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INDUSTRIAL AMENITY OVERLAY CODE
NOISE AND AIR QUALITY ASSESSMENT
184 GARDNER ROAD
ROCHEDALE

Prepared for:

Gardner Rd Developments Pty Ltd
c/- Development Directive

Prepared by:

MWA Environmental

17 July 2026

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MWA Environmental

Level 8 241 Adelaide Street
GPO Box 3137 Brisbane 4001

Job Name: Rochedale

Job No: 26049

Telephone: 07 3002 5500

Email: mail@mwaenviro.com.au

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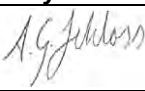
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Principal Author: Mr Alex Schloss

Client: Gardner Rd Developments Pty Ltd
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Client Contact: Mr Lachlan Quadrell

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1.0 INTRODUCTION

1.1 PURPOSE OF REPORT

MWA Environmental has been engaged to prepare an Industrial Amenity Overlay Code noise and air quality assessment for a proposed development at 184 Gardner Road, Rochedale (“**the subject site**”). The subject site is located within the Brisbane City Plan 2014 *Industrial amenity investigation area sub-category* which triggers assessment against the *Industrial Amenity Overlay Code*.

The Industrial Amenity Investigation Area Overlay affecting the subject site is associated with the following uses:

- Austral Bricks facility, located to the west at 105 Gardner Road, Rochedale; and
- Rochedale Landfill, located to the north at 174 Gardner Road, Rochedale.

The subject site currently has two (2) development applications under assessment, as follows:

- Development application *A006940193*, relates to the proposed reconfiguration of lot for Low Impact Industry and Warehouse allotments and a Variation Request for Low-Medium Density Residential zone, referred to as ‘Land use DA’.
- Development application *A006761597* which relates to a separate proposal which includes (amongst other things) a Preliminary Approval for a Material Change of Use (including a variation request) for Multiple Dwellings. The variation request component of the proposal seeks to vary the waterway overlay mapping, HESS mapping and zoning mapping, referred to as ‘Waterway DA’.

There is also a development approval: Development approval *A005747839*, which relates to an existing development approval for a preliminary approval for a Material Change of Use for multiple dwellings over Lot 904.

It is understood that these applications and approvals are to be separately considered, but are related, as the proposed residential areas are contiguous, and if/when all applications are approved, the combined developments will form one large residential development area. This is visually demonstrated in **Attachment 1**.

Notwithstanding, each application is to be assessed separately whereby *A006940193* (Land Use DA) can be progressed with no reliance on *A006761597* (Waterway DA).

Each development application has received an Information Request from Council. Particularly the A006940193 - Land Use DA received an Information Request on 13 April 2026 and the A006761597 - Waterway DA received an Information Request on 2 March 2026.

Each information request included an identical Item 1(b) which relates Industrial Amenity Overlay Code matters relevant to the potential impact of surrounding Austral Bricks and Rochedale landfill at the proposed Low-medium density residential zone. Information Request Item 1(b) is provided below.

Air quality and noise impacts

- b. The site is located within the Industrial amenity investigation area sub-category of the Industrial amenity overlay. As compliance with the separation distances cannot be achieved as per PO2 and PO3 of the Industrial amenity overlay code, submit the following:
- i. Submit an Air quality report prepared in accordance with the Air quality planning scheme policy to demonstrate compliance. When modelling for the air quality impacts, it must be for the future expansion of both the Austral Brick site and the Co-generation plants located at the adjacent landfill site. The modelling to consider Co-generation operation at the landfill site at 174 Gardner Road, Rochedale is slated for expansion and upgrades in the future. Odour must also be taken into account for the modelling.
 - ii. Submit further information demonstrating the proposed use can comply with the separation distances as prescribed in AO3 of the Industrial amenity overlay code. Where compliance with the separation distances cannot be achieved, submit for approval a Noise impact assessment report in accordance with PO3 of the Industrial amenity overlay code. Further guidance can be found in the Noise impact assessment planning scheme policy.

This Noise and Air Quality Assessment has been prepared to address the potential noise and air quality impacts of the nearby Austral Bricks facility and Rochedale Landfill on the proposed sensitive Multiple Dwelling residential uses on the subject site. As each application identified the same Information Request item, this report has been prepared to address both applications. However, the findings and recommendations of this report can be applied to each application separately.

The assessment has been based upon noise monitoring, assessment of noise and air pollutant emissions and detailed noise and air quality modelling in accordance with the CityPlan 2014 *Industrial Amenity Overlay Code* and associated *Noise Impact Assessment Planning Scheme Policy* and *Air Quality Planning Scheme Policy*.

1.2 SITE DESCRIPTION

The subject site is located on 184, 198 & 202 Gardener Road and 56 Farley Road, Rochedale and currently has a real property description of Lot 102 on SP226721 and Lots 3, 4 and 6 on RP114765.

An aerial photograph showing the location and extent of the subject site is included as **Figure 1**.

The site is currently of rural character and is zoned *Emerging Community*.

The proposed Low-Medium Density Residential precincts are located approximately 365 metres from the nearest boundary of the Austral Bricks site and approximately 770 metres from the kiln stacks.

The proposed Low-Medium Density Residential precincts are located approximately 200 metres from the nearest boundary of the Rochedale Landfill site and approximately 330 metres from landfill gas engines.

1.3 PROPOSED DEVELOPMENT

This development application A006761597, relates to the proposed variation request for residential uses, proposed changes to vary the Waterway Corridor Overlay, Biodiversity Overlay and Flood Overlay under the Brisbane City Plan and the reconfiguration of the lot (ROL) proposal.

The proposed Reconfiguration of a Lot application seeks to create the following:

- 14 future development lots (proposed Lots 1 to 6, 13, 15 to 19, 904 and 905)
- A drainage reserve (proposed Lot 800)
- A new road
- Balance land (proposed Lot 907)

The proposed Low Impact Industry and Warehouse land uses are located within proposed Lots 1 to 6, 15 to 19 and 905. The Low Impact Industry and Warehouse lots are consistent with the intent and overall outcomes of the Business Park and Gateway Civic Precinct within the Rochedale Urban Community Neighbourhood Plan (NPM-018.4) of the Brisbane City Plan 2014.

Low-Medium Density Residential zone is proposed within Lots 13 and 904 with intended multiple dwelling land uses. The Low-Medium Density Residential zones on Lots 13 and 904 are proposed sensitive uses relevant to this Industrial Amenity Overlay Code assessment.

The proposed development plan is provided in **Attachment 1**.

1.4 SURROUNDING INDUSTRIAL LAND USES

Land uses adjacent to the subject site are summarised as:

To North: Farley Road, an unformed road reserve to the north of the subject site with the Rochedale Landfill on land zoned *Special purpose (Utility services)*

To East: Large lot rural uses on land zoned *Emerging Community*.

To South: Large lot rural uses on land zoned *Emerging Community*.

To West: Gardner Road, with land zoned *Emerging Community* and *Industry investigation* owned by Austral Bricks located beyond.

The current land zoning of the site and surrounding land parcels are shown on **Figure 2**.

1.5 DESCRIPTION OF AUSTRAL BRICKS OPERATION

Austral Bricks manufactures clay brick products at the Gardner Road Rochedale facility.

The facility incorporates the 'Factory Area' used for brick manufacturing to the northern area of the landholding and the 'Southern Area' which is utilised for raw materials stockpiling. It is understood that extraction of clay resource on the subject site has ceased, with the southern area used for the receipt and stockpiling of imported raw materials extracted from other sites.

The Austral Bricks facility uses are separated from the proposed Low-Medium Density Residential precinct on the subject land by the following minimum distances:

To Manufacturing Plant:	700 metres
To Southern Area (raw materials storage):	300 metres

The Austral Bricks facility holds Environmental Authority EPML00912113 for the following environmentally relevant activities:

- ERA 42 - Clay or ceramic products manufacturing – Threshold (b) - Manufacturing the following quantity of clay or ceramic products in a year - more than 5000t
- ERA 54 - Mechanical waste reprocessing Threshold 2(a) - Operating a facility for receiving and mechanically reprocessing, in a year, the following quantity of general waste - 5,000t or less
- ERA 60 - Waste disposal – Threshold 2(f) - Operating a facility for disposing of, in a year, the following quantity of waste mentioned in subsection (1)(b) - more than 50,000t but not more than 100,000t
- ERA 20(a) - Clay pit mining, dimension stone mining or mining gemstones (including the material from which gemstones are extracted) - at least 5,000t but not more than 100,000t in a year

Austral Bricks provided assistance in understanding the current and potential future operations at the Rochedale facility by way of discussion and site inspection in March 2016. Review of aerial imagery and observations of the site operations from publicly accessible locations indicates that the facility generally appears to operate in the same manner as was the case in 2016.

Key information provided by Austral Bricks in 2016 is summarised as follows:

Southern Area

- No raw materials are extracted from the site any longer
- Austral use the southern area for receipt and stockpiling of imported raw materials
- Rehabilitation / filling is currently occurring on the southern area and will continue to occur in the future with the ultimate land use to transfer to business park
- Water truck in use to minimise dust emissions from unpaved roads, stockpiles etc.
- Austral are currently working on sealing roads from the stockpile area to the crusher (feed into manufacturing plant)

Factory Area

- Factory fully operational and will look to expand production steadily over the next few years
- No set timeframe for transition of site to Business Park use
- There is one operational kiln at present (Ceric)
- The second kiln (Swindell) was being refurbished with anticipated commissioning in 2017 at which time the currently operating kiln will be mothballed i.e. not likely to operate both at once to facilitate future target production rates
- Austral undertake flue gas testing in accordance with Environmental Authority conditions but the data was not made available to MWA Environmental.

Operating Hours

- Southern area raw materials deliveries and stockpiling 6am to 6pm Monday to Saturday (less on Saturday) as per Environmental Authority
- Kilns and brick production 24-hour / 7days
- No raw materials / clay are input to the plant outside of the 6am to 6pm period
- Raw material delivery to the crusher and 'Clay Plant' Wednesday to Saturday which is sufficient to support production by storage within the Clay Plant shed for rest of week

Production Rate

- Target future production is 65 million bricks per year¹

Whilst recent production rates are not known, for the purposes of this assessment it has been assumed that the Austral Bricks facility will operate to the future target production rate of 65 million bricks per year.

¹ However, MWA Environmental analysis of NPI reporting for recent years indicates that recent years peak production rates have been in the order of 50 million bricks per year

1.6 DESCRIPTION OF ROCHEDALE LANDFILL OPERATION

The Rochedale landfill is owned and operated by Brisbane City Council and receives putrescible residential waste. From review of the current landform, it is understood that the landfill is approaching capacity and the Rochedale landfill now only receives a limited volume of municipal waste generated within the Brisbane local government area, with the majority of municipal waste now transported to landfills in surrounding local government areas.

The Rochedale landfill includes gas recovery systems and power generation plant, with seven (7) landfill gas engines present but with an advised future intention for up to ten (10) landfill gas engines. LMS Energy hold the environmental authority and operate the landfill gas engines on the landfill site.

The landfill gas engines are separated from the proposed Low-Medium Density Residential precinct on the subject land by the following minimum distances:

To Landfill Gas Engines: 340 metres

The Rochedale Landfill holds Environmental Authority EPPR00839913 for the following environmentally relevant activities, specific to the Gardner Road site:

- ERA 60 - Waste disposal 2: Operating a facility for disposing of, in a year, the following quantity of waste mentioned in subsection (1)(b) – (h) more than 200,000t/yr

LMS Energy holds Environmental Authority EPPR00779613 for the following environmentally relevant activities, specific to the Gardner Road site:

- ERA 15 – Fuel burning, Using fuel burning equipment that is capable of burning at least 500kg of fuel in an hour.

2.0 NOISE AMENITY ASSESSMENT

2.1 INDUSTRIAL AMENITY OVERLAY CODE PROVISIONS

CityPlan 2014 interactive mapping indicates that the subject site is affected by the 'Industrial Amenity Investigation Area' overlay.

The Industrial Amenity Overlay Code includes the following PO2 related to noise amenity:

Performance outcomes	Acceptable outcomes
Section A—If in the Industrial amenity investigation area sub-category	
PO2 Development is located, designed and constructed to achieve the noise (planning) criteria in Table 8.2.13.3.E to protect the development from adverse noise impacts. Note—A noise impact assessment report prepared in accordance with the Noise impact assessment planning scheme policy can assist in demonstrating achievement of this performance outcome.	AO2 Development for a sensitive use is located no closer than: (a) 150m to a medium impact industry A ; (b) 250m to a medium impact industry B ; (c) 500m to a high impact industry ; (d) 1500m to a special industry .

Acceptable Outcome AO2 is satisfied for industrial activities at the locality with the exception of the Austral Bricks facility and Rochedale Landfill. As such, the assessment has considered the proposed development against Performance Outcome PO2 considering noise emissions from Austral Bricks and Rochedale Landfill.

2.2 NOISE MONITORING

To enable an assessment of the existing noise exposure near the subject site, detailed noise measurements were undertaken using two noise dataloggers located at separate locations for a period of seven (7) days between 13 and 20 March 2026.

[Datalogger 1](#) was located along the eastern boundary of the site in proximity to the future proposed residential lot 904. [Datalogger 2](#) was located on the western portion of the site to measure the ambient noise from the existing road and industrial uses.

The logger locations are shown on **Figure 3**.

The dataloggers used were Norsonic NOR139, pre-calibrated to 94 dB and 114dB at 1kHz using Norsonic Sound Calibrator Nor1256. At post-calibration, the datalogger exhibited less than ± 0.3 dB deviation.

The unattended statistical noise levels recorded by the noise dataloggers at Noise Datalogger locations 1 and 2 for the Eastern and Western parts of the site are presented in **Table 1** and **Table 2** respectively. The recorded noise levels are presented as statistical components, which are described as:

- L_{max} : Noise level referred to as the adjusted maximum sound pressure level.
- L_{10} : Noise level exceeded for 10 percent of the measurement period, referred to as the averaged maximum sound pressure level.
- L_{90} : Noise level exceeded for 90 percent of the measurement period. AS1055-2018² notes that the L_{90} is described as the background sound pressure level.
- L_{eq} : An “average” measurement, and as per AS1055-2018 defined as the value of the sound pressure level of a continuous steady sound state, that within a measurement period, has the same mean square sound pressure as a sound under consideration whose level varies with time.

**Table 1: Range of Datalogger Recorded Statistical Noise Levels
Datalogger 1 – Eastern Part of Site**

PARAMETER	PERIOD	RECORDED NOISE LEVELS - dB(A)		
		MINIMUM	MAXIMUM	AVERAGE
L_{max}	Daytime (7am-6pm)	50	98	68
	Evening (6pm-10pm)	45	77	59
	Nighttime (10pm-7am)	40	92	55
L_{10}	Daytime (7am-6pm)	40	62	50
	Evening (6pm-10pm)	39	58	47
	Nighttime (10pm-7am)	36	67	45
L_{90}	Daytime (7am-6pm)	36	49	41
	Evening (6pm-10pm)	36	49	40
	Nighttime (10pm-7am)	33	53	39
L_{eq}	Daytime (7am-6pm)	39	69	49
	Evening (6pm-10pm)	37	56	46
	Nighttime (10pm-7am)	35	65	44

² Australian Standard AS 1055 -2018 Acoustics – Description and measurement of environmental noise.

Key statistical noise level parameters at Datalogger 1 on the Eastern part of site included:

Average Recorded L_{eq} (7am to 6pm) = 49 dB(A)

Average Recorded L_{eq} (6pm to 10pm) = 46 dB(A)

Average Recorded L_{eq} (10pm to 7am) = 44 dB(A)

**Table 2: Range of Datalogger Recorded Statistical Noise Levels
Datalogger 2 – Western Part of Site**

PARAMETER	PERIOD	RECORDED NOISE LEVELS - dB(A)		
		MINIMUM	MAXIMUM	AVERAGE
L_{max}	Daytime (7am-6pm)	59	90	70
	Evening (6pm-10pm)	55	77	62
	Nighttime (10pm-7am)	44	82	62
L_{10}	Daytime (7am-6pm)	53	61	56
	Evening (6pm-10pm)	48	57	53
	Nighttime (10pm-7am)	38	60	48
L_{90}	Daytime (7am-6pm)	41	55	46
	Evening (6pm-10pm)	36	50	42
	Nighttime (10pm-7am)	34	50	40
L_{eq}	Daytime (7am-6pm)	50	63	54
	Evening (6pm-10pm)	44	56	49
	Nighttime (10pm-7am)	37	59	46

Key statistical noise level parameters at Datalogger 2 on the Western part of site included:

Average Recorded L_{eq} (7am to 6pm) = 54 dB(A)

Average Recorded L_{eq} (6pm to 10pm) = 49 dB(A)

Average Recorded L_{eq} (10pm to 7am) = 46 dB(A)

The datalogger recorded noise levels at Noise Datalogger Locations 1 and 2 are included as graphical traces of noise level versus time for the statistical noise level descriptors L_{max} , L_{10} , L_{90} and L_{eq} as **Attachment 2**.

2.3 NOISE (PLANNING) CRITERIA

The relevant Industrial Amenity Overlay Code noise (planning) criteria are specified in CityPlan 2014 Table 8.2.13.3.E, as follows:

Table 8.2.13.3.E—Noise (planning) criteria

Location where the criteria applies inside a sensitive use	Adjusted equivalent continuous sound pressure level ($L_{Aeq,adj,T}$) to be achieved during day, evening and night-time periods			Adjusted maximum sound pressure level ($L_{Amax,adj}$) to be achieved during the night-time period
	Day 7am–6pm $L_{Aeq,adj,11hr}$	Evening 6pm–10pm $L_{Aeq,adj,4hr}$	Night 10pm–7am $L_{Aeq,adj,9hr}$	Night 10pm–7am
Sleeping areas	35dB(A)	35dB(A)	30dB(A)	45dB(A)
Other habitable rooms	35dB(A)	35dB(A)	35dB(A)	-

A noise reduction of 7 dB(A) is expected through an open sliding glass door to a habitable rooms³ when assessing the day/evening indoor Acoustic Quality Objective. For the night period a noise reduction of 10 dB(A) is expected through an open window to a bedroom⁴ when assessing the night indoor Acoustic Quality Objective.

If greater noise reductions are required through residential dwelling facades to achieve the indoor noise (planning) criteria then doors and windows may be closed with the provision of air-conditioning and/or mechanical ventilation and acoustic upgrades if required.

³ AS3671 states approximate 10 dB(A) noise reduction through a façade with 10% open area. Thus approximately 7 dB(A) noise reduction through a façade with 20% open area. A large 1200x1800 sliding window relates to approximately 10% open area. A large 2100x2300 sliding glass door represents approximately 20% open area. Thus, 7dB(A) noise reduction is conservatively adopted based upon a large sliding glass door in an affected living area façade. Openings larger than 20% open area are unlikely to be necessary for ventilation of living areas.

⁴ AS3671 states approximate 10 dB(A) noise reduction through a façade with 10% open area. A large 1200x1800 sliding window relates to approximately 10% open area. Bedroom window openings larger than 10% open area are unlikely to be necessary for ventilation.

2.4 NOISE EMISSIONS SOURCES

2.4.1 AUSTRAL BRICKS NOISE EMISSIONS

Previous assessment of Austral Bricks facility was undertaken in March 2016 with the assistance of Mr Julius Marinelli (Raw Materials and Environment Manager, Austral Bricks). Based upon the site inspection the following key noise emission sources have been assessed for the Austral Bricks facility:

Factory Site

- Factory building noise (including kiln noise)
- 'Clay plant' building noise including sieving and raw material handling
- Crusher noise (enclosure)
- Forklifts at product stockpile yards
- Product dispatch trucks

Southern Site (materials stockpiles)

- Raw material delivery trucks
- Scrapers forming stockpiles
- Front-end loaders loading raw materials to articulated dump truck
- Articulated dump truck transferring raw materials to crusher

Source noise levels for the factory building (including kiln and packaging plant) and the clay plant were derived from measurements conducted on-site in 2016. Source noise levels for trucks, forklifts, scrapers, front-end loaders and the crusher were taken from measurements previously undertaken by MWA Environmental at comparable facilities.

Summarised below in **Table 3** are the modelled noise sources.

Table 3: Summary of Modelled Noise Sources – Austral Bricks

NOISE SOURCE	LOCATION	OPERATING PERIOD	SOURCE REPRESENTATION	SOUND POWER LEVEL – dB(A)	
				L _{Aeq}	L _{Amax}
Raw material trucks (20 loads per day)	Southern Area	6am to 6pm	Line Source	62/m (one-way loop)	103
Scraper forming stockpiles	Southern Area	6am to 6pm	Point Source	112	118
Front-end loader loading trucks	Southern Area	6am to 6pm	Point Source	104	110
Dump truck haulage stockpile to plant (29 loads per day)	Southern Area to Crusher	6am to 6pm	Line Source	69/m (two-way)	105.4
Factory Building	Factory Site	24-hour	Industrial Building Source	112	-
Clay Plant Building	Factory Site	24-hour	Industrial Building Source	115	-
Crusher	Factory Site	6am to 6pm	Point Source	111	116
2x Forklifts	Factory Site	24-hour	Point Source	100	110
Product Trucks (6 loads per hour)	Factory Site	24 hours	Line Source	72/m (two-way)	104

2.4.2 ROCHEDALE LANDFILL NOISE EMISSIONS

The Rochedale landfill site accepts waste that cannot be recycled or reused from resource recovery centres, including general waste collected from kerbside bins. This waste is taken from the disposal area at each resource recovery centre to the landfill site.

The facility also includes gas recovery systems and power generation plant, with seven (7) landfill gas engines are present but with an advised future intention for up to ten (10) landfill gas engines.

Key noise emission sources associated with the landfill site are:

- Landfill gas engine plant (x10)
- Plant flare (x4) (operation during power generation plant breakdown and scheduled offline periods, not routinely operating)
- Heavy vehicles i.e. truck deliveries
- Heavy equipment (earthmoving equipment for filling and compacting)

Source noise of the above were taken from measurements previously undertaken by MWA Environmental at comparable facilities.

Table 4 below summarises the modelled noise sources.

Table 4: Summary of Modelled Noise Sources – Rochedale Landfill

NOISE SOURCE	LOCATION	OPERATING PERIOD	SOURCE REPRESENTATION	SOUND POWER LEVEL – dB(A)	
				L _{Aeq}	L _{Amax}
Gas Engines ⁵ (x10)	Southern Area	24-hour	Point Source	99	99
Flare (x4) ⁶	Southern Area	24-hour	Point Source	103	103
Product Trucks (10 loads per hour)	Site	6am to 6pm	Line Source	77/m (two-way)	104
Compactor	Central Area	6am to 6pm	Point Source	109	110
Excavator	Central Area	6am to 6pm	Point Source	110	112
2 x Frontend Loader	Central Area	6am to 6pm	Point Source	107	109
Bulldozer	Central Area	6am to 6pm	Point Source	111	115

2.5 DESCRIPTION OF NOISE MODEL

To enable assessment of Austral Bricks and the Rochedale Landfill noise levels at the proposed sensitive multiple dwellings, a detailed noise model has been established using the SoundPLAN 8.2 software applying the ISO9613 standard. This model is an accepted regulatory model that allows input of site-specific terrain data and source noise data as sound power level spectra.

The noise modelling undertaken has considered meteorological conditions as per the methodology of the ISO9613 standard, with a temperature of 10 degrees Celsius and 70% humidity, a temperature inversion and the following wind conditions as per the adverse meteorological assumptions of ISO9613:

⁵ Based upon indicative source noise level of cogeneration plant

⁶ Based upon indicative enclosed ground level gas plant flare source noise level with assumed 10% operation activity rate per flare

Downwind propagation conditions for the method specified in this part of ISO 9613 are as specified in 5.4.3.3 of ISO 1996-2:1987, namely

- *Wind direction within an angle of $\pm 45^\circ$ of the direction connecting the centre of the dominant sound source and the centre of the specified receiver region, with the wind blowing from source to receiver, and*
- *Wind speed between approximately 1m/s and 5m/s, measured at a height of 3m to 11m above the ground.*

As such, given the above meteorological assumptions, it is considered that the results of the noise modelling represent the resultant Austral Bricks and Rochedale landfill noise levels across the subject site during noise propagation enhancing meteorological conditions.

The SoundPLAN model has been setup to represent L_{Aeq} and L_{Amax} noise emissions from the key Austral Bricks and Rochedale landfill sources as summarised in **Table 3** and **Table 4** above.

The model was setup with terrain data based upon Brisbane City Council LIDAR digital elevation data and preliminary earthworks design of the multiple dwelling lots.

The SoundPLAN model layout including noise source locations of the industrial sources is included as **Attachment 3**.

2.6 PROPOSED RESIDENTIAL NOISE CONTROLS

A noise impact assessment was undertaken relating to the proposed reconfiguration of lot for Low Impact Industry and Warehouse allotments and a Variation Request for Low-Medium Density Residential zone.

The outcome of the noise report titled '*Noise Impact Assessment – Proposed Low Impact Industry, Warehouse and Multiple Dwelling Development – 184 Gardner Road, Rochedale*' recommended noise control measures for the future multiple dwelling residential zone on Lots 13 and 904 as follows:

- A **2.0 to 2.4 metre high** acoustic barrier along the northern boundary of the future multiple dwelling Lots 13 and 904 with part returns along any future access driveways (see **Figure 4**);
- Acoustic treatment is to be provided to upper level façades of the future multiple dwellings to achieve a minimum noise reduction of 20 dB(A). Mechanical ventilation is to be incorporated into habitable rooms and bedrooms on these levels to maintain acoustic performance with windows closed.

The recommended acoustic barrier height and alignment are shown on **Figure 4**. The acoustic barrier shall be gap-free and constructed of materials achieving a minimum surface density of 12.5kg/m².

2.7 NOISE MODELLING RESULTS

The results of the noise modelling are presented in **Attachment 4** as plots of the predicted day, evening and night period L_{Aeq} noise levels and night L_{Amax} noise levels over an aerial photograph base showing the subject site.

The highest predicted Austral Bricks and Rochedale landfill noise levels at the proposed Multiple Dwelling Lots are summarised in **Table 5** below.

Table 5: Summary of Predicted Noise Levels for Most Exposed Part of the Proposed Multiple Dwelling Lots on Subject Site – dB(A)

Location	Floor	$L_{Aeq,11hr}$ – 7am to 6pm - dB(A)	$L_{Aeq,4hr}$ – 6pm to 10pm - dB(A)	$L_{Aeq,9hr}$ – 10pm to 7am - dB(A)	$L_{Amax,T}$ - dB(A)	Façade Sound Transmission Loss Required - dB(A)
Multiple Dwelling Lots 13 & 904	Ground	40	39	39	42	3 to 10 (i.e. open doors / windows)
	Upper	48	46	47	50	11 to 17 (i.e. closed doors / windows but standard dwelling construction)
Criteria (internal)		35	35	30 (bedrooms)	45 (bedrooms)	

The assessment of the industrial impact upon future multiple dwelling lots is provided below based upon the detailed noise modelling.

Overall Maximum Noise LAeq:	47 dB(A) L _{Aeq,9hr}
Internal noise level to achieve per Table 8.2.13.3.E:	30 dB(A) L _{Aeq,9hr}
Sound transmission loss required:	17 dB(A)

As such, the Industrial Amenity Overlay Code noise criteria will be achieved within the proposed multiple dwelling lots if 20 dB(A) of sound transmission loss is provided by the external facades. This is readily achieved through standard building construction without the need for acoustic upgrades. Nominally, the following weighted sound reduction indices (Rws) can achieve the desired sound transmission loss:

- Rw 27 for glazing (windows and doors) where total area of glazing is greater than 1.8m²
- Rw 24 for glazing (windows and doors) where total area of glazing is less than or equal to 1.8m²
- Rw 35 for external walls
- Rw 35 for roof/ceiling
- Rw 28 for (hinged) entry doors

Based upon the detailed noise assessment undertaken, noise associated with the operation of the Austral Bricks and Rochedale Landfill facilities will satisfy the relevant CityPlan 2014 Industrial Amenity Overlay Code noise (planning) criteria with specific requirement for acoustic mitigation as outlined in **Section 2.6** above. This outcome is consistent with observations and noise monitoring in proximity to the industry which did not identify any excessive audible noise from the Austral Bricks and Landfill sites at the subject site.

3.0 AIR QUALITY ASSESSMENT

3.1 INDUSTRIAL AMENITY OVERLAY CODE PROVISIONS

CityPlan 2014 interactive mapping indicates that the subject site is affected by the 'Industrial Amenity Investigation Area' overlay.

The Industrial Amenity Overlay Code includes the following PO1 related to air quality:

Performance outcomes	Acceptable outcomes
Section A—If in the Industrial amenity investigation area sub-category	
PO1 Development is located, designed and constructed to achieve the air quality (planning) criteria in Table 8.2.13.3.B, odour criteria in Table 8.2.13.3.C and health risk criteria in Table 8.2.13.3.D Note—An air quality impact report prepared in accordance with the Air quality planning scheme policy can assist in demonstrating achievement of this performance outcome.	AO1 Development for a <u>sensitive use</u> is located no closer than: (a) 150m to a <u>medium impact industry A</u>; (b) 250m to a <u>medium impact industry B</u>; (c) 500m to a <u>high impact industry</u>; (d) 1500m to a <u>special industry</u>.

Acceptable Outcome AO1 is satisfied for industrial activities at the locality with the exception of the Austral Bricks and Rochedale landfill. As such, the assessment has considered the proposed development against Performance Outcome PO1 considering air pollutant emissions from Austral Bricks.

3.2 AUSTRAL BRICKS

3.2.1 OVERVIEW OF EMISSIONS

MWA Environmental has previously undertaken an inspection of the Austral Bricks facility back in March 2016 with the assistance of Mr Julius Marinelli (Raw Materials and Environment Manager at the time for Austral Bricks).

Review of the site and aerial imagery indicates that no significant changes to the plant have occurred over the 10-year period from when MWA Environmental previously inspected the Austral Bricks site to present.

Based upon previous site inspection, review of NPI reported emissions, Environmental Authorities and review of aerial imagery, the following key air pollutant emission sources have been assessed for the Austral Bricks facility:

Factory Site

- Kilns (point sources)
 - Release point A1 Swindell Dressler Kiln
 - Release point A2 Ceric Kiln
- 'Clay plant' including sieving and raw material handling (fugitive building source)
- Crusher (fugitive source)

Southern Site (materials stockpiles)

- Raw material transfers
- Raw material delivery trucks on unsealed roads (watered roads)
- Dump trucks on unsealed roads from stockpiles to Clay Plant
- Scrapers forming stockpiles
- Wind erosion
- Material drop processes (raw material deliveries, reclaim from stockpiles to dump truck, tip into crusher)

Minor fugitive combustion emissions associated with vehicles and mobile machinery do not warrant detailed assessment given the available separation distance to the subject site.

Austral Bricks Environmental Authority for the 'clay or ceramic product manufacturing' activity⁷ includes emission limits for the two kiln stacks, as follows:

Schedule B – Table 1 (Release of contaminants)

Release point number	Minimum release height (metres)	Minimum velocity (m/sec)	Minimum efflux temp (°C)	Contaminant	Release Limit	Sampling frequency
Rochdale Plant A1 – Swindell Dressler Tunnel Kiln	30	8.7	126	Total particulates	0.25 g/m ³	Not less frequently than annually
				Mass emission total particulates	n/a	Not less frequently than annually
				Nitrogen oxides	0.35 g/m ³	Not less frequently than annually
				Mass emission nitrogen oxides	n/a	Not less frequently than annually
				Total fluoride (mass emission rate) g/sec	1.35	Not less frequently than annually
				Concentration total fluoride	n/a	Not less frequently than annually
Rochdale Plant A2 – Ceric Tunnel Kiln	15	9.5	124	Total particulates	0.25 g/m ³	Not less frequently than annually
				Mass emission total particulates	n/a	Not less frequently than annually
				Nitrogen oxides	0.35 g/m ³	Not less frequently than annually
				Mass emission nitrogen oxides	n/a	Not less frequently than annually
				Total fluoride (mass emission rate) g/sec	1.88	Not less frequently than annually
				Concentration total fluoride	n/a	Not less frequently than annually

⁷ EPA Permit IPDE01104308

The various Environmental Authorities held by Austral bricks for the 'clay or ceramic product manufacturing' and mining lease area (southern site) include conditions requiring air management measures to minimise emissions from the site.

3.2.2 EMISSION ESTIMATION TECHNIQUES

Reference was made to the emissions estimation hierarchy specified in the CityPlan 2014 *Air Quality Planning Scheme Policy*, summarised as follows:

- (a) licence or approval emission limits – **applied for emissions of Particulates and Nitrogen Oxides from the kiln stacks (release points A1 and A2) based upon the emission limits in EPA Permit IPDE01104308**
- (b) published emission factors (e.g. NPI manual) – **applied for estimation of emissions of kiln emissions (excluding Particulates and Nitrogen Oxides) and fugitive dust emissions from the factory site and southern raw material handling site by application of relevant published emission factors at the future target product rate of 65 million bricks per year**
- (c) site-specific emissions measurement data – **no site specific emissions monitoring data was made available by Austral Bricks**
- (d) mass balance analysis – **not relevant**
- (e) manufacturers' design specifications – **not relevant**
- (f) measurements taken from a comparable plant and process – **no suitably representative data identified**

As such, the most relevant emission estimation techniques supported by CityPlan 2014 are as follows:

Kilns:	Emission Limits for Particulates and Nitrogen Oxides Published emission factors for other pollutant emissions
Fugitive Dust:	Published emission factors for unsealed roads, scrapers, wind erosion, crushing, grinding and screening, material transfers

For the purposes of this assessment, emissions of Particulates and Nitrogen Oxides from the kiln stacks (release points A1 and A2) have been based upon the emission limits in EPA Permit IPDE01104308.

Review of the annual emissions reported by Austral Bricks to the NPI, generally indicates the use of NPI Manual emission factors to derive estimates of annual emissions.

Emission rates from the Austral Bricks site has been estimated based upon the future target product rate of 65 million bricks per year⁸ using emission factors from the following references:

Kiln emissions: *National Pollutant Inventory Emission Estimation Technique Manual for Bricks, Ceramics & Clay Product Manufacturing* (Environment Australia, 1998)

Factory fugitive dust: *National Pollutant Inventory Emission Estimation Technique Manual for Bricks, Ceramics & Clay Product Manufacturing* (Environment Australia, 1998)

Southern area fugitive dust: *National Pollutant Inventory Emission Estimation Technique Manual for Mining*, (Environment Australia, 2012)

USEPA AP42 Chapter 13.2.2 Unpaved Roads (2006)

USEPA AP42 Chapter 13.2.4 Aggregate Handling and Storage Piles (2006)

USEPA AP42 Chapter 11.19.2 Crushed Stone Processing and Pulverized Mineral Processing (2004)

Particle size distributions for particulate emissions from the kilns were modelled in accordance with *AP42 Chapter 11.3 Brick and Structural Clay Product Manufacturing* (1997) for sawdust kilns (most relevant available data) including for the purposes of interpolating PM₁₀ and PM_{2.5} emission rate from the TSP emission limits. For fugitive dust from the raw materials handling activities the modelled particle size distribution was derived from the following data included in the *USEPA AP42 Chapter 13.2.4 Aggregate handling and Storage Piles* (2006).

Appropriate control factors were applied for fugitive dust emissions based upon observations on-site (i.e. water truck and enclosure within buildings) and the requirements of the Environmental Authorities based upon the control factors specified in the *National Pollutant Inventory Emission Estimation Technique Manual for Mining*, (Environment Australia, 2012).

⁸ Default 3kg/brick average applied as per NPI Manual

The speciation of Chromium (III) (80%) and Chromium (VI) (20%) was based upon the recommendation of *UK Particulate and Heavy Metal Emissions from Industrial Processes* (Passant et. al. for DEFRA, 2002) for liquid fuel combustion sources.

The adopted emission estimation techniques applied are consistent with the CityPlan 2014 Air Quality Planning Scheme Policy.

