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243 Forrester Road, North St Marys

Noise Impact Assessment

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1 INTRODUCTION

Acoustic Logic has been engaged to conduct an acoustic assessment of potential noise impacts associated with the proposed Home Co, home improvement shopping centre to be located at 243 Forrester Road, North St Marys.

This document will address noise impacts associated with the following:

- Traffic noise intrusion from the nearby busy roads to the proposed childcare within the development.
- Noise emissions associated with the use of the Childcare within the development.
- Noise emissions associated with the use of the Gym/Fitness Centre within the development.
- Noise emissions associated with the use of the shared loading dock servicing the individual retail tenancies within the development.
- Noise emission associated with traffic generation once the proposed development is operational.
- Noise emissions associated with mechanical plant servicing the development (in principle)

Acoustic Logic have utilised the following documents and regulations in assessing potential noise impacts associated with the development:

- Penrith City Council document – '*Penrith Development Control Plan (DCP) 2014*'
- Penrith City Council document – '*Penrith Local Environmental Plan (LEP) 2010*'
- NSW Environmental Protection Authority (EPA) document – '*Noise Policy for Industry (NPfI)* 2017*'*
- NSW Environmental Protection Authority (EPA) document – '*Road Noise Policy (RNP) 2011*'
- Associated of Australasian Acoustic Consultants (AAAC) document – '*Guideline for Child Care Centre Acoustic Assessment 2020*'

This assessment has been conducted based on architectural drawings provided by Buchan, dated 13th November 2020, issued for DA.

2 SITE DESCRIPTION

The proposed development is to be located at 243 Forrester Road, North St Marys.

The proposed development will be used as a home improvement shopping centre that will consist of:

- Individual restricted retail spaces
- A Gym/Fitness Centre
- A Childcare Centre and associated outdoor play area
- A pet store and veterinarian
- Medical Centre, Dentistry, Nutritionist and Physiotherapy spaces
- A shared loading dock with associated loading laneway, warehouse and ancillary spaces
- At grade car parking providing a total of 367 car park spaces.

Acoustic investigation has been carried out by this office with regard to the existing environment surrounding the proposed development, which is detailed below:

- The site currently lies within an existing light industrial (IN2) zone, as per Penrith Council LEP 2010, with surrounding industrial, recreational and commercial developments. A zoning map relevant to the proposed development is presented in Figure 1 below.
- The nearest residential receivers are multi-storey dwellings adjacent Forrester Road towards the north and north-east, along Ellsworth Drive, Tregear and Townsend Crescent, Ropes Crossing, which are approx. 500m away. Along with this, nearest multi-storey residential receivers along Boronia Road, St Marys have been considered.

The nearest sensitive receivers surrounding the project site are outlined below:

- Receiver 1 – Existing industrial developments situated west of the project site, across Forrester Road.
- Receiver 2 – St Marys Leagues Club, an existing commercial/private recreational development situated south and-east of the project site, located at the corner of Forrester Road and Boronia Road, St Marys
- Receiver 3 – Existing residential receivers situated south of the project site, located along Boronia Road, St Marys.
- Receiver 4 – Existing residential receivers situated north and north-east of the project site, located along Ellsworth Drive, Tregear and Townsend Crescent, Ropes Crossing.

A detailed site map and surrounding receiver locations are presented in Figure 2 below.

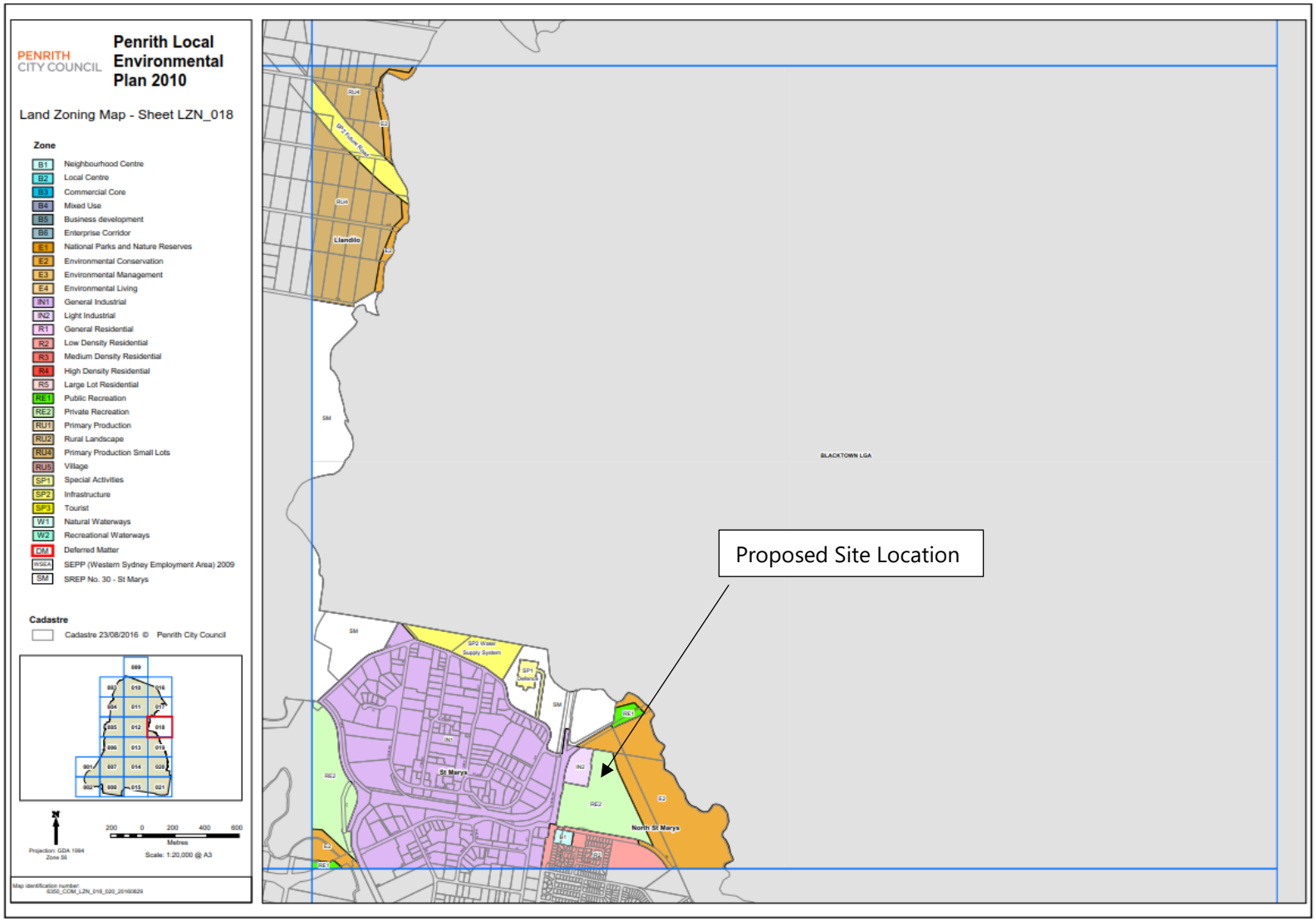
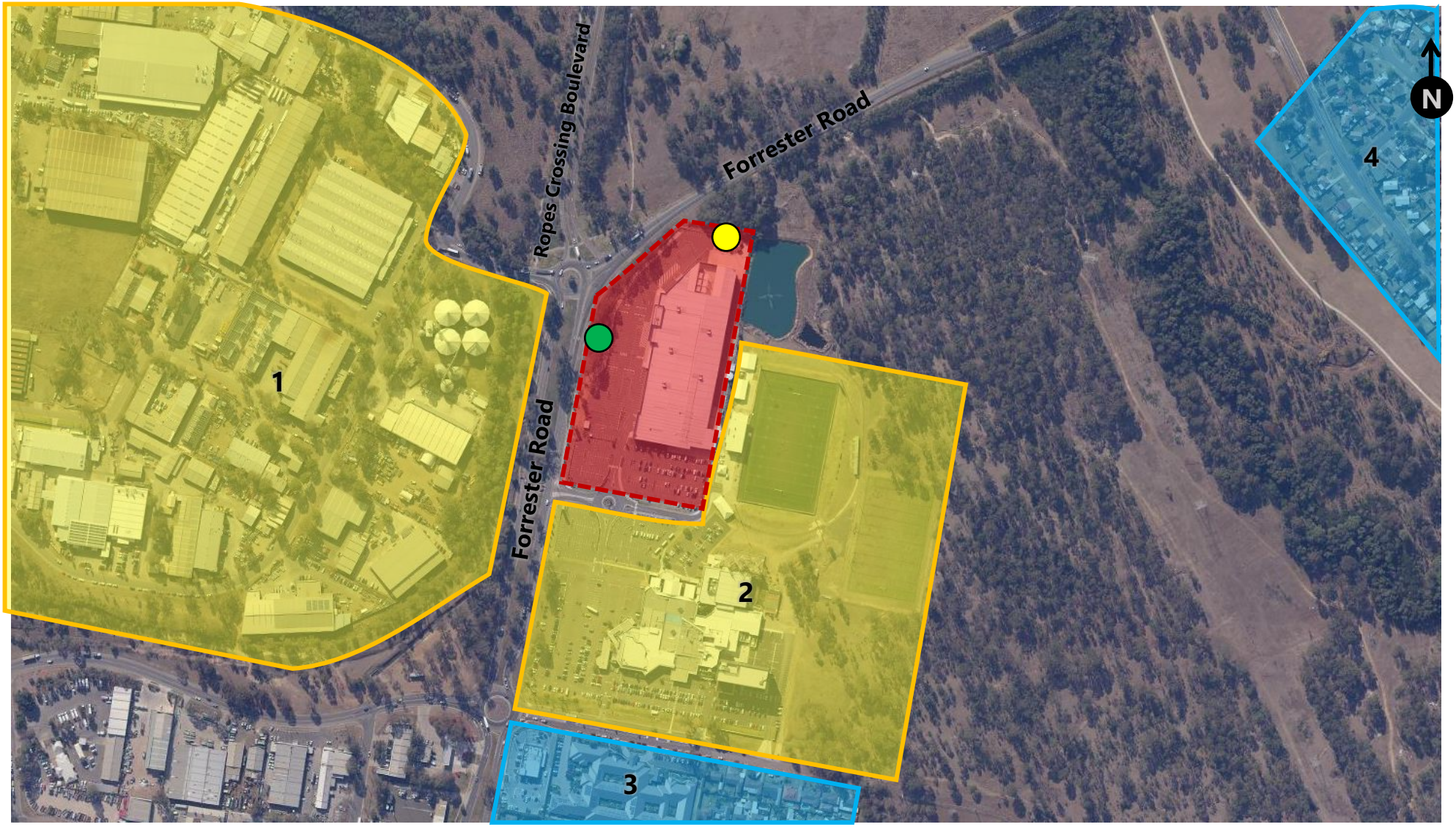


