of similar developments, a conservative heavy vehicle rate of 10% was assumed (234 heavy vehicles per day, 2102 light vehicles per day)
- Peak hour traffic volumes were subtracted from the total to determine the traffic volume in off-peak times.
- Peak hours of 7am-8am and 5pm-6pm were assumed, with off-peak traffic distributed across the remaining hours.
- Hourly traffic volumes were assumed to be reduced during the evening and night periods (75% in the evening period, 50% in the night period)
- Traffic volumes were rounded to the nearest whole number.

Assumed off-peak hourly traffic volumes are presented below

Table 15: Hourly Traffic volumes

Source Description	Hourly Traffic Volumes (veh/h)		
	All Vehicles	Heavy Vehicles (10%)	Light Vehicles (90%)
AM Peak (7am-8am)	225	23	203
PM Peak (5pm-6pm)	242	24	218
Day Off-peak (8am – 5pm)	113	11	102
Evening Off-peak (6pm – 10pm)	85	9	76
Night Off-peak (10pm-7am)	57	6	51

Noise source levels were based on either previous measurements conducted by Acoustic Works (for L_{max} noise levels) or on sound power levels contained in the SoundPLAN library (for all other noise levels). Previous Acoustic Works measurements were measured at 1m from the source in outdoor locations with reflective ground surfaces, therefore sound power levels were assumed to be 8dB higher than the measured sound pressure level. For area sources, sound power levels were determined based on the reverberant sound pressure levels inside the relevant building and the transmission loss of each façade. Measurements of vehicles included acceleration, deceleration, idling and braking of the vehicles. The itemised noise source list is presented in Table 16. Car park activities were calculated in accordance with the NORDTEST General Prediction Method: 2019.

Table 16: Itemised Noise Sources

Source Description	Source type	Sound Power L_W	Sound Power L_{Wmax}*	Source Height above ground RL (m)	Source duration (s)	Total no. of events per 15 min				
						AM Peak	PM Peak	Day	Eve	Night
Truck Passby (accelerating to 20km/h)	Line	60dBA/m	103dBA	1	30***	8	8	4	3	1
Refrigerated Truck Passby (accelerating to 20km/h)	Line	60dBA/m	103dBA	1	30***	4	4	2	1	1
Refrigerated Truck Cooling Unit (when refrigerated truck is idle)	Point	98dBA	101dBA	2.5	900	4	4	2	1	1
Truck idling	Point	93dBA	96dBA	1	900	8	8	4	3	1
Truck Venting Airbrake	Point	113dBA	116dBA	2.5	1	12	12	6	4	2
Truck Door Closure	Point	92dBA	93dBA	2.5	1	12	12	6	4	2
Truck Reversing including alarm	Line	78dBA/m	104dBA	2.5	30***	6	6	3	2	1
Truck Starting	Point	97dBA	101dBA	1	2	6	6	3	2	1
Forklift activities including reverse alarm (10km/h)	Line	72dBA/m	104dBA	1	240***	6	6	3	2	1
Forklift activities including reverse alarm (indoor 10km/h)**	Area	43dBA/m^2	92dBA	N/A	240	6	6	3	2	1
Mechanical Plant Deck	Point	77dBA	79dBA	1	900	1 (per unit)	1 (per unit)	1 (per unit)	1 (per unit)	1 (per unit)
Refrigeration Plant Deck (5 cooling towers)	Point	90dBA	92dBA	1	900	1	1	1	1	1
Car starting	Point	84dBA	86dBA	0.5	2	51	55	25	19	13
Car door closure	Point	83dBA	86dBA	0.5	1	102	110	50	38	26
Car driving on asphalt (accelerating to 30km/h)	Line	47dBA/m	80dBA	0.5	30***	102	110	50	38	26
Voice Conversation (common area)	Point	78dBA	86dBA	1.5	900	1	1	1	1	1

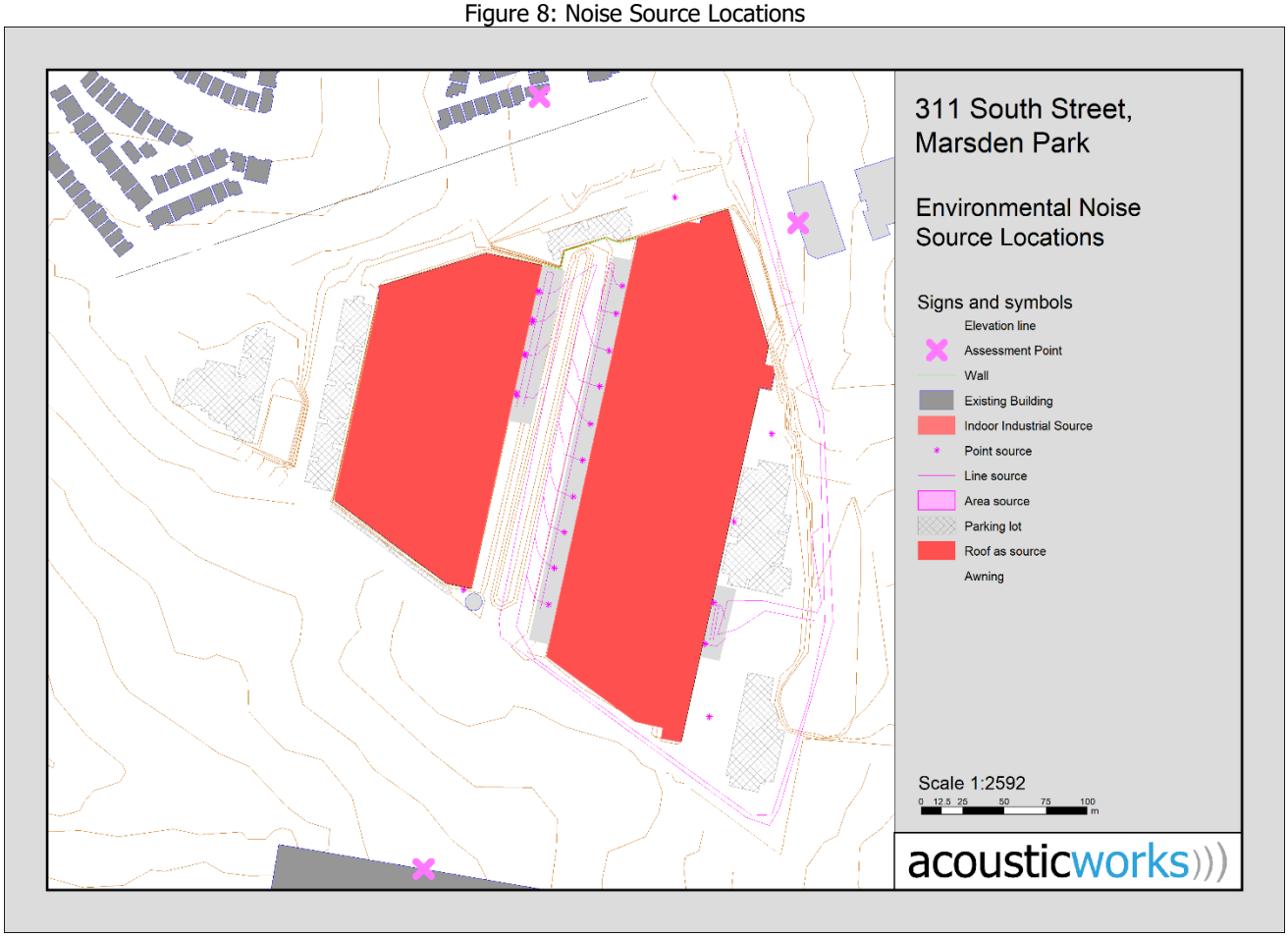
*Note that L_{max} events were assessed as point sources at worst-case locations in relation to each receiver.
** Note that indoor sources were modelled based on internal reverberant noise levels, with the sound power determined by the transmission loss of the façade. Sources were assumed to be operating continuously
*** Note the duration of events for line sources is determined by the length of each source, with the value presented in this table only valid for the L_{max} levels presented. Forklifts were assumed to be operating continuously.

Refer to Figures 6 and 7 for a graphical representation of assumed truck paths and noise source locations. Appendices for a graphical representation of the source locations.

Figure 7: Truck Entry/Exit paths

Assumed path of trucks entering and exiting site.

Figure 8: Noise Source Locations



8.1 Cumulative Noise Impact Assessment without Mitigation Measures

The following assessment of noise impacts (without any mitigation measures) to sensitive receivers is based on the criteria established using the cumulative criteria specified in Section 2.4.2 of the Noise Policy for Industry, which takes into account the potential impacts from multiple sources within the site and surrounding area and the current SEAR's specified requirements (ref: SSD-29668067). The noise levels at the receiver locations are shown in Table 18. Where a receiver has more than one storey, the worst affected storey is presented. LAeq results are not shown where the calculated total is less than 0dBA.

Table 17: Project specific noise levels (Receivers 1 to 6)

Receiver (Floor)	Project Specific Criteria $L_{eq,15min}$ dBA			Predicted Noise Impacts $L_{eq,15min}$ dBA			Complies (Yes/No)		
	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
1 (1st Floor)	47	37	31	40	38	36	Yes	No	No
2 (Ground Floor)	47	37	31	35	33	29	Yes	Yes	Yes
3 (Ground Floor)	47	37	31	14	12	9	Yes	Yes	Yes
4 (1st Floor)	47	37	31	24	23	20	Yes	Yes	Yes
5 (1st Floor)	43	33	28	16	14	11	Yes	Yes	Yes
6 (1st Floor)	43	33	28	12	10	7	Yes	Yes	Yes

Exceedances of the criteria are predicted, therefore mitigation measures will be necessary. Refer to Section 11 for recommendations.

Figures 8 to 13 present a graphical representation of the predicted noise levels.

Figure 9: $L_{Aeq,15min}$ noise contours (Day, Receivers 1 to 4, no mitigation measures)

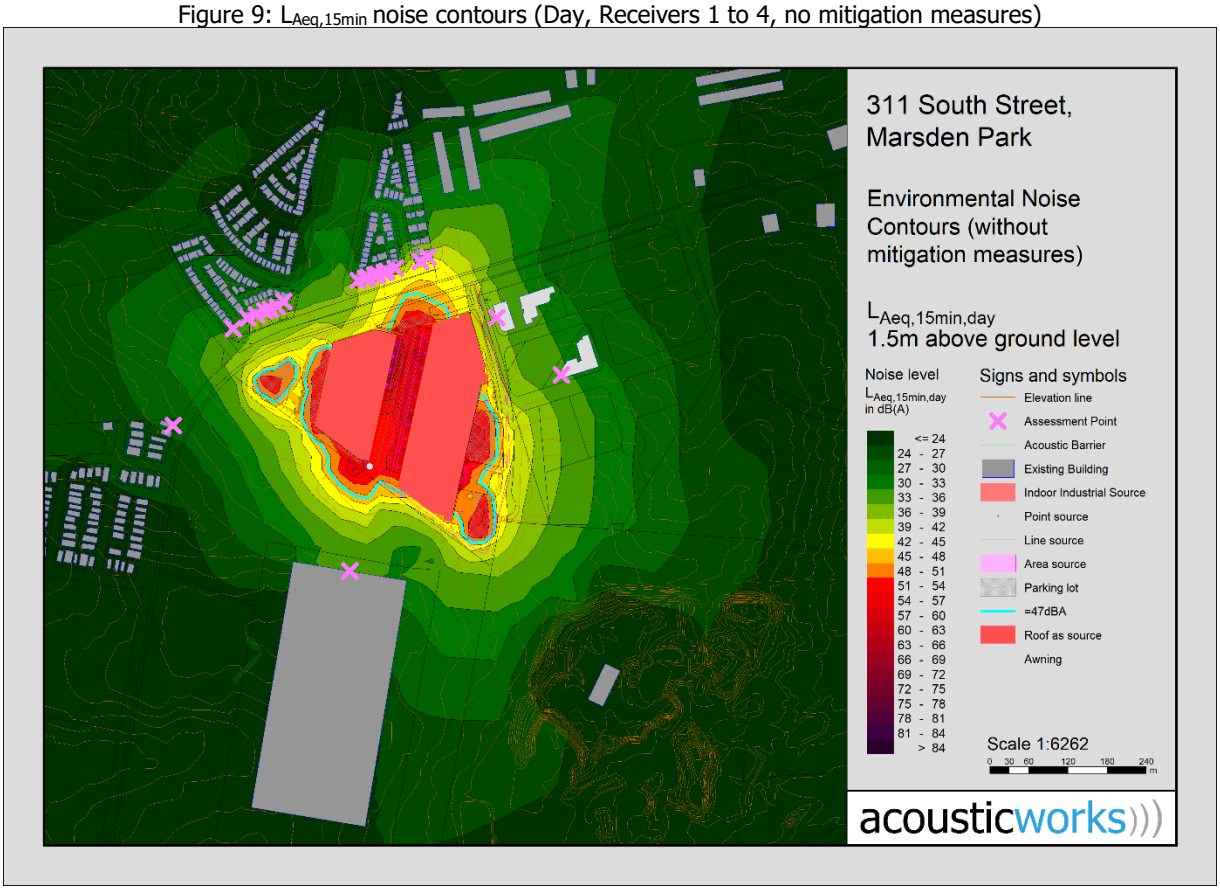


Figure 10: $L_{Aeq,15min}$ noise contours (Evening, Receivers 1 to 4, no mitigation measures)

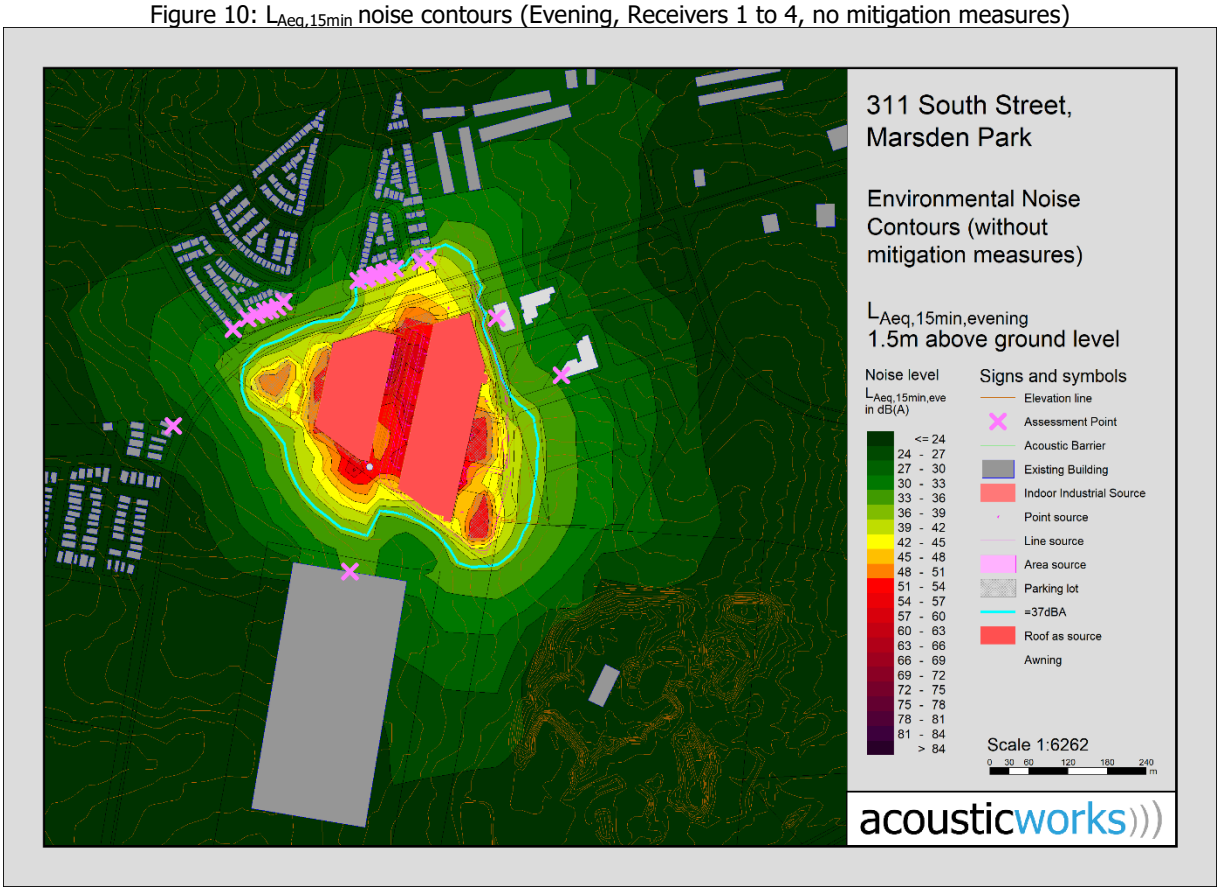


Figure 11: $L_{Aeq,15min}$ noise contours (Night, Receivers 1 to 4, no mitigation measures)

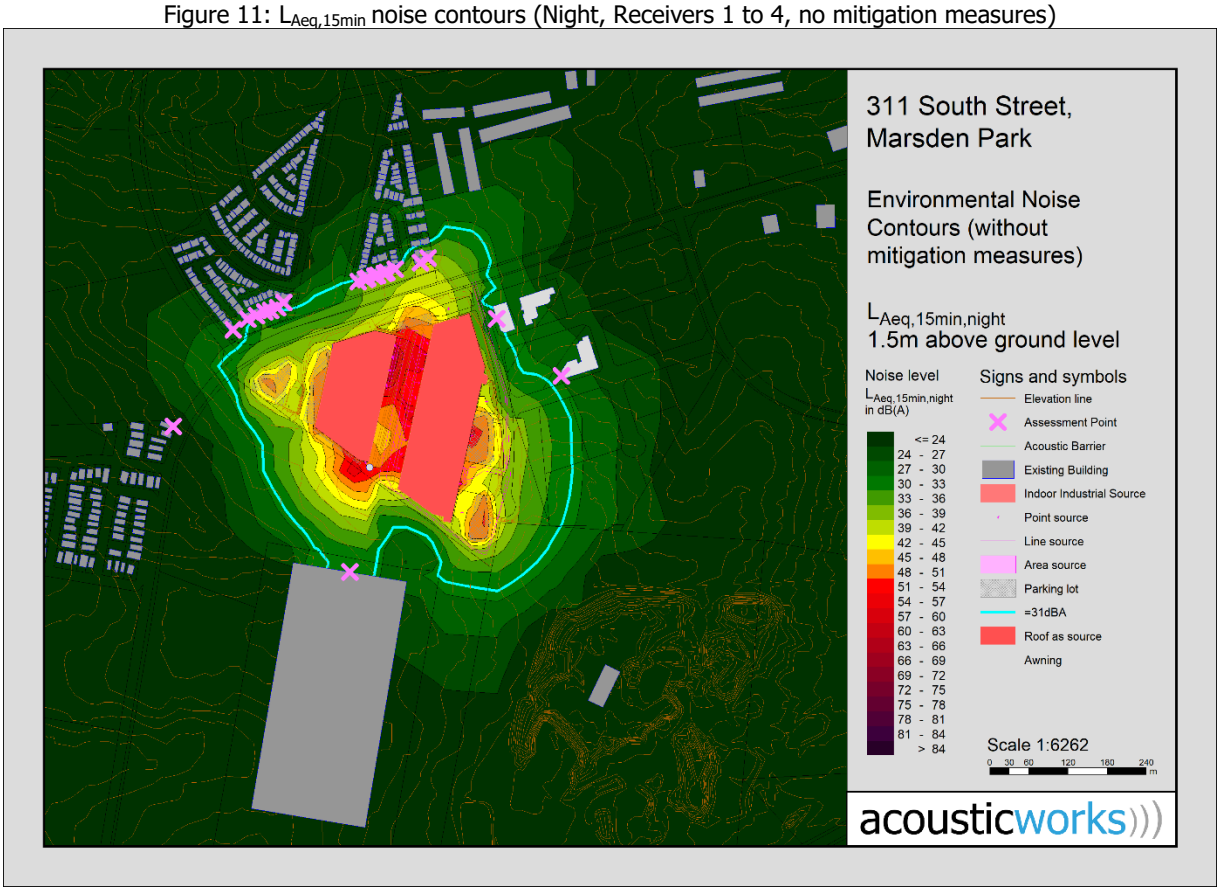


Figure 12: $L_{Aeq,15min}$ noise contours (Day, All Receivers, no mitigation measures)

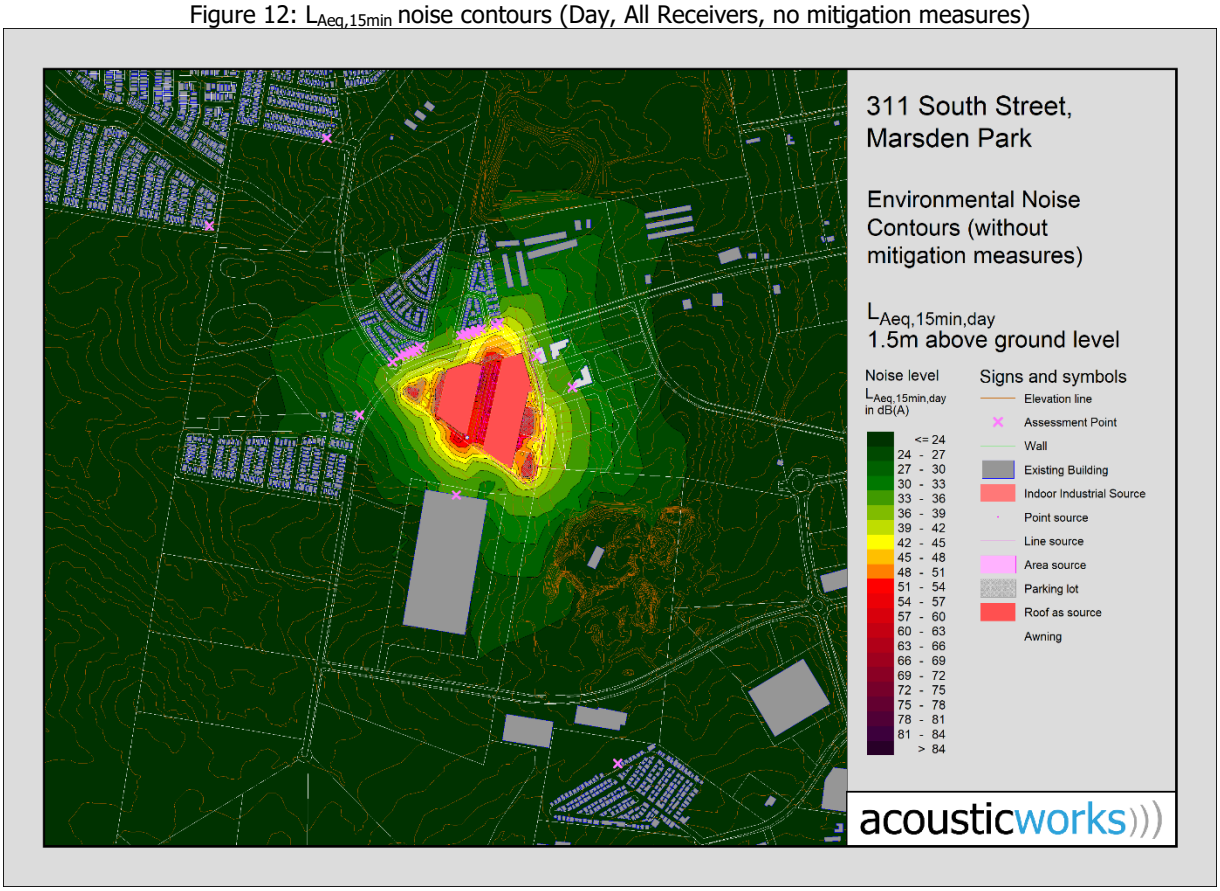


Figure 13: $L_{Aeq,15min}$ noise contours (Evening, All Receivers, no mitigation measures)

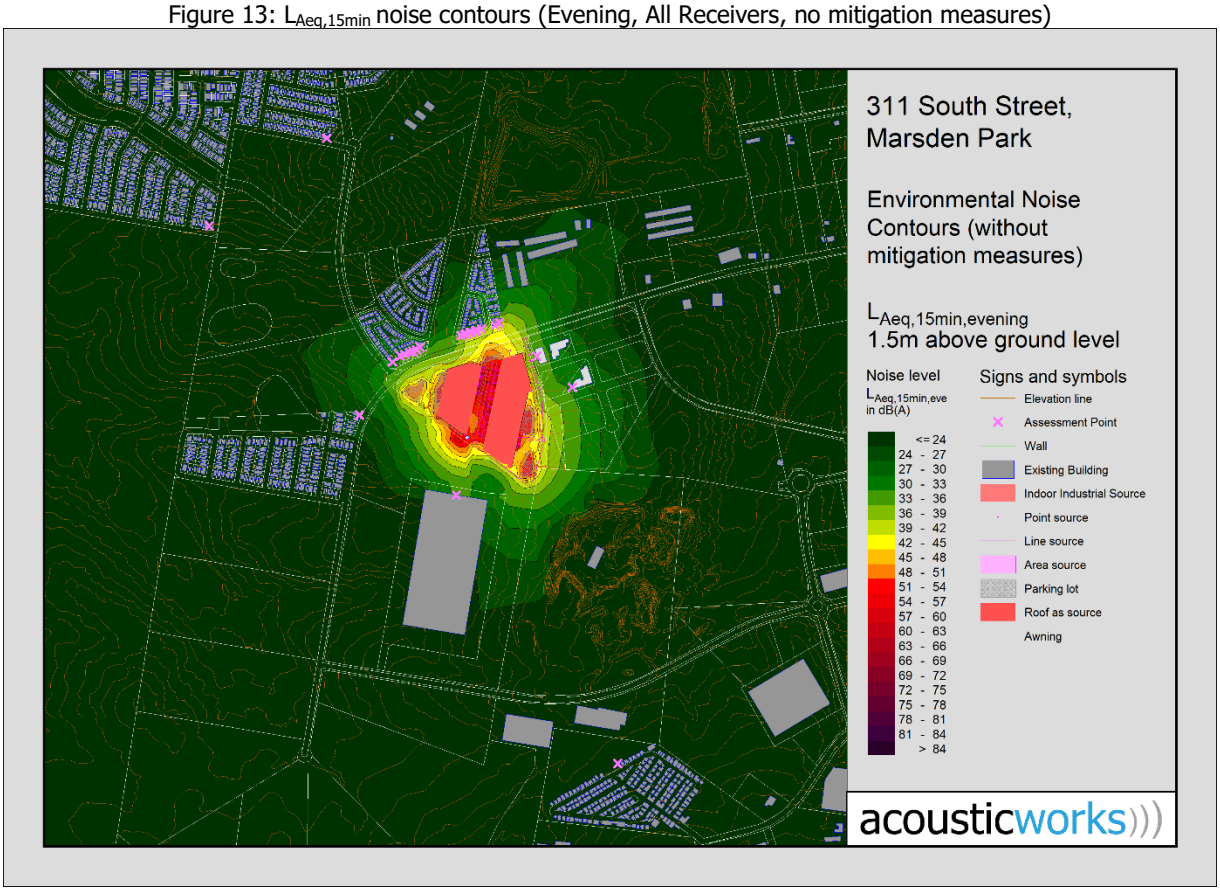
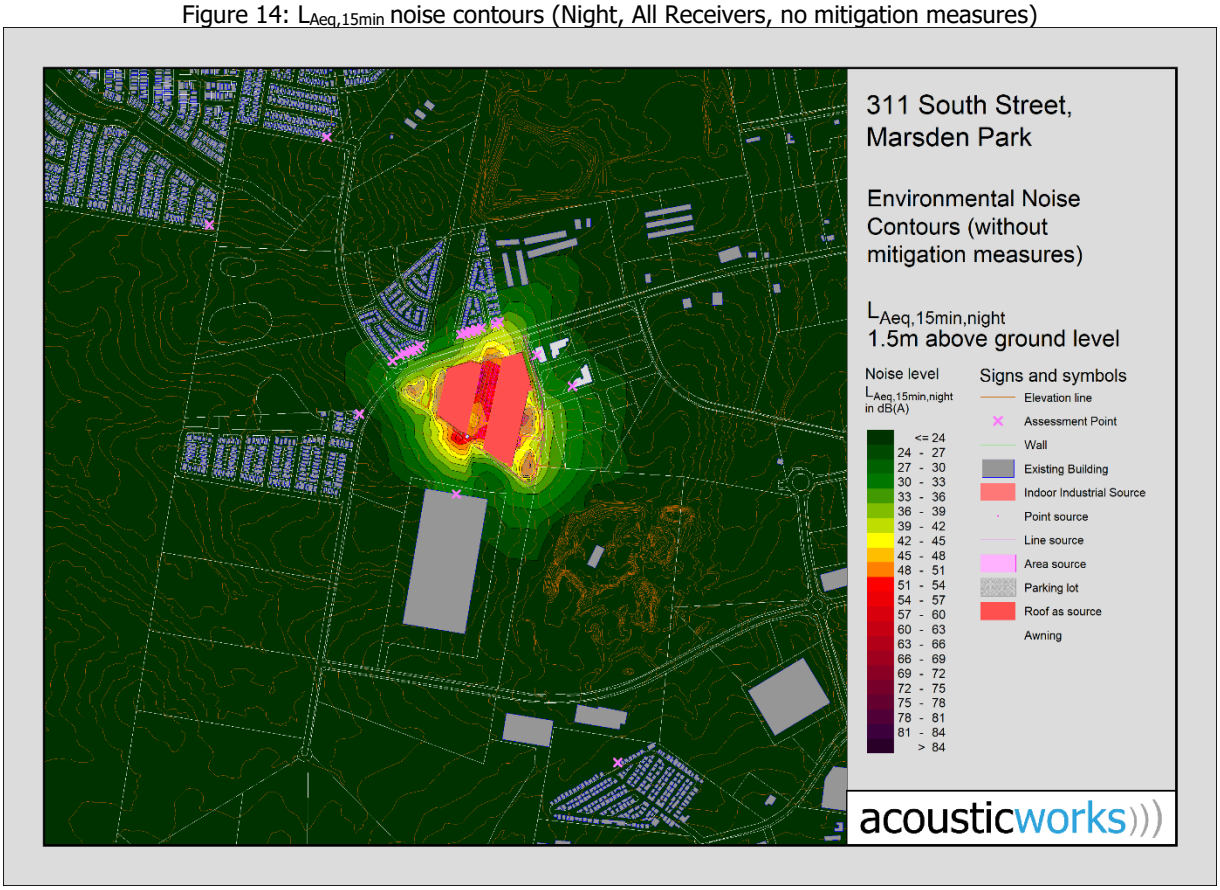


Figure 14: $L_{Aeq,15min}$ noise contours (Night, All Receivers, no mitigation measures)



8.2 Cumulative Noise Impact Assessment with Mitigation Measures

The following assessment of noise impacts to sensitive receivers is based on the criteria established using the cumulative criteria specified in Section 2.4.2 of the Noise Policy for Industry, which takes into account the potential impacts from multiple sources within the site and surrounding area and the current SEAR's specified requirements (ref: SSD-29668067). The noise levels at the receiver locations are shown in Table 18. Where a receiver has more than one storey, the worst affected storey is presented. LAeq results are not shown where the calculated total is less than 0dBA.

Table 18: Project specific noise levels (Receivers 1 to 6)

Receiver (Floor)	Project Specific Criteria $L_{eq,15min}$ dBA			Predicted Noise Impacts $L_{eq,15min}$ dBA			Complies (Yes/No)		
	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
1 (1st Floor)	47	37	31	36	34	31	Yes	Yes	Yes
2 (Ground Floor)	47	37	31	34	32	29	Yes	Yes	Yes
3 (Ground Floor)	47	37	31	14	12	9	Yes	Yes	Yes
4 (1st Floor)	47	37	31	23	22	19	Yes	Yes	Yes
5 (1st Floor)	43	33	28	16	14	10	Yes	Yes	Yes
6 (1st Floor)	43	33	28	13	11	8	Yes	Yes	Yes

Compliance with the cumulative impact criteria is predicted for all onsite activities at the receiver locations during the proposed operating hours on the condition the recommendations detailed in Section 11 are implemented.

Figures 14 to 19 present a graphical representation of the predicted noise levels.