3.2.3 EMISSION RATES AND PARAMETERS

Emissions from the kilns have been represented as stack (point) sources. Austral Bricks Environmental Authority for the 'clay or ceramic product manufacturing' activity⁹ specifies the minimum stack release height, exit velocities and efflux temperatures for the kiln Release Points A1 and A2 (refer **Section 3.2** above).

Stack diameters for Release Points A1 and A2 have been estimated as 1.4 metres based upon aerial photograph analysis and review of QLD Government Point Cloud Lidar.

The modelled emission parameters for Austral Bricks kiln Release Points A1 and A2 are summarised in **Table 6**.

Table 6: Summary of Modelled Emission Parameters for Austral Bricks Kiln Stacks

PARAMETER	RELEASE POINT A1	RELEASE POINT A2
Emission Temperature (°C)	126	124
Emission Velocity at Release Point (m/s)	8.7	9.5
Release Height (m AGL)	30	15
Stack Diameter (m)	1.4	1.4

For the purposes of this assessment both kilns have been represented as operating concurrently with emission rates based upon a target future production rate of 65 million bricks per year.

⁹ EPA Permit IPDE01104308

Particulates and Nitrogen Oxides emission rates have been modelled at the maximum emission limit for each stack. Emissions derived from emission factors associated with the target future production rate of 65 million bricks per year have been split evenly between the two release points given the generally consistent stack diameters and minimum emission velocities.

A summary of the kiln emission estimation calculations is provided as **Attachment 5**.

The modelled emission rates from the point sources (kiln stacks) for each kiln are summarised in **Table 7** below.

A summary of the fugitive dust emission estimation calculations including the factory area and the southern raw materials stockpile area is provided as **Attachment 6**.

The modelled emission rates from the fugitive dust sources are summarised in **Table 8** for the factory area and **Table 9** for the southern area (material handling).

Table 7: Summary of Modelled Kiln Emissions - 65 Million Bricks per Year Future Target Scenario

SUBSTANCE	Emission Factor	Kilns A1 & A2	
		Emission Rate	
		Release Point A1	Release Point A2
	kg/tonne	g/s	g/s
Acetone	0.00085	2.62E-03	2.62E-03
Antimony & compounds	1.35E-05	4.16E-05	4.16E-05
Arsenic & compounds	1.55E-05	4.78E-05	4.78E-05
Benzene	0.00145	4.47E-03	4.47E-03
Beryllium & compounds	2.10E-07	6.47E-07	6.47E-07
Cadmium & compounds	7.50E-06	2.31E-05	2.31E-05
Carbon disulphide	2.15E-05	6.63E-05	6.63E-05
Carbon monoxide	0.6	1.85E+00	1.85E+00
Chlorine & compounds	0.00065	2.00E-03	2.00E-03
Chloroethane (ethyl chloride)	0.000235	7.25E-04	7.25E-04
Chromium (III) compounds	2.04E-05	6.29E-05	6.29E-05
Chromium (VI) compounds	5.10E-06	1.57E-05	1.57E-05
Ethylbenzene	2.20E-05	6.78E-05	6.78E-05
Hydrochloric acid	0.085	2.62E-01	2.62E-01
Lead & compounds	7.50E-05	2.31E-04	2.31E-04
Manganese	1.45E-04	4.47E-04	4.47E-04
Mercury & compounds	3.75E-06	1.16E-05	1.16E-05
Nickel & compounds	3.60E-05	1.11E-04	1.11E-04
Oxides of Nitrogen	Emission Limit	3.44E+00	3.76E+00
Total Suspended Particulates	Emission Limit	2.46E+00	2.69E+00
Particulate Matter 10.0 µm	Derived from Emission Limit	1.85E+00	2.02E+00
Particulate Matter 2.5 µm	Derived from Emission Limit	1.18E+00	1.29E+00
Phenol	4.30E-05	1.33E-04	1.33E-04
Styrene (ethenylbenzene)	1.00E-05	3.08E-05	3.08E-05
Sulfur dioxide	0.39	1.20E+00	1.20E+00
Tetrachloroethylene	1.40E-06	4.32E-06	4.32E-06
Toluene (methylbenzene)	0.0008	2.47E-03	2.47E-03
Total Volatile Organic Compounds	0.012	3.70E-02	3.70E-02
Xylenes (individual or mixed isomers)	6.25E-05	1.93E-04	1.93E-04

Table 8: Summary of Modelled Factory Area Fugitive Dust Emissions – 65 Million Bricks per Year Future Target Scenario

SUBSTANCE	FUGITIVE (FACTORY)				
	Primary Crusher		Grinding and Screening	Extrusion Line with fabric filter	Factory Fugitive
	6am to 6pm		24-hour		
	Emission Factor kg/tonne	Emission Rate g/s	Emission Factor kg/tonne	Emission Factor kg/tonne	Emission Rate g/s
Total Suspended Particulates	0.0006 (AP42)	1.29E-02	0.159 (estimate 200% PM ₁₀)	0.0036 (estimate 200% PM ₁₀)	1.0
Particulate Matter 10.0 µm	0.000295 (NPI)	6.37E-03	0.0795 (NPI 70% control)	0.0018 (NPI 70% control)	0.5
Particulate Matter 2.5 µm	0.00005 (AP42)	1.08E-03	0.00795 (estimate 10% PM ₁₀)	0.00018 (estimate 10% PM ₁₀)	0.05

Table 9: Summary of Modelled Southern Area Fugitive Dust Emissions – 65 Million Bricks per Year Future Target Scenario

SOURCE	OPERATING PERIOD	FUGITIVE (MATERIAL HANDLING SOUTHERN SITE)					
		TSP		PM ₁₀		PM _{2.5}	
		Emission Factor	Emission Rate g/s	Emission Factor	Emission Rate g/s	Emission Factor	Emission Rate g/s
Wind Erosion (Pit) (average per hour, refer detailed calculations)	24-hour	624 kg/ha/annum (NPI)	0.713 ¹⁰	312 kg/ha/annum (NPI 50% TSP from AP42 PSD)	0.356 ⁸	47 kg/ha/annum (NPI 7.5% TSP from AP42 PSD)	0.053 ⁸
Unpaved Road Emissions - Road truck imported material	6am to 6pm	1114.5 g/vkt (AP42 with watering 50%)	0.898	284 g/vkt (AP42 with watering 50%)	0.229	28.4 g/vkt (AP42 with watering 50%)	0.023
Unloading Road Trucks - imported material	6am to 6pm	1.19e-04 kg/tonne (AP42 adjusted from PM ₁₀ as per NPI PSD)	0.179	5.00e-05 kg/tonne (AP42)	0.085	1.25e-05 kg/tonne (AP42 assume 25% of PM ₁₀)	0.013
Material Handling / Stockpiling - scraper	6am to 6pm	17 kg/hr (NPI)	4.722	4.1 kg/hr (NPI)	1.139	1 kg/hr (NPI assume 25% of PM ₁₀)	0.285
Front end loader to dump truck	6am to 6pm	1.19e-04 kg/tonne (AP42 adjusted from PM ₁₀ as per NPI PSD)	0.0027	5.00e-05 kg/tonne (AP42)	0.0011	1.25e-05 kg/tonne (AP42 assume 25% of PM ₁₀)	0.0003
Unpaved Road Emissions - Dump truck (Southern Area) - (400m of 700m)	6am to 6pm	1883 g/vkt (AP42 with watering 50%)	1.133	535 g/vkt (AP42 with watering 50%)	0.322	53.5 g/vkt (AP42 with watering 50%)	0.032
Unpaved Road Emissions - Dump truck (Haul Road Area) - (200m of 700m)	6am to 6pm	1883 g/vkt (AP42 with watering 50%)	0.567	535 g/vkt (AP42 with watering 50%)	0.161	53.5 g/vkt (AP42 with watering 50%)	0.016
Unpaved Road Emissions - Dump truck - (Factory Area) - (100m of 700m)	6am to 6pm	1883 g/vkt (AP42 with watering 50%)	0.283	535 g/vkt (AP42 with watering 50%)	0.081	53.5 g/vkt (AP42 with watering 50%)	0.008
Unloading Truck at Tip Head	6am to 6pm	9.52E-06 kg/tonne (AP42 50% control for partial enclosure, adjusted from PM ₁₀ as per NPI PSD)	0.0002	4.00E-06 kg/tonne (AP42 50% control for partial enclosure)	0.00009	2.00e-06 kg/tonne (AP42 assume 25% of PM ₁₀)	0.00002

¹⁰ Average emissions stated, modelled emissions vary with wind speed

3.3 ROCHEDALE LANDFILL

3.3.1 OVERVIEW OF EMISSIONS

The Rochedale landfill is owned and operated by Brisbane City Council and receives putrescible residential waste. It is understood that the landfill is approaching capacity and the Rochedale landfill now only receives a limited volume of municipal waste generated within the Brisbane local government area, with the majority of municipal waste now transported to landfills in surrounding local government areas.

Review of QLD Globe and Google Earth imagery does however identify that landfill activities have not entirely ceased, and the presence of an active tipping area is observed where waste material is unloaded from trucks and compacted into the landform.

Provided below is a summary of relevant air pollutant emissions from the landfill operations.

Landfill – Odour Emissions

- Odour emissions from the active face where waste material is received
- Odour emission from leachate collection ponds

Landfill – Gas Combustion Air Pollutant Emissions

- Combustion emissions associated with operation of landfill gas engines
- Combustion emissions associated with operation of landfill gas flares

Landfill – Particulate Emissions

- Heavy vehicle movements on unsealed roads
- Material handling emissions from waste transfers
- Bulldozers compacting waste material into landform
- Wind erosion of exposed areas

3.3.2 ACTIVE FACE EMISSIONS

Odour emissions from landfills are typically generated at the active tipping face, where waste material is unloaded from vehicles, transferred by frontend loader and then compacted by a wheeled roller to achieve the desired compaction rate within the landform.

Minimising the size of the active tipping face can assist with minimising odour emissions and the generation of leachate under periods of rainfall. A control method typically employed at putrescible waste landfills is application of 'night cover', to minimise odour emissions during the night period. The tipping face is open and exposed during the day while waste is delivered by trucks to the pit and compacted into the landform. Clay or soil will be spread by earthmoving machinery or covers deployed over the tipping face to minimise release of odours during the night period where atmospheric conditions are less favourable to dispersal of odours in the surrounding receiving environment.

From review of QLD Globe aerial imagery, MWA Environmental has nominated an active face area at the Rochedale landfill of approximately 50 metres x 50 metres, with an area of 2,500m².

MWA Environmental have reviewed a range of odour emission rates for active tip face areas published in several odour impact assessments of landfills. A conservative odour emission rate of 0.75 ou/m²/s has been adopted considering odour emission rates from five waste facilities, some of which receive putrescible waste.

The difference in the odour emission rates for landfill sites between active face and intermediate cover for the night period is indicatively 10%. An odour emission rate at 10% of the day period has been applied over the period 6pm to 6am, representing application of night cover applied to the active tip face.

Summarised in **Table 10** are the odour emission from the active face applied to the assessment.

Table 10: Active Face Odour Emission Rates

Source	Emission Rate	Units
Active Face (day)	1875	odour units per second
Covered Active Face (night)	187.5	odour units per second

The conservative assumptions applied to this assessment are likely to overestimate the potential odour impacts generated from the active tip face; however, are considered appropriate for land use planning purposes.

The location of the modelled odour emission sources at the landfill are provided in **Attachment 7**.

3.3.3 LEACHATE POND EMISSIONS

A series of leachate and stormwater collection and treatment ponds are located in the southwest corner of the Rochedale Landfill site, for the storage and treatment of leachate generated from landfill operations.

Odour emissions from leachate storage have been conservatively represented by three area sources covering an area of 3,962m² from review of aerial imagery.

A conservative odour emission rate of 1.87 ou/m²/s has been adopted for representation of the leachate storage and leachate sumps. This odour emission rate has been measured at a large commercial scale soil conditioning and composting operations in South East Queensland, which is likely to contain a higher proportion of organics within the leachate, and, when combined with the conservatively large estimate of surface area, is considered to likely be conservative for application to the landfill site.

The following odour emission rates in **Table 11** have been adopted for representation of leachate emissions.

Table 11: Leachate Odour Emission Rates

Source	Emission Rate	Units
Leachate ponds (x3)	7,408	odour units per second

The location of the modelled odour emission sources at the landfill are provided in **Attachment 7**.

3.3.4 PARTICULATE EMISSIONS

The following sources were represented in the CALPUFF Model:

- Heavy vehicle route on access roads (paved) as a series of road source links
- Heavy vehicle route to tip-face (unpaved) as a series of road sources;
- Wind erosion from unsealed areas as area sources;
- Unloading of waste material at tip-face as an area source;
- Front-end loader moving waste material at tip-face as an area source; and
- Bulldozer on waste material as an area source;

Dust emissions from each of these sources have been represented in the CALPUFF model as area sources with appropriate locations, sizes and initial dispersion parameters to represent the releases.

The locations of the modelled dust emission sources for representation of the landfill are provided in **Attachment 7**.

Emissions rates for each of the above sources have been calculated using published emission factors from the following references:

- NPI *Emission Estimation Technique Manual for Mining v3.1*, Environment Australia (2012);
- USEPA AP42 Chapter 13.2.2 *Unpaved Roads* (2006);
- USEPA AP42 Chapter 13.2.1 *Paved Roads* (2002);
- USEPA AP42 Chapter 11.19.2 *Crushed Stone Processing and Pulverized Mineral Processing* (2004); and
- USEPA AP42 Chapter 13.2.4 *Aggregate Handling and Storage Piles* (2006).

Annual emissions from wind erosion of exposed surfaces at the site have been estimated using the method presented in the NPI *Emission Estimation Technique Manual for Mining v3.1*, wind erosion emissions have only been represented when wind speed is greater than a 5.4m/s threshold.

A summary of the emission calculations and emission rates is included as **Attachment 7**.

3.3.5 LANDFILL GAS POWER GENERATION EMISSIONS

Landfill gas is produced from the anaerobic decomposition of organic material within the engineered landform. The quantity and quality of the gas generated, will be subject to the age, extent of compaction and composition of waste material placed within the landform. At present a total of seven (7) landfill gas engines are present on the Rochedale Landfill site.

MWA Environmental has been advised by Council¹¹ that an additional three (3) landfill gas engines may be added in the future which would occur if the landfill gas generation rates were to increase.

Presented in **Table 12** and **Table 13** are stack exhaust parameters and emission rates adopted for this assessment based upon instructions from Brisbane City Council.

¹¹ Email correspondence from Mr Michael O'Reilly, Brisbane City Council, 23 April 2026

Table 12: Existing Landfill Gas Engine stack parameters and emission rates (g/s)

Parameter	Engine							Units	Reference
	GM1A	GM2A	GM3A	GM4A	GM5A	GM6A	GM7A		
Easting	512195	512193	512221	512236	512231	512266	512283	GDA2020	MWA Digitised
Northing	6951634	6951628	6951629	6951623	6951618	6951615	6951612	GDA2020	MWA Digitised
Stack height	7.6	7.6	7.6	7.6	7.6	7.6	7.6	metres	EA
Stack diameter	0.323	0.323	0.323	0.323	0.323	0.323	0.323	metres	EA
Exit temperature	510	510	510	486	560	510	510	°C	BCC
	783.15	783.15	783.15	759.15	833.15	783.15	783.15	°K	MWA Calc
Exit velocity	40	40	40	32	45	40	40	m/s	BCC
Emission rates									
Nitrogen oxides as NO ₂	0.85	0.85	0.85	0.85	0.85	0.85	0.85	g/s	EA
Carbon monoxide	2.38	2.38	2.38	2.38	2.38	2.38	2.38	g/s	EA

Table 13: Potential Future Landfill Gas Engine stack parameters and emission rates (g/s) replicating Sources GM6A and GM7A

Parameter	Engine			Units	Reference
	GM8A	GM9A	GM10A		
Easting	512300	512316	512333	GDA2020	MWA Digitised
Northing	6951609	6951606	6951603	GDA2020	MWA Digitised
Stack height	7.6	7.6	7.6	metres	EA
Stack diameter	0.323	0.323	0.323	metres	EA
Exit temperature	510	510	510	°C	BCC
	783.15	783.15	783.15	°K	MWA Calc
Exit velocity	40	40	40	m/s	BCC
Emission rates					
Nitrogen oxides as NO ₂	0.85	0.85	0.85	g/s	BCC advice
Carbon monoxide	2.38	2.38	2.38	g/s	BCC advice

Presented in **Table 14** are the exhaust parameters and emission rates adopted for the assessment of each of the four (4) landfill gas flares.

Table 14: Flare stack parameters and emission rates

Parameter	Flare	Units	Reference
Stack height	8.4	metres	MWA measured from Point Cloud Lidar
Stack diameter	1.7	metres	MWA measured from Point Cloud Lidar
Exit temperature	500	°C	EA Limit for indicative site ¹²
	773.15	°K	MWA Calc
Exit velocity	5	metres/second	EA Limit for indicative site
Emission rates			
Nitrogen oxides as NO ₂	0.37	grams/second	EA Limit for indicative site
Carbon monoxide	4.6	grams/second	EA Limit for indicative site

¹² EPPR00779613

3.4 MODELLING METHODOLOGY

3.4.1 METEOROLOGICAL MODELLING

To enable assessment of air pollutant and odour concentrations at sensitive used on the proposed development site, detailed dispersion modelling has been conducted using the TAPM / CALMET / CALPUFF modelling suite.

Following accepted methodology for detailed assessment, the TAPM software was utilised to develop a prognostic meteorological model which generated a year of representative hourly meteorological data for the region.

TAPM has been used to predict meteorological parameters specific to the region including temperature, wind speed, wind direction and stability classification. The model accesses databases of surface characteristics (terrain height, soil and vegetation) and synoptic weather analyses provided by CSIRO to carry out these analyses. TAPM is able to process the output data to produce input meteorological data files suitable for input to the CALMET / CALPUFF modelling system i.e. hourly predictions of meteorological parameters over a full year and generation of surface, upper air and geophysical data files.

Technical discussion of the model algorithms, inputs and model validation studies are provided in the *Part 1: Technical Paper* (Hurley, 2002) and *Part 2: Summary of Verification Studies* (Hurley et al, 2002)^{13,14}.

The centre coordinates for the model grid were Latitude -27°28'30" and Longitude 153°1'. The following nested model grids were applied to the TAPM modelling:

- 40 x 30 km grid (total area 1200 km x 1200 km)
- 40 x 10 km grid (total area 400 km x 400 km)
- 40 x 3 km grid (total area 120 km x 120 km)
- 40 x 1 km grid (total area 40 km x 40 km)

Twenty-five vertical grid levels were modelled.

The TAPM model was set up to generate a site-specific meteorological data file for the locality, based upon synoptic analysis data for the representative Year 2021, as provided by CSIRO. A detailed meteorological evaluation has been undertaken on Bureau of Meteorology (BoM) meteorological observations recorded at Brisbane (Kangaroo Point) station.

¹³ Hurley, P.J. (2002) The Air Pollution Model (TAPM) Version 2: User Manual. Aspendale: CSIRO Atmospheric Research Internal Paper.

¹⁴ Hurley, P.J. (2002) The Air Pollution Model (TAPM) Version 2: Part 1: Technical Description. Aspendale: CSIRO Atmospheric Research Technical Paper.

Included in **Attachment 8** is a summary of the meteorological analysis undertaken to select a representative model year for undertaking dispersion modelling.

Observed wind speeds and wind directions for the Bureau of Meteorology (BoM) stations at Brisbane Airport, Kangaroo Point and Archerfield Airport were incorporated into the TAPM model as assimilation data.

The TAPM output was processed using the CALTAPM software to produce a 3-dimensional data file suitable for input to the diagnostic CALMET model as an 'initial guess field'. The regional CALMET model further resolved the prognostic meteorology to a finer terrain, land use and soil type resolution of 250 metres over a 32.5 x 32.5 km area covering the subject site and surrounding region.

To further resolve the local terrain influences on plume transport and dispersion, a nested CALMET model was configured over an area covering the subject site and surrounding local area for the purpose of capturing variations in terrain and local scale dispersion modelling. The nested CALMET model further resolved the prognostic meteorology to a finer terrain, land use and soil type resolution of 100 metres over a 5km x 5km area covering the subject site and surrounding sensitive land uses.

Terrain information has been sourced from the *Geoscience Australia Digital Elevation Model (DEM) 5 Metre Grid of Australia derived from LiDAR*. The dataset consists of 1 metre resolution LiDAR-derived DEMs which have been compiled and resampled to 5 metre resolution datasets for each survey area. MWA Environmental has further resampled the dataset to the 100-metre meteorological grid spacing of the CALMET grid.

To characterise the land use for CALMET, the relatively low-resolution Global Land Cover Characterization (GLCC) database over the subject site was initially inspected. CALMET has specific land use characterisations which are applied to each grid cell in the geophysical data file (GEO.DAT). Visual inspection of the dominant land use categories across the inner CALMET area against aerial imagery has identified "Urban", "Forest" and "Rangeland" as the dominant land use categories present.

Included in **Attachment 9** are graphical representations of the terrain and land use categorisation within the CALMET meteorological model.

Meteorological data used in the model including TAPM and CALMET files can be supplied to Council upon request.

Analysis of the CALMET derived meteorology for the site including a wind rose, wind frequency graph, monthly average temperatures graph and tabulated stability class analysis is contained in **Attachment 10**.

3.4.2 DISPERSION MODELLING

The CALPUFF model was set up to model dispersion within a 1.8 km x 1.5 km area covering the proposed development site, Austral Bricks facility and the Rochedale Landfill. A gridded receptor grid of 50 metre spacing over the modelling domain was modelled in CALPUFF.

The CALPUFF Model has been utilised to assess the potential air pollutant and odour concentrations at the proposed development considering emissions released from Austral Bricks and the Rochedale Landfill.

The dispersion modelling has considered discrete receptor located on the boundary of the proposed sensitive residential uses. Modelled discrete receptor locations are presented in **Figure 5**.

The modelling intent is to determine whether the relevant air quality objectives will be achieved at the proposed Low-Medium Density Residential precinct considering the addition emissions from Austral Bricks and the Rochedale Landfill to the ambient concentrations measured by the regional state government monitoring sites.

The ambient air pollutant concentrations presented in **Section 3.5** were added to the dispersion modelling as appropriate background concentrations.

Building wake effects have been considered for the significant buildings surrounding the Kiln stacks on the Austral site and the landfill gas engines on the Rochedale Landfill site. The building locations and elevations were input to the dispersion model using the BPIP utility for CALPUFF.

3.4.3 CONVERSION OF OXIDES OF NITROGEN

Potential air quality impacts associated with discharge of air pollutant emission from the Austral Brick kilns and the Rochedale landfill gas engines principally relate to local scale dispersion. The chemical transformation of Oxides of Nitrogen (NO_x) to Nitrogen Dioxide (NO_2) is expected to be limited due to the short distances and transport time between the source and surrounding uses.

Application of the Ozone Limiting Method has been undertaken in accordance with the prescribed Brisbane City Council methodology to determine the resultant NO_2 concentrations at surrounding uses.

Reference has been made to the USEPA Nitrogen Dioxide / Total Nitrogen Oxides In-Stack Ratio (ISR) Database¹⁵. A conservative NO₂ / NO_x in-stack ratio of 7% has been adopted considering representative sampling of 26 diesel powered reciprocating engines.

A cumulative assessment has been undertaken which has considered the air pollutant emissions from the future ten (10) landfill gas engines plus representative ambient air monitoring concentrations representative of the surrounding existing environment.

3.5 AMBIENT AIR QUALITY

The Queensland Government operates a network of ambient air quality monitoring stations across the state.

Key air pollutant emissions released from Austral Bricks and the Rochedale landfill have been identified in **Section 3.2 and Section 3.3**.

Reference has been made to particulate monitoring undertaken at Rocklea. The Rocklea air monitoring station is described by DETSI as a 'Neighbourhood' station. The Rocklea air monitoring station has historically been preferred by BCC for application to air quality assessments.

Reference has been made to Sulfur dioxide monitoring undertaken at Springwood. The Springwood air monitoring station is described by DETSI as a 'Neighbourhood' station.

The South Brisbane air monitoring station is described by DETSI as a 'Peak' station. This station is indicative of peak concentrations adjacent a heavily trafficked roadside in an inner-city location. The South Brisbane monitoring location is considered by MWA Environmental to be a 'roadside' location that is representative only of air quality adjacent to the specific highly trafficked environments within which they are located.

Reference has been made to monitoring of Benzene, Toluene, Xylenes (BTEX) undertaken at Memorial Park, Gladstone. The Memorial Park, Gladstone air monitoring station is described by DETSI as a 'Neighbourhood' station. Monitoring of BTEX previously was undertaken at Springwood, however is now exclusively undertaken at Gladstone.

¹⁵ USEPA (2017) Nitrogen Dioxide/Nitrogen Oxide In-Stack Ratio (ISR) Database, Source: <https://www.epa.gov/scram/nitrogen-dioxidenitrogen-oxide-stack-ratio-isr-database>

Reference has been made to Nitrogen Dioxide and Ozone monitoring undertaken at Cannon Hill. The Cannon Hill air monitoring station is described by DETSI as a 'Peak' station. Hourly measurements of Nitrogen Dioxide and Ozone have been applied contemporaneously as part of the Ozone limiting method for assessing the conversion of Oxides of Nitrogen to Nitrogen Dioxide. Statistics for the year 2021 have been adopted, with measurements at Cannon Hill conservatively higher than measured at Rocklea for the same period.

An analysis of ambient air quality data for five years of monitoring has been undertaken. A summary of the ambient air quality data for inclusion in the dispersion modelling predictions as background concentrations is presented in **Table 15**.

Table 15: Ambient Air Pollutant Concentrations

Air Pollutant	Averaging Period	Concentration ($\mu\text{g}/\text{m}^3$)	Reference
Benzene	1-hour	4.05	Highest 1-hour average 70 th percentile for 2020 to 2024 at Memorial Park
	Annual	3.1	Highest Annual average for 2020 to 2024 at Memorial Park
Nitrogen Dioxide	1-hour	16.4	Highest 1-hour average 70 th percentile for Model Year 2021 at Cannon Hill
	Annual	14.1	Highest Annual average for Model Year 2021 at Cannon Hill
Ozone ¹⁶	1-hour	49.3	1-hour average 70 th percentile for Model Year 2021 at Cannon Hill
	Annual	39.4	Annual average for Model Year 2021 at Cannon Hill
Total Suspended Particulates	Annual	26.6	Assumption of double Highest PM ₁₀ Annual Average for 2020 to 2024 at Rocklea
Particulate Matter PM ₁₀	24-hour	15.4	Highest 24-hour average 70 th percentile for 2020 to 2024 at Rocklea
	Annual	13.3	Highest Annual average for 2020 to 2024 at Rocklea
Particulate Matter PM _{2.5}	24-hour	7.1	Highest 24-hour average 70 th percentile for 2020 to 2024 at Rocklea
	Annual	6.2	Highest Annual average for 2020 to 2024 at Rocklea
Sulphur Dioxide	1-hour	0.57	Highest 1-hour average 70 th percentile for 2020 to 2024 at Springwood
	24-hour	0.98	Highest 24-hour average 70 th percentile for 2020 to 2024 at Springwood
	Annual	0.75	Highest Annual average for 2020 to 2024 at Springwood
Carbon Monoxide	8-hour	222	Highest 8-hour average 70 th percentile for 2020 to 2024 at South Brisbane
Toluene	1-hour	5.9	Highest 1-hour average 70 th percentile for 2020 to 2024 at Memorial Park
	24-hour	5.7	Highest 24-hour average 70 th percentile for 2020 to 2024 at Memorial Park
	Annual	5.0	Highest Annual average for 2020 to 2024 at Memorial Park
Xylenes	24-hour	26.2	Highest 24-hour average 70 th percentile for 2020 to 2024 at Memorial Park
	Annual	23.2	Highest Annual average for 2020 to 2024 at Memorial Park

¹⁶ For conversion of Oxides of Nitrogen by the Ozone Limiting Method

3.6 RELEVANT AIR QUALITY PLANNING CRITERIA

The following **Table 16** summarises the relevant air quality (planning) criteria based upon the CityPlan 2014 *Industrial Amenity Overlay Code*.

Table 16: Adopted Air Quality Planning Criteria

POLLUTANT	AVERAGING PERIOD	Air Quality Planning Criteria (µg/m ³)
Nitrogen dioxide	1-hour	250
	Annual	62
Sulfur dioxide	1-hour	570
	24-hour	230
	Annual	57
TSP	Annual	90
PM ₁₀	24 hour	50
	Annual	25
PM _{2.5}	24-hour	25
	Annual	8
Carbon monoxide	8 hours	11,000
Acetone	1-hour	22,000
Antimony	1-hour	9
Arsenic (as PM ₁₀)	1-hour	0.09
	Annual	0.006
Benzene	Annual	10
Beryllium	1-hour	0.004
Cadmium (as PM ₁₀)	Annual	0.005
Carbon disulfide	1-hour	183
	24-hour	110
Chlorine	1-hour	50
Chromium III compounds	1-hour	9
Chromium VI compounds	1-hour	0.09
Ethyl chloride (chloroethane)	1-hour	48,000
Ethylbenzene	1-hour	8,000
Hydrogen chloride	1-hour	140
Lead (as TSP)	Annual	0.5
Manganese (as PM ₁₀)	Annual	0.16
Mercury inorganic	1-hour	1.8
	Annual	1.1
Mercury organic	1-hour	0.18
Nickel (PM ₁₀)	Annual	0.02
Phenol	1-hour	20
Styrene	1-hour	65
	7 days	280
Tetrachloroethylene (perchloroethylene)	1-hour	7,487
	Annual	270
Toluene	1-hour	958
	24-hour	4,100
	Annual	410
Xylenes (Total)	24-hour	1,200
	Annual	950

The following **Table 17** summarises the relevant odour criteria based upon the CityPlan 2014 *Industrial Amenity Overlay Code*.

Table 17: Adopted Odour Criteria

POLLUTANT	AVERAGING PERIOD	Criteria (odour units-OU)
Odour	1-hour average 99.5 th percentile	2.5 odour units

3.7 RESULTS OF DISPERSION MODELLING

A summary of the highest predicted air pollutant concentrations at the boundary of the proposed Low-Medium Density Residential zone multiple dwelling site is summarised in **Table 10**.

The predicted air pollutant concentrations include the relevant ambient concentrations as per **Table 8**.

Table 18: Predicted Air Pollutant Concentrations at the Proposed Development – including ambient

Pollutant	Averaging Period	Predicted Concentration for Most Exposed Receptor ($\mu\text{g}/\text{m}^3$)	Air Quality Planning Criteria ($\mu\text{g}/\text{m}^3$)	Highest Percentage of Air Quality Criteria (%)
Acetone	1-hour	0.05	22,000	<1%
Antimony	1-hour	8.0E-04	9	<1%
Arsenic (PM_{10})	1-hour	9.1E-04	0.09	1%
	Annual	5.2E-06	0.006	<1%
Benzene	1-hour	4.102	29	14%
	Annual	3.101	5.4	57%
Beryllium	1-hour	9.1E-04	0.004	23%
Cadmium (PM_{10})	Annual	2.5E-06	0.005	<1%
Carbon disulphide	1-hour	1.3E-03	183	<1%
	24-hour	1.5E-04	110	<1%
Chlorine	1-hour	0.04	50	<1%
Ethyl chloride (chloroethane)	1-hour	0.01	48,000	<1%
Chromium III compounds	1-hour	1.2E-03	9	<1%
Chromium VI compounds	1-hour	3.0E-04	0.09	<1%
Carbon monoxide	8 hours	1006.0	11,000	9%
Ethylbenzene	1-hour	1.3E-03	8,000	<1%
Hydrogen chloride	1-hour	5.0	140	4%
Lead (TSP)	Annual	2.5E-05	0.5	<1%
Manganese (PM_{10})	Annual	4.9E-05	0.16	<1%
Mercury inorganic	1-hour	2.2E-04	1.8	<1%
	Annual	1.3E-06	1.1	<1%
Nickel (PM_{10})	Annual	1.2E-05	0.02	<1%

Pollutant	Averaging Period	Predicted Concentration for Most Exposed Receptor ($\mu\text{g}/\text{m}^3$)	Air Quality Planning Criteria ($\mu\text{g}/\text{m}^3$)	Highest Percentage of Air Quality Criteria (%)
Nitrogen dioxide	1-hour	116.2	250	46%
	Annual	21.8	62	35%
Phenol	1-hour	2.5E-03	20	<1%
PM ₁₀	24-hour	39.8	50	80%
	Annual	16.7	25	67%
PM _{2.5}	24-hour	13.4	25	54%
	Annual	7.2	8	90%
Sulfur dioxide	1-hour	23.4	570	4%
	24-hour	11.1	230	5%
	Annual	2.0	57	3%
Styrene	1-hour	5.9E-04	65	<1%
	7 days	1.4E-05	280	<1%
Tetrachloroethylene (perchloroethylene)	1-hour	8.3E-05	7,487	<1%
	Annual	4.7E-07	270	<1%
Toluene	1-hour	6.0	958	1%
	24-hour	5.7	4,100	<1%
	Annual	5.0	410	1%
TSP	Annual	35.6	90	40%
Xylenes (Total)	24-hour	26.21	1,200	2%
	Annual	23.201	950	2%
Odour	1-hour average 99.5 th percentile	1.3 odour units	2.5 odour units	52%

Contour plots presenting the predicted odour concentrations from the Rochedale landfill operations and the worst-case cumulative assessment of Austral Bricks and the Rochedale Landfill for Particulates and Nitrogen Dioxide are provided in **Attachment 11**.

All other pollutant concentrations are predicted to be a small fraction of the relevant air quality (planning) criteria at the proposed development site and thus no detailed graphical analysis is warranted.

Based upon the detailed air quality assessment undertaken, with a conservative worst-case cumulative assessment of Austral Bricks and the Rochedale Landfill operating at their respective licence limits, demonstrates that the relevant CityPlan 2014 Industrial Amenity Overlay Code air quality (planning) criteria and odour criteria will be satisfied at the subject site.

4.0 CONCLUSIONS

MWA Environmental has been engaged to prepare an Industrial Amenity Overlay Code noise and air quality assessment for a proposed development at 184 Gardner Road, Rochedale. The subject site is located within the Brisbane City Plan 2014 *Industrial amenity investigation area sub-category* which triggers assessment against the *Industrial Amenity Overlay Code*.

The Industrial Amenity Investigation Area Overlay affecting the subject site is associated with the following uses:

- Austral Bricks facility, located to the west at 105 Gardner Road, Rochedale; and
- Rochedale Landfill, located to the north at 174 Gardner Road, Rochedale.

The assessment has been based upon noise monitoring, assessment of noise and air pollutant emissions and detailed noise and air quality modelling in accordance with the CityPlan 2014 *Industrial Amenity Overlay Code* and associated *Noise Impact Assessment Planning Scheme Policy* and *Air Quality Planning Scheme Policy*.

A detailed noise assessment has been undertaken including source noise monitoring, computer noise modelling and assessment against the relevant noise (planning) criteria referenced in Performance Outcome PO2 of the CityPlan 2014 Industrial Amenity Overlay Code. Based upon the assessment undertaken, noise associated with the operation of the Austral Bricks and Rochedale Landfill will satisfy the relevant CityPlan 2014 Industrial Amenity Overlay Code noise (planning) criteria with the recommended acoustic mitigation measures for multiple dwelling development on the proposed Low-Medium Density Residential zone.

A detailed air quality assessment has been undertaken including emission estimations based upon Brisbane City Council instructions, Environmental Authority emission limits and published emission factors in accordance with the emissions estimation hierarchy specified in the CityPlan 2014 *Air Quality Planning Scheme Policy*. Modelling undertaken using TAPM/CALMET/CALPUFF software in accordance with methods accepted by Brisbane City Council for other assessments demonstrates that the relevant CityPlan 2014 Industrial Amenity Overlay Code air quality (planning) criteria will be satisfied at the subject site considering operation of Austral Bricks and the Rochedale Landfill.

As such, the site-specific assessment undertaken demonstrates that the proposed development satisfies the requirements of Performance Outcomes PO1 and PO2 of the CityPlan 2014 Industrial Amenity Overlay Code considering the operation of Austral Bricks and the Rochedale Landfill.