Figure 1 – Land Zoning Map for the Project Site (Penrith LEP 2010



Unattended Noise Measurement – Monitor 1

Unattended Noise Measurement – Monitor 2

Figure 2 – Aerial View of Site & Receivers
(NSW Six Maps 2020)

Project Site

Residential Receiver

Non-Residential Receiver

3 EXISTING ACOUSTIC ENVIRONMENT

3.1 ENVIRONMENTAL NOISE DESCRIPTORS

Environmental noise constantly varies in level. Accordingly, it is not possible to accurately determine prevailing environmental noise conditions by measuring a single, instantaneous noise level. To accurately determine the environmental noise, a 15-20-minute measurement interval is utilised. Over this period, noise levels are monitored on a continuous basis and statistical and integrating techniques are used to determine noise description parameters. These parameters are used to measure how much annoyance would be caused by a particular noise source.

In analysing environmental noise, three-principle measurement parameters are used, namely L_{max}, L_{90} and L_{eq}.

The L_{90} level (which is commonly referred to as the background noise level) represents the noise level heard in the quieter periods during a measurement interval. The L_{90} parameter is used to set the allowable noise level for new, potentially intrusive noise sources since the disturbance caused by the new source will depend on how audible it is above the pre-existing noise environment, particularly during quiet periods, as represented by the L_{90} level.

The L_{eq} parameter represents the average noise energy during a measurement period. This parameter is derived by integrating the noise levels measured over the 15-minute period. L_{eq} is important in the assessment of traffic noise impact as it closely corresponds with human perception of a changing noise environment; such is the character of environmental noise.

L_{max} levels represent is the loudest noise event during a measurement period.

3.2 BACKGROUND NOISE LEVELS

3.2.1 Measurement Equipment

Unattended background noise monitoring was conducted using one Acoustic Research Laboratories Pty Ltd noise logger. The logger was programmed to store 15-minute statistical noise levels throughout the monitoring period. The equipment was calibrated at the beginning and the end of each measurement using a Rion NC-73 calibrator; no significant drift was detected. All measurements were taken on A-weighted fast response mode.

3.2.2 Measurement Location & Period

Two unattended noise monitors were installed at the project site, located at 243 Forrester Road, North St Marys, as indicated in Figure 2 above. Unattended noise monitoring was conducted in two separate locations with the objective of obtaining traffic and background noise levels in separate locations within the project site. Unattended noise monitoring was conducted from Tuesday, 24th November 2020 to Wednesday, 2nd December 2020.

3.2.3 Measured Background Noise Levels

NSW EPA's RBL assessment procedure requires determination of background noise levels for each day (the ABL) then the median of the individual days as set out for the entire monitoring period.

Appendix A provides detailed results of the unattended noise monitoring from both locations. Weather affected data was excluded from the assessment. The processed Rating Background Noise Levels (lowest 10th percentile noise levels during operation time period) are presented in Table 1 below.

3.2.4 Summarised Rating Background Noise Levels

The summarised rating background noise levels for the project site are as below.

Table 1 – Summarised Rating Background Noise Level

Location	Time of Day	Rating Background Noise Level dB(A)$L_{90(Period)}$
Nearest Residential Receivers	Day (7:00am – 6:00pm)	53(1)
	Evening (6:00pm – 10:00pm)	48(1)
	Night (10:00pm – 7:00am)	38(1)

Table Notes:

1. Measured background noise levels from each monitoring location has been averaged and summarised as the total Rating Background Noise Levels (RBL) of the project site.

3.3 MEASURED TRAFFIC NOISE LEVELS

3.3.1 Measurement Equipment

Unattended traffic noise monitoring was conducted using one Acoustic Research Laboratories Pty Ltd noise logger. The logger was programmed to store 15-minute statistical noise levels throughout the monitoring period. The equipment was calibrated at the beginning and the end of each measurement using a Rion NC-73 calibrator; no significant drift was detected. All measurements were taken on A-weighted fast response mode.

3.3.2 Measurement Location & Period

Two unattended noise monitors were installed at the project site, located at 243 Forrester Road, North St Marys, as indicated in Figure 2 above. Unattended noise monitoring was conducted in two separate locations with the objective of obtaining traffic and background noise levels in individual locations. Unattended noise monitoring was conducted from Tuesday, 24th November 2020 to Wednesday, 2nd December 2020.

3.3.3 Measured Traffic Noise Levels

Table 2 – Measured Traffic Noise Levels

Location	Period	Measured Noise Level dB(A)$L_{eq(Period)}$	
243 Forrester Road, North St Marys @ 18m from road kerb (180° view of Forrester Road, partial views of Links Road and Ropes Crossing Boulevard)	Day (7:00am – 10:00pm)	63 dB(A)$L_{eq(15hr)}$	65 dB(A)$L_{eq(1hr)}$
	Night (10:00pm – 7:00am)	59 dB(A)$L_{eq(9hr)}$	65 dB(A)$L_{eq(1hr)}$

4 NOISE EMISSIONS ASSESSMENT

4.1 NOISE EMISSION CRITERIA

4.1.1 Penrith City Council document – *'Penrith Development Control Plan (DCP) 2014'*

Part C12 (Noise and Vibration) states the following controls regarding noise emissions from industrial/commercial development:

1) General

a) Council will not grant consent to any noise generating industrial development, commercial development or licensed premises unless it can be demonstrated that:

i) The development complies with the relevant State Government authority or agency standards and guidelines for noise, as well as any relevant Australian Standards;

ii) The development is not intrusive (as defined in the EPA's Industrial Noise Policy);

iii) Road traffic noise generated by the development complies with the provisions of Section 12.1 Road Traffic Noise of this Section;

iv) The development complies with rail noise and vibration criteria (refer Section 12.2 Rail Traffic Noise and Vibration of this Section); and

v) The development does not adversely impact on the amenity of the area or cause sleep disturbance.

