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KINGS PARK WASTE METAL RECOVERY PROCESSING AND RECYCLING FACILITY

Addendum Noise Impact Assessment

20 December 2021

Sell & Parker

TK653-06F01 Report (r6).docx

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Document details

Detail	Reference
Doc reference:	TK653-06F01 Report (r6).docx
Prepared for:	Sell & Parker
Address:	11 Meadow Way Banksmeadow NSW 2019
Attention:	Mr Jordan Rodgers

Document control

Date	Revision history	Non-issued revision	Issued revision	Prepared	Instructed	Reviewed / Authorised
16.12.2021	Draft	0-1	2	W. Chan	-	M. Chung
17.12.2021	Final	3	4	W. Chan	-	M. Chung
20.12.2021	Final		5-6	W. Chan	-	M. Chung

File Path: R:\AssocSydProjects\TK651-TK700\TK653 wc Kings Park Recycling Facility Mod\TASK 6\1 Docs\TK653-06F01 Report (r6).docx

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1 Introduction

Renzo Tonin & Associates was engaged to conduct a Noise Impact Assessment for the proposed expansion (the Proposal) of the existing Kings Park Waste Metal Recovery, Processing and Recycling Facility located at 23-43 and 45 Tattersall Road, Kings Park. The purpose of this assessment is to provide an updated environmental noise impact assessment of the Proposal including additional considerations provided by the NSW Environmental Protection Authority (EPA) and NSW Department of Planning, Industry and Environment (DPIE).

The work documented in this report was carried out in accordance with the Renzo Tonin & Associates Quality Assurance System, which is based on Australian Standard / NZS ISO 9001. Appendix A contains a glossary of acoustic terms used in this report.

2 Project description

Sell & Parker currently operates the Kings Park Waste Metal Recovery, Processing and Recycling Facility located at 23-43 and 45 Tattersall Road, Kings Park. The Proposal is to increase the approved throughput limit from 350,000 to 600,000 tonnes per annum.

The existing infrastructure at the subject site has the capacity to accommodate the increased throughput and would not require any physical works or change to the nature of operations. However, some adjustments to site processes such as internal traffic flows, stacking locations and scheduling would be required.

A plan for the subject site is presented in Figure 1 below.

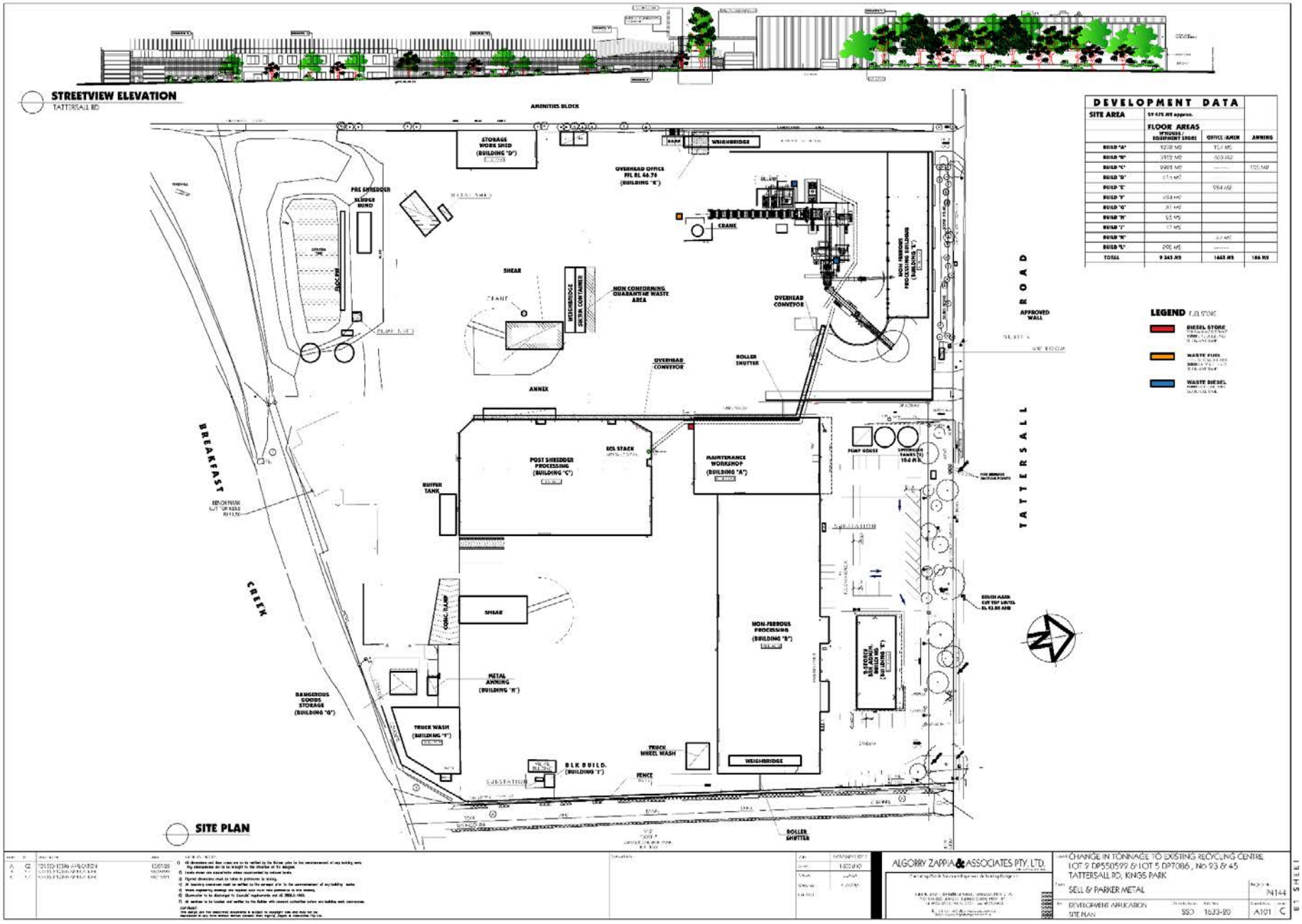
2.1 Hours of operation

The Proposal would not impact or change the current approved hours of operation. The current approved hours of operation will be maintained as follows.

Table 2.1 – Currently approved hours of operation

Activity		Day	Hours
Operation	Oxy-acetylene torch cutting	Monday – Saturday	9am to 3pm
		Sunday & Public Holidays	Nil
	Maintenance and cleaning	Monday – Saturday	9pm to 6am
		Sunday	24 hours
	All other activities	Monday – Saturday	6am to 9pm
		Sunday & Public Holidays	Nil

Figure 1 – Proposal plan



3 Noise sensitive receivers and other receivers

As the existing acoustic environment surrounding the subject site varies, noise sensitive receivers have been grouped into Noise Catchment Areas (NCAs) based on areas with similar acoustic environments. NCAs have been included to address agency comments. The following NCAs were nominated to provide an assessment of areas potentially affected by noise from the subject site.

Table 3.1 – Noise Catchment Areas

NCA	Description
NCA1A	Noise catchment area directly east of the Kings Park Industrial Estate and on the eastern side of Sunnyholt Road. These receivers are not located behind the road noise barrier along Sunnyholt Road and have line of sight to Sunnyholt Road.
NCA1B	Noise catchment area directly east of the Kings Park Industrial Estate and on the eastern side of Sunnyholt Road. These receivers are located behind the road noise barrier along Sunnyholt Road and are shielded from traffic noise from Sunnyholt Road and general industrial noise from the Kings Park Industrial Estate.
NCA1C	Noise catchment area directly east of NCA1B. These receivers are further removed from Sunnyholt Road and generally located at a higher elevation than the receivers of NCA1B, particularly for receivers along Anthony Street.
NCA1D	Noise catchment area east of NCA1B and north of NCA1C. These receivers are further removed from Sunnyholt Road and generally located at a higher elevation than the receivers of NCA1B. In addition to traffic noise from Sunnyholt Road and general industrial noise from the Kings Park Industrial Estate, the noise environment is also influenced by traffic noise from Vardys Road.
NCA1E	Noise catchment area directly east of NCA1C. These receivers are further removed from Sunnyholt Road and generally located at a higher elevation than the receivers of NCA1C, particularly for receivers along Anthony Street.
NCA2	Noise catchment area directly north of the Kings Park Industrial Estate and between Garling Road and Sunnyholt Road. Noise environment is dominated by industrial noise from the Kings Park Industrial Estate and traffic noise from Sunnyholt Road.
NCA3	Noise catchment area directly west of the Kings Park Industrial Estate and includes receivers on Railway Road, Attard Avenue and Chedley Place. Noise environment is dominated by industrial noise from the Kings Park Industrial Estate and the Blacktown to Marayong rail line.

The following residential receivers are potentially most affected by noise from the site within each NCA determined from site surveys and predicted noise contours.

- **Receiver R1A – 189 Sunnyholt Road, Blacktown**
  Residential receiver located approx. 315m east of the facility and considered representative of the nearest affected receivers within NCA1A.
- **Receiver R1B – 2 Anthony Street, Blacktown**
  Residential receiver located approx. 320m east of the facility and considered representative of the nearest affected receivers within NCA1B.
- **Receiver R1C – 40 Charles Street, Blacktown**
  Residential receiver located approx. 400m east of the facility and considered representative of the nearest affected receivers within NCA1C.

- **Receiver R1D – 2 Eggleton Street, Blacktown**
  Residential receiver located approx. 460m east of the facility and considered representative of the nearest affected receivers within NCA1D.

- **Receiver R1E – 11 Anthony Street, Blacktown**
  Residential receiver located approx. 500m east of the facility and considered representative of the nearest affected receivers within NCA1E.

- **Receiver R2 – 249 Madagascar Drive, Kings Park**
  Residential receiver located approx. 650m north of the facility and considered representative of the nearest affected receivers within NCA2. It is noted that this replaces 17 Camorta Close, Kings Park, nominated in the EIS, as the most affected receiver location to the north.

- **Receiver R3 – 3 Railway Road, Marayong**
  Residential receiver located approx. 830m west of the facility and considered representative of the nearest affected receivers within NCA3.

The following adjacent commercial and industrial receivers are potentially most affected by noise from the site.

- **Receiver R4 – 38 Tattersalls Road, Kings Park**
  Industrial receiver to the north of the facility across Tattersalls Road.

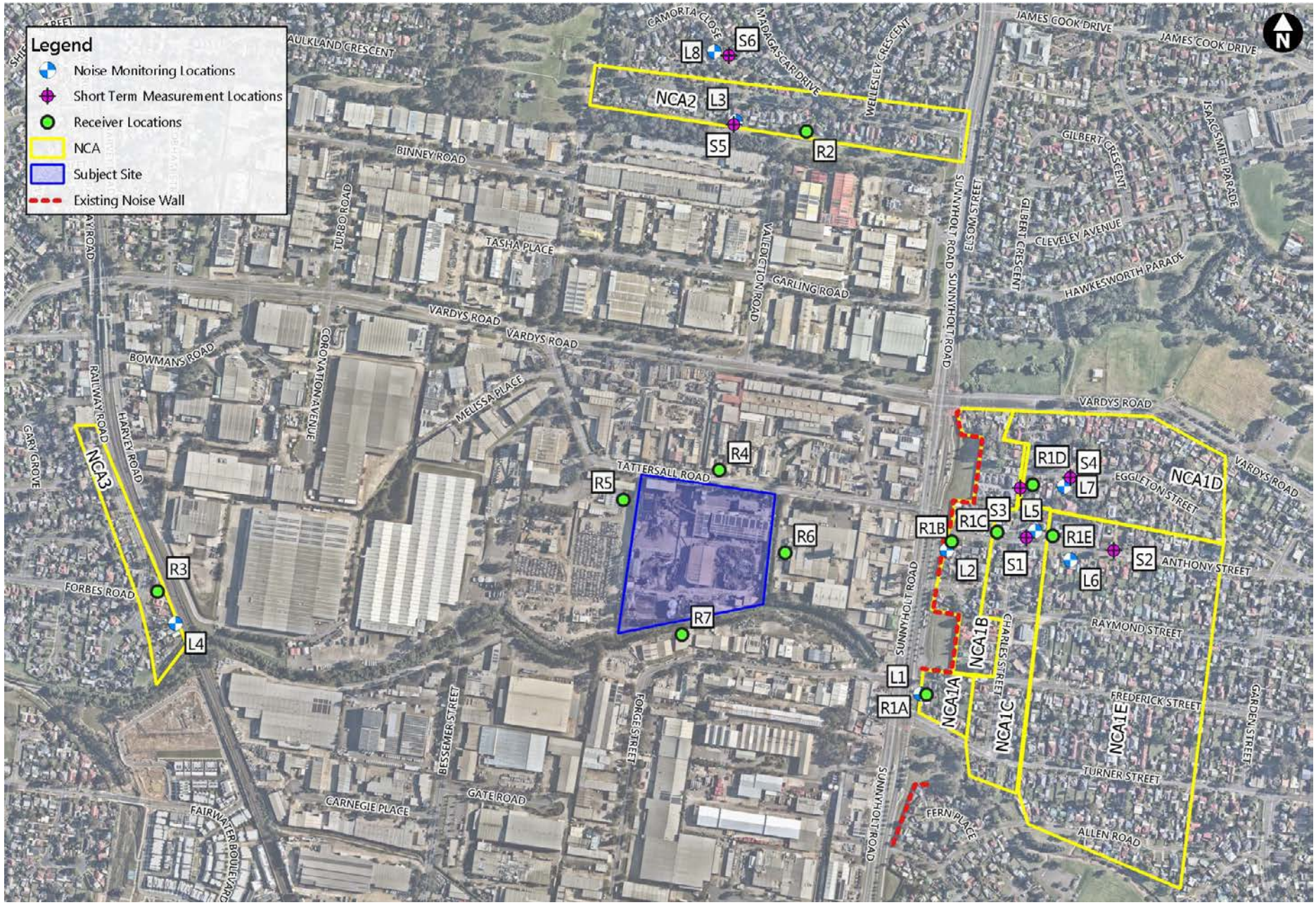
- **Receiver R5 – 57-69 Tattersall Road, Kings Park**
  Industrial receiver to the west of the facility sharing a common site boundary.

- **Receiver R6 – 21 Tattersalls Road, Kings Park**
  Industrial receiver to the east of the facility sharing a common site boundary.

- **Receiver R7 – 38 Forge Street, Blacktown**
  Commercial receiver to the south of the facility across Breakfast Creek.

These locations are depicted in Figure 2 below.

Figure 2 – Site, noise monitoring and receiver locations



4 Existing acoustic environment

As the noise environment of an area almost always varies over time, background and ambient noise levels need to be determined for the operational times of the proposed development. For example, in a suburban or urban area the noise environment is typically at its minimum at 3am in the morning and at its maximum during the morning and afternoon traffic peak hours. The NSW 'Noise Policy for Industry' (NPfI) outlines the following standard time periods over which the background and ambient noise levels are to be determined:

- **Day:** 7am to 6pm Monday to Saturday and 8am to 6pm Sundays & Public Holidays
- **Evening:** 6pm to 10pm Monday to Sunday & Public Holidays
- **Night:** 10pm to 7am Monday to Saturday and 10pm to 8am Sundays & Public Holidays

The NPfI also outlines methods for assessing 'shoulder periods' being shorter periods on either side of a standard period, where the standard period noise levels are not representative. For example, a 'shoulder period' may be warranted for 5am to 7am or 10pm to 12am midnight where the night time period background noise level is not representative.

Given that the approved hours for the facility, as presented in Table 2.1, allows for activities (other than oxy-acetylene torch cutting and maintenance and cleaning) to begin at 6am from Monday to Saturday, a shoulder period would be applicable. Therefore, the shoulder period has been identified as follows:

- **Shoulder:** 6am to 7am Monday to Saturday

4.1.1 Noise monitoring locations

Noise monitoring is ideally carried out at the nearest or most potentially affected locations surrounding a development. An alternative representative location should be established in the case of access restrictions or a safe and secure location cannot be identified. Furthermore, representative locations may be established in the case of multiple receivers as it is usually impractical to carry out measurements at all locations surrounding a site.

The long-term and short-term noise monitoring locations are outlined in Table 4.1 and shown in Figure 2.

Table 4.1 – Noise monitoring locations

ID	Address	Description
Long-term noise monitoring		
L1	187 Sunnyholt Road, Blacktown	The monitor was located in the front yard with line of sight to Sunnyholt Road. The noise monitoring location is considered representative of receiver locations within NCA1A

ID	Address	Description
L2	2 Anthony Street, Blacktown	The monitor was located in the side yard with no line of sight to Sunnyholt Road due to the concrete noise barrier located along the western boundary of the property. The monitor was located behind the noise barrier and was shielded from traffic noise along Sunnyholt Road and general noise from the Kings Park Industrial Estate. The noise monitoring location is considered representative of receiver locations within NCA1B
L3	19 Camorta Close, Kings Park	The monitor was located in the rear yard and shielded from the industrial area by the boundary fence. The noise monitoring location is considered representative of receiver locations within NCA2
L4	1 Chedley Place, Marayong	The monitor was located in the rear yard and shielded from the industrial area by the boundary fence. The noise monitoring location is considered representative of receiver locations within NCA3
L5	29 Charles Street, Blacktown	The monitor was located in the backyard and shielded by the dwelling from the industrial area and Sunnyholt Road The noise monitoring location is considered representative of receiver locations within NCA1C
L6	8A Eggleton St, Blacktown	The monitor was located along the driveway of a battleaxe block. The monitor was shielded by the western boundary Colorbond fence from the industrial area and Sunnyholt Road. The noise monitoring location is considered representative of receiver locations within NCA1E
L7	22 Anthony Street, Blacktown	The monitor was located in the front yard. The monitor was shielded by the western boundary Colorbond fence from the industrial area and Sunnyholt Road. The noise monitoring location is considered representative of receiver locations within NCA1D
L8	54 Camorta Close, Kings Park	The monitor was located in the front yard. There is no line of sight to the industrial area from this location The noise monitoring location is considered representative of receiver locations within NCA2
Short-term noise monitoring		
S1	29 Charles Street, Blacktown	The monitor was placed on the footpath in line with the western facade of the dwelling. This location is at an elevated position from the subject site. The arms of material handlers at the subject site can be seen from this location.
S2	23 Anthony Street, Blacktown	The monitor was placed on the footpath in line with the western boundary. This location is at an elevated position from the subject site. The arms of material handlers at the subject site can be seen from this location.
S3	51 Charles Street, Blacktown	The monitor was placed on the footpath adjacent to the mailboxes. This location is at an elevated position from the subject site. There is no line of sight to the subject site.
S4	8 Eggleton Street, Blacktown	The monitor was placed on the footpath in line with the western façade of the dwelling. This location is at an elevated position from the subject site. There is no line of sight to the subject site.

ID	Address	Description
S5	19 Camorta Close, Kings Park	The monitor was placed within the reserve adjacent to the southern boundary of the address. There is no line of sight to the subject site.
S6	95 Camorta Close, Kings Park	The monitor was placed on the footpath in line with the southern façade of the dwelling. There is no line of sight to the subject site.

4.1.2 Short-term noise monitoring

Short-term noise measurements were undertaken between Tuesday 16th and Thursday 18th November 2021, in order to supplement the long-term noise monitoring, provide greater detail of the surrounding noise environment and assist with selection of additional long-term noise monitoring locations

A summary of the short-term measurement results is presented in Table 4.2.

Table 4.2 – Short-term noise monitoring results, dB(A)

Time	Measured noise level, dB(A)		Comments on measured noise levels
	L_{Aeq}	L_{A90}	
S1 – 29 Charles Street, Blacktown			
16/11/2021, 11:55-12:10	54	45	Noise environment dominated by traffic noise from Sunnyholt Road and occasional traffic on Charles Street Metal processing noise can be heard from the subject site but no low frequency or tonal characteristics observed.
16/11/2021, 19:15-19:30	56	41	Noise environment dominated by traffic noise from Sunnyholt Road. Some noise from rustling trees and local neighbourhood noise (e.g. kids playing, neighbours talking) Metal processing noise can be heard from the subject site but no low frequency or tonal characteristics observed.
17/11/2021, 6:20-6:35	52	47	Noise environment dominated by traffic noise from Sunnyholt Road and occasional traffic on Charles Street. Metal processing noise can be heard from the subject site but no low frequency, tonal or intermittent characteristics observed.
S2 – 23 Anthony Street, Blacktown			
16/11/2021,11:35-11:50	52	40	Noise environment dominated by distant traffic noise from Sunnyholt Road and occasional traffic on Anthony Street. Metal processing noise can be heard from the subject site but no low frequency or tonal characteristics observed.
16/11/2021, 18:55-19:10	47	40	Noise environment dominated by distant traffic noise from Sunnyholt Road. Some noise from rustling trees. Metal processing noise can be heard from the subject site but no low frequency or tonal characteristics observed.