**MWA Environmental
17 July 2026**

FIGURES



LEGEND

SITE LOCATION

DRAWING REFERENCE

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REGIONAL AND RURAL DEVELOPMENT)
QLDGLOBE.

N

050100150m

CLIENT

GARDNER RD DEVELOPMENTS PTY LTD
C/- DEVELOPMENT DIRECTIVE

PROJECT

INDUSTRIAL AMENITY
OVERLAY CODE
NOISE AND AIR
QUALITY ASSESSMENT
PROPOSED INDUSTRIAL AND
RESIDENTIAL DEVELOPMENT
184, 198 & 202 GARDNER ROAD
AND 56 FARLEY ROAD
ROCHEDALE QLD

TITLE

SITE LOCATION
AND SURROUNDING
LAND USES

JOB

ROCHEDALE

FIGURE 1

JOB NO.

26049

DATE

17/07/26

DWG NUMBER

SCALE

1:5000 (A4)

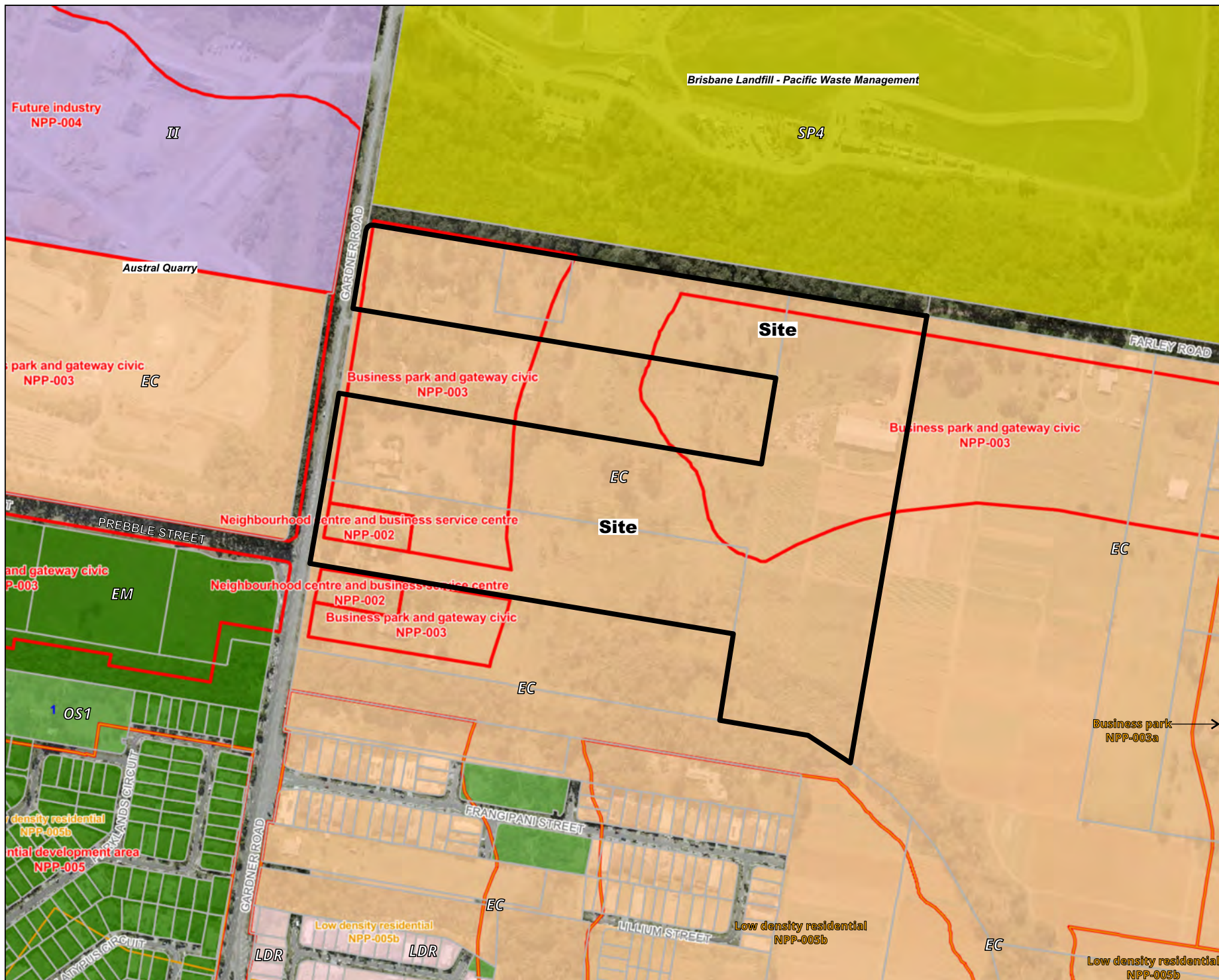
26049-1

REV.

mwa

ENVIRONMENTAL

Max Winders & Associates Pty Ltd t/as MWA Environmental
Level 8, 241 Adelaide St, Brisbane, GPO BOX 3137, Brisbane Qld 4001
P 07 3002 5500 E mail@mwaenviro.com.au
W www.mwaenviro.com.au
ABN 94 010 833 084



LEGEND

- SITE LOCATION
- ROCHEDALE URBAN COMMUNITY
- PRECINCT BOUNDARY
- ROCHEDALE URBAN COMMUNITY SUB-PRECINCT BOUNDARY

BCC CITY PLAN 2014 ZONING

- EC Emerging Community
- II Industry Investigation
- SP4 Special Purpose (Utility services)
- LDR Low Density Residential
- OS1 Open Space (Local)
- EM Environmental Management

DRAWING REFERENCE
BRISBANE CITY COUNCIL CITY PLAN 2014, INTERACTIVE MAPPING, ZONING & NEIGHBOURHOOD PLANS.

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PROJECT
**INDUSTRIAL AMENITY
OVERLAY CODE
NOISE AND AIR
QUALITY ASSESSMENT
PROPOSED INDUSTRIAL AND
RESIDENTIAL DEVELOPMENT
184, 198 & 202 GARDNER ROAD
AND 56 FARLEY ROAD
ROCHEDALE QLD**

TITLE
BCC ZONING MAP

JOB	ROCHEDALE	FIGURE 2
JOB NO.	26049	
DATE	17/07/26	DWG NUMBER
SCALE	1:5000 (A4)	26049-2
REV.		

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ENVIRONMENTAL

Max Winders & Associates Pty Ltd t/as MWA Environmental
Level 8, 241 Adelaide St, Brisbane, QPO BOX 3137, Brisbane Qld 4001
P 07 3002 5500 E mail@mwaenviro.com.au
W www.mwaenviro.com.au
ABN 94 010 833 084



LEGEND

— SITE LOCATION

■ NOISE DATALOGGER LOCATIONS (D1-D2)

DRAWING REFERENCE

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PROJECT

**INDUSTRIAL AMENITY
OVERLAY CODE
NOISE AND AIR
QUALITY ASSESSMENT
PROPOSED INDUSTRIAL AND
RESIDENTIAL DEVELOPMENT
184, 198 & 202 GARDNER ROAD
AND 56 FARLEY ROAD
ROCHEDALE QLD**

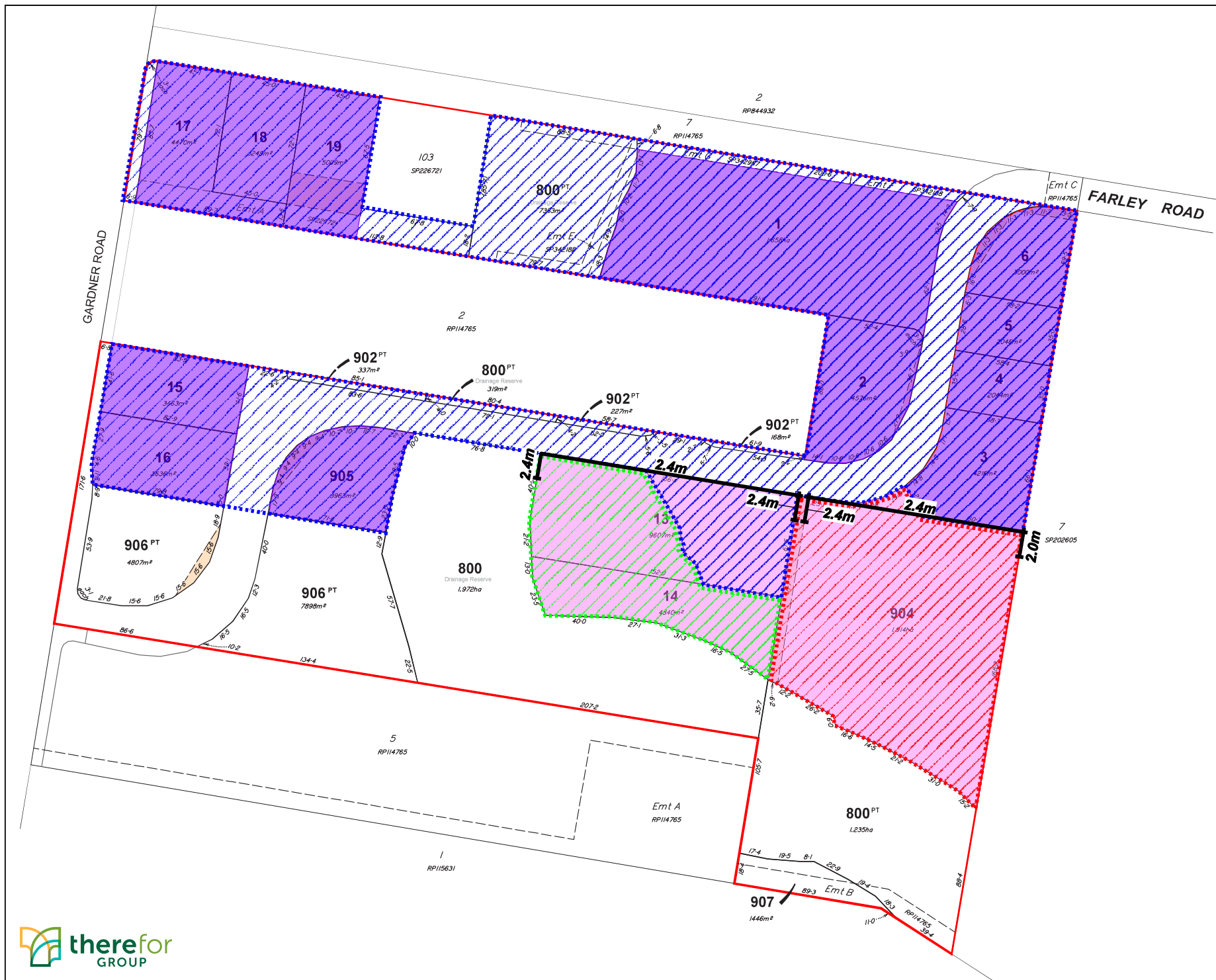
TITLE

**NOISE MONITORING
LOCATIONS**

JOB	ROCHEDALE	FIGURE 3
JOB NO.	26049	
DATE	17/07/26	
SCALE	1:4000 (A4)	
REV.		DWG NUMBER
		26049-3

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Max Winders & Associates Pty Ltd t/as MWA Environmental
Level 8, 241 Adelaide St, Brisbane, GPO BOX 3137, Brisbane Qld 4001
P 07 3002 5500 E mail@mwaenviro.com.au
W www.mwaenviro.com.au
ABN 94 010 833 084



LEGEND

— SITE BOUNDARY

2.4m BARRIER HEIGHT

ACOUSTIC BARRIER

DRAWING REFERENCE

THEREFOR GROUP, PROJECT 23-0329P/01,
PLAN OF RECONFIGURATION,
DRAWING 23-0329P-13, SHEET 1 OF 1,
REVISION A, 18/12/25.

0 25 50 75 100m

CLIENT
GARDNER RD DEVELOPMENTS PTY LTD
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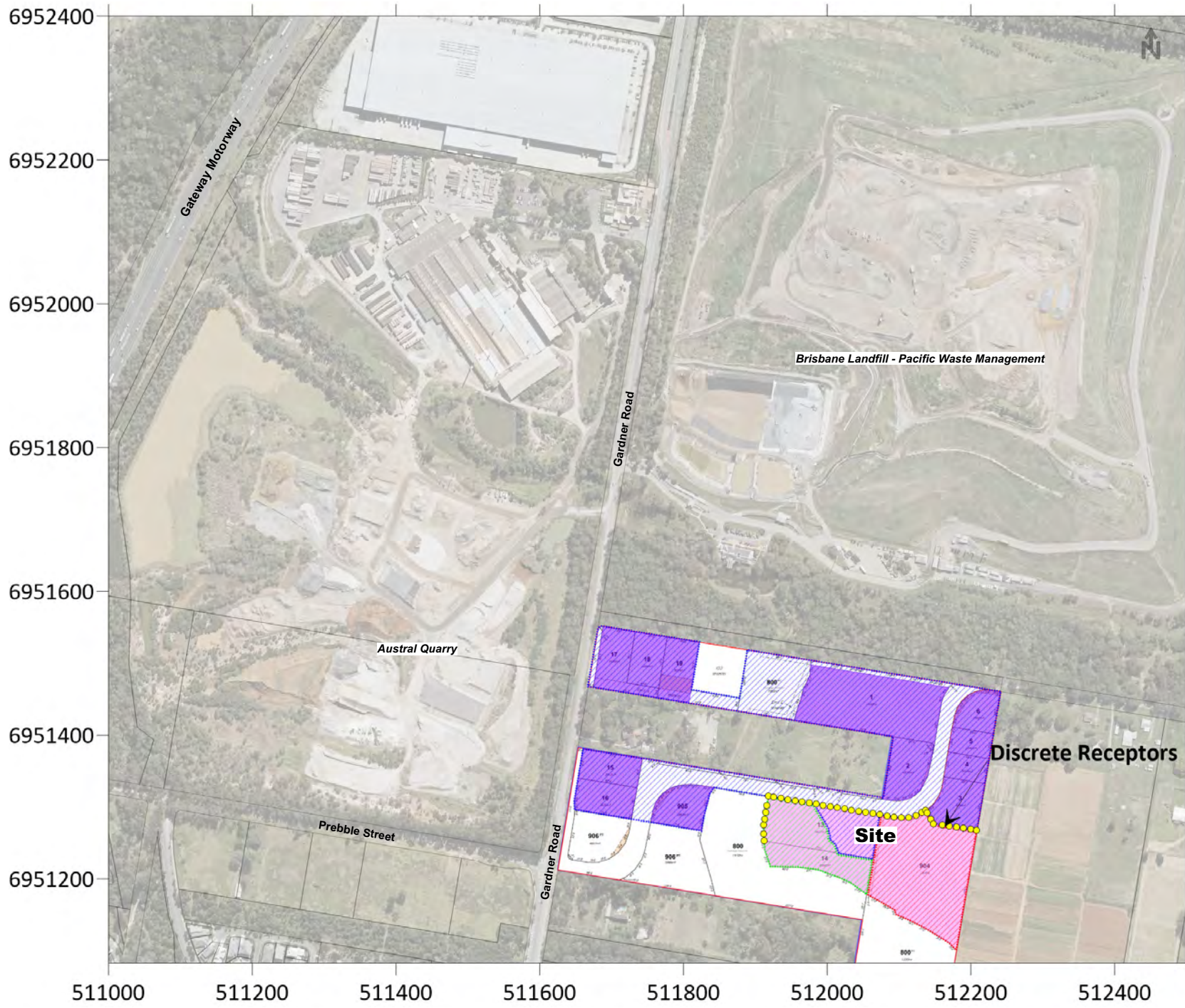
PROJECT
**INDUSTRIAL AMENITY
OVERLAY CODE
NOISE AND AIR
QUALITY ASSESSMENT**
PROPOSED INDUSTRIAL AND
RESIDENTIAL DEVELOPMENT
184, 198 & 202 GARDNER ROAD
AND 56 FARLEY ROAD
ROCHEDALE QLD

TITLE
**ACOUSTIC BARRIER
LOCATIONS**

JOB	ROCHEDALE	FIGURE 4
JOB NO.	26049	
DATE	17/07/26	DWG NUMBER
SCALE	1:3000 (A4)	26049-4
REV.		

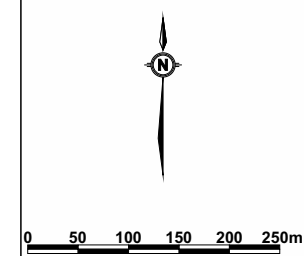
mwa
ENVIRONMENTAL

Max Winders & Associates Pty Ltd t/as MWA Environmental
Level 8, 241 Adelaide St, Brisbane, GPO BOX 3137, Brisbane Qld 4001
P 07 3002 5500 E mail@mwaenviro.com.au
W www.mwaenviro.com.au
ABN 94 010 833 084



LEGEND
 ● DISCRETE RECEPTORS

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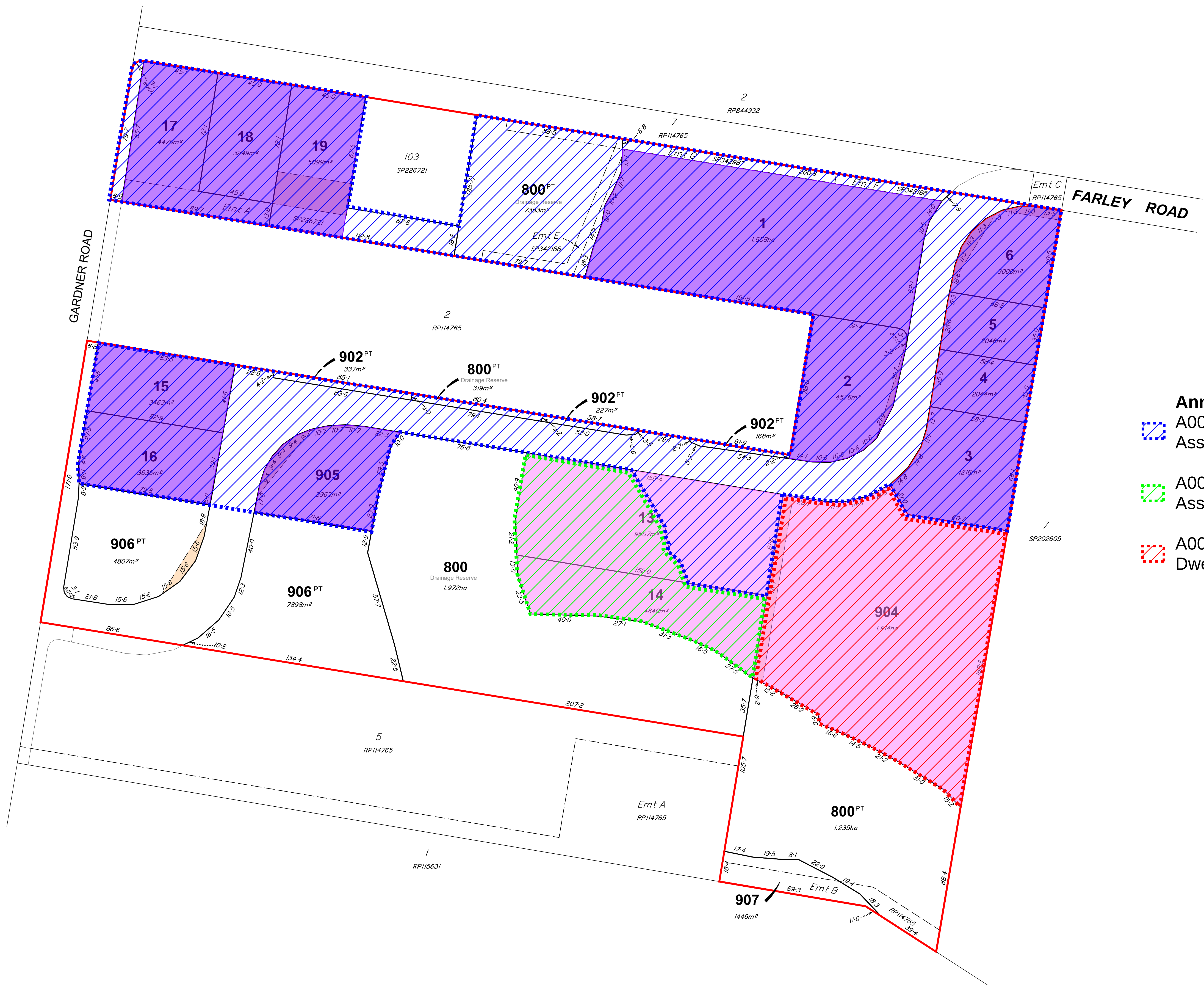
PROJECT
**INDUSTRIAL AMENITY
 OVERLAY CODE
 NOISE AND AIR
 QUALITY ASSESSMENT**
 PROPOSED INDUSTRIAL AND
 RESIDENTIAL DEVELOPMENT
 184, 198 & 202 GARDNER ROAD
 AND 56 FARLEY ROAD
 ROCHEDALE QLD

TITLE
**MODELLLED
 DISCRETE RECEPTOR
 LOCATIONS**

JOB	ROCHEDALE	FIGURE 5
JOB NO.	26049	
DATE	17/07/26	DWG NUMBER
SCALE	1:7500 (A4)	26049-5
REV.		

ATTACHMENT 1

Proposed Development Plans



- Annotations Legend**
- A006940193 (Land Use DA) (Under Assessment)
 - A006761597 (Waterway DA) (Under Assessment)
 - A005747839 (Lot 904 Multiple Dwellings (Approved))

Legend

- Site Boundary
- Proposed Easement

Notes

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2. Design subject to local authority approval & detailed engineering requirements, areas and dimensions are approximate only and are subject to survey. Therefore this drawing is not to be used for engineering design.

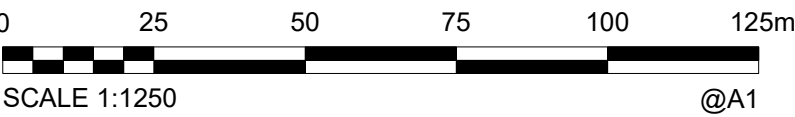
3. Indicative road pavement design subject to engineering review.

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Table of Development

Gross area of subject land.....	16.506ha
Area of proposed drainage reserve.....	3.974ha
Area of new road.....	2.055ha
Net area of subject land.....	10.477ha
(Excluding drainage reserve & new road)	
Number of proposed lots.....	20
Number of existing lots.....	1



therefor GROUP

CLIENT
Rochedale
Development Partners

PROJECT
198 & 202 Gardner Road
Rochedale

PROJECT NO.
23-0329P/01

DRAWING NAME
Plan of Reconfiguration

LOT DESCRIPTION
Part of Lots 3 & 4 on RP114765

LOCAL GOVERNMENT
Brisbane City

REVISION TABLE				
REV	DESCRIPTION	DRAWN	APPROVED	DATE
A	Original Issue	JC	MVI	18-12-2025

DRAWING NO.
23-0329P-13

SHEET NO.
1 of 1

REVISION
A

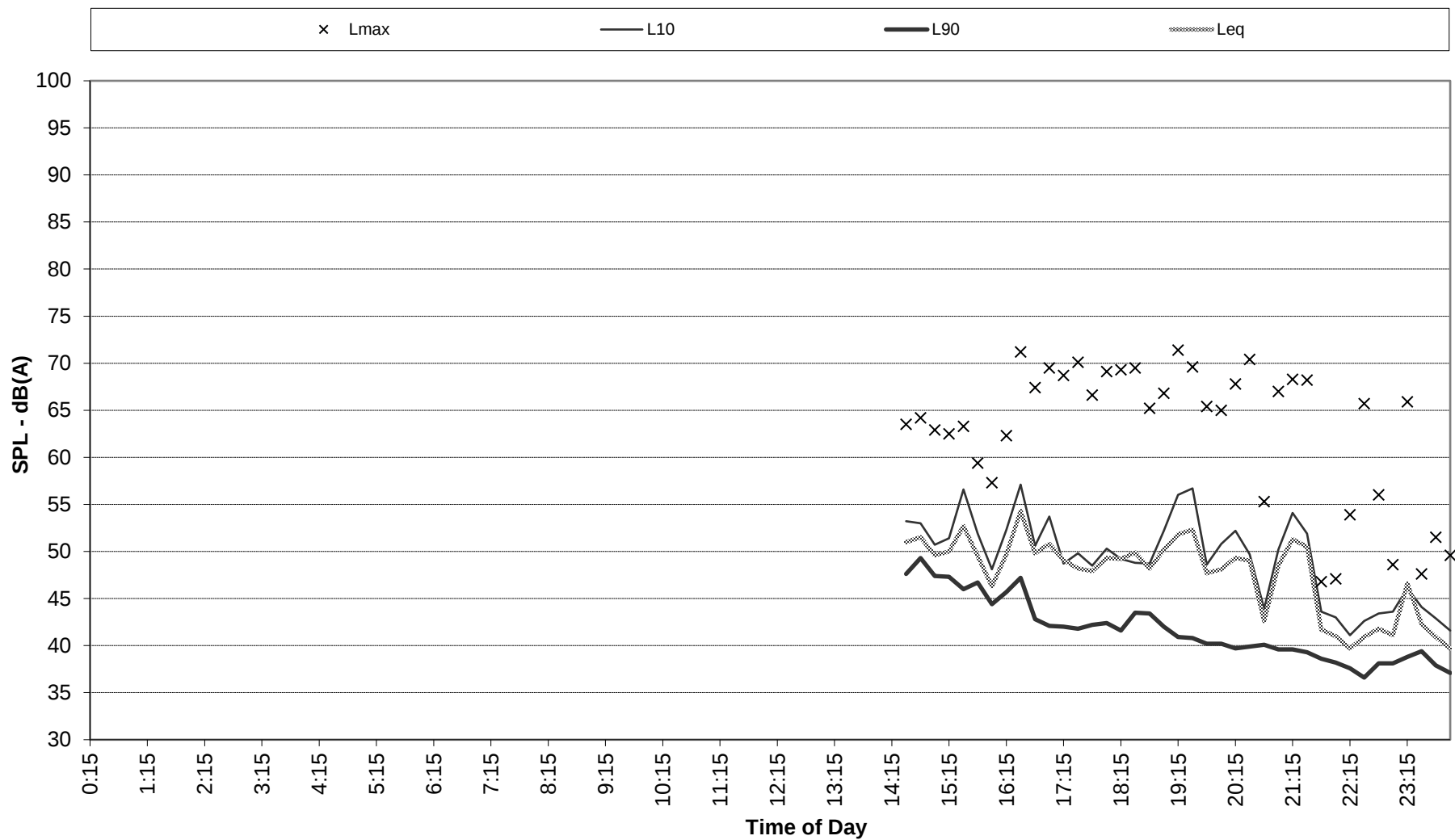
NORTH

ATTACHMENT 2

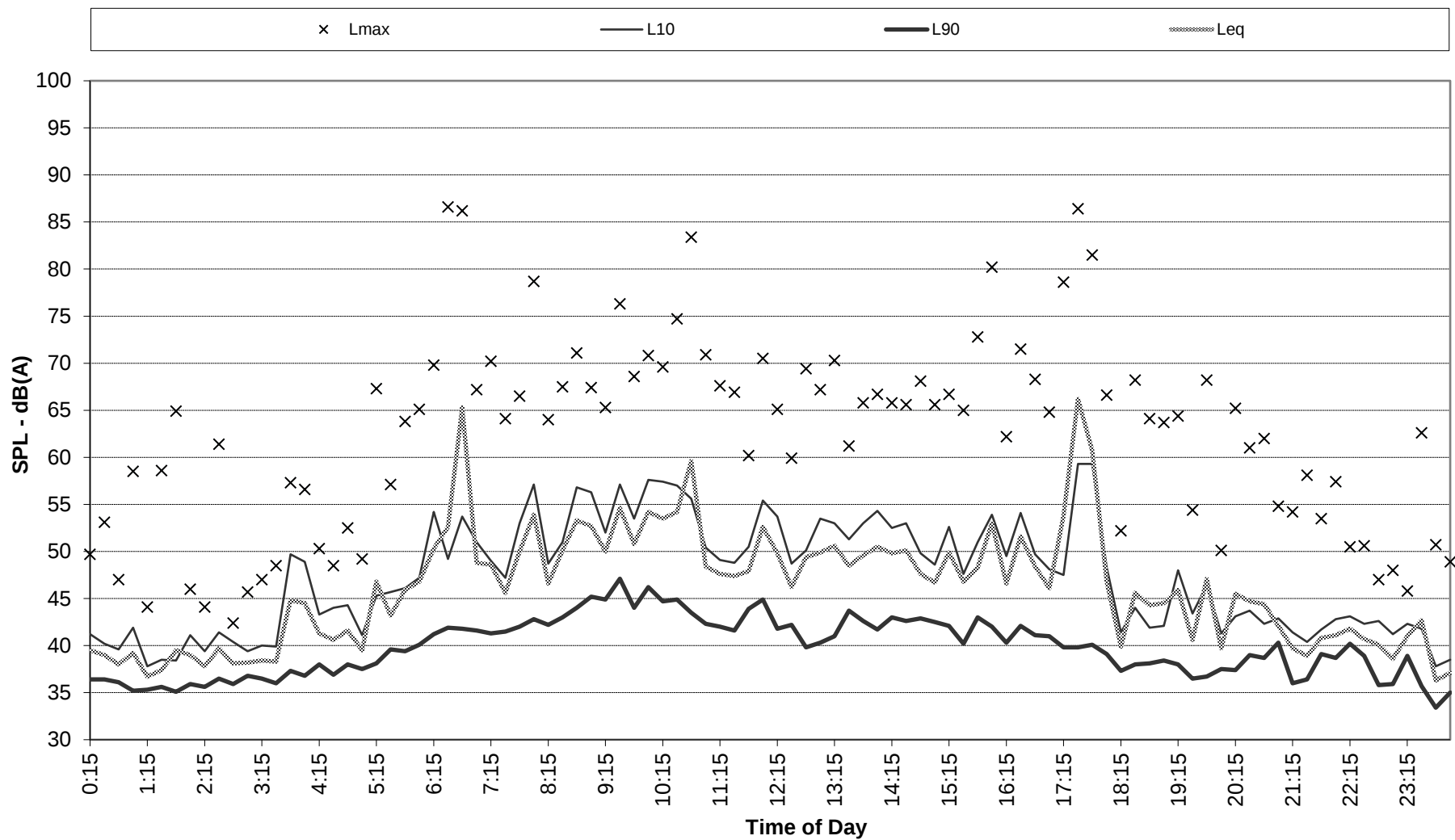
Noise Datalogger Results

Datalogger 1 – Eastern Part of Site
Datalogger 2 – Western Part of Site

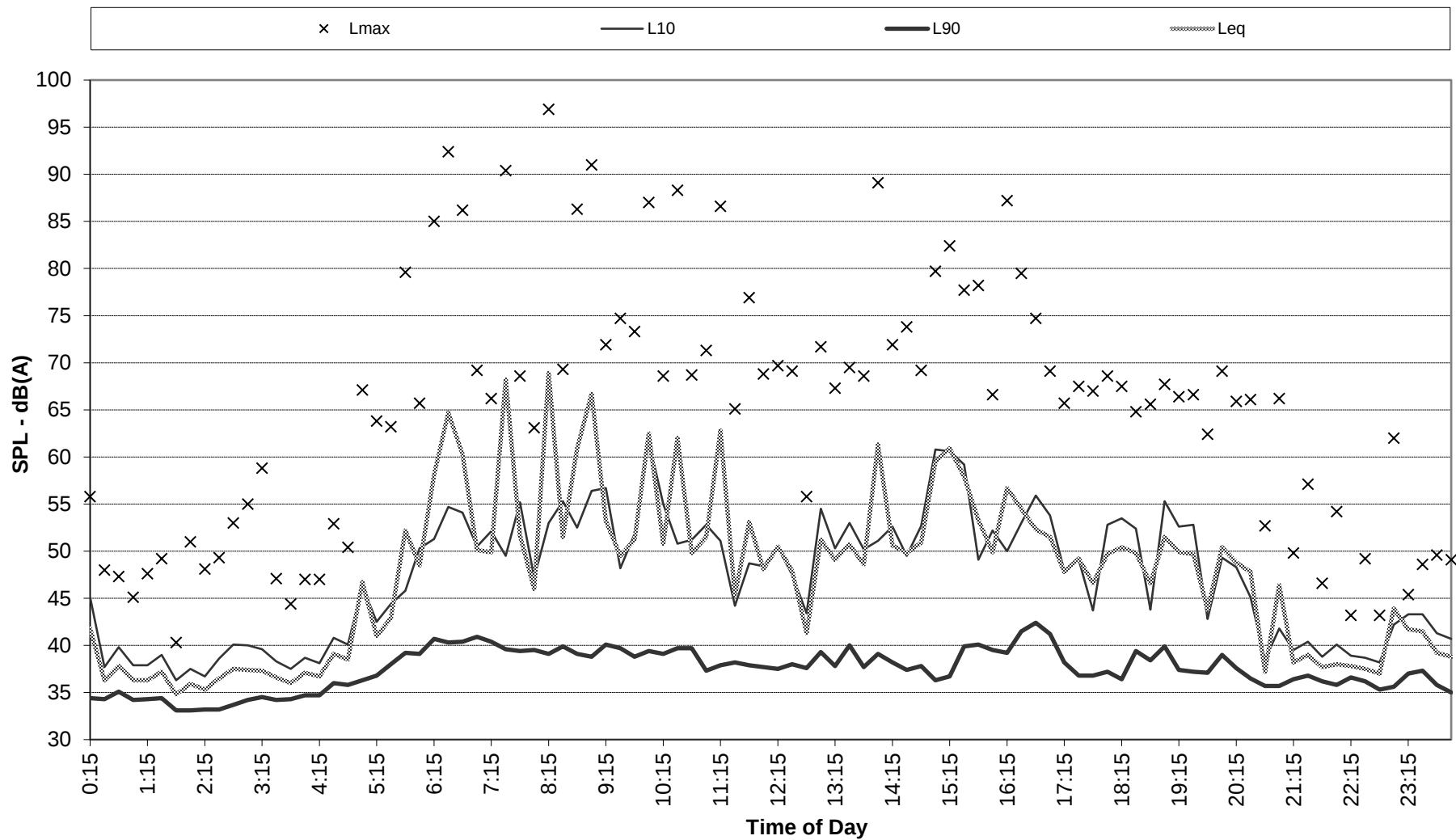
Recorded Statistical Noise Levels for Rochedale 26049 - East Logger - 13-Mar-2026 - Friday