Noise Impact Statements - specific requirements

a) All development applications where the above controls are relevant are required to provide a Noise Impact Statement prepared by a qualified acoustic consultant in accordance with the requirements set out in the DA Submission Requirements Appendix of this DCP.

b) The Noise Impact Statement should demonstrate acoustic protection measures necessary to achieve an indoor environment meeting residential standards, in accordance with relevant noise criteria, as well as relevant Australian Standards.

NOTE: Council considers all forms of recreation facilities, as commercial development. Any applications for these land uses would be subject to the above provisions.

4.1.2 NSW Environmental Protection Authority (EPA) document- *'Noise Policy for Industry (NPfI) 2017'*

The NPfI provides guidelines for assessing noise impacts from developments. The recommended assessment objectives vary depending on the potentially affected receivers, the time of day, and the type of noise source. The NPfI has two requirements which both have to be complied with, namely an amenity criterion and an intrusiveness criterion.

4.1.2.1 Intrusiveness Criterion

The intrusiveness criterion is intended to limit the audibility of noise emissions at **residential receivers** and requires that noise emissions measured using the L_{eq} descriptor not exceed the background noise level by more than 5 dB(A).

Table 3 – NSW EPA NPfI Intrusiveness Criteria

Receiver	Time of Day	Background Noise Level dB(A)$L_{90(period)}$	Intrusiveness Criteria (Background + 5 dB(A)$L_{eq15\text{-}min}$)
Residential Receivers	Day (7am – 6pm)	53	58
	Evening (6pm – 10pm)	48	53
	Night (10pm – 7am)	38	43

4.1.2.2 Amenity Criterion

The guideline is intended to limit the absolute noise level from all noise sources to a level that is consistent with the general environment.

The Noise Policy for Industry set outs acceptable noise levels for various land uses. Table 2.2 on page 11 of the policy has four categories to distinguish different residential areas. They are rural, suburban, urban and urban/industrial interface.

The NPfI requires project amenity noise levels to be calculated in the following manner:

$$L_{Aeq,\ 15min} = \textit{Recommended Amenity Noise Level} - 5\ dB(A) + 3\ dB(A)$$

For the purposes of a conservative assessment, this office will assess noise emissions to residential receivers in accordance with the 'Suburban' category.

Table 4 – NSW EPA NPfI Project Amenity Criteria

Type of Receiver	Time of Day	Project Amenity Noise Level dB(A)$L_{eq(15\text{-}min)}$
Residential (Suburban)	Day (7:00am – 6:00pm)	53
	Evening (6:00pm – 10:00pm)	43
	Night (10:00pm – 7:00am)	38
Industrial	When in Use	68
Commercial	When in Use	63
Active Recreation Area (St Marys Leagues Stadium)	When in Use	53
Areas specifically reserved for passive recreation	When in Use	48

4.1.2.3 Maximum Noise Level Event Assessment (Sleep Disturbance)

The *NPfI* recommends the following noise limits to mitigate sleep disturbance:

> *Where the subject development/premises night time noise levels at a residential location exceed:*
>
> - *$L_{Aeq,\ 15min}$ 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, and/or*
> - *L_{AFmax} 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater,*
>
> *A detailed maximum noise level event assessment should be undertaken.*

The following sleep emergence noise objectives then apply:

Table 5 – Sleep Disturbance Criteria for Residential Receivers

Receiver	Rating Background Noise Level dB(A)L_{90}	Emergence Level
Residential Receivers (R3)	38	43 dB(A)$L_{eq,\ 15min}$ 53 dB(A)L_{Fmax}

If noise events exceed the emergence levels detailed in the table above, then a detailed assessment is required to be carried out, considering the level and frequency of noise events during the night, existing noise sources, etc. This more detailed sleep arousal test is conducted using the guidelines in the NSW EPA's *Road Noise Policy*. Most relevantly, the *RNP* states:

> *For research on sleep disturbance to date it can be concluded that:*
>
> - *Maximum internal noise levels below 50-55dB(A) are unlikely to awaken people from sleep.*
> - *One or two noise events per night with maximum internal noise levels of 65-70 dB(A) are not likely to affect health and wellbeing significantly.*

4.1.3 NSW Environmental Protection Authority (EPA) document – '*Road Noise Policy 2011*'

4.1.3.1 Noise from Increased Traffic Generation on Public Streets

Penrith City Council do not have any specific acoustic/noise criteria with respect to traffic generation associated with the development, thus the EPA guideline will be adopted for assistance.

For land use developments with the potential to create additional traffic, the development should comply with the requirements detailed in the EPA *Road Noise Policy* criteria in the table below. This has been applied to assess the future potential acoustic impacts of increased traffic that will result from the development once it is operational.

Table 6 – Criteria for Increased Traffic Generation from the Development

Time of Day	Criteria for Acceptable Traffic Noise Level (Sub-arterial Roads) – dB(A)
Day (7:00am – 10:00pm)	60 dB(A)$L_{eq(15hr)}$
Night (10:00pm – 7:00am)	55 dB(A)$L_{eq(9hr)}$

Given the moderate traffic volumes on Forrester Road, it would be appropriate to consider the surrounding roadways of the project site as sub-arterial roads. Traffic noise levels along Forrester Road currently exceed the acceptable noise levels presented in the table above. However, the provisions outlined in Section 3.4 of the policy will apply, which state the following:

> *"If practicable, noise on public roads as a result of increased traffic generation should not result in an increase in traffic noise level of more than 2dB(A). In this regard, the Policy relevantly states "an increase of up to 2 dB represents a minor impact that is considered barely perceptible to the average person."*

4.1.4 Summarised Noise Emission Criteria

A summary for noise emission criteria for all operational noise associated with the development has been summarised below:

Table 7 – Summarised Noise Emission Criteria

Receiver	Time of Day	Background Noise Level dB(A)$L_{90(Period)}$	Intrusiveness Criteria (Background + 5 dB(A)$L_{eq(15\text{-}min)}$	Project Amenity Criteria dB(A)$L_{eq(15\text{-}min)}$	Sleep Emergence Level
Residential Receivers	Day (7:00am – 6:00pm)	53	58	53	-
	Evening (6:00pm – 10:00pm	48	53	43	-
	Night (10:00pm – 7:00am)	38	43	38	43 dB(A)$L_{eq,\ 15min}$ 53 dB(A)L_{Fmax}
Commercial Receivers	When in Use	-	-	63	-
Industrial Receivers	When in Use	-	-	68	-
Active Recreation Area (St Marys Leagues Stadium)	When in Use	-	-	53	-
Areas specifically reserved for passive recreation	When in Use	-	-	48	-

Table 8 – Criteria for Noise from Increased Traffic Generation

Time of Day	Existing Traffic Noise Level	Acceptable Increased Traffic Noise Level
Day (7:00am – 6:00pm)	63 dB(A)$L_{eq(15hr)}$	65 dB(A)$L_{eq(15hr)}$
Night (6:00pm – 10:00pm_	59 dB(A)$L_{eq(9hr)}$	61 dB(A)$L_{eq(9hr)}$

4.2 ASSESSMENT OF NOISE EMISSIONS

Operational noise from the proposed use of the development must comply with the requirements of the NSW EPA's *Noise Policy for Industry*, the criteria for which has been detailed in Section 4.1.4 above. The primary noise sources expected to be emitted from the use of the development are as follows:

- Operational noise from the gym/fitness centre
- Vehicular noise on site from the use of the proposed car park.
- Noise generated from the use of the proposed shared loading dock
- Noise generated on public roads as a result of traffic generated by the site
- Noise generated from the use of mechanical plant servicing the development (in principle).

The *NPfI* requires that noise levels are assessed at the closest façade of a habitable space, e.g. a bedroom or living area. This assessment will cover the following activities:

- Average noise events (noise from vehicle manoeuvring, mechanical plant, operational noise of tenancies, etc) and;
- Intermittent peak noise events (slamming/closing of a vehicle door, idling of a vehicle, truck reverse beacon, etc.) and their potential on sleep disturbance.

The predicted noise levels from operation at peak times are presented in the following sections. Predicted noise levels factor in losses due to distance attenuation, barrier effects and transmission losses through the building structure where applicable. Forecasted noise levels have been calculated upon the assumption that the recommendations outlined in Section 6 of this report have been implemented.

4.2.1 Assessment of Operational Noise from the Gym/Fitness Centre

Operational noise levels from the proposed gym/fitness facility have been predicted and assessed against the relevant noise criteria, detailed in Section 4.1.4. This assessment has been conducted with reference to night-time noise goals (most stringent) as operating hours of the gym is yet to be determined.