Time	Measured noise level, dB(A)		Comments on measured noise levels
	L_{Aeq}	L_{A90}	
17/11/2021, 6:00-6:15	47	42	Noise environment dominated by distant traffic noise from Sunnyholt Road. Some noise from birds and occasional Traffic on Charles Street. Metal processing noise can be heard from the subject site but no low frequency or tonal characteristics observed.
S3 – 51 Charles Street, Blacktown			
16/11/2021, 12:15-12:30	59	44	Noise environment dominated by traffic noise from Sunnyholt Road and occasional traffic on Charles Street. Metal processing noise can sometimes be heard from the subject site but no low frequency or tonal characteristics observed.
16/11/2021, 19:15-19:30	55	42	Noise environment dominated by traffic noise from Sunnyholt Road. Some noise from rustling trees and local neighbourhood noise (e.g. kids playing, neighbours talking). Metal processing noise can sometimes be heard from the subject site but no low frequency or tonal characteristics observed.
17/11/2021, 6:40-6:55	58	44	Noise environment dominated by traffic noise from Sunnyholt Road and traffic on Charles Street. Metal processing noise can sometimes be heard from the subject site but no low frequency, tonal or intermittent characteristics observed.
S4 – 8 Eggleton Street, Blacktown			
16/11/2021, 12:35-12:50	52	42	Noise environment dominated by distant traffic noise from Sunnyholt Road and Vardys Road. Noise from the subject site was not observed.
16/11/2021, 18:55-19:10	54	41	Noise environment dominated by distant traffic noise from Sunnyholt Road and Vardys Road. Noise from the subject site was not observed.
18/11/2021, 6:25-6:40	53	47	Noise environment dominated by distant traffic noise from Sunnyholt Road, Vardys Road and Charles Street. Noise from the subject site was not observed.
S5 – 19 Camorta Close, Kings Park			
16/11/2021, 16:40-16:55	54	49	Noise environment dominated by distant traffic noise from Sunnyholt Road. Some noise from rusting trees and neighbourhood noise (e.g. passer-by talking). Noise from the subject site was not observed. After measurement, an inspection of the facilities along the northern boundary of the industrial area did not identify any mechanical plant that would be operational at night.
16/11/2021, 18:30-18:45	54	47	Noise environment dominated by distant traffic noise from Sunnyholt Road. Some noise from rusting trees and neighbourhood noise (e.g. passer-by talking). Noise from the subject site was not observed.

Time	Measured noise level, dB(A)		Comments on measured noise levels
	L_{Aeq}	L_{A90}	
S6 – 95 Camorta Close, Kings Park			
16/11/2021, 16:40-16:55	54	48	Noise environment dominated by distant traffic noise from Sunnyholt Road. Some noise from rusting trees and neighbourhood noise (e.g. neighbours talking). Noise from the subject site was not observed.
16/11/2021, 18:30-18:45	53	46	Noise environment dominated by distant traffic noise from Sunnyholt Road. Some noise from rusting trees. Noise from the subject site was not observed.

4.1.3 Long-term noise monitoring

Long-term noise monitoring for locations L1 to L4 was carried out from Thursday 11th to Wednesday 24th February 2021. Updated noise monitoring has been undertaken in response to agency comments for locations L5 to L8 and was carried out from Monday 29th November to Monday 12th December 2021. The noise level-vs-time graphs of the data are included in Appendix E.

Fact Sheet B of the NPfI outlines the methods for determining the background noise level of an area. The NPfI also outlines methods for assessing 'shoulder periods' being shorter periods on either side of a standard period, where the standard period noise levels are not well represented. Fact Sheet A, Section A3 of the NPfI outlines suitable methods to determine the shoulder period background noise level. Nearby arterial roads (Sunnyholt Road and Vardys Road) have increased traffic during the early morning period and existing background noise levels are steadily rising in these early morning hours. This can be seen from noise monitoring graphs in Appendix E where at all locations the background noise levels begin steadily increasing between 3:00am and 4:00am and reaches background and ambient noise levels typical of the day time period by 6:00am. Therefore, a shoulder period has been established between 6:00am and 7:00am for the assessment.

Table 4.2 presents the overall single L_{A90} Rating Background Levels (RBL) and representative ambient L_{eq} noise levels for each assessment period, determined in accordance with the NPfI.

Table 4.3 – Long-term noise monitoring results, dB(A)

Monitoring location	L_{A90} Rating Background Level (RBL)				L_{Aeq} Ambient noise levels[1]			
	Shoulder[2]	Day[3]	Evening[4]	Night[5]	Shoulder[2]	Day[3]	Evening[4]	Night[5]
L1 – 187 Sunnyholt Road, Blacktown	56	54	52	42	62	64	62	59
L2 – 2 Anthony Street, Blacktown	46	45	44	42	52	60	56	52
L3 – 19 Camorta Close, Kings Park	42	43	41	37	55	57	51	47
L4 – 1 Chedley Place, Marayong	38	40	37	33	52	54	53	49
L5 – 29 Charles Street, Blacktown	36	38	38	32	47	49	43	47
L6 – 8A Eggleton Street, Blacktown	37	39	41	36	46	49	43	48
L7 – 22 Anthony Street, Blacktown	35	37	38	33	49	48	46	51
L8 – 54 Camorta Close, Kings Park	42	42	41	32	55	52	49	55

Monitoring location	L_{A90} Rating Background Level (RBL)				L_{Aeq} Ambient noise levels[1]			
	Shoulder[2]	Day[3]	Evening[4]	Night[5]	Shoulder[2]	Day[3]	Evening[4]	Night[5]

Notes:
1. As required by the NPfI, the external ambient noise levels presented are free-field noise levels. [i.e., no facade reflection]
2. Shoulder: 6am to 7am Monday to Saturday
3. Day: 7am to 6pm Monday to Saturday and 8am to 6pm Sundays & Public Holidays
4. Evening: 6pm to 10pm Monday to Sunday & Public Holidays
5. Night: 10pm to 7am Monday to Saturday and 10pm to 8am Sundays & Public Holidays

5 Meteorology

5.1 Summary of meteorological assessment conditions

Based on the meteorology findings in previous addendum report. Table 5.1 below presents a summary of the meteorological conditions considered for the operational noise computer modelling for each assessment period, including wind speeds, wind direction and temperature inversions modelling parameters.

Table 5.1 – Summary of meteorological assessment conditions

Period	Meteorological Assessment Condition	Wind Speed	Wind Direction	Temperature Inversion[1]
Shoulder	Calm	-	-	-
	Adverse	3 m/s	SSW	-
		3 m/s	SW	-
		3 m/s	WSW	-
		3 m/s	W	-
Day	Calm	-	-	-
Evening	Calm	-	-	-
	Adverse	3 m/s	ESE	-
		3 m/s	WSW	-
Night	Calm	-	-	-
	Adverse	3 m/s	SSW	-
		3 m/s	SW	-
		3 m/s	WSW	-
		3 m/s	W	-
		-	-	4°C / 100 m
		2 m/s	SSW	4°C / 100 m
		2 m/s	SW	4°C / 100 m
		2 m/s	WSW	4°C / 100 m
		2 m/s	W	4°C / 100 m

Notes: 1. Temperature inversion only applicable for night time period.

6 Criteria

Noise impact is assessed in accordance with the NPfI. The assessment procedure has two components:

- Controlling intrusive noise impacts in the short-term for residences; and
- Maintaining noise level amenity for residences and other land uses.

In accordance with the NPfI, noise impact should be assessed against the project noise trigger level which is the lower value of the project intrusiveness noise levels and project amenity noise levels.

6.1 Project intrusive noise levels

According to the NPfI, the intrusiveness of a noise source may generally be considered acceptable if the equivalent continuous (energy-average) A-weighted level of noise from the source (represented by the $L_{Aeq,15min}$ descriptor) does not exceed the background noise level measured in the absence of the source by more than 5dB(A). The project intrusiveness noise level, which is only applicable to residential receivers, is determined as follows:

- **$L_{Aeq,15min}$ Intrusiveness noise level = Rating Background Level ('RBL') plus 5dB(A)**

Based on the background noise monitoring results and the proposed operating hours of the facility, the intrusiveness noise levels for the residential receivers are reproduced in Table 6.1 below.

Table 6.1 – Intrusiveness noise levels, dB(A)

NCA / Receiver Location	Intrusiveness noise level, $L_{Aeq,15min}$			
	Shoulder	Day	Evening	Night
NCA1A / Receiver R1A	56 + 5 = **61**	54 + 5 = **59**	52 + 5 = **57**	42 + 5 = **47**
NCA1B / Receiver R1B	46 + 5 = **51**	45 + 5 = **50**	44 + 5 = **49**	42 + 5 = **47**
NCA1C / Receiver R1C	36 + 5 = **41**	38 + 5 = **43**	38 + 5 = **43**	32 + 5 = **37**
NCA1D / Receiver R1D	37 + 5 = **42**	39 + 5 = **44**	39[1] + 5 = **44**	36 + 5 = **41**
NCA1E / Receiver R1E	35 + 5 = **40**	37 + 5 = **42**	37[1] + 5 = **42**	33 + 5 = **38**
NCA2 / Receiver R2	42 + 5 = **47**	42 + 5 = **47**	41 + 5 = **46**	32 + 5 = **37**
NCA3 / Receiver R3	38 + 5 = **43**	40 + 5 = **45**	37 + 5 = **42**	33 + 5 = **38**

Notes: 1. Where the measured RBL for the evening period is higher than the day period, the day RBL is adopted.

6.2 Amenity noise levels

The project amenity noise levels for different time periods of the day are determined in accordance with Section 2.4 of the NPfI. The NPfI recommends amenity noise levels ($L_{Aq,period}$) for various receivers including residential, commercial, industrial receivers and sensitive receivers such as schools, hotels, hospitals, churches and parks. These "recommended amenity noise levels" represent the objective for total industrial noise experienced at a receiver location. However, when assessing a single industrial development and its impact on an area, "project amenity noise levels" apply.

NCA 1A and NCA 1B are located within a 'R2 – low density residential zone'. However, both NCA1A and NCA 1B meet the NPfI's description of an Urban residential receiver category as the acoustical environment:

- is dominated by 'urban hum' or industrial source noise, where urban hum means the aggregate sound of many unidentifiable, mostly traffic and/or industrial related sound sources
- has through-traffic with characteristically heavy and continuous traffic flows during peak periods (from Sunnyholt Road)
- is located near an industrial district
- or has any combination of the above

In addition the monitored background noise levels are consistent with the typical existing background noise levels for an Urban residential receiver category:

- Daytime RBL >45 dB(A)
- Evening RBL >40 dB(A)
- Night RBL >35 dB(A)

Given the above, NCA 1A and NCA 1B will be assessed under the Urban residential receiver category. All other catchments will be assessed under the Suburban residential receiver category.

The recommended amenity noise levels applicable for the subject area are reproduced in Table 6.2 below.

Table 6.2 – Recommended amenity noise levels, dB(A)

Type of Receiver	Noise Amenity Area	Time of Day	Recommended amenity noise level, $L_{Aeq,}$
Residential NCA 1A & NCA 1B	Urban	Day	60
		Evening	50
		Night	45
Residential NCA 1C, NCA 1D, NCA 1E, NCA 2 & NCA 3	Suburban	Day	55
		Evening	45
		Night	40
Commercial premises	All	When in use	65
Industrial premises	All	When in use	70

Notes:
1. Daytime 7am to 6pm; Evening 6pm to 10pm; Night-time 10pm to 7am
2. On Sundays and Public Holidays, Daytime 8am to 6pm; Evening 6pm to 10pm; Night-time 10pm to 8am.
3. The L_{Aeq} index corresponds to the level of noise equivalent to the energy average of noise levels occurring over a measurement period.
4. The recommended amenity noise levels refer only to noise from industrial sources. However, they refer to noise from all such sources at the receiver location, and not only noise due to a specific project under consideration.

To ensure that the total industrial noise level (existing plus new) remain within the recommended amenity noise levels for an area, the project amenity noise level that applies for each new industrial noise source is determined as follows:

$$\mathbf{L_{Aeq,period}\ Project\ amenity\ noise\ level = L_{Aeq,period}\ Recommended\ amenity\ noise\ level - 5dB(A)}$$

Furthermore, given that the intrusiveness noise level is based on a 15 minute assessment period and the project amenity noise level is based on day, evening and night assessment periods, the NPfI provides the following guidance on adjusting the $L_{Aeq,period}$ level to a representative $L_{Aeq,15minute}$ level in order to standardise the time periods.

$$\mathbf{L_{Aeq,15minute} = L_{Aeq,period} + 3dB(A)}$$

The project amenity noise levels ($L_{Aeq,\ 15min}$) applied for this project are reproduced in Table 6.3 below.

Table 6.3 – Project amenity noise levels

Type of Receiver	Noise Amenity Area	Time of Day	Recommended Noise Level, dB(A)	
			$L_{Aeq,\ Period}$	$L_{Aeq,\ 15min}$
Residential NCA 1A & NCA 1B	Urban	Day	60 – 5 = 55	55 + 3 = **58**
		Evening	50 – 5 = 45	45 + 3 = **48**
		Night	45 – 5 = 40	40 + 3 = **43**
Residential NCA 1C, NCA 1D, NCA 1E, NCA 2 & NCA 3	Suburban	Day	55 – 5 = 50	55 + 3 = **53**
		Evening	45 – 5 = 40	45 + 3 = **43**
		Night	40 – 5 = 35	40 + 3 = **38**
Commercial Premises	All	When in use	65 – 5 = 60	60 + 3 = **63**
Industrial Premises	All	When in use	70 – 5 = 65	65 + 3 = **68**

Notes:
1. Daytime 7am to 6pm; Evening 6pm to 10pm; Night-time 10pm to 7am
2. On Sundays and Public Holidays, Daytime 8am to 6pm; Evening 6pm to 10pm; Night-time 10pm to 8am.
3. The L_{Aeq} index corresponds to the level of noise equivalent to the energy average of noise levels occurring over a measurement period.

6.3 Project noise trigger levels

In accordance with the NPfI the project noise trigger levels (PNTL), which are the lower (ie. more stringent) value of the project intrusiveness noise level and project amenity noise level, have been determined as shown in Table 6.4 below.

Table 6.4 – Project noise trigger levels

Receiver Location	$L_{Aeq,\ 15min}$ Project noise trigger levels, dB(A)			
	Shoulder[1]	Day	Evening	Night
NCA1A / Receiver R1A	58	58	48	43
NCA1B / Receiver R1B	51	50	48	43
NCA1C / Receiver R1C	41	43	43	37
NCA1D / Receiver R1D	42	44	43	38
NCA1E / Receiver R1E	40	42	42	38
NCA2 / Receiver R2	47	47	43	37
NCA3 / Receiver R3	43	43	42	38
Receiver R4 – 38 Tattersalls Road[2]	68	68	68	68
Receiver R5 – 57-69 Tattersalls Road[2]	68	68	68	68
Receiver R6 – 21 Tattersalls Road[2]	68	68	68	68
Receiver R7 – 38 Forge Street[2]	63	63	63	63

Notes:
1. Where the daytime project amenity noise level is more stringent than the shoulder project intrusive noise level, the daytime project amenity noise level has been adopted for the shoulder period as the Proposal site is located within an industrial estate where the majority of neighbouring facilities are operational during the shoulder period, and the ambient noise environment for residential receivers during the shoulder period is similar to the day time period
2. Receivers R4, R5, R6 and R7 are industrial / commercial receivers and only the amenity project amenity noise levels are applicable to these receivers when in use.

6.4 Cumulative noise Levels

For cumulative noise levels, the NPfI project recommended amenity noise levels are applicable as it is intended to control the total noise level at a receiver location from all industrial developments. Cumulative noise levels are therefore assessed against the recommended amenity project noise levels nominated in Table 6.2.

6.5 Sleep disturbance noise levels

The potential for sleep disturbance from maximum noise level events from the premises during the night-time period needs to be considered. In accordance with NPfI, a detailed maximum noise level event assessment should be undertaken where the subject development night-time noise levels at a residential location exceed:

- $L_{Aeq,15min}$ 40dB(A) or the prevailing RBL plus 5dB, whichever is the greater, and/or
- L_{AFmax} 52dB(A) or the prevailing RBL plus 15dB, whichever is the greater.

Where there are noise events found to exceed the initial screening level, further analysis is undertaken to identify:

- The likely number of events that might occur during the night assessment period,
- The extent to which the maximum noise level exceeds the rating background noise level.

The sleep disturbance noise levels for the project are presented in Table 6.5.

Table 6.5 – Sleep disturbance assessment levels, dB(A)

Receiver Location	Shoulder period 6am – 7am		Night period 10pm – 6am	
	Assessment Level $L_{Aeq,15min}$	Assessment Level L_{AFmax}	Assessment Level $L_{Aeq,15min}$	Assessment Level L_{AFmax}
NCA1A / Receiver R1A	56 + 5 = **61**	56 + 15 = **71**	42 + 5 = **47**	42 + 15 = **57**
NCA1B / Receiver R1B	46 + 5 = **51**	46 + 15 = **61**	42 + 5 = **47**	42 + 15 = **57**
NCA1C / Receiver R1C	36 + 5 = **41**	**52**[2] (36 + 15 = 51)	**40**[1] (32 + 5 = 37)	**52**[2] (32 + 15 = 47)
NCA1D / Receiver R1D	37+ 5 = **42**	37 + 15 = **52**	36 + 5 = **47**	36 + 15 = **57**
NCA1E / Receiver R1E	35 + 5 = **40**	**52**[2] (35 + 15 = 50)	**40**[1] (33 + 5 = 38)	**52**[2] (33 + 15 = 48)
NCA2 / Receiver R2	42 + 5 = **47**	42 + 15 = **57**	**40**[1] (32 + 5 = 37)	**52**[2] (32 + 15 = 47)
NCA3 / Receiver R3	38 + 5 = **43**	38 + 15 = **53**	**40**[1] (33 + 5 = 38)	**52**[2] (33 + 15 = 48)

Note: 1. As the prevailing RBL plus 5dB is less than the minimum of $L_{Aeq,15min}$ 40dB(A), 40dB(A) has been adopted as the $L_{Aeq,15min}$ assessment level

2. As the prevailing RBL plus 15dB is less than the minimum of L_{Amax} 52dB(A), 52dB(A) has been adopted as the L_{Amax} assessment level

It is noted that the $L_{Aeq,15min}$ assessment level for sleep disturbance in Table 6.5 are the same or higher than the corresponding shoulder or night time project noise trigger levels in Table 6.4. Therefore, compliance with the night time project noise trigger levels will deem compliance with the $L_{Aeq,15min}$ sleep

disturbance assessment levels. Therefore, the sleep disturbance assessment will only consider the L_{AFmax} assessment levels from herein.

7 Predicted noise levels

7.1 Noise sources

7.1.1 Operational noise

A summary of mobile and fixed plant and equipment included in the noise modelling for the Proposal, and corresponding sound power levels, is provided in Table 7.1 and Table 7.2. Sound power levels for this assessment were determined based on site measurements and data from similar projects. In order to address agency comments, additional attended on site noise measurements were undertaken on Monday, 8 March 2021 to capture noise from existing plant and equipment on site. Additional attended on site noise measurements included measurements of individual plant items as well as measurement of activities / processes such as hammer milling and metal shearing, where a number of plant items were operating within an area concurrently and completing a typical routine / cycle.

Table 7.1 – $L_{Aeq,\ 15min}$ sound power level of existing plant, dB(A) re. 1pW,

Plant[1]	$L_{Aeq,\ 15min}$ Sound Power Level (per item)	Number of items (included in noise model)
General operations (6am – 9pm)		
Hammer mill[2]	117	1
Metal shear[3]	112	2
Seram / pedestal crane	110	2
Excavator	107	2
Front End Loader	107	2
Pre-shredder[3]	107	1
Material handler	105	3
Truck movement (travelling in and out of site)	105	7
Oxy-acetylene torch	102	1
Maintenance and cleaning (24 hours)		
Forklift[4]	90	3
Hand tools[4]	105	1
Pressure hose[4]	97	1
Crane[4]	107	3

Notes:
1. Only the noisiest and most dominant noise sources have been presented
2. Presented sound power level of the hammer mill includes noise generated by the shaker
3. Plant item was not operational during site visit on 8th March 2021 and presented sound power level is based on previous measurements.
4. Sound power levels for these items are from past projects and/or information held in our library files

Table 7.2 – L_{Amax} sound power level of existing activities, dB(A) re. 1pW

Activities	L_{Amax} Sound Power Level (per activity)
General operations (6am – 9pm)	
Hammer milling – includes noise from hammer mill, front end loaders pushing materials, crane loading materials into hammer mill and trucks dumping materials into stockpiles	127
Metal shearing – includes noise from metal shear, crane loading materials into shear, excavator sorting materials and trucks dumping materials into stockpiles	129
Maintenance and cleaning (24 hours)	
Maintenance and cleaning – includes noise from forklift, hand tools, pressure hose and crane	117

Notes: 1. Only the noisiest and most dominant noise activities have been presented

Noise measurements undertaken at the subject site and other similar metal recycling facilities were analysed for tonal or low frequency characteristics as per the methodology prescribed in NPfI. After accounting for acoustic shielding provided by intervening structures between the site and both residential and industrial receptors, source noise levels were not considered to be tonal or have low frequency characteristics

7.1.2 Carpark vehicle movement on site

Noise generated by car park activities which may contribute to the overall L_{Aeq} noise level emission from the site includes vehicle doors closing, vehicle engines starting and vehicles moving. To assess this noise, the L_{Aeq} noise levels were determined for the relevant time period based on the number of vehicle activities expected to occur during that period at the nearest affected receiver locations. Sound power level measurements from our database and library files were used for the purpose of this assessment.

The sound power levels of the car park activities are shown in Table 7.3 below.

Table 7.3 – Sound power levels of car park activities

Activity	Sound Power Level, dB(A) re. 1pW
Vehicle door closing	86
Vehicle engine starting	92
Vehicle moving (10km/h)	79 per metre

The facility is proposed to have a maximum staff capacity of 79 employees plus an additional 4 visitors. Assuming all employees and visitors drive to site and arrive / leave within a one hour period; for modelling purposes, the worst case scenario for the car park would include 83 vehicle doors closing, 83 vehicle engine starts and 83 vehicles manoeuvring in the carpark, within a one hour period.