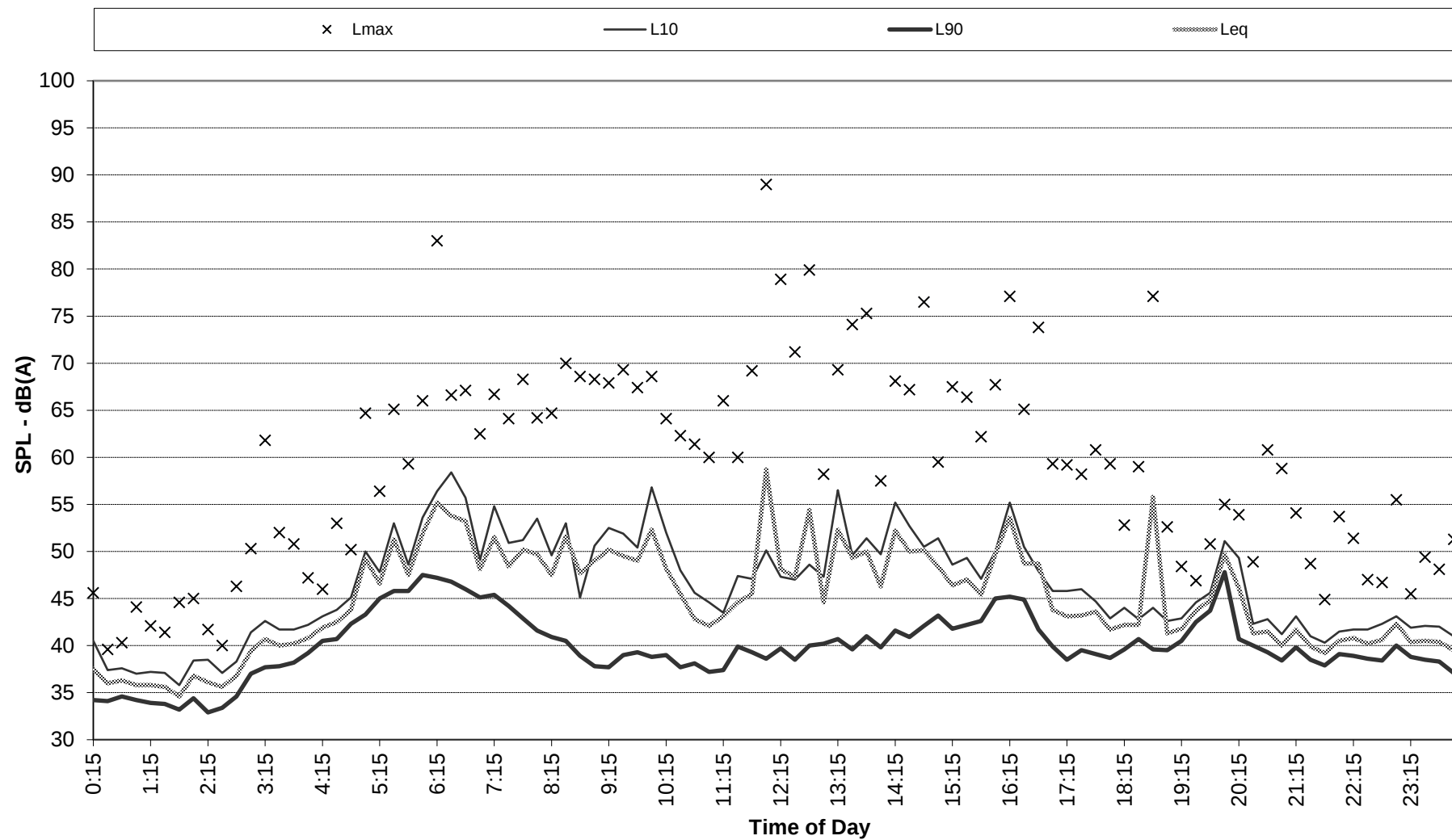
Recorded Statistical Noise Levels for Rochedale 26049 - East Logger - 14-Mar-2026 - Saturday



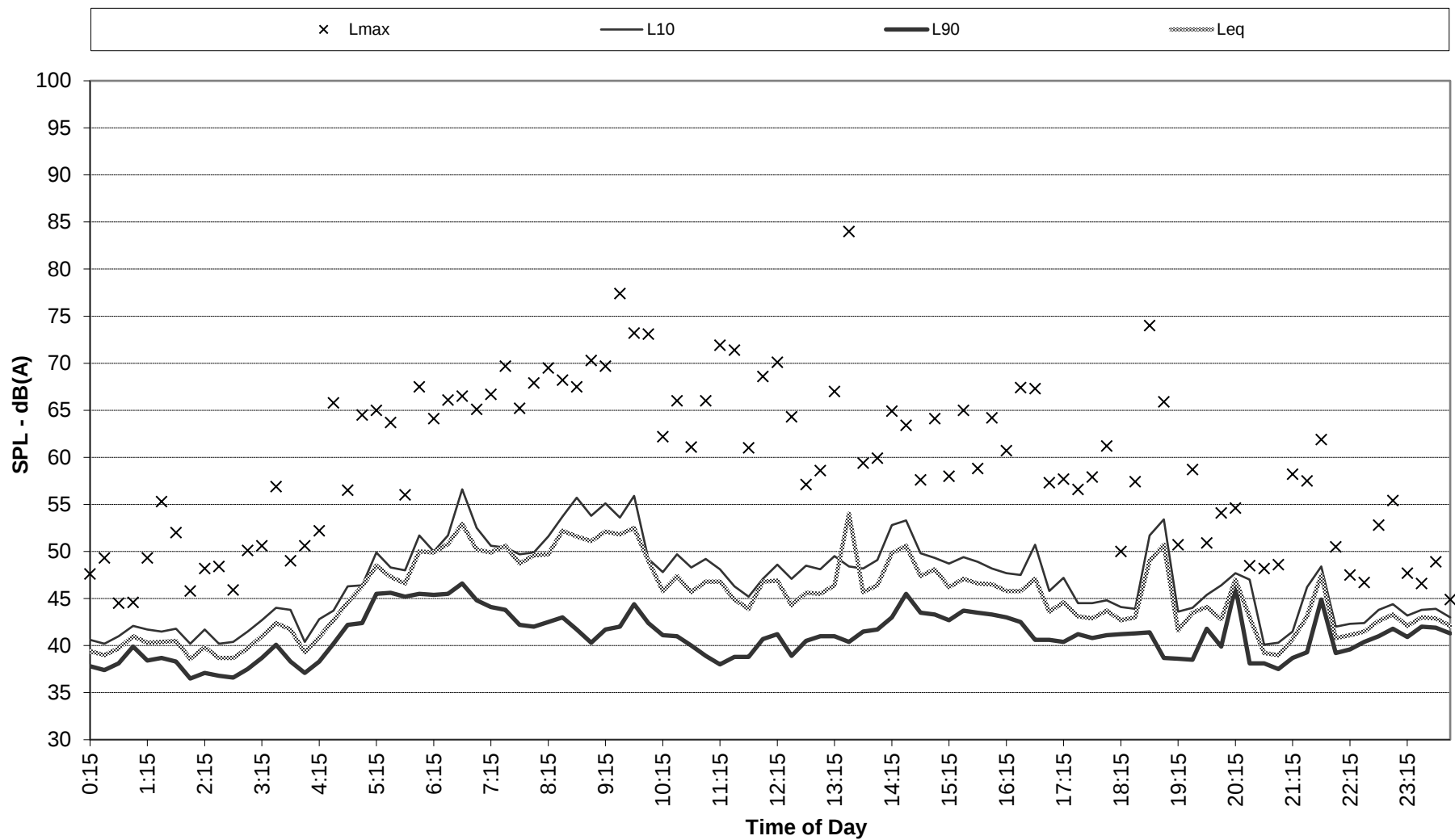
Recorded Statistical Noise Levels for Rochedale 26049 - East Logger - 15-Mar-2026 - Sunday



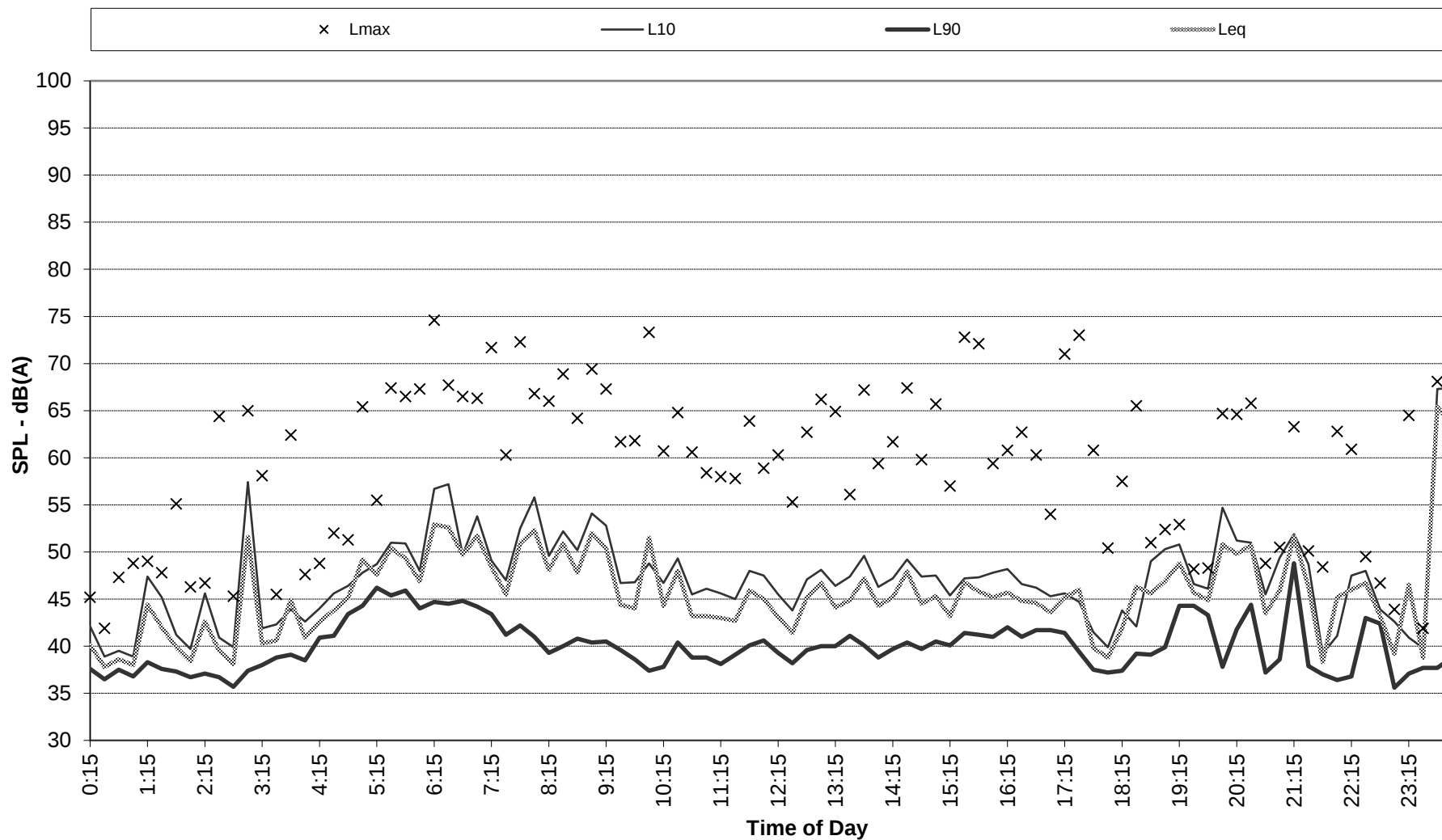
Recorded Statistical Noise Levels for Rochedale 26049 - East Logger - 16-Mar-2026 - Monday



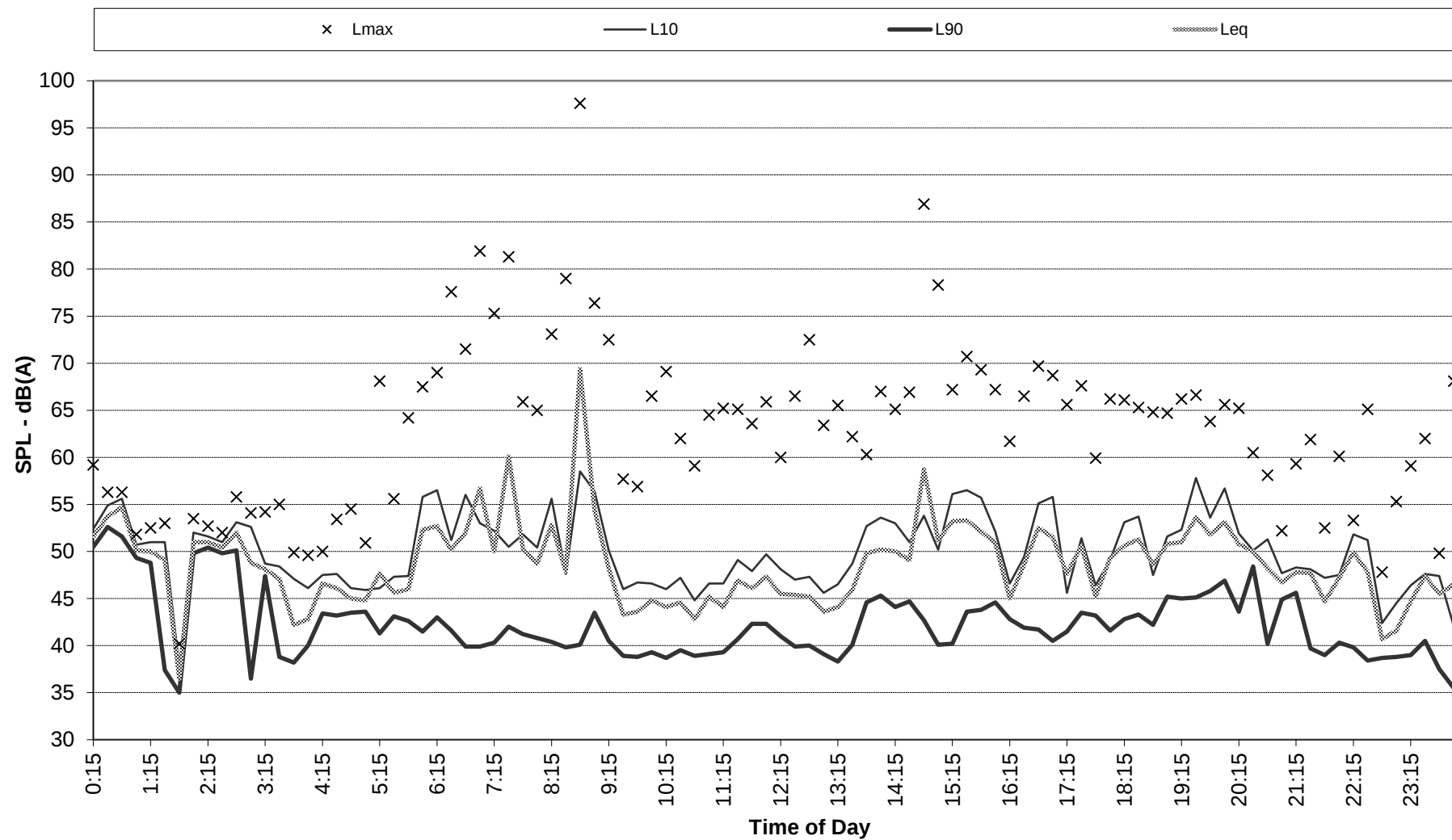
Recorded Statistical Noise Levels for Rochedale 26049 - East Logger - 17-Mar-2026 - Tuesday



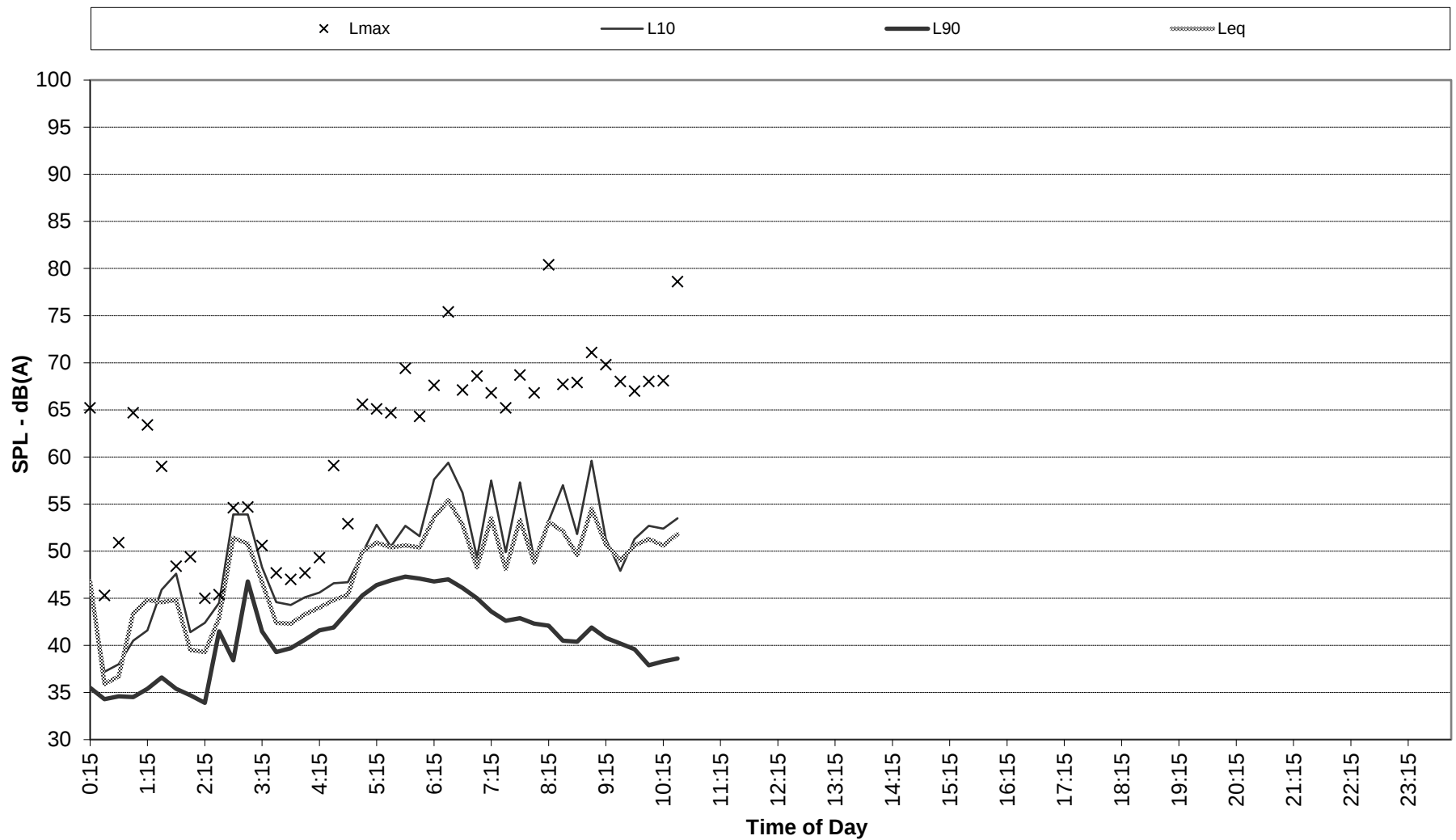
Recorded Statistical Noise Levels for Rochedale 26049 - East Logger - 18-Mar-2026 - Wednesday



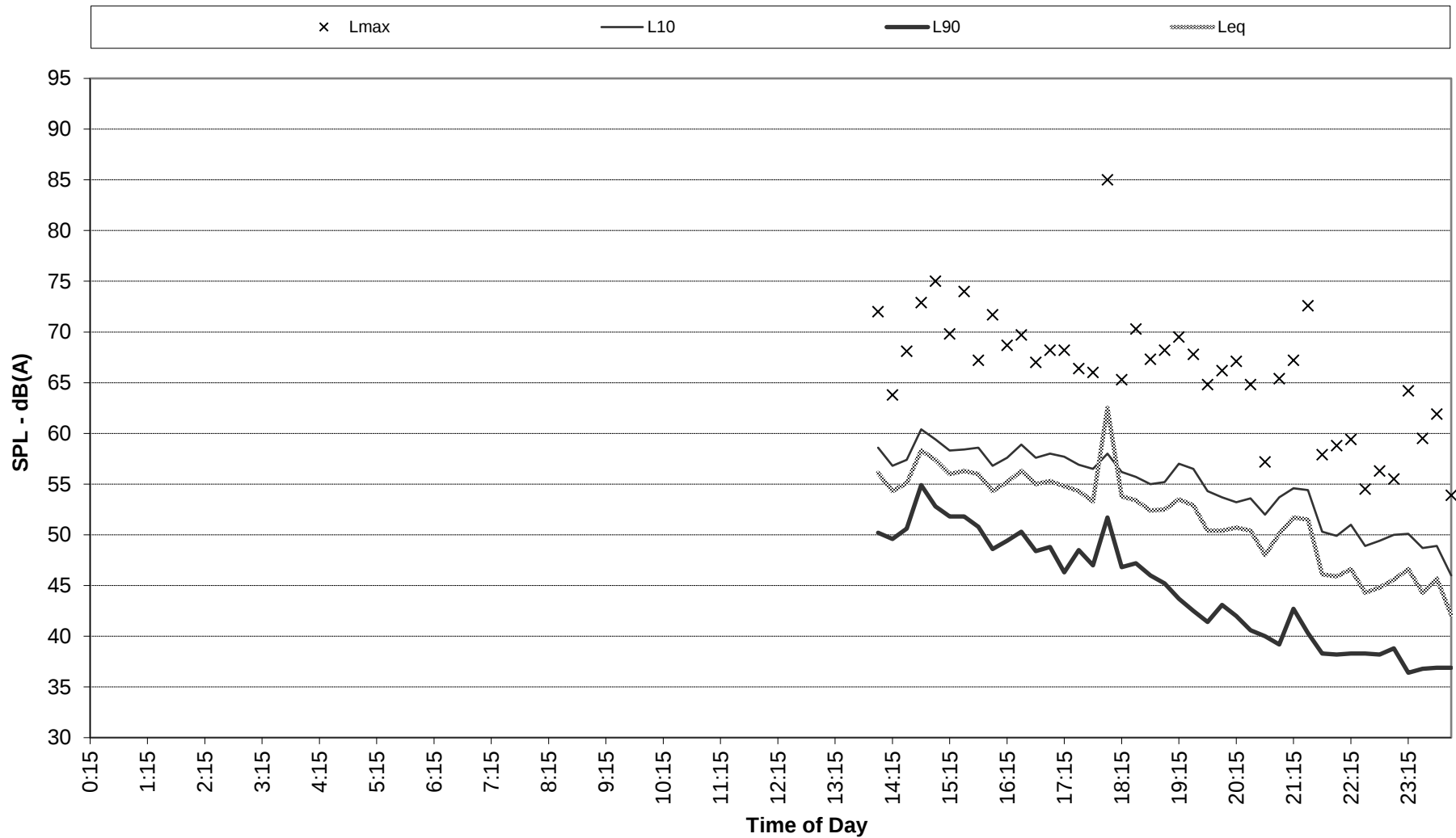
Recorded Statistical Noise Levels for Rochedale 26049 - East Logger - 19-Mar-2026 - Thursday



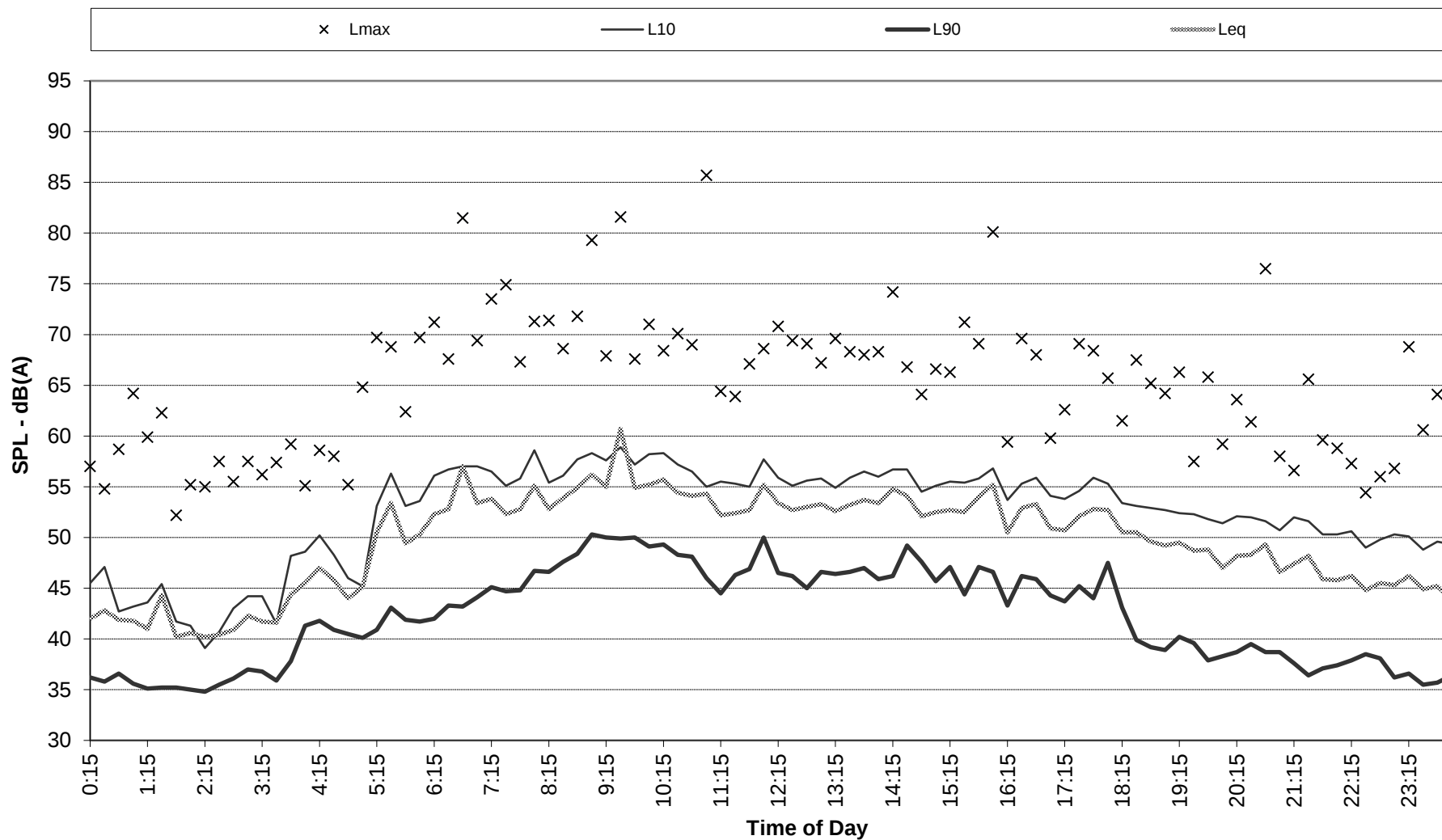
Recorded Statistical Noise Levels for Rochedale 26049 - East Logger - 20-Mar-2026 - Friday



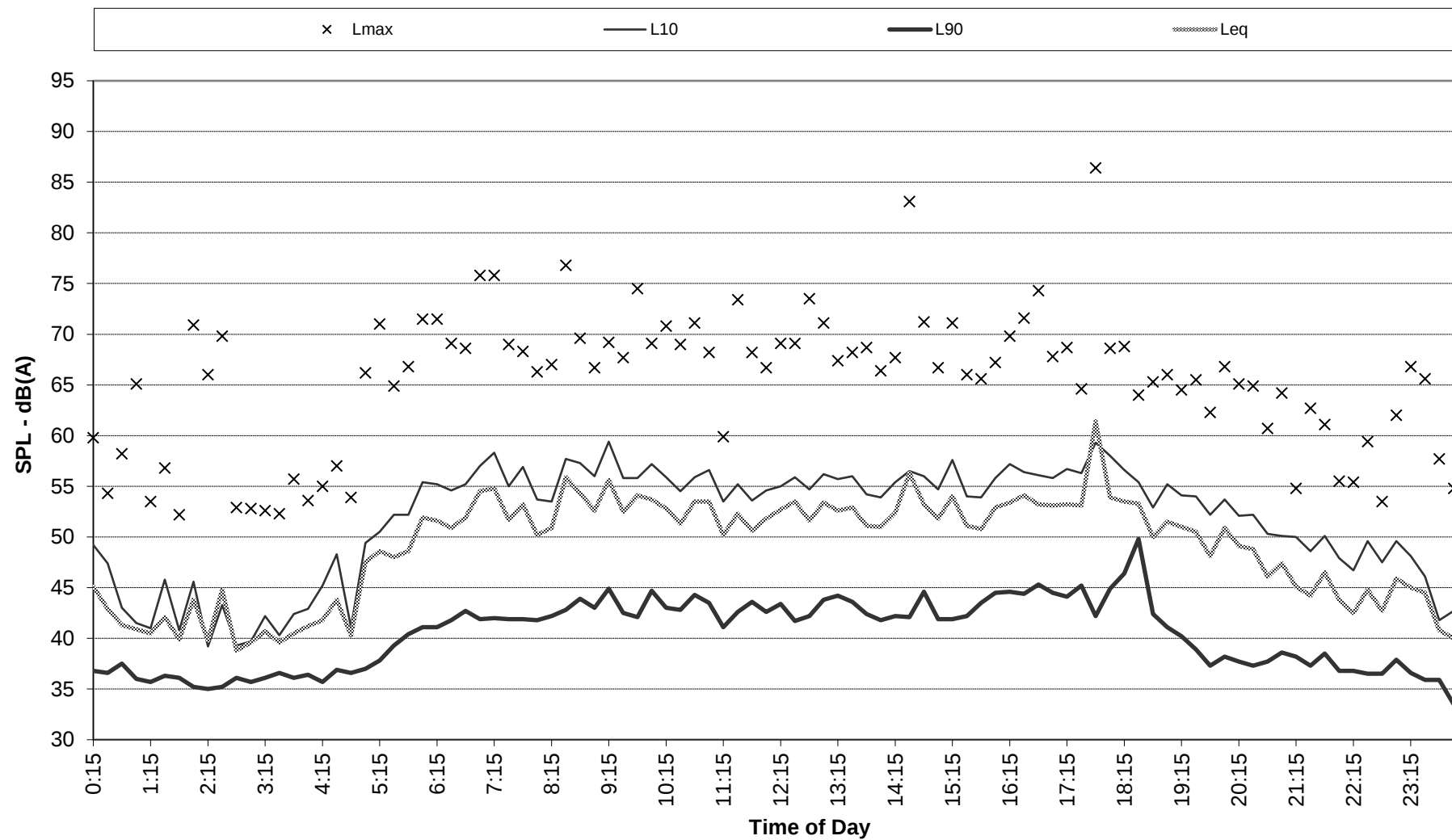
Recorded Statistical Noise Levels for Rochedale 26049 - West Logger - 13-Mar-2026 - Friday



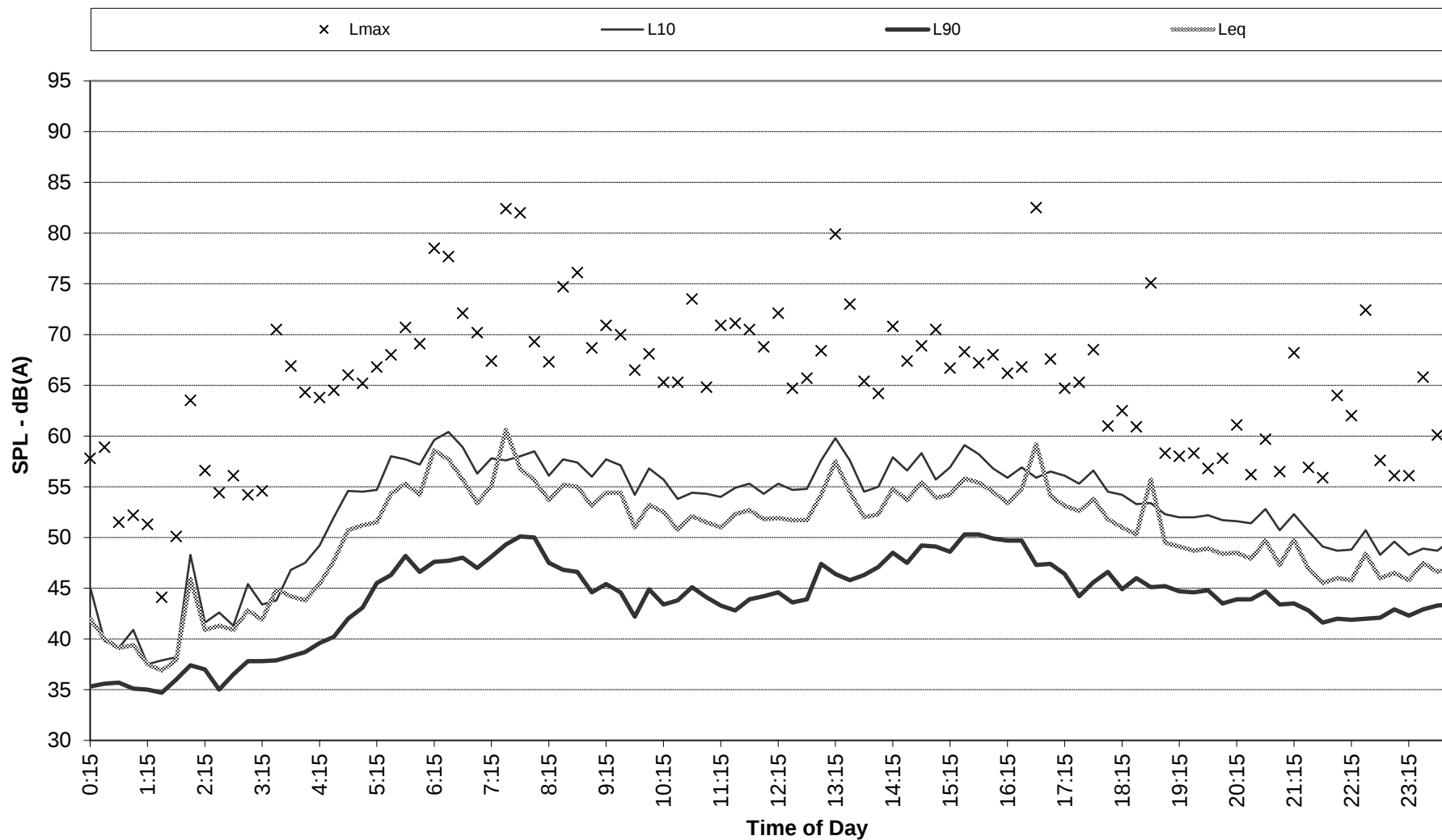
Recorded Statistical Noise Levels for Rochedale 26049 - West Logger - 14-Mar-2026 - Saturday



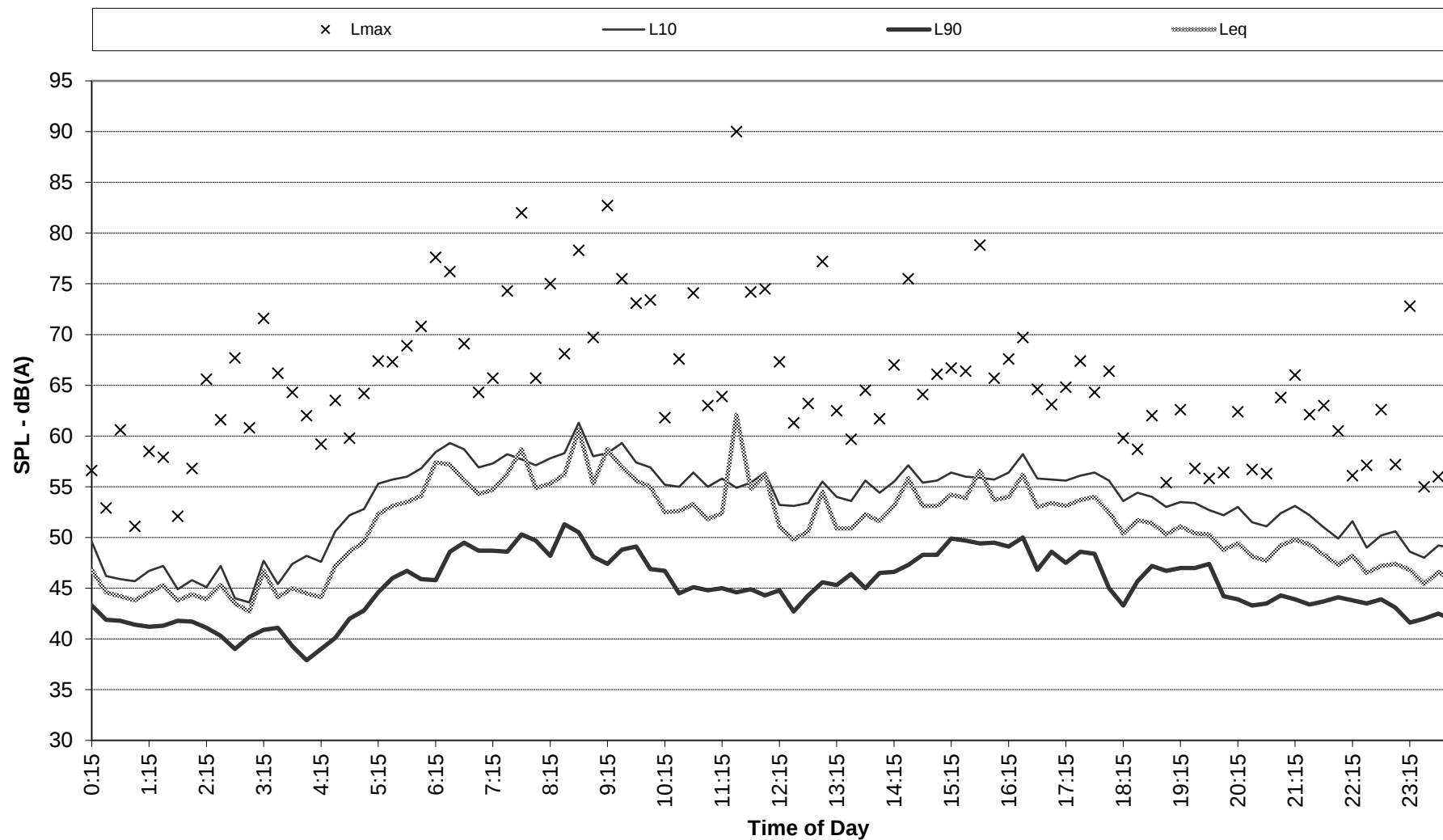
Recorded Statistical Noise Levels for Rochedale 26049 - West Logger - 15-Mar-2026 - Sunday