Noise emission from the use of the gym/fitness centre have been predicted based on an internal noise level of 85 dB(A)L_{eq} from the gym, inclusive of patron noise and amplified music, which presents a suitably conservative assessment.

Table 9 – Predicted Noise Levels from Gym/Fitness Centre to Residential Receivers (R3)

Receiver	Predicted Noise Level dB(A)L_{eq}	Noise Emission Objective dB(A)L_{eq}	Comment
R4 Residential Receivers North-east of Site	<25	$\leq$ 38 **Night** **(10:00pm – 7:00am)** 43 dB(A)$L_{eq,\ 15min}$ 53 dB(A)L_{Fmax} **(Sleep Disturbance)**	Complies with the dominating noise emission objectives.

Table 10 – Predicted Noise Levels from Gym/Fitness Centre to Non-Residential Receivers (R1)

Receiver	Predicted Noise Level dB(A)L_{eq}	Noise Emission Objective dB(A)L_{eq}	Comment
R2 Non-residential Receivers East of Site	<25	53 **Active Recreation Area (St Marys Leagues Stadium)**	Complies with the dominating noise emission objectives.

4.2.2 Assessment of Noise from Carpark

Operational noise levels from the use of the carpark have been predicted and assessed against the relevant noise criteria, detailed in Section 4.1.4. This assessment has been conducted with reference to night-time noise goals (most stringent).

This assessment will include a review of both average (L_{eq}) and maximum/sleep disturbance (L_{max}) criteria.

Noise emissions from the proposed car park at peak/worst-case usage is based on the following assumptions:

- Given a detailed traffic report is yet to be determined, peak traffic movements have been assumed based on the car-park capacity as defined in the architectural drawings.
    - For peak period usage, it has been assumed that there will be 158 inbound movements and 209 outbound movements within the proposed carpark from private/light vehicles.
    - During a typical 15-minute period during peak time usage, we have assumed up to 39 in bound and 52 outbound movements from the carpark, which presents an accurate and conservative assumption.
- Peak noise events from carpark (such as vehicle door closing) have been assumed to occur at the boundary of the carpark.
- A sound power level of 95 dB(A)L_{max} has been adopted for a vehicle door closing/slamming.
- A sound power level of 84 dB(A) has been adopted for typical private motor vehicles.

4.2.2.1 Predicted Average (L_{eq}) Carpark Noise Emissions

Table 11 – Predicted Noise Levels from Carpark to Residential Receivers (Average/L_{eq} Noise Emissions)

Receiver	Predicted Noise Level dB(A)L_{eq}	Noise Emission Objective dB(A)L_{eq}	Comment
R3 Residential Receivers South of the site	33	≤ 38 **Night** **(10:00pm – 7:00am)**	Complies with the dominating noise emission objectives.
R4 Residential Receivers North/North-east of the site	30		

Table 12 – Predicted Noise Levels from Carpark to Non-Residential Receivers (Average/L_{eq} Noise Emissions)

Receiver	Predicted Noise Level dB(A)L_{eq}	Noise Emission Objective dB(A)L_{eq}	Comment
R1 Industrial Receivers West of the site	38	68 **Industrial Receivers**	Complies with the dominating noise emission objectives.
R2 Commercial Receivers South of the site	42	63 **Commercial Receivers**	

4.2.2.2 Predicted Peak (L_{Max}) Carpark Noise Emissions for Sleep Disturbance

Table 13 – Predicted Noise Levels from Carpark to Residential Receivers (Average/L_{eq} Noise Emissions)

Receiver	Predicted Noise Level dB(A)L_{Max}	Noise Emission Objective dB(A)L_{eq}	Comment
R3 Residential Receivers South of the site	39	43 dB(A)$L_{eq,\ 15min}$ 53 dB(A)L_{Fmax} **(Sleep Disturbance)**	Complies with the dominating noise emission objectives.
R4 Residential Receivers North/North-east of the site	35		

4.2.3 Assessment of Shared Loading Dock

Operational noise levels from the use of the shared loading dock have been predicted and assessed against the relevant noise criteria, detailed in Section 4.1.4. This assessment has been conducted with reference to night-time noise goals (most stringent).

This assessment will include a review of both average (L_{eq}) and maximum/sleep disturbance (L_{max}) criteria.

Noise emissions from the proposed loading dock at peak/worst-case usage is based on the following assumptions:

- For peak hour period usage, it has been assumed that there will be 5 inbound movements and 5 outbound movements within the loading dock from medium-rigid trucks.
    - During a typical 15-minute period during peak time usage, we have assumed up to 5 inbound and outbound movements from the carpark, which presents an accurate and conservative assumption.
- Peak noise events from the loading (such as vehicle door closing, truck airbrake) have been assumed to occur at the boundary of the loading dock
- A sound power level of 100 dB(A) has been adopted for engine noise from articulated truck manoeuvring
- A sound power level of 110 dB(A) has been adopted for a truck airbrake, inclusive of a +5dB(A) penalty for tonality.

4.2.3.1 Predicted Average (L_{eq}) Loading Dock Noise Emissions

Table 14 – Predicted Average Noise Levels from Loading Dock to Residential Receivers

Receiver	Predicted Noise Level dB(A)L_{eq}	Noise Emission Objective dB(A)L_{eq}	Comment
R3 Residential Receivers South of the site	34	≤ 38 **Night** **(10:00pm – 7:00am)** 43 dB(A)$L_{eq,\ 15min}$ 53 dB(A)L_{Fmax} **(Sleep Disturbance)**	Complies with the dominating noise emission objectives.
R4 Residential Receivers North/North-east of the site	<20		

Table 15 – Predicted Average Noise Levels from Loading Dock to Non-Residential Receivers

Receiver	Predicted Noise Level dB(A)L_{eq}	Noise Emission Objective dB(A)L_{eq}	Comment
R2 Non-residential Receivers East of Site	52	53 **Active Recreation Area** **(St Marys Leagues Stadium)**	Complies with the dominating noise emission objectives.

4.2.3.2 Predicted Peak (L_{Max}) Loading Dock Noise Emissions

Table 16 – Predicted Peak Noise Levels from Loading Dock to Residential Receivers

Receiver	Predicted Noise Level dB(A)L_{Max}	Noise Emission Objective dB(A)L_{eq}	Comment
R3 Residential Receivers South of the site	53	43 dB(A)$L_{eq, 15min}$ 53 dB(A)L_{Fmax} **(Sleep Disturbance)**	Complies with the dominating noise emission objectives
R4 Residential Receivers North/North-east of the site	50		

4.2.4 Noise Generated by Additional Traffic on Public Roads

Traffic generation from the proposed development have been based on information provided by the client. The existing and proposed traffic movements for a Friday afternoon peak hour on roads surrounding the project site are detailed in Appendix B.

With consideration to Appendix B and compliance with the criteria of the NSW EPA *Road Noise Policy*, we provide the following commentary:

- Forrester Road currently exceeds the respective noise requirement of sub-arterial roads of the *RNP*, as detailed in Table 8.
- The *RNP* notes that an increase of less than 2 dB(A) is a minor impact and would be barely perceptible to the average person.
- Predicted increases in road traffic during a Friday afternoon peak hour would be expected to be up to 2dB(A) along Forrester Road, which represents that traffic noise levels once the proposed development is operational would represent a minor impact to the existing traffic noise levels surrounding the site.

4.2.5 Noise Emissions from Mechanical Plant

An indicative assessment of mechanical plant that would typically service a development of this nature has been conducted and we provide the following commentary:

- Major fans/mechanical plant items that would typically emit high noise levels (such as kitchen exhaust, major toilet exhaust and major relief air fans) will typically require acoustic treatment if located externally. This may not be required when specific to this project given the location of sensitive noise receivers. Whenever possible for major fans, it is recommended that axial (as opposed to roof mounted fans) are to be used as this will enable acoustic treatment to be incorporated within ductwork running to atmosphere.
- Location of major plant items will need to be carefully considered and we recommend that items such as these be located as far as practically possible from adjacent noise sensitive receivers. Noise screening (using either a dedicated noise screen or the building shell between plant items and noise sensitive receivers) may be required.

- Refrigeration equipment are typical mechanical plant items used in developments such as this project, and the commentary outlined in the above dot points should be taken into consideration when locating these plant items.