It is noted that carpark activities do not include movements of trucks delivering and picking up material. Noise from these activities are assessed as part of the overall operational noise of the site and source noise levels were presented in Table 7.1 and Table 7.2.

7.2 Validation exercise

A site survey along Tattersalls Road was undertaken to determine whether there were suitable locations to undertake validation measurements at close distance to the subject site. The following was observed:

- Beyond 80m east of the site, noise from the subject site could not be heard. The noise environment was influenced by traffic noise on Tattersalls Road and Sunnyholt Road, and some industrial noise from other surrounding industrial premises, not associated with the subject site.

- Beyond 60m west of the site, noise from the subject site could not be heard. The noise environment was influenced by traffic noise on Tattersalls Road and Vardys Road, and some industrial noise from industrial premises to the south and southwest, not associated with the subject site. When the adjacent Pick N Payless site and the Blacktown Container Return site are operational, noise from subject site is entirely masked and inaudible.

It was determined that given the site has 8-10m high perimeter walls, measurements along Tattersalls Road will not achieve the signal-to-noise ratio required to distinguish noise from the subject site. Therefore, measurements were undertaken further afield at elevated locations, relative to the subject site, along Anthony Street to the east.

Short-term attended noise measurements were undertaken between Thursday 23rd and Friday 24th September 2021, in order to assist with the validation of the noise model. The measurements were conducted during the evening period outside of peak hour and morning shoulder period, where the noise from surrounding industrial sites and Sunnyholt Road were less likely to influence the measurements.

Short-term attended noise measurements were supplemented by two noise monitors installed at the subject site to concurrently capture noise levels at the eastern boundary and at the western boundary of the site.

A summary of the short-term measurement results is presented in Table 4.3.

Table 7.4 – Short-term noise monitoring results, dB(A)

Time	Measured noise level, dB(A)		Comments on measured noise levels
	L_{Aeq}	L_{A90}	
S1 – 29 Charles Street, Blacktown			
23/09/2021, 19:00-19:15	49.8	44.7	Noise environment dominated by traffic noise from Sunnyholt Road and local neighbourhood noise. Metal processing noise can be heard from the subject site, but no low frequency or tonal characteristics observed.
23/09/2021, 19:15-19:30	50.0	45.4	
23/09/2021, 19:30-19:45	51.3	46.1	
23/09/2021, 19:45-20:00	50.4	46.0	

Time	Measured noise level, dB(A)		Comments on measured noise levels
	L_{Aeq}	L_{A90}	
24/09/2021, 6:00-6:15	63.2	52.3	Noise environment dominated by traffic noise from Sunnyholt Road and traffic on Charles Street. Occasional noise from garbage truck and birds in the area. Metal processing noise can be heard from the subject site but no low frequency or tonal characteristics observed.
24/09/2021, 6:15-6:30	56.2	52.9	
24/09/2021, 6:30-6:45	60.3	52.2	
24/09/2021, 6:45-7:00	59.0	52.7	
S2 – 23 Anthony Street, Blacktown			
23/09/2021, 19:00-19:15	45.8	41.3	Noise environment dominated by traffic noise from Sunnyholt Road and local neighbourhood noise. Metal processing noise can be heard from the subject site, particularly during lulls in traffic on Sunnyholt Road. No low frequency or tonal characteristics observed
23/09/2021, 19:15-19:30	44.1	40.3	
23/09/2021, 19:30-19:45	46.9	42.4	
23/09/2021, 19:45-20:00	48.1	42.5	
24/09/2021, 6:00-6:15	56.9	50.6	Noise environment dominated by traffic noise from Sunnyholt Road. Occasional noise from garbage truck and birds in the area. Metal processing noise can be heard from the subject site, particularly during lulls in traffic on Sunnyholt Road. No low frequency or tonal characteristics observed.
24/09/2021, 6:15-6:30	52.3	50.2	
24/09/2021, 6:30-6:45	56.1	50.2	
24/09/2021, 6:45-7:00	55.8	50.5	
Eastern Site Boundary Noise Monitor			
23/09/2021, 19:00-19:15	53.6	51.4	Eastern metal shear not operational, material handler and excavator working within closest operational area. Trucks passby while exiting site. Some noise from main yard.
23/09/2021, 19:15-19:30	58.1	50.4	
23/09/2021, 19:30-19:45	52.1	50.3	
23/09/2021, 19:45-20:00	55.4	51.2	
24/09/2021, 6:00-6:15	59.7	52.7	Material handler and excavator working within closest operational area prepping site for start of day. Some noise from main yard and storage shed
24/09/2021, 6:15-6:30	73.2	62.5	Eastern metal shear, material handler and excavator working within closest operational area. Trucks passby while exiting site. Some noise from the main yard and storage shed. Operations at full capacity.
24/09/2021, 6:30-6:45	72.9	62.9	
24/09/2021, 6:45-7:00	73.4	61.0	
Western Site Boundary Noise Monitor			
23/09/2021, 19:00-19:15	78.0	72.8	Hammer mill, western metal shear, seram cranes and all mobile plant operational. Trucks passby while entering site and unloading.
23/09/2021, 19:15-19:30	76.6	72.8	
23/09/2021, 19:30-19:45	77.0	72.8	
23/09/2021, 19:45-20:00	77.0	72.8	
24/09/2021, 6:00-6:15	77.1	67.8	Hammer mill and western metal shear on mobile plant prepping site for start of day.
24/09/2021, 6:15-6:30	78.2	75.2	Hammer mill, western metal shear, seram cranes and all mobile plant operational. Trucks passby while entering site and unloading. Noise from the eastern metal shear area. Operations at full capacity.
24/09/2021, 6:30-6:45	77.9	74.8	
24/09/2021, 6:45-7:00	77.4	74.5	

From the measurements undertaken at locations S1 and S2, noise contribution from the subject site could not be established as the metal processing noise can be heard occasionally over the ambient

noise, but the measured noise levels were dominated by traffic noise on Sunnyholt Road. During lulls in traffic the noise from the subject site was slightly audible; however, given the non-steady nature of metal processing activities, a consistent 15 minute L_{Aeq} noise level contribution could not be determined.

Measurements at locations S1 and S2 were analysed for tonal and/or low frequency characteristics as per the methodology prescribed in NPfI and were found not to exhibit any tonal of low frequency characteristics.

The NPfI details the test for intermittent noise that applies during the night period as follows:

> "*The source noise heard at the receiver varies by more than 5 dB(A) and the intermittent nature of the noise is clearly audible."; and*
>
> *"…where the level suddenly drops/increases several times during the assessment period…"*.

Where all of the following tests are met shall a penalty be applicable to the predicted noise level at the relevant receiver:

- the noise level fluctuates / cycles by more than 5 dB(A);
- this difference relates to a 'sudden' drop/increase in the activity noise level;
- this activity may occur multiple times during a 15-minute assessment period; and
- the measured noise level from the subject source at a receiver is clearly audible over the ambient noise environment.

During the morning shoulder period at locations S1 and S2, it was observed that the noise of metal processing was slightly audible continuously throughout the shoulder period but not clearly audible above the ambient noise of the area which is dominated by traffic noise from Sunnyholt Road. Although the nature of the noise of metal processing is non-steady state and fluctuates, no 'sudden' drop or increase in the activity noise level was observed. As such, the screening test demonstrated that the noise emissions during the night time period are unlikely to require an intermittent penalty as identified in the NPfI.

Therefore, it is not necessary to apply modifying factors to correct for the character of the noise.

As validation to the monitoring locations further afield from the subject site was not possible due to the ambient noise environment at the monitoring locations being influenced by other noise source not associated with the subject site (e.g. traffic noise on Sunnyholt Road), validation was undertaken to the noise monitors placed at the eastern and western site boundaries.

In the previous assessment the noise modelling was undertaken using the CadnaA (version 2021 MR 1) noise modelling computer program utilising the ISO 9613 algorithm. Previous feedback from the EPA on the modelling algorithm used are as follows:

- The EPA notes that the ISO 9613 prediction methodology has been augmented with the CONCAWE meteorological module and is a conservative approach.

- The EPA accepts this approach, noting however, that in situations where limits above PNTLs are being sought, this approach may not be acceptable.

The validation exercise considered the use of the ISO 9613 algorithm as well as the CONCAWE algorithm. With the introduction of additional sub-NCAs with lower background noise levels, the preliminary noise modelling indicated potential exceedances of the noise criteria using both algorithms. Based on EPA's feedback that if limits above PNTLs are being sought the use of ISO 9613 with the augmented CONCAWE meteorological module may not be acceptable; therefore, the CONCAWE algorithm was selected for use in this assessment.

A summary of the validation results at the eastern and western boundaries of the site are shown in Table 4.3.

Table 7.5 – Validation results, dB(A)

Locations	Measured noise level $L_{Aeq, 15min}$	Predicted noise level $L_{Aeq, 15min}$	Difference (Predicted minus Measured)
Eastern Site Boundary	73.4	73.7	0.3
Western Site Boundary	78.2	78.6	0.4

Results of the noise model validation shows good agreement at both locations as the difference between the measured and predicted noise levels are within 1dB(A). As the predicted noise levels are higher than the measured noise levels at both locations, the noise model is considered conservative, and no additional validation factor is required.

7.3 Feasible and reasonable noise mitigation measures

A 'feasible and reasonable' mitigation decision-making matrix is presented below.

Table 7.6 – 'Feasible and Reasonable' Mitigation Decision-making Matrix

Mitigation Option	Feasible Mitigation test	Reasonable Mitigation Test	Justification for adoption or disregarding this option
Selection of quieter plant	Wherever possible, areas of plant and equipment that are able to be enclosed are already enclosed. The plant is regularly reviewed and upgraded when required and consideration will be given upgrades using quieter plant.	This approval request relates to increase in tonnage only and involves no planned amendment of any building or changes to existing plant and equipment. It is considered not reasonable to replace existing plant.	This option is disregarded as it is considered not reasonable.

Mitigation Option	Feasible Mitigation test	Reasonable Mitigation Test	Justification for adoption or disregarding this option
Relocation of plant – moving plant to where noise barrier and intervening building provide maximum noise shielding	Site layout has been designed and implemented to provide highest noise reduction benefits. No new layout configuration would result in an improvement.	This approval request relates to increase in tonnage only and involves no planned amendment of any building or fixed plant locations. It is considered not reasonable to relocate existing plant.	This option is disregarded as it is considered not feasible or reasonable.
Fully enclosing: • hammermill (and operational area) • pre-shredder (and operational area) • shear (and operational area)	Roof structures would require columns for support. The columns will impact truck and plant movements and notably safety issues during reverse manoeuvres. Introduced safety concerns with trucks exiting and entering site and within the site due to elimination of sight lines and over reliance on technological solutions for surveillance and security. Reduces the flexibility of the site for changes in process as safety procedures, systems and operations evolve Planning requirements – new buildings require minimum setbacks which the site may not be able accommodate if area enclosed. The preshredder and shear are processing potentially combustible material and putting it under a roof could impact safety (in particular fire safety).	The height of the hammermill enclosed roof would need to be at least 25m high. This would have construction cost and operational impairment. The preshredder and shear are loaded from the top and it discharges from the side. Therefore, if enclosed in order to have an operational area around these machines this would significantly impact on egress or be an impediment to movement around the site.	This option is disregarded as it is considered not feasible or reasonable.
Rubberise/noise dampening material to minimise noise impacts for: • areas where waste materials are dropped • dozer bucket • to material handlers • to sorting bins	Due to the waste material being handled, the use of rubber/dampening material will not last and will require daily replacement. It is noted that even the current concrete area is reinforced but suffers damage requiring replacement every 2-3 years	The cost of replacing rubber/dampening material is not sustainable. Furthermore, if the rubber/dampening material is shredded daily and discarded, this is not an environmentally friendly outcome.	This option is disregarded as it is considered not feasible or reasonable.
Dropping waste materials from lower heights in order to minimise impact noise	This is current practice and enforced whenever possible.	This is current practice and enforced whenever possible	This is current practice and enforced whenever possible. Constant staff training will be provided to reinforce this ongoing practice.

Mitigation Option	Feasible Mitigation test	Reasonable Mitigation Test	Justification for adoption or disregarding this option
Noise barriers	Existing boundary noise barriers are currently 8-10m high. As some receivers to the east are located at an RL greater than 10m above the subject site RL, the extension of the existing 8m high eastern boundary barrier is a feasible option Current eastern boundary barrier already have pillars installed that allow for an increase in height	The expected noise reduction benefit of increasing the barrier from 8m to 16m for receivers to the east is up to 4dB(A).	This option is to be adopted, with the existing 8m high eastern boundary barrier proposed to be increased to 16m in height. The expected noise reduction benefit of increasing the barrier from 8m to 16m for receivers to the east is up to 4dB(A). Furthermore, the implementation of a wall of 16m would help reduce the visibility of plant and equipment for the receivers to the east.

7.4 Predicted noise levels

Noise emissions were predicted by modelling the noise sources, receiver locations, topographical features of the intervening area, and possible noise control treatments using CadnaA (version 2021 MR 1) noise modelling computer program utilising the CONCAWE algorithm. The program calculates the contribution of each noise source at each specified receptor point and allows for the prediction of the total noise from a site.

The noise prediction model takes into account:

- Location of noise sources and receiver locations
- Height of sources and receivers
- Separation distances between sources and receivers
- Ground type between sources and receivers (G=0 for industrial area and G=0.5 elsewhere)
- Attenuation from barriers (natural and purpose built).

The following assumptions were made for noise prediction purposes:

<u>General operations (6am – 9pm)</u>

- All fixed plant including (hammermill, pre-shredder and shears) operating concurrently and continuously
- All mobile plant operating concurrently and continuously.
- Seven (7) trucks moving on site concurrently. No time corrections were applied
- Acoustic screen fencing / walls erected around the existing site's northern and western boundaries and along existing driveways as shown on in Figure 1.
- Acoustic screen fencing / wall on the eastern boundary is raised to 16m in height

Maintenance and cleaning (24 hours)

- For crane operations, only one crane is located on Tattersalls Road at any one time with the remaining two cranes operating anywhere within the boundaries of the subject site
- No fixed plant is operating in this scenario
- All other mobile plant operating concurrently and operating anywhere within the boundaries of the subject site. This is a conservative assumption as it is unlikely that all mobile plant will be operating concurrently.

Predicted noise levels based on the above assumptions are summarised in Table 7.7 below.

Table 7.7 – Predicted operational noise levels at nearest potentially affected receivers, $L_{Aeq,15min}$

Receiver Location	Project Trigger Noise Levels, dB(A)				Predicted Noise Levels, dB(A)																	
					Shoulder					Day	Evening			Night								
	Shoulder	Day	Evening	Night	Calm	SSW Wind	SW Wind	WSW Wind	W Wind	Calm	Calm	ESE Wind	WSW Wind	Calm	SSW Wind	SW Wind	WSW Wind	W Wind	Temp. Inv.	Temp. Inv. with SSW Wind	Temp. Inv. with SW Wind	Temp. Inv. with WSW Wind	Temp. Inv. with W Wind
NCA1A / Receiver R1A – 189 Sunnyholt Road, Blacktown	*53*	*53*	*48*	*38*	41	39	41	42	42	41	41	42	42	35	34	36	36	36	38	37	38	38	38
NCA1B / Receiver R1B – 2 Anthony Street, Blacktown	*51*	*50*	*48*	*38*	42	44	44	44	44	42	42	43	44	32	34	34	34	34	36	36	35	35	35
NCA1C / Receiver R1C – 40 Charles Street, Blacktown	*41*	*43*	*43*	*37*	40	42	41	41	41	40	40	41	41	32	34	34	34	34	36	36	35	35	35
NCA1D / Receiver R1D – 2 Eggleton Street, Blacktown	*42*	*44*	*43*	*38*	40	42	42	42	42	40	40	40	42	32	34	34	34	34	36	36	35	35	35
NCA1E / Receiver R1E – 11 Anthony Street, Blacktown	*40*	*42*	*42*	*38*	37	40	40	40	40	37	37	37	40	30	32	32	32	32	34	34	33	33	33
NCA2 / Receiver R2 – 249 Madagascar Drive, Kings Park	*47*	*47*	*43*	*37*	37	41	41	41	41	37	37	38	41	31	34	34	34	34	35	35	35	36	35
NCA3 / Receiver R3 – 3 Railway Road, Marayong	*43*	*43*	*42*	*38*	34	32	34	34	34	34	34	36	34	27	26	27	27	27	31	29	29	29	29
Receiver R4 – 38 Tattersalls Road, Kings Park	*68*	*68*	*68*	*68*	60	61	60	60	60	60	60	60	60	45	47	47	47	46	47	48	48	48	47
Receiver R5 – 57-69 Tattersalls Road, Kings Park	*68*	*68*	*68*	*68*	54	54	54	54	54	54	54	54	54	43	44	44	43	43	45	45	45	44	44
Receiver R6 – 21 Tattersalls Road, Kings Park	*68*	*68*	*68*	*68*	50	50	50	50	51	50	50	49	50	38	39	39	39	39	39	39	39	39	39
Receiver R7 – 38 Forge Street, Blacktown	*63*	*63*	*63*	*63*	65	64	64	64	65	65	65	65	64	58	57	57	57	58	59	58	59	59	59

The predicted operational noise levels at the nearest potentially affected receivers were found to be within the nominated project trigger noise levels for all time periods and during all adverse meteorological conditions for receivers in NCA1A, NCA1B, NCA1D, NCA1E, NCA2 and NCA3 as well as receivers R4, R5 and R6.

A 1dB(A) exceedance is predicted for Receiver R1C during the shoulder period under SSW wind condition. As per the NPfI, a 1dB(A) exceedance is considered negligible as the exceedance would not be discernible by the average listener and therefore, would not warrant further treatments and controls.

A 2dB(A) exceedance is predicted for Receiver R7 during the shoulder, day and evening periods. As per the NPfI, a 2dB(A) exceedance is considered negligible as the exceedance would not be discernible by the average listener and therefore would not warrant further treatments and controls.

Operational noise contours for the calm and the combined worst case adverse meteorological conditions for each time period are presented in Appendix B.

7.4.1 Sleep disturbance predicted levels

In addition to the above predicted noise levels, Table 7.8 below presents a summary of the predicted sleep disturbance L_{Amax} noise levels at residential receivers during the night time and shoulder periods from 10pm to 7am.

Table 7.8 – Predicted L_{Amax} sleep disturbance noise levels at nearest potentially affected residential receivers, dB(A)

Receiver Location	Sleep disturbance assessment level (10pm to 7am)		Predicted Noise Levels, dB(A)													
			Night										Shoulder				
	Night	Shoulder	Calm	SSW Wind	SW Wind	WSW Wind	W Wind	Temp. Inv.	Temp. Inv. with SSW Wind	Temp. Inv. with SW Wind	Temp. Inv. with WSW Wind	Temp. Inv. with W Wind	Calm	SSW Wind	SW Wind	WSW Wind	W Wind
NCA1A / Receiver R1A – 189 Sunnyholt Road, Blacktown	*57*	*71*	39	38	40	40	41	42	41	42	42	42	55	52	54	54	54
NCA1B / Receiver R1B – 2 Anthony Street, Blacktown	*57*	*61*	37	39	38	38	38	40	41	40	40	40	53	55	54	54	54
NCA1C / Receiver R1C – 40 Charles Street, Blacktown	*52*	*52*	36	39	38	38	38	40	40	39	39	39	50	52	51	51	51
NCA1D / Receiver R1D – 2 Eggleton Street, Blacktown	*57*	*52*	36	38	38	38	38	40	40	39	39	39	50	52	52	52	52
NCA1E / Receiver R1E – 11 Anthony Street, Blacktown	*52*	*52*	35	37	36	36	36	38	39	38	38	38	48	50	50	50	50
NCA2 / Receiver R2 – 249 Madagascar Drive, Kings Park	*52*	*57*	35	39	39	39	38	39	40	40	40	40	49	53	53	53	53
NCA3 / Receiver R3 – 3 Railway Road, Marayong	*52*	*53*	31	30	31	31	31	35	33	33	33	33	45	43	45	45	46

The predicted sleep disturbance L_{Amax} noise levels at the nearest potentially affected residential receivers were found to be within the nominated sleep disturbance assessment levels for all time periods and during all adverse meteorological conditions.

7.5 Cumulative noise levels

The assessment of cumulative noise impacts considers the total and relative noise from the subject site, the neighbouring non-associated resource recovery facility at 46-50 Tattersall Road, Kings Park and the non-associated metal recovery and recycling facility at 57-69 Tattersall Road, Kings Park. The contribution of noise from the two sites at 46-50 Tattersall Road and 57-69 Tattersall Road, Kings Park has been taken from the following assessments:

- "46-50 Tattersall Road Kings Park – Environmental Impact Statement", prepared by Claron Consulting (2019)
- "Proposed Metal Recovery and Recycling Facility 57-69 Tattersall Road, Kings Park, NSW – Environmental Noise & Vibration Assessment" prepared by Day Design (2019).

The assessment for 46-50 Tattersall Road, Kings Park states the following:

> *"The site is located within an existing Industrial Area. The proposal would not introduce new noise sources to the local area nor is it expected to reduce the acoustical amenity of the nearby area. It is expected the noise level contribution from the proposal would be considered insignificant when compared to the existing levels of industrial noises including those of traffic and transport noise from the surrounding roads and operations at the Tattersall Road industrial precinct."*

Since noise contributions from 46-50 Tattersall Road, Kings Park were found to be insignificant when compared to existing levels of industrial noise for the area it is expected that the noise emissions from this site would not add to the cumulative noise levels from the subject site and neighbouring sites. Therefore, cumulative noise contributions from 46-50 Tattersall Road, Kings Park are not considered further from herein.