Figure 15: $L_{Aeq,15min}$ noise contours (Day, Receivers 1 to 4, with mitigation measures)

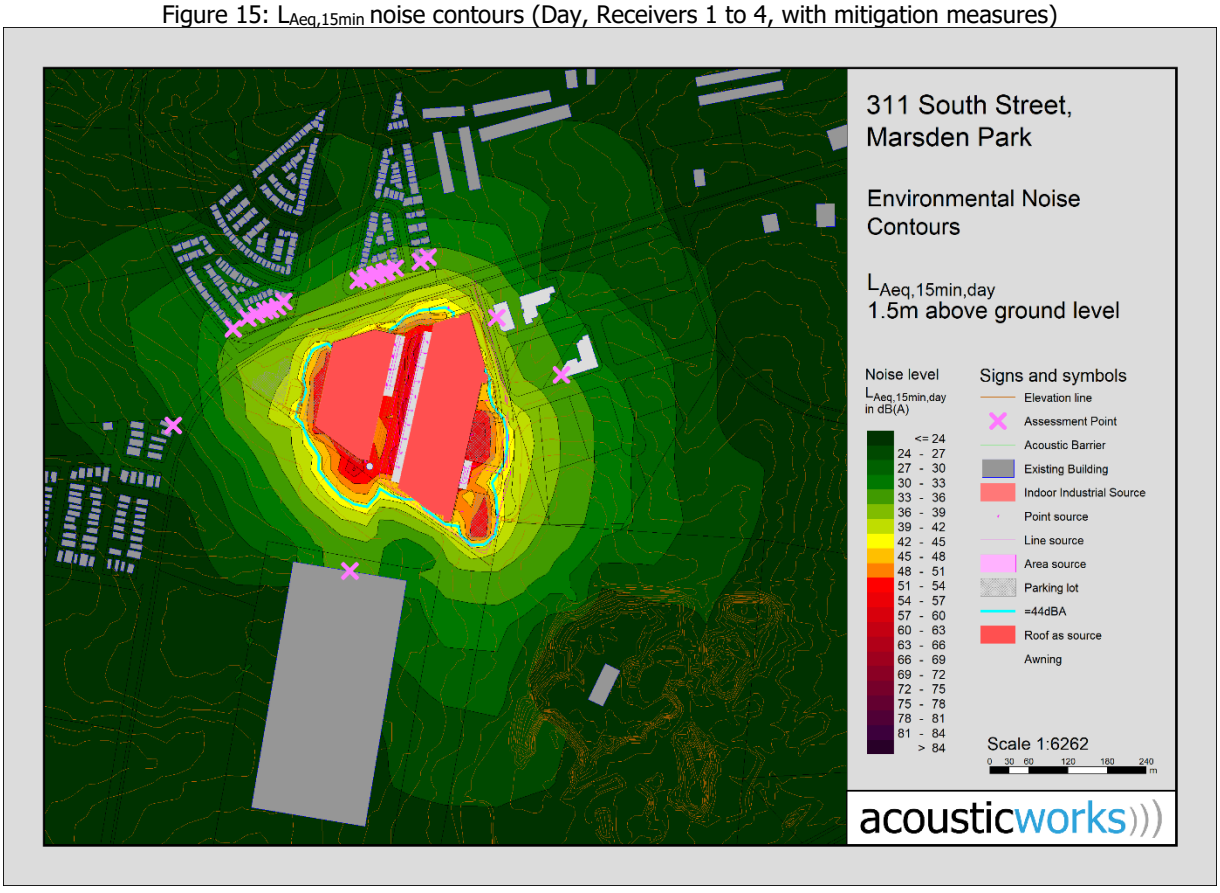


Figure 16: $L_{Aeq,15min}$ noise contours (Evening, Receivers 1 to 4, with mitigation measures)

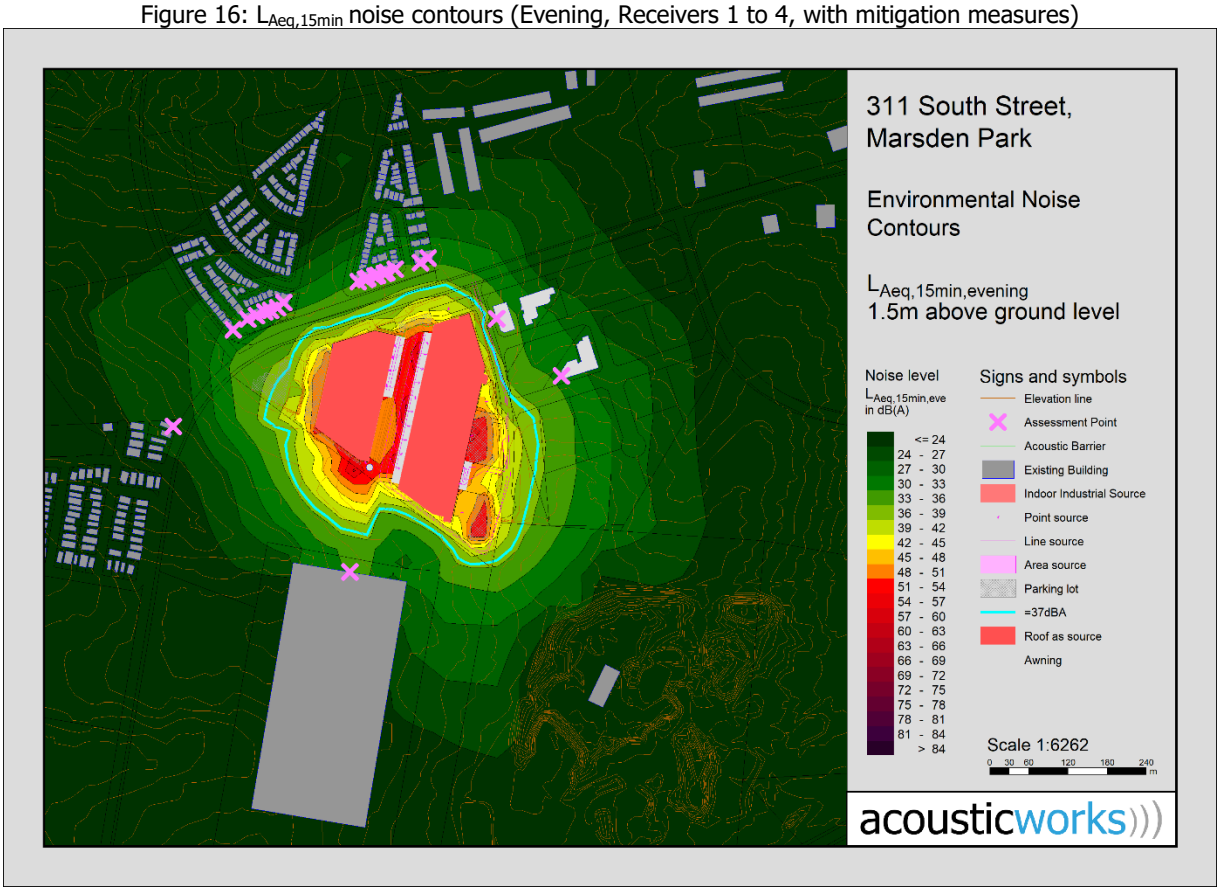


Figure 17: $L_{Aeq,15min}$ noise contours (Night, Receivers 1 to 4, with mitigation measures)

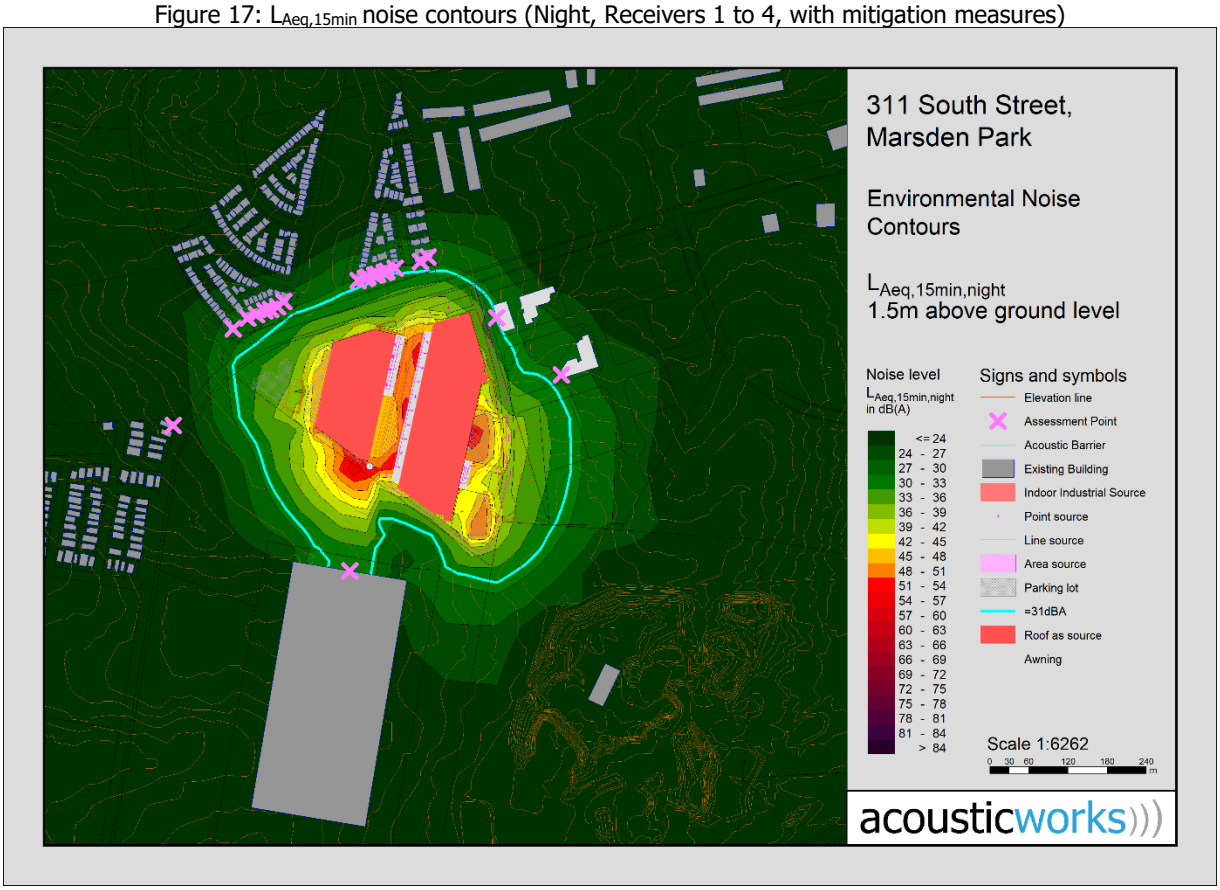


Figure 18: $L_{Aeq,15min}$ noise contours (Day, All Receivers, with mitigation measures)

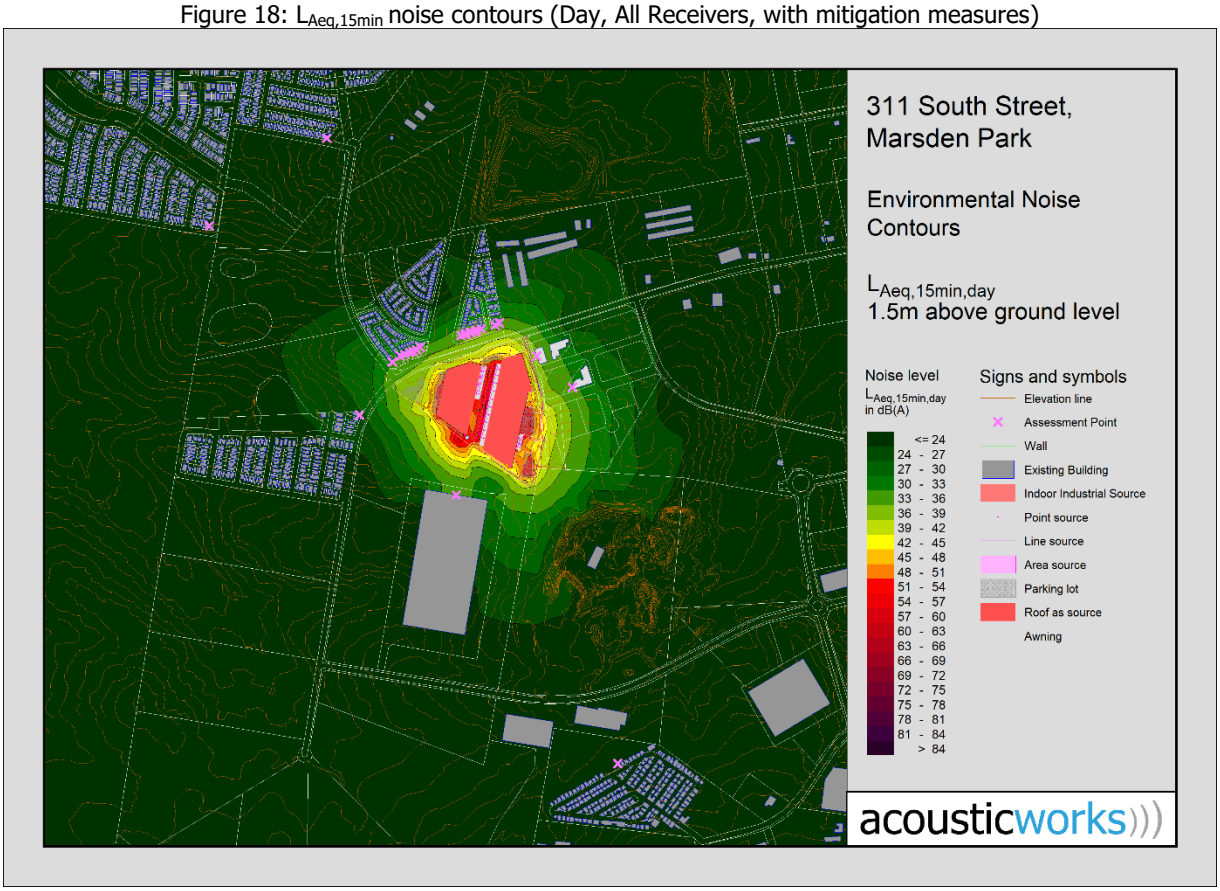


Figure 19: $L_{Aeq,15min}$ noise contours (Evening, All Receivers, with mitigation measures)

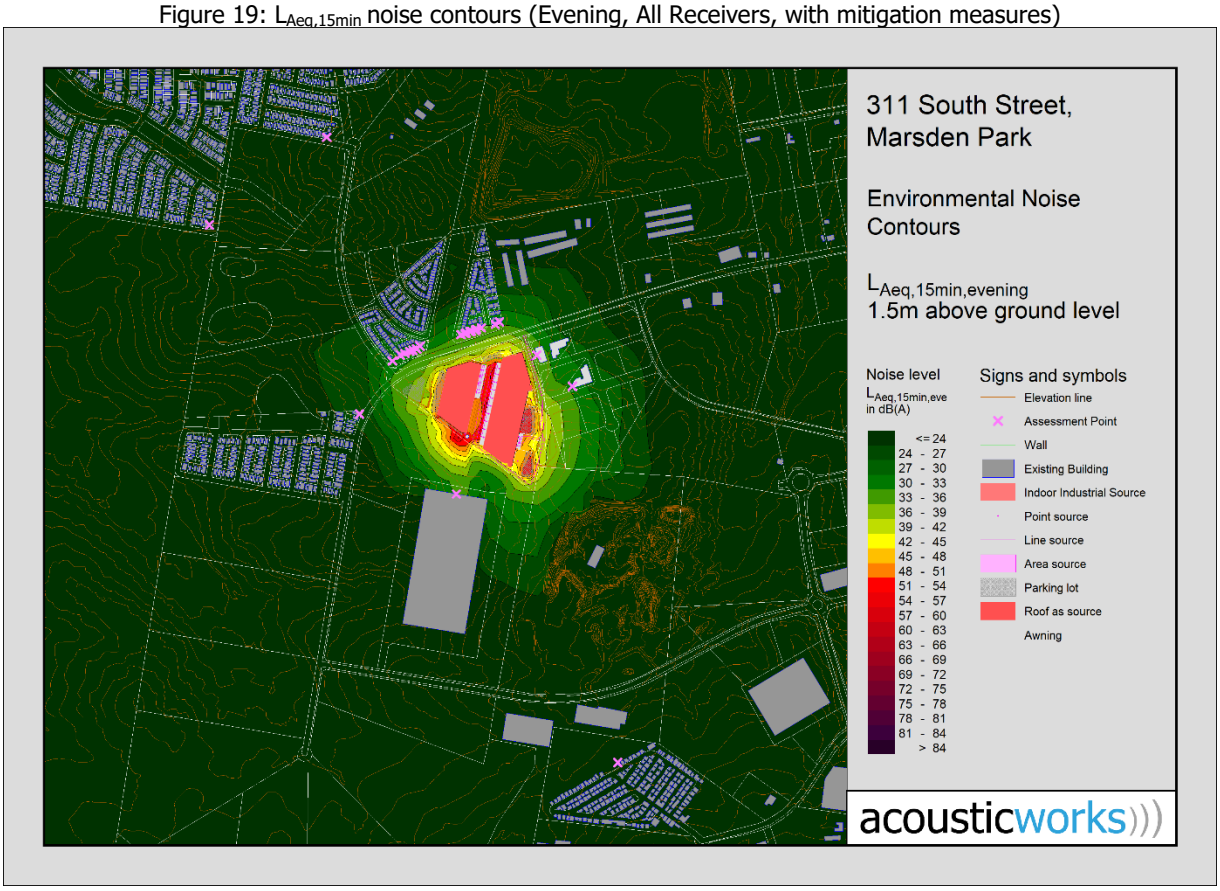
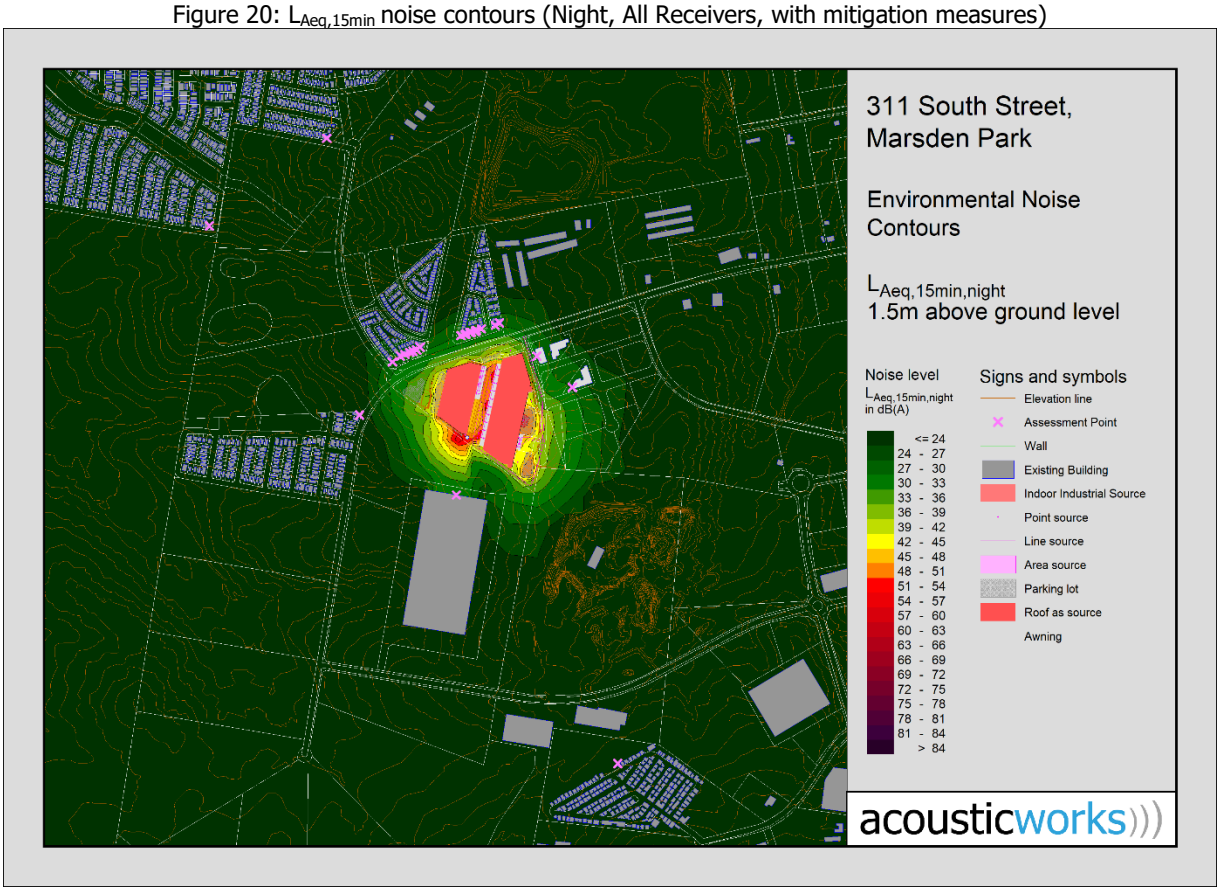


Figure 20: $L_{Aeq,15min}$ noise contours (Night, All Receivers, with mitigation measures)



8.3 Sleep disturbance criteria

The noise source levels and predicted levels of noise at the receiver locations are shown in Table 19. The calculations were undertaken to determine if noise impacts are predicted to comply with the sleep disturbance criteria for 24/7 operation. Refer to Section 8.1.1 for details on the source locations. For each receiver, the nearest source of each type was assessed as this would have the highest potential for sleep disturbance.

Table 19: Sleep Disturbance noise levels (Receivers 1 to 3)

Receiver	Receivers 1. 312 South Street (N) 2. 305 South Street (E) 3. Ingenia Lifestyle (S) 4. Dortmund Crescent (W) 5. Raine Avenue (N) 6. Hazelwood Avenue (E) Description	Lwmax dB(A)	Distance (m)	Barrier (height (m)) Yes	Barrier screening dB	Building TL or shield dB	Building screening	Dist atten. @-6dB/dd	Laeq adj, T ext. dB(A) Night	LAmax adj,T ext.. dB(A)	Complies Lmax dB(A)
											52
	Truck door closing	93	104	4	-15			-48	4.2	22	Yes
1	Truck idle	96	104	4	-15			-48	3.8	25	Yes
	Truck air brakes	116	104	4	-15			-48		45	Yes
	Truck passby	103	104	4	-15			-48	29	32	Yes
	Truck reverse alarm	104	104	4	-15			-48	21	33	Yes
	Truck starting	101	104	4	-15			-48	29	30	Yes
	Forklift activities inc. reverse al	104	79					-46	21	50	Yes
	Car door closure	86	73					-45	22	33	Yes
											52
	Truck door closing	93	202					-46	4.2	39	Yes
2	Truck idle	96	202					-46	3.8	42	Yes
	Truck air brakes	116	121				-20	-42		46	Yes
	Truck passby	103	135					-43	29	52	Yes
	Truck reverse alarm	104	202					-46	21	50	Yes
	Truck starting	101	202					-46	29	47	Yes
	Forklift activities inc. reverse al	104	213					-47	23	49	Yes
	Car door closure	86	133					-42		36	Yes
	Car passby	80	133					-42	21	30	Yes
	Car start	86	133					-42	22	36	Yes
											52
	Truck door closing	93	1008					-60	4.2	25	Yes
3	Truck idle	96	1008					-60	3.8	28	Yes
	Truck air brakes	116	1008					-60		48	Yes
	Truck passby	103	1008					-60	29	35	Yes
	Truck reverse alarm	104	1008					-60	21	36	Yes
	Truck starting	101	1008					-60	29	33	Yes
	Forklift activities inc. reverse al	104	1008					-60	23	36	Yes
	Car door closure	86	1008					-60		18	Yes
	Car passby	80	1008					-60	21	12	Yes
	Car start	86	997					-60	22	18	Yes

Table 20: Sleep Disturbance noise levels (Receivers 5 & 6)

Receiver	Receivers 1. 312 South Street (N) 2. 305 South Street (E) 3. Ingenia Lifestyle (S) 4. Dortmund Crescent (W) 5. Raine Avenue (N) 6. Hazelwood Avenue (E) Description	Lwmax dB(A)	Distance (m)	Barrier (height (m)) Yes	Barrier screening dB	Building TL or shield dB	Building screening	Dist atten. @-6dB/dd	Laeq adj, T ext. dB(A) Night	LAmax adj,T ext.. dB(A)	Complies Lmax dB(A)
											52
	Truck door closing	93	333				-20	-50	4.2	15	Yes
4	Truck idle	96	333				-20	-50	3.8	18	Yes
	Truck air brakes	116	333				-20	-50		38	Yes
	Truck passby	103	333				-20	-50	29	25	Yes
	Truck reverse alarm	104	333				-20	-50	21	26	Yes
	Truck starting	101	333				-20	-50	29	23	Yes
	Forklift activities inc. reverse al	104	339				-20	-51	23	25	Yes
	Car door closure	86	339				-20	-51		7	Yes
	Car passby	80	339				-20	-51	21	1	Yes
	Car start	86	150					-44	22	34	Yes
											52
	Truck door closing	93	827					-58	4.2	27	Yes
5	Truck idle	96	827					-58	3.8	30	Yes
	Truck air brakes	116	827					-58		50	Yes
	Truck passby	103	827					-58	29	37	Yes
	Truck reverse alarm	104	827					-58	21	38	Yes
	Truck starting	101	827					-58	29	35	Yes
	Forklift activities inc. reverse al	104	827					-58	23	38	Yes
	Car door closure	86	827					-58		20	Yes
	Car passby	80	827					-58	21	14	Yes
	Car start	86	827					-58	22	20	Yes
											52
	Truck door closing	93	1508					-64	4.2	21	Yes
6	Truck idle	96	1508					-64	3.8	24	Yes
	Truck air brakes	116	1508					-64		44	Yes
	Truck passby	103	1508					-64	29	31	Yes
	Truck reverse alarm	104	1508					-64	21	32	Yes
	Truck starting	101	1508					-64	29	29	Yes
	Forklift activities inc. reverse al	104	1508					-64	23	32	Yes
	Car door closure	86	1508					-64		14	Yes
	Car passby	80	1508					-64	21	8	Yes
	Car start	86	1508					-64	22	14	Yes

Compliance is predicted for all onsite activities at the receiver locations during the proposed operating hours on the condition the recommendations detailed in Section 11 are implemented.

9. Vibration Predictions

Potential vibration and acceleration impacts were assessed to determine typical levels within a set distance of the activity to the receiver with a maximum combined Peak Particle Velocity of level less than 1mm/s predicted based on the equipment in operation. The level of impact may change depending on the ground composition, example stone/rock or concrete will allow higher levels of ground vibration than soft soil. It is recommended a strict management plan is implemented to allow a proactive approach to addressing complaints including vibration monitoring of activities if complaints are received.

After review of the proposal in relation to vibration impacts, we provide the following recommendations:

- The surrounding residential receivers located in proximity to the site are separated from the site by roads and soil, with reasonable separation distances from onsite activities and local roads associated with the development. The human exposures and Peak Particle levels are predicted to be below the criteria nominated in section 7.6 with no further treatments required.
- The surrounding lots within the development are predicted to comply with the criteria based on the proposed warehousing activities. Note if vibrating plant is proposed within the development then induvial assessment is recommended of the equipment to determine minimum treatment requirements.
- If complaints are received for onsite activities from any of the sensitive receiver, we recommend that compliance monitoring is undertaken as detailed in Section 12.3.

10. Road Traffic Noise

Based on the Traffic Impact Assessment prepared by Positive Traffic Pty Ltd (ref:PT21076r01, dated 31/01/2022) the predicted post-upgrade traffic volumes on South Street and the collector road adjacent the eastern boundary are 16,000 vehicles per day and 2,700 vehicles per day, respectively. The predicted volumes have been used as a baseline to account for future road upgrades. The development is predicted to generate an additional 2,400 vehicles per day, based on a maximum PM peak hour traffic generation of 242 trips per day. Based on these predictions, a road traffic noise assessment was conducted using the CoRTN method.

Note that the post-upgrade traffic volumes do not account for the eventual connection of South Street to the M7, which would increase baseline traffic volumes substantially. This was not included in the model as it would result in a less conservative assessment.

Existing road traffic noise levels exceed the criteria (55 dB $L_{Aeq,15h}$ in the day time period and 50dB $L_{Aeq,9h}$ in the night time period) at the façade of residences located closer to the road. When accounting for the additional trips predicted to be generated by the development, no additional exceedances of the criteria are predicted at the façade of residences along South Street. Note that this does not include traffic generated by other nearby proposed industrial developments.