- To ensure compliance with the NSW EPA's *NPfI* requirements (as outlined in section 4.1), an additional acoustic review is recommended following final plant selection and review of operational speeds during specific periods of day.

- A cumulative assessment of both plant noise with other operational noise sources is recommended when conducting the acoustic design of such plant items. This is particularly important for plant noise near the property boundaries, adjacent to any noise sensitive receivers, where cumulative assessment with plant/vehicle noise to be considered.

Compliance with the NSW EPA's *NPfI*, as per Section 4.1., will be achievable, provided that a detailed acoustic review of specific plant items is undertaken once plant is selected, and acoustic treatments similar to those outlined above are adopted.

5 CHILDCARE CENTRE ASSESSMENT

5.1 TRAFFIC NOISE INTRUSION

Site investigation and measured noise levels indicate that the major external noise sources around the project site is traffic noise from Forrester Road, as well as industrial noise sources adjacent to the project site, across Forrester Road (indicated in Figure 2). Noise intrusion from these sources have been considered and assessed in accordance with criteria nominated in Section 4.1.1

5.1.1 Traffic Noise Intrusion Criteria

5.1.1.1 Penrith City Council document – '*Penrith Development Control Plan (DCP) 2014*'

Part D5 (Other Land Uses) states the following regarding noise intrusion relevant to childcare centres.

> c) Where a site may be affected by traffic, rail or aircraft noise, the child care centre shall be designed to minimise any impact on the children and staff. A report from an acoustic consultant may be required to support the proposal. (Design elements may include double glazing, insulated walls, locating sleeping rooms in protected areas and solid fencing).

5.1.1.2 Associated of Australasian Acoustic Consultants (AAAC) document – '*Guideline for Child Care Centre Acoustic Assessment 2020*'

The AAAC Technical Guideline specifies the following in relation to traffic noise intrusion:

- The $L_{Aeq,\ 1hr}$ noise level from road traffic, rail or industry at any location within the outdoor play or activity area during the hours when the Centre is operating should not exceed 55 dB(A).
- The $L_{Aeq,\ 1hr}$ noise level from road traffic, rail or industry at any location within the indoor activity or sleeping areas of the Centre during the hours when the centre is operating shall be capable (i.e. with windows and/or windows closed) of achieving 40 dB(A) within indoor activity areas and 35 dB(A) in sleeping areas.

5.1.1.3 NSW Environmental Protection Authority document – '*Road Noise Policy (RNP) 2011*'

The NSW EPA's *RNP* states that childcares being affected by development or existing roads shall be designed to the requirements of Table 4 on page 12 of the policy. The design criteria of page 4 from the policy is summarised below.

Table 17 – NSW EPA RNP Design Criteria

Existing Sensitive Land Use	Assessment Criteria – dB(A)	Additional Considerations
	Day (7am – 10pm)	
Childcare Facilities	Sleeping Rooms (Internal) 35 dB(A)$L_{Aeq(1\ hour)}$	Multi-purpose spaces, e.g. shared indoor play/sleeping rooms should meet the lower of the respective criteria. Measurements for sleeping rooms should be taken during designated sleeping times for the facility, or if these are not known, during the highest hour traffic noise level during the opening hours of the facility.
	Indoor Play Areas 40 dB(A)$L_{Aeq(1hour)}$	
	Outdoor Play Areas (External) 55 dB(A)$L_{Aeq(1hour)}$	

5.1.1.4 Australian and New Zealand AS/NZS 2107:2016 '*Recommended Design Sound Levels and Reverberation Times for Building Interiors*'

Australian and New Zealand AS/NZS 2107:2016 '*Recommended Design Sound Levels and Reverberation Times for Building Interiors*' specify allowable internal noise levels for internal spaces within buildings of difference occupancies. The following table gives the range of internal noise level as detailed in Table 1 of Section 5 of AZ/NZS 2107-2016.

Table 18 – AS/NZS 2107:2016 Recommended Design Sound Levels

Building Type	Type of Occupancy/Activity	Design Sound Level dB(A)L_{eq}
Educational	Childcare Internal Areas	45

5.1.1.5 Summarised Noise Intrusion Criteria

The governing project criteria is presented in the table below.

Table 19 – Summarised Noise Intrusion Criteria

Space	Time of Day	Noise Level Criteria
Sleeping Areas	Day 7:00am – 6:00pm	35 dB(A)$L_{Aeq,\ (1hr)}$ (AAAC/RNP)
Indoor Play Areas		40 dB(A)$L_{Aeq,\ (1hr)}$ (AAAC/RNP)
Outdoor Play or Activity Areas		55 dB(A)$L_{Aeq,\ (1hr)}$ (External) (AAAC/RNP)
Staff Common Rooms, Office Areas and Reception		45 dB(A)L_{Aeq} (AS 2107)

5.2 NOISE INTRUSION ANALYSIS

Traffic and industrial noise intrusion into the proposed childcare centre within the development was assessed using measured traffic noise levels and CORTN noise model predictions. Calculations were undertaken taking into account the orientation of windows, barrier effects (if applicable), the total area of glazing, façade transmission loss and room sound absorption characteristics. In this way, the likely interior noise levels can be predicted. The recommended constructions to achieve the required internal noise levels are outlined in the following sections.

5.2.1 Recommended Constructions

5.2.1.1 Recommended Glazing

As general layouts and detailed glazed areas of the proposed childcare centre are yet to be determined, indicative recommended glazing constructions have been addressed in the table below. All installed systems should contain full acoustic seals (mohair is unacceptable) and must achieve a R_w rating equal or better than proposed. All R_w ratings specified are glazing in frame.

Table 20 – Recommended Glazing Construction

Indicative Spaces	Glazing Area	Recommended Construction	Acoustic Seals
Indoor Sleeping Areas	>15m^2	10mm float/12mm airgap/10mm float	Yes
	<15m^2	10.38mm laminate	Yes
Indoor Play Areas	<15m^2	6.38mm laminate	Yes
	>15m^2	10mm float	Yes
Other Ancillary Spaces (Staff Rooms, Office Spaces, Reception	-	6mm float	Yes

In addition to complying with the minimum schedule glazing thickness, the R_w rating of the glazing fitted into operable frames and fixed into the building opening should not be lower than the values listed in Table 7 in all areas. Where nominated, this will require the use of acoustic seals around the full perimeter of operable frames and the frame will need to be sealed into the building opening using a flexible sealant. Note that mohair seals in windows and doors are **not** acceptable where acoustic seals are required. The proposed suppliers should provide evidence that the window systems proposed have been tested in a registered laboratory with the recommended glazing thickness and comply with the minimum R_w requirements listed in Table 7, and that they will be constructed and installed in a manner equal to the test samples.

Table 21 – Minimum R_w of Glazing

Glazing Assembly	Minimum R_w of Installed Window	Acoustic Seals
6mm float	29	Yes
6.38mm laminate	31	Yes
10mm float	33	Yes
10.38mm laminate	35	Yes

5.2.1.2 External Roof/Ceiling Construction

If the proposed external roof construction is comprised of concrete or masonry construction, no further acoustic treatment will be required.

In the event that the proposed external construction is comprised of light-weight materials (such as sheet metal, etc), a further acoustic review will need to be undertaken to ensure that noise intrusion from the surrounding environmental noise will not significantly impact the internal levels of the proposed spaces.

5.2.1.3 External Wall Construction

If the proposed external wall construction is comprised of concrete or masonry construction, no further acoustic treatment will be required.

In the event that the proposed external construction is comprised of light-weight materials (such as fibre-cement cladding, sheet metal, etc), a further acoustic review will need to be undertaken to ensure that noise intrusion from the surrounding environmental noise will not significantly impact the internal levels of the proposed spaces.

5.2.1.4 Outdoor Play Area Recommendations

In order to satisfy the requirements of the AAAC in regard to noise levels in external play areas, the following acoustic treatment is recommended to be implemented.

- A minimum 1.5m high solid barrier is required to be installed at the northern, western and eastern perimeters of the outdoor play area, as indicated in Figure 3 below.
- The fence is to be constructed of colorbond, capped and lapped timber, 4mm Perspex, 9mm FC or similar construction with gaps minimised.