The assessment of 57-69 Tattersall Road, Kings Park has identified receivers R1A and R3 as noise affected receiver locations from the development. The cumulative noise impacts of 57-69 Tattersall Road, Kings Park and the subject site for receivers R1A and R3 are shown in the table below.

Table 7.9 – Cumulative noise levels from 57-69 Tattersall Road and the subject site, dB(A)

Receiver ID	Recommended amenity levels				Proposal site				57-69 Tattersall Road				Cumulative noise				Complies? (Yes/No)			
	Shoul-der	Day	Eve	Night	Shoul-der	Day	Eve	Night	Shoul-der	Day	Eve	Night	Shoul-der	Day	Eve	Night	Shoul-der	Day	Eve	Night
Receiver R1A – 189 Sunnyholt Road, Blacktown (residences to the east along Sunnyholt Road)	*60*	*60*	*55*	*45*	42	41	42	38	<50	<50	N/A	N/A	<51	<51	42	38	Yes	Yes	Yes	Yes
Receiver R3 – 3 Railway Road, Marayong (residences to the west along Railway Road)	*55*	*55*	*50*	*40*	34	34	36	31	<47	<47	N/A	N/A	<47	<47	36	31	Yes	Yes	Yes	Yes

From Table 7.9, it can be seen that the cumulative noise from 57-69 Tattersall Road, Kings Park and the subject site would comply with the recommended amenity noise levels from the NPfI.

7.6 Statement of noise impact

From the results it is shown that with the implementation of the 16m eastern boundary noise wall, noise emission levels to the residential receivers R1A, R1B, R1D, R1E, R2 and R3 comply with the project noise trigger levels and sleep disturbance assessment levels, and a negligible noise exceedance of 1dB(A) was predicted for Receiver R1C during a SSW wind condition.

Predicted noise levels to the neighbouring industrial receivers (receivers R4, R5 and R6) also comply with the project noise trigger levels.

For the neighbouring commercial Receiver R7, a negligible noise exceedance of 2dB(A) was predicted.

8 Conclusion

An updated assessment of environmental noise impact from the proposed expansion of the Kings Park Waste Metal Recovery, Processing and Recycling Facility has been undertaken. A number of changes on the previous addendum assessment have been incorporated in this assessment, including additional noise monitoring results, updated noise criteria, inclusion of sub-NCAs and updated modelling methodology as per comments from the regulatory agencies.

Noise impact from the proposed expansion upon the potentially most affected noise sensitive residential locations and existing neighbouring industrial / commercial premises, has been quantified and compared to the noise requirements set by the EPA.

Noise emissions to residential receivers are predicted to generally comply with the project noise trigger levels and sleep disturbance assessment levels without the proposed mitigation measures.

Noise emissions to industrial receivers are predicted to comply with the project noise trigger levels and a negligible exceedance is predicted for commercial receivers.

APPENDIX A Glossary of terminology

The following is a brief description of the technical terms used to describe noise to assist in understanding the technical issues presented.

Adverse weather	Weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).
Ambient noise	The all-encompassing noise associated within a given environment at a given time, usually composed of sound from all sources near and far.
Assessment period	The period in a day over which assessments are made.
Assessment Point	A point at which noise measurements are taken or estimated. A point at which noise measurements are taken or estimated.
Background noise	Background noise is the term used to describe the underlying level of noise present in the ambient noise, measured in the absence of the noise under investigation, when extraneous noise is removed. It is described as the average of the minimum noise levels measured on a sound level meter and is measured statistically as the A-weighted noise level exceeded for ninety percent of a sample period. This is represented as the L90 noise level (see below).
Decibel [dB]	The units that sound is measured in. The following are examples of the decibel readings of common sounds in our daytime environment:

threshold of hearing	0 dB	The faintest sound we can hear
	10 dB	Human breathing
almost silent	20 dB	
	30 dB	Quiet bedroom or in a quiet national park location
generally quiet	40 dB	Library
	50 dB	Typical office space or ambience in the city at night
moderately loud	60 dB	CBD mall at lunch time
	70 dB	The sound of a car passing on the street
loud	80 dB	Loud music played at home
	90 dB	The sound of a truck passing on the street
very loud	100 dB	Indoor rock band concert
	110 dB	Operating a chainsaw or jackhammer
extremely loud	120 dB	Jet plane take-off at 100m away
threshold of pain	130 dB	
	140 dB	Military jet take-off at 25m away

dB(A)	A-weighted decibels. The A- weighting noise filter simulates the response of the human ear at relatively low levels, where the ear is not as effective in hearing low frequency sounds as it is in hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the "A" filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is measured using the A filter.
dB(C)	C-weighted decibels. The C-weighting noise filter simulates the response of the human ear at relatively high levels, where the human ear is nearly equally effective at hearing from mid-low frequency (63Hz) to mid-high frequency (4kHz), but is less effective outside these frequencies.

Frequency	Frequency is synonymous to pitch. Sounds have a pitch which is peculiar to the nature of the sound generator. For example, the sound of a tiny bell has a high pitch and the sound of a bass drum has a low pitch. Frequency or pitch can be measured on a scale in units of Hertz or Hz.
Impulsive noise	Having a high peak of short duration or a sequence of such peaks. A sequence of impulses in rapid succession is termed repetitive impulsive noise.
Intermittent noise	The level suddenly drops to that of the background noise several times during the period of observation. The time during which the noise remains at levels different from that of the ambient is one second or more.
L_{Max}	The maximum sound pressure level measured over a given period.
L_{Min}	The minimum sound pressure level measured over a given period.
L_1	The sound pressure level that is exceeded for 1% of the time for which the given sound is measured.
L_{10}	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
L_{90}	The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L90 noise level expressed in units of dB(A).
L_{eq}	The "equivalent noise level" is the summation of noise events and integrated over a selected period of time.
Reflection	Sound wave changed in direction of propagation due to a solid object obscuring its path.
SEL	Sound Exposure Level (SEL) is the constant sound level which, if maintained for a period of 1 second would have the same acoustic energy as the measured noise event. SEL noise measurements are useful as they can be converted to obtain Leq sound levels over any period of time and can be used for predicting noise at various locations.
Sound	A fluctuation of air pressure which is propagated as a wave through air.
Sound absorption	The ability of a material to absorb sound energy through its conversion into thermal energy.
Sound level meter	An instrument consisting of a microphone, amplifier and indicating device, having a declared performance and designed to measure sound pressure levels.
Sound pressure level	The level of noise, usually expressed in decibels, as measured by a standard sound level meter with a microphone.
Sound power level	Ten times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power.
Tonal noise	Containing a prominent frequency and characterised by a definite pitch.

APPENDIX B Operational noise contours

Figure 3 – Operational noise contours for shoulder period during calm conditions, $L_{Aeq, 15min}$

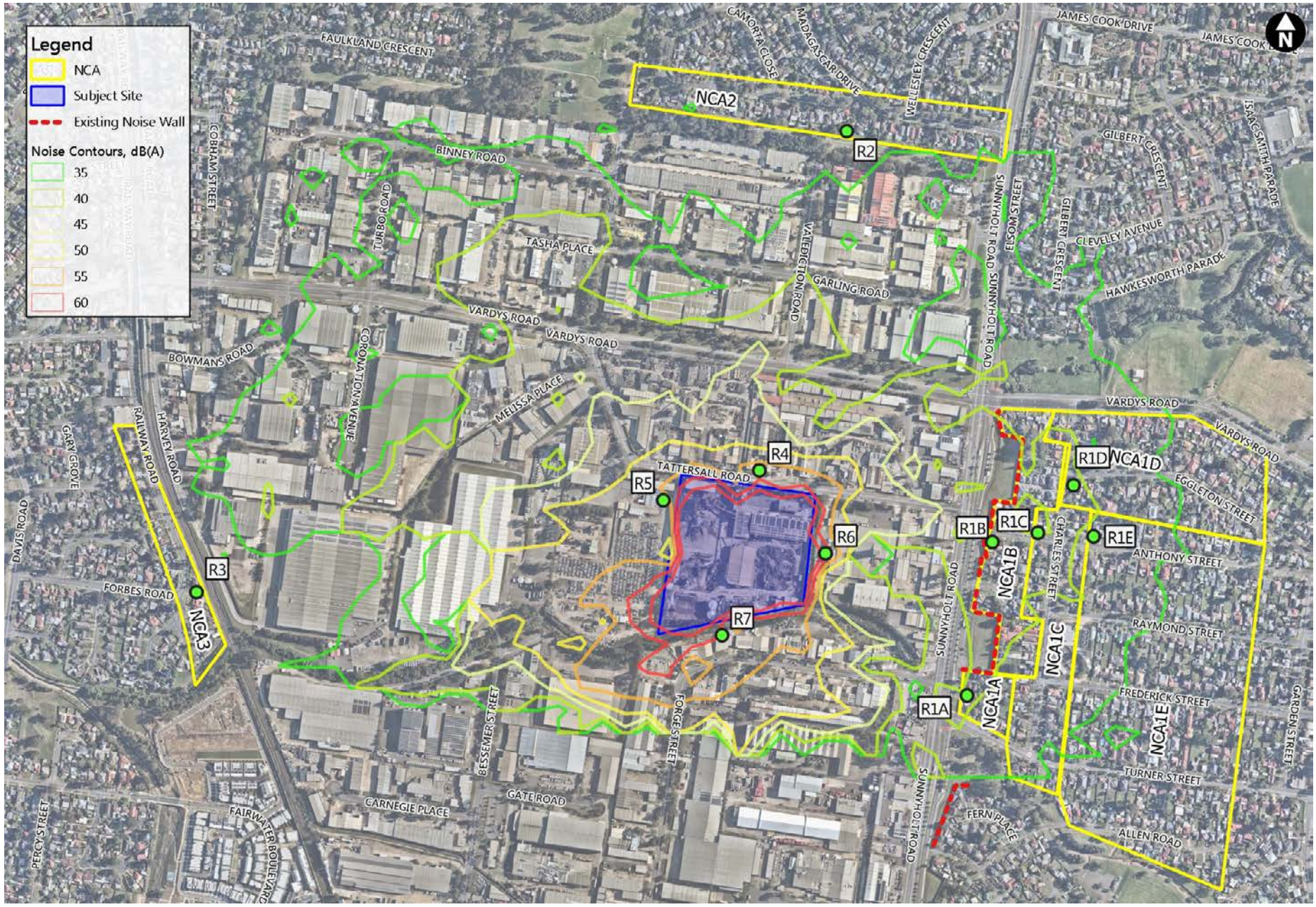


Figure 4 – Operational noise contours for shoulder period with combined worst case adverse meteorological enhancement, $L_{Aeq, 15min}$

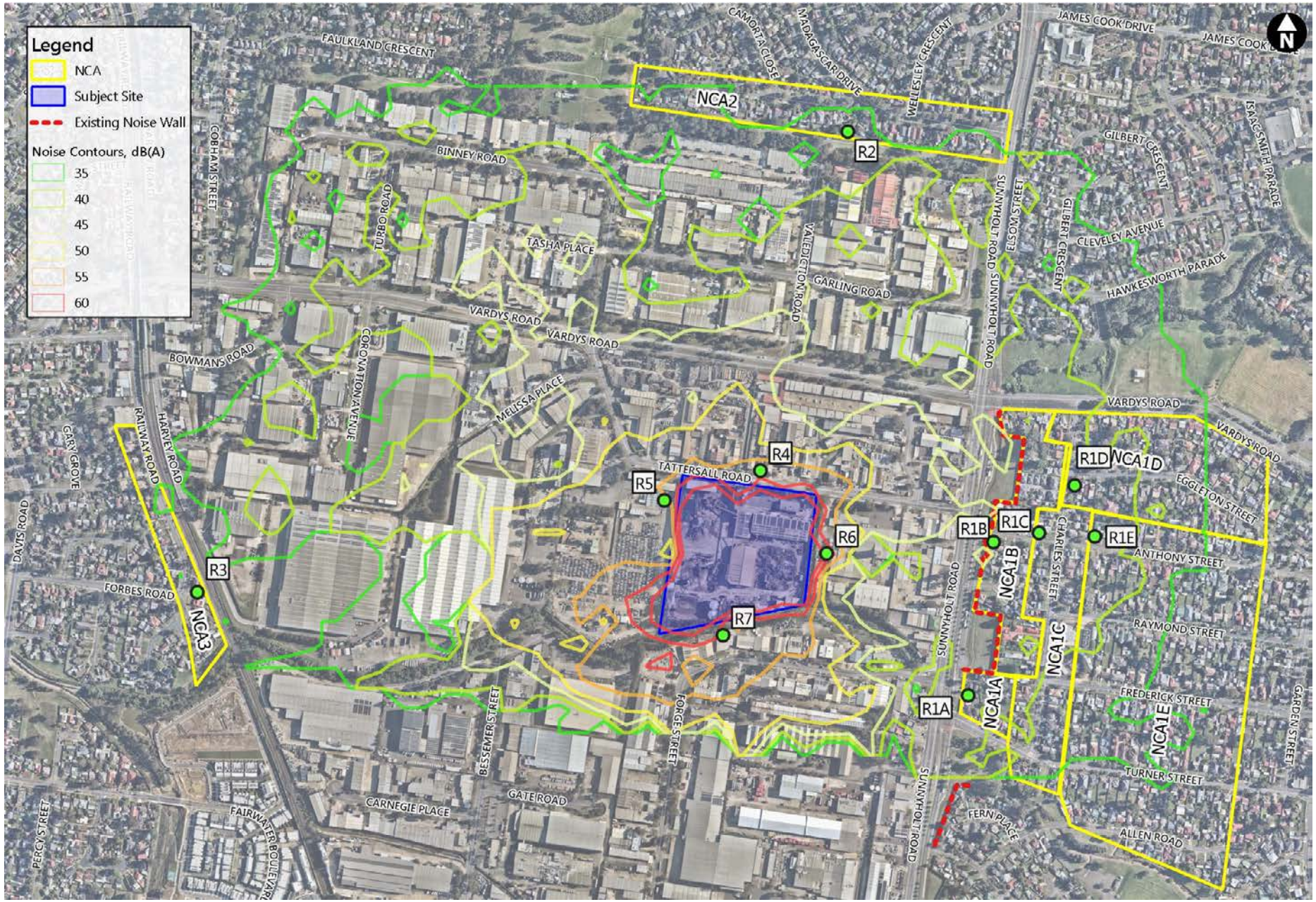


Figure 5 – Operational noise contours for day period during calm conditions, $L_{Aeq, 15min}$

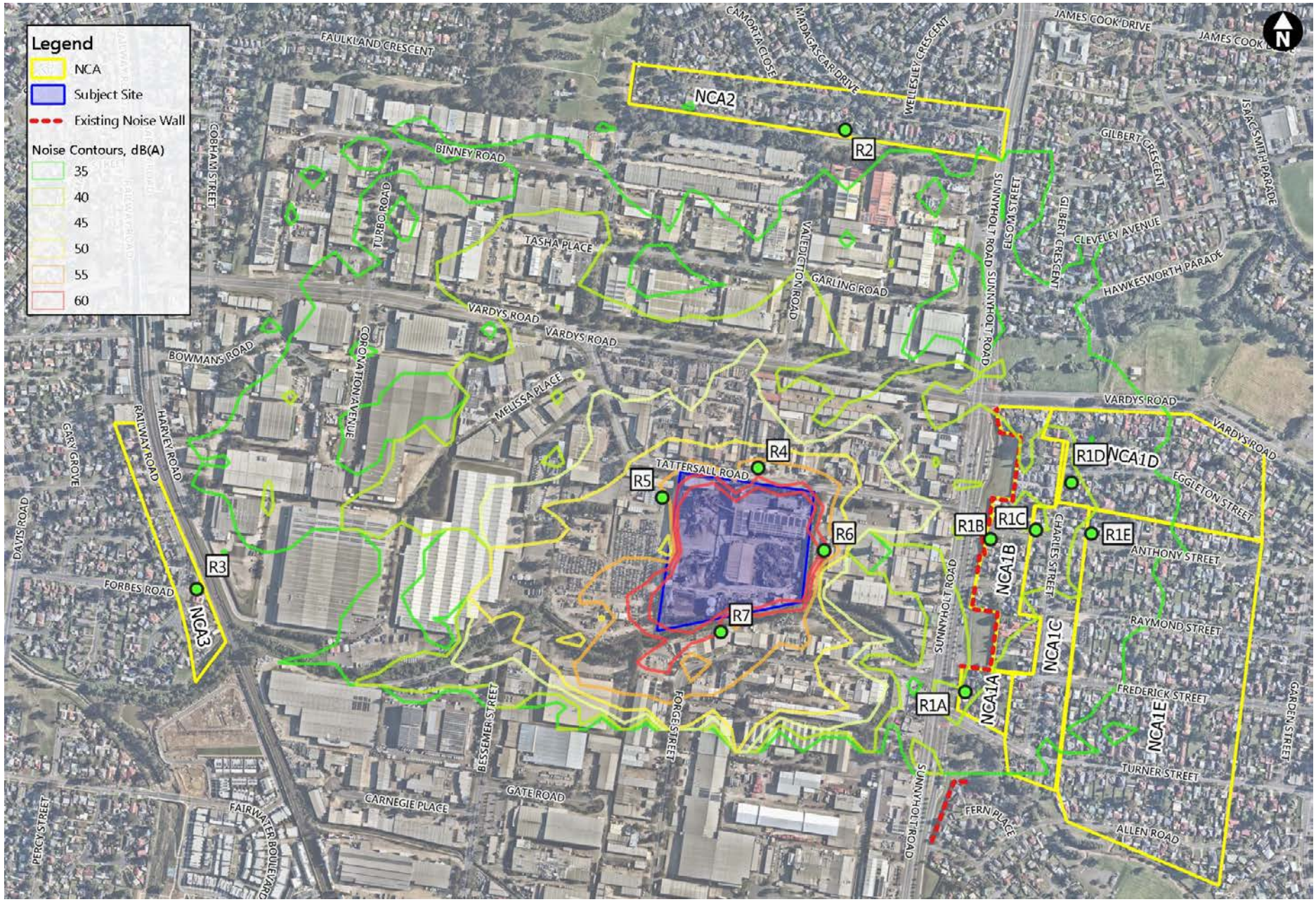


Figure 6 – Operational noise contours for evening period during calm conditions, $L_{Aeq, 15min}$

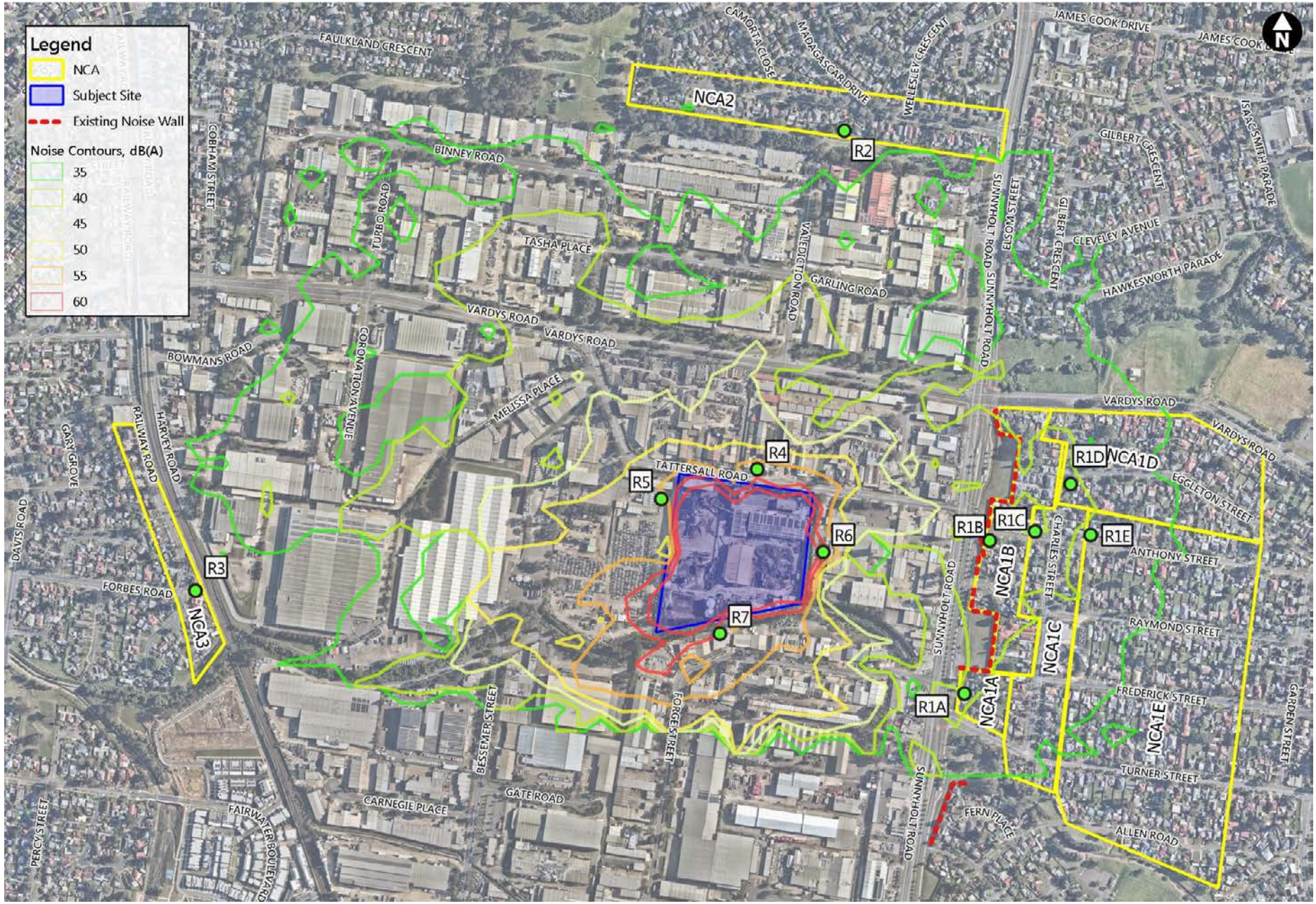


Figure 7 – Operational noise contours for evening period with combined worst case adverse meteorological enhancement, $L_{Aeq, 15min}$