For a visual representation of the existing and predicted road traffic noise levels, refer to Figures 9 to 12

Figure 21: Existing $L_{Aeq,15h}$ noise levels

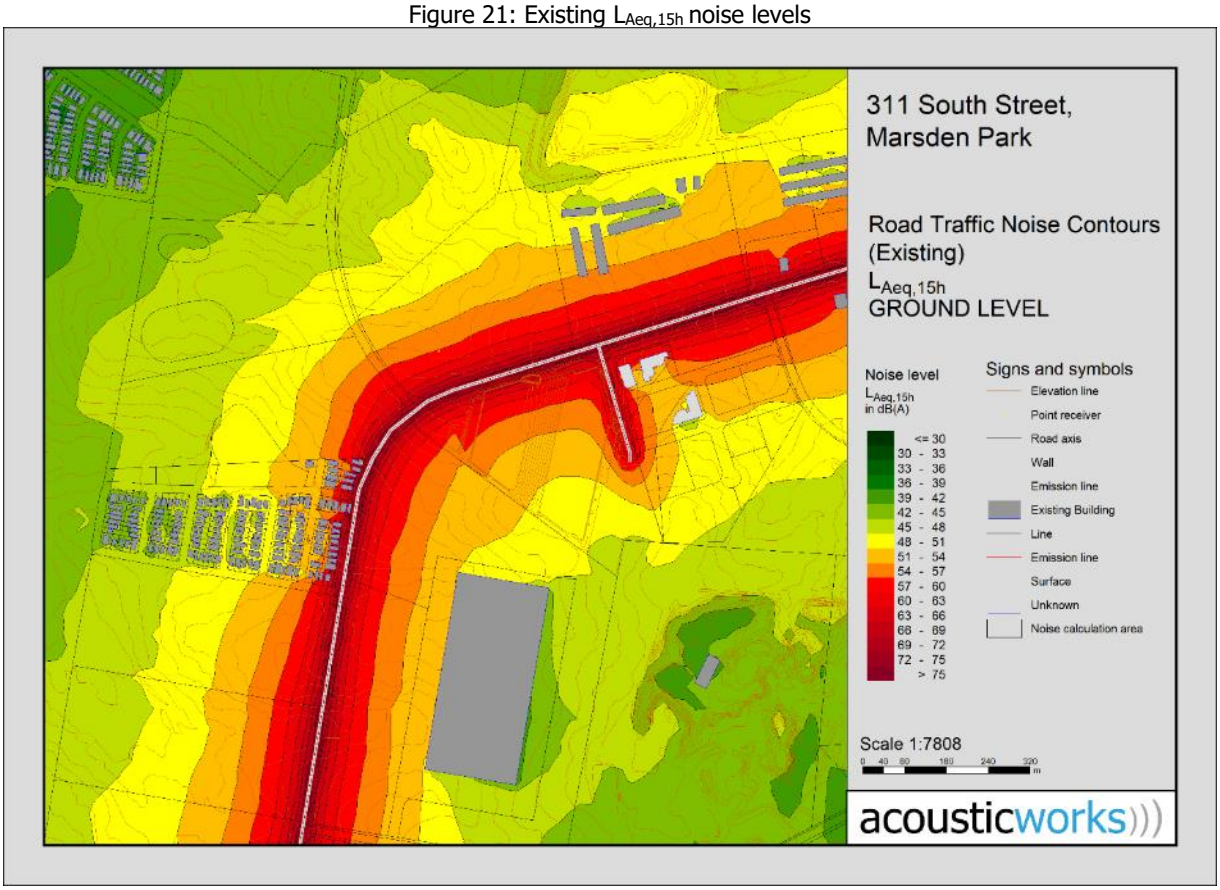


Figure 22: Existing $L_{Aeq,9h}$ noise levels

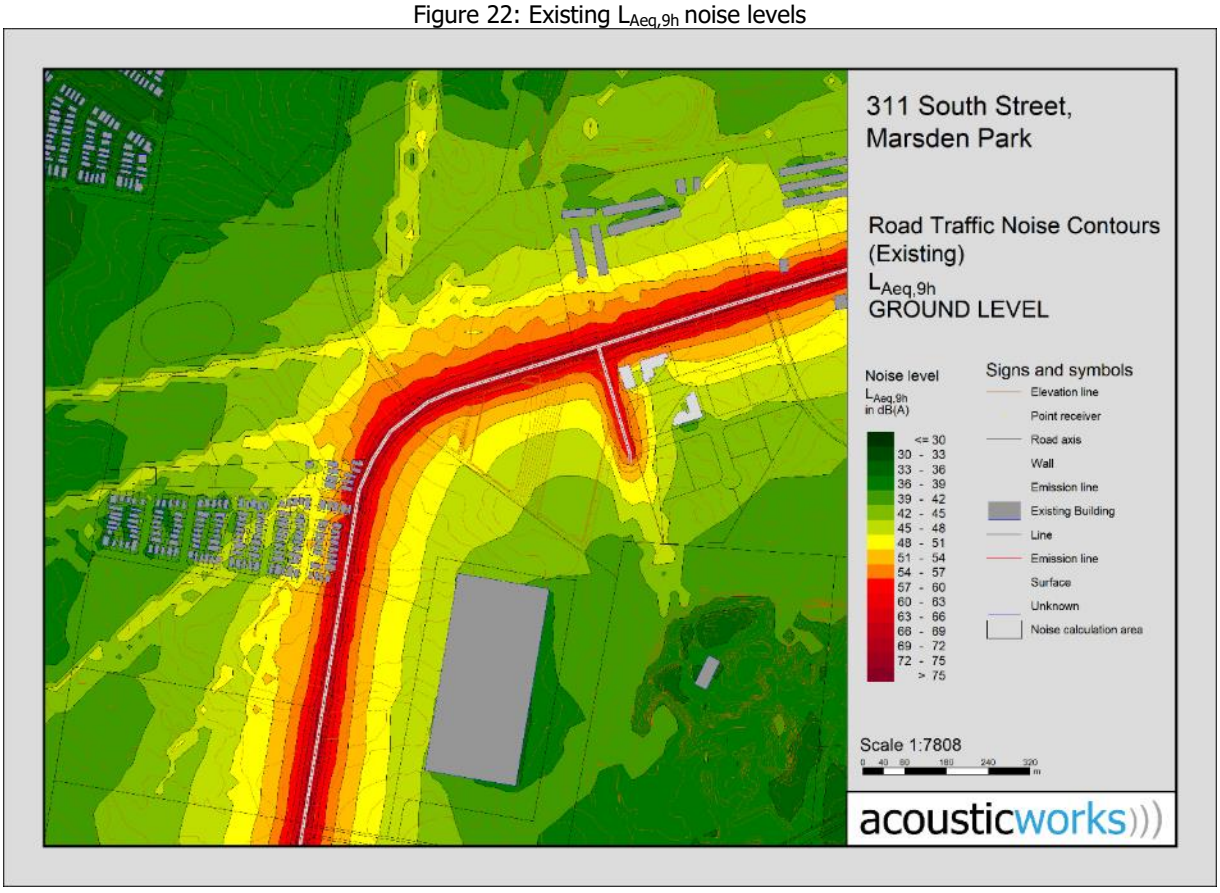


Figure 23: Predicted $L_{Aeq,15h}$ noise levels

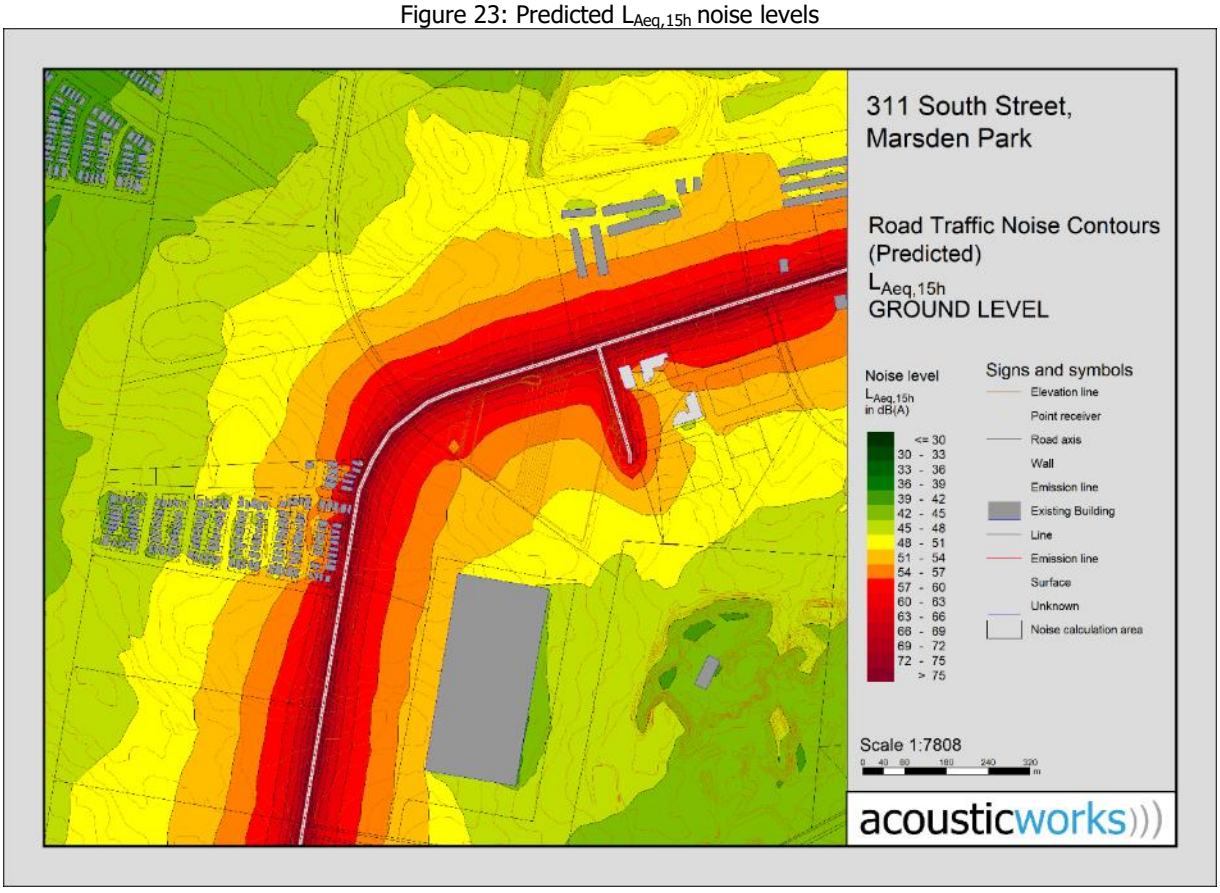
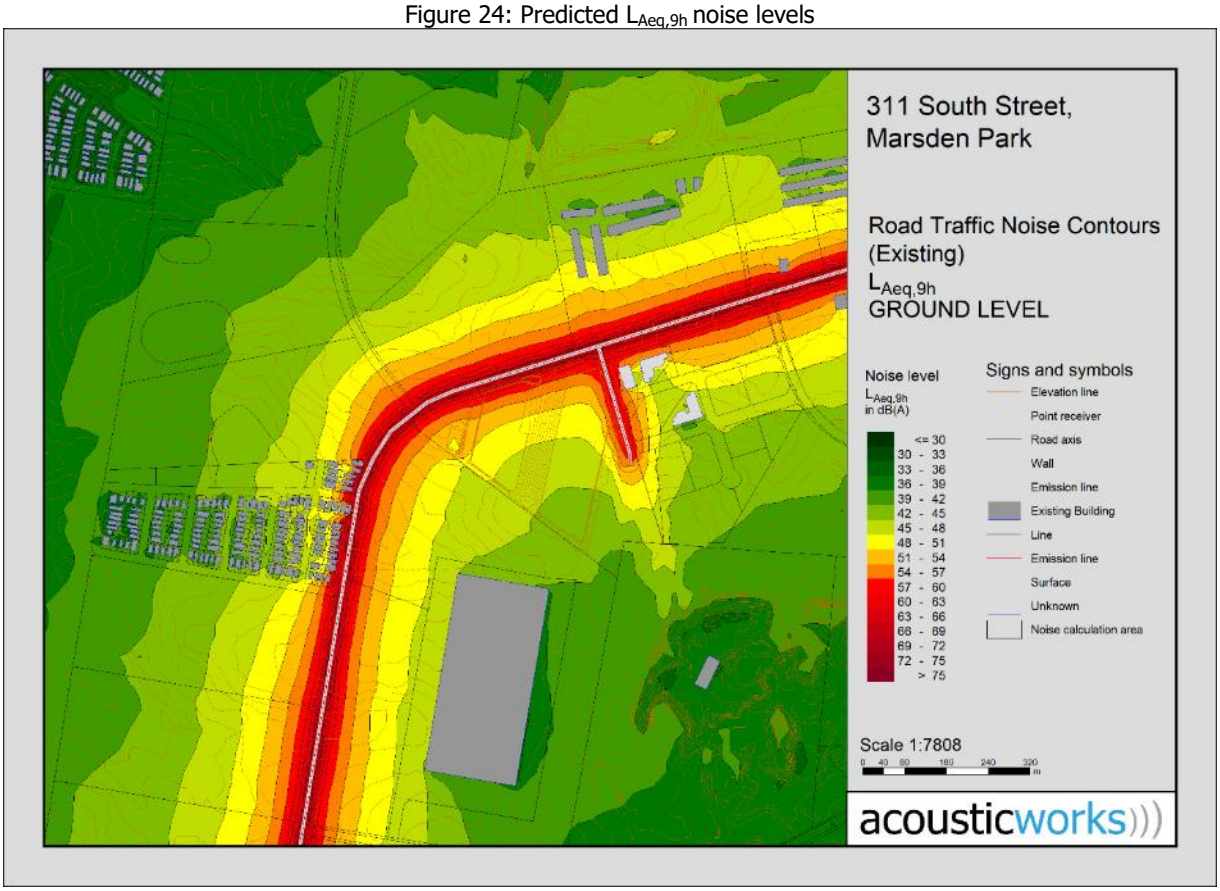


Figure 24: Predicted $L_{Aeq,9h}$ noise levels



Based on the provided traffic volumes, the development is predicted to generate traffic resulting in a relative noise increase of 0.6dB for South Street and 1.7dB for the collector road on the eastern boundary. This would comply with the relative increase criteria of +12dBA

Therefore, traffic generated by the development is predicted to comply with the NSW Road Noise Policy criteria (55 dB $L_{Aeq,15h}$, 50dB $L_{Aeq,9h}$ and +12dBA relative increase) at all nearby residences except for those where the criteria are exceeded by existing traffic. Refer to Section 11 for further recommendations.

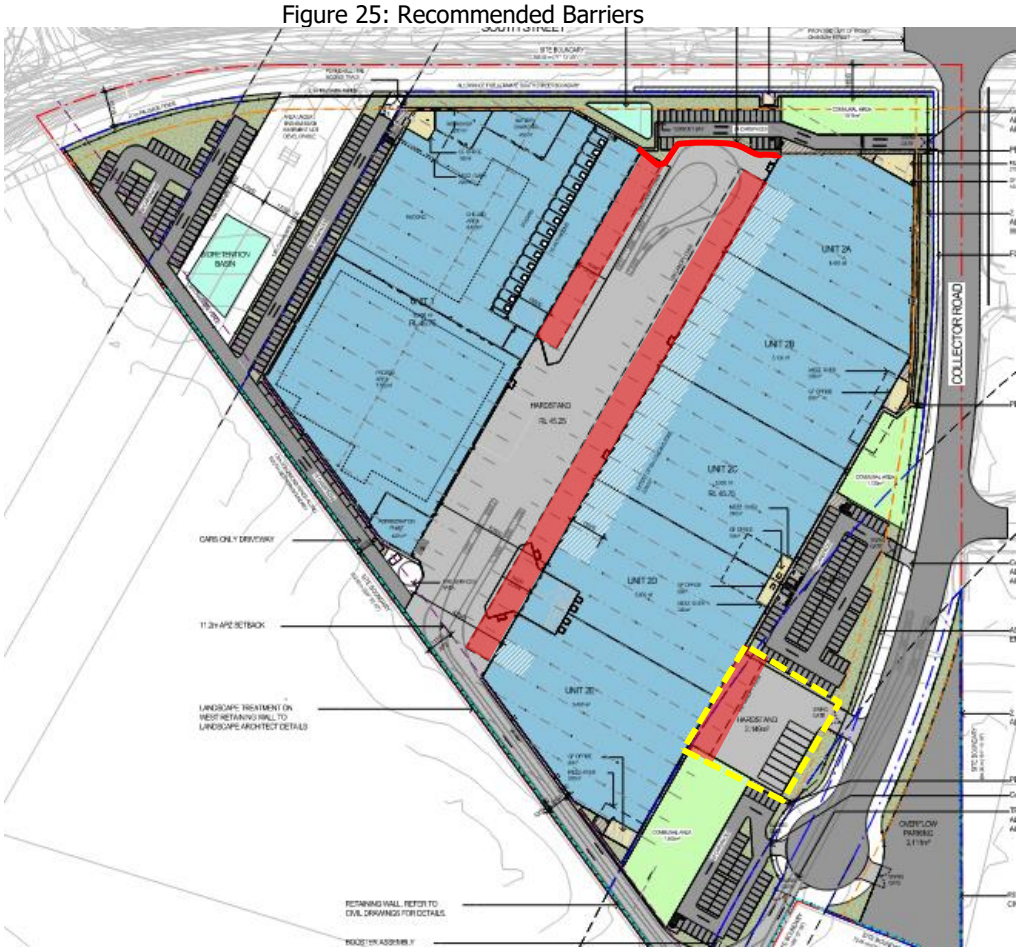
11. Recommendations

11.1 Operational Noise

The noise assessment indicates that 24 hour operation of the site is predicted to comply with the assessment criteria on the condition that the following recommendations are implemented:

- An acoustic barrier shall be constructed to the height and extent shown in Figure 25. The acoustic barrier should be constructed using either masonry, 9mm fibre cement sheet, Hebel, Perspex, plywood, or other materials with a minimum surface density of 9kg/m^2 and shall be free of gaps and holes.
- The 10 metre high awnings shall be constructed as proposed in the most recent plans for the site.
- Vehicles using the eastern loading docks of Units 2D & 2E during the night time period (10pm-7am Monday to Saturday, 10pm-8am Sunday shall be limited to 6 tonne trucks, delivery vans or lighter. No restrictions on vehicle types would apply during the day and evening time periods.

Figure 25: Recommended Barriers



4.2m high acoustic barrier above concrete pad RL

10m high awnings as indicated by plans

Vehicles limited to 6t trucks, delivery vans or lighter during the night time period

If manufacturing, workshops or factory production is proposed for any of the warehouse units then additional individual acoustic assessments may be required to ensure that proposed warehouse building construction will adequately attenuate internal noise sources.

11.1.1 Minimum Building Construction

Except where nominated in Warehouses shall be constructed using concrete tilt walls to a minimum height above pad level RL as specified in Figure 26, with the remainder of the construction to use standard sheet metal construction.

Figure 26: Recommended Minimum Construction

4.2m high concrete tilt wall on indicated façade of building

2.4m high concrete tilt wall on indicated façade of building

For any façade not specified above, standard construction would be suitable. Note that changes to the internal layout of the building may result in changes to the minimum requirements for each façade.

11.1.2 NSW Road Noise Policy – Traffic Generation

The traffic generation from the proposed development is not predicted to cause exceedances of the criteria nominated in Section 7.6 at residences along South Street except for those where the criteria are already exceeded by existing road traffic noise. In addition, compliance with the relative increase criteria is predicted with no need for further treatment.

11.1.3 Onsite Mechanical Plant

No information regarding mechanical services was available at the time of the assessment, but a preliminary assessment based on measurements of similar developments predicted that similar plant would comply on the condition the recommendations of this report are implemented. Any new mechanical plant shall be designed to comply with the criteria nominated in Section 7 of this report.

Acoustic Works recommends that once mechanical plant selection is finalised, an assessment by qualified acoustic consultant be conducted prior to installation to determine any requirements for acoustic treatments.

11.2 Vibration

Vibration associated with truck activity and onsite activities is predicted to comply with the relevant NSW guidelines at the nearest sensitive receivers. We recommend that any vibrating equipment used onsite is adequately isolated to prevent vibration issues to nearby receivers and is reviewed by a qualified acoustic consultant. If complaints are received for vibration, we recommend the management controls nominated in Section 12.3 are implemented.

11.3 Compliance Vibration Monitoring Procedure

To ensure the vibration monitoring is effective, we recommend the following:

- All vibration monitors will be set to a maximum measurement interval of 5 minutes and record over the period commencing over the entire day and be located onsite and at the sensitive receiver location.
- The client shall provide a list of relevant management staff (including mobile phone numbers) working on the project to be notified of exceedance of the nominated vibration levels.
- All vibration monitors will be fitted with an internal SMS warning system (allow the unit to send SMS notification of vibration levels when the nominated level is exceeded). The SMS warning from the vibration monitors will go out to all staff who have provided their mobile numbers for use for notifications from the vibration monitor.
- The vibration monitor will be set to provide vibration impact warnings at 2/3 of the criteria for human exposure and peak particle velocity, this will allow staff to be notified of vibration levels and take a proactive approach before the criteria is exceeded. The Acoustic consultant will also have a minimum of 2 staff nominated on the warning system.
- The vibration monitors will be installed with additional battery packs to extend the operation of the monitor to a minimum of 6 weeks without recharge.
- Attended vibrations measurement will be undertake for the affected site to determine existing levels of specific equipment to help identify Regardless of warning or notification, the vibration monitor will be downloaded on a monthly basis with a monthly report provided to the client, the report will be suitable for submission to council.

11.3.1 Procedure for measuring Vibration

11.3.1.1 Where to measure vibration for complaints

Vibration is required to be measured at complainants location and onsite simultaneously with the geophone located at the nearest point to the dwelling for the sensitive receiver and onsite where the source of the compliant originated. The geophone can be fixed to the ground using mounting spikes in line with the nearest point of the site or fixed directly to building elements, note that relocation of the geophone may be required to be representative of the nearest location of works being conducted onsite. Note multiple vibration monitors (two) are recommended to avoid the need for relocating the geophone multiple times.

11.3.1.2 Information to be reported

Any reporting should be concise. The minimum requirements to be included in a report are;

- Date and duration of measurements.
- Time of measurements or measurement period.
- Person(s) performing measurements or placing equipment used for long term monitoring.
- Equipment used for measurements.
- Location of measurements including photos.
- Measured values including graphed PPV for the period of monitoring.
- Corrected values (where applicable).
- Notes regarding vibrating sources.
- Notes regarding any extraneous sources that may have influenced measurements.
- Detail of instrumentation and calibration.
- Meteorological conditions.
- Explanation of any high levels below the criteria including exceedances
- Action taken for any exceedance including changes to site operations

11.4 Noise Management Plan

If noise complaints are received from nearby receivers, noise monitoring with audio shall be conducted for a period of 7 weeks, with a monitor placed onsite and at the receiver from which the complaint was received. The monitors shall record simultaneously, with attended measurements also conducted onsite and at the complaining receiver. The monitoring data and audio shall be examined by a suitably qualified person to verify that the offending noise originated at the site.

If noise generated by the site has resulted in complaints, we recommend an acoustic assessment is conducted to determine suitable mitigation strategies and/or acoustic treatments.

12. Conclusion

A noise assessment was conducted for a State Significant Development Application for a proposed warehouse, logistics and facilities hub development to be located at 311 South Street, Marsden Park. Based on the results of the investigation, the application for the masterplan is predicted to be acoustically satisfactory for the 24 hour operation of the site, on the condition the recommendations detailed in Section 11 are implemented.

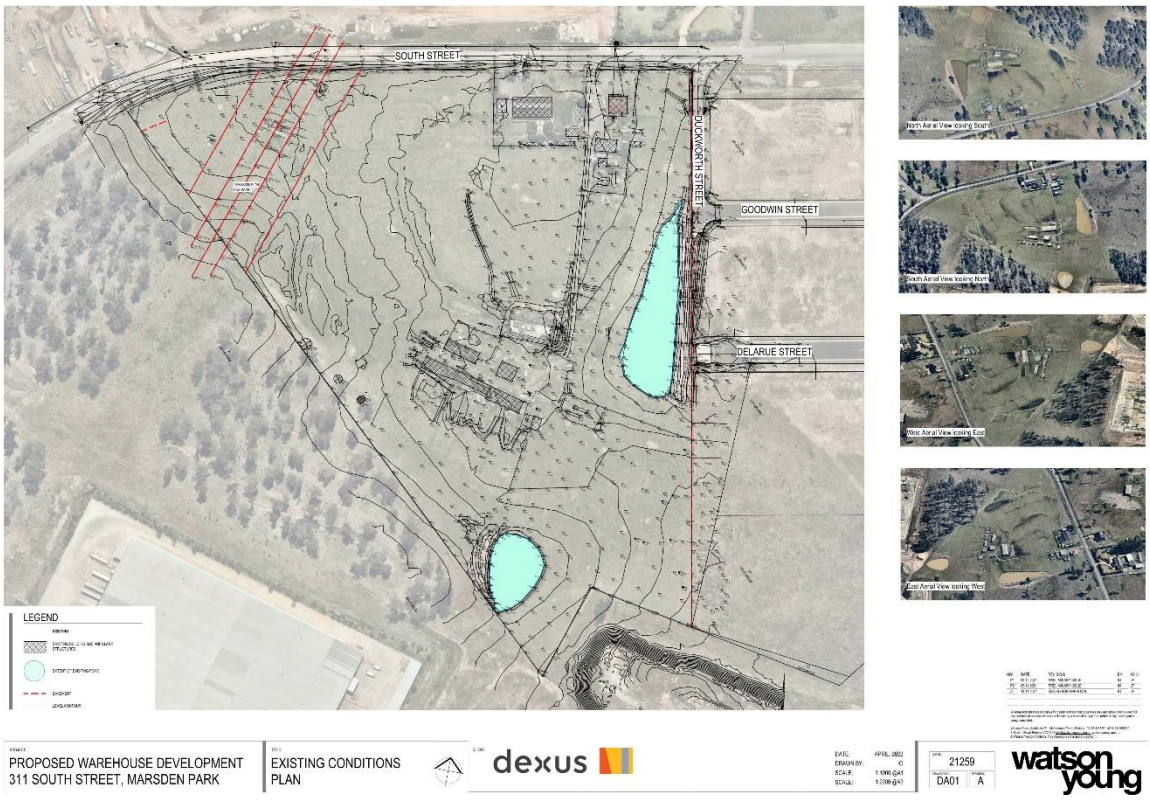
If you should have any queries please do not hesitate to contact us.

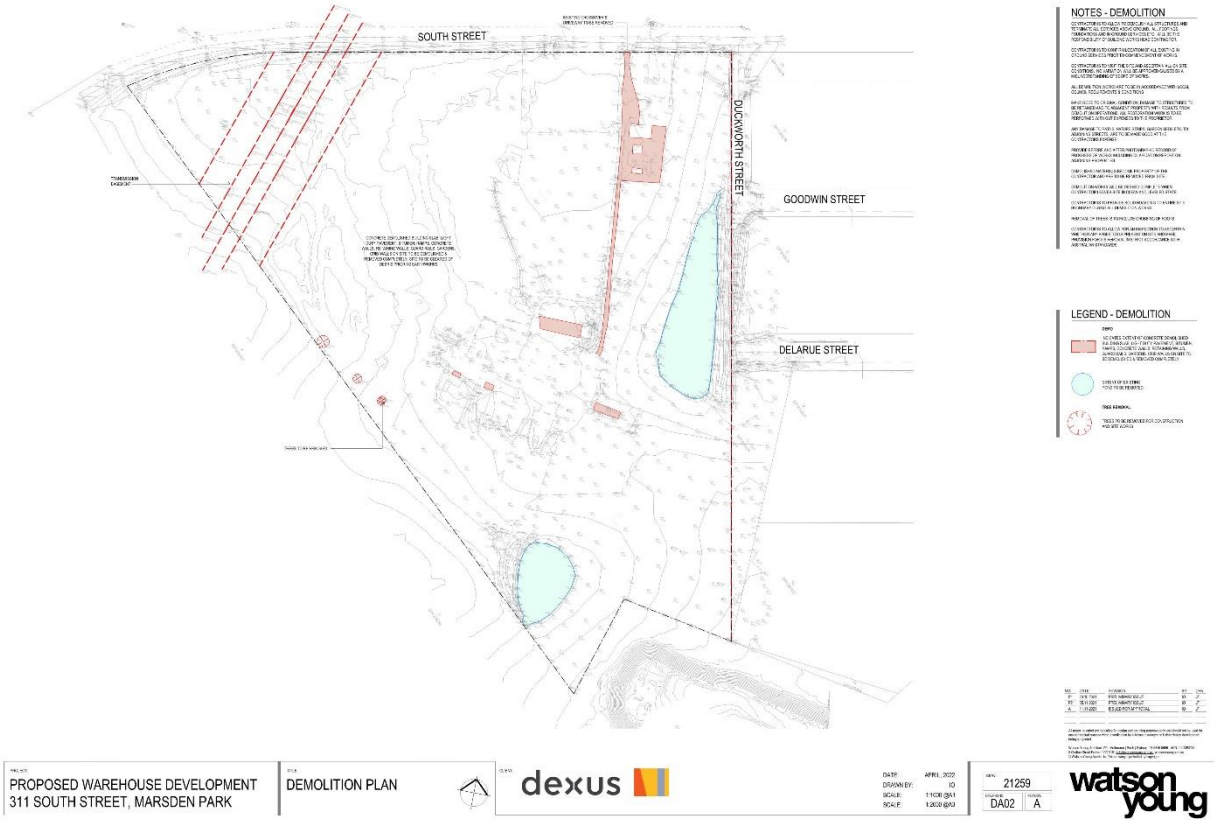
Report Prepared By

Michael Gunning M.ArchSci
Acoustic Consultant
acousticworks)))

13. Appendices

13.1 Development Plans

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DUCKWORTH STREET
GOODWIN STREET
DELARUE STREET
NOTES - DEMOLITION
LEGEND - DEMOLITION
PROPOSED WAREHOUSE DEVELOPMENT
311 SOUTH STREET, MARSDEN PARK
DEMOLITION PLAN
dexus
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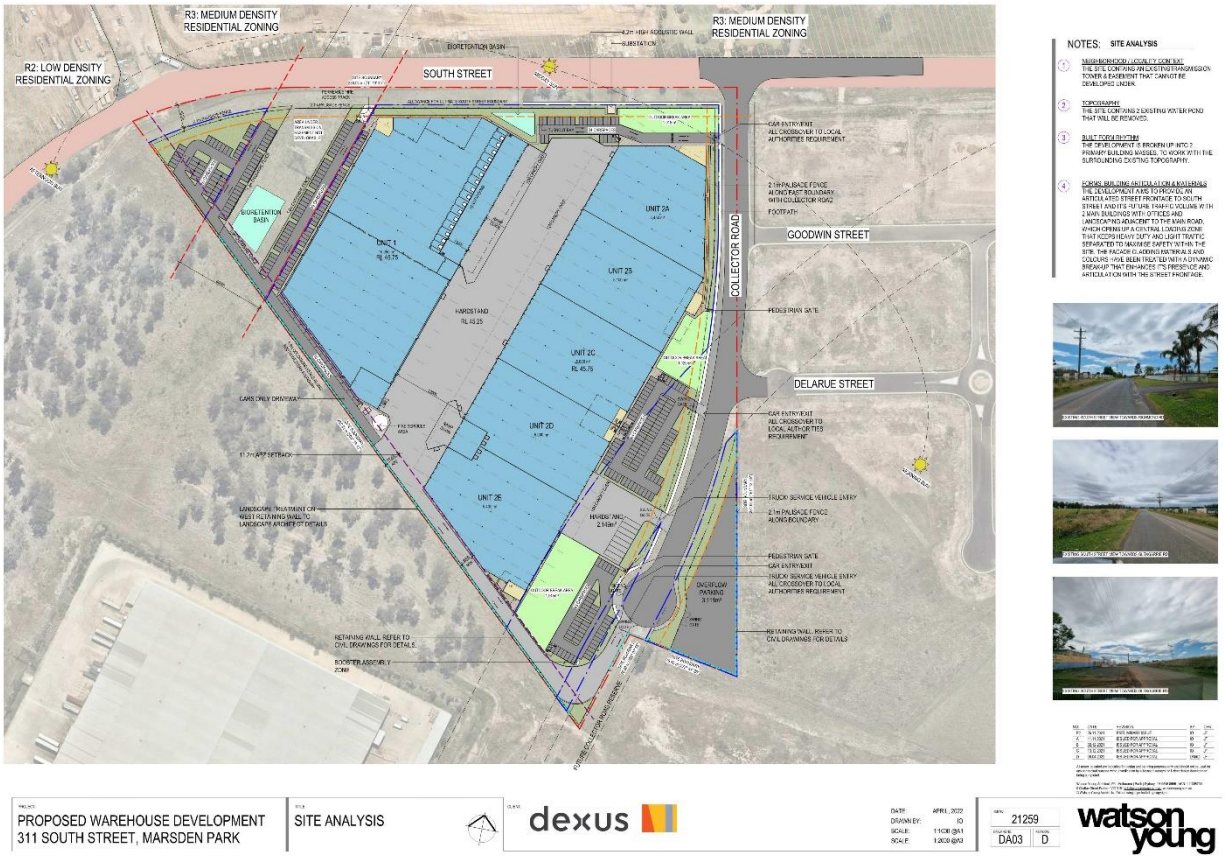
R3: MEDIUM DENSITY RESIDENTIAL ZONING
R2: LOW DENSITY RESIDENTIAL ZONING
SOUTH STREET
COLLECTOR ROAD
GOODWIN STREET
DELARUE STREET
NOTES: SITE ANALYSIS
PROPOSED WAREHOUSE DEVELOPMENT
311 SOUTH STREET, MARSDEN PARK
SITE ANALYSIS
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NOTES

LEGEND

DEVELOPMENT ANALYSIS

BUILDING	GFA
WAREHOUSE	
UNIT 1	15,863 m²
UNIT 2A	4,483 m²
UNIT 2B	5,103 m²
UNIT 2C	5,663 m²
UNIT 2D	5,663 m²
UNIT 2E	5,463 m²
TOTAL	46,863 m²
OFFICE SPACE (including Mezzanines)	
UNIT 1	350 m²
UNIT 2A	370 m²
UNIT 2B	420 m²
UNIT 2C	210 m²
UNIT 2D	200 m²
UNIT 2E	350 m²
TOTAL	2,160 m²
TOTAL AREA	49,023 m²
EXTERNAL AREAS (APPROX)	
CANOPIES	4,181 m²
HARDSTAND	15,067 m²
LIGHT DUTY	10,281 m²
PAVING	1,444 m²
LANDSCAPING	7,080 m²
COMMUNAL AREA	4,080 m²
PARKING	
WAREHOUSE	
OFFICE	
BAYS REQUIRED	316
BAYS PROVIDED	327
SITE COVERAGE	
TOTAL SITE AREA	102,415 m²
TOTAL BRUTE DEVELOPABLE AREA (WITHIN BLUE BOUNDARY)	73,096 m²
TOTAL BUILDING FOOTPRINT	41,480 m²
SITE COVERAGE	40.49%

METHOD OF MEASUREMENT FOR GROSS FLOOR AREA: THE SUM OF THE FLOOR AREA OF EACH FLOOR OF A BUILDING MEASURED FROM THE INTERNAL FACE OF THE EXTERNAL WALLS, INCLUDES STAIRS, LIFT SHAFTS, AND SERVICE SPACES.