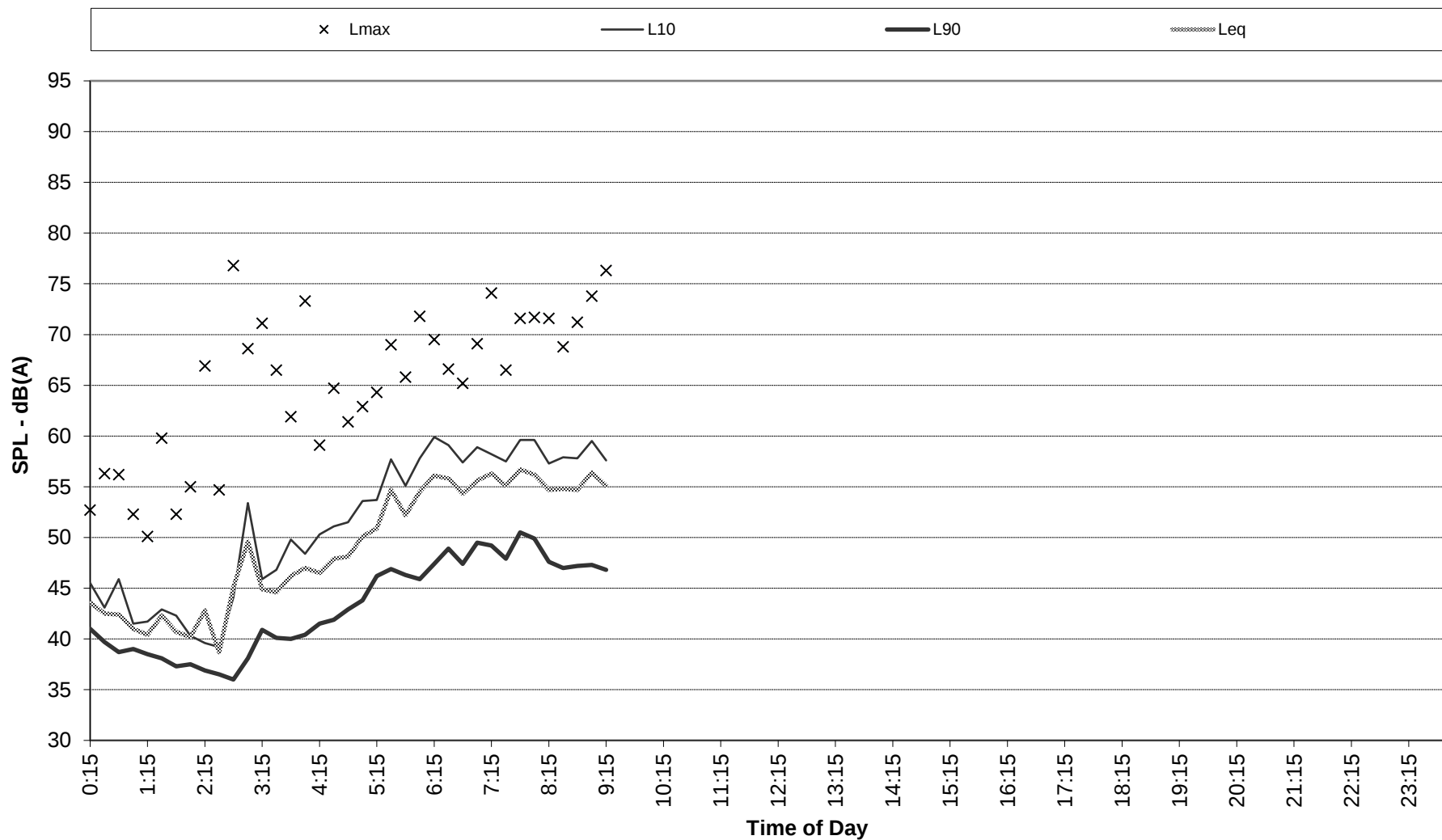
Recorded Statistical Noise Levels for Rochedale 26049 - West Logger - 16-Mar-2026 - Monday



Recorded Statistical Noise Levels for Rochedale 26049 - West Logger - 17-Mar-2026 - Tuesday

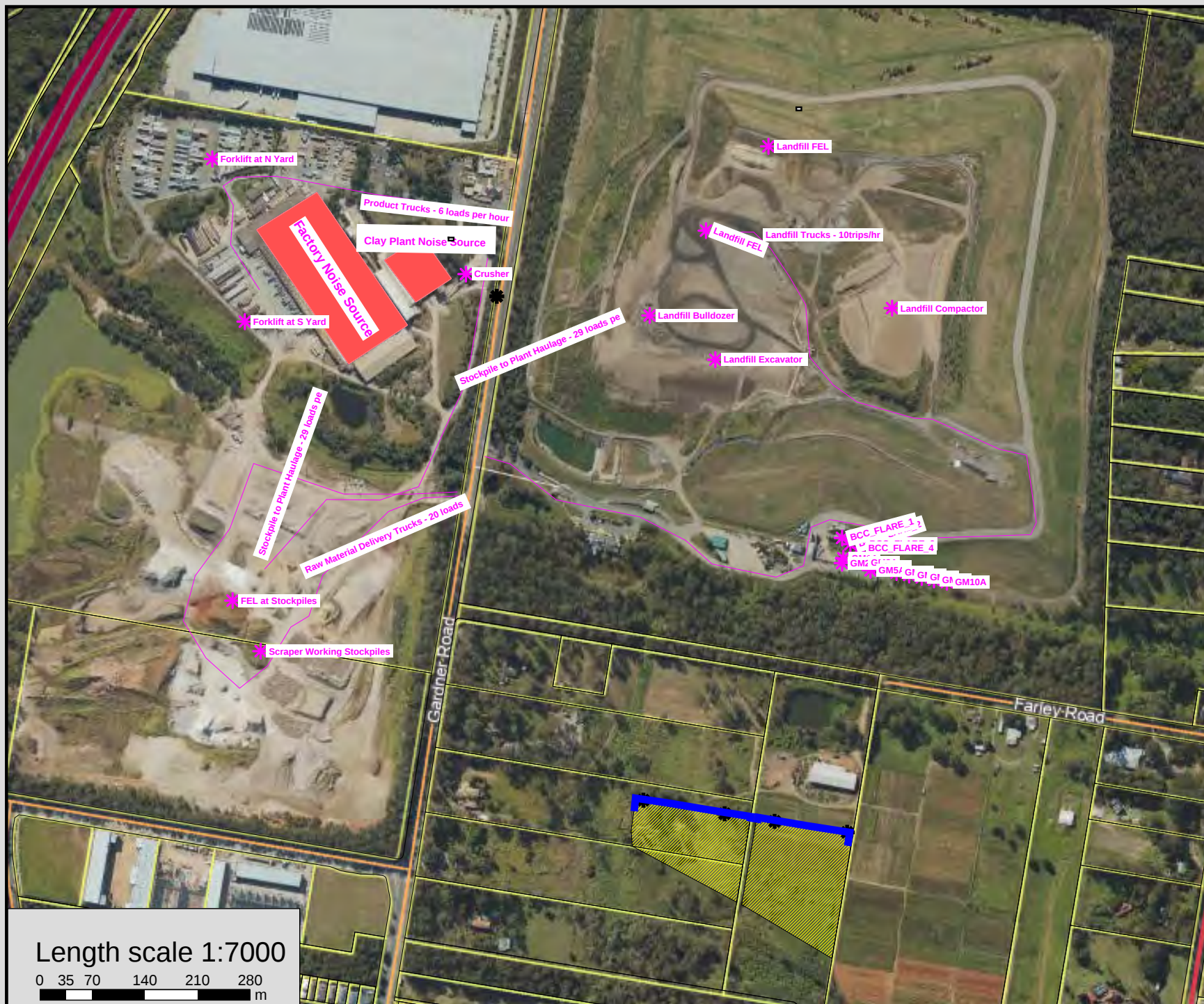


Recorded Statistical Noise Levels for Rochedale 26049 - West Logger - 18-Mar-2026 - Wednesday



ATTACHMENT 3

SoundPLAN Model Layout



Legend

- Cadastral
- * Point source
- Line source
- ★ Point receiver
- Building as source
- Noise Barrier
- ▨ Proposed residential

Rosedale 26019

Industrial Amenity
Overlay Noise
Assessment

Source Layout

July 2026

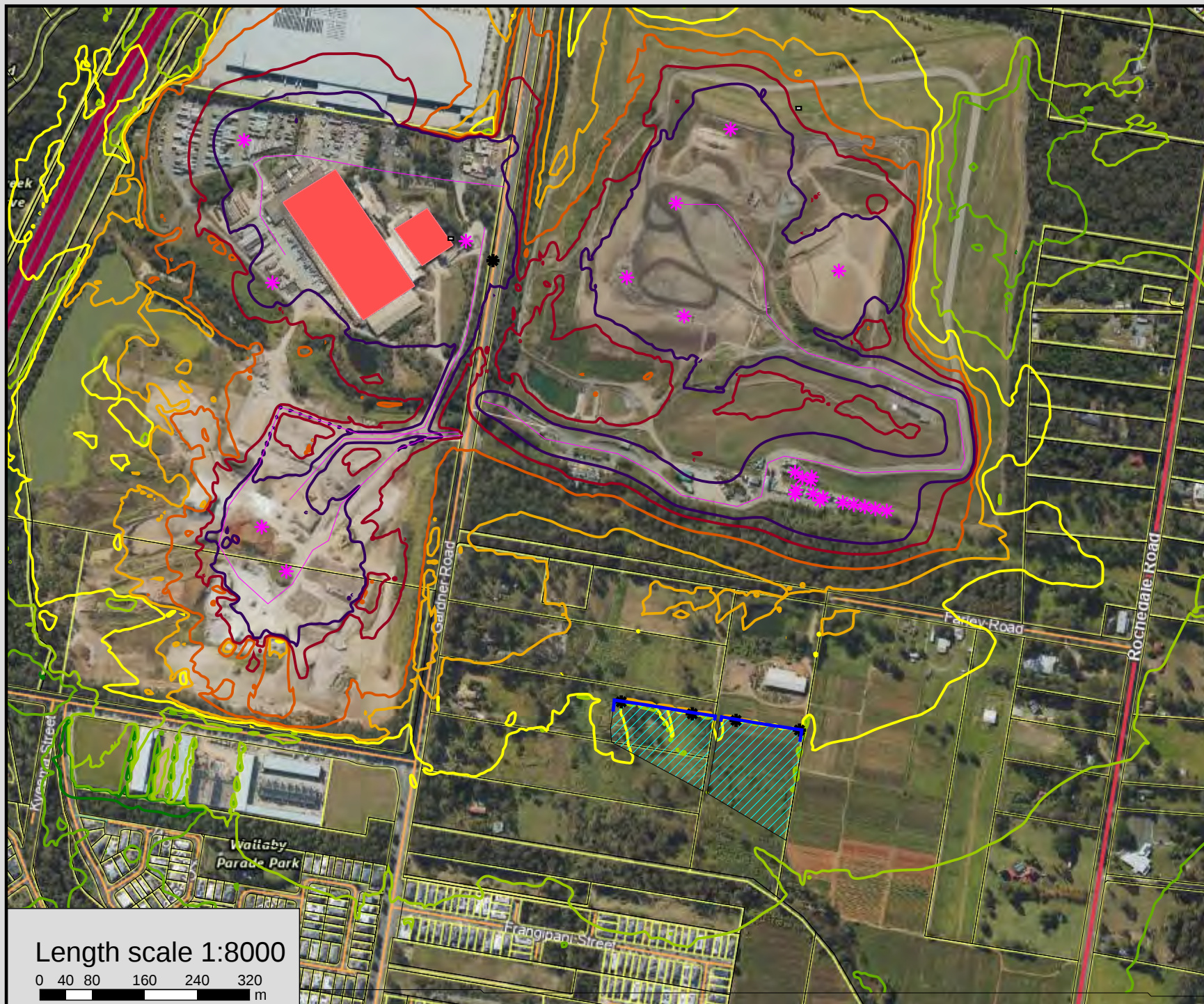


Length scale 1:7000

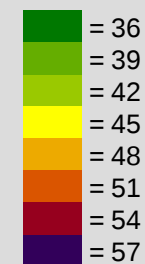
0 35 70 140 210 280
m

ATTACHMENT 4

SoundPLAN Predicted L_{Aeq} Noise Levels



Noise level
LAeq,adj,T
in dB(A)



Legend

- Cadastral
- * Point source
- Line source
- * Point receiver
- Building as source
- Acoustic Barrier
- ▨ Proposed residential

Rochdale 26049

Industrial Amenity Overlay

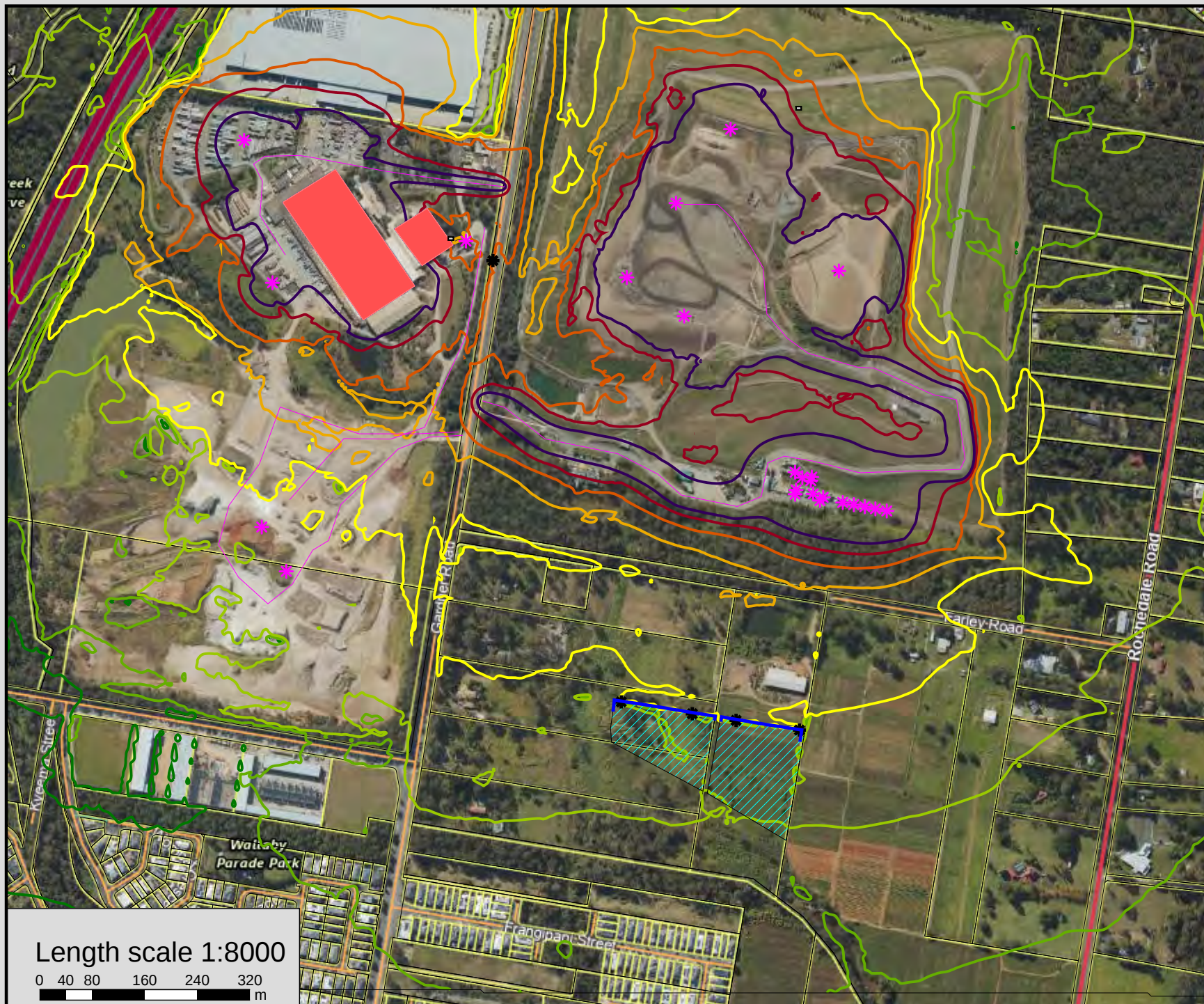
Noise Impact Austral Bricks
& Rochdale Landfill

7am to 6pm LAeq, 11hr

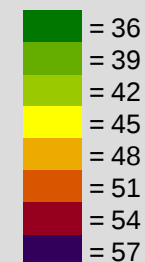
Ground Level

July 2026





Noise level
LAeq,adj,T
in dB(A)



Legend

- Cadastral
- * Point source
- Line source
- * Point receiver
- Red rectangle Building as source
- Blue line Acoustic Barrier
- Hatched rectangle Proposed residential

Rochedale 26049

Industrial Amenity Overlay

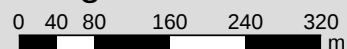
Noise Impact Austral Bricks
& Rochedale Landfill

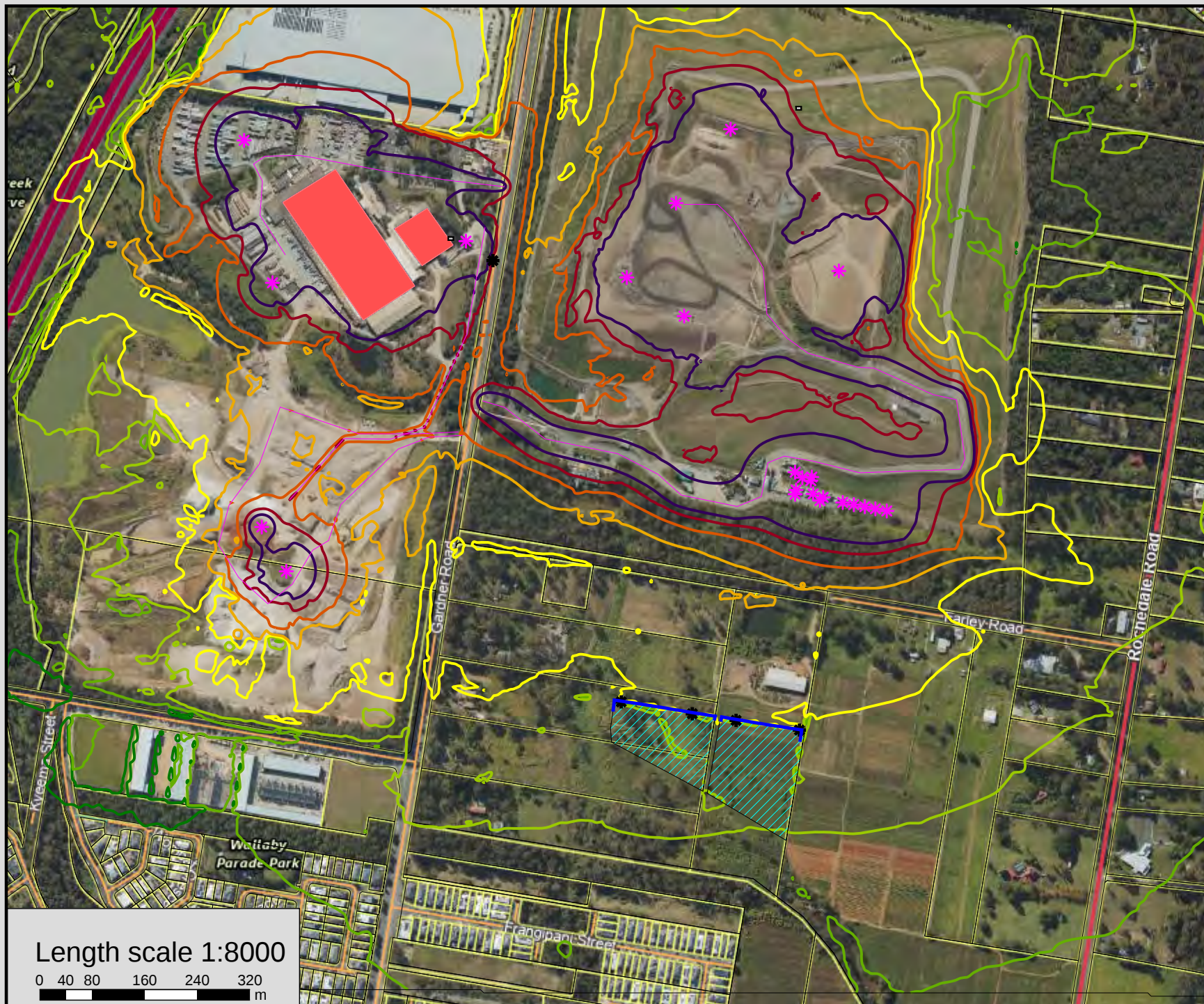
6pm to 10pm LAeq,4hr

Ground Level

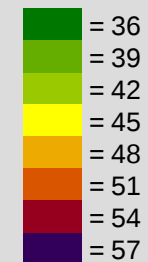
July 2026

Length scale 1:8000





Noise level
LAeq,adj,T
in dB(A)



Legend

- Cadastral
- * Point source
- Line source
- * Point receiver
- Red rectangle Building as source
- Blue line Acoustic Barrier
- Hatched rectangle Proposed residential

Rochedale 26049

Industrial Amenity Overlay

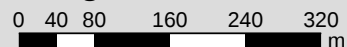
Noise Impact Austral Bricks
& Rochedale Landfill

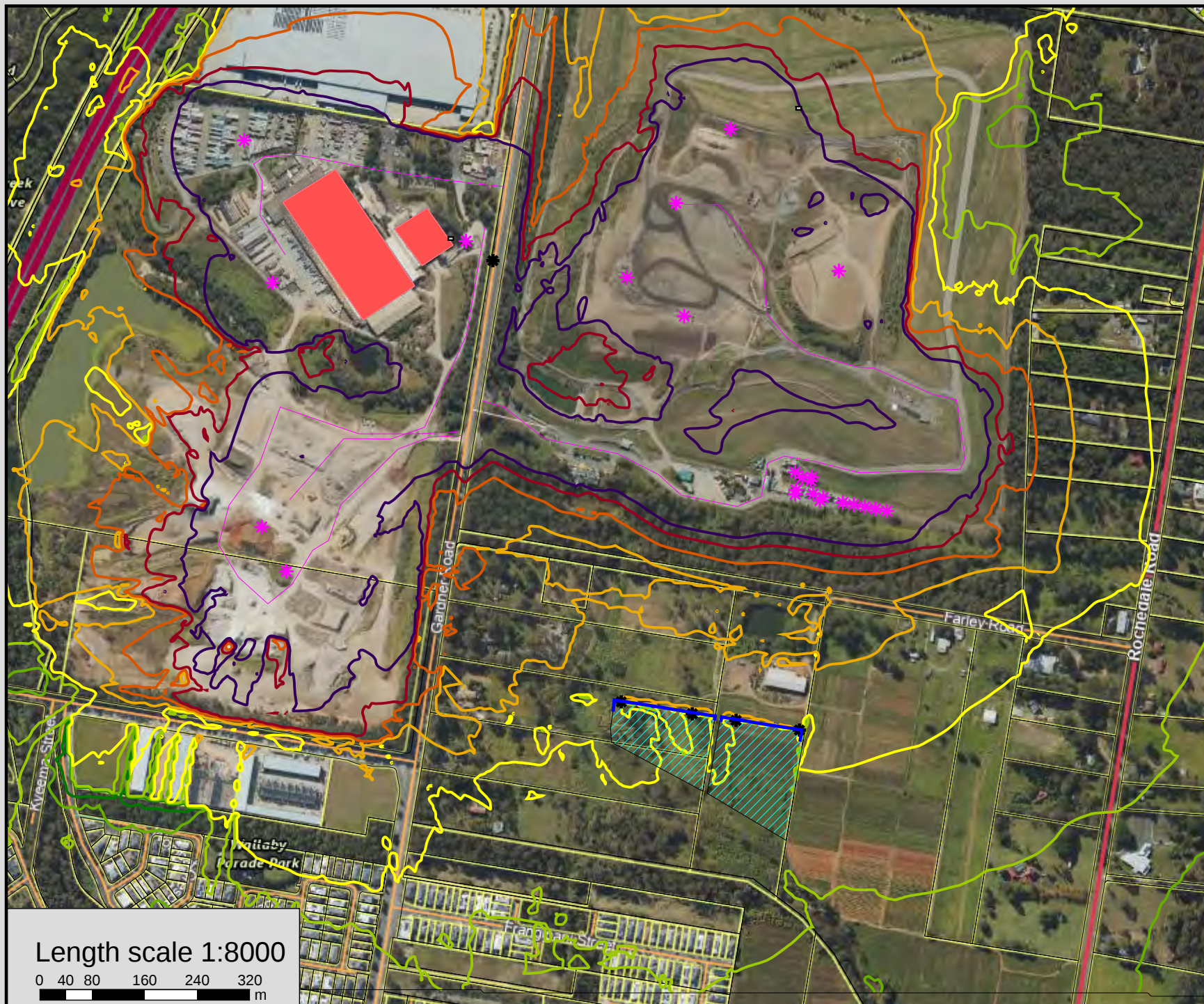
10pm to 7am LAeq, 9hr

Ground Level

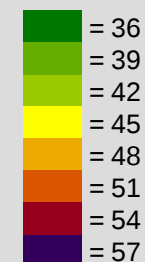
July 2026

Length scale 1:8000





Noise level
L_Amax
in dB(A)



Legend

- Cadastral
- * Point source
- Line source
- * Point receiver
- Red Building as source
- Blue line Acoustic Barrier
- Hatched Proposed residential

Rochdale 26049

Industrial Amenity Overlay

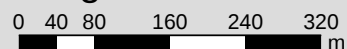
Noise Impact Austral Bricks
& Rochdale Landfill

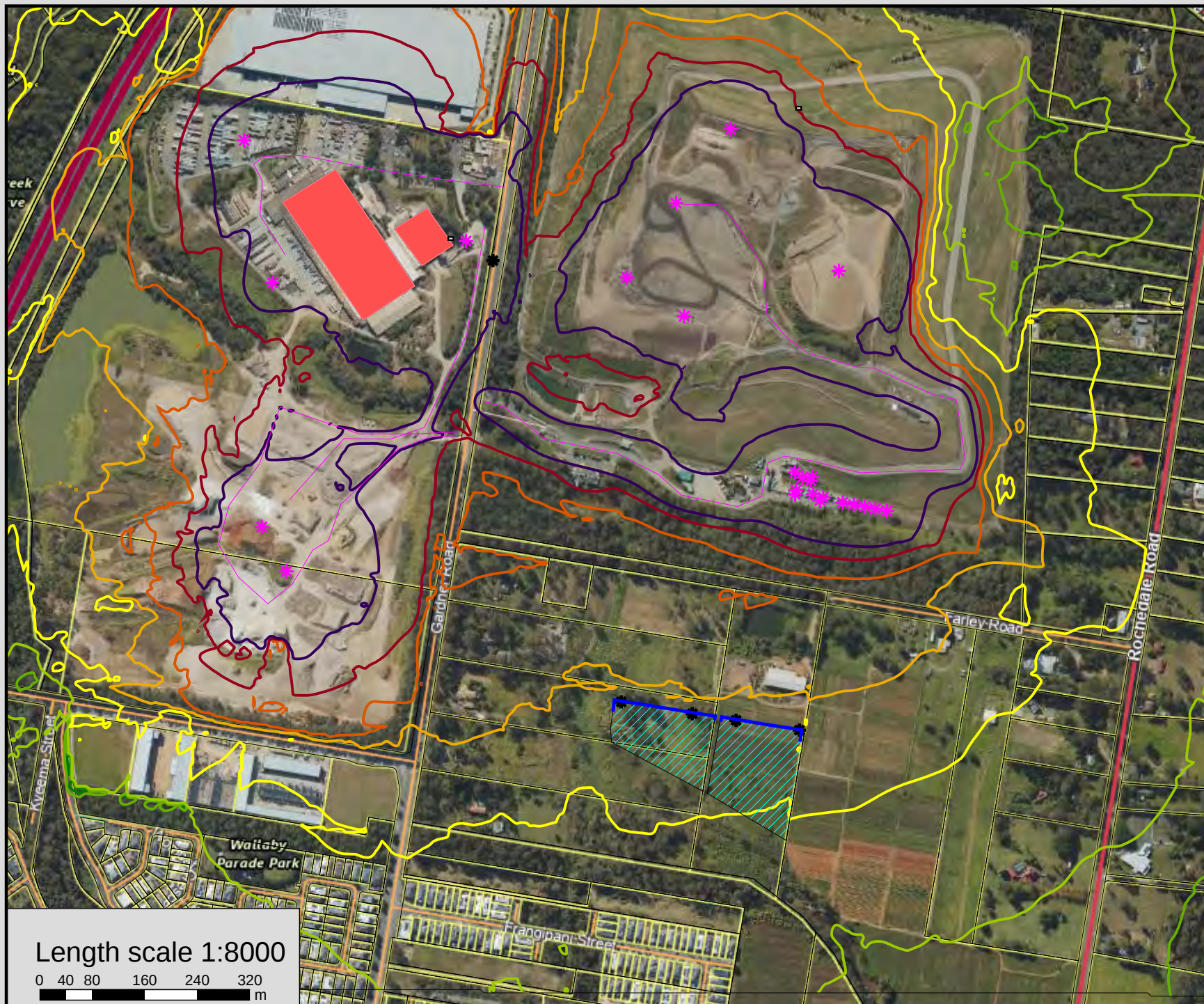
10pm to 7am L_{max}

Ground Level

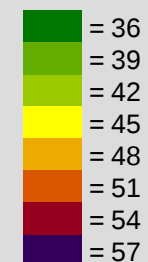
July 2026

Length scale 1:8000





Noise level
LAeq,adj,T
in dB(A)



Legend

- Cadastral
- * Point source
- Line source
- * Point receiver
- Red Building as source
- Blue line Acoustic Barrier
- Blue hatched Proposed residential

Rochedale 26049

Industrial Amenity Overlay

Noise Impact Austral Bricks
& Rochedale Landfill

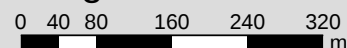
7am to 6pm LAeq, 11hr

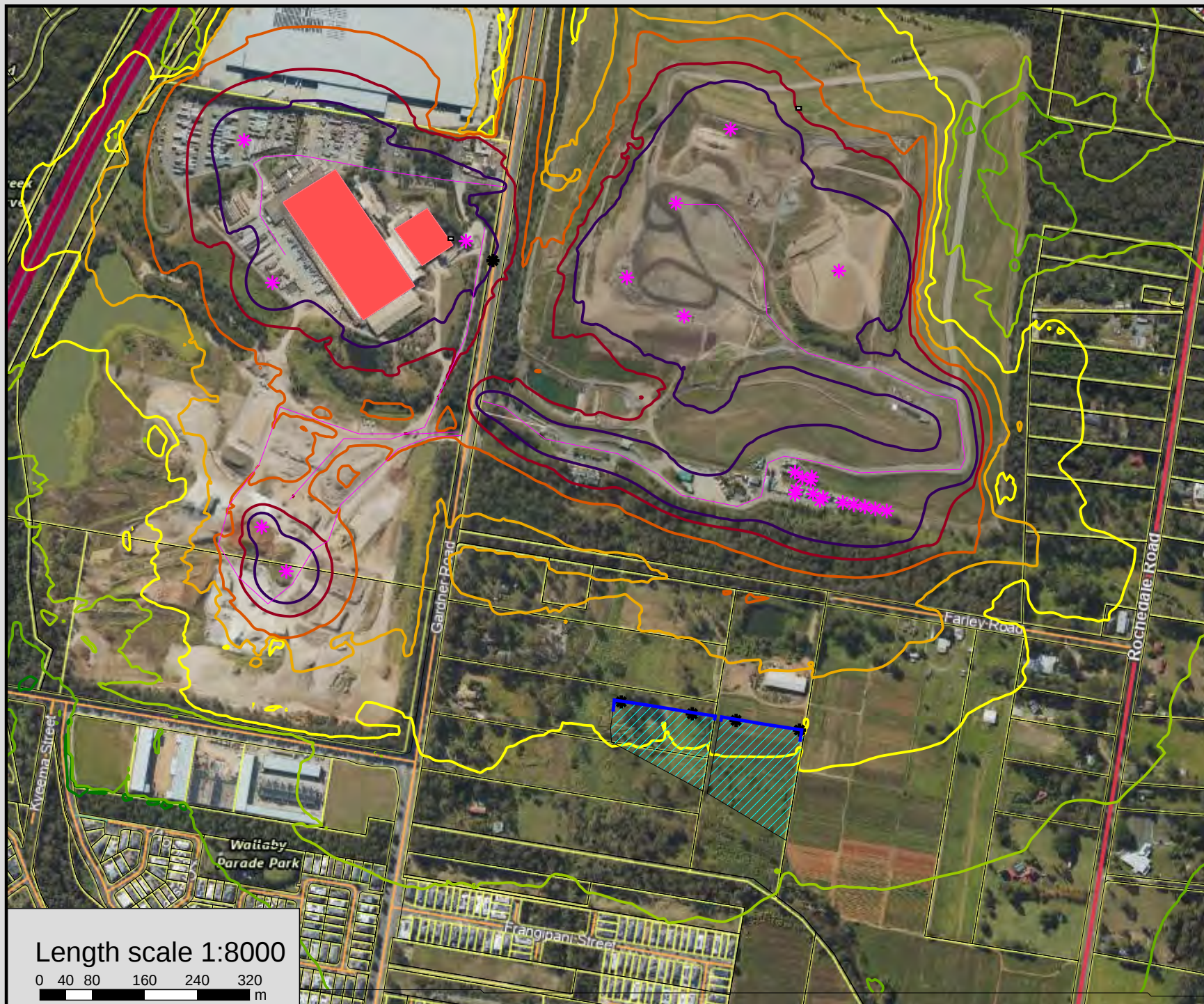
Upper Level

July 2026

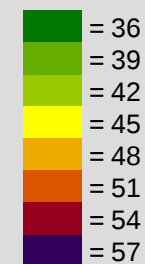


Length scale 1:8000





Noise level
LAeq,adj,T
in dB(A)



Legend

- Cadastral
- * Point source
- Line source
- * Point receiver
- Red Building as source
- Blue line Acoustic Barrier
- Blue hatched Proposed residential