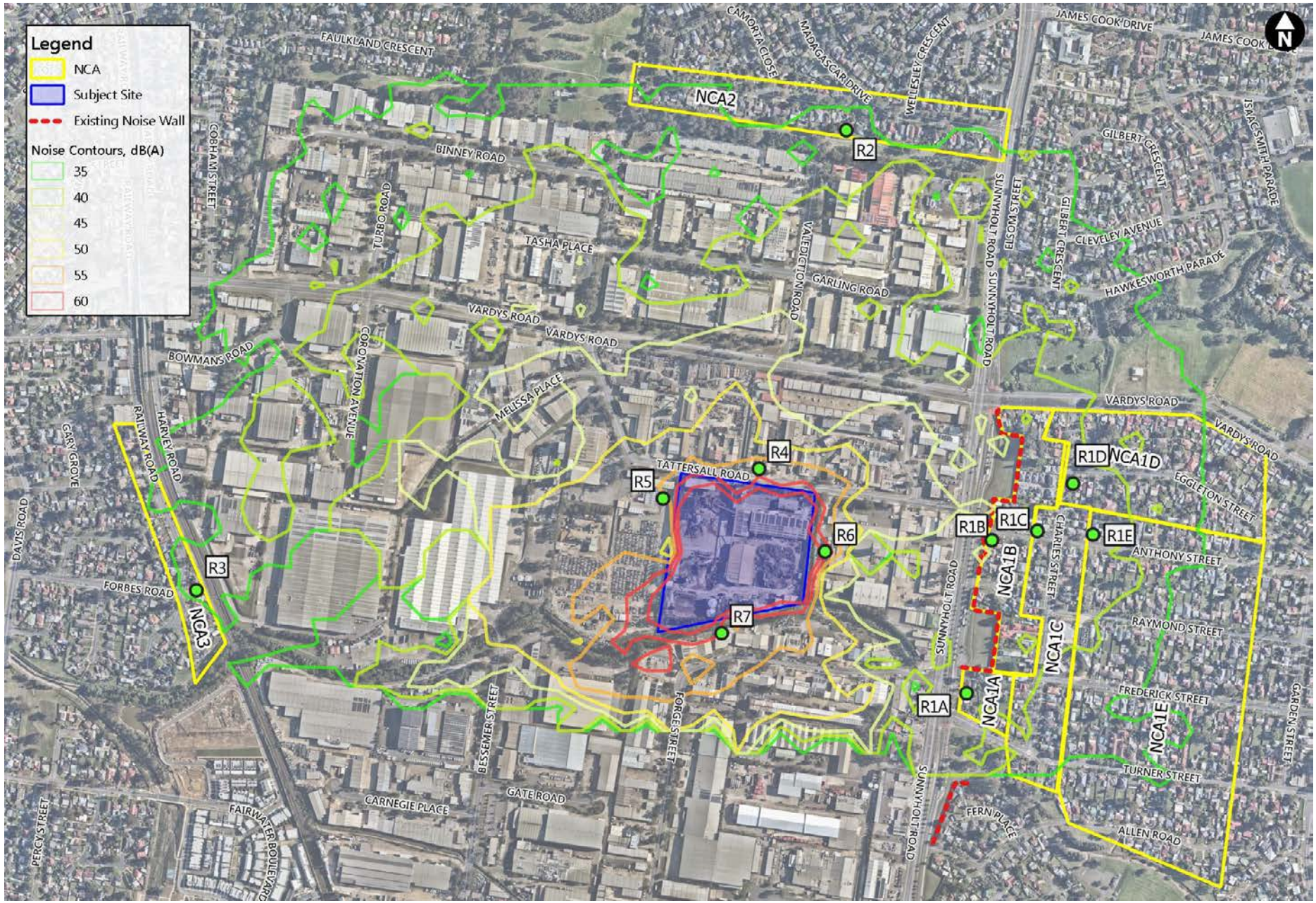


Figure 8 – Operational noise contours for night period during calm conditions, $L_{Aeq, 15min}$

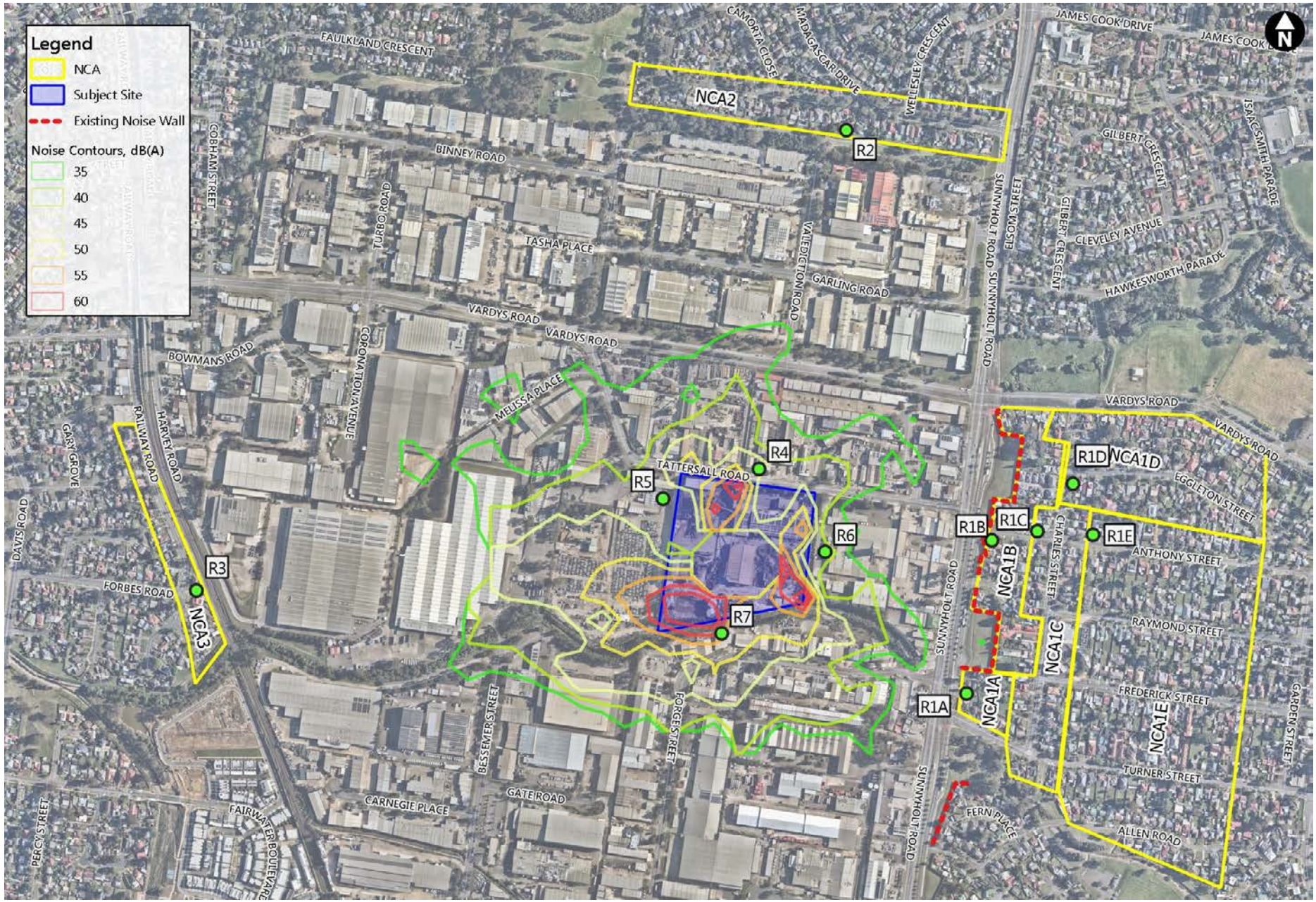
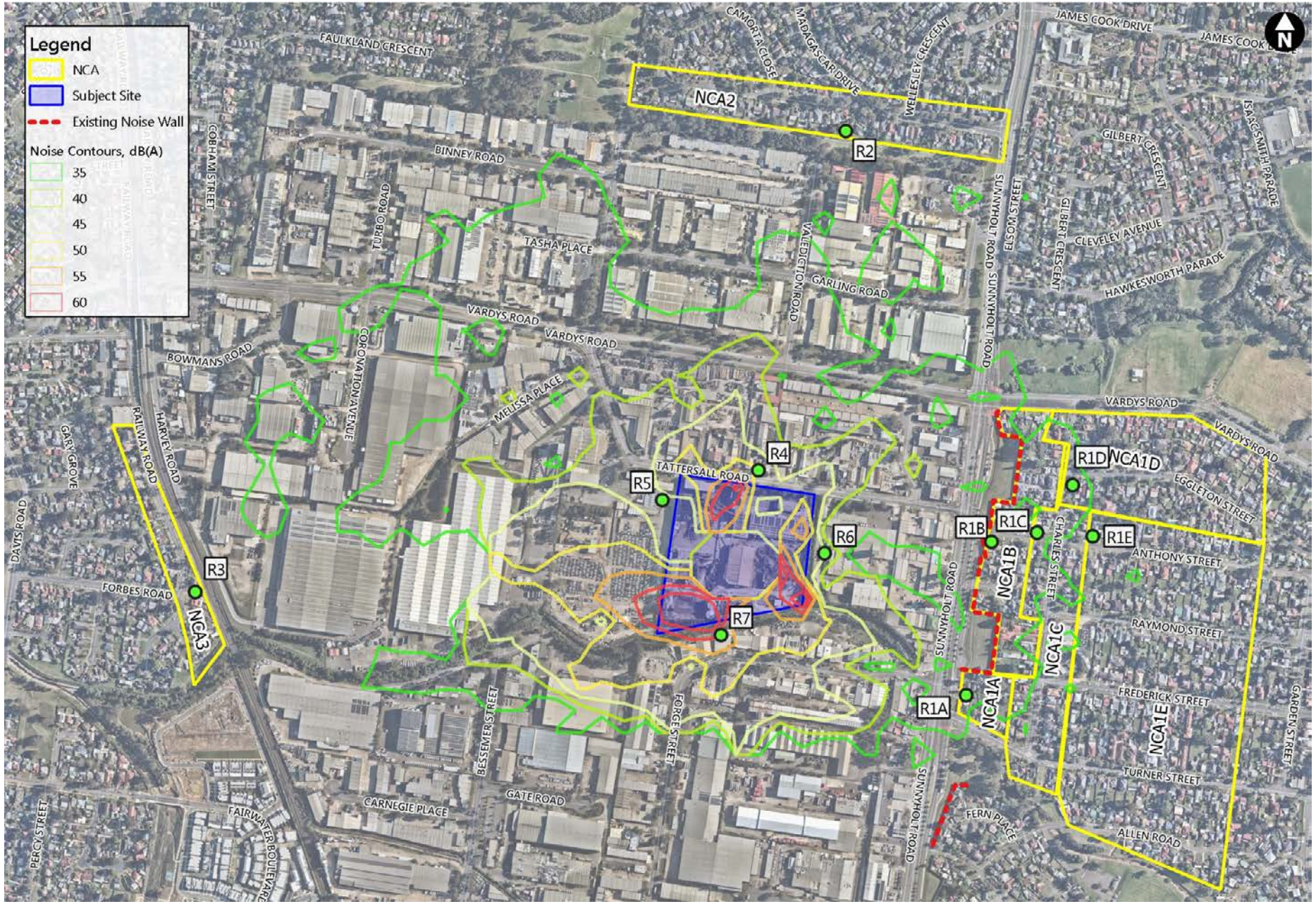


Figure 9 – Operational noise contours for night period with combined worst case adverse meteorological enhancement, $L_{Aeq, 15min}$



APPENDIX C Detailed operational noise source measurement results

Attended on site noise measurements were undertaken on Monday, 8 March 2021 to capture noise from existing plant and equipment on site, including measurements of individual plant items as well as measurement of activities / processes such as hammer milling and metal shearing, where a number of plant items were operating within an area concurrently and completing a typical routine / cycle.

The measurement results were used to derive a range of noise source levels for this assessment that are presented in Table 7.1 and Table 7.2. Measurements of the noise source levels from the key noise generating activities were undertaken with a sufficient duration to capture the total activity noise level (ie. metal processing activity, pass-by, etc), and relevant statistical measurement parameters (L_{Amax}, $LA_{eq,T}$, $L_{A90,T}$, L_{Amin}) were recorded. For the trucks moving onsite, maximum pass-by noise levels were used to derive conservatively high sound power levels for the assessment. A summary of the measured noise levels for the key activities are presented in Table C.1 and Table C.2.

Table C.1: Attended noise measurement results – Stationary sources / Area Sources

Noise generating operation/activity	Measured noise level, dB(A)				Comments on measured noise levels
	L_{Amax}	$L_{Aeq,t}$	$L_{A90,t}$	L_{Amin}	
Hammer mill	89.8	85.8	82	81.5	Measurement distance 15m. Continuously operating over 5 minutes. Measurement influenced by mobile plant operating in vicinity but noise is predominantly from hammer mill.
Hammer mill activities	93.4	83.5	79.3	76.9	Measurement distance approximately 20m. Activities continuously operating and includes noise from hammer mill, front end loaders pushing materials, seram crane loading materials into hammer mill and trucks dumping materials into stockpiles
Metal shear	97.6	83.5	76.5	74.1	Measurement distance 15m. Continuously operating over several cycles. Measurement influenced by mobile plant operating in vicinity but noise is predominantly from metal shear
Metal shear activities	93.2	82.9	77.8	76.4	Only shear and seram crane operating. Measurement distance approximately 15m from shear and 10m from seram crane. Seram crane picking up materials and feeding shear continuously over several cycles.
Metal shear activities	94.5	77.0	69.7	65.2	Measurement distance approximately 20m. Activities continuously operating and includes noise from shear, seram crane loading materials into shear, excavator sorting materials and trucks dumping materials into stockpiles.
Seram crane	91.7	81.7	76.0	73.6	Measurement distance 10m. Continuously picking up material and feeding into hammer mill. Measurement influenced by mobile plant operating in vicinity but noise is predominantly from seram crane.
Excavator	90.8	82.5	76	69.2	Measurement distance 7m. Picking up material and moving to stockpile. Measurement of this continuous activity over several cycles.
Front end loader	92.2	79.4	70.1	68.1	Measurement distance 10m. Pushing dumped waste materials into piles for seram crane to pick up. Measurement of this continuous activity over several cycles.

Noise generating operation/activity	Measured noise level, dB(A)				Comments on measured noise levels
	L_{Amax}	$L_{Aeq,t}$	$L_{A90,t}$	L_{Amin}	
Material handler	93.5	82.6	76.7	73.1	Measurement distance 5m. Sorting waste materials and placing into piles for feeding into shear.
Oxy-acetylene torch	87.6	80.4	76.8	75.0	Measurement distance 5m. Continuously cutting for over 1 minute.

Notes: 1. Based upon a representative measurement from a measurement set.

Table C.2: Attended noise measurement results – Line sources

Noise generating operation/activity	Measured noise level, dB(A)		Speed (km/h)	Comments on measured noise levels
	L_{Amax}[1],	$L_{Aeq,t}$		
B-Double Pass By	83.3	73.6	10	Closest measurement distance 5m.
Semi Trailer Pass By	82.0	75.7	10	Closest measurement distance 5m.
Dump Truck Pass By	81.2	73.2	10	Closest measurement distance 5m.

Notes: 1. Maximum pass-by noise level.
2. Based upon a representative measurement from a measurement set.

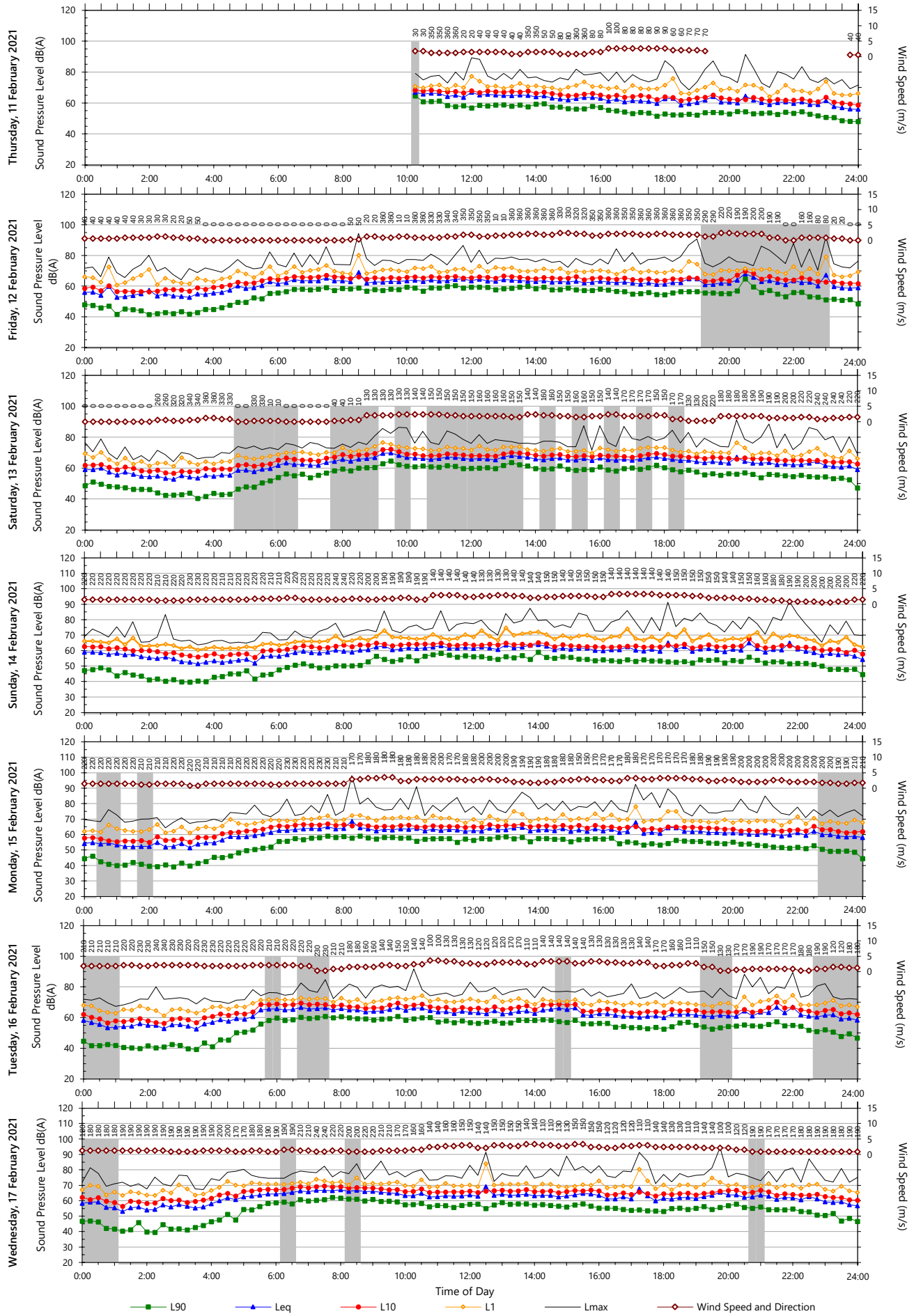
APPENDIX D Modelled noise source locations