PROJECT: PROPOSED WAREHOUSE DEVELOPMENT 311 SOUTH STREET, MARSDEN PARK	TITLE: PROPOSED SITE PLAN	CLIENT: dexus	DATE: APRIL 2022	JOB NO: 21259	watson young
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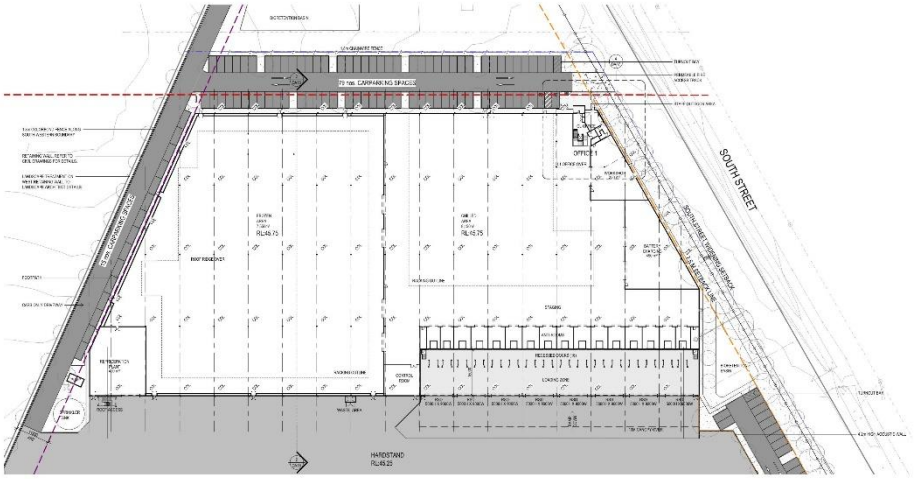

NOTES

LEGEND

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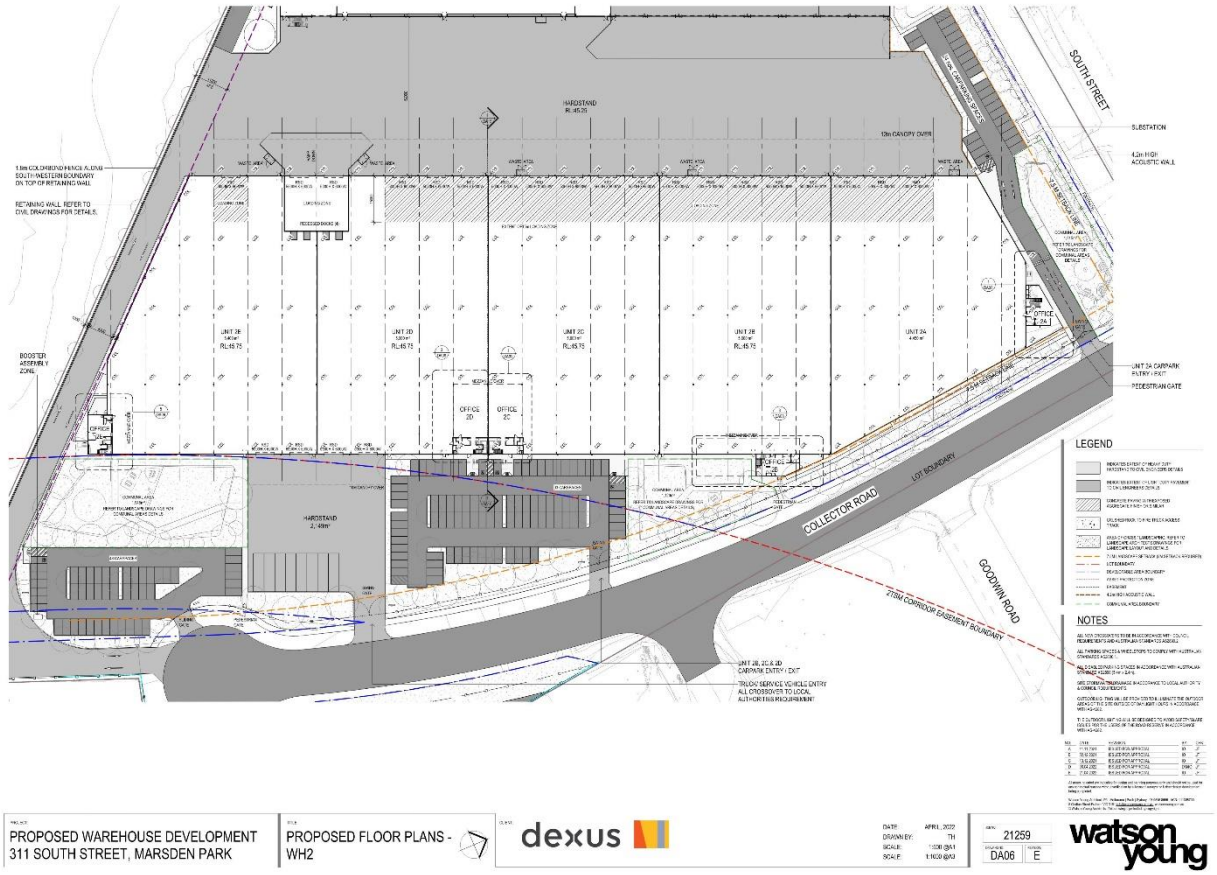

PROPOSED WAREHOUSE DEVELOPMENT
311 SOUTH STREET, MARSDEN PARK

PROPOSED FLOOR PLANS - WH2

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DRAWING NO: DA06
ISSUE: E

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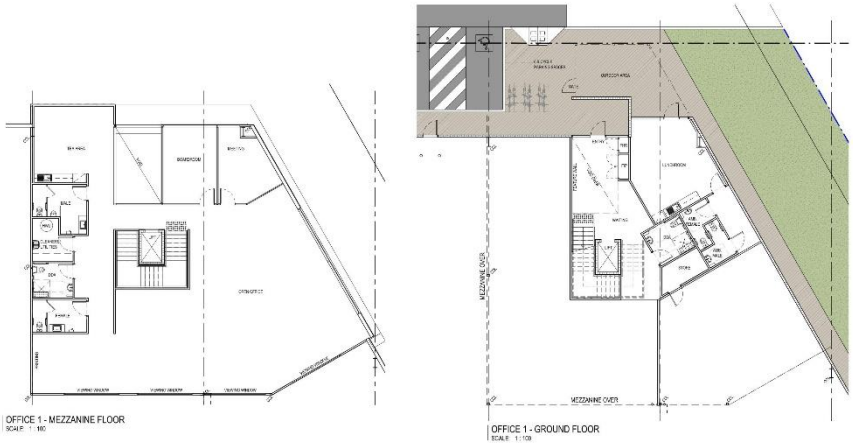

PROPOSED WAREHOUSE DEVELOPMENT
311 SOUTH STREET, MARSDEN PARK

PROPOSED OFFICE PLANS - WH1

dexus

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DRAWING NO: DA07
ISSUE: B

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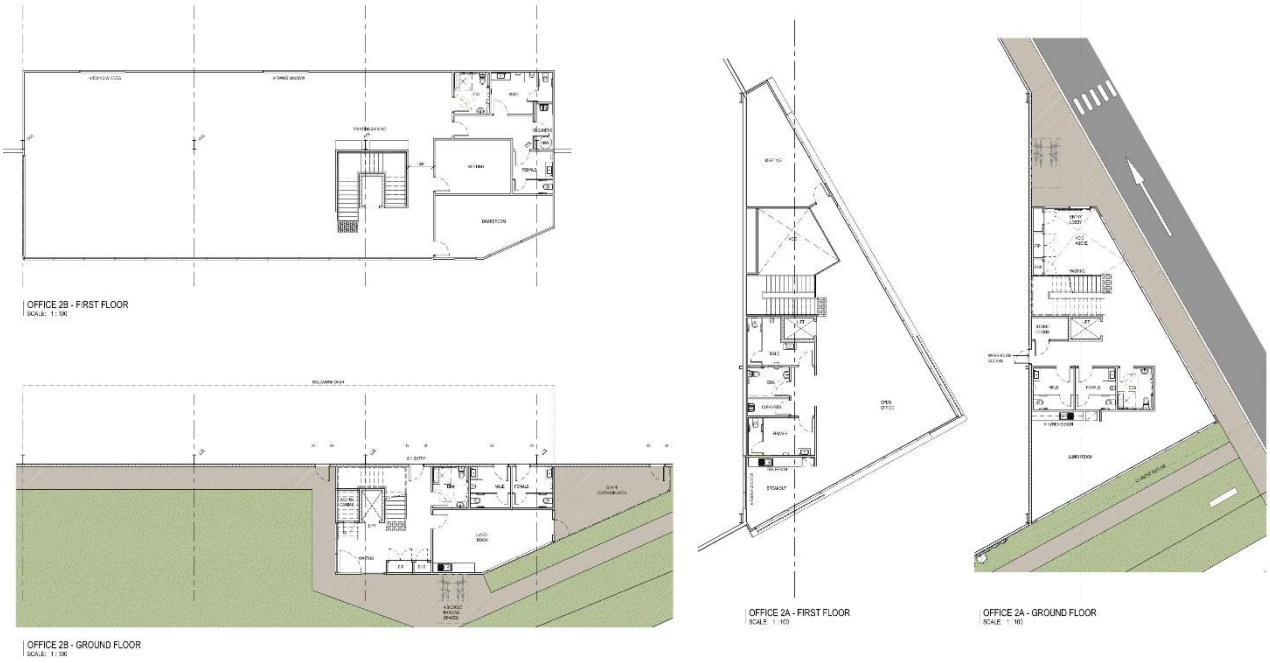
OFFICE 2B - FIRST FLOOR
OFFICE 2B - GROUND FLOOR
OFFICE 2A - FIRST FLOOR
OFFICE 2A - GROUND FLOOR
PROPOSED WAREHOUSE DEVELOPMENT
311 SOUTH STREET, MARSDEN PARK
PROPOSED OFFICE PLANS - WH2
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OFFICE 2E - FIRST FLOOR
OFFICE 2D - FIRST FLOOR
OFFICE 2C - FIRST FLOOR
OFFICE 2E - GROUND FLOOR
OFFICE 2D - GROUND FLOOR
OFFICE 2C - GROUND FLOOR
PROPOSED WAREHOUSE DEVELOPMENT
311 SOUTH STREET, MARSDEN PARK
PROPOSED OFFICE PLANS - WH2
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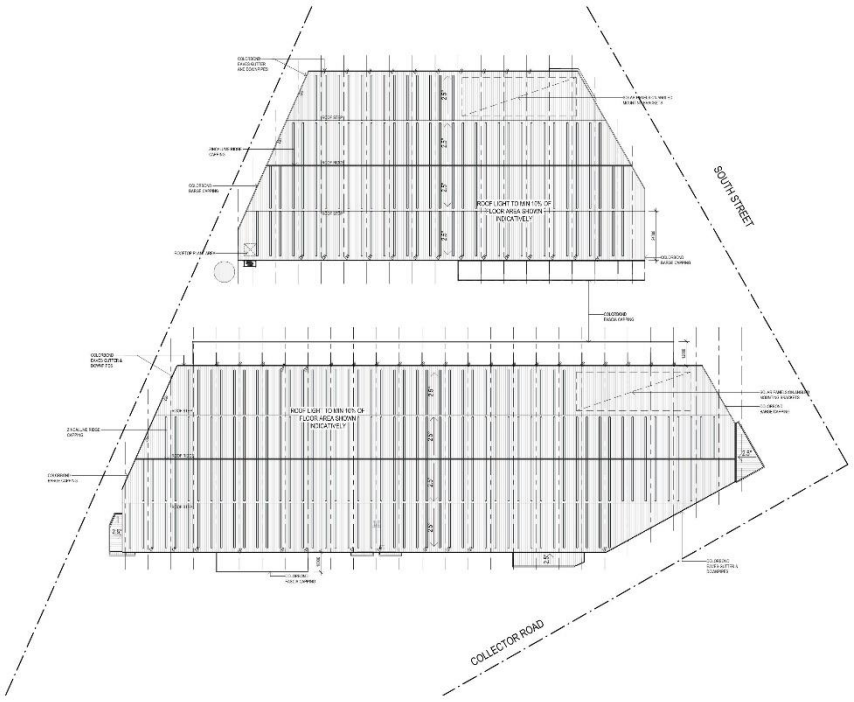

PROPOSED WAREHOUSE DEVELOPMENT
311 SOUTH STREET, MARSDEN PARK

PROPOSED OVERALL ROOF PLAN

dexus

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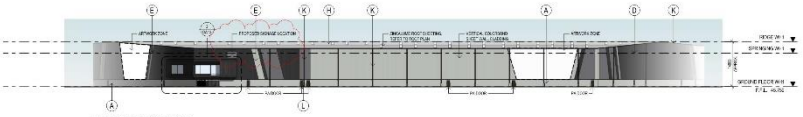
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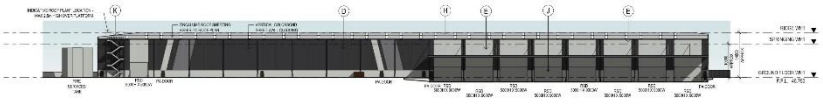
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EXTERNAL FINISHES

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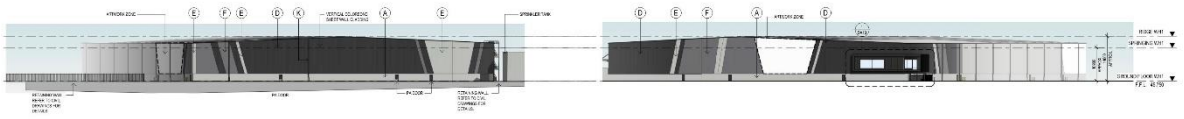
C	LINEAR TEXTURED CEMENT WALL CLADDING	GREY
D	COLORBOND WALL CLADDING	COLORBOND MONUMENT MATTE
E	COLORBOND WALL CLADDING	COLORBOND SHALE GREY
F	COLORBOND WALL CLADDING	COLORBOND BASALT
G	EXTERNAL STEEL	GALVANISED FINISH
H	ROOF CLADDING	ZINCALUME
J	ROLLER SHUTTER DOOR CLADDING	COLORBOND SHALE GREY
K	DOWNPIPES / GUTTERS / FR. DOORS	COLORBOND MONUMENT
L	BOLLARDS	SAFETY YELLOW
M	ALUMINIUM CLADDING	MONUMENT
N	ALUMINIUM CLADDING	SHALE GREY
O	ALUMINIUM FRAMED CLADDING	CLEAR
P	POWDERCOAT FINISH	COLORBOND MONUMENT
Q	SCHULIN FENCE	TIMBER
R	CORRUGATED COLORBOND WALL CLADDING	COLORBOND MONUMENT MATTE
S	ALUMINIUM RECTANGULAR HOLLOW BLADES	BLACK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ELEVATION - WH1 NORTH
SCALE: 1:500

PROPOSED WAREHOUSE DEVELOPMENT
311 SOUTH STREET, MARSDEN PARK

PROPOSED WAREHOUSE ELEVATIONS WH1 - SHEET 1

dexus

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SCALE: 1:1000 @A3

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DA11 E

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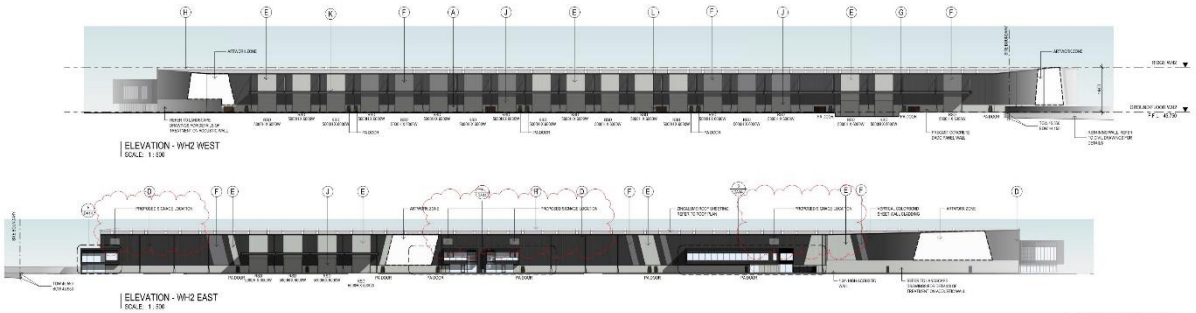

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G	EXTERNAL STEEL	GALVANISED FINISH
H	ROOF CLADDING	ZINCALUME
J	ROLLER SHUTTER DOOR CLADDING	COLORBOND SHALE GREY
K	DOWNPIPES / GUTTERS / FR DOORS	COLORBOND MONUMENT
L	BOLLARDS	SAFETY YELLOW
M	ALUMINUM CLADDING	MONUMENT
N	ALUMINUM CLADDING	SHALE GREY
O	ALUMINUM FRAMED GLAZING	CLEAR
P	POWDERCOAT FINISH	COLORBOND MONUMENT
Q	SCREEN FENCE	TIMBER
R	CORRUGATED COLORBOND WALL CLADDING	COLORBOND MONUMENT MATTE
S	ALUMINUM RECTANGULAR HOLLOW BLADES	BLACK

PROPOSED WAREHOUSE DEVELOPMENT
311 SOUTH STREET, MARSDEN PARK

PROPOSED WAREHOUSE
ELEVATIONS WH2 - SHEET 2

dexus

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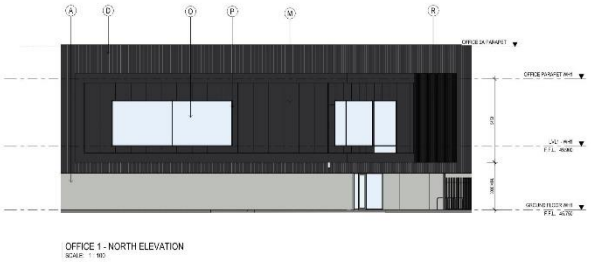

EXTERNAL FINISHES

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H	ROOF CLADDING	ZINCALUME
J	ROLLER SHUTTER DOOR CLADDING	COLORBOND SHALE GREY
K	DOWNPIPES / GUTTERS / FR DOORS	COLORBOND MONUMENT
L	BOLLARDS	SAFETY YELLOW
M	ALUMINUM CLADDING	MONUMENT
N	ALUMINUM CLADDING	SHALE GREY
O	ALUMINUM FRAMED GLAZING	CLEAR
P	POWDERCOAT FINISH	COLORBOND MONUMENT
Q	SCREEN FENCE	TIMBER
R	CORRUGATED COLORBOND WALL CLADDING	COLORBOND MONUMENT MATTE
S	ALUMINUM RECTANGULAR HOLLOW BLADES	BLACK

PROPOSED WAREHOUSE DEVELOPMENT
311 SOUTH STREET, MARSDEN PARK

PROPOSED OFFICE
ELEVATIONS - SHEET 1

dexus

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JOB NO. 21259
DRAWING NO. DA13
REVISION C

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OFFICE 2A - NORTH ELEVATION
OFFICE 2A - WEST ELEVATION
OFFICE 2B - EAST ELEVATION
OFFICE 2C & 2D - EAST ELEVATION
OFFICE 2E - EAST ELEVATION
OFFICE 2E - SOUTH ELEVATION
EXTERNAL FINISHES
PROPOSED WAREHOUSE DEVELOPMENT
311 SOUTH STREET, MARSDEN PARK
PROPOSED OFFICE
ELEVATIONS - SHEET 2
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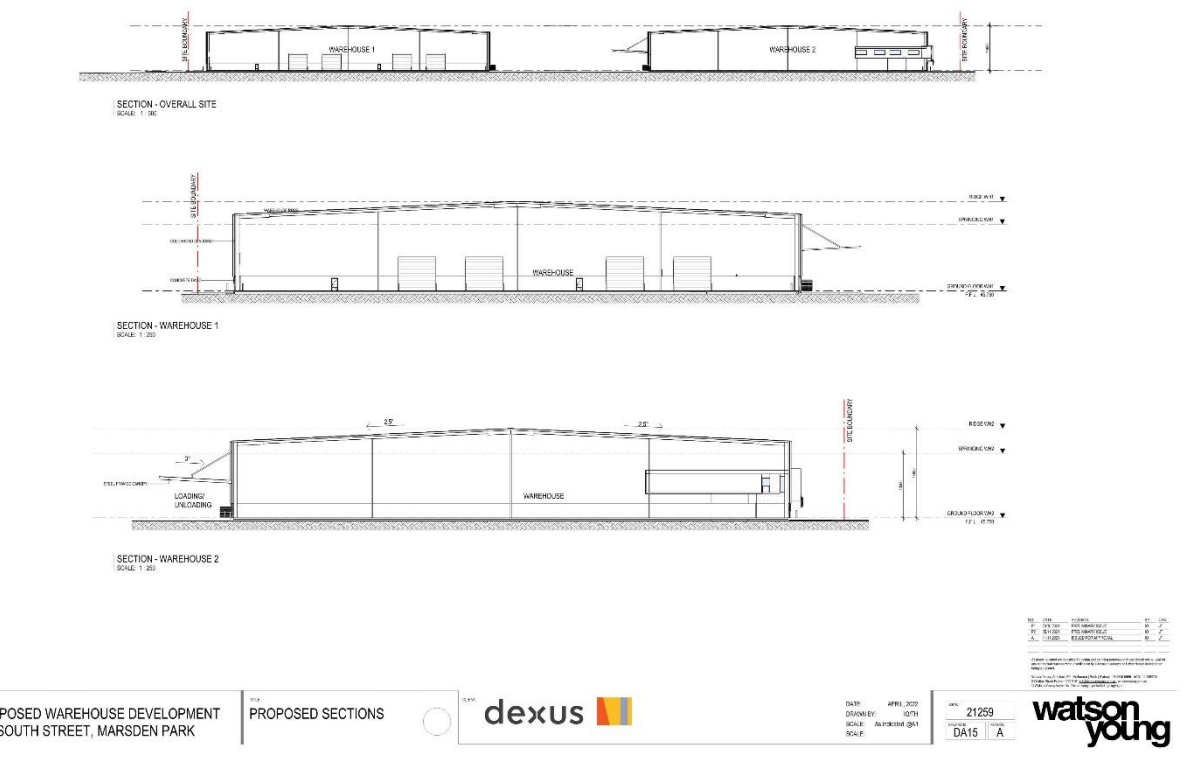
WAREHOUSE 1
WAREHOUSE 2
SECTION - OVERALL SITE
WAREHOUSE
SECTION - WAREHOUSE 1
LOADING/
UNLOADING
WAREHOUSE
SECTION - WAREHOUSE 2
PROPOSED WAREHOUSE DEVELOPMENT
311 SOUTH STREET, MARSDEN PARK
PROPOSED SECTIONS
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INDICATIVE PERSPECTIVE - SOUTH STREET

INDICATIVE PERSPECTIVE - SOUTH EAST HARDSTAND

INDICATIVE PERSPECTIVE - HARDSTAND

PERSPECTIVE VIEW NOTES

PROPOSED WAREHOUSE DEVELOPMENT
311 SOUTH STREET, MARSDEN PARK

PERSPECTIVES

dexus

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SCALE: NTS @A1
SCALE: NTS @A3

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INDICATIVE PERSPECTIVE - OFFICE 2D & 2C

INDICATIVE PERSPECTIVE - OFFICE 2D & 2C

INDICATIVE PERSPECTIVE - OFFICE 2E SOUTH EAST VIEW

INDICATIVE PERSPECTIVE - OFFICE 2E NORTH WEST VIEW

PERSPECTIVE VIEW NOTES

PROPOSED WAREHOUSE DEVELOPMENT
311 SOUTH STREET, MARSDEN PARK

PERSPECTIVES

dexus

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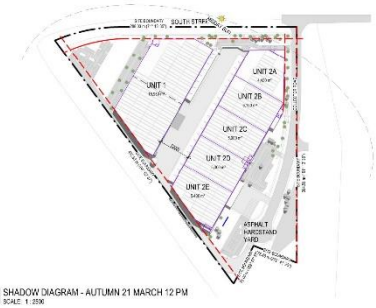

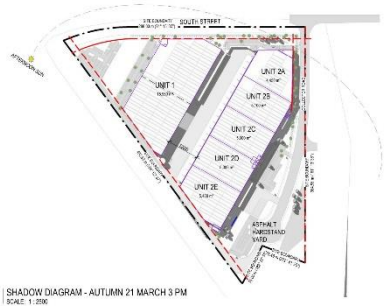

PROPOSED WAREHOUSE DEVELOPMENT
311 SOUTH STREET, MARSDEN PARK

SHADOW DIAGRAMS -
AUTUMN & WINTER

dexus

DATE APRIL 2022
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SCALE

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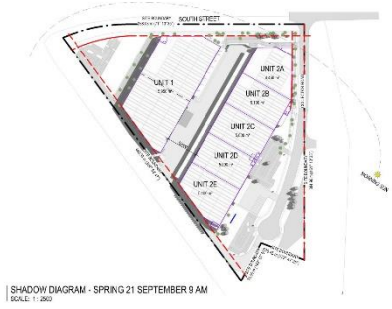
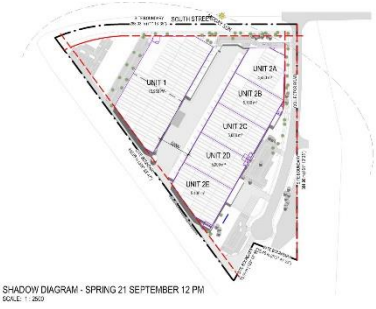
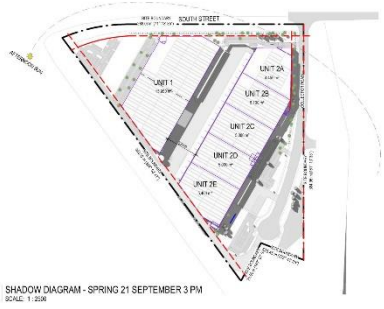
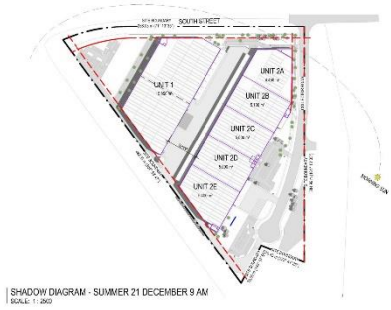
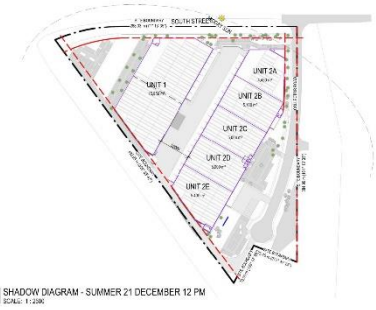
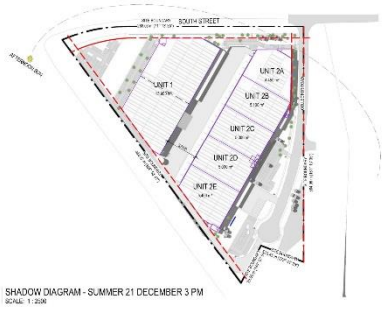












PROPOSED WAREHOUSE DEVELOPMENT
311 SOUTH STREET, MARSDEN PARK

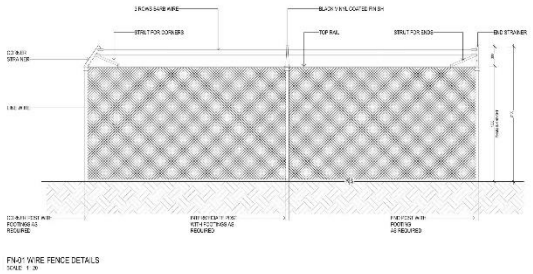
SHADOW DIAGRAMS -
SPRING & SUMMER

dexus

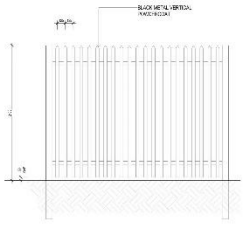
DATE APRIL 2022
DRAWN BY IO
SCALE 1 : 2500 @A1
SCALE

JOB NO. 21259
DRAWING NO. DA19
REVISION B

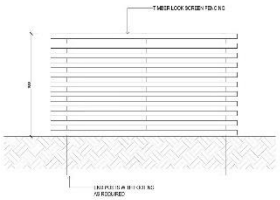
watson young



FN-01 WIRE FENCE DETAILS



FN-02 PALISADE FENCE DETAILS



FN-03 OUTDOOR AREA FENCING

PROPOSED WAREHOUSE DEVELOPMENT
311 SOUTH STREET, MARSDEN PARK

FENCE DETAILS

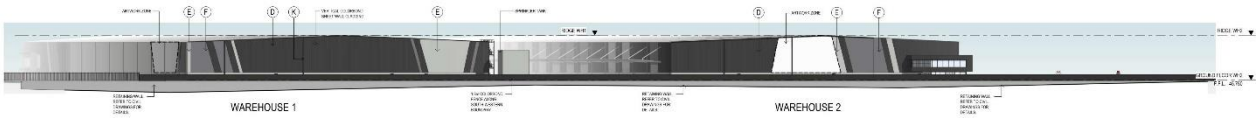
dexus ARCHILE PROJECTS

DRAFT

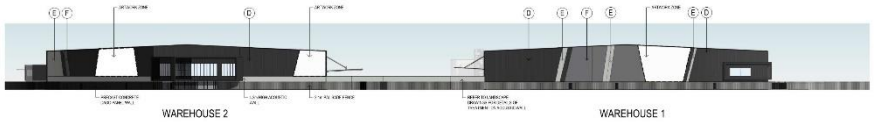
DATE APRIL 2022
SCALE 1:20

21259
DA20

watson young



OVERALL SOUTH ELEVATION
SCALE 1:500



OVERALL NORTH ELEVATION
SCALE 1:500

EXTERNAL FINISHES

A	PRECAST CONCRETE PANEL TEXTURE PAINT	COLORBOND SHALE GREY
C	LINEAR TEXTURED CEMENT WALL CLADDING	GREY
D	COLORBOND WALL CLADDING	COLORBOND MONUMENT MATT®
E	COLORBOND WALL CLADDING	COLORBOND SHALE GREY
F	COLORBOND WALL CLADDING	COLORBOND BASALT
G	EXTERVIL STEEL	GALVANISED FINISH
H	ROOF CLADDING	ZINCALUME
J	ROLLER SHUTTER DOOR CLADDING	COLORBOND SHALE GREY
K	DOWNPIPES / CAPPINGS / FLASHINGS	COLORBOND MONUMENT
L	BOLLARDS	SAFETY YELLOW
M	ALUMINIUM CLADDING	MONUMENT
N	ALUMINIUM CLADDING	SHALE GREY
O	ALUMINIUM FRAMED GLAZING	CLEAR
P	POWDERCOAT FINISH	COLORBOND MONUMENT
Q	SCREEN FENCE	TIMBER
R	CORRUGATED COLORBOND WALL CLADDING	COLORBOND MONUMENT MATT®
S	ALUMINIUM RECTANGULAR HOLLOW SURDS	BLACK