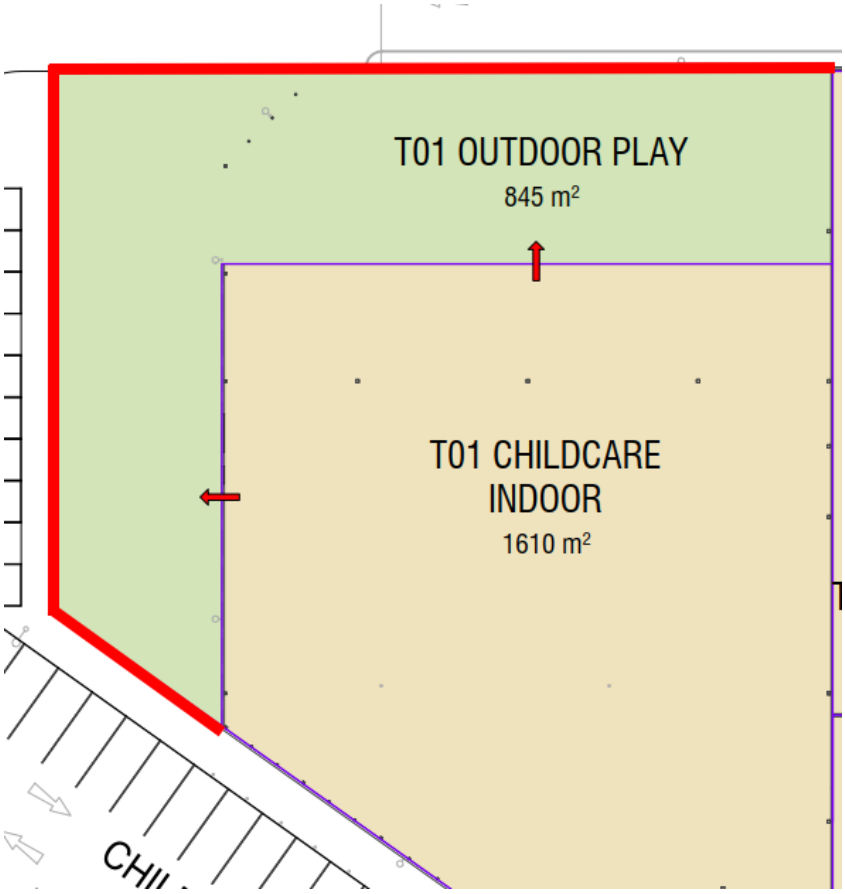


Figure 3 – Recommended Acoustic Treatment for the proposed Outdoor Play Area

5.3 CHILDCARE NOISE EMISSIONS ASSESSMENT

5.3.1 Childcare Noise Emission Criteria

In addition to the noise emission criteria outlined in Section 4.1, the following noise emission criteria specific to childcare centres has been implemented in this assessment and addressed below:

5.3.1.1 Penrith City Council document – '*Penrith Development Control Plan (DCP) 2014*'

6) Noise

a) Outside playing areas shall be designed and located to minimise noise impact on any noise sensitive adjacent properties. Separation between boundary fencing and areas occupied by the children may be required.

b) Where there may be noise impact on adjacent properties, fencing shall be of a height, design and material (e.g. masonry) suitable to contain noise generated by the children's activities. This ensures the children may play outside without time limitations in accordance with licensing requirements.

c) Where a site may be affected by traffic, rail or aircraft noise, the child care centre shall be designed to minimise any impact on the children and staff. A report from an acoustic consultant may be required to support the proposal. (Design elements may include double glazing, insulated walls, locating sleeping rooms in protected areas and solid fencing).

d) A noise impact assessment may be required for the development of a child care centre proposing to cater for 40 children or more, or where surrounding land uses may have an impact on the proposal.

The objectives should be to limit the impact of the child care centre on adjacent properties, and also to limit the impact noise from external sources may have on the child care centre. While noise can be measured, the intent is to also minimise nuisance which is subjective by nature. This may be achieved either by physical separation, design and layout of the centre or by implementing noise mitigation measures, such as acoustic treatments to buildings.

e) A noise impact assessment report should address the relevant provisions of the Noise and Vibration section of this Plan.

Part D5 (Other Land Uses) states the following regarding noise control relevant to childcare centres.

5.3.1.2 Associated of Australasian Acoustic Consultants (AAAC) document – '*Guideline for Child Care Centre Acoustic Assessment 2020*'

5.3.1.2.1 Indoor Play Areas

Noise emission from indoor play and activities should be considered, including scenarios with windows and doors both open and closed. Some child care centres may need to close their windows and doors during active indoor play or music.

5.3.1.2.2 Outdoor Play Areas

The AAAC technical guideline states the following regarding noise control for external play areas:

> **Base Criteria** – With the development of child care centres in residential areas, the background noise level within these areas can at certain times, be low. Thus, a base criterion of a contributed $L_{eq,15min}$ 45 dB(A) for the assessment of outdoor play is recommended in locations where the background noise level is less than 40 dB(A).
>
> **Up to 4 hours (total) per day** – If outdoor play is limited to no more than 2 hours in the morning and 2 hours in the afternoon, the contributed $L_{eq,15\ minute}$ noise level emitted from the outdoor play shall not exceed the background noise level by more than 10 dB at the assessment location.
>
> **More than 4 hours (total) per day** – If outdoor play is not limited to no more than 2 hours in the morning and 2 hours in the afternoon, the contributed $L_{eq,15\ minute}$ noise level emitted from the outdoor play area shall not exceed the background noise level by more than 5 dB at the assessment location.

5.3.1.2.3 Commercial Receivers

> The cumulative $L_{eq,15min}$ noise level emitted from the use and operation of the child care centre shall not exceed 65 dB(A), from all activities (including outdoor play), when assessed at the most affected point on or within any commercial property boundary.

5.3.1.2.4 Mechanical Plant

The AAAC technical guideline states the following regarding noise control for mechanical plant:

> Child care centres may include air-conditioning plant and equipment, kitchen and wet area exhaust fans, car park and garbage room ventilation fans. Depending on the requirements of the state or territory where the centre is located, any such mechanical equipment should be assessed in accordance with this section and should not be audible outside the premises between 6pm and 7am.

5.3.2 Summarised Childcare Noise Emission Criteria

Table 22 – Summarised Childcare Noise Emission Criteria

Receiver	Time of Day	Noise Emission Objective
Residential Receivers	Day (7:00am – 6:00pm)	58 dB(A)$L_{eq(15\text{-}min)}$ NSW EPA *NPfI*/AAAC Criteria (More than 4 hours play per day)
Commercial Receivers		65 dB(A)$L_{eq(15\text{-}min)}$ NSW EPA *NPfI*/AAAC Criteria

5.4 ASSESSMENT OF CHILDCARE NOISE EMISSIONS

A noise emissions assessment of the proposed childcare centre within the development has been carried out to ensure noise emitted from the use of the centre is in accordance with the requirements listed in the section above.

This assessment will review noise emissions associated with the following areas of the childcare centre:

- Indoor Play Areas
- Outdoor Play Areas

As detailed capacities and operating hours of the childcare centre are yet to be determined the following assumptions have been adopted:

- Operating hours are between 7:00am – 6:00pm.
- The centre will accommodate a total children capacity of 175 children. This office has assumed that the centre will accommodate 25 children aged 0-2, 50 children aged 2-3, and 100 children aged 3-6.
- The recommended acoustic treatment for the outdoor play area is implemented (as per Figure 3).
- Noise emissions from the childcare centre were predicted using the mid-point of the Sound Power Level data range recommended within the AAAC technical guideline. These noise levels are presented in the table below:

Number and Age of Children	Sound Power Levels [dB] at Octave Band Centre Frequencies [Hz]								
	dB(A)	63	125	250	500	1k	2k	4k	8k
10 Children - 0 to 2 years	78	54	60	66	72	74	71	67	64
10 Children - 2 to 3 years	85	61	67	73	79	81	78	74	70
10 Children - 3 to 5 years	87	64	70	75	81	83	80	76	72

5.4.1 Predicted Childcare Noise Emissions

5.4.1.1 Noise Emissions from Outdoor Play Areas

The predicted cumulative external noise levels at the nearest receivers have been summarised in the tables below.