Figure 10 – Modelled noise source locations

APPENDIX E Long term noise monitoring results

Unattended Monitoring Results

Location: 187 Sunnyholt Road, Blacktown



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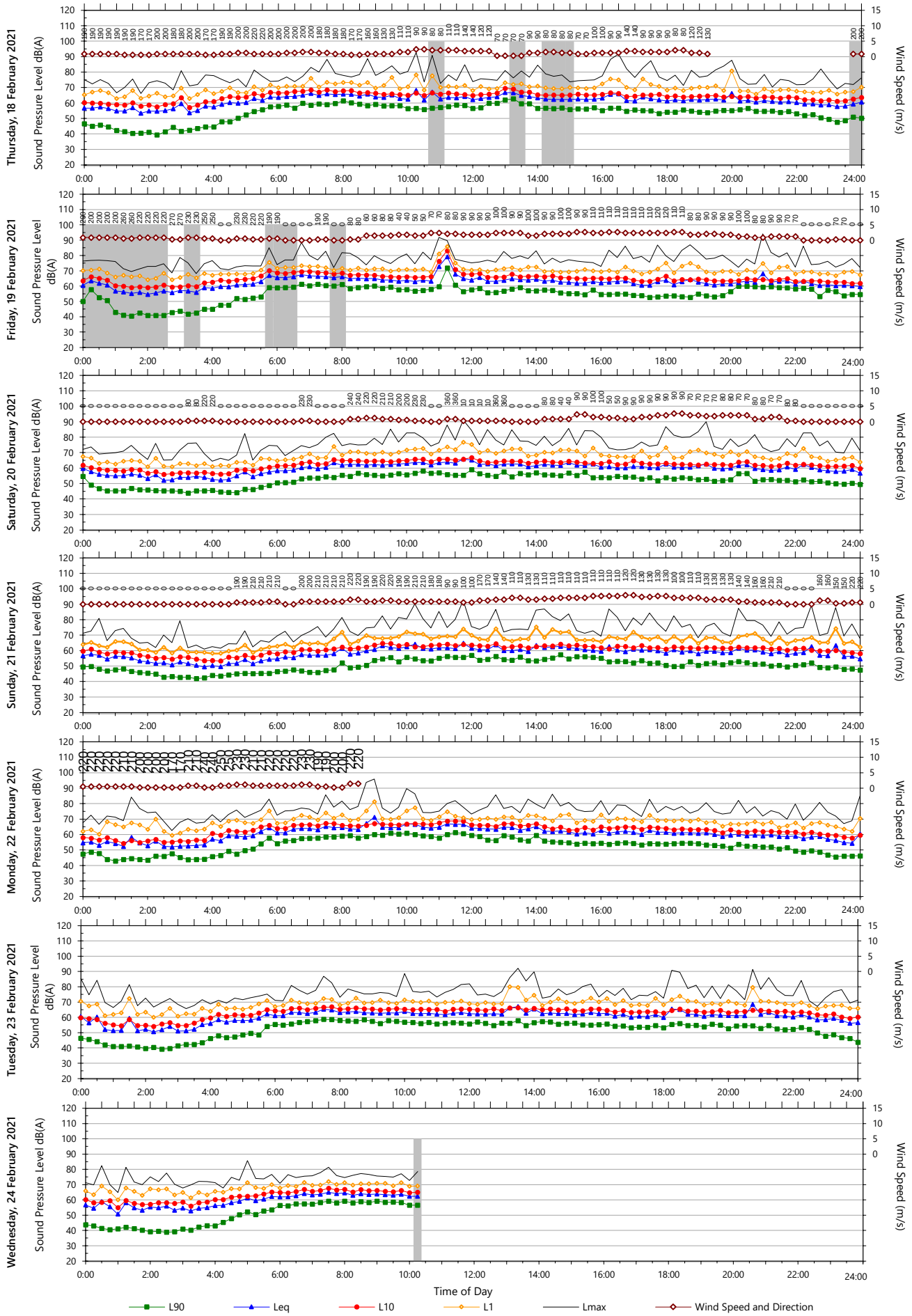
Unattended Monitoring Results

Location: 187 Sunnyholt Road, Blacktown



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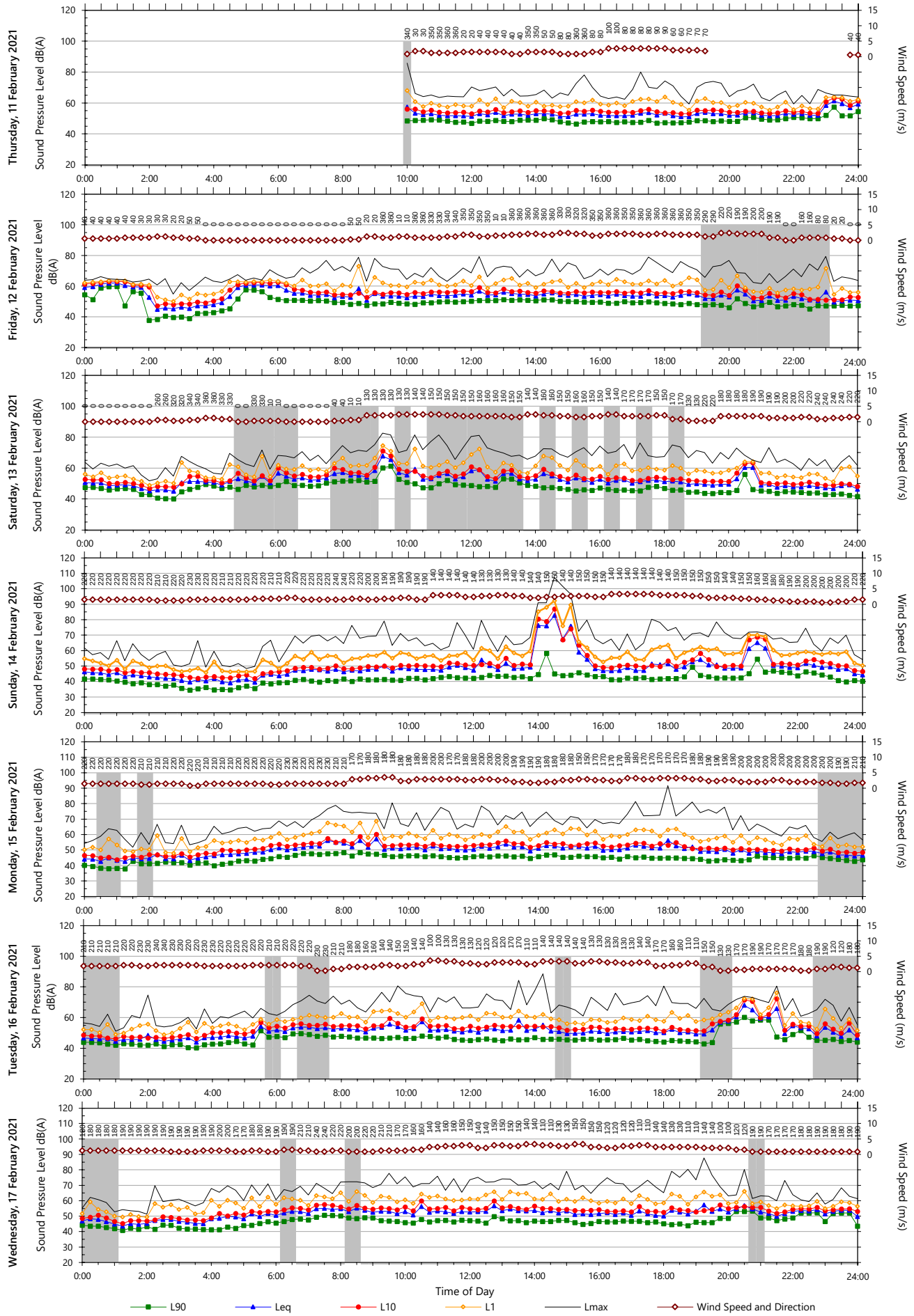
Template: QTE-26 Logger Graphs Program (r34)

Unattended Monitoring Results

Location: 2 Anthony Street, Blacktown



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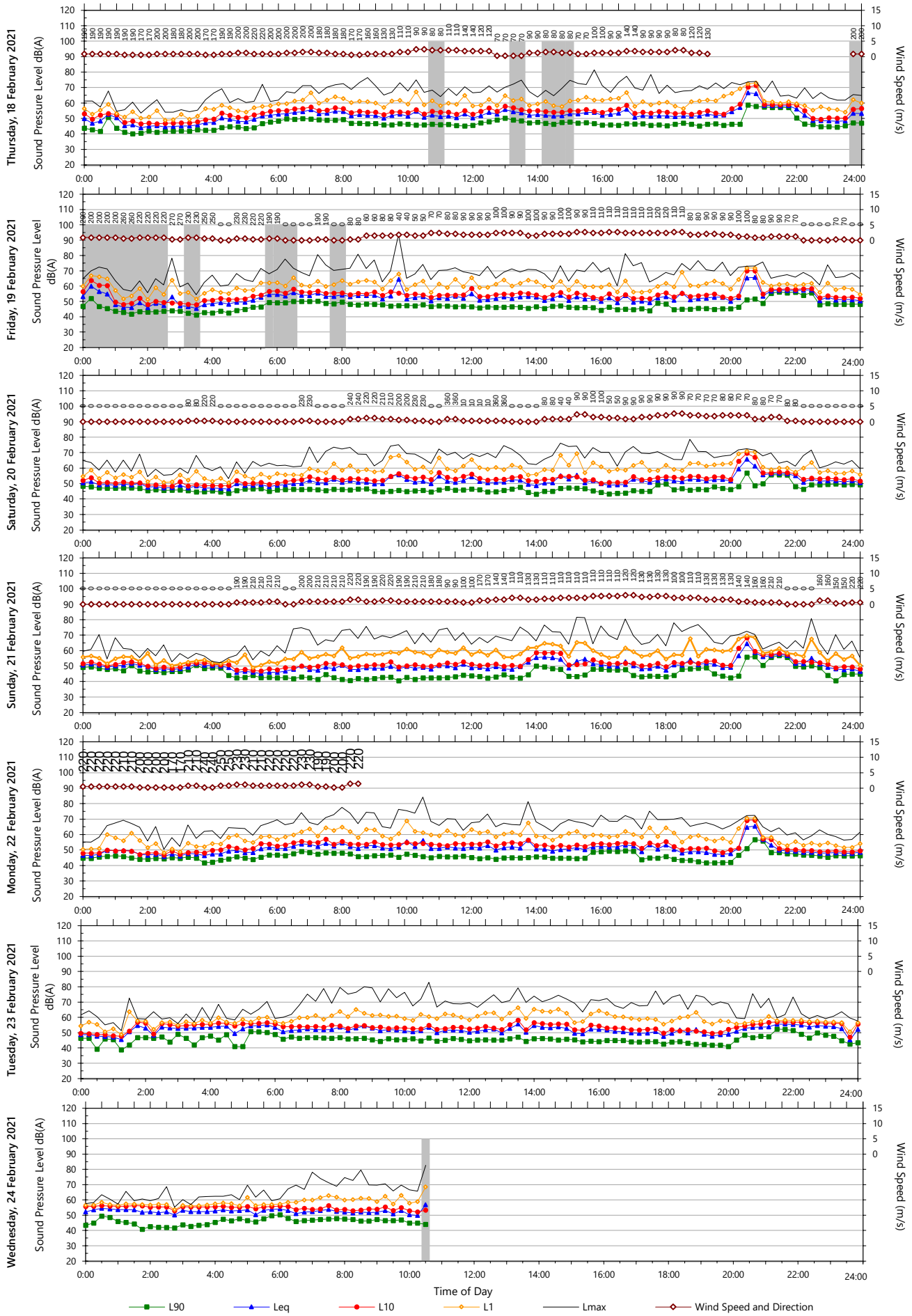
Template: QTE-26 Logger Graphs Program (r34)

Unattended Monitoring Results

Location: 2 Anthony Street, Blacktown



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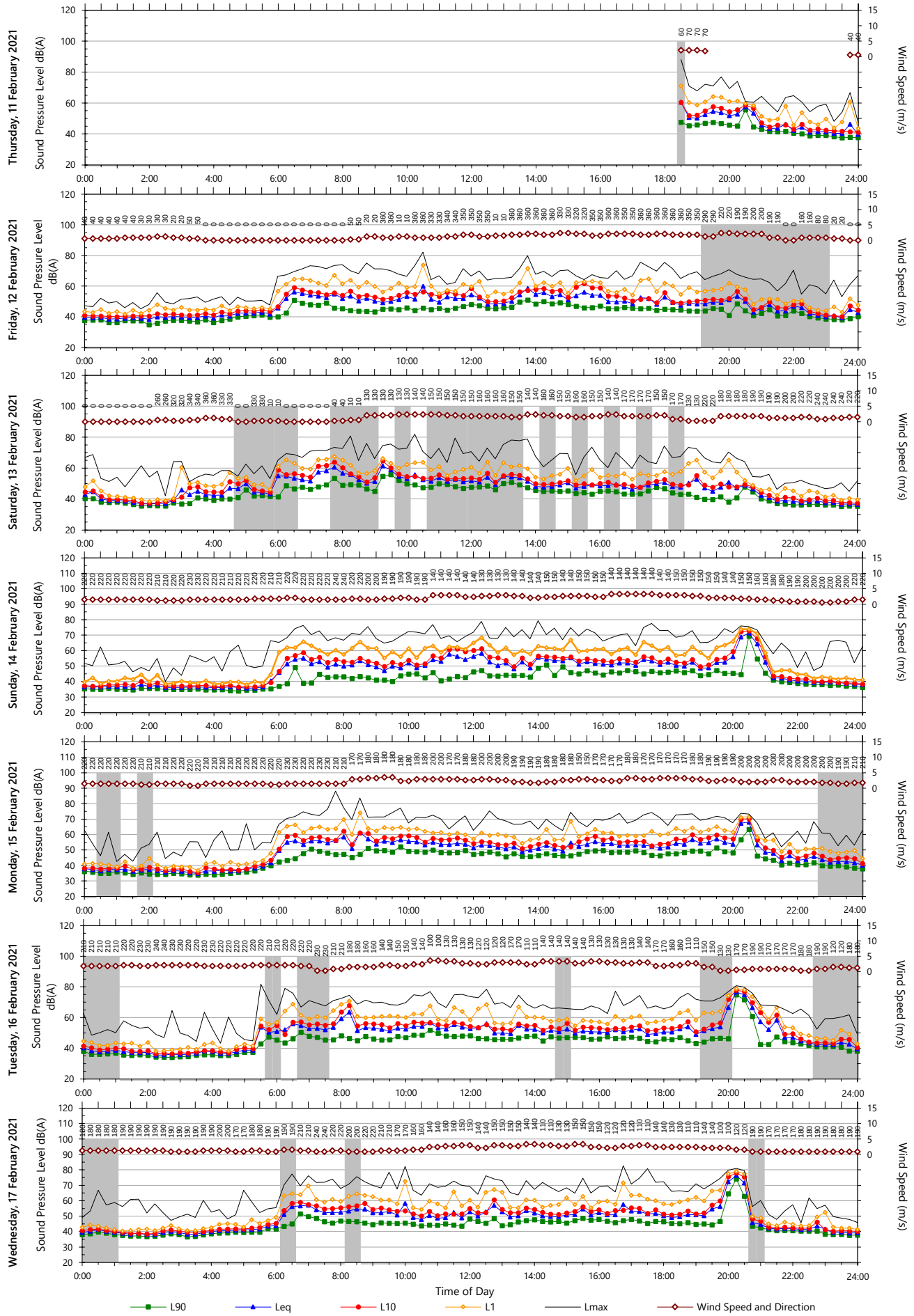
Template: QTE-26 Logger Graphs Program (r34)

Unattended Monitoring Results

Location: 19 Camorta Close, Kings Park



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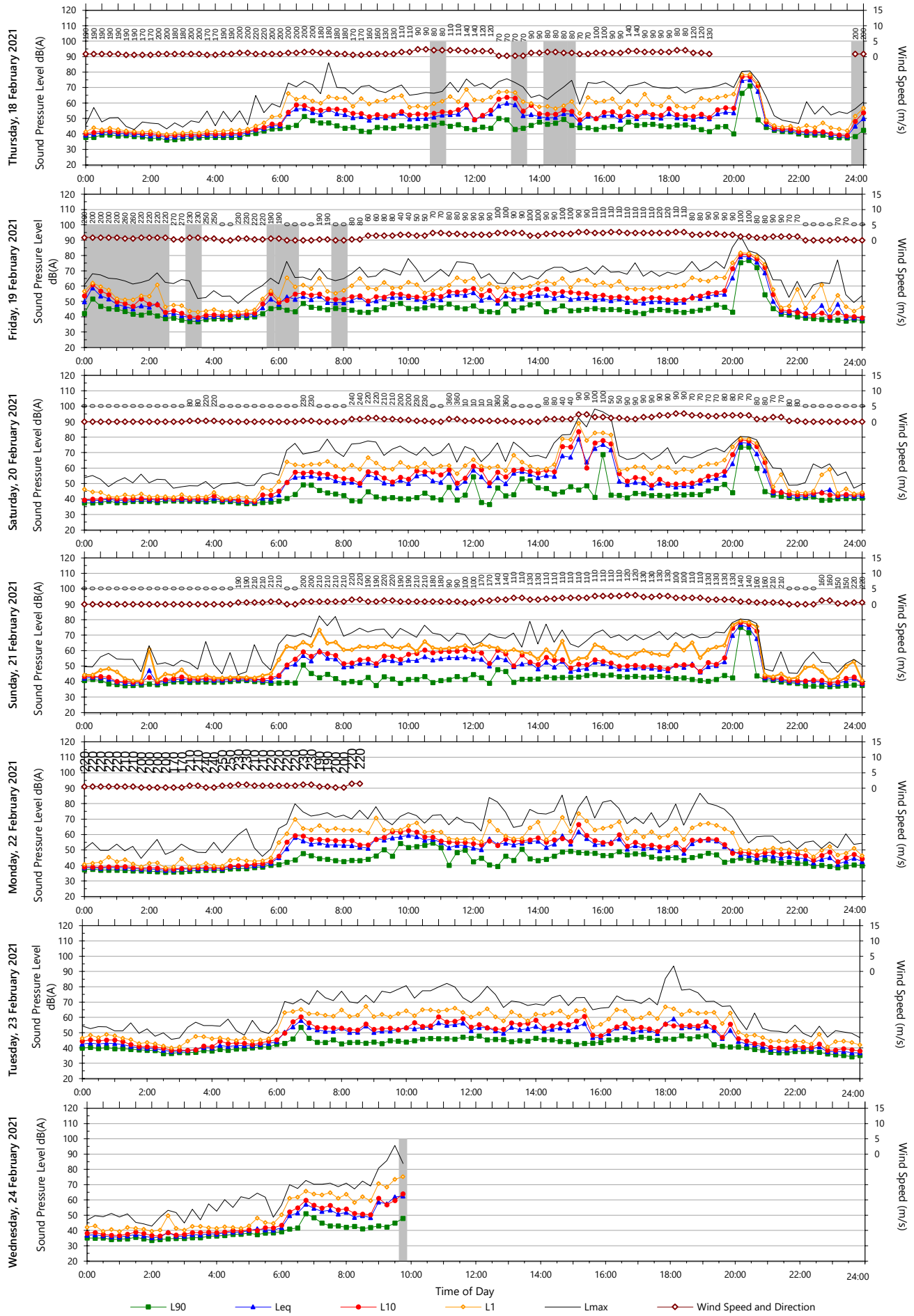
Unattended Monitoring Results

Location: 19 Camorta Close, Kings Park



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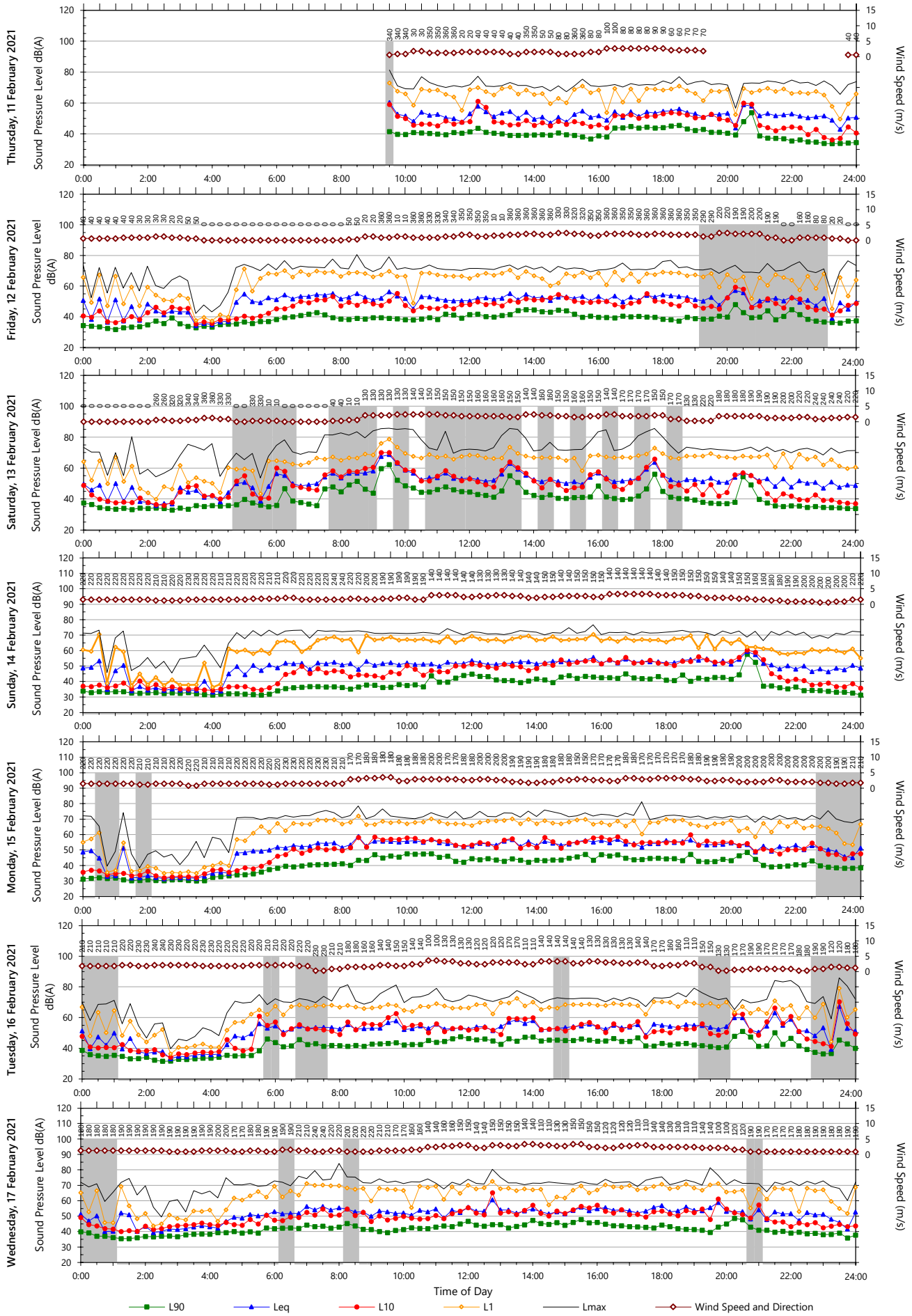
Template: QTE-26 Logger Graphs Program (r34)