PROPOSED WAREHOUSE DEVELOPMENT
311 SOUTH STREET, MARSDEN PARK

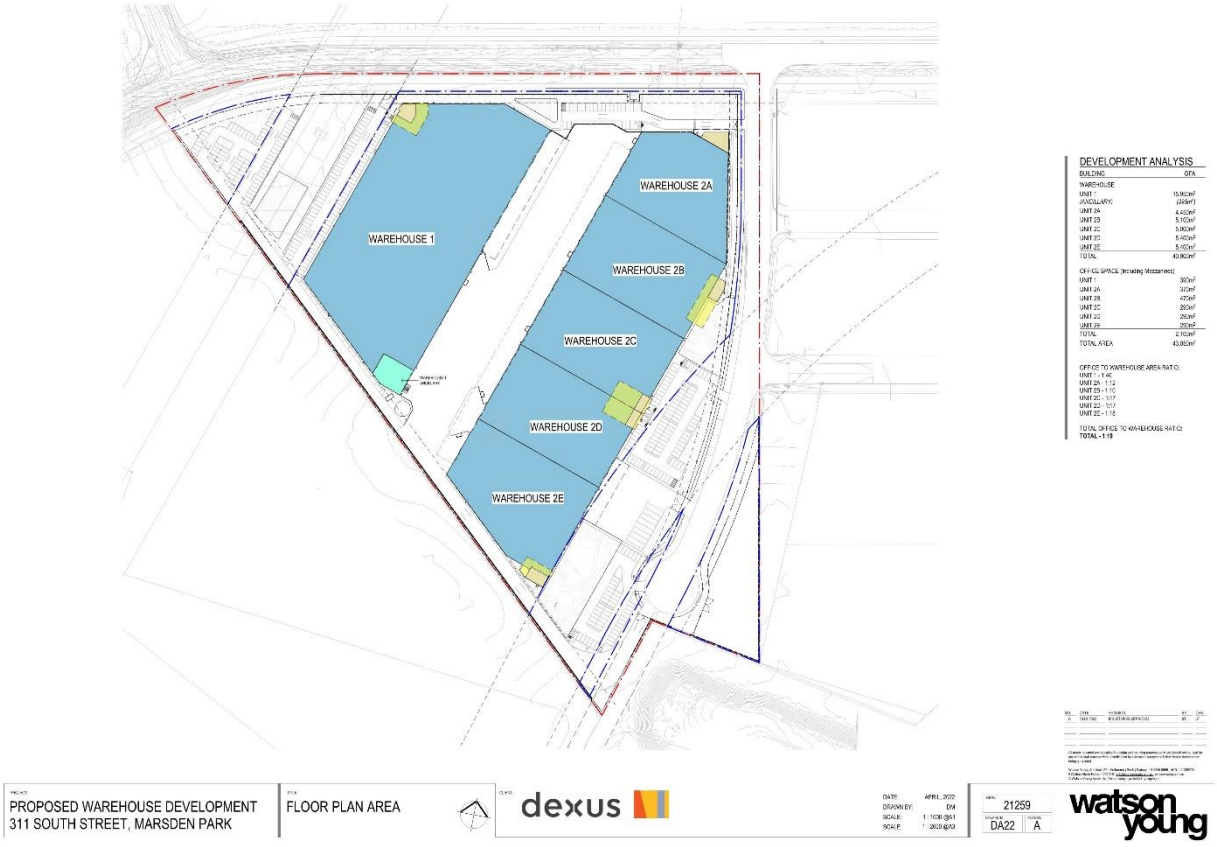
PROPOSED WAREHOUSE ELEVATIONS - OVERALL

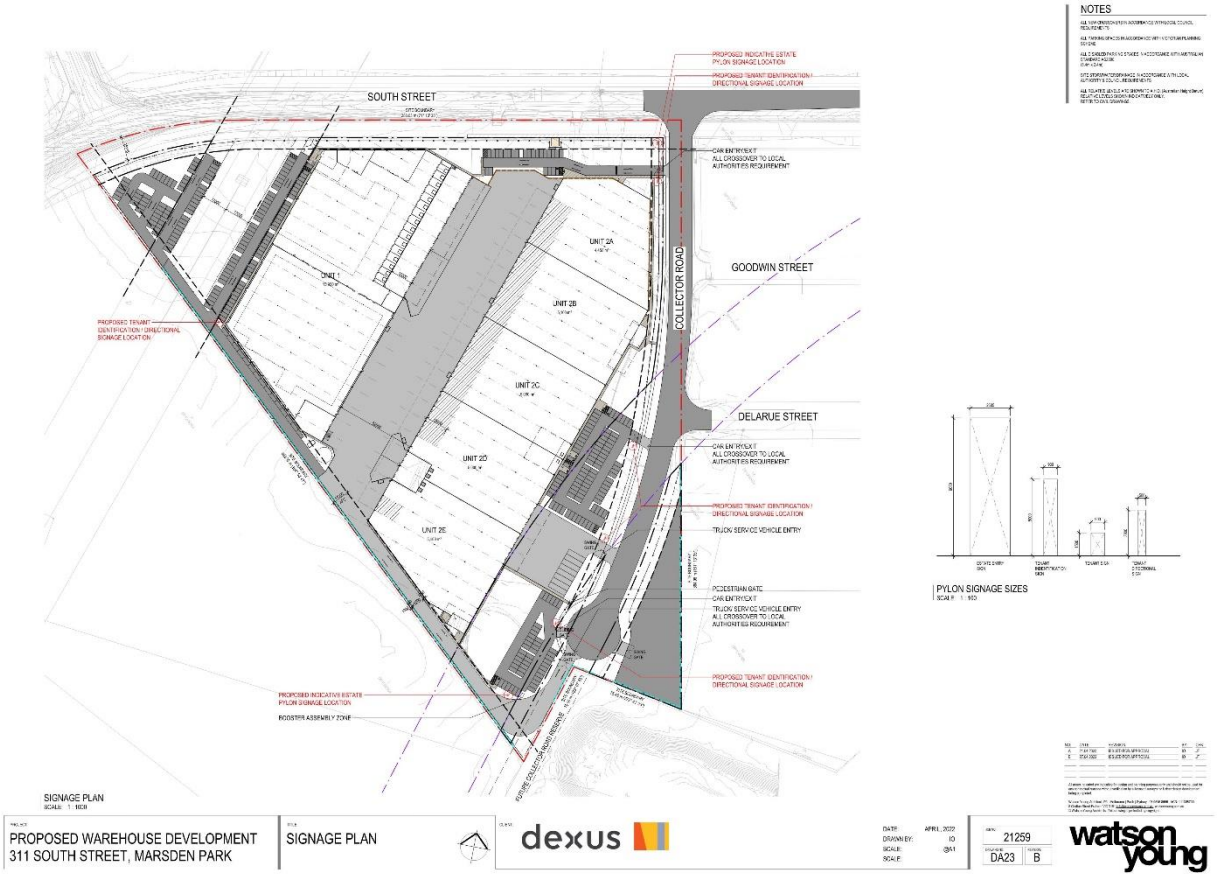
dexus

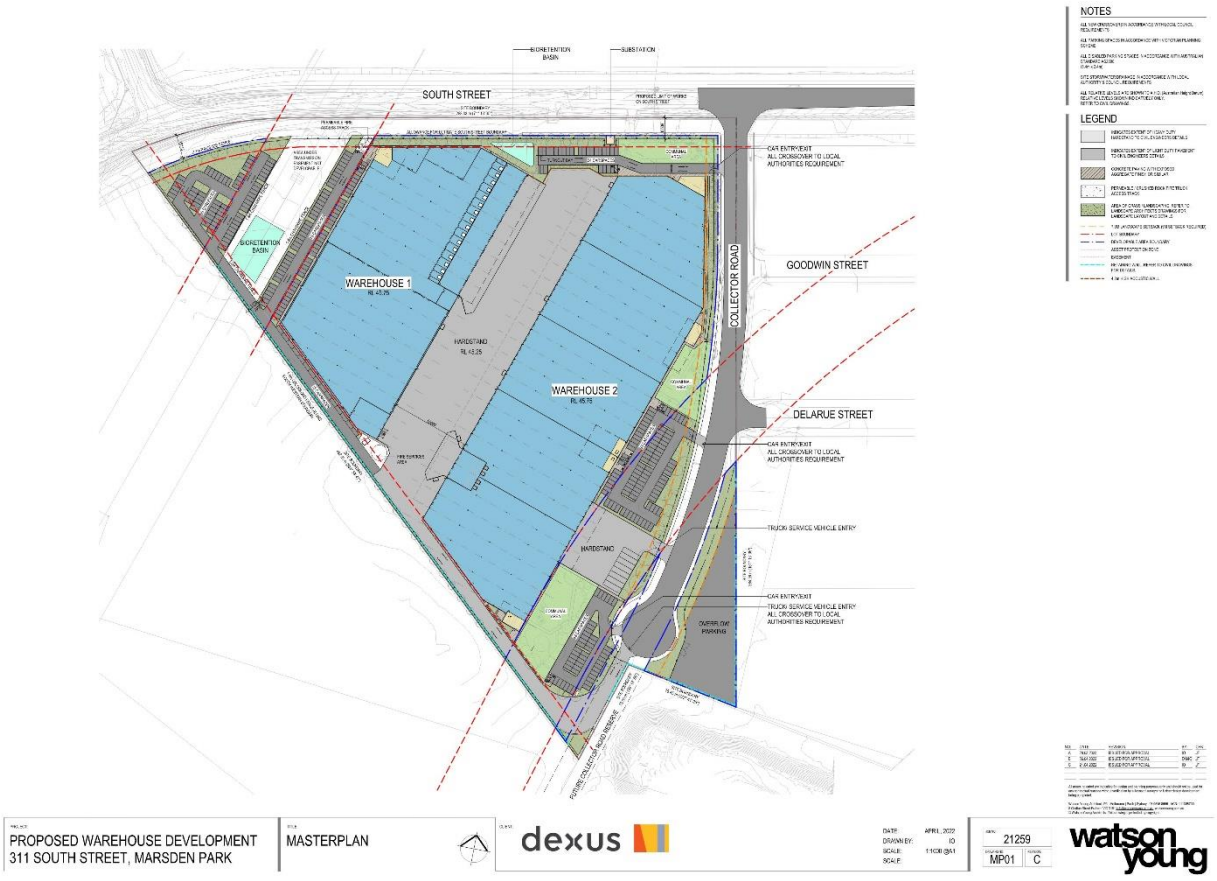
DATE APRIL 2022
DRAWN BY IO
SCALE @A1

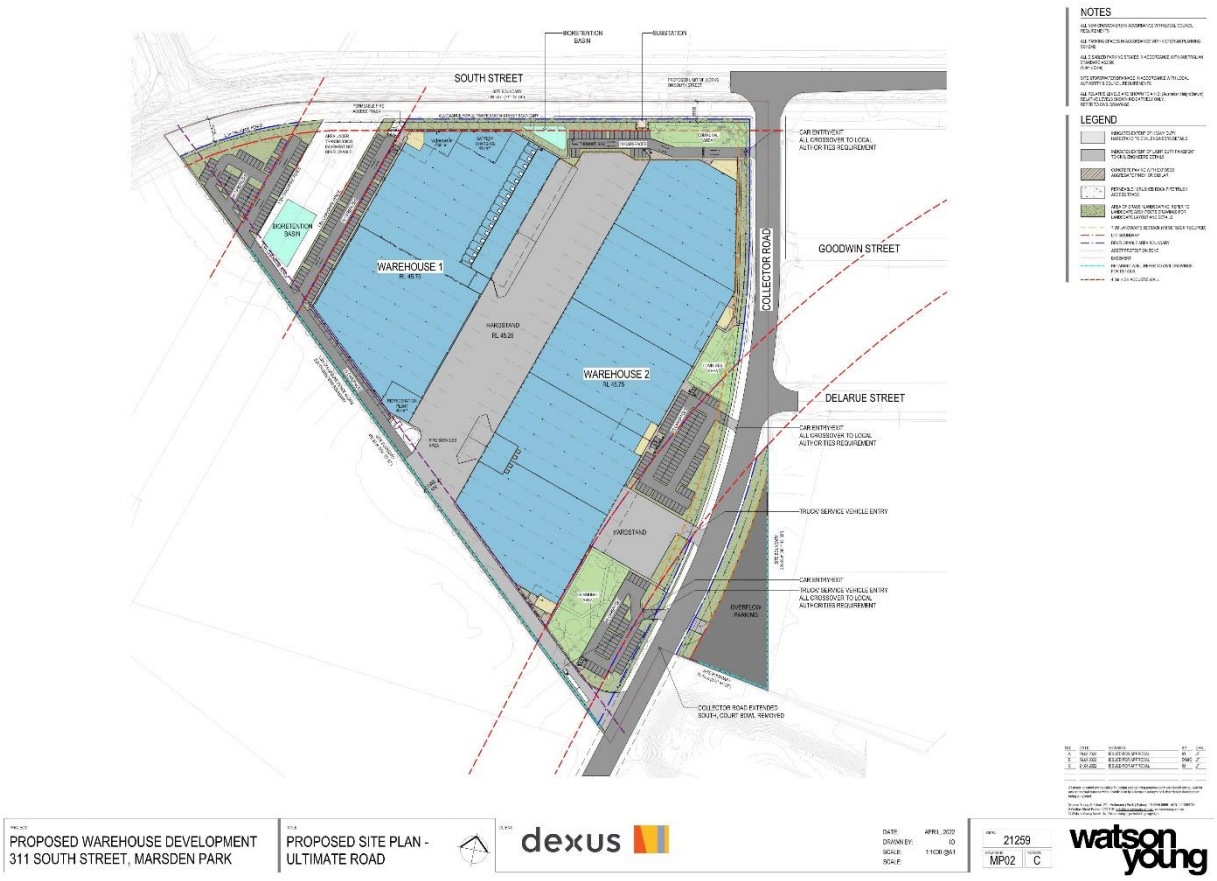
21259
DA21
B

watson young


WAREHOUSE 1
WAREHOUSE 2A
WAREHOUSE 2B
WAREHOUSE 2C
WAREHOUSE 2D
WAREHOUSE 2E
DEVELOPMENT ANALYSIS
PROPOSED WAREHOUSE DEVELOPMENT
311 SOUTH STREET, MARSDEN PARK
FLOOR PLAN AREA
dexus
21259
DA22
A
watson young

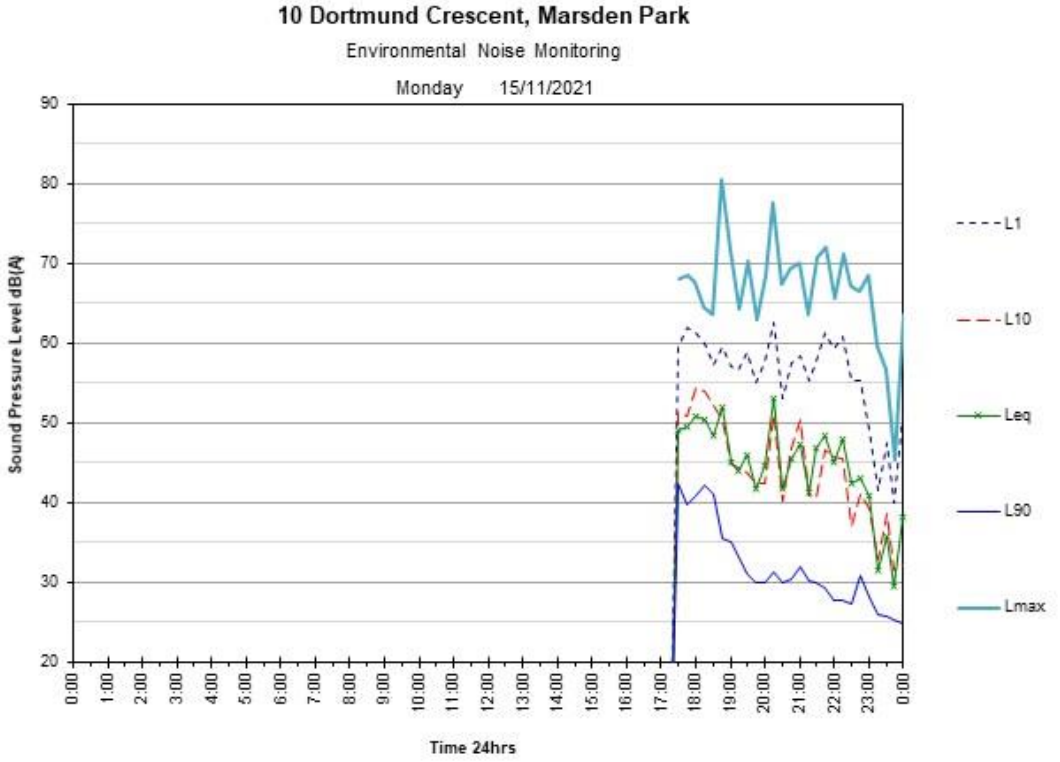

SOUTH STREET
GOODWIN STREET
DELARUE STREET
COLLECTOR ROAD
UNIT 1
UNIT 2A
UNIT 2B
UNIT 2C
UNIT 2D
UNIT 2E
NOTES
PYLON SIGNAGE SIZES
SIGNAGE PLAN
PROPOSED WAREHOUSE DEVELOPMENT
311 SOUTH STREET, MARSDEN PARK
SIGNAGE PLAN
dexus
21259
DA23
B
watson young

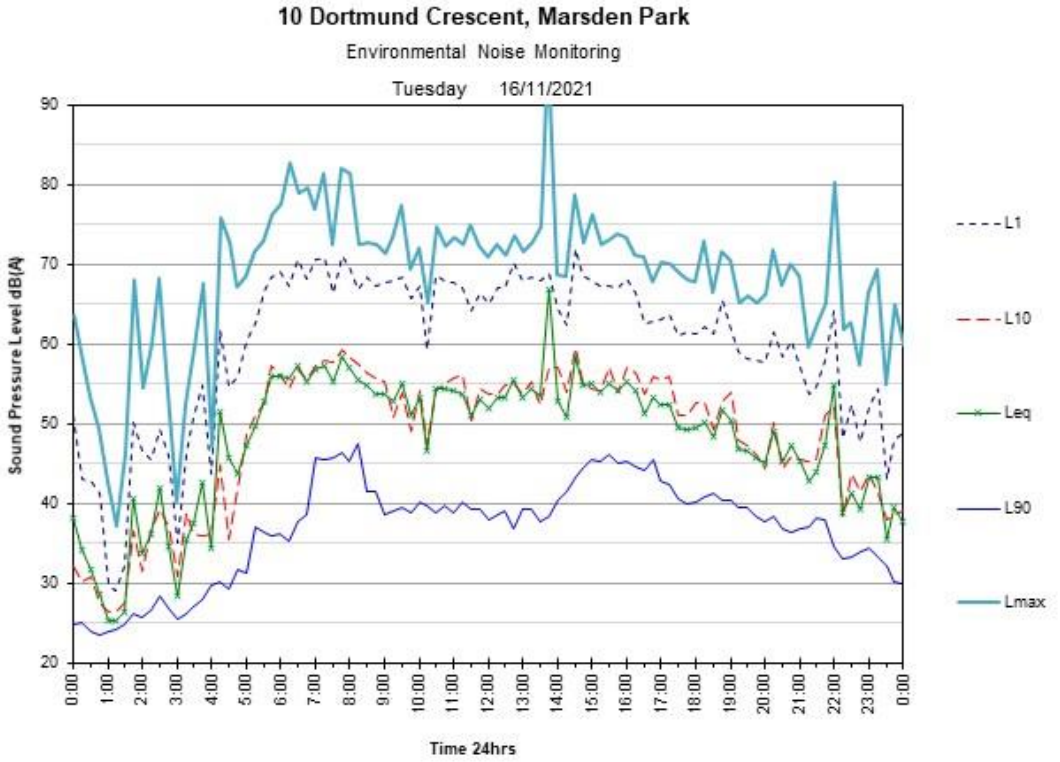

NOTES
LEGEND
SOUTH STREET
BIORETENTION BASIN
SUBSTATION
WAREHOUSE 1
WAREHOUSE 2
HARDSTAND
COLLECTOR ROAD
GOODWIN STREET
DELARUE STREET
CAR ENTRY/EXIT
ALL CROSSOVER TO LOCAL AUTHORITIES REQUIREMENT
TRUCK SERVICE VEHICLE ENTRY
OVERFLOW PARKING
PROPOSED WAREHOUSE DEVELOPMENT
311 SOUTH STREET, MARSDEN PARK
MASTERPLAN
dexus
APRIL 2022
DRAWN BY: IO
1:1000 @A1
21259
MP01
C
watson young

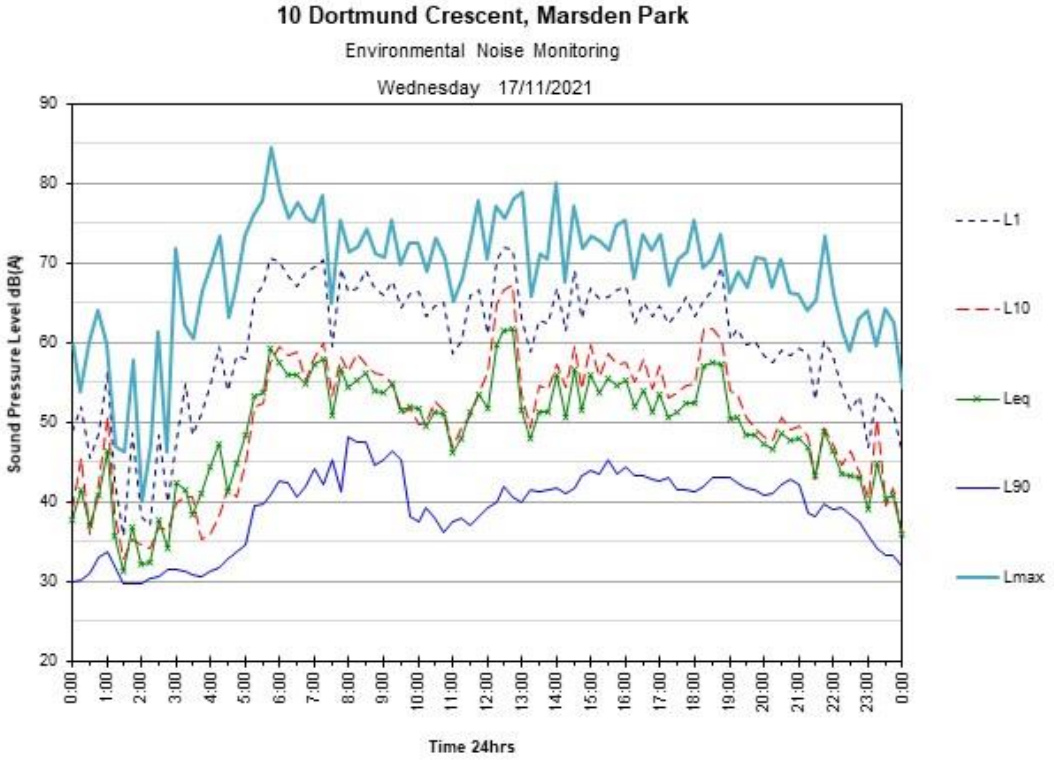

NOTES
LEGEND
SOUTH STREET
BIORETENTION BASIN
SUBSTATION
WAREHOUSE 1
WAREHOUSE 2
HARDSTAND
COLLECTOR ROAD
GOODWIN STREET
DELARUE STREET
CAR ENTRY/EXIT
ALL CROSSOVER TO LOCAL AUTHORITIES REQUIREMENT
TRUCK SERVICE VEHICLE ENTRY
OVERFLOW PARKING
COLLECTOR ROAD EXTENDED SOUTH, COURT BOWL REMOVED
PROPOSED WAREHOUSE DEVELOPMENT
311 SOUTH STREET, MARSDEN PARK
PROPOSED SITE PLAN - ULTIMATE ROAD
dexus
APRIL 2022
DRAWN BY: IO
1:1000 @A1
21259
MP02
C
watson young

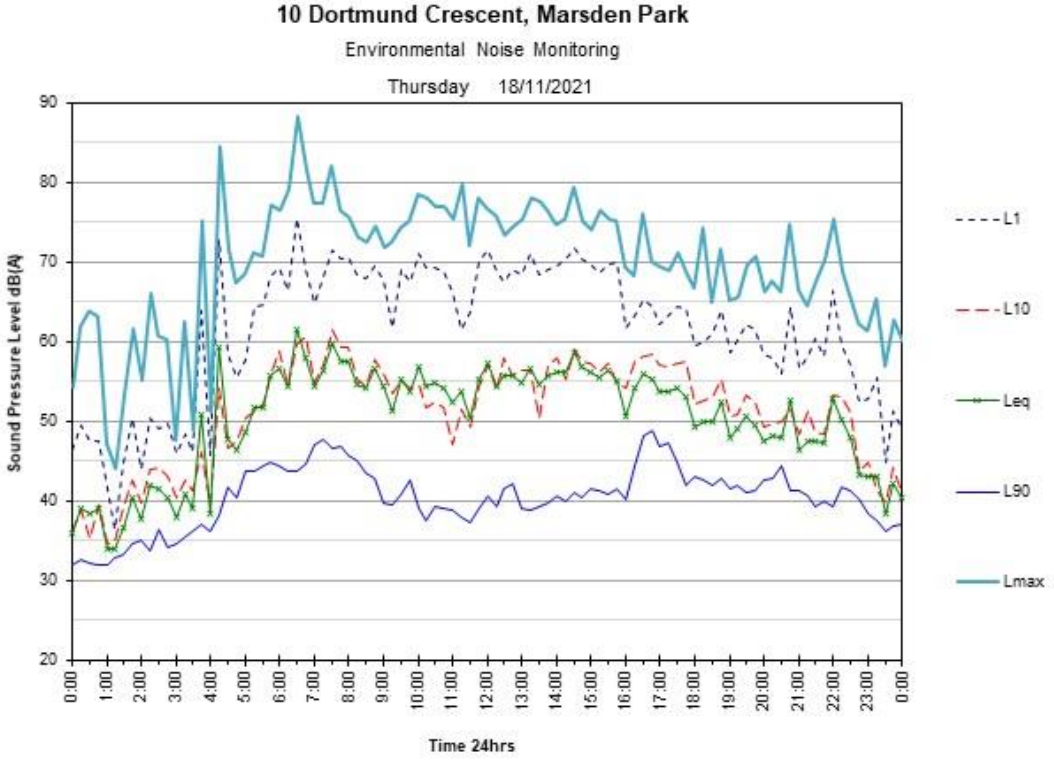
13.2 Noise Monitoring Charts

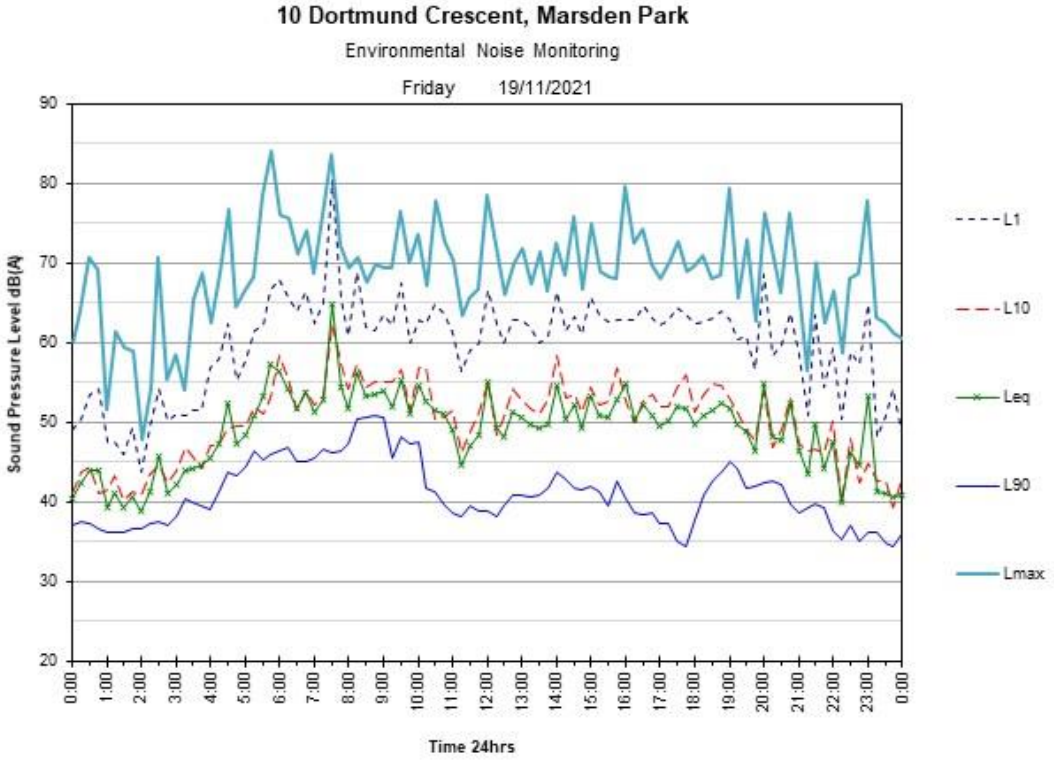
13.2.1 Noise Monitor A (10 Dortmund Crescent)






10 Dortmund Crescent, Marsden Park
Environmental Noise Monitoring
Wednesday 17/11/2021
Sound Pressure Level dB(A)
90
80
70
60
50
40
30
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Time 24hrs
L1
L10
Leq
L90
Lmax


10 Dortmund Crescent, Marsden Park
Environmental Noise Monitoring
Thursday 18/11/2021
Sound Pressure Level dB(A)
90
80
70
60
50
40
30
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Time 24hrs
L1
L10
Leq
L90
Lmax