Rochedale 26049

Industrial Amenity Overlay

Noise Impact Austral Bricks
& Rochedale Landfill

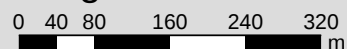
6pm to 10pm LAeq,4hr

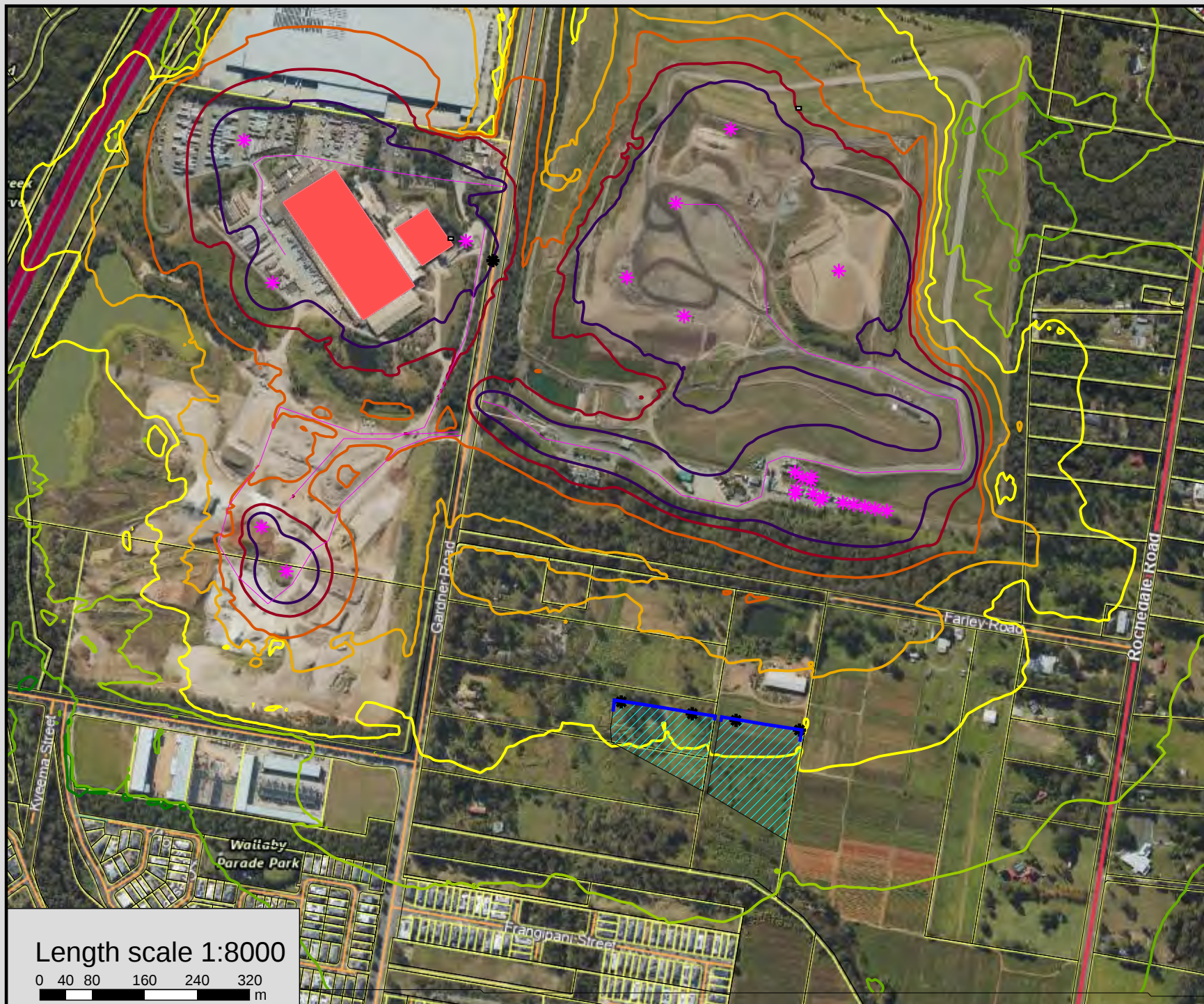
Upper Level

July 2026

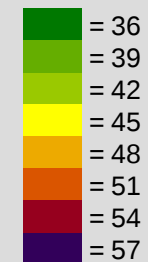


Length scale 1:8000





Noise level
LAeq,adj,T
in dB(A)



Legend

- Cadastral
- Point source
- Line source
- Point receiver
- Building as source
- Acoustic Barrier
- Proposed residential

Rochedale 26049

Industrial Amenity Overlay

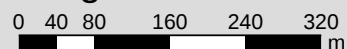
**Noise Impact Austral Bricks
& Rochedale Landfill**

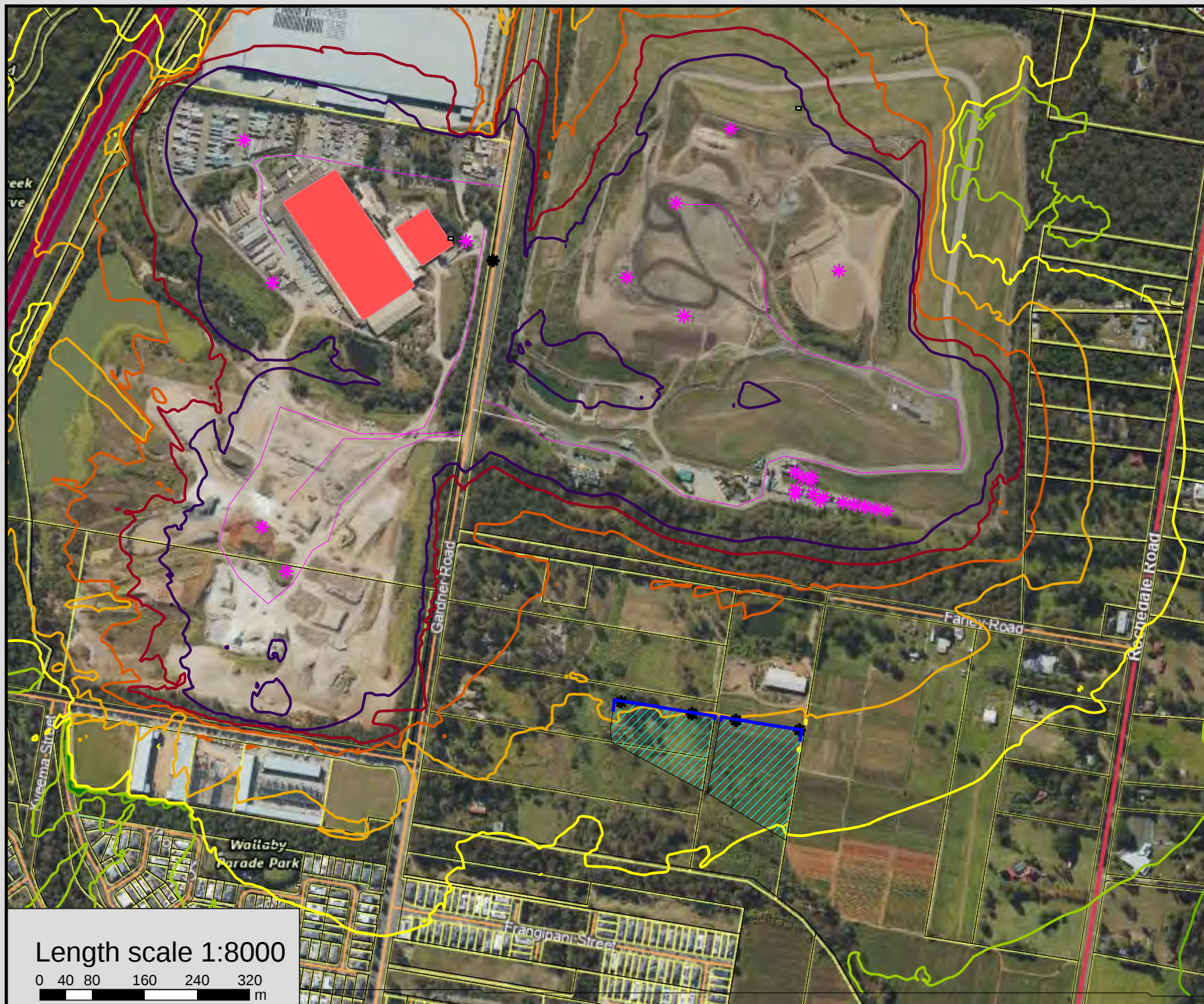
10pm to 7am LAeq, 9hr

Upper Level

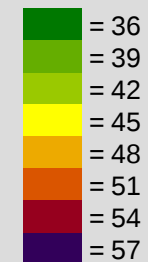
July 2026

Length scale 1:8000





Noise level
L_Amax
in dB(A)



Legend

- Cadastral
- * Point source
- Line source
- * Point receiver
- Red Building as source
- Blue Acoustic Barrier
- Green hatched Proposed residential

Rochdale 26049

Industrial Amenity Overlay

Noise Impact Austral Bricks
& Rochdale Landfill

10pm to 7am L_{max}

Upper Level

July 2026



Length scale 1:8000

0 40 80 160 240 320
m

ATTACHMENT 5

Austral Bricks Emission Rates

Kiln Emissions

AUSTRAL ROCHEDALE KILN EMISSION ESTIMATIONS**PRODUCTION RATE**

65 Million bricks per year production rate
 3 kg per brick (NPI Manual)
 195000 tonnes per year production

KILN OPERATING HOURS

24 hours per day (Austral)
 366 days per year

SUBSTANCE	Emission Factor	Kiln A1 - Swindell Only	Kiln A2 - Ceric Only	Kilns A1 & A2	
		Emission Rate	Emission Rate	Emission Rate	
		Release Point A1	Release Point A1	Release Point A1	Release Point A2
	kg/tonne	g/s	g/s	g/s	g/s
Acetone	0.00085	5.24E-03	5.24E-03	2.62E-03	2.62E-03
Antimony & compounds	1.35E-05	8.32E-05	8.32E-05	4.16E-05	4.16E-05
Arsenic & compounds	1.55E-05	9.56E-05	9.56E-05	4.78E-05	4.78E-05
Benzene	0.00145	8.94E-03	8.94E-03	4.47E-03	4.47E-03
Beryllium & compounds	2.10E-07	1.29E-06	1.29E-06	6.47E-07	6.47E-07
Cadmium & compounds	7.50E-06	4.62E-05	4.62E-05	2.31E-05	2.31E-05
Carbon disulphide	2.15E-05	1.33E-04	1.33E-04	6.63E-05	6.63E-05
Carbon monoxide	0.6	3.70E+00	3.70E+00	1.85E+00	1.85E+00
Chlorine & compounds	0.00065	4.01E-03	4.01E-03	2.00E-03	2.00E-03
Chloroethane (ethyl chloride)	0.000235	1.45E-03	1.45E-03	7.25E-04	7.25E-04
Chromium (III) compounds	2.04E-05	1.26E-04	1.26E-04	6.29E-05	6.29E-05
Chromium (VI) compounds	5.10E-06	3.14E-05	3.14E-05	1.57E-05	1.57E-05
Cobalt	1.05E-06	6.47E-06	6.47E-06	3.24E-06	3.24E-06
Ethylbenzene	2.20E-05	1.36E-04	1.36E-04	6.78E-05	6.78E-05
Hydrochloric acid	0.085	5.24E-01	5.24E-01	2.62E-01	2.62E-01
Lead & compounds	7.50E-05	4.62E-04	4.62E-04	2.31E-04	2.31E-04
Manganese	1.45E-04	8.94E-04	8.94E-04	4.47E-04	4.47E-04
Mercury & compounds	3.75E-06	2.31E-05	2.31E-05	1.16E-05	1.16E-05
Nickel & compounds	3.60E-05	2.22E-04	2.22E-04	1.11E-04	1.11E-04
Oxides of Nitrogen	Emission Limit	3.44E+00	3.76E+00	3.44E+00	3.76E+00
Total Suspended Particulates	Emission Limit	2.46E+00	2.69E+00	2.46E+00	2.69E+00
Particulate Matter 10.0 um	Derived from Emission Limit	1.85E+00	2.02E+00	1.85E+00	2.02E+00
Particulate Matter 2.5 um	Derived from Emission Limit	1.18E+00	1.29E+00	1.18E+00	1.29E+00
Phenol	4.30E-05	2.65E-04	2.65E-04	1.33E-04	1.33E-04
Styrene (ethenylbenzene)	1.00E-05	6.17E-05	6.17E-05	3.08E-05	3.08E-05
Sulfur dioxide	0.39	2.40E+00	2.40E+00	1.20E+00	1.20E+00
Tetrachloroethylene	1.40E-06	8.63E-06	8.63E-06	4.32E-06	4.32E-06
Toluene (methylbenzene)	0.0008	4.93E-03	4.93E-03	2.47E-03	2.47E-03
Total Volatile Organic Compounds	0.012	7.40E-02	7.40E-02	3.70E-02	3.70E-02
Xylenes (individual or mixed isomers)	6.25E-05	3.85E-04	3.85E-04	1.93E-04	1.93E-04

JOB:**Rochedale 16-028****STAGE:****Material Handling Emissions****SETUP VARIABLES**

Bricks manufactured 65 Million per Annum
 Brick Size 3 kg
 Annual Material Imported Rate: 195,000 tonnes per annum
 Operating Days: 200 day per year
 975 tonnes per day

MWA Calc

MWA Calc

MWA Calc

Hours of Operation

Wed - Saturday 12.0 hours

6am - 6pm

Conservatively model peak rate over all days

DUMP TRUCK HAUL ROAD - SOUTHERN STOCKPILE AREA TO CLAY PLANT

Control Measures: Level 1 watering (2 litres/m2/hour)
 Control Efficiency: 50 %

Dump truck mass 29.9 tonnes MWA Calc
 Dump truck payload 30.0 tonnes MWA Calc
 Average truck mass 44.9 tonnes MWA Calc
 Average truck mass 49.4 tons MWA Calc

Haul route trips per Day: 32.5 single trips MWA Calc
 Haul route trips per hour: 2.71 single trips MWA Calc
 Haul route Length (each way): 0.700 km MWA Calc
 Haul road Silt Content (s): 8.3 % (USEPA AP42 Chapter 13.2.2 Table 13.2.2-1 Average for quarry haul)

IMPORTED FILL MATERIAL FROM ROAD TRUCKS TO SOUTHERN STOCKPILE AREA

Control Measures: Level 1 watering (2 litres/m2/hour)
 Control Efficiency: 50 %

Quarry Road Truck Payload: 28.0 tonnes MWA Calc
 Quarry Road Truck Payload: 30.9 tons MWA Calc
 Quarry Road Truck Unladen: 20.7 tons MWA Calc
 Average quarry road truck weight: 36.1 tons MWA Calc

Quarry road truck trips per annum: 6,964 trips MWA Calc
 Quarry road truck trips per Day: 34.82 # MWA Calc
 Quarry road truck trips per hour: 2.9 # MWA Calc

Access Road Length (each way): 0.500 km MWA Calc
 Access road Silt Content (s): 4.8 % (USEPA AP42 Chapter 13.2.2 Table 13.2.2-1 Mean for Sand and Gravel)

WIND EROSION

Exposed Areas: 360,000 m² Estimated exposed area
 Silt Content (s): 5 %
 Days of rainfall > 0.25mm (p): 106 Data from Sunnybank Raingauge (1990 - 2015)
 Percentage wind speed > 5.4m/s (f): 3.7 % CALMET for site
 Mean Windspeed 6am to 6pm 3.06 m/s CALMET for site

JOB: **Rochedale 16-028**

STAGE: **Material Handling Emissions**

UNPAVED ROADS

Emission Source: **Haul Road from Southern Stockpile Area to Clay Pit**

Data Source: **USEPA AP42 Chapter 13.2.2 Unpaved Roads (2006)**

Emission Factor Formula:
$$EF = k \times \left(\frac{s}{12} \right)^a \left(\frac{W}{3} \right)^b$$
 lb/VMT

Haul Road Silt Content (s): 8.3 % (USEPA AP42 Chapter 13.2.2 Table 13.2.2-1 mean for quarry haul road)

Mean Vehicle Mass (W): 49.4 tons

Constants (PM2.5): k = 0.15 a= 0.9 b= 0.45

Constants (PM10): k = 1.5 a= 0.9 b= 0.45

Constants (TSP): k = 4.9 a= 0.7 b= 0.45

(USEPA AP42 Chapter 13.2.2 Table 13.2.2-2)

Uncontrolled Emission Factor (PM2.5): EF= 107.1 g/VKT

Uncontrolled Emission Factor (PM10): EF= 1070.9 g/VKT

Uncontrolled Emission Factor (TSP): EF= 3766.0 g/VKT

Control Measures: Level 1 watering (2 litres/m2/hour)

Control Efficiency: 50 % (Table 4 NPI Emission Estimation Technique Manual for Mining, Environment Australia 2011)

Controlled Emission Factor (PM2.5): EF= 53.5 g/VKT

Controlled Emission Factor (PM10): EF= 535.5 g/VKT

Controlled Emission Factor (TSP): EF= 1883.0 g/VKT

Operating Hours: 12.0 per day

Production Rate: 195,000 tonnes per annum

Trips per Day: 33 trips

Average Trip Length (each way): 0.7 km

Average Trip Length (two way): 1.4 km

Controlled Emission Rate:	PM2.5:	0.06 grams/second	6am - 6pm
	PM10:	0.56 grams/second	6am - 6pm
	TSP:	1.98 grams/second	6am - 6pm

JOB: **Rochedale 16-028**

STAGE: **Material Handling Emissions**

UNPAVED ROADS

Emission Source: **Imported fill material from road trucks to southern stockpile area**

Data Source: ***USEPA AP42 Chapter 13.2.2 Unpaved Roads (2006)***

Emission Factor Formula:

$$EF = k \times \left(\frac{s}{12} \right)^a \left(\frac{W}{3} \right)^b$$

lb/VMT

Haul Road Silt Content (s): 4.8 % (USEPA AP42 Chapter 13.2.2 Table 13.2.2-1
Mean for Sand and Gravel Plant Road)

Mean Vehicle Mass (W): 36.1 tons

Constants (PM2.5): k = 0.15 a= 0.9 b= 0.45

Constants (PM10): k = 1.5 a= 0.9 b= 0.45

Constants (TSP): k = 4.9 a= 0.7 b= 0.45

(USEPA AP42 Chapter 13.2.2 Table 13.2.2-2)

Uncontrolled Emission Factor (PM2.5): EF= 56.8 g/VKT

Uncontrolled Emission Factor (PM10): EF= 568.1 g/VKT

Uncontrolled Emission Factor (TSP): EF= 2228.9 g/VKT

Control Measures: Level 1 watering (2 litres/m2/hour)

Control Efficiency: 50 % (Table 3 NPI Emission Estimation Technique
Manual for Mining, Environment Australia 2011)

Controlled Emission Factor (PM2.5): EF= 28.4 g/VKT

Controlled Emission Factor (PM10): EF= 284.0 g/VKT

Controlled Emission Factor (TSP): EF= 1114.5 g/VKT

Operating Hours: 12.0 per day

Production Rate: 195,000 tonnes per annum

Trips per Day: 35 trips

Average Trip Length (each way): 0.5 km

Average Trip Length (two way): 1 km

Controlled Emission Rate:	PM2.5:	0.023 grams/second	6am - 6pm
	PM10:	0.229 grams/second	6am - 6pm
	TSP:	0.898 grams/second	6am - 6pm

JOB: **Rochedale 16-028**

STAGE: **Material Handling Emissions**

Emission Source: **Using a Scraper - to mix imported material to stockpiles**

Data Source: ***NPI Emission Estimation Technique Manual for Mining, Environment Australia 2012***

Uncontrolled Emission Factor (PM2.5):	EF=	1.0	kg/hr/vehicle	Assume 1/4 of PM10 emissions
Uncontrolled Emission Factor (PM10):	EF=	4.1	kg/hr/vehicle	
Uncontrolled Emission Factor (TSP):	EF=	17.0	kg/hr/vehicle	

Uncontrolled Emission Rate:	PM2.5:	0.285	grams/second	6am - 6pm
	PM10:	1.139	grams/second	6am - 6pm
	TSP:	4.722	grams/second	6am - 6pm

JOB: Rosedale 16-028

STAGE: **Material Handling Emissions**

WIND EROSION

Emission Source: **Exposed Areas of Site**

Data Source: ***NPI Emission Estimation Technique Manual
for Mining (Environment Australia, 2011)***

Emission Factor Formula:

$$EF = 1.9 \times \left(\frac{s}{1.5} \right) \times 365 \times \left(\frac{365 - p}{235} \right) \times \left(\frac{f}{15} \right) \quad \text{kg/ha/annum}$$

no wind erosion emissions for wind speeds below 5.4m/s

Silt Content (s):	5 %	(USEPA AP42 Chapter 13.2.2 Table 13.2.2-1)
Days of rainfall > 0.25mm (p):	106 days	(typical data for region)
Percentage wind speed > 5.4m/s (f):	3.7 %	(from meteorological data)
Exposed Quarry Area:	36.0 ha	

Emission Factor (PM2.5):	47	EF= 1686.3	kg/annum	Particle size factor from (USEPA AP42 Chapter 13.2.5)
Emission Factor (PM10):	312	EF= 11242.1	kg/annum	Particle size factor from (USEPA AP42 Chapter 13.2.5)
Emission Factor (TSP):	625	EF= 22484.3	kg/annum	

ANNUAL EMISSIONS DISTRIBUTED BETWEEN HOURS BASED UPON WIND SPEED RELATIONSHIP

JOB: Rochedale 16-028

STAGE: **Material Handling Emissions**

LOADING STOCKPILES

Emission Source: Unloading Road Trucks - imported material

Data Source: USEPA AP42 Chapter 13.2.4 Aggregate Handling and Storage Piles (2006)

Unloading Road Trucks - imported

$$EF = k(0.0016) \times \frac{\left(\frac{U}{2.2}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}} \quad \text{kg/Mg}$$

	PM2.5	PM10	TSP (PM30)
Aerodynamic particle size multiplier (k):	0.053	0.35	0.74
Mean wind speed m/s (U):	3.06389	3.06	
Material moisture content % (M):	0.7	(mean from Table 13.2.4-1)	
Emission Factor (PM2.5):	EF=	5.67E-04	kg/tonne
Emission Factor (PM10):	EF=	3.75E-03	kg/tonne
Emission Factor (TSP):	EF=	7.92E-03	kg/tonne
Production Rate:		195,000	tonnes per annum
Operating Days:		200	per year
Operating Hours:		12.0	per day

Emission Rate (PM2.5):	EF=	110.6	kg/annum
Emission Rate (PM10):	EF=	730.4	kg/annum
Emission Rate (TSP):	EF=	1544.2	kg/annum

Emission Rate:	PM2.5:	0.01	grams/second	6am - 6pm
	PM10:	0.08	grams/second	6am - 6pm
	TSP:	0.18	grams/second	6am - 6pm

JOB: **Rochedale 16-028**

STAGE: **Material Handling Emissions**

LOADING TRUCKS - FRAGMENTED STONE

Emission Source: **Front end loader transfer of material to dump trucks for Clay Plant**

Data Source: ***USEPA AP42 Chapter 11.19.2 Crushed Stone Processing and
Pulverized Mineral Processing (2004)***

Derived Emission Factor (PM2.5):	EF=	1.25E-05 kg/tonne	Assume 1/4 of PM10 emissions
Default Emission Factor (PM10):	EF=	5.00E-05 kg/tonne	(Table 11.19.2-1 USEPA AP42)
Derived Emission Factor (TSP):	EF=	1.19E-04 kg/tonne	Based upon 0.42 PM10/TSP ratio for unloading from stockpiles specified in NPI Emission Estimation Technique Manual for Mining (Environment Australia, 2011)
Production Rate:		195,000 tonnes per annum	
Operating Days:		200 per year	
Operating Hours:		12.0 per day	
Emission Rate (PM2.5):	EF=	2.4 kg/annum	
Emission Rate (PM10):	EF=	9.8 kg/annum	
Emission Rate (TSP):	EF=	23.2 kg/annum	

Emission Rate:	PM2.5:	0.0003	grams/second	6am - 6pm
	PM10:	0.0011	grams/second	6am - 6pm
	TSP:	0.0027	grams/second	6am - 6pm

JOB: **Rochedale 16-028**

STAGE: **Material Handling Emissions**

UNLOADING DUMP TRUCKS - AT TIP HEAD

Emission Source: **Unloading material from dump trucks at tip head into Clay Plant**

Data Source: ***USEPA AP42 Chapter 11.19.2 Crushed Stone Processing and
Pulverized Mineral Processing (2004)***

Derived Uncontrolled Emission Factor (PM2.5):	EF=	2.00E-06 kg/tonne	Assume 1/4 of PM10 emissions
Default Uncontrolled Emission Factor (PM10):	EF=	8.00E-06 kg/tonne	(Table 11.19.2-1 USEPA AP42)
Derived Uncontrolled Emission Factor (TSP):	EF=	1.90E-05 kg/tonne	Based upon 0.42 PM10/TSP ratio for trucks dumping coal loading specified in NPI Emission Estimation Technique Manual for Mining (Environment Australia, 2011)
Control Measures:	Partial enclosure		
Control Efficiency:	50 %	(Table 4 NPI Emission Estimation Technique Manual for Mining, Environment Australia 2011)	
Derived Uncontrolled Emission Factor (PM2.5):	EF=	1.00E-06 kg/tonne	
Default Uncontrolled Emission Factor (PM10):	EF=	4.00E-06 kg/tonne	
Derived Uncontrolled Emission Factor (TSP):	EF=	9.52E-06 kg/tonne	
Production Rate:		195,000 tonnes per annum	
Operating Days:		200 per year	
Operating Hours:		12.0 per day	
Emission Rate (PM2.5):	EF=	0.2 kg/annum	
Emission Rate (PM10):	EF=	0.8 kg/annum	
Emission Rate (TSP):	EF=	1.9 kg/annum	

Emission Rate:	PM2.5:	0.00002	grams/second	6am - 6pm
	PM10:	0.00009	grams/second	6am - 6pm
	TSP:	0.00021	grams/second	6am - 6pm

ATTACHMENT 6

Austral Bricks Emission Rates

Fugitive Dust

AUSTRAL ROCHEDALE FACTORY EMISSION ESTIMATIONS

PRODUCTION RATE

65 Million bricks per year production rate
3 kg per brick (NPI Manual)
195000 tonnes per year production

RAW MATERIAL INPUT OPERATING HOURS

12 hours per day (Austral)
209 days per year Wed-Sat

EMISSION FACTORS

SUBSTANCE	FUGITIVE (FACTORY)				
	Primary Crusher		Grinding and Screening	Extrusion Line with fabric filter	Factory Fugitive
	6am to 6pm		24 hours		
	Emission Factor kg/tonne	Emission Rate g/s	Emission Factor kg/tonne	Emission Factor kg/tonne	g/s
Total Suspended Particulates	0.0006 (AP42)	1.29E-02	0.159 (estimate 200% PM10)	0.0036 (estimate 200% PM10)	1.003E+00
Particulate Matter 10.0 um	0.000295 (NPI)	6.37E-03	0.0795 (NPI 70% control)	0.0018 (NPI 70% control)	5.01E-01
Particulate Matter 2.5 um	0.00005 (AP42)	1.08E-03	0.00795 (estimate 10% PM10)	0.00018 (estimate 10% PM10)	5.01E-02

ATTACHMENT 7

Rochedale Landfill Emission Rates

JOB:

26049 - Rochedale Landfill

STAGE:

SETUP VARIABLES

VALUE

UNITS

NOTES/SOURCE

OPERATIONAL INFORMATION

Daily Activities

Operations undertaken

300

per year

Assumption

Hourly Activities

Filling

6am to 6pm
12

-
hours/day

Assumption
Assumption

Filling Rates

Filling Rate :

720,000
2,400

tonnes per annum
tonnes per day

Conservative Assumption
Conservative Assumption

ACCESS ROADS - For Product Trucks

Control Measures:

Level 1 watering (2 litres/m²/hour) + Low Vehicle Speeds:

Control Efficiency:

75

%

Haul road Silt Content (s):

8.3

%

USEPA AP42 Chapter 13.2.2 Table 13.2.2-1 Average for quarry
(USEPA AP42 Chapter 13.2.1 mean quarrying)

Silt Loading (sL):

8.2

g/m²

Truck & Dog

Road Truck Payload:

20,000

kg

Road Truck Unladen:

15,000

kg

Representative from other projects.

Average Road Truck weight:

25,000

kg

MWA Calc

Fleet Composition

Truck & Dog

100%

MWA Assumption

Fleet Average Payload:

20,000

kg

MWA Calc

Fleet Average Road Truck weight:

25,000

kg

MWA Calc

Number of Landfill Trucks (one-way)

Average Trips Per Hour

10

trips/hour

Conservative Assumption - matching Noise Report

Average Trips Per Day

120

trips/day

MWA Calc

Access Road Lengths

Paved Road Length:

1.00

km

MWA Base Assumption to be Scaled

Unpaved Road Length:

1.00

km

MWA Base Assumption to be Scaled

ATTACHMENT 8

Representative Meteorological Model Year Selection

MWA Environmental have undertaken a review of meteorology recorded at the BoM Brisbane Aero, Archerfield Aero monitoring stations for the period of 2004 to 2024. 1-minute average data has been processed to derive hourly averages, with the interannual variability assessed on the 1-hour average data.

Presented in **Table A8.1** to **Table A8.2** are summary of statistics comparing individual years against the 20-year datasets.

Presented in **Figure A8.1** and **Figure A8.2** are individual yearly wind roses for the BoM Brisbane Aero and Archerfield Aero monitoring stations.

The Year 2021 has been identified as a recent meteorological year closely aligned with the long-term meteorological distribution of wind speeds and wind directions in the region. Comparison of the Year 2021 against the long-term meteorological dataset of 2004 to 2024 for each station is presented in **Figure A8.3**.

Table A8.1: Representative Year Meteorological Analysis for Brisbane Airport observations

Year	Correlation of Yearly Wind Rose against Long-term Wind Rose	Ranking Wind Rose Correlations	Frequency of Calm Winds <0.5m/s (%)	Number of Missing Hours per annum	Mean Wind Speed (m/s)	Absolute Difference to Long term Mean Wind Speed (m/s)
2004	0.919	21	0.4	141	4.2	0.17
2005	0.982	6	0.4	115	4.1	0.09
2006	0.989	3	0.2	81	4.1	0.03
2007	0.969	12	0.3	159	4.1	0.09
2008	0.982	5	0.3	25	4.1	0.07
2009	0.974	10	0.2	27	4.2	0.15
2010	0.956	17	0.3	25	3.9	0.17
2011	0.961	14	0.3	55	3.9	0.18
2012	0.958	16	0.4	24	4.0	0.02
2013	0.978	8	0.6	158	4.2	0.12
2014	0.960	15	0.5	28	4.2	0.16
2015	0.990	2	0.5	51	3.9	0.10
2016	0.965	13	0.8	18	4.1	0.08
2017	0.990	1	0.5	3	4.1	0.02
2018	0.978	9	0.9	42	3.9	0.12
2019	0.951	18	0.3	5	4.2	0.16
2020	0.970	11	0.6	10	4.1	0.04
2021 (Selected Year)	0.983	4	0.5	6	3.9	0.14
2022	0.944	19	0.3	2	3.9	0.11
2023	0.981	7	0.2	8	3.9	0.13
2024	0.937	20	0.5	38	3.9	0.20

Table A8.2 **Representative Year Meteorological Analysis for Archerfield Airport observations**

Year	Correlation of Yearly Wind Rose against Long-term Wind Rose	Ranking Wind Rose Correlations	Frequency of Calm Winds <0.5m/s (%)	Number of Missing Hours per annum	Mean Wind Speed (m/s)	Absolute Difference to Long term Mean Wind Speed (m/s)
2004	0.953	16	1.6	41	3.4	0.07
2005	0.963	13	1.5	99	3.3	0.01
2006	0.957	15	1	53	3.2	0.07
2007	0.950	17	1.6	107	3.5	0.20
2008	0.978	8	1.6	17	3.3	0.01
2009	0.962	14	1.9	2992	3.3	0.02
2010	0.974	9	1.6	32	3.2	0.08
2011	0.970	10	1.5	59	3.2	0.10
2012	0.984	6	1.3	16	3.3	0.06
2013	0.992	1	1.9	4	3.4	0.04
2014	0.889	21	1.6	25	3.5	0.14
2015	0.988	2	1.5	9	3.2	0.07
2016	0.930	19	1	14	3.5	0.17
2017	0.985	4	1.7	21	3.3	0.06
2018	0.986	3	1.7	12	3.3	0.02
2019	0.945	18	2.1	5	3.5	0.20
2020	0.963	12	1.9	3	3.4	0.05
2021 (Selected Year)	0.964	11	2.2	45	3.2	0.08
2022	0.915	20	2.4	40	3.3	0.02
2023	0.979	7	2	22	3.1	0.16
2024	0.985	5	2.3	8	3.1	0.17