Unattended Monitoring Results

Location: 1 Chedley Place, Marayong



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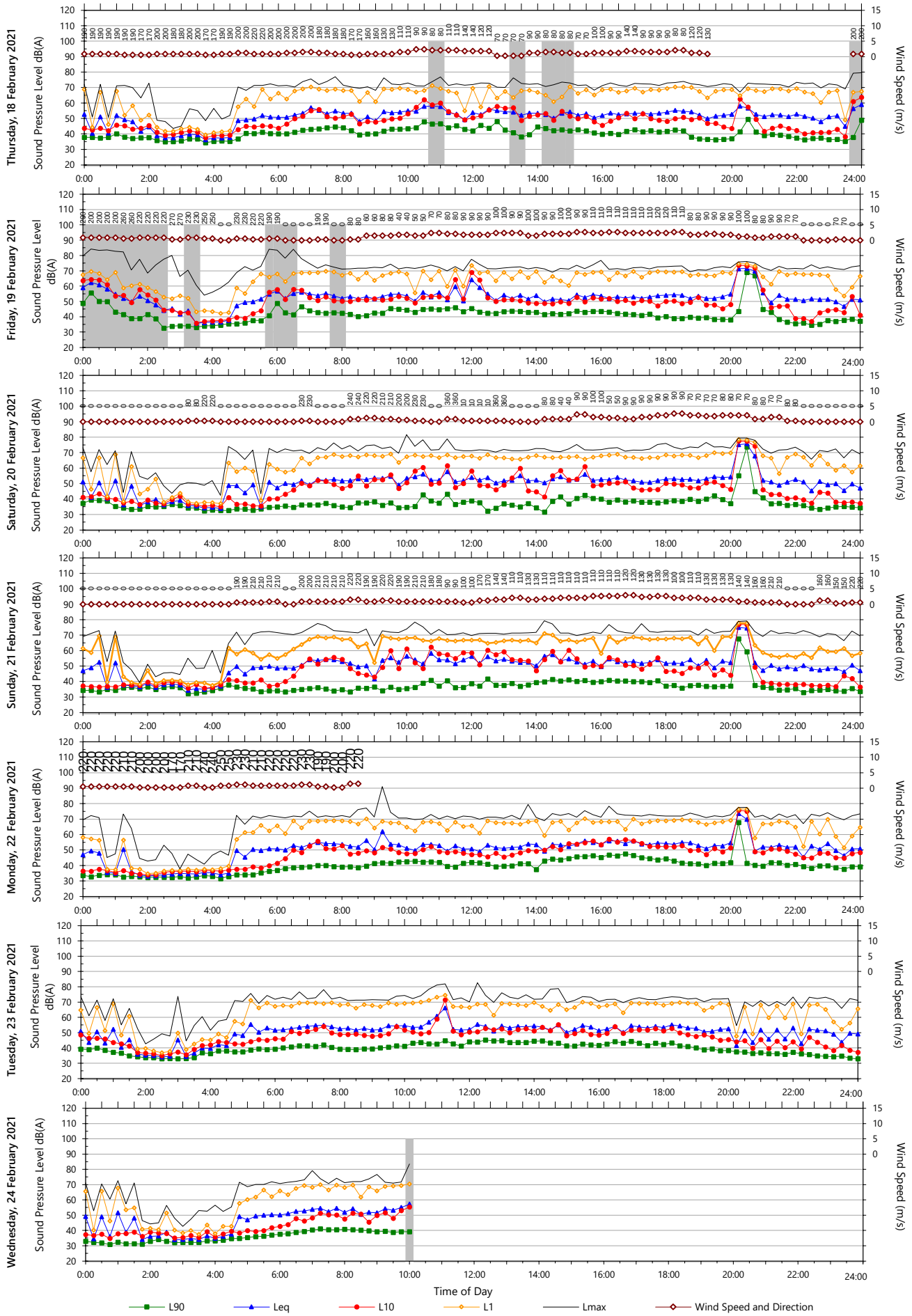
Unattended Monitoring Results

Location: 1 Chedley Place, Marayong



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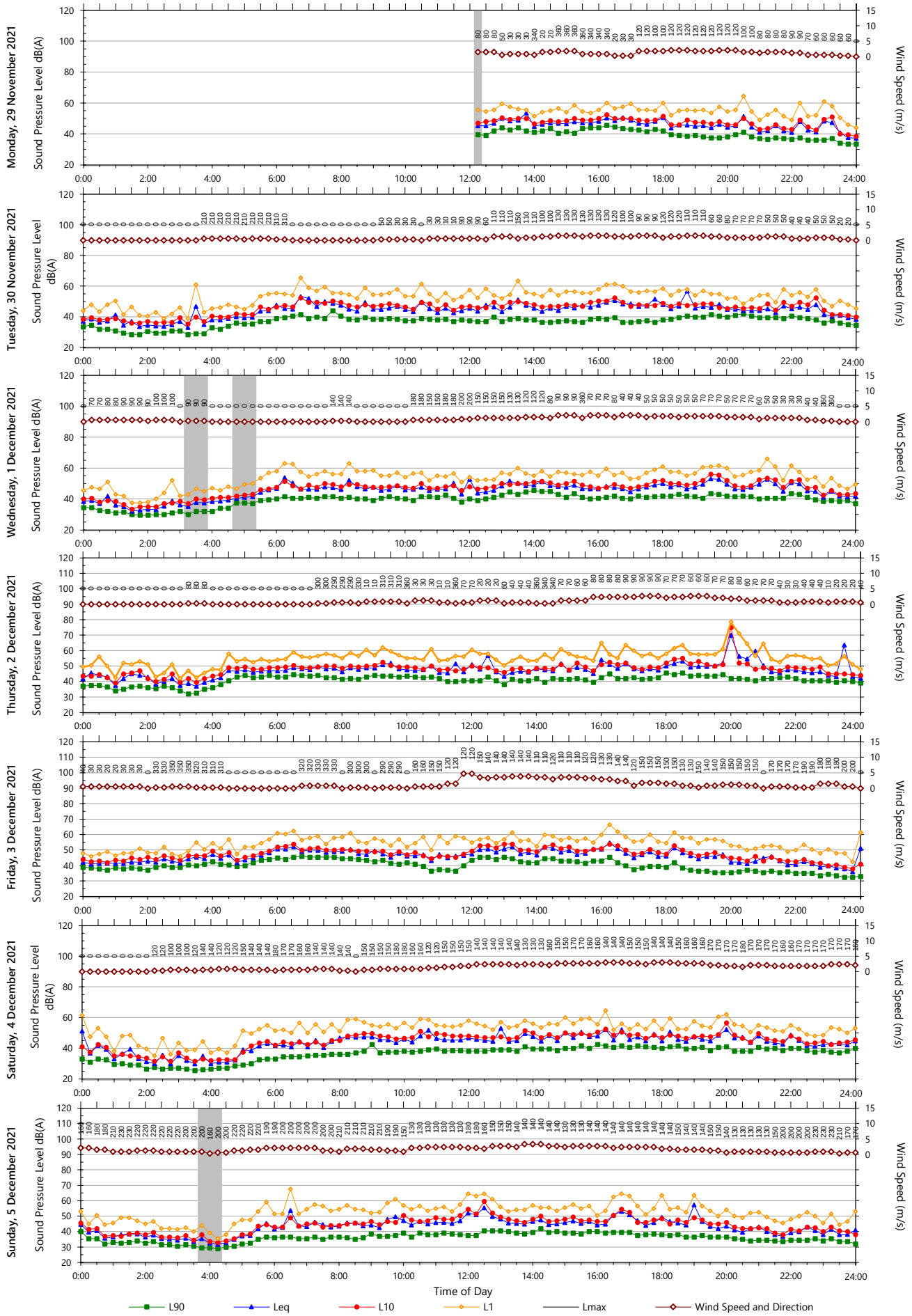
Template: QTE-26 Logger Graphs Program (r34)

Unattended Monitoring Results

Location: 29 Charles Street, Blacktown



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Unattended Monitoring Results

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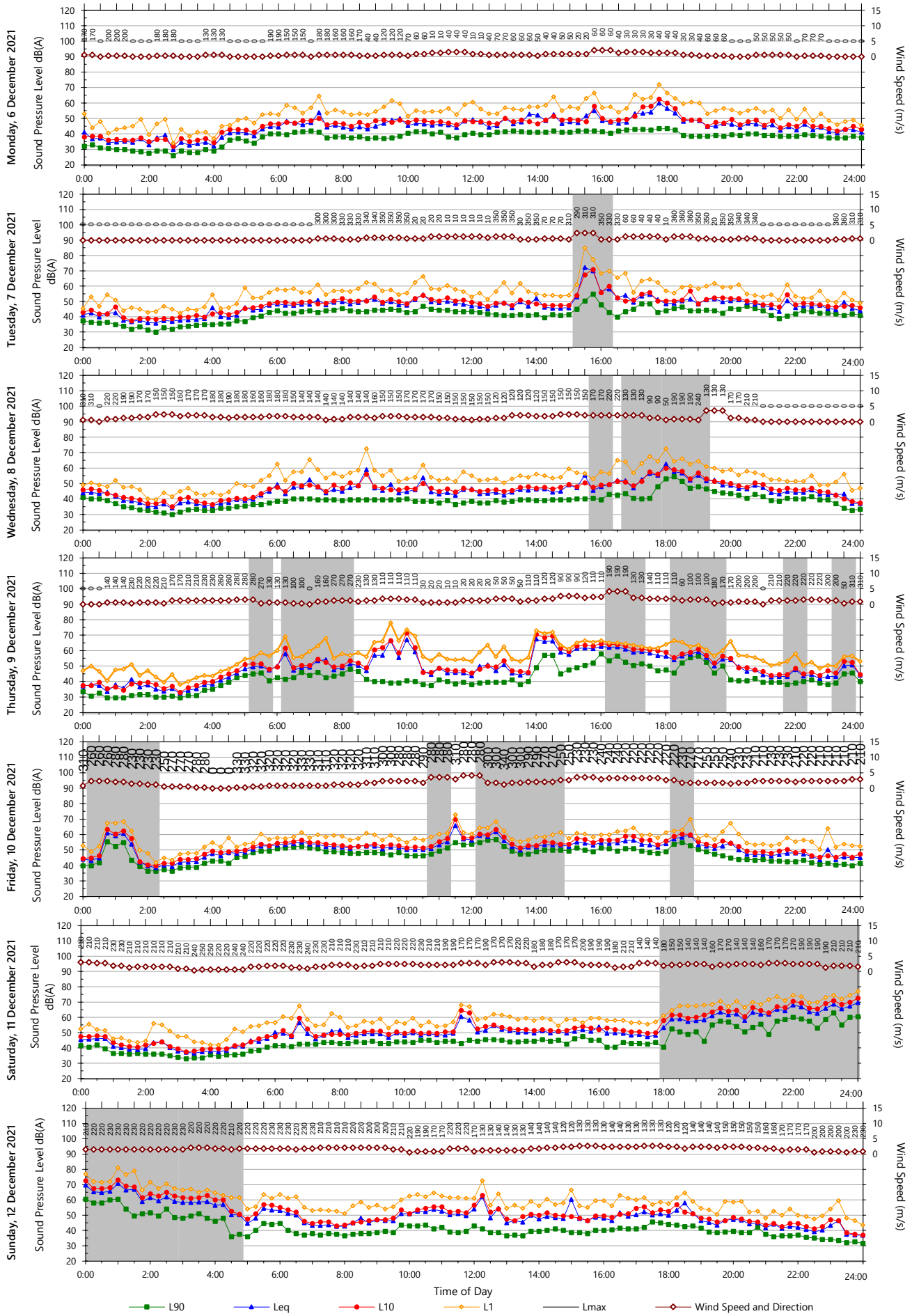

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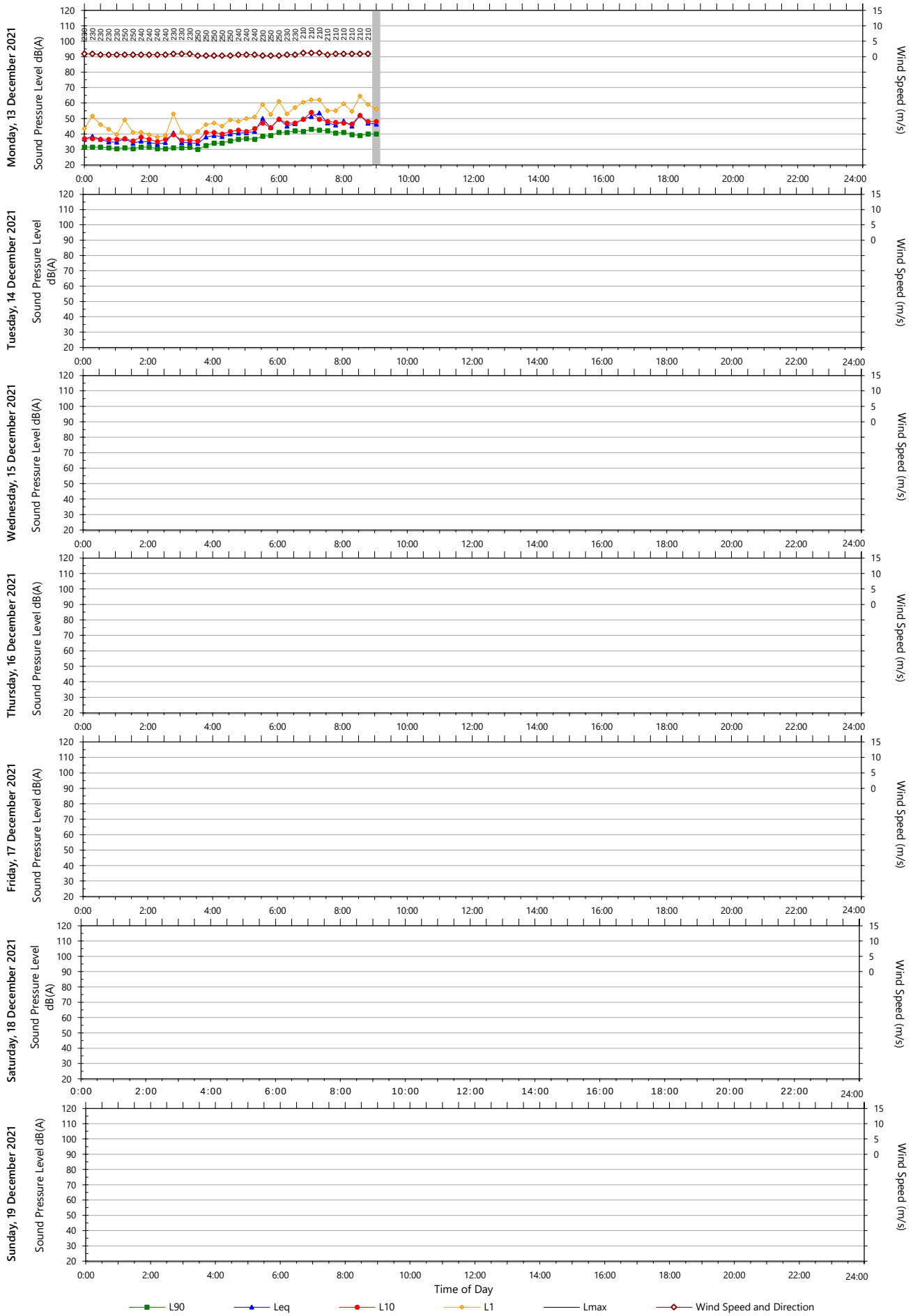

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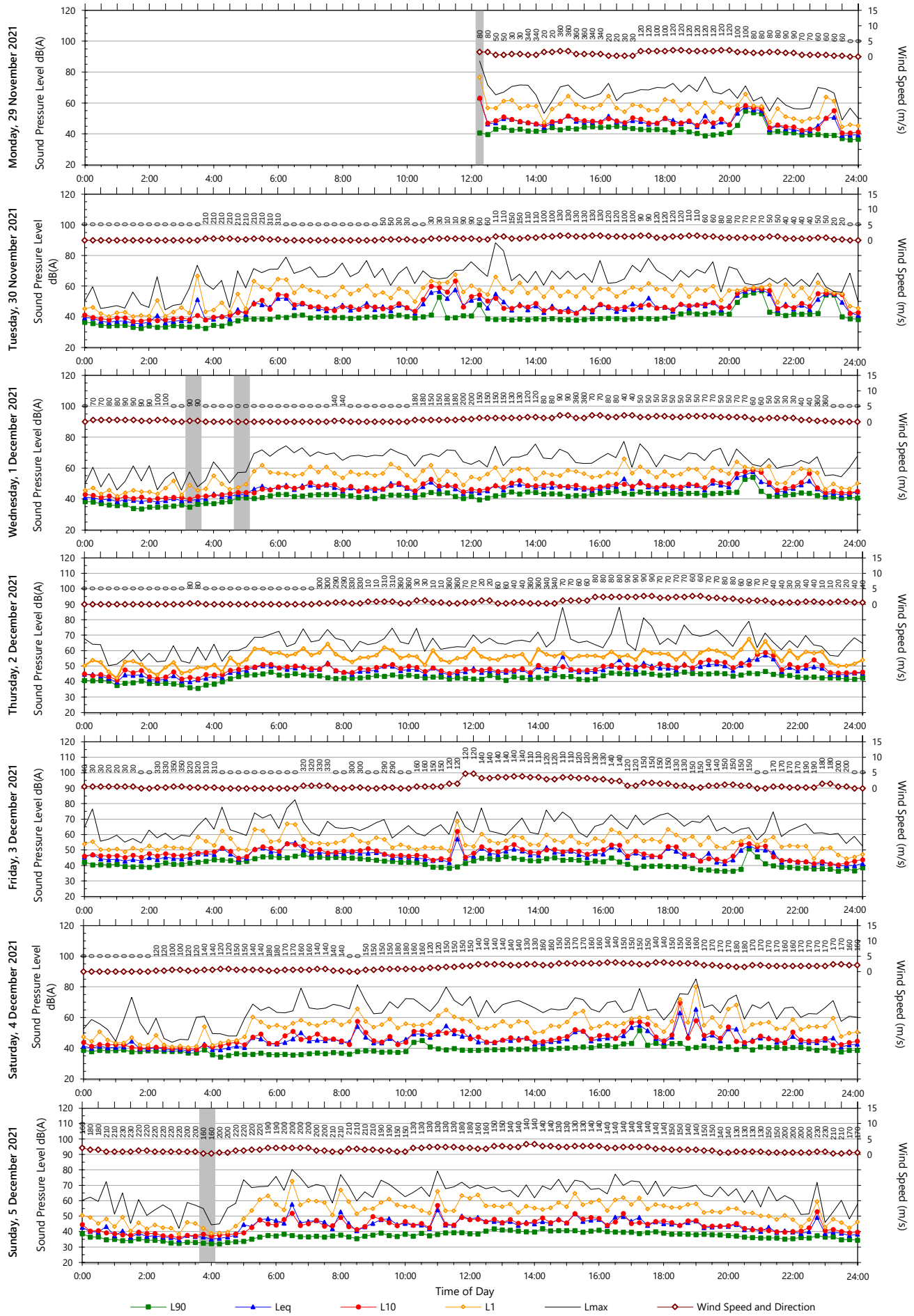
Template: QTE-26 Logger Graphs Program (r38)

Unattended Monitoring Results

Location: 8A Eggleton Street, Blacktown



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Unattended Monitoring Results