10 Dortmund Crescent, Marsden Park
Environmental Noise Monitoring
Friday 19/11/2021
Sound Pressure Level dB(A)
90
80
70
60
50
40
30
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
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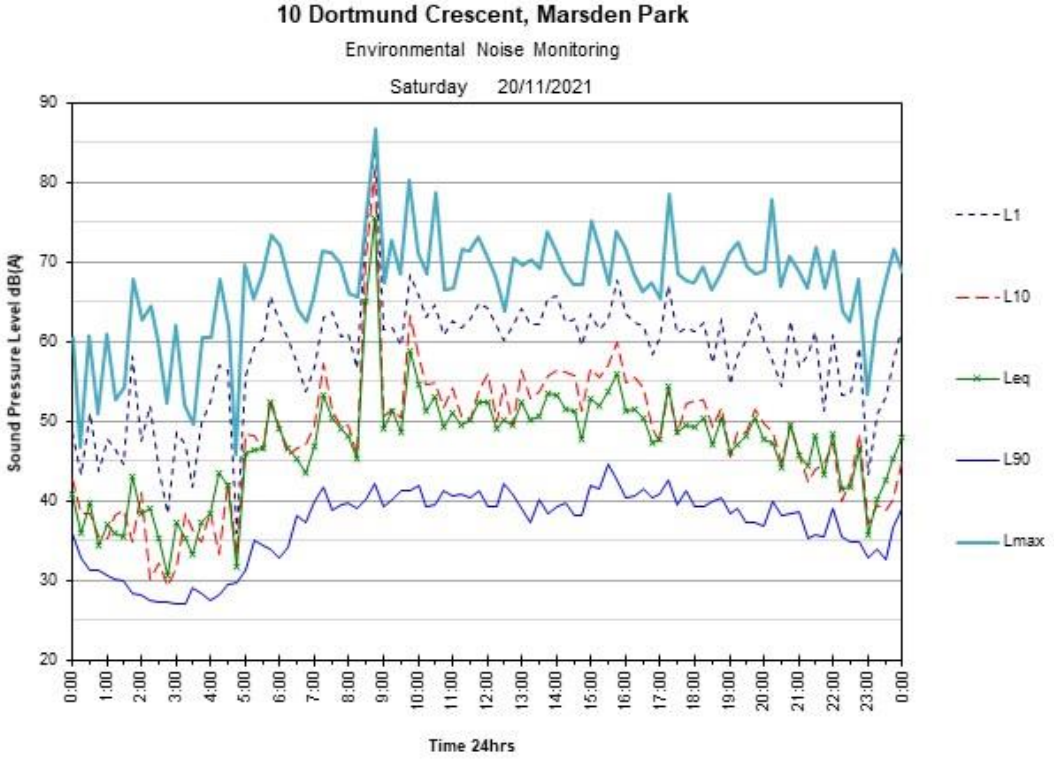
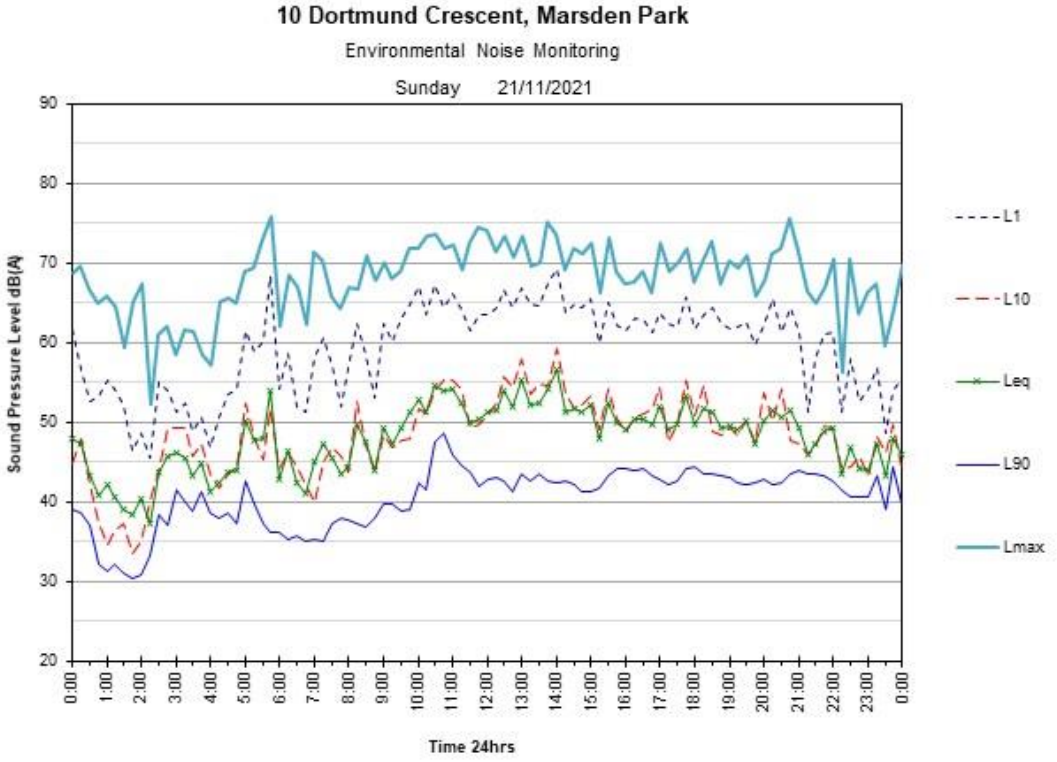
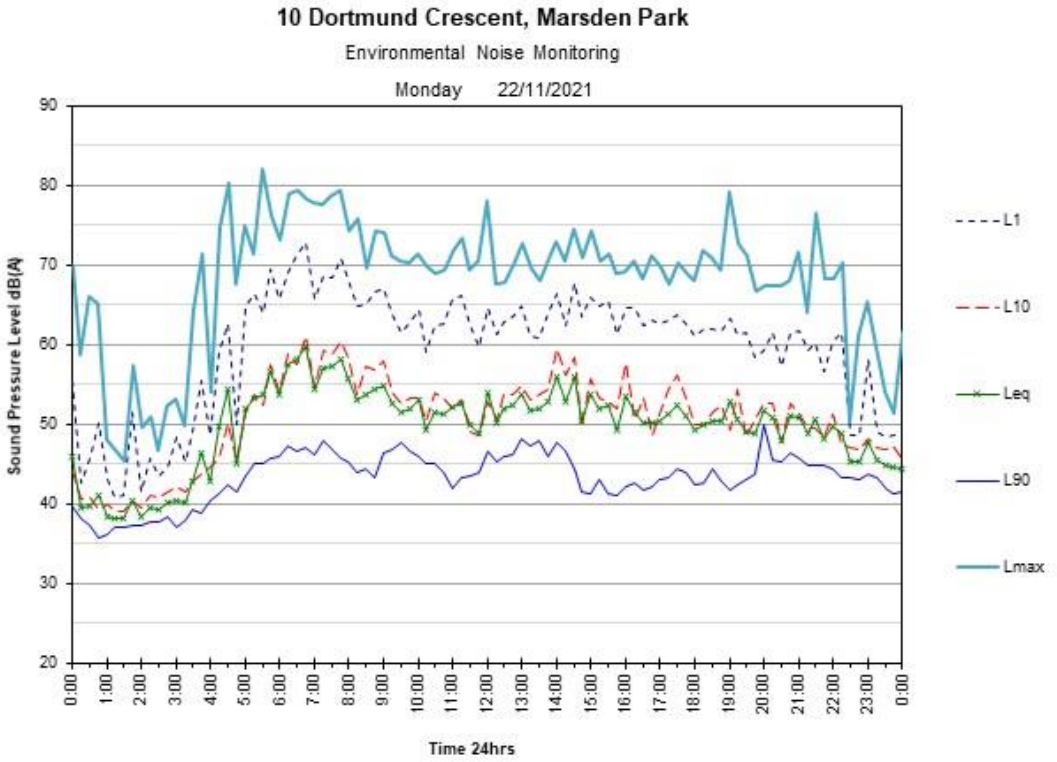
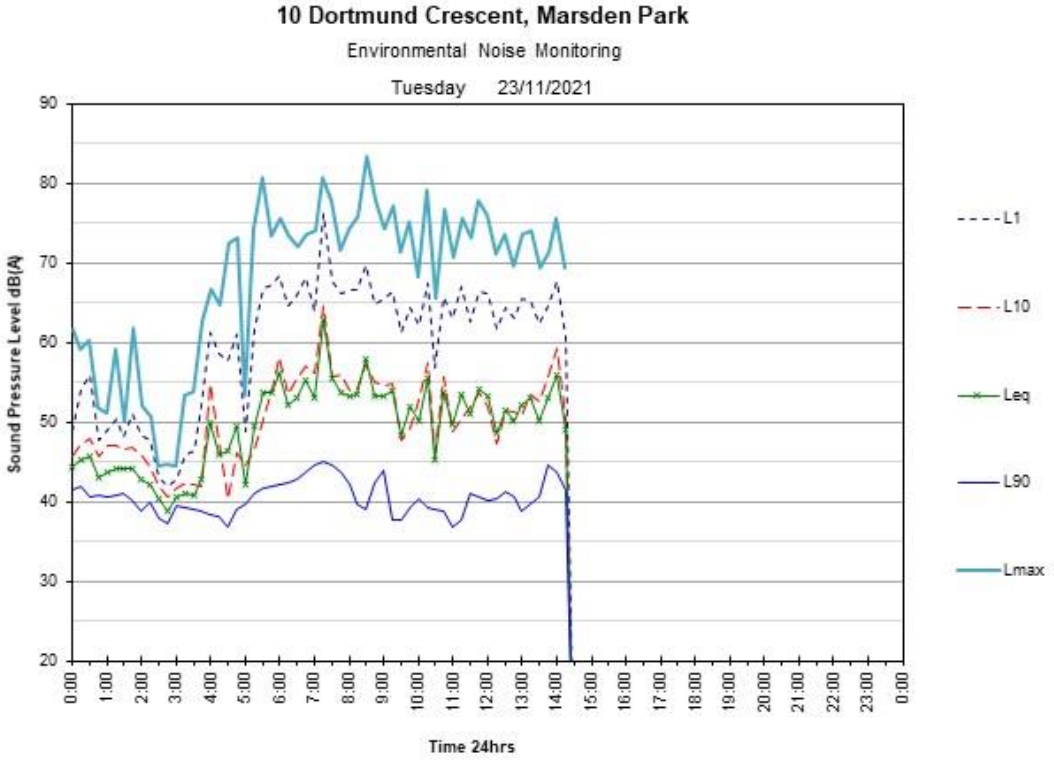
20:00
21:00
22:00
23:00
0:00
Time 24hrs
L1
L10
Leq
L90
Lmax

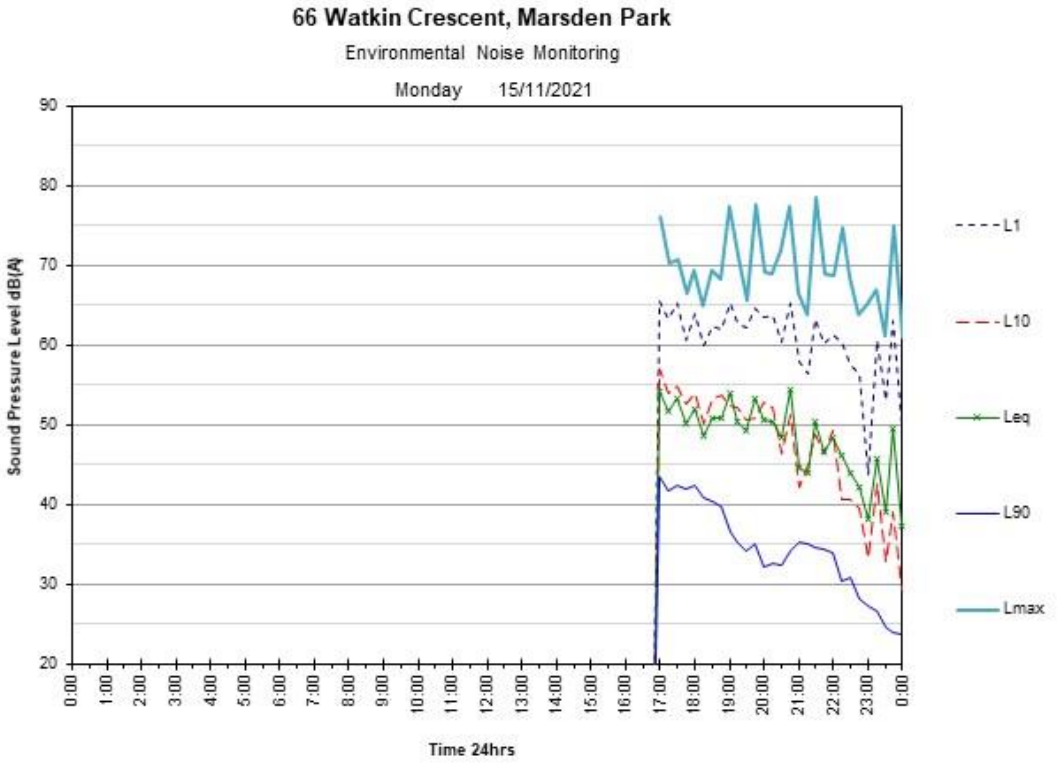

10 Dortmund Crescent, Marsden Park
Environmental Noise Monitoring
Saturday 20/11/2021
Sound Pressure Level dB(A)
90
80
70
60
50
40
30
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Time 24hrs
L1
L10
Leq
L90
Lmax

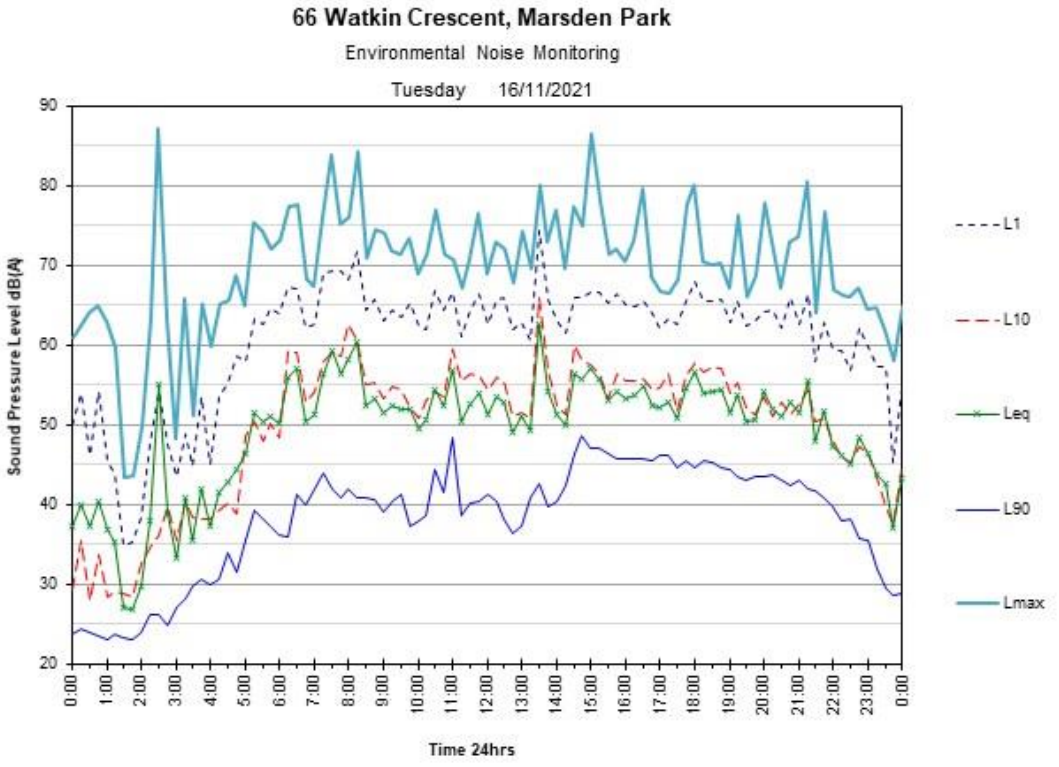

10 Dortmund Crescent, Marsden Park
Environmental Noise Monitoring
Sunday 21/11/2021
Sound Pressure Level dB(A)
Time 24hrs
L1
L10
Leq
L90
Lmax

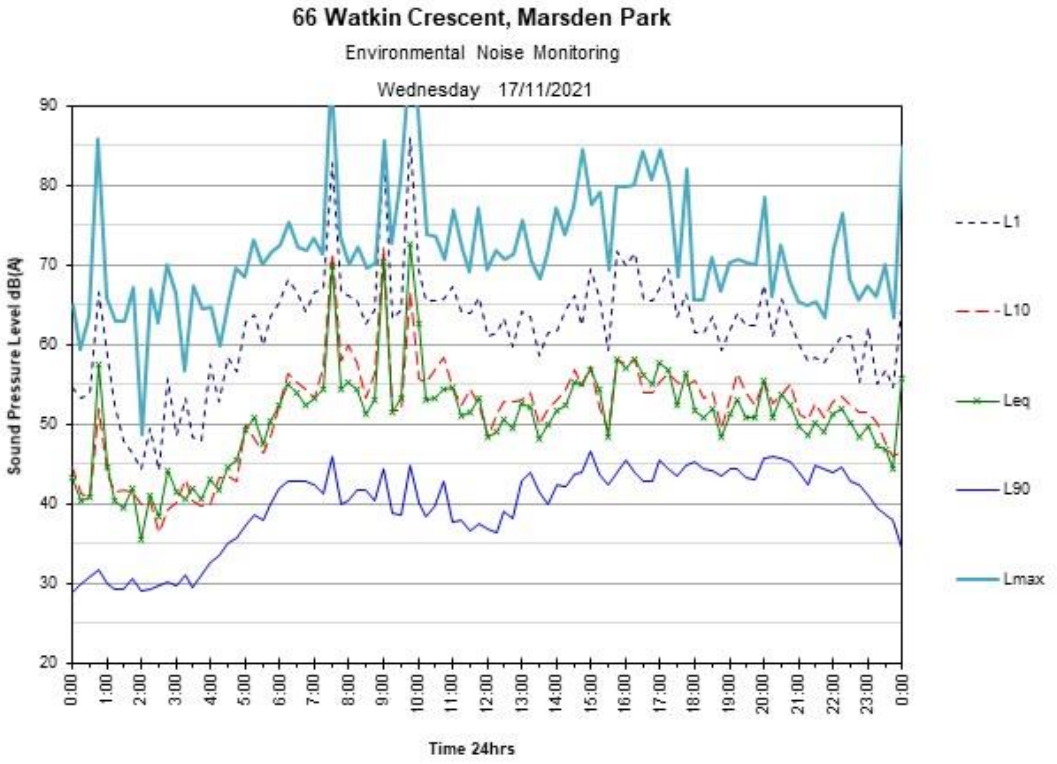

10 Dortmund Crescent, Marsden Park
Environmental Noise Monitoring
Monday 22/11/2021
Sound Pressure Level dB(A)
Time 24hrs
L1
L10
Leq
L90
Lmax

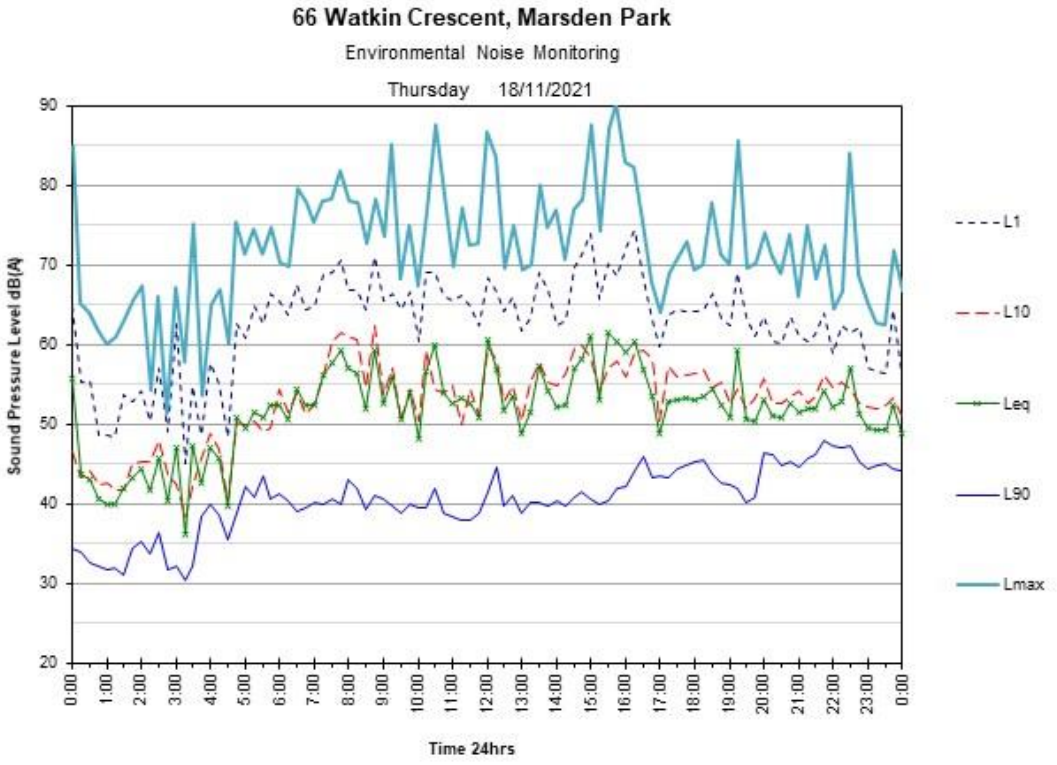

10 Dortmund Crescent, Marsden Park
Environmental Noise Monitoring
Tuesday 23/11/2021
Sound Pressure Level dB(A)
90
80
70
60
50
40
30
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Time 24hrs
L1
L10
Leq
L90
Lmax

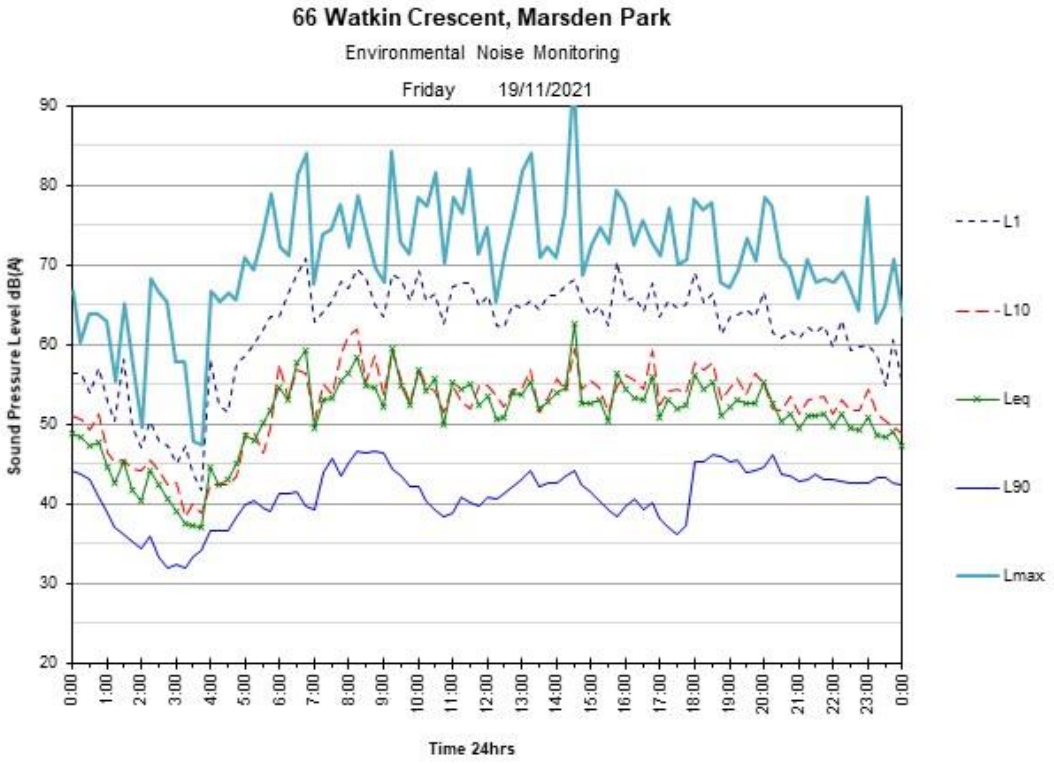
13.2.2 Noise Monitor B (66 Watkin Crescent)

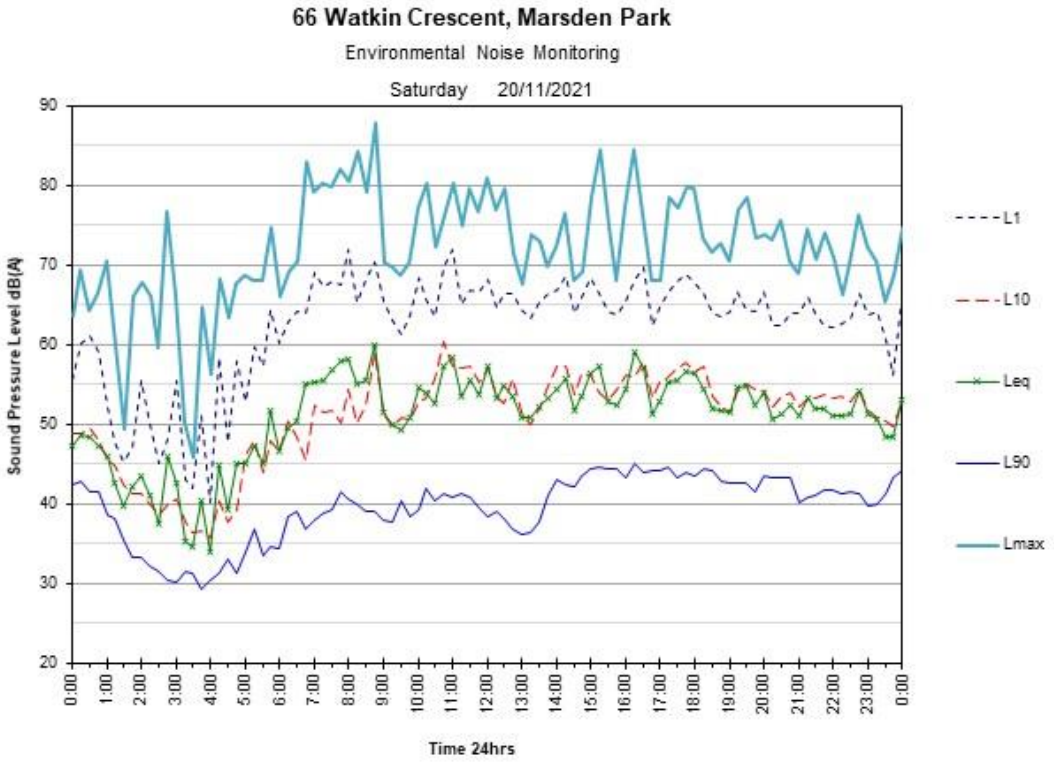


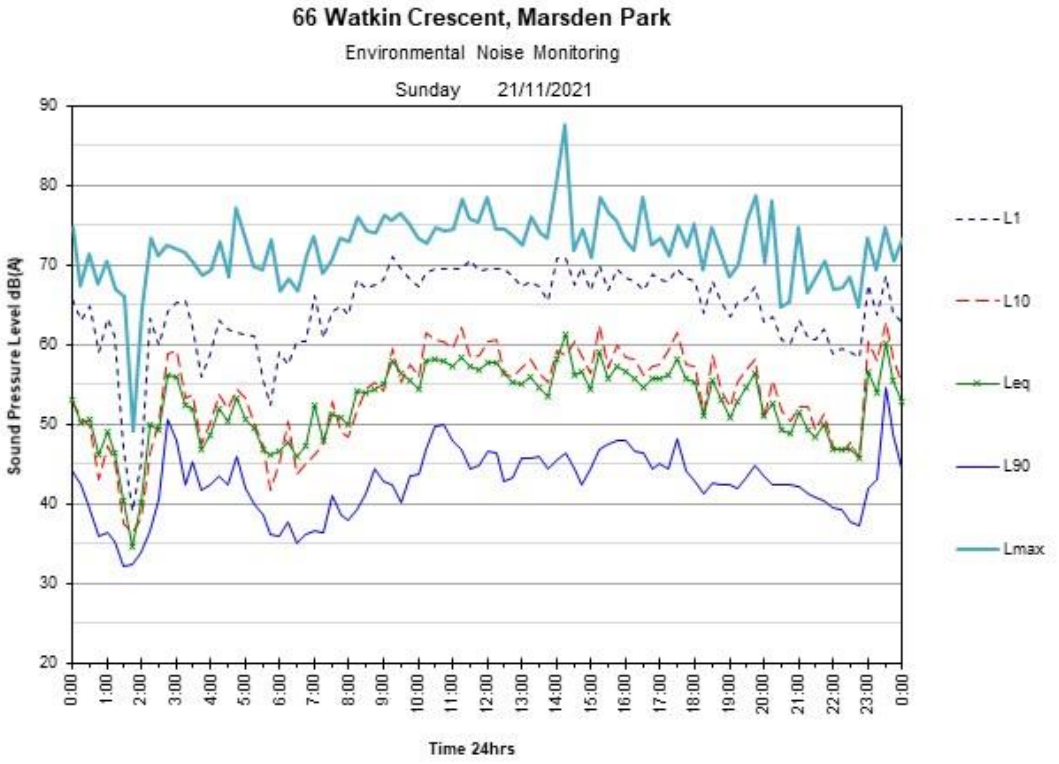


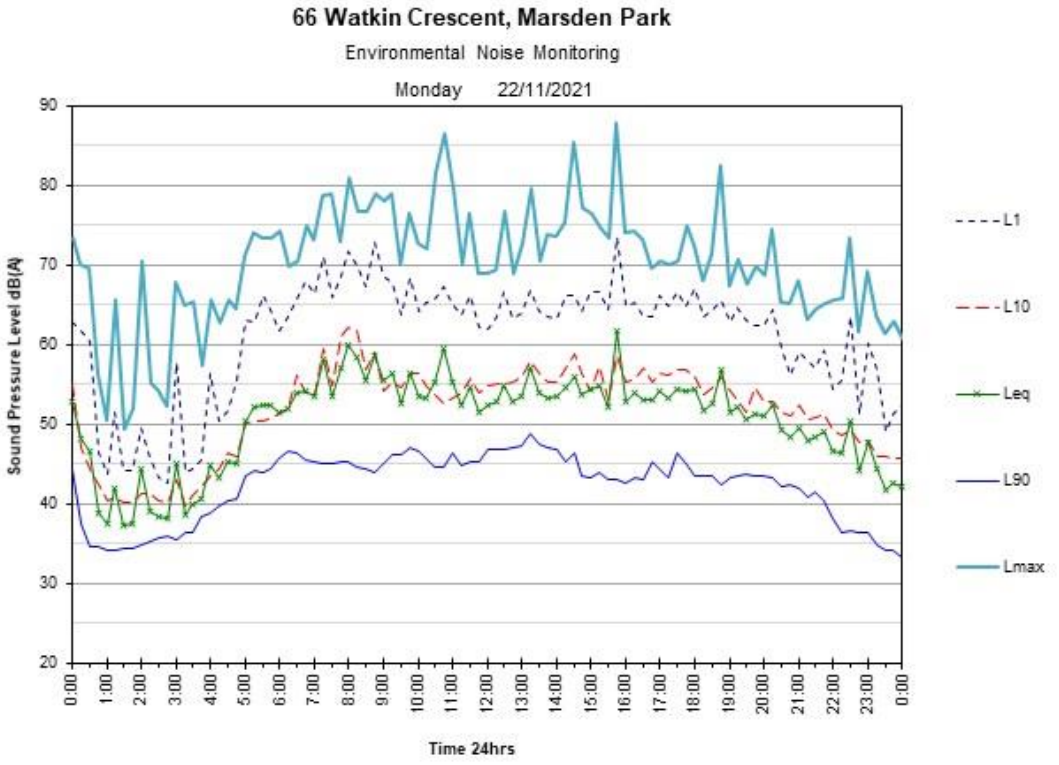

66 Watkin Crescent, Marsden Park
Environmental Noise Monitoring
Wednesday 17/11/2021
Sound Pressure Level dB(A)
Time 24hrs
L1
L10
Leq
L90
Lmax

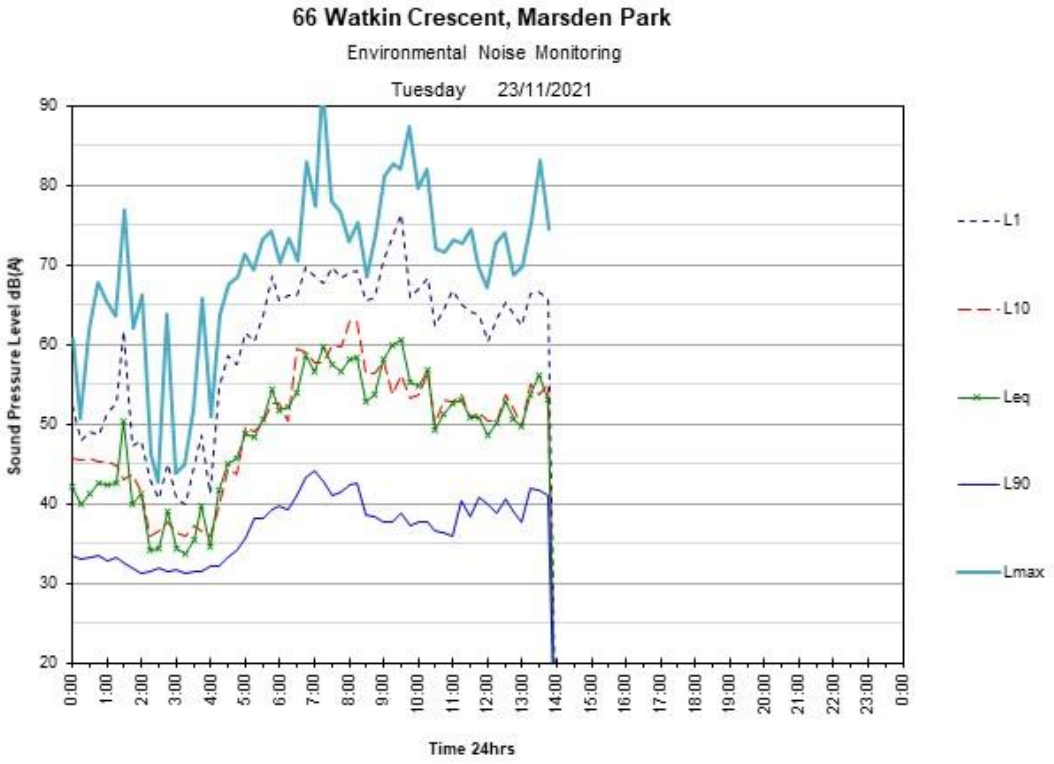

66 Watkin Crescent, Marsden Park
Environmental Noise Monitoring
Thursday 18/11/2021
Sound Pressure Level dB(A)
Time 24hrs
L1
L10
Leq
L90
Lmax


66 Watkin Crescent, Marsden Park
Environmental Noise Monitoring
Friday 19/11/2021
Sound Pressure Level dB(A)
Time 24hrs
L1
L10
Leq
L90
Lmax


66 Watkin Crescent, Marsden Park
Environmental Noise Monitoring
Saturday 20/11/2021
Sound Pressure Level dB(A)
Time 24hrs
L1
L10
Leq
L90
Lmax


66 Watkin Crescent, Marsden Park
Environmental Noise Monitoring
Sunday 21/11/2021
Sound Pressure Level dB(A)
Time 24hrs
L1
L10
Leq
L90
Lmax


66 Watkin Crescent, Marsden Park
Environmental Noise Monitoring
Monday 22/11/2021
Sound Pressure Level dB(A)
Time 24hrs
L1
L10
Leq
L90
Lmax



13.3 Richmond RAAF – Wind Speed and Direction Statistics

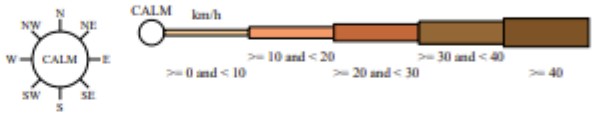
Rose of Wind direction versus Wind speed in km/h (01 Jan 1965 to 27 May 2018)

Custom times selected, refer to attached note for details

PROSPECT RESERVOIR

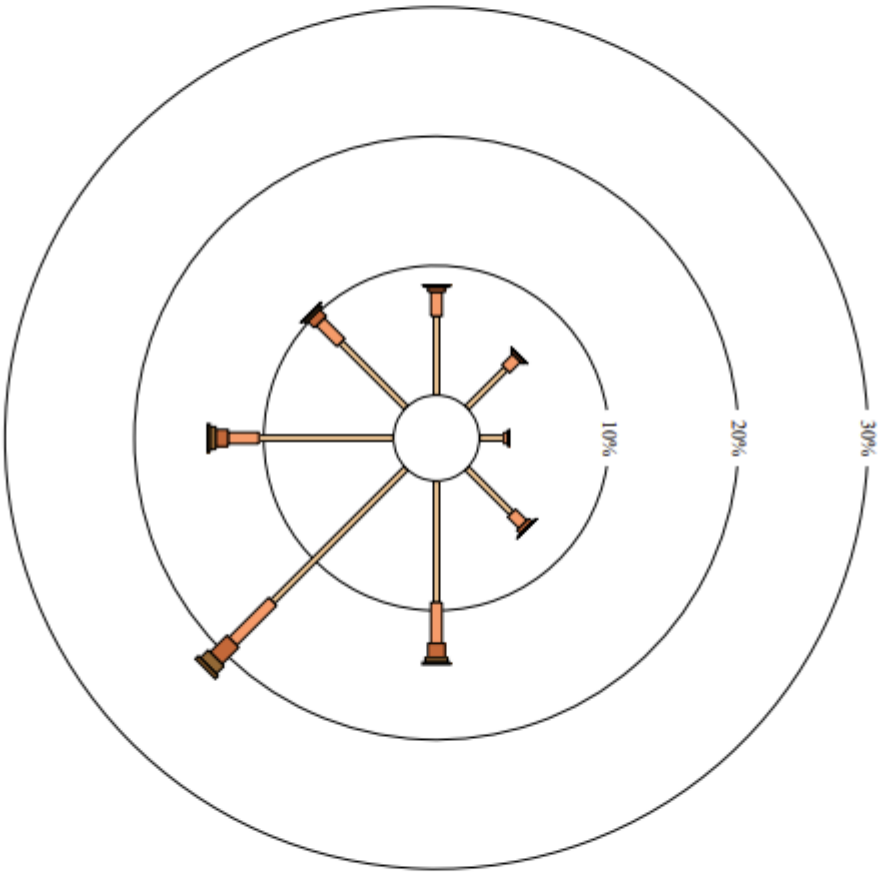
Site No: 067019 • Opened Jan 1887 • Still Open • Latitude: -33.8193° • Longitude: 150.9127° • Elevation 61m

An asterisk (*) indicates that calm is less than 0.5%.
Other important info about this analysis is available in the accompanying notes.