Table 23 – Predicted Noise Emissions from Outdoor Play to Residential Receivers

Receiver	Predicted Noise Level dB(A)L_{eq}	Noise Emission Objective dB(A)L_{eq}	Comment
R4 Residential Receivers North/North-east of the site	<25	**58 dB(A)$L_{eq(15\text{-}min)}$** NSW EPA *NPfI*/AAAC Criteria (More than 4 hours play per day)	Complies with the dominating noise emission objectives

Table 24 – Predicted Noise Emissions from Outdoor Play to Non-Residential Receivers

Receiver	Predicted Noise Level dB(A)L_{eq}	Noise Emission Objective dB(A)L_{eq}	Comment
R2 Non-Residential Receivers East of the site	52	**65 dB(A)$L_{eq(15\text{-}min)}$** NSW EPA *NPfI*/AAAC Criteria	Complies with the dominating noise emission objectives
R1 Non-Residential Receivers West of the site	<25		

5.4.1.2 Noise Emissions from Indoor Play Areas

The predicted cumulative internal noise levels at the nearest receivers have been summarised in the tables below.

Table 25 – Predicted Noise Emissions from Indoor Play to Residential Receivers

Receiver	Predicted Noise Level dB(A)L_{eq}	Noise Emission Objective dB(A)L_{eq}	Comment
R4 Residential Receivers North/North-east of the site	<25	**58 dB(A)$L_{eq(15\text{-}min)}$** NSW EPA *NPfI*/AAAC Criteria (More than 4 hours play per day)	Complies with the dominating noise emission objectives

Table 26 – Predicted Noise Emissions from Indoor Play to Non-Residential Receivers

Receiver	Predicted Noise Level dB(A)L_{eq}	Noise Emission Objective dB(A)L_{eq}	Comment
R2 Non-Residential Receivers East of the site	48	**65 dB(A)$L_{eq(15\text{-}min)}$** NSW EPA *NPfI*/AAAC Criteria	Complies with the dominating noise emission objectives
R1 Non-Residential Receivers West of the site	<25		

6 RECOMMENDATIONS/MANAGEMENT CONTROLS

The following section details the recommendations/management controls to achieve the noise levels detailed in Sections 4.2 and 5.4. This section will also outline recommendations to ensure the amenity of adjacent spaces within the development is not disrupted.

6.1 RECOMMENDATIONS FOR PROPOSED GYM/FITNESS CENTRE

- Internal noise level within the gym/fitness centre should not exceed 85 dB(A)L_{eq} and is to be volume controlled by the club manager.
- A minimum 6.38mm laminated glazing with the acoustic rating of R_w 31 is to be installed to all glazed elements of the façade (if applicable).
- Carpark areas outside the gym/fitness centre are not to be used as part of regular gym activities (i.e. training activities are only to be undertaken within the gym tenancy).

6.2 RECOMMENDATIONS FOR LOADING DOCKS

- Trucks are to limit idling and the use of airbrakes within the loading dock as much as feasibly possible.

6.3 INDICATIVE RECOMMENDATIONS FOR INTERNAL ACOUSTIC DESIGN

6.3.1 Gym Tenancy/Medical Imaging Tenancy

- Careful consideration shall be made specifically to the gym, as it bounds a proposed imaging tenancy. Given that medical imaging centres typically contain sensitive equipment that may be sensitive to vibration, internal treatment within the gym tenancy may be required as some gym activities can induce vibration in the structure. Indicative internal treatment to avoid disruption to sensitive receivers may include:
    - Up to 50mm thick rubber flooring – for free weight areas (typically)
    - Pin loaded weight machines – rubber/spring mounts located below adjustable weights.
    - Rubber mounts on the feet of treadmill/rowing machines
- As final layouts and equipment selections are yet to be determined, specific vibration isolation treatment proposed by the gym should be reviewed by the project acoustic consultant prior to installation to ensure treatments are able to sufficiently reduce vibration transmitted throughout the building.

6.3.2 Childcare Centre/Medical Centre

- Careful consideration shall be made to the design of the childcare centre, as it bounds a proposed medical centre tenancy. To avoid internal noise levels within the childcare centre disrupting those within the medical centre, acoustic treatment to the inter-tenancy wall may be required. As final layouts of both proposed tenancies are yet to be determined, specific wall treatment should be reviewed by the project acoustic consultant prior to installation to ensure treatments are able to sufficiently reduce air-borne noise transmission throughout the building.

7 CONCLUSION

This report presents an acoustic assessment of potential noise impacts associated with the proposed Home Co, home improvement shopping centre to be located at 243 Forrester Road, North St Marys.

Noise impacts associated with the proposed development have been conducted to satisfy the following documents:

- Penrith City Council document – '*Penrith Development Control Plan (DCP) 2014*'
- Penrith City Council document – '*Penrith Local Environmental Plan (LEP) 2010*'
- NSW Environmental Protection Authority (EPA) document – '*Noise Policy for Industry (NPfI)* 2017'
- NSW Environmental Protection Authority (EPA) document – '*Road Noise Policy (RNP) 2011*'
- Associated of Australasian Acoustic Consultants (AAAC) document – '*Guideline for Child Care Centre Acoustic Assessment 2020*'

Based on the predicted noise levels outlined in Section 4.2 and 5.4, noise generated by the development will comply with all relevant requirements on the proviso that the recommendations of Section 6 are adopted.

Provided that the recommended acoustic treatments outlined in Section 5.2.1 are implemented, noise intrusion into the childcare centre located within the proposed development will comply with the requirements of the AAAC technical guideline.

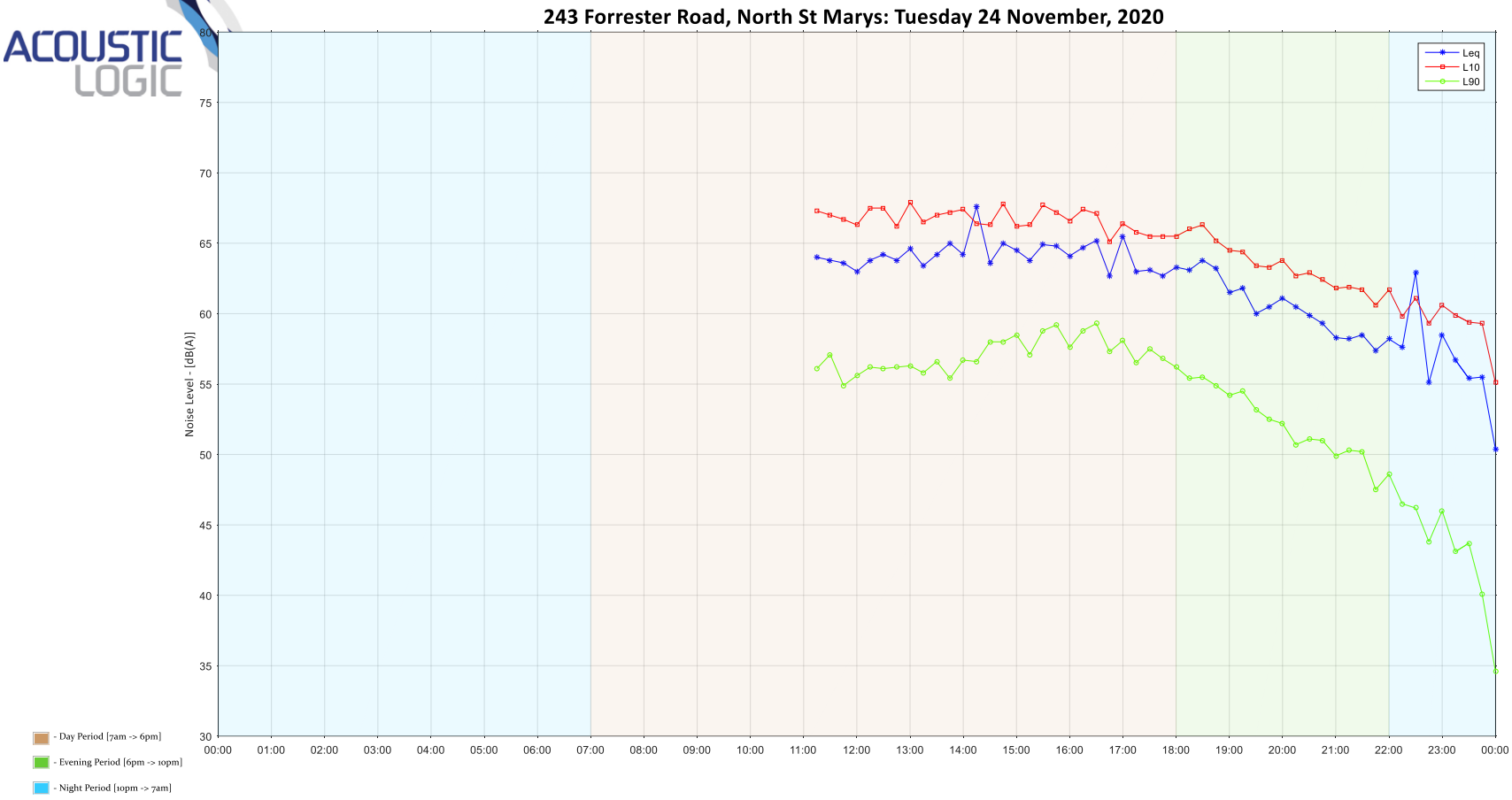
Please contact us should you have any further queries.

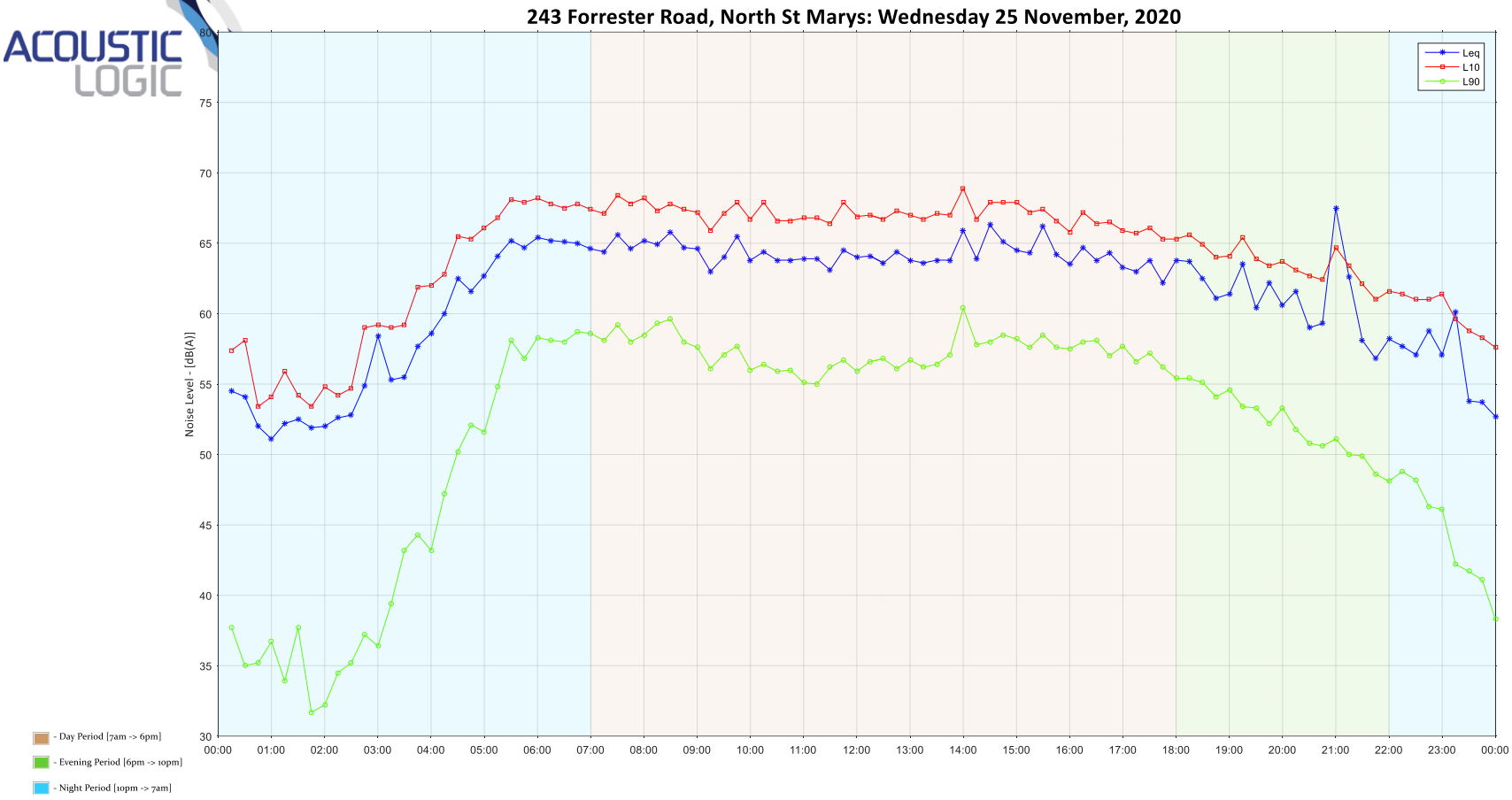
Yours faithfully,

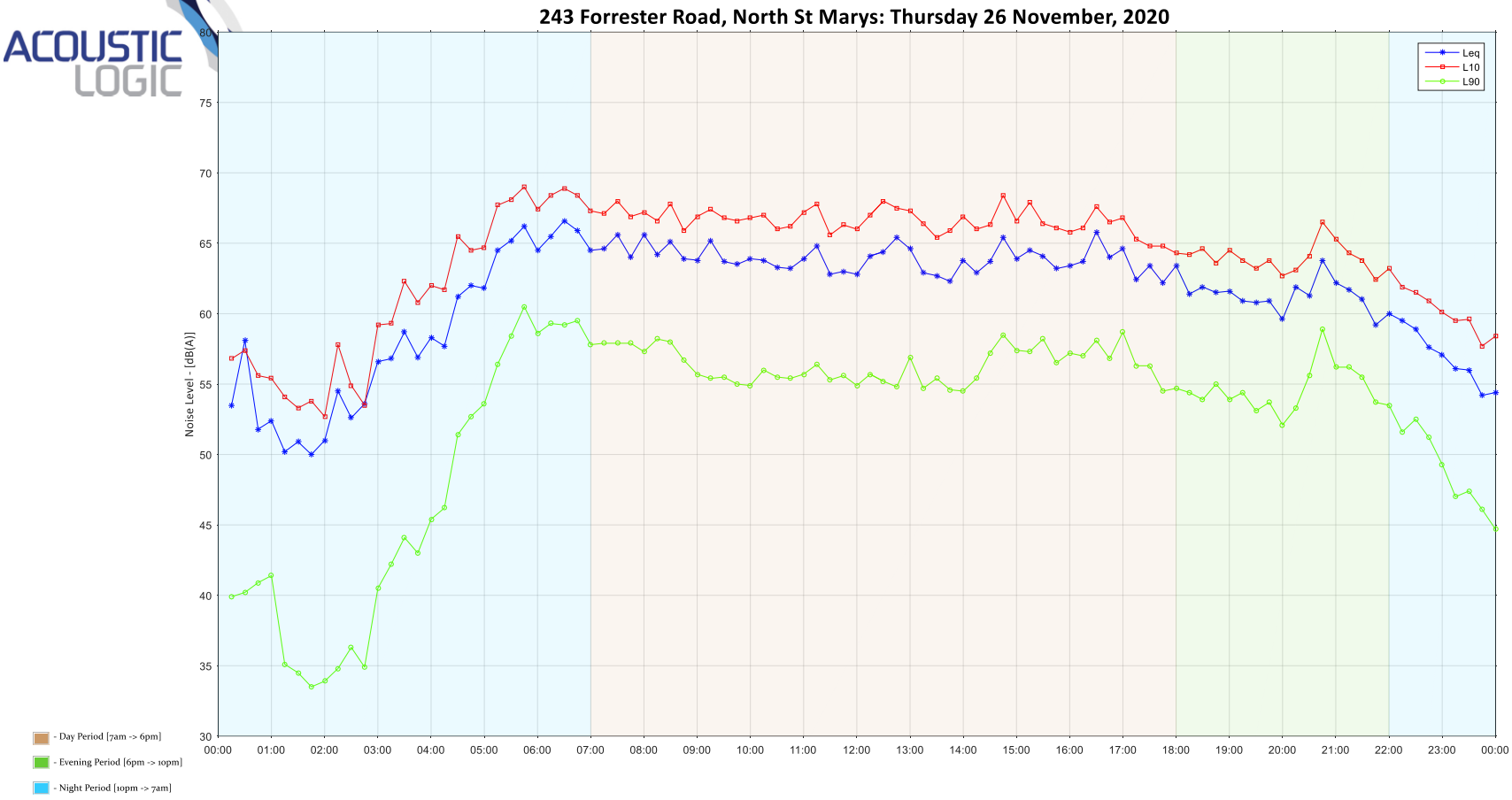
Acoustic Logic Pty Ltd
Adrian Zappia