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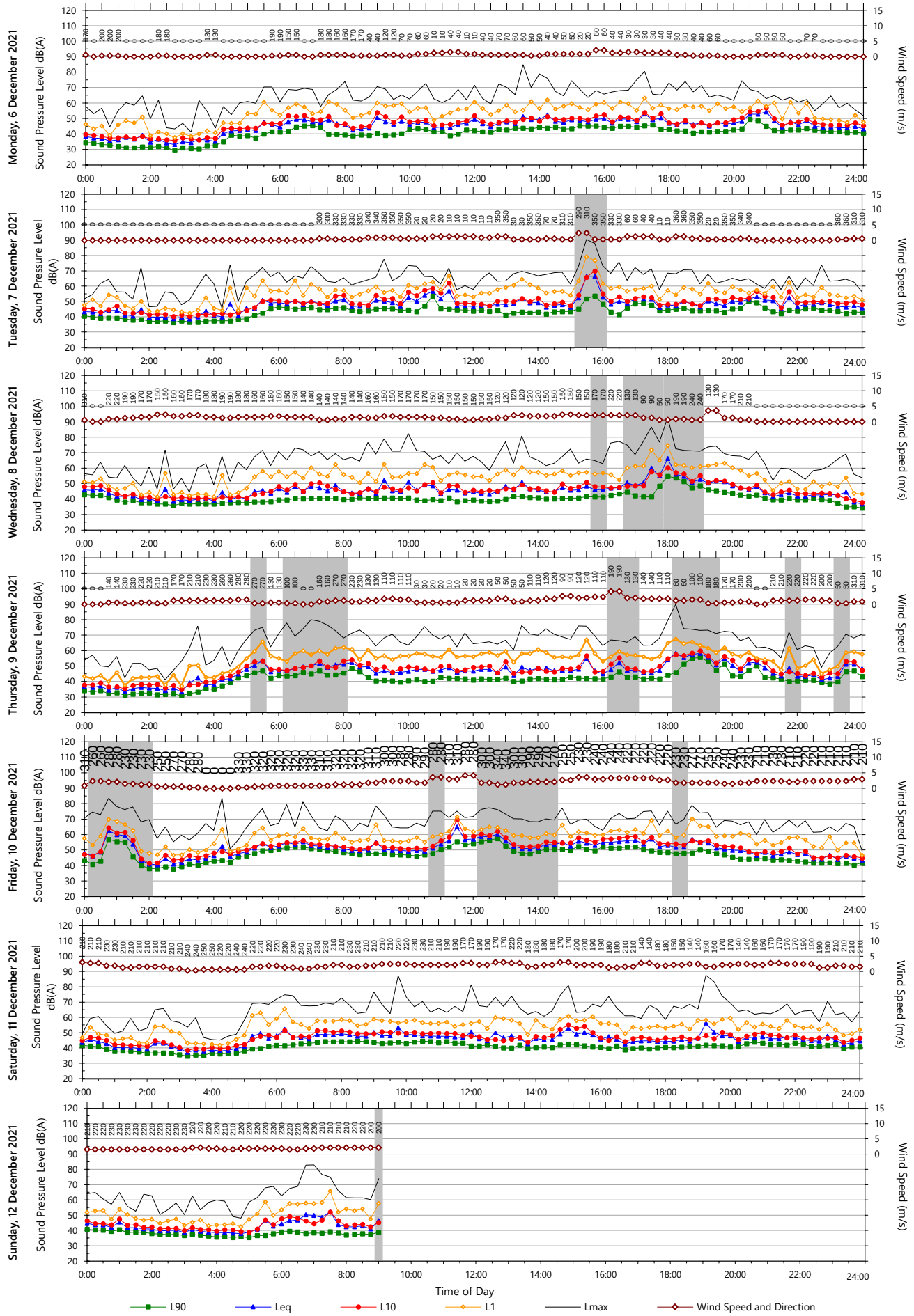

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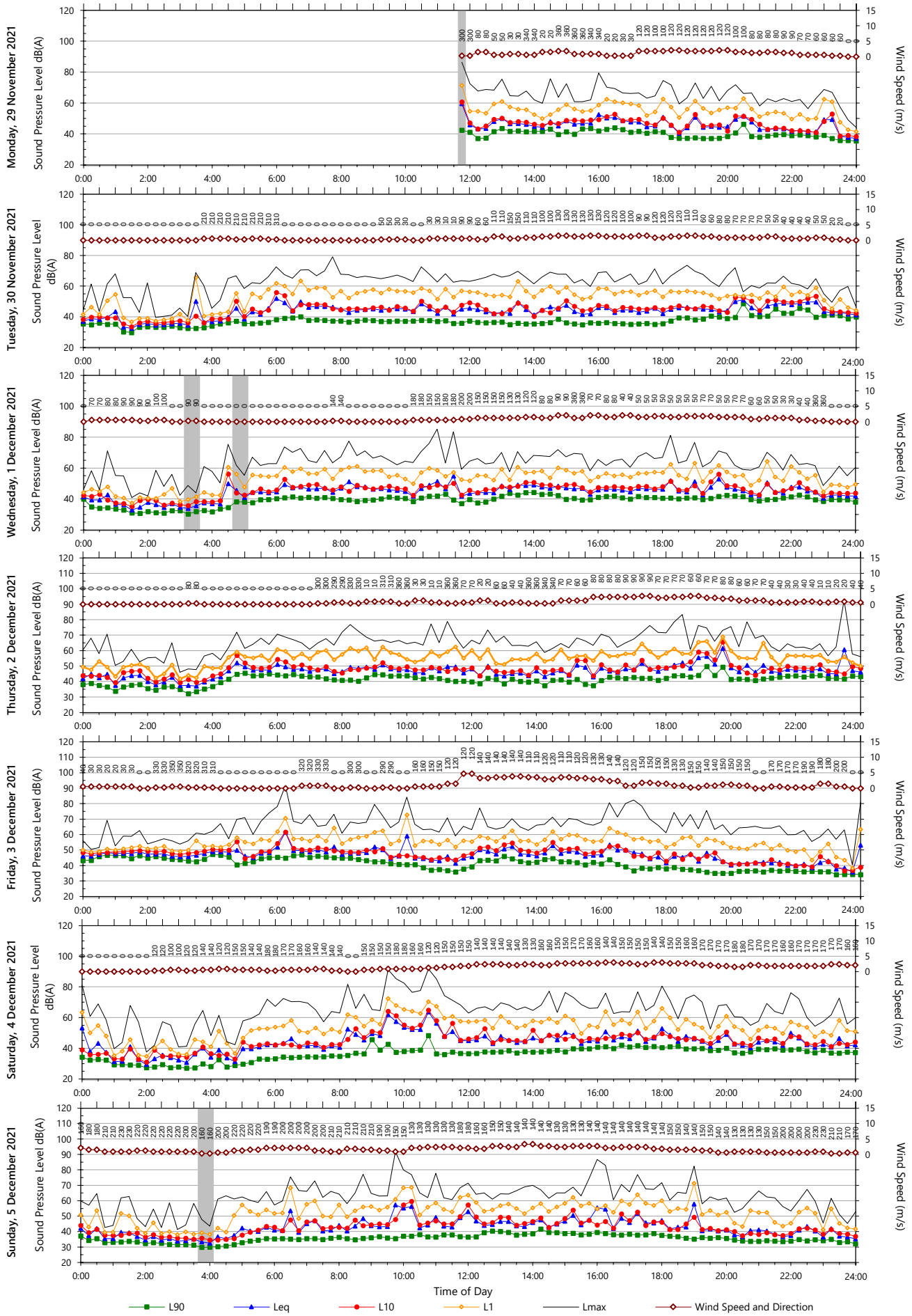
Template: QTE-26 Logger Graphs Program (r38)

Unattended Monitoring Results

Location: 22 Anthony Street, Blacktown



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Unattended Monitoring Results

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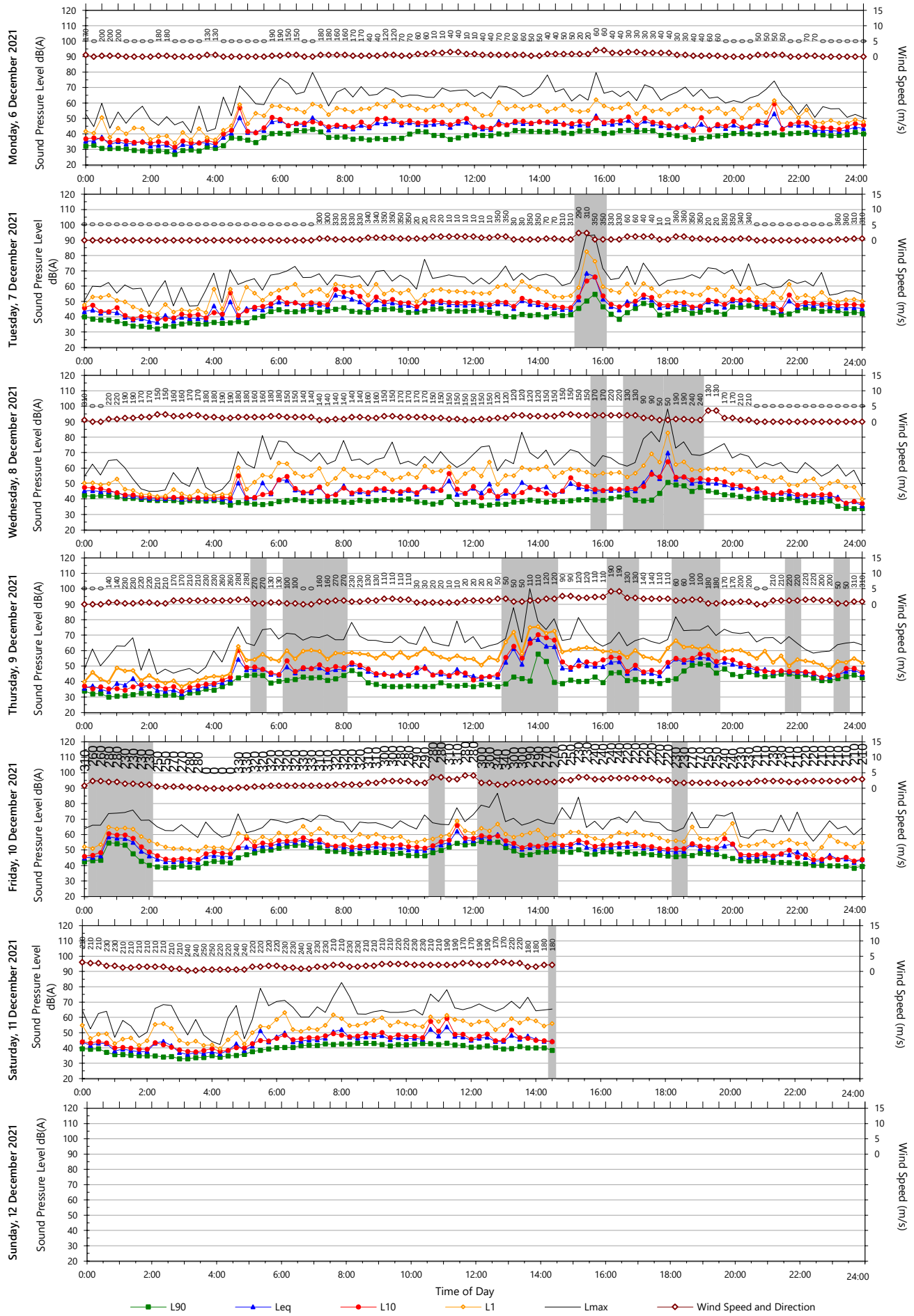

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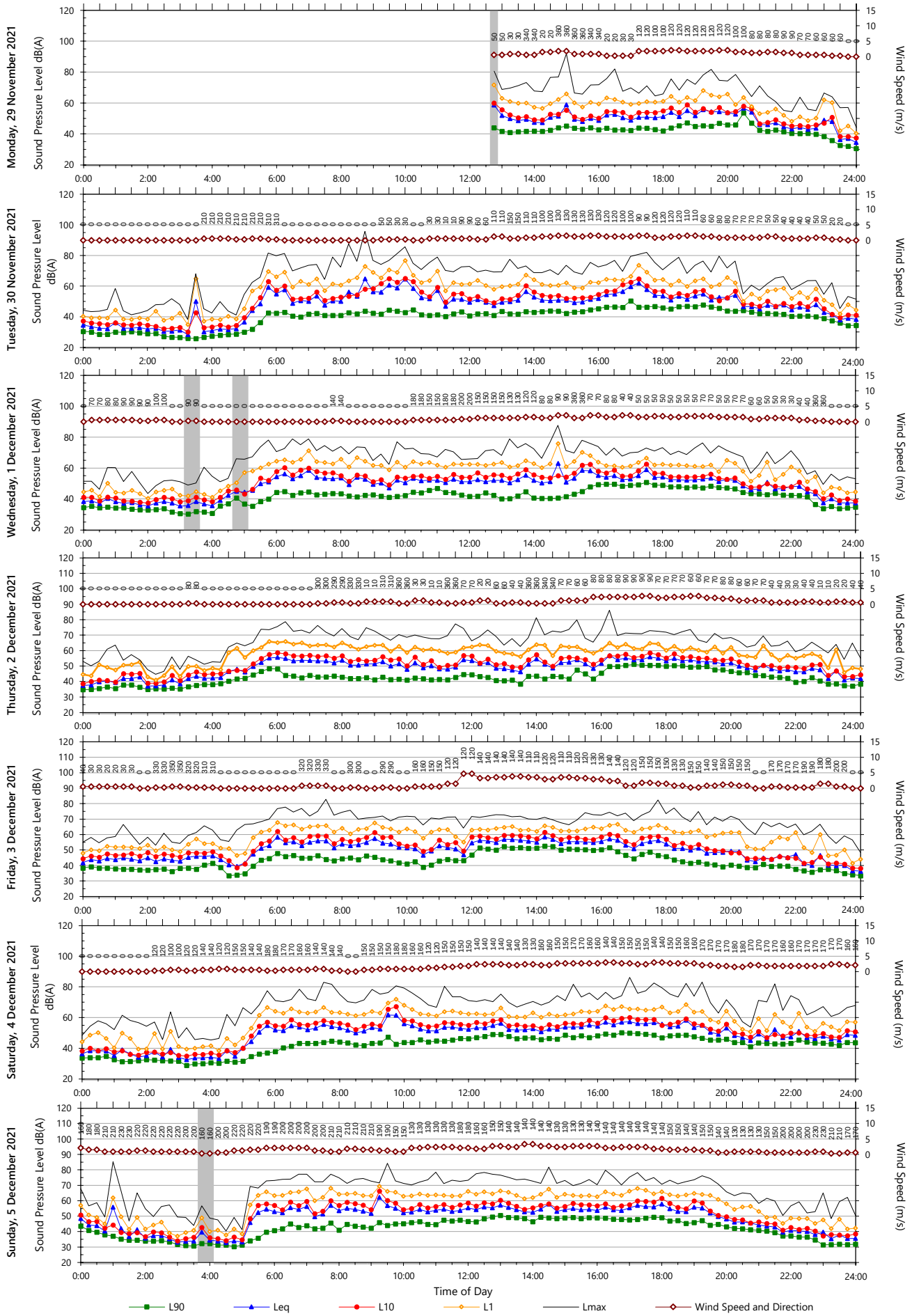
Template: QTE-26 Logger Graphs Program (r38)

Unattended Monitoring Results

Location: 54 Camorta Close, Kings Park



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Unattended Monitoring Results

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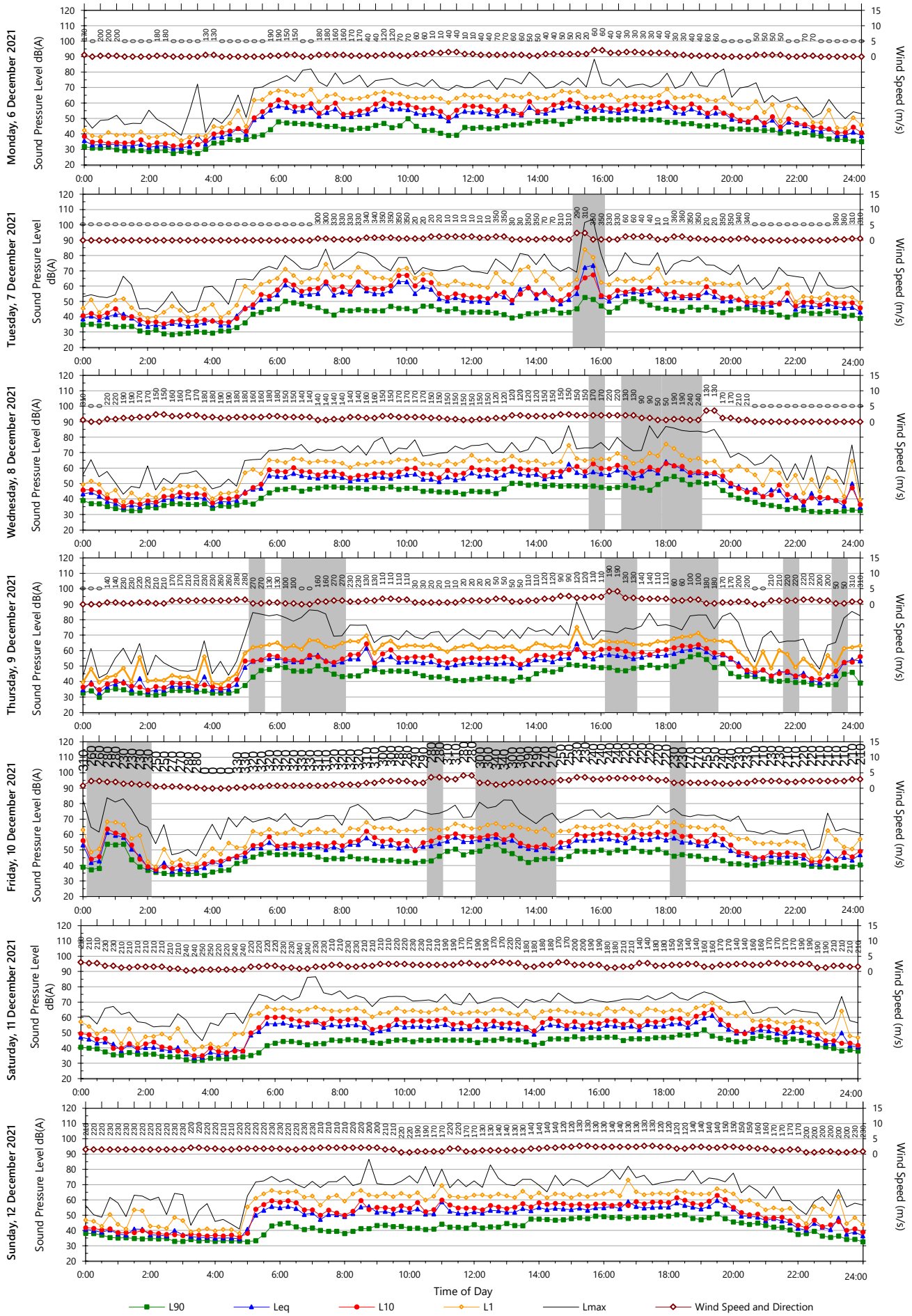

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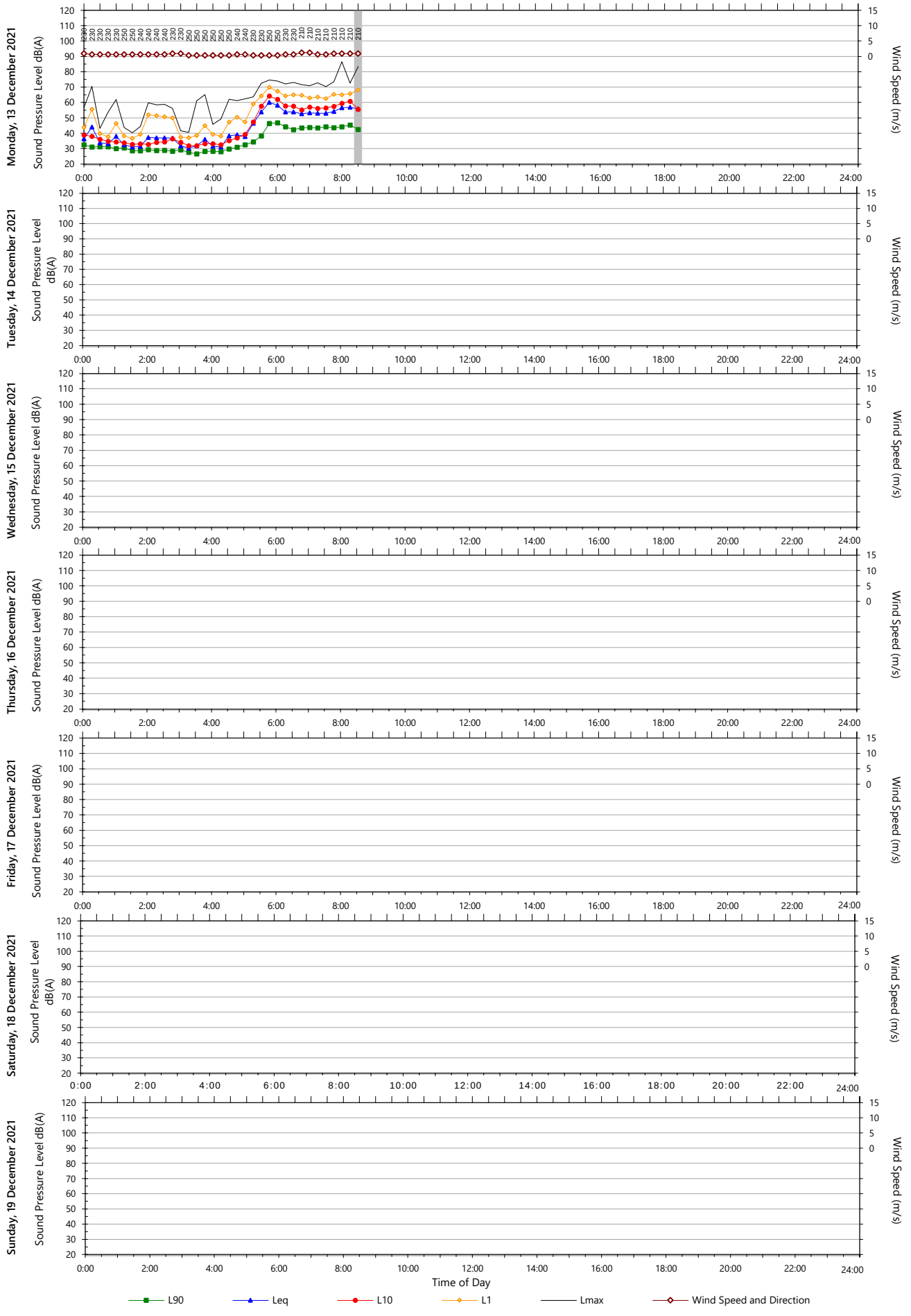
Unattended Monitoring Results

Location: 54 Camorta Close, Kings Park



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