9 am
19100 Total Observations

Calm 17%



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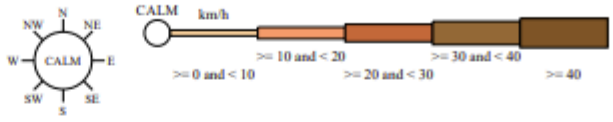
Rose of Wind direction versus Wind speed in km/h (21 Oct 1993 to 11 Aug 2021)

Custom times selected, refer to attached note for details

RICHMOND RAAF

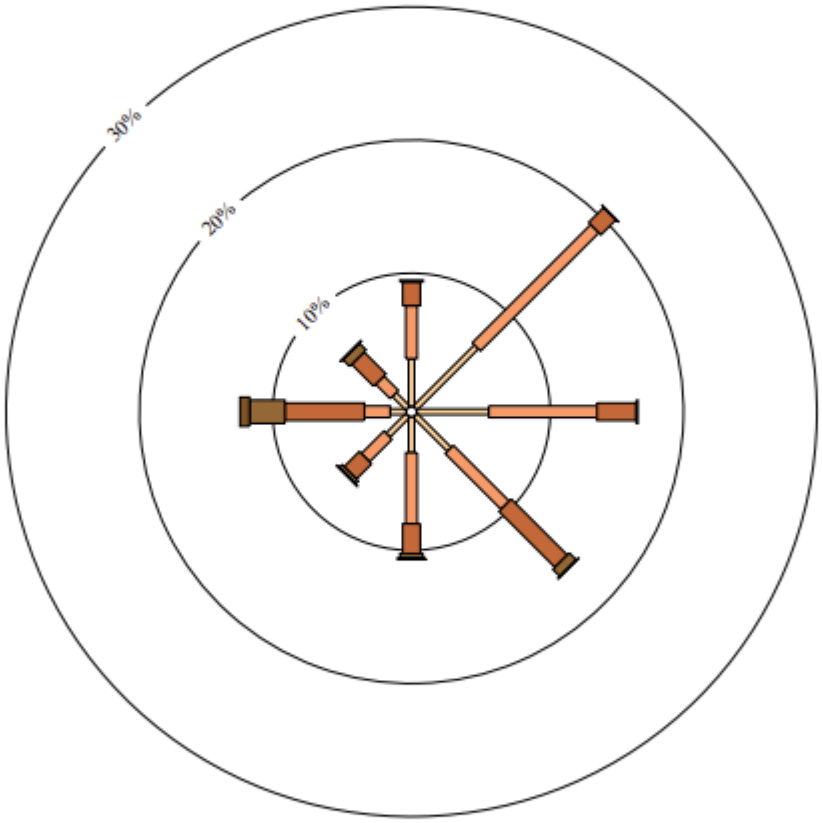
Site No: 067105 • Opened Sep 1993 • Still Open • Latitude: -33.6004° • Longitude: 150.7761° • Elevation 19m

An asterisk (*) indicates that calm is less than 0.5%.
Other important info about this analysis is available in the accompanying notes.



3 pm
9877 Total Observations

Calm 2%



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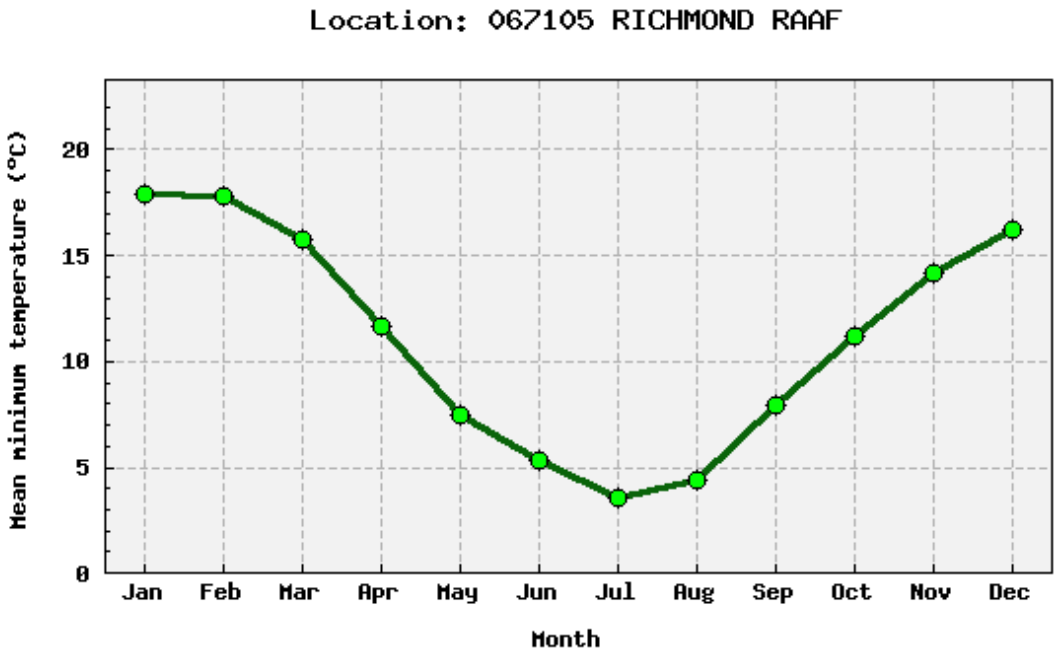
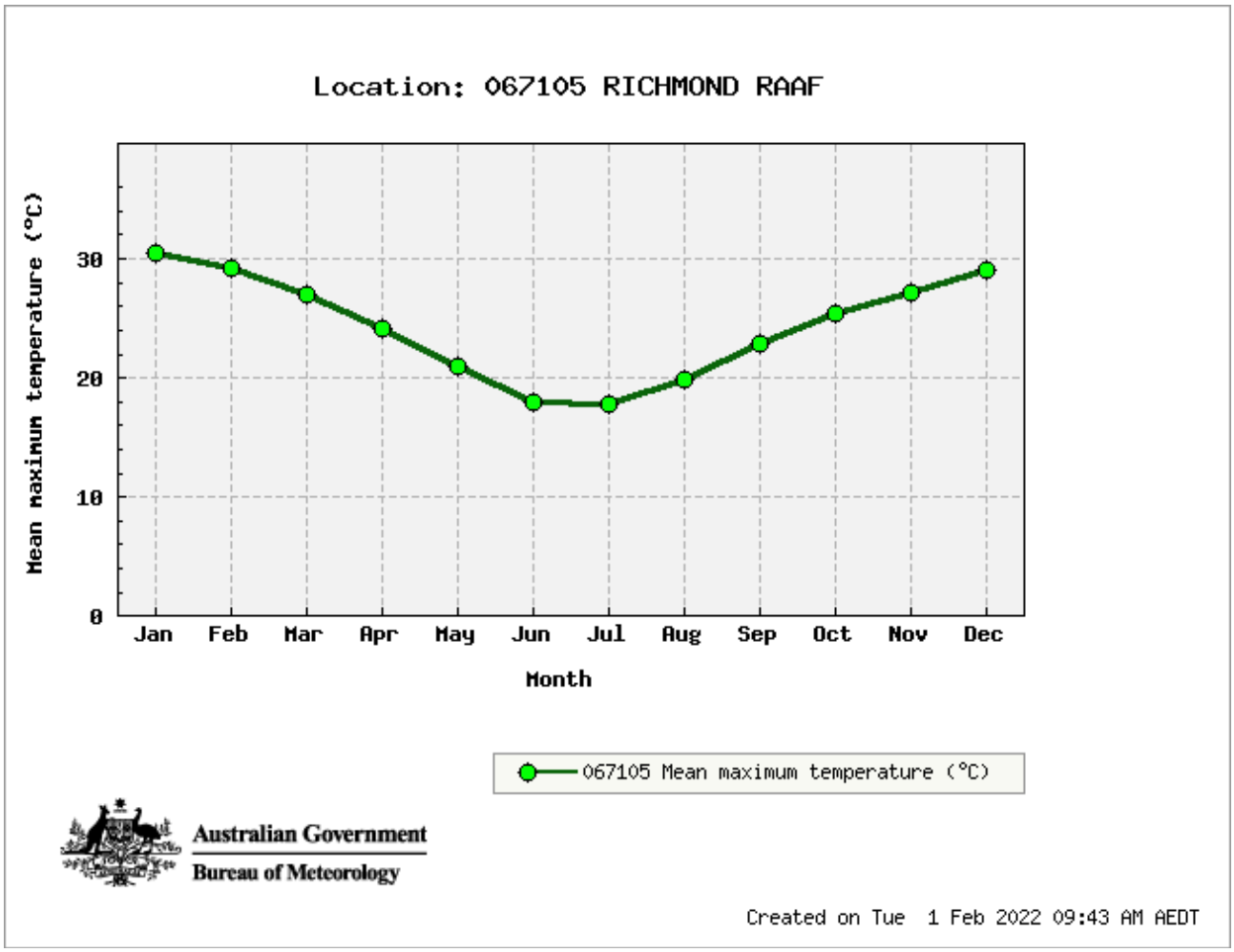


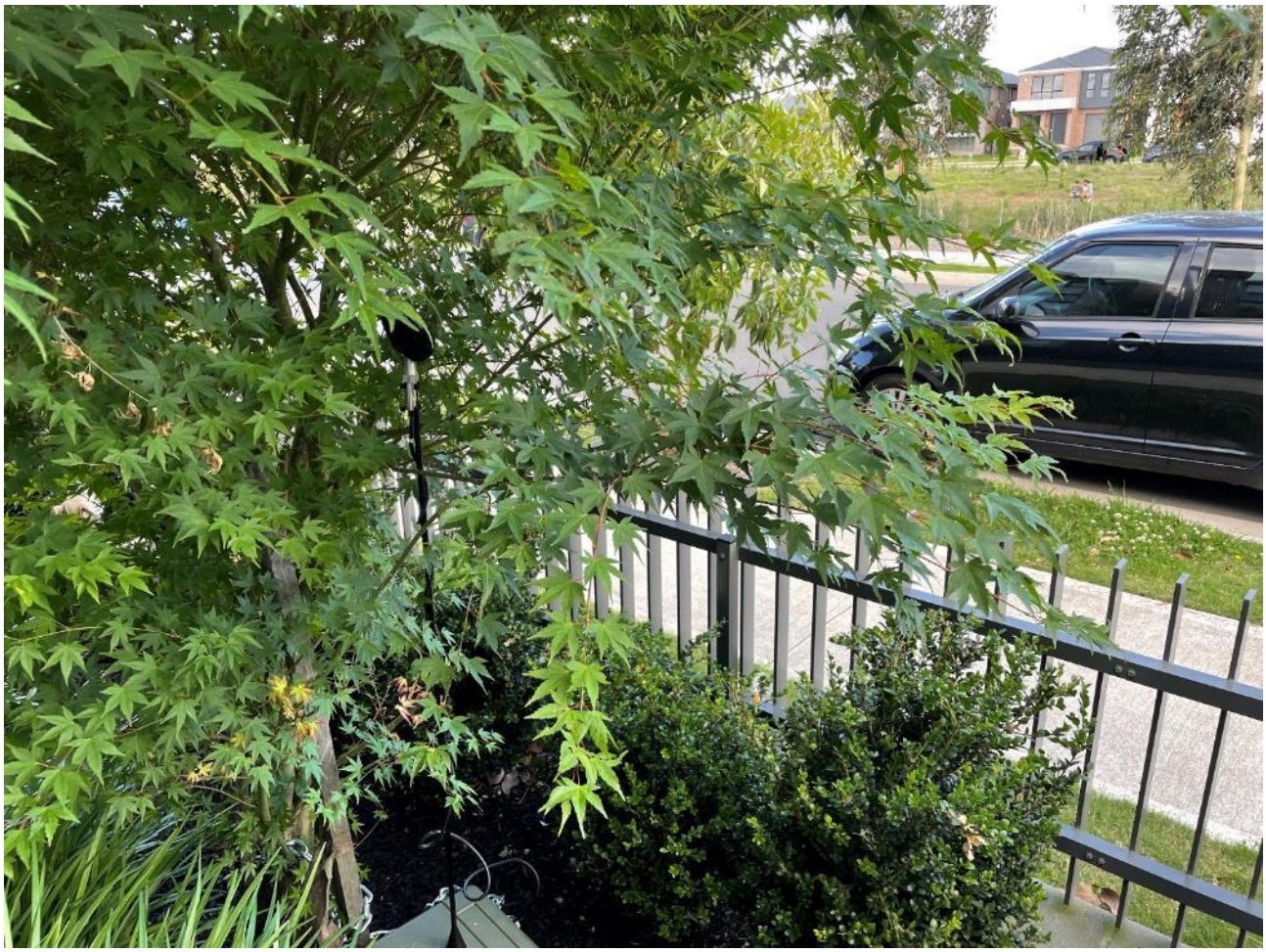
Australian Government
Bureau of Meteorology

Created on Tue 1 Feb 2022 09:42 AM AEDT


Location: 067105 RICHMOND RAAF
Mean maximum temperature (°C)
0
10
20
30
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month
067105 Mean maximum temperature (°C)
Australian Government
Bureau of Meteorology
Created on Tue 1 Feb 2022 09:43 AM AEDT

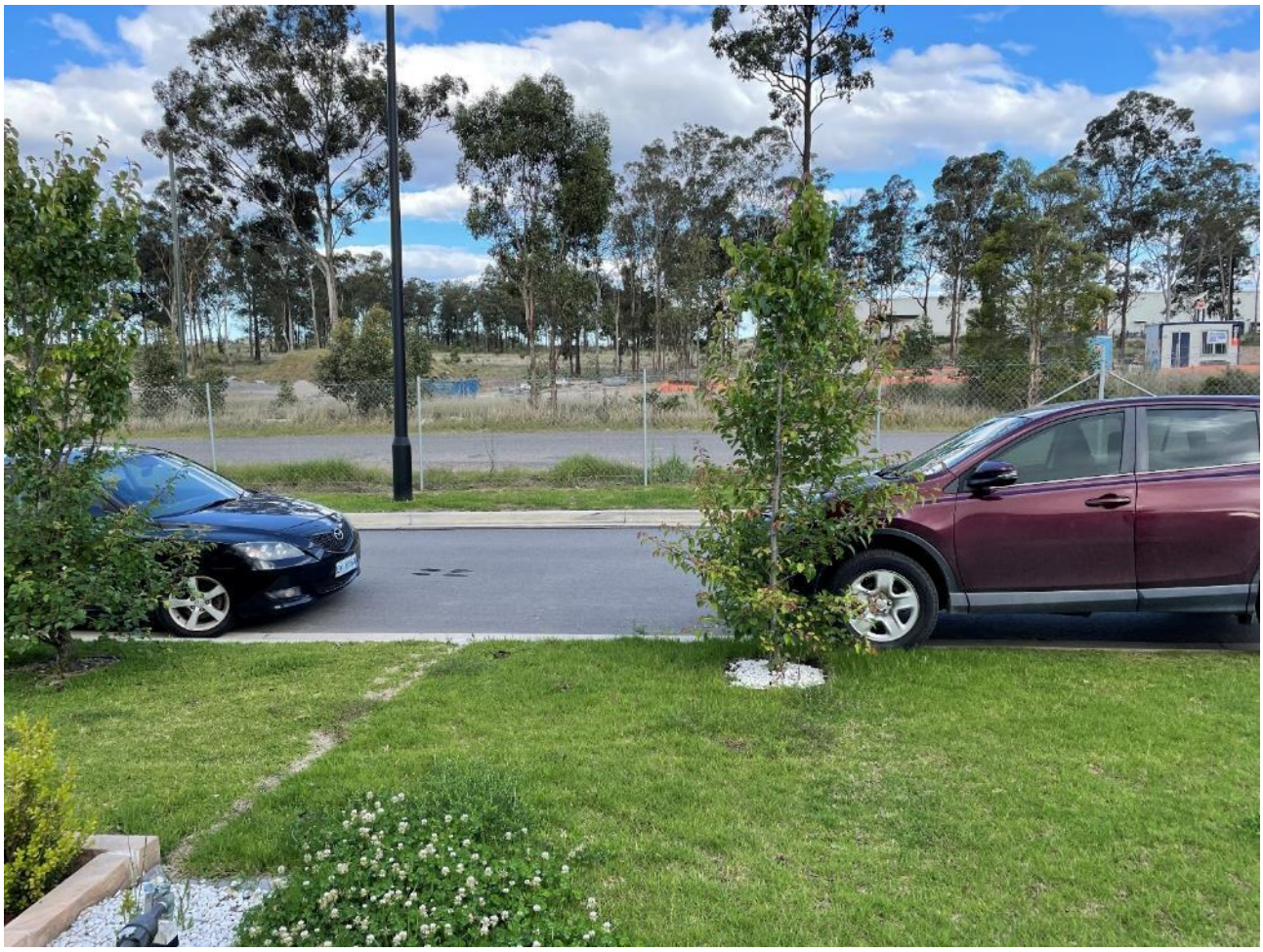
13.4 Photographs of Noise Monitor Locations

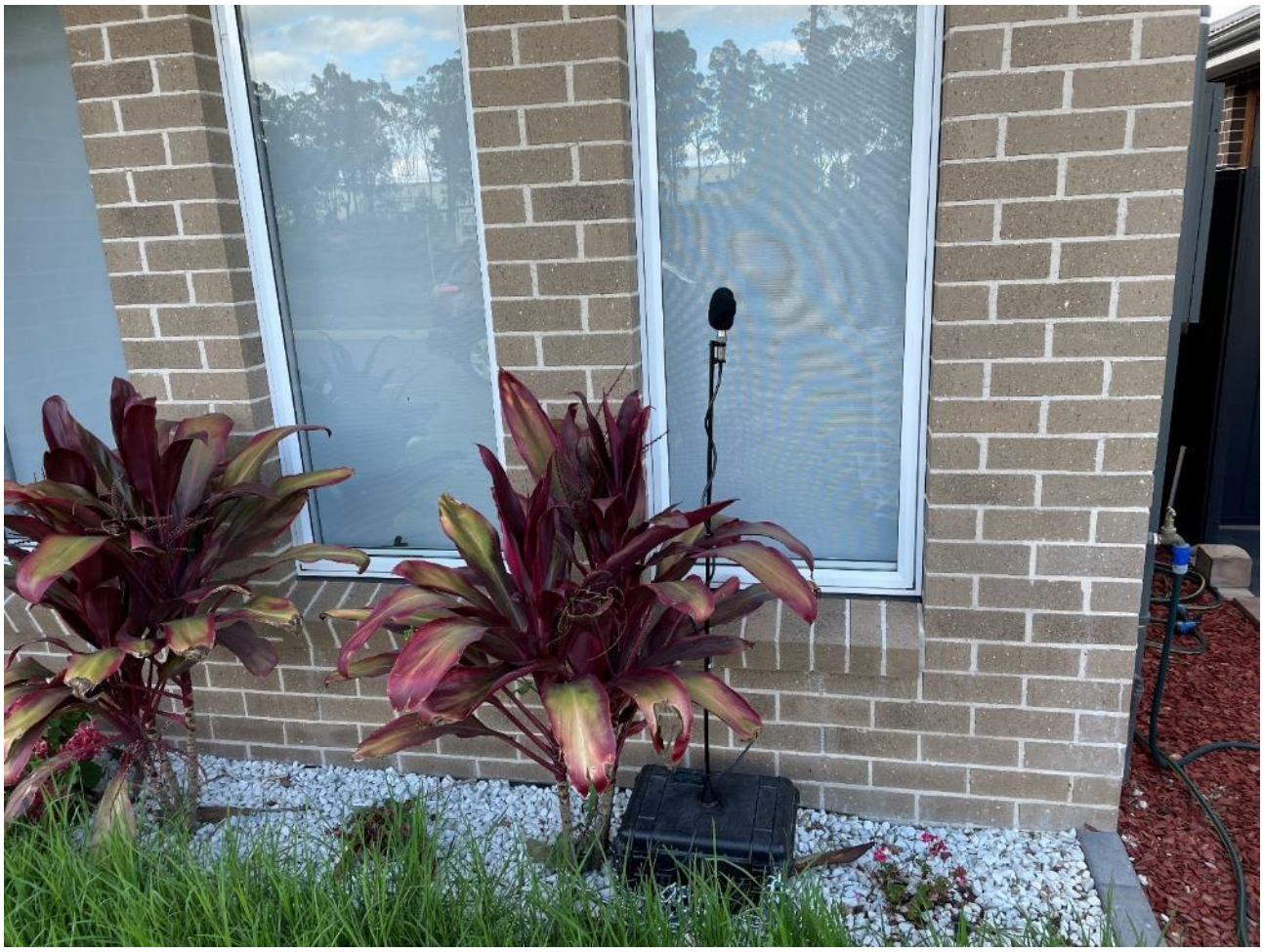
13.4.1 10 Dortmund Crescent (Noise Monitor A)



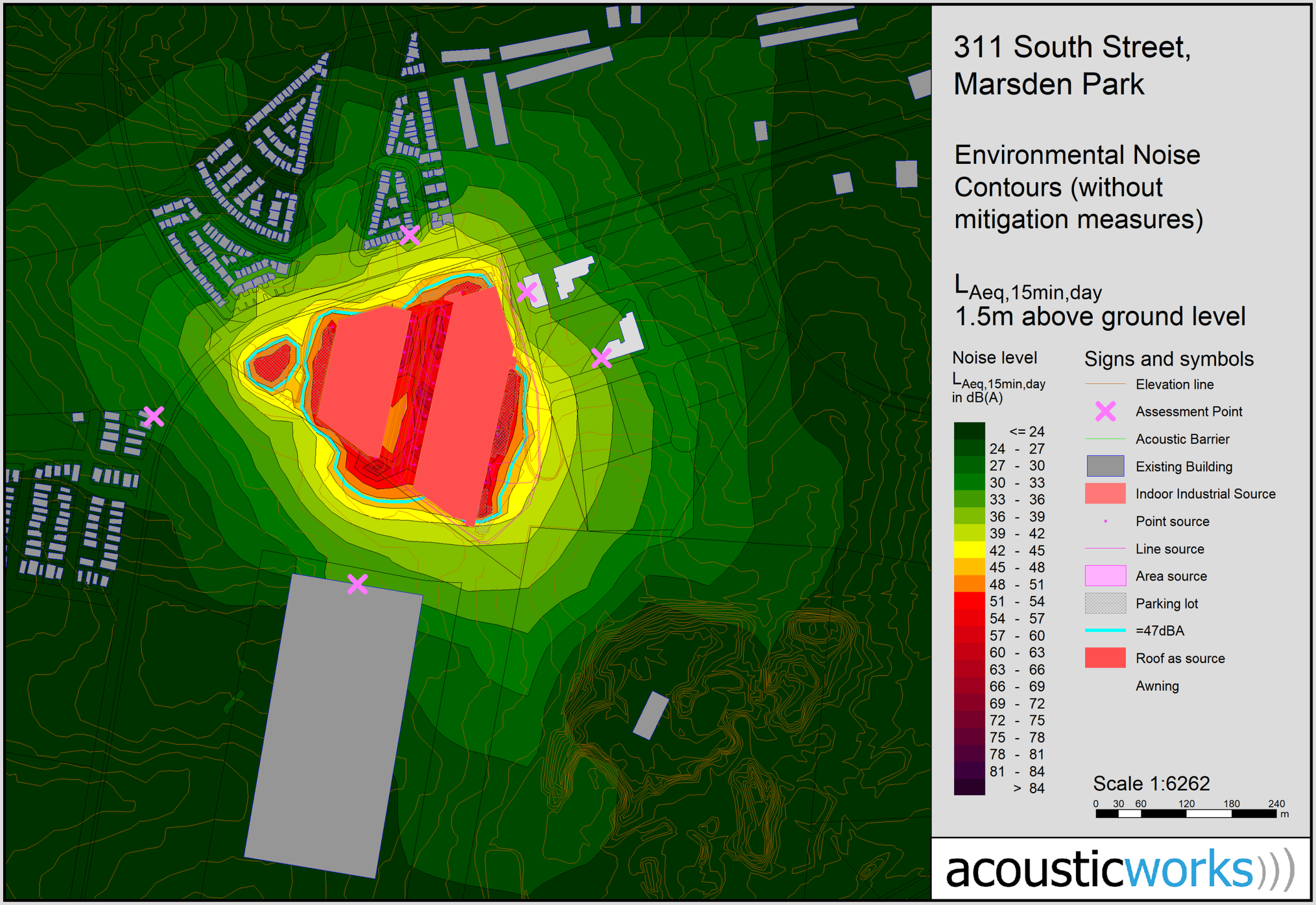
\]

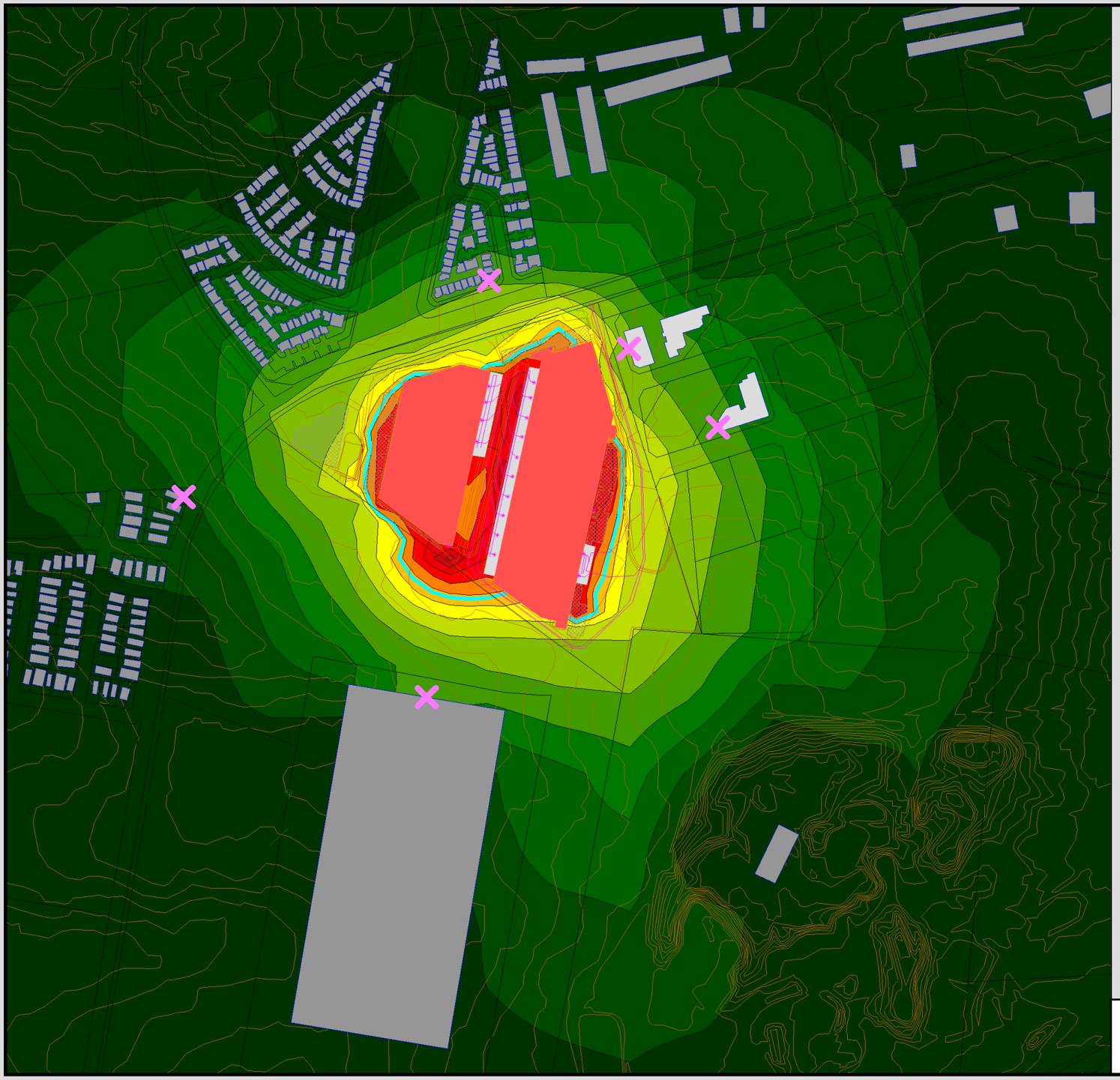
13.4.2 66 Watkin Crescent (Noise Monitor B)





13.5 SoundPLAN Noise Contour Maps


311 South Street,
Marsden Park
Environmental Noise Contours (without mitigation measures)
$L_{Aeq,15min,day}$
1.5m above ground level
Noise level
$L_{Aeq,15min,day}$ in dB(A)
<= 24
24 - 27
27 - 30
30 - 33
33 - 36
36 - 39
39 - 42
42 - 45
45 - 48
48 - 51
51 - 54
54 - 57
57 - 60
60 - 63
63 - 66
66 - 69
69 - 72
72 - 75
75 - 78
78 - 81
81 - 84
> 84
Signs and symbols
Elevation line
Assessment Point
Acoustic Barrier
Existing Building
Indoor Industrial Source
Point source
Line source
Area source
Parking lot
=47dBA
Roof as source
Awning
Scale 1:6262
0 30 60 120 180 240
m
acousticworks)))



311 South Street, Marsden Park

Environmental Noise Contours

$L_{Aeq,15min,day}$
1.5m above ground level

Noise level
$L_{Aeq,15min,day}$ in dB(A)

<= 24
24 - 27
27 - 30
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48 - 51
51 - 54
54 - 57
57 - 60
60 - 63
63 - 66
66 - 69
69 - 72
72 - 75
75 - 78
78 - 81
81 - 84
> 84