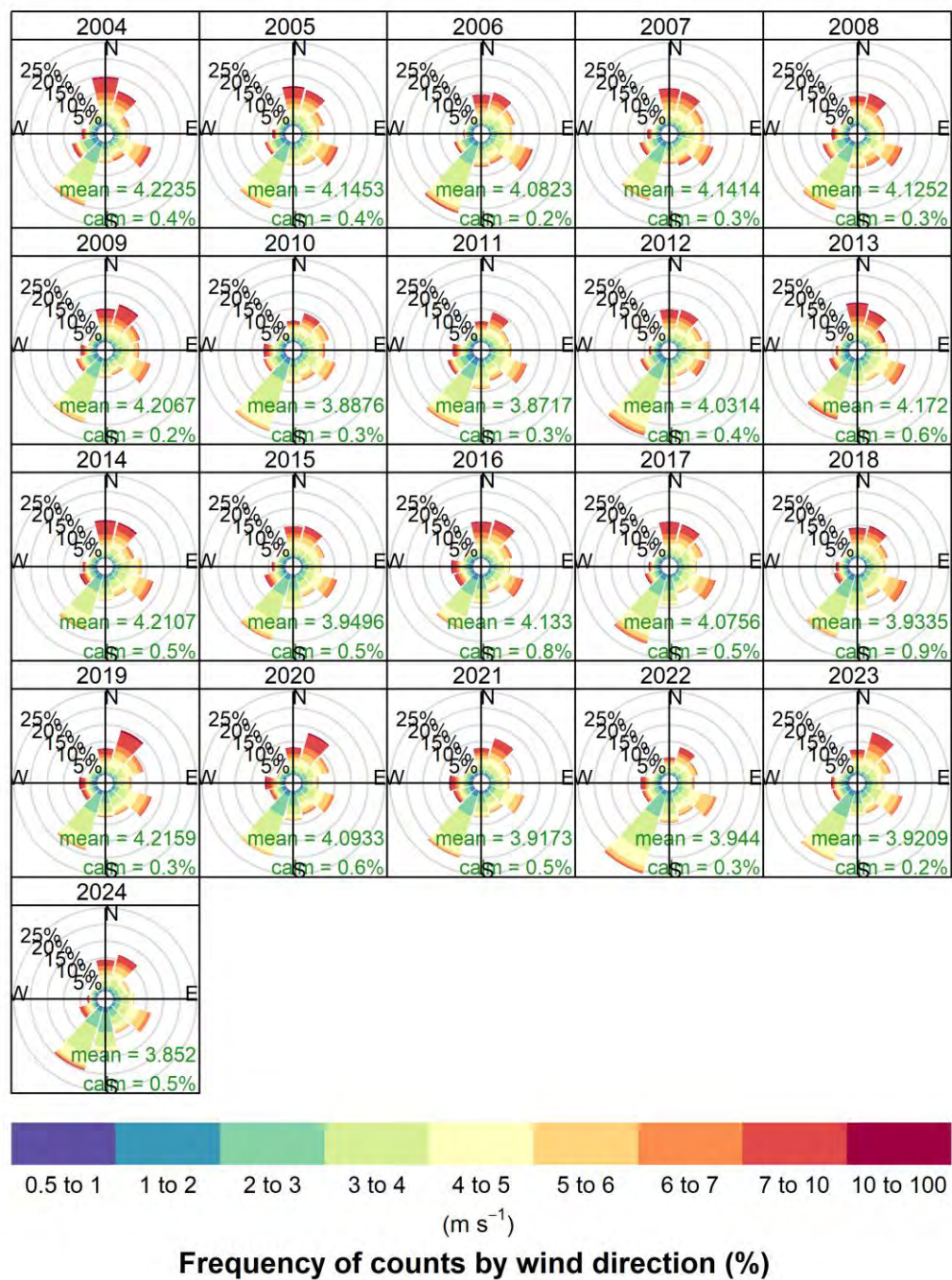


Figure A8.1: Annual Wind Roses for the BoM Brisbane Aero Station

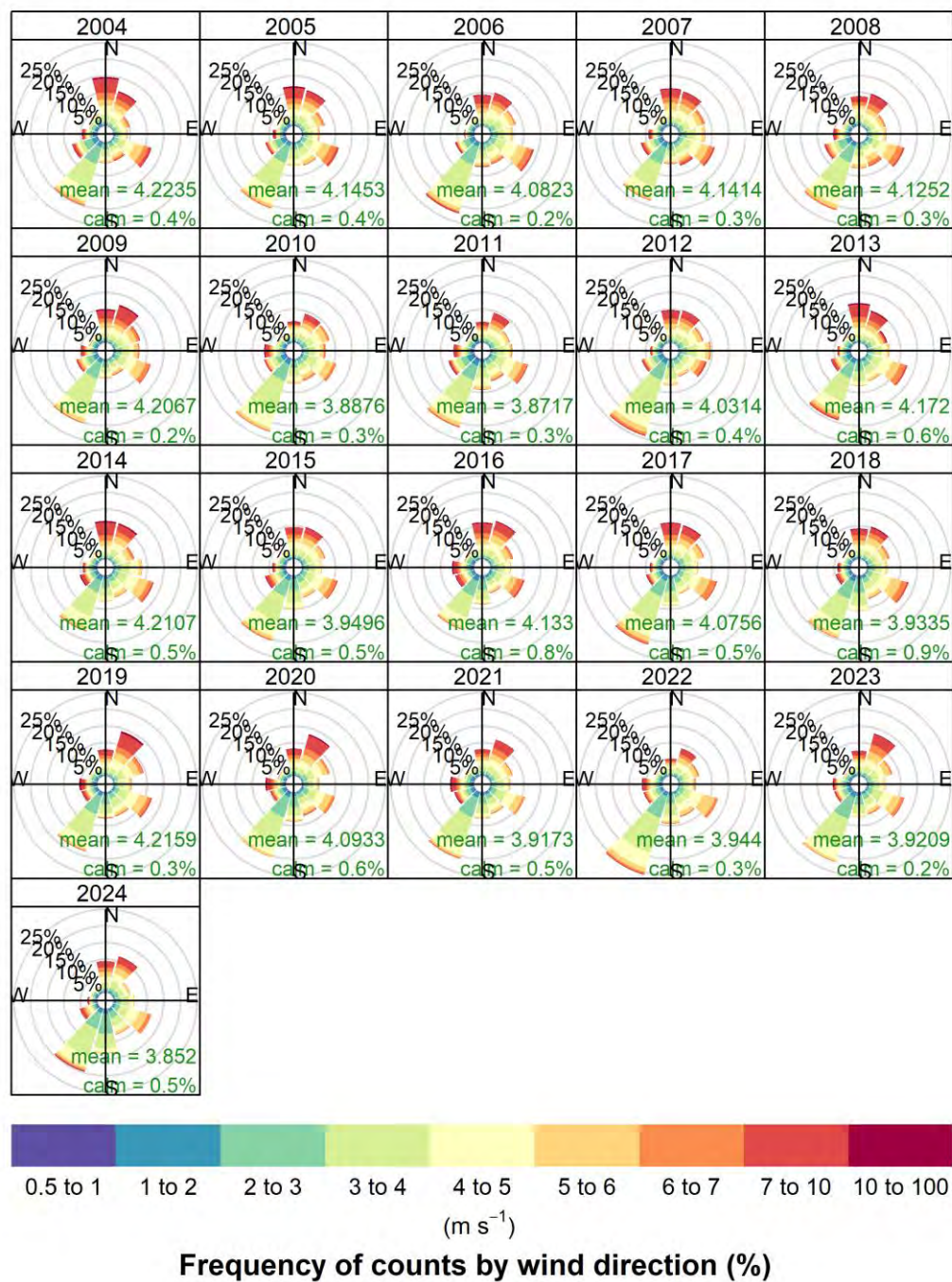


Figure A8.2: Annual Wind Roses for the BoM Archerfield Aero Station

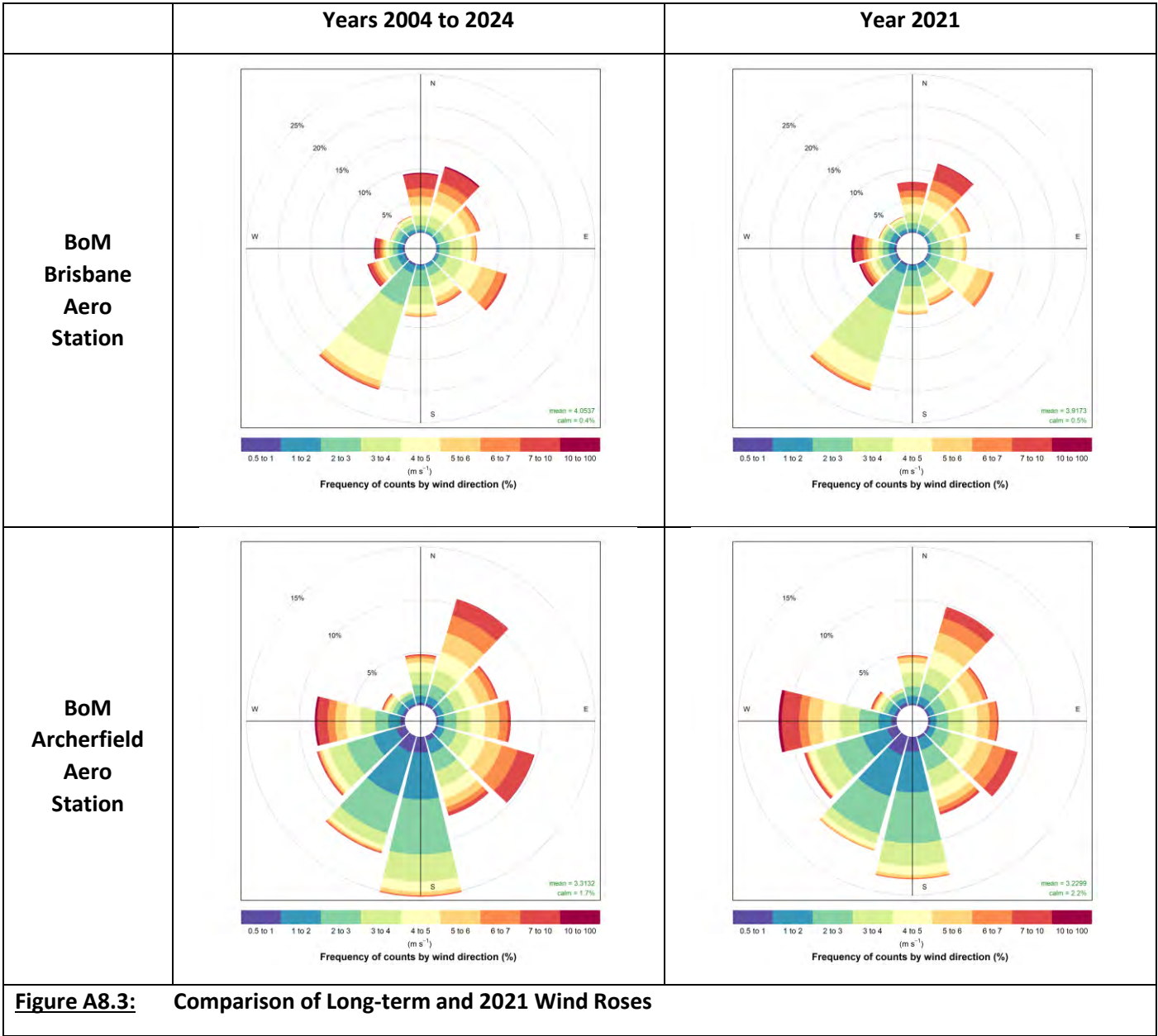
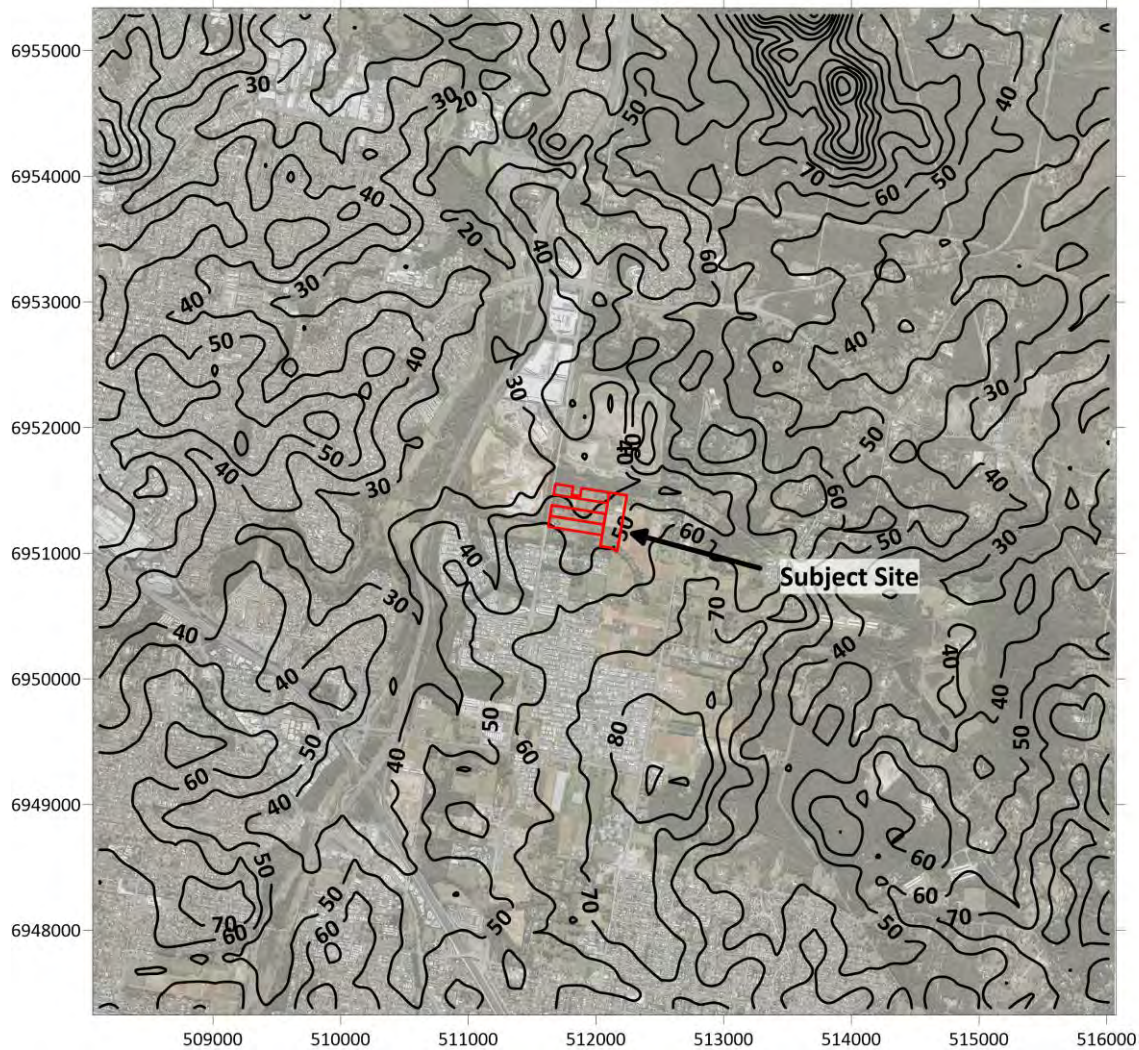


Figure A8.3: Comparison of Long-term and 2021 Wind Roses

ATTACHMENT 9

*CALMET Terrain and Land Use
representation within dispersion model*



Terrain contours in metres AHD

Figure A9.1	Description	Date
	CALMET – Terrain Representation	17-July-2026

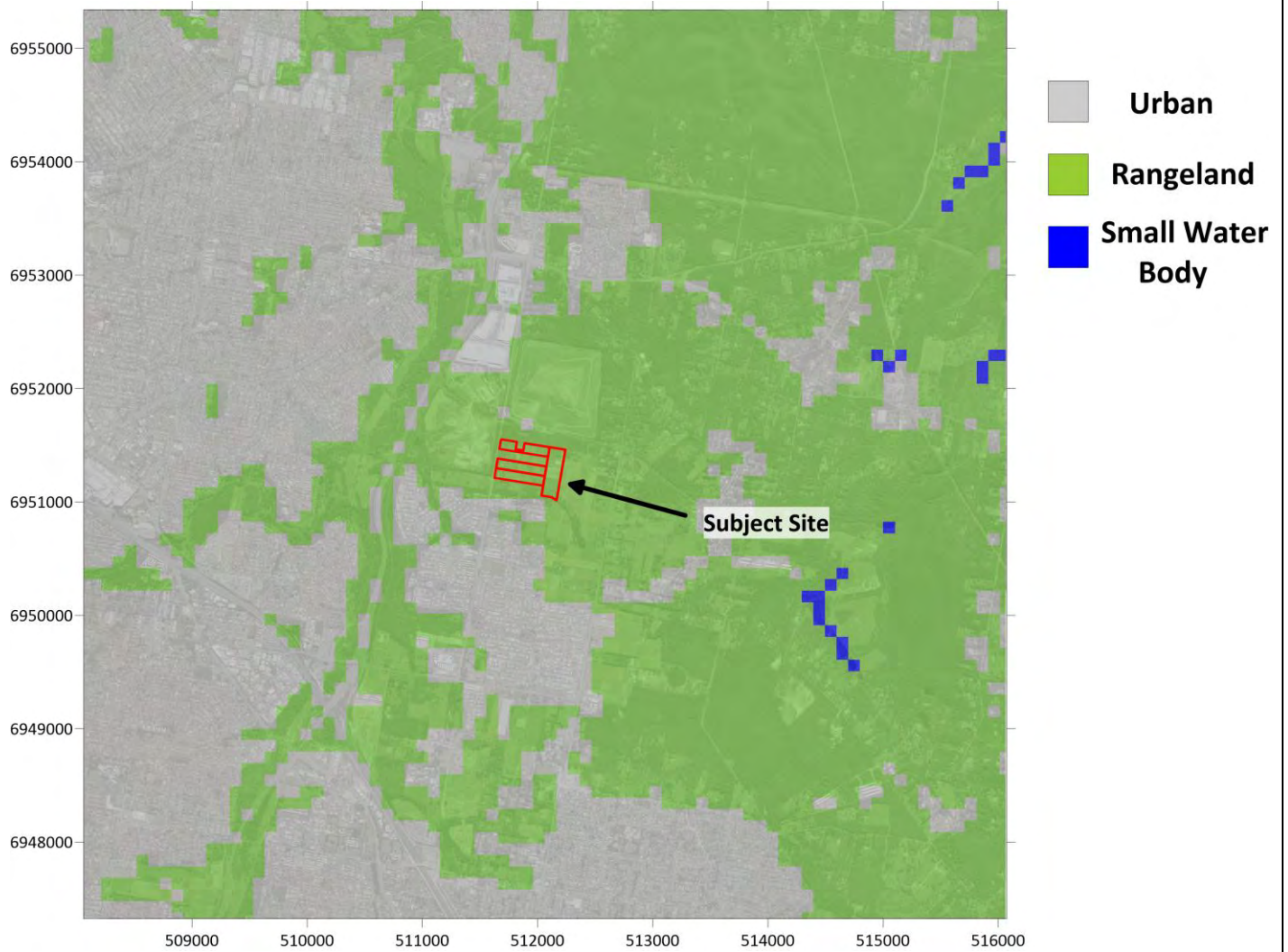


Figure A9.2	Description	Date
	CALMET – Land use classification	17-July-2026

ATTACHMENT 10

Analysis of CALMET Predicted Meteorology for the Subject Site

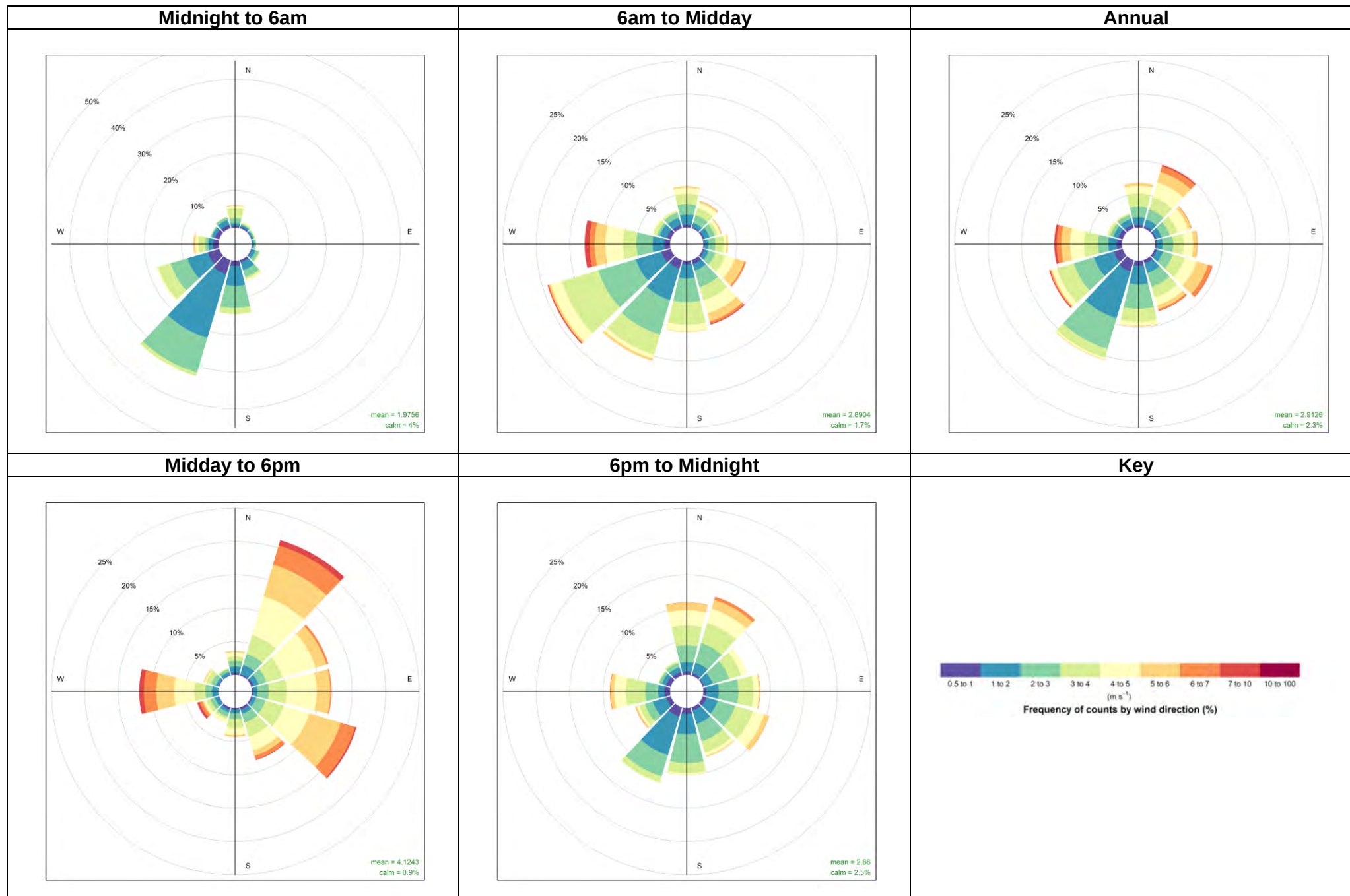


Figure A20.1 Diurnal wind roses for Site as generated by CALMET

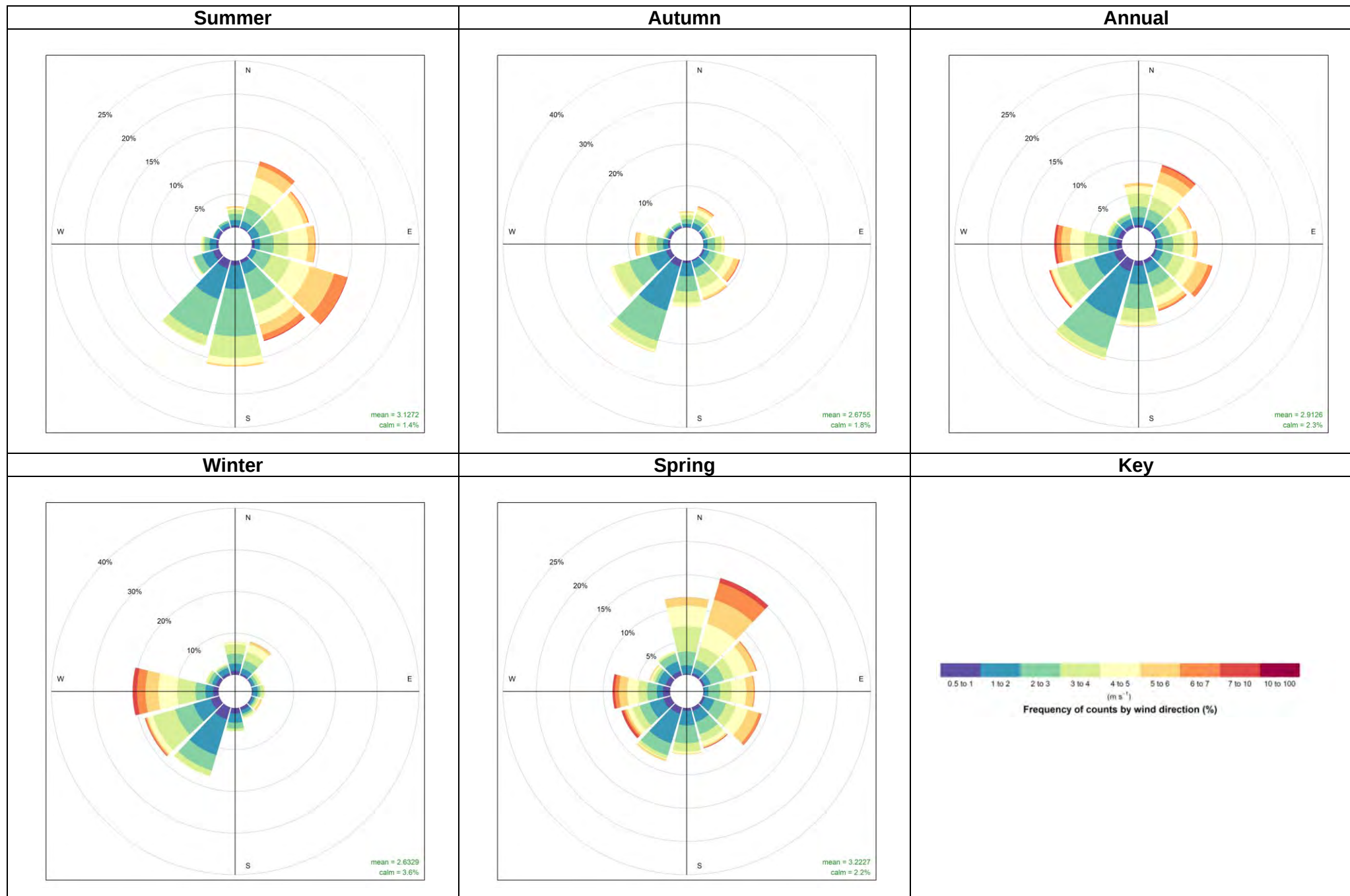


Figure A20.2 Seasonal wind roses for Site as generated by CALMET

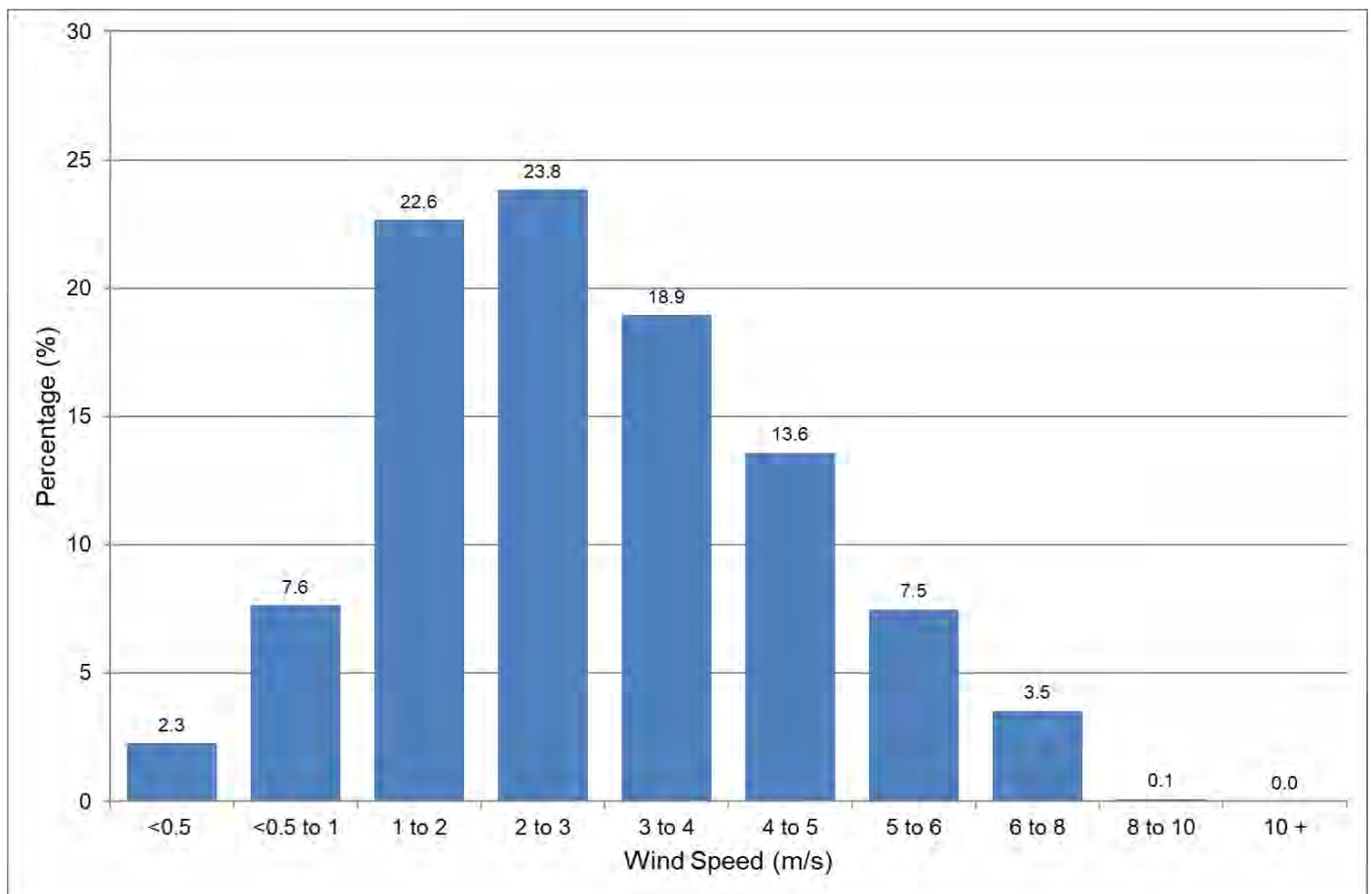


Figure A20.3 Wind frequency graph for Site as generated by CALMET

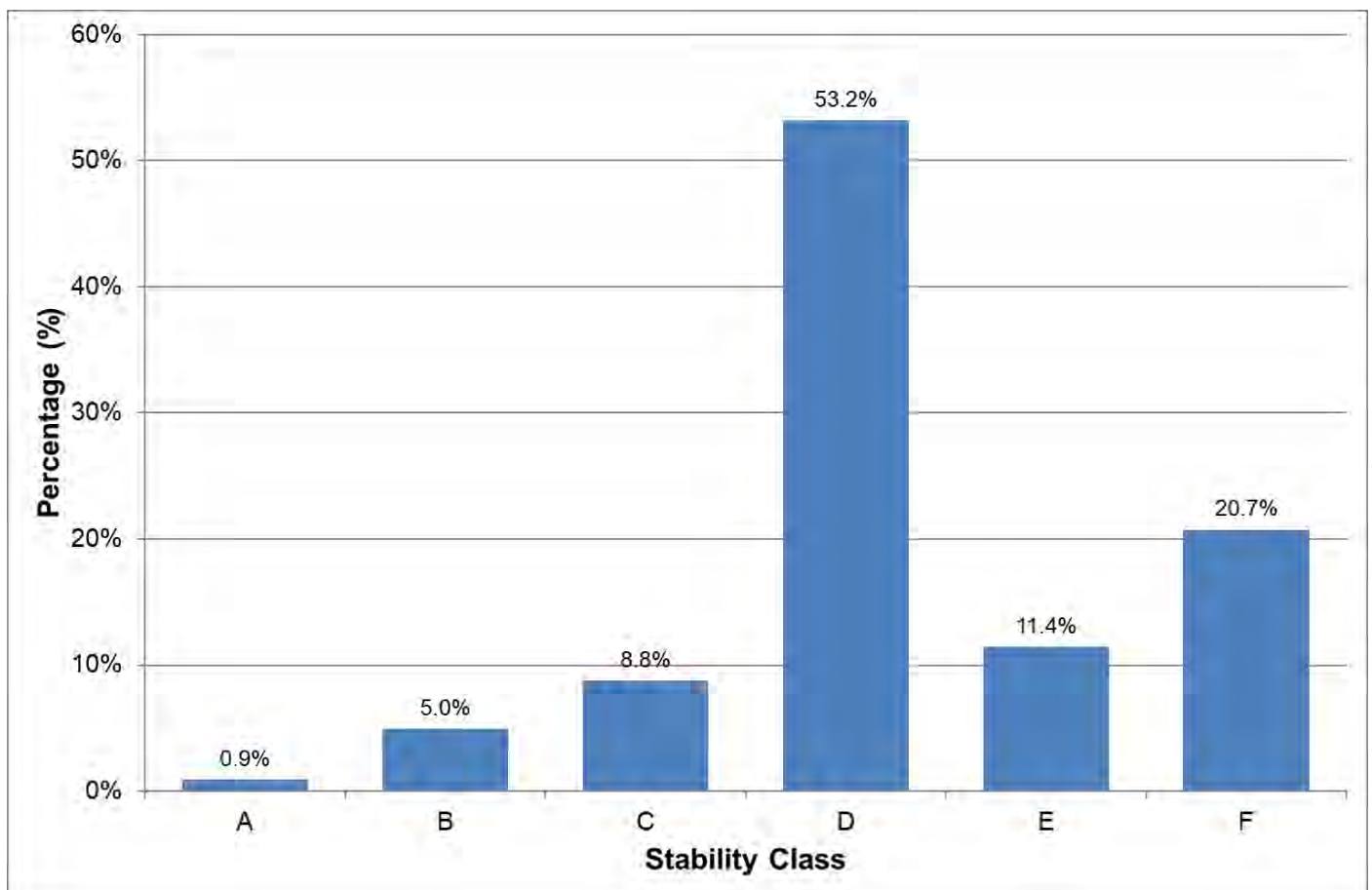


Figure A20.4 Stability Class distribution for Site as generated by CALMET

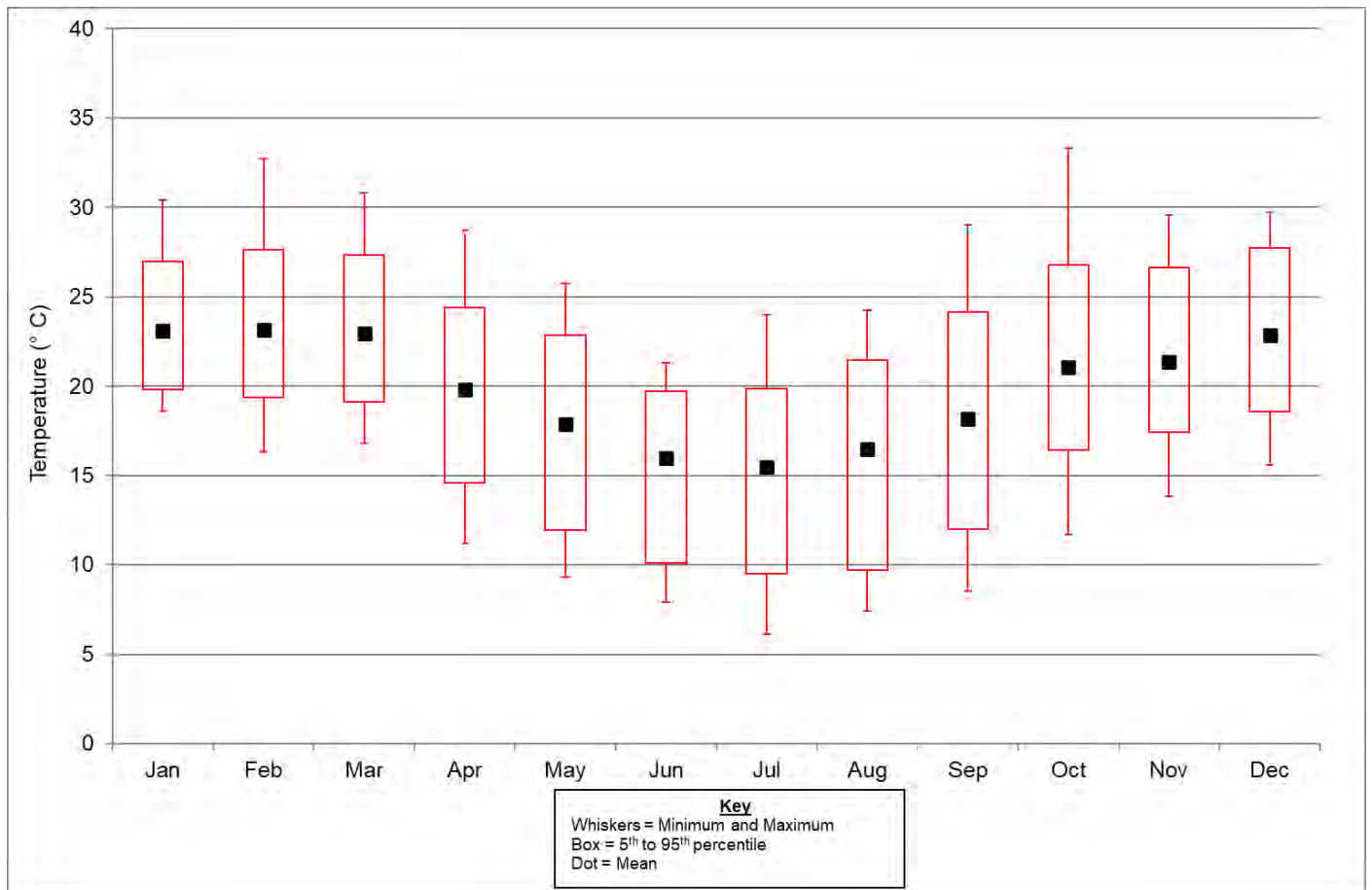


Figure A20.5 Box and Whisker plot of monthly temperature for Site as generated by CALMET