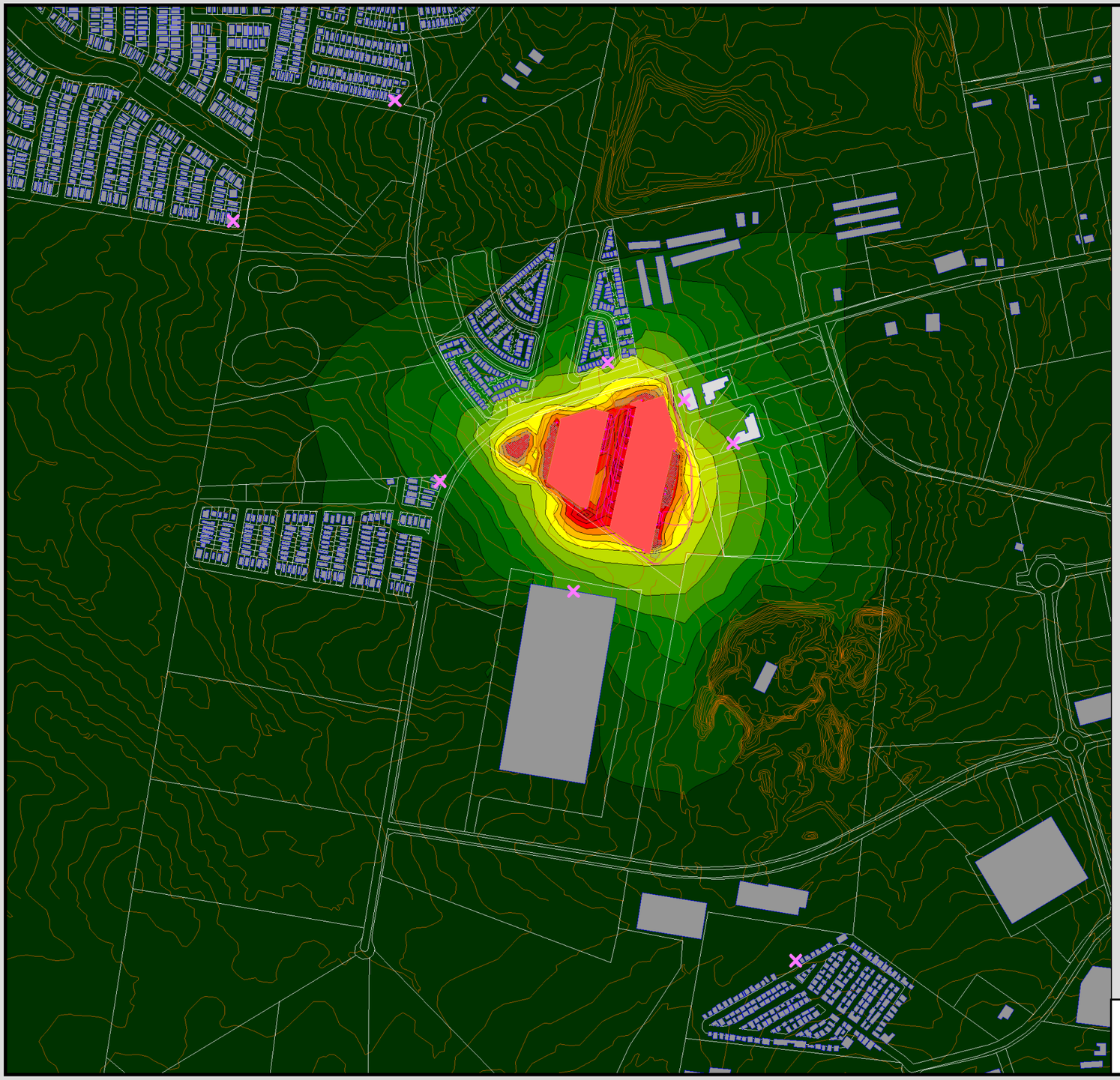
Signs and symbols

- Elevation line
- Assessment Point
- Acoustic Barrier
- Existing Building
- Indoor Industrial Source
- Point source
- Line source
- Area source
- Parking lot
- =47dBA
- Roof as source
- Awning

Scale 1:6262

0 30 60 120 180 240 m

acousticworks)))



311 South Street, Marsden Park

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27 - 30
30 - 33
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39 - 42
42 - 45
45 - 48
48 - 51
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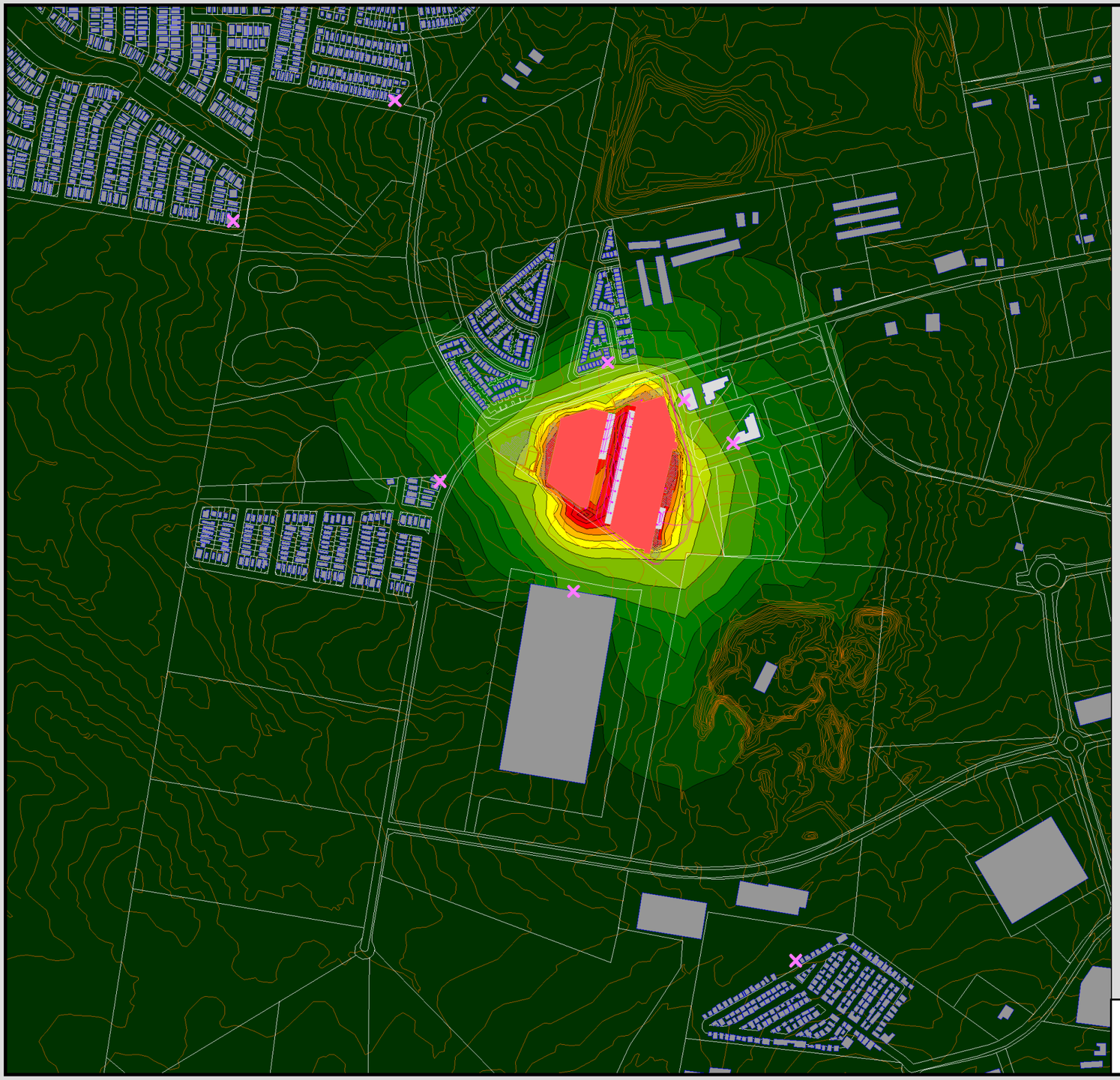
57 - 60
60 - 63
63 - 66
66 - 69
69 - 72
72 - 75
75 - 78
78 - 81
81 - 84
> 84

Signs and symbols

- Elevation line
- Assessment Point
- Wall
- Existing Building
- Indoor Industrial Source
- Point source
- Line source
- Area source
- Parking lot
- Roof as source
- Awning

acousticworks)))



311 South Street, Marsden Park

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> 84

Signs and symbols

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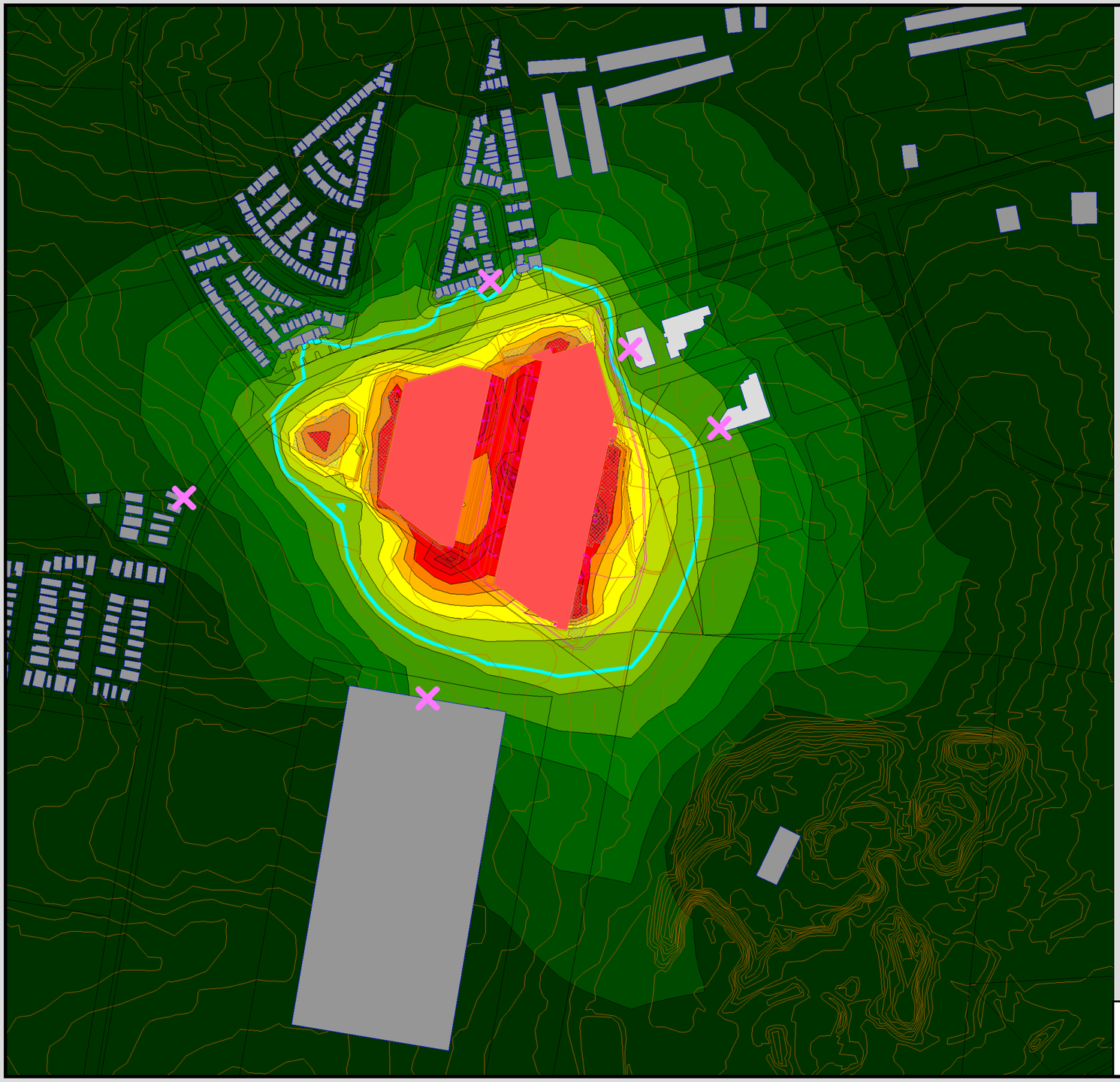
acousticworks)))



311 South Street, Marsden Park

Environmental Noise Contours (without mitigation measures)

$L_{Aeq,15min,evening}$
1.5m above ground level

Noise level
$L_{Aeq,15min,eve}$ in dB(A)

<= 24
24 - 27
27 - 30
30 - 33
33 - 36
36 - 39
39 - 42
42 - 45
45 - 48
48 - 51
51 - 54
54 - 57
57 - 60
60 - 63
63 - 66
66 - 69
69 - 72
72 - 75
75 - 78
78 - 81
81 - 84
> 84

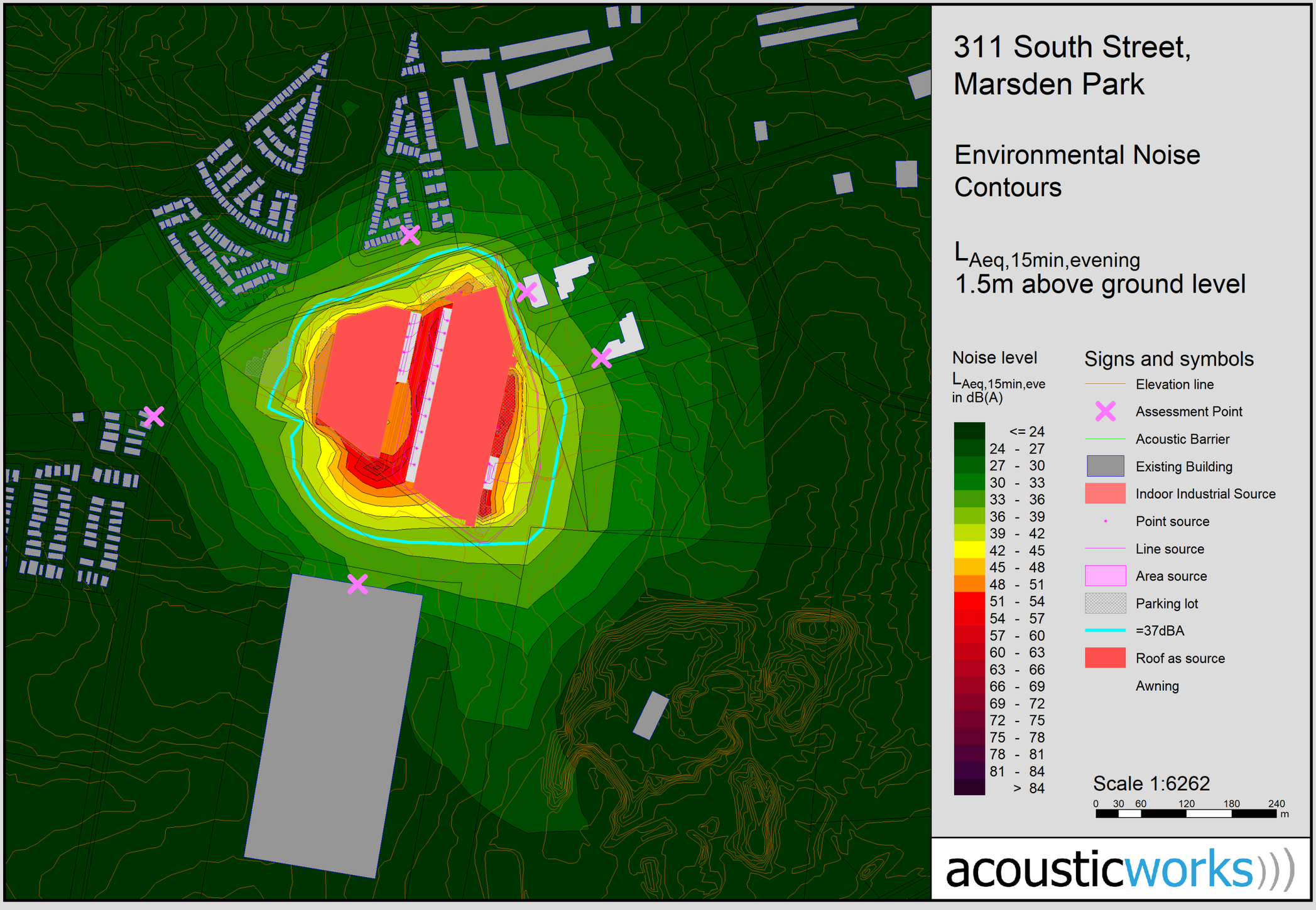
Signs and symbols

- Elevation line
- Assessment Point
- Acoustic Barrier
- Existing Building
- Indoor Industrial Source
- Point source
- Line source
- Area source
- Parking lot
- =37dBA
- Roof as source
- Awning

Scale 1:6262

0 30 60 120 180 240 m

acousticworks)))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Marsden Park
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Noise level
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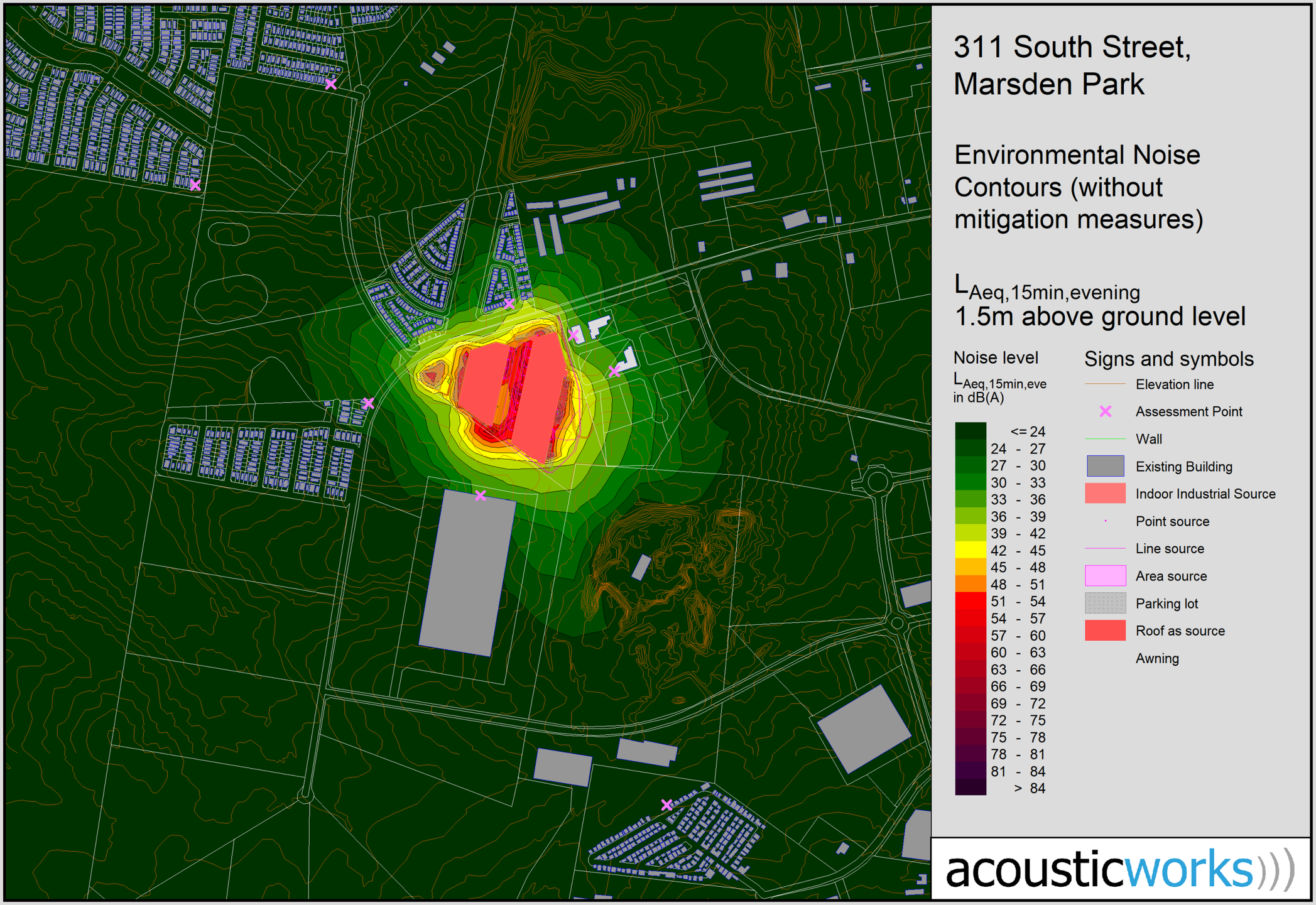
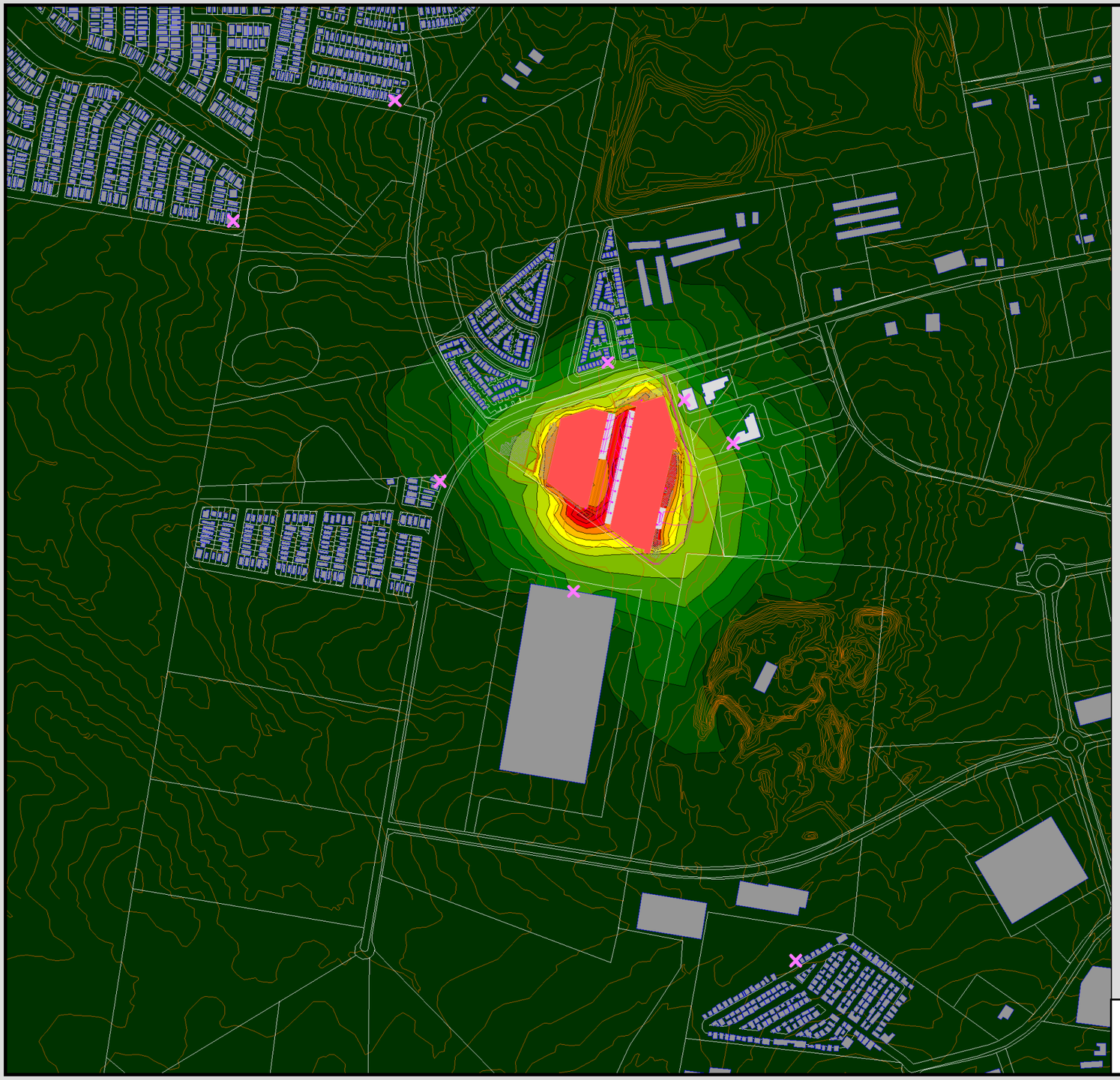
Roof as source
Awning
Scale 1:6262
0 30 60 120 180 240
m
acousticworks)))





311 South Street, Marsden Park

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Noise level
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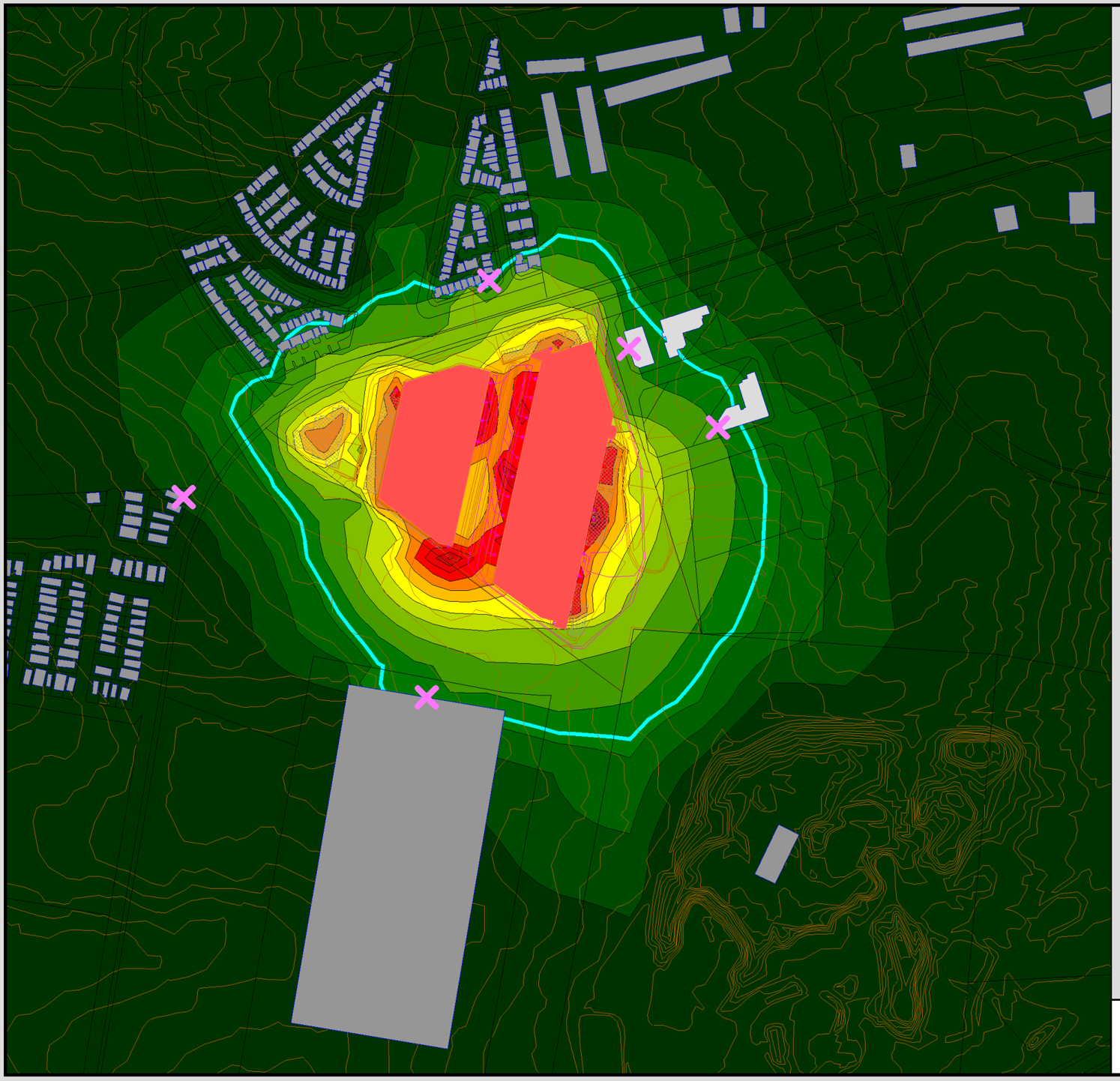

311 South Street, Marsden Park

Environmental Noise Contours (without mitigation measures)

$L_{Aeq,15min,night}$
1.5m above ground level

Noise level
$L_{Aeq,15min,night}$ in dB(A)

<= 24
24 - 27
27 - 30
30 - 33
33 - 36
36 - 39
39 - 42
42 - 45
45 - 48
48 - 51
51 - 54
54 - 57
57 - 60
60 - 63
63 - 66
66 - 69
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72 - 75
75 - 78
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81 - 84
> 84

Signs and symbols

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- Indoor Industrial Source
- Point source
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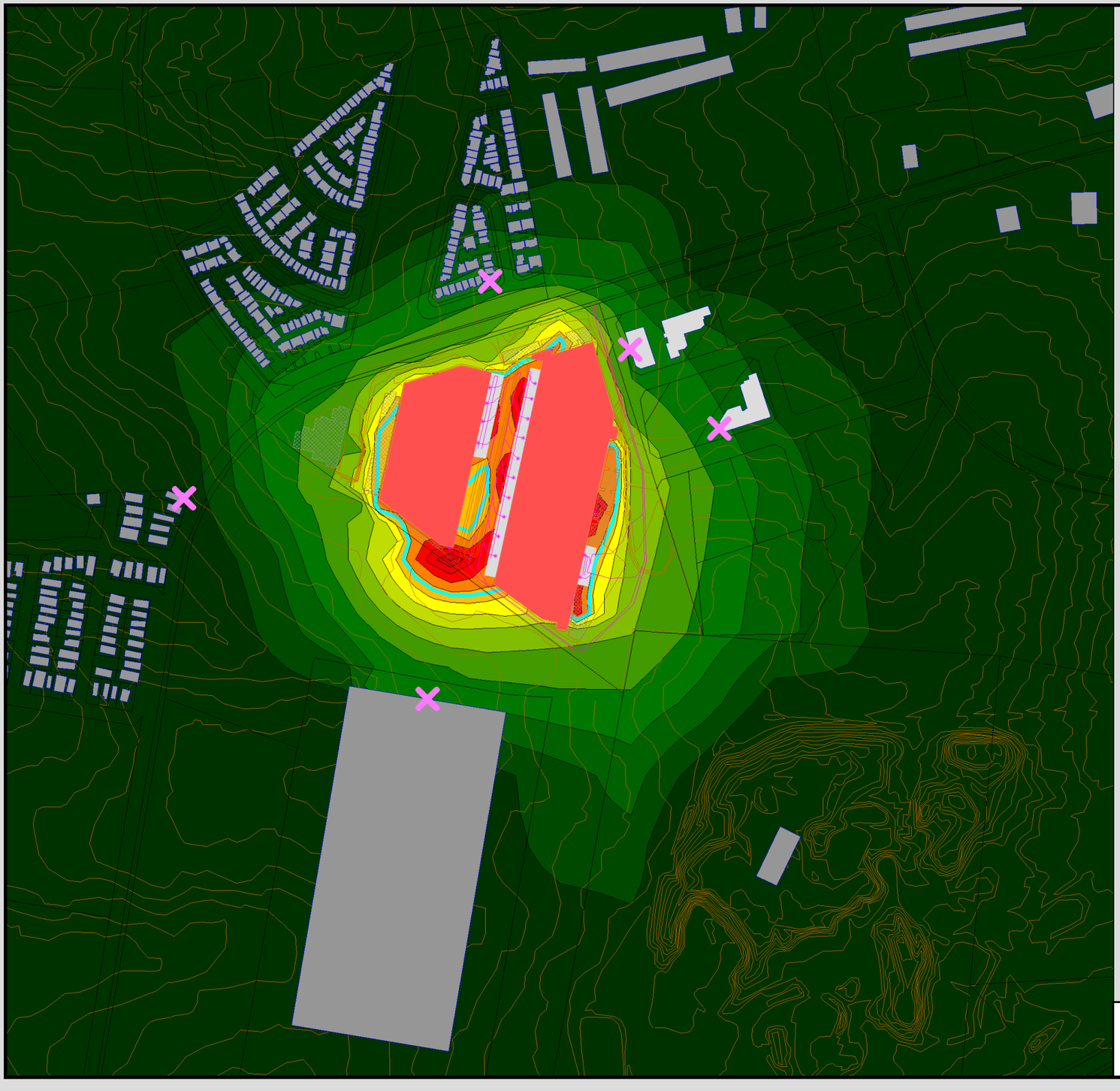
- Parking lot
- =31dBA
- Roof as source
- Awning

Scale 1:6262

0 30 60 120 180 240 m

acousticworks)))



311 South Street, Marsden Park

Environmental Noise Contours

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1.5m above ground level

Noise level
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24 - 27
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