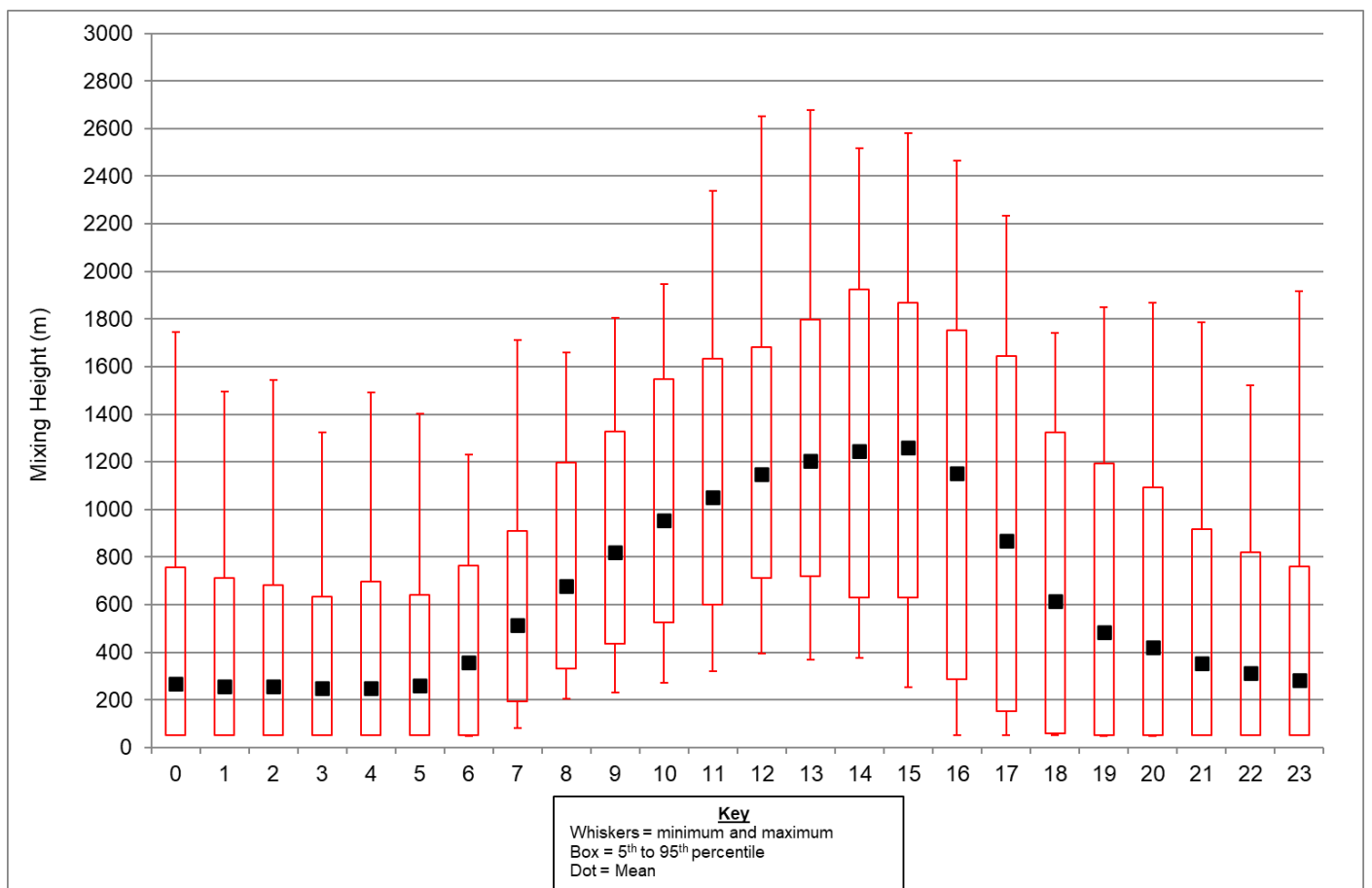


Figure A20.6 Box and Whisker plot of diurnal mixing height for Site as generated by CALMET

ATTACHMENT 11

Predicted Pollutant Concentrations

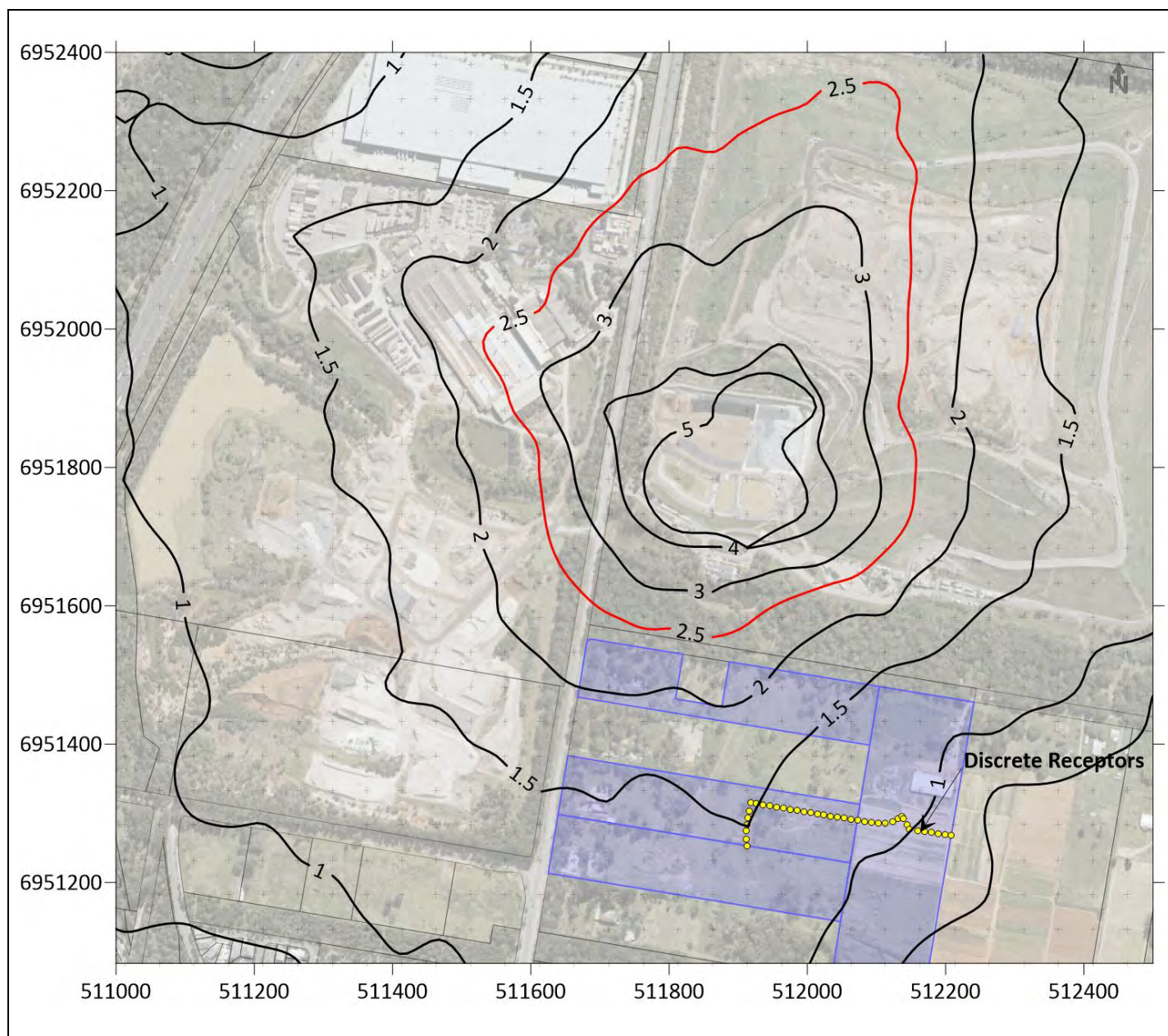
Odour

TSP

PM₁₀

PM_{2.5}

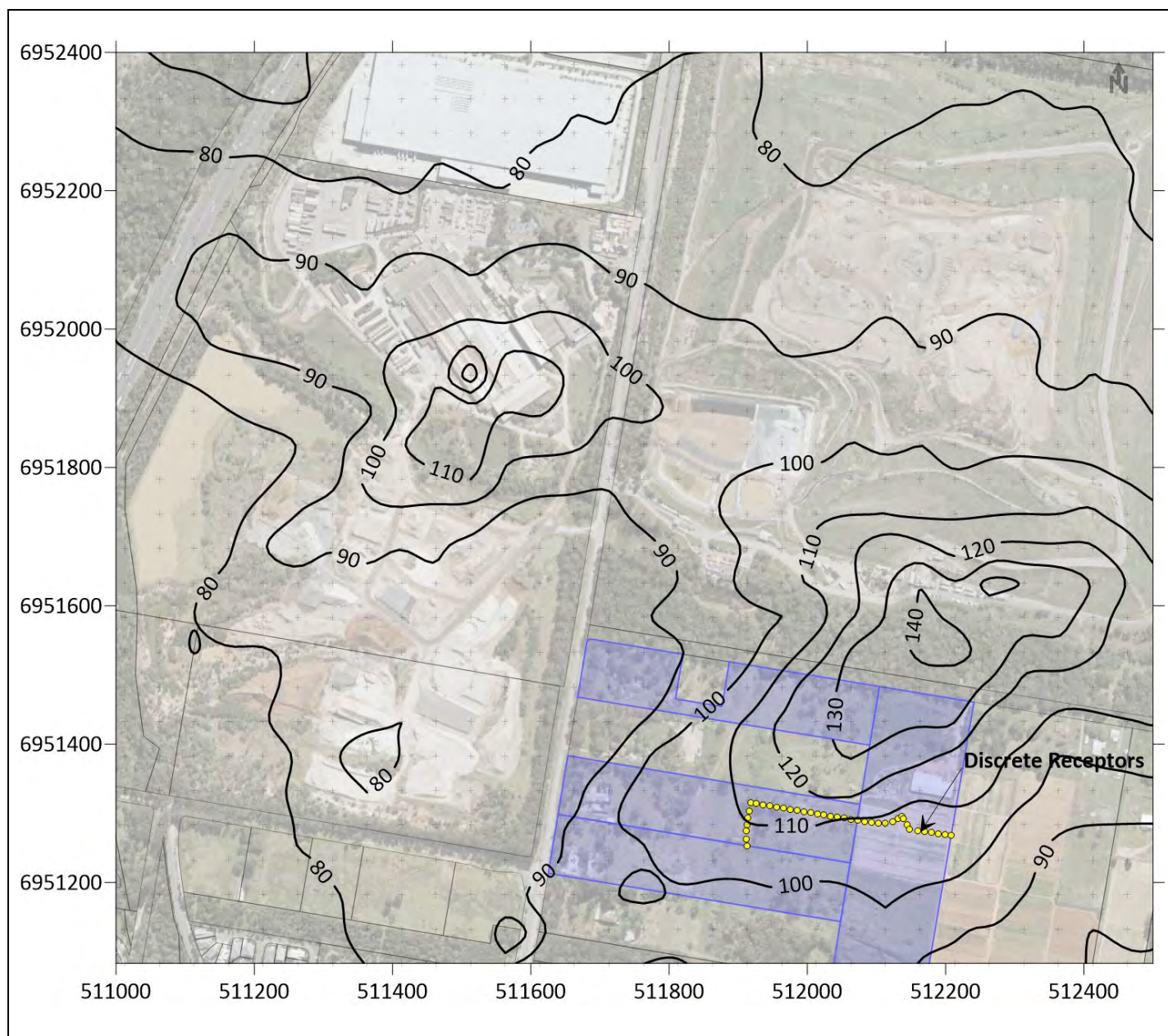
Nitrogen Dioxide



24096 Rochedale

1-hour average 99.5th concentrations of Odour from Rochedale Landfill operations

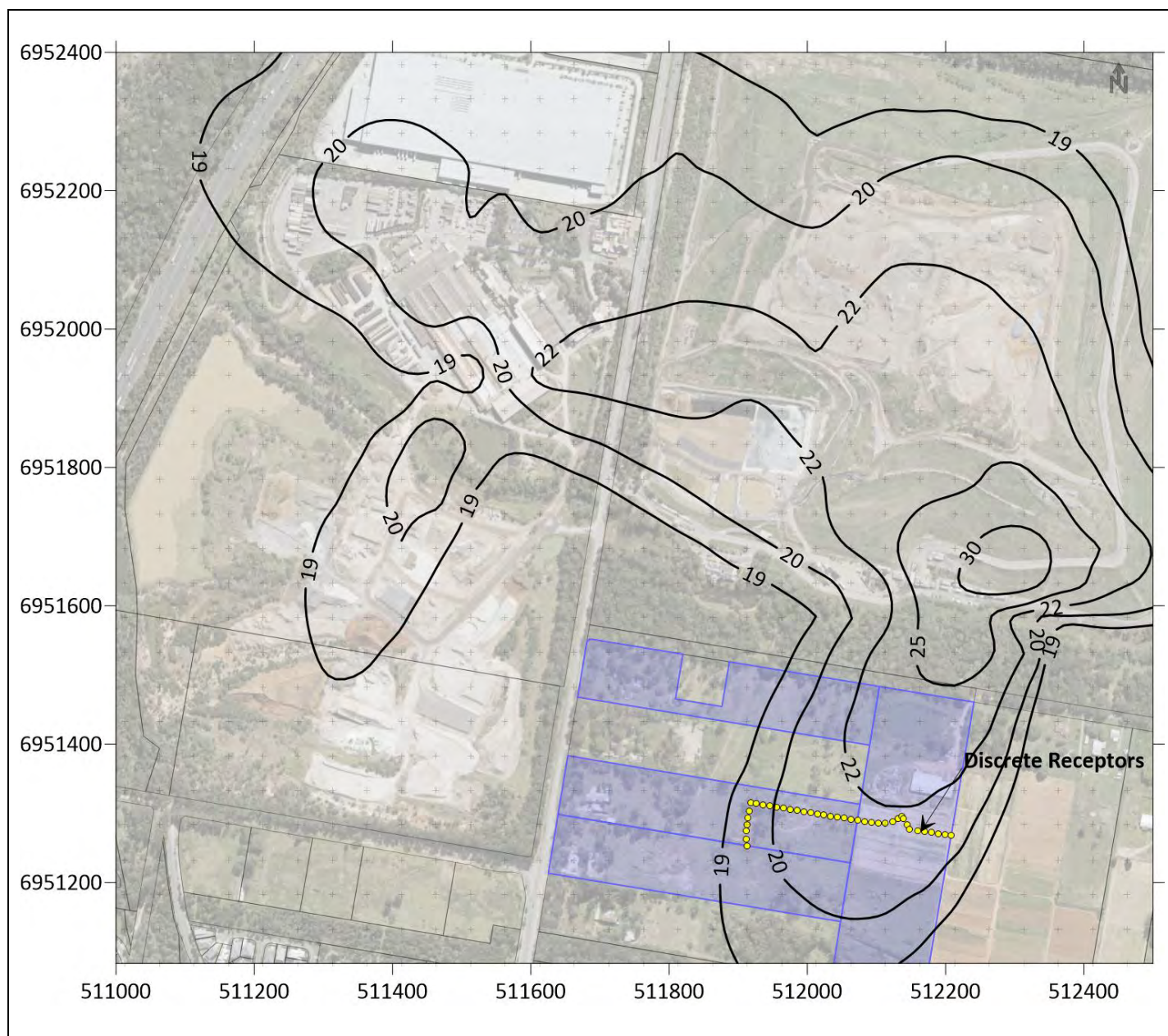
Figure A11.1	Source	Pollutant	Averaging Period	Odour Criteria	Units	Date
	Landfill Active Face and Leachate Ponds	Odour	1-hour average 99.5 th	2.5	Odour Units	10 Jul 2026



24096 Rochedale

1-hour average 99.9th percentile concentrations of Nitrogen Dioxide from Austral Bricks and Rochedale Landfill including ambient concentrations

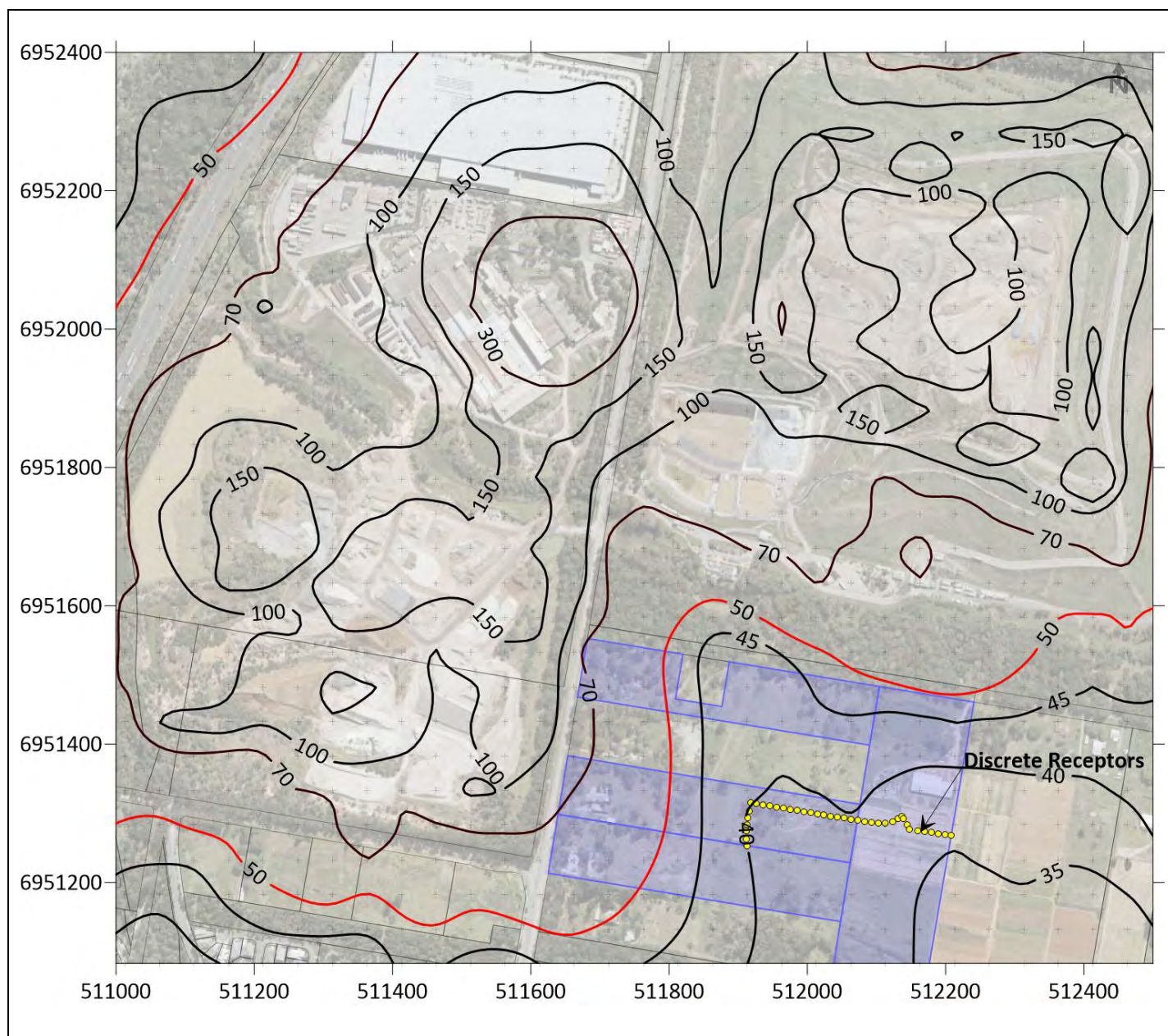
Figure A11.2	Source	Pollutant	Averaging Period	Air Quality (Planning) Criteria	Units	Date
	Austral Bricks + Rochedale Landfill	Nitrogen Dioxide	1-hour average 99.9 th	250	µg/m ³	10 Jul 2026



24096 Rochedale

Annual average concentrations of Nitrogen Dioxide from Austral Bricks and Rochedale Landfill including ambient concentrations

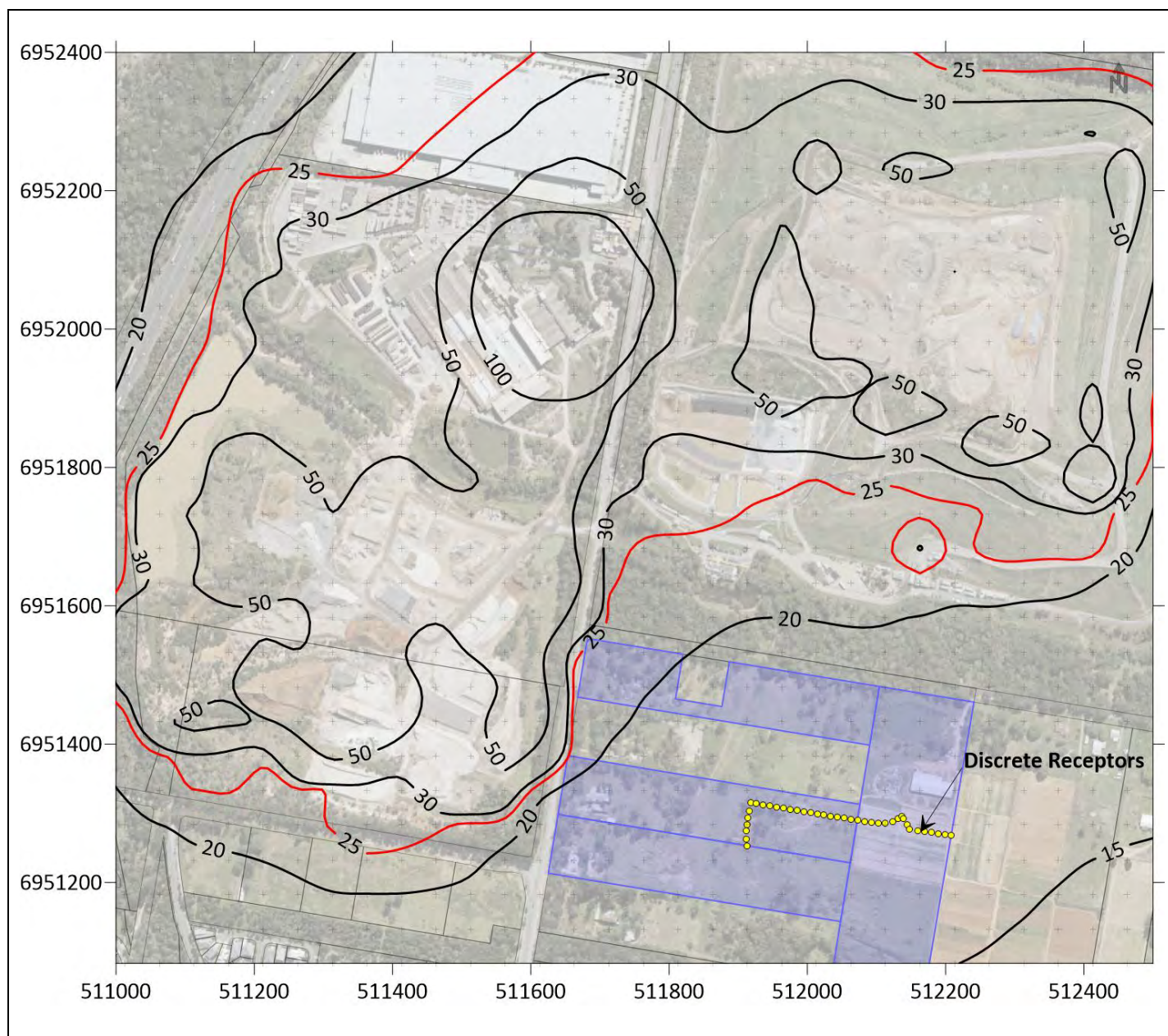
Figure A11.3	Source	Pollutant	Averaging Period	Air Quality (Planning) Criteria	Units	Date
	Austral Bricks + Rochedale Landfill	Nitrogen Dioxide	Annual average	62	$\mu\text{g}/\text{m}^3$	10 Jul 2026



24096 Rochedale

Maximum 24-hour average PM₁₀ concentrations from Austral Bricks and Rochedale Landfill including ambient concentrations

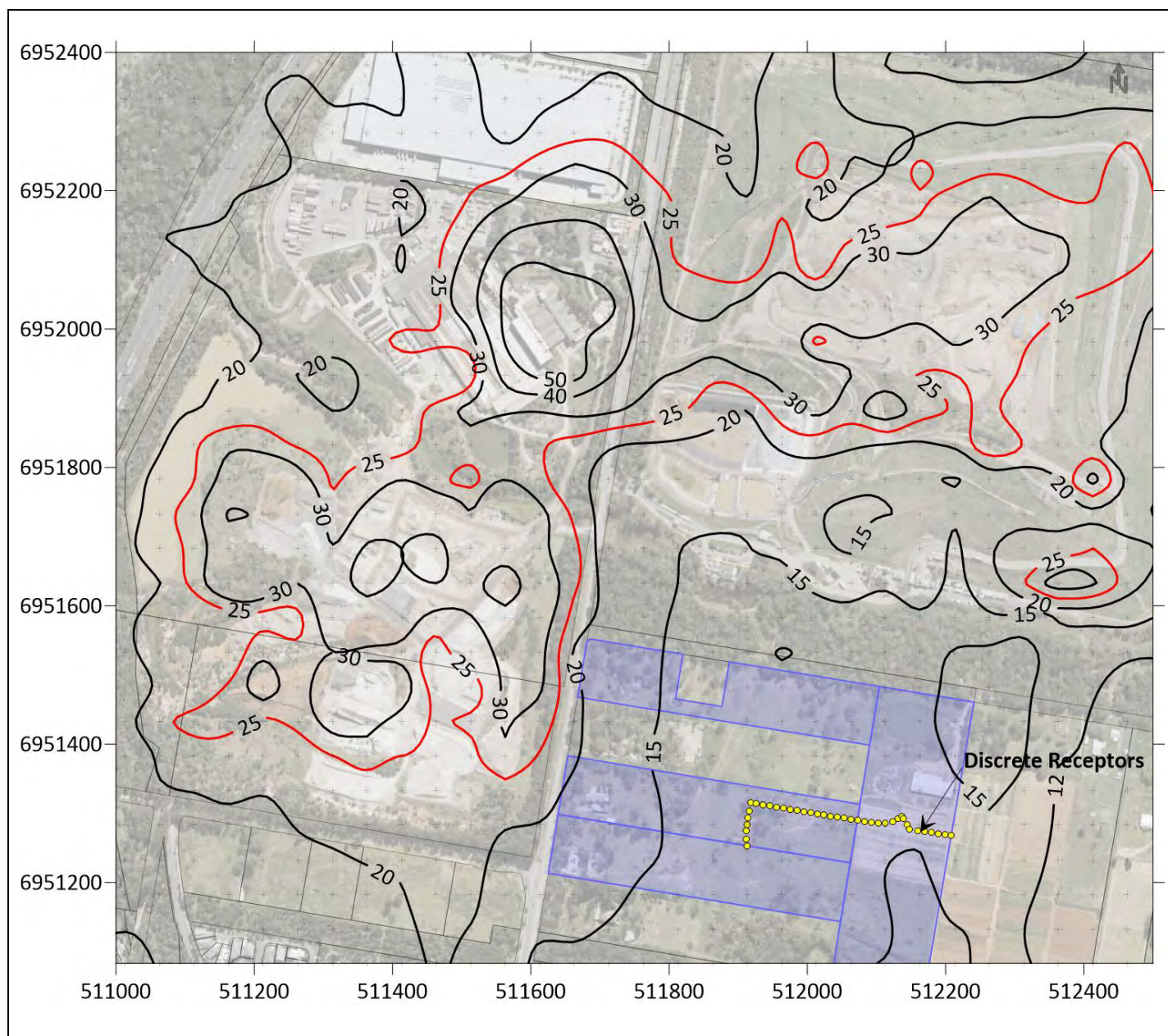
Figure A11.4	Source	Pollutant	Averaging Period	Air Quality (Planning) Criteria	Units	Date
	Austral Bricks + Rochedale Landfill	PM ₁₀	Maximum 24-hour average	50	µg/m ³	10 Jul 2026



24096 Rochedale

Annual average PM₁₀ concentrations from Austral Bricks and Rochedale Landfill including ambient concentrations

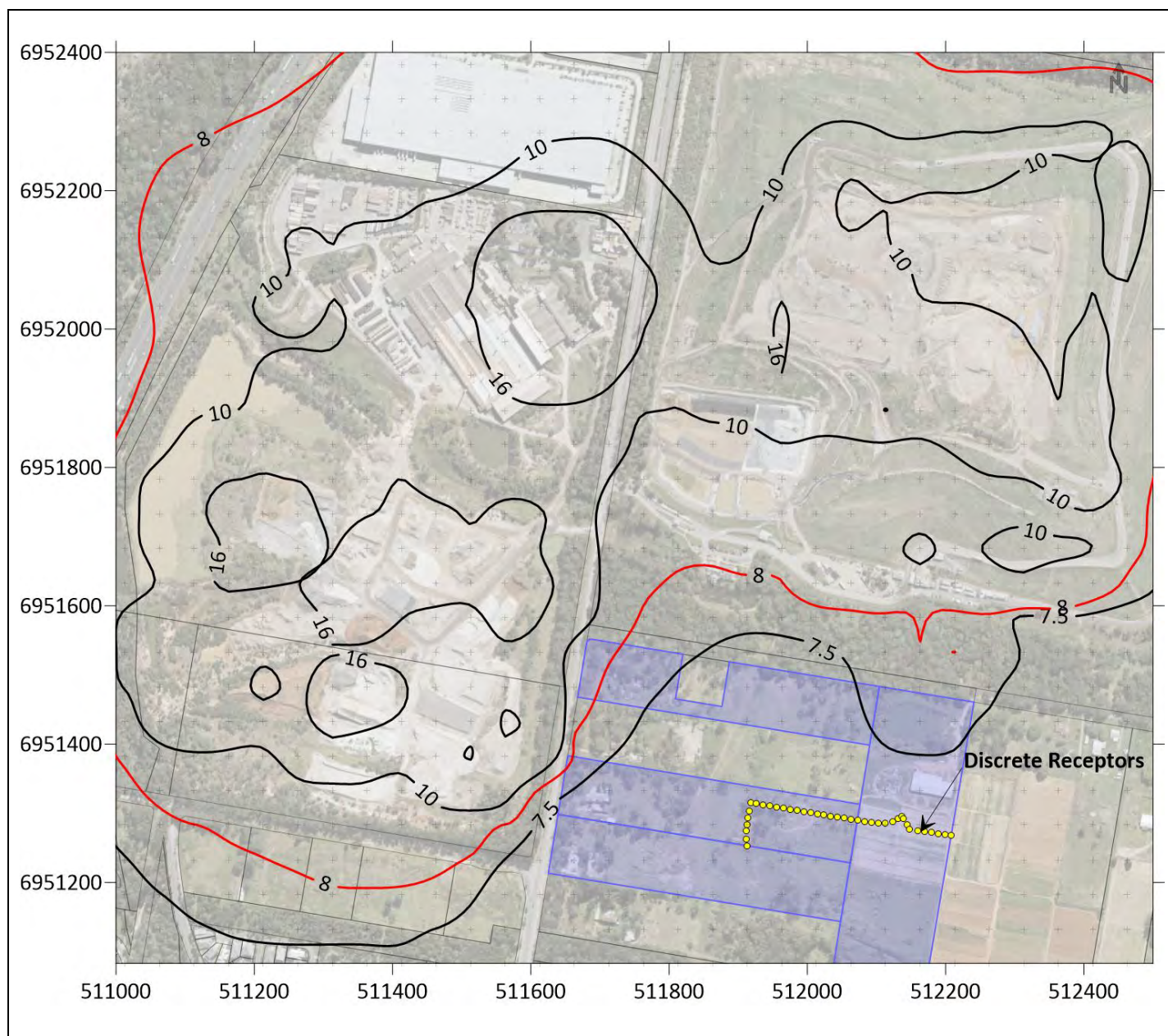
Figure A11.5	Source	Pollutant	Averaging Period	Air Quality (Planning) Criteria	Units	Date
	Austral Bricks + Rochedale Landfill	PM ₁₀	Annual average	25	µg/m ³	10 Jul 2026



24096 Rochedale

Maximum 24-hour average PM_{2.5} concentrations from Austral Bricks and Rochedale Landfill including ambient concentrations

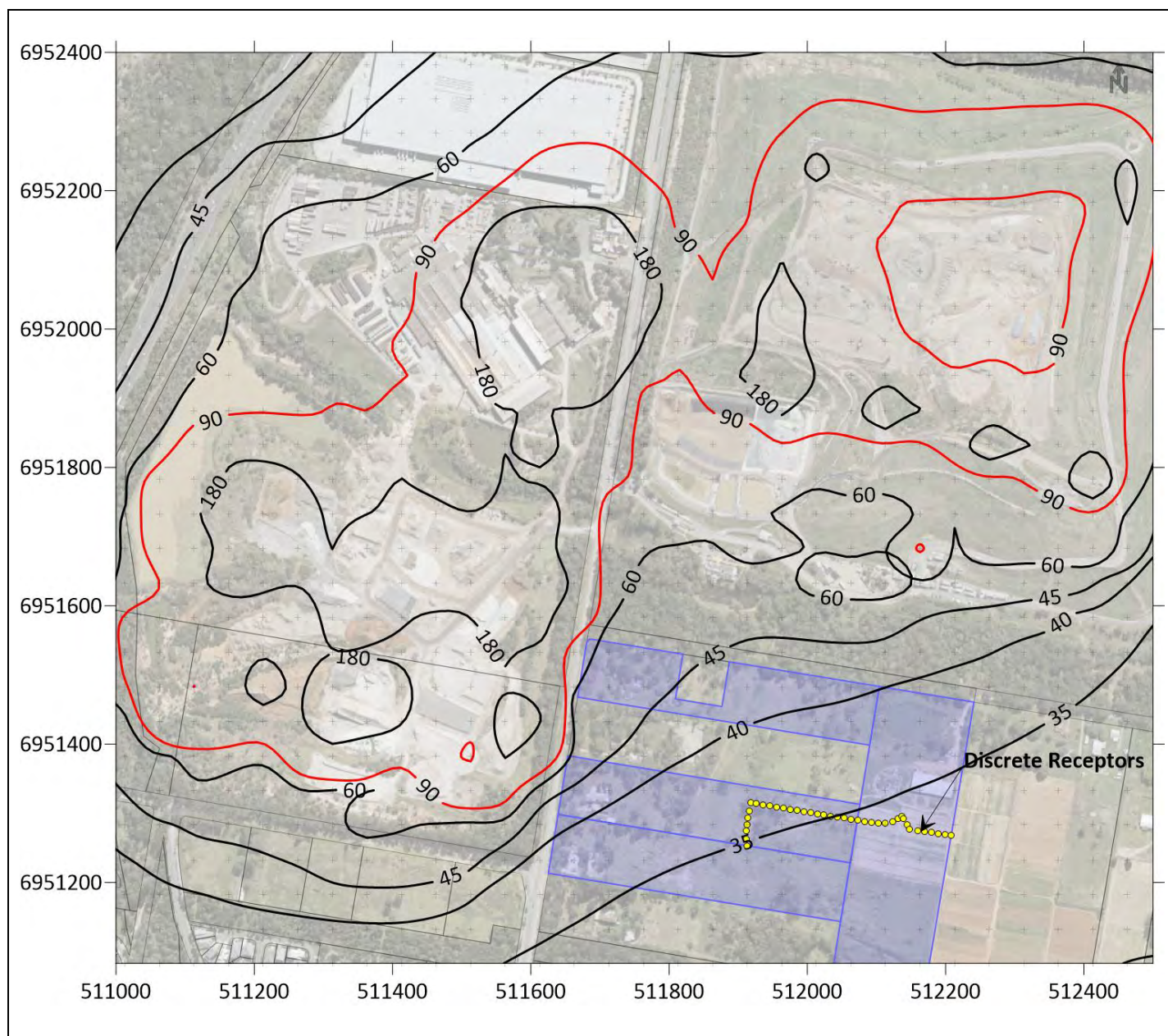
Figure A11.6	Source	Pollutant	Averaging Period	Air Quality (Planning) Criteria	Units	Date
	Austral Bricks + Rochedale Landfill	PM _{2.5}	Maximum 24-hour average	25	µg/m ³	10 Jul 2026



24096 Rochedale

Annual average PM_{2.5} concentrations from Austral Bricks and Rochedale Landfill including ambient concentrations

Figure A11.7	Source	Pollutant	Averaging Period	Air Quality (Planning) Criteria	Units	Date
	Austral Bricks + Rochedale Landfill	PM _{2.5}	Annual average	8	µg/m ³	10 Jul 2026



24096 Rochedale

Annual average TSP concentrations from Austral Bricks and Rochedale Landfill including ambient concentrations

Figure A11.8	Source	Pollutant	Averaging Period	Air Quality (Planning) Criteria	Units	Date
	Austral Bricks + Rochedale Landfill	TSP	Annual average	90	µg/m³	10 Jul 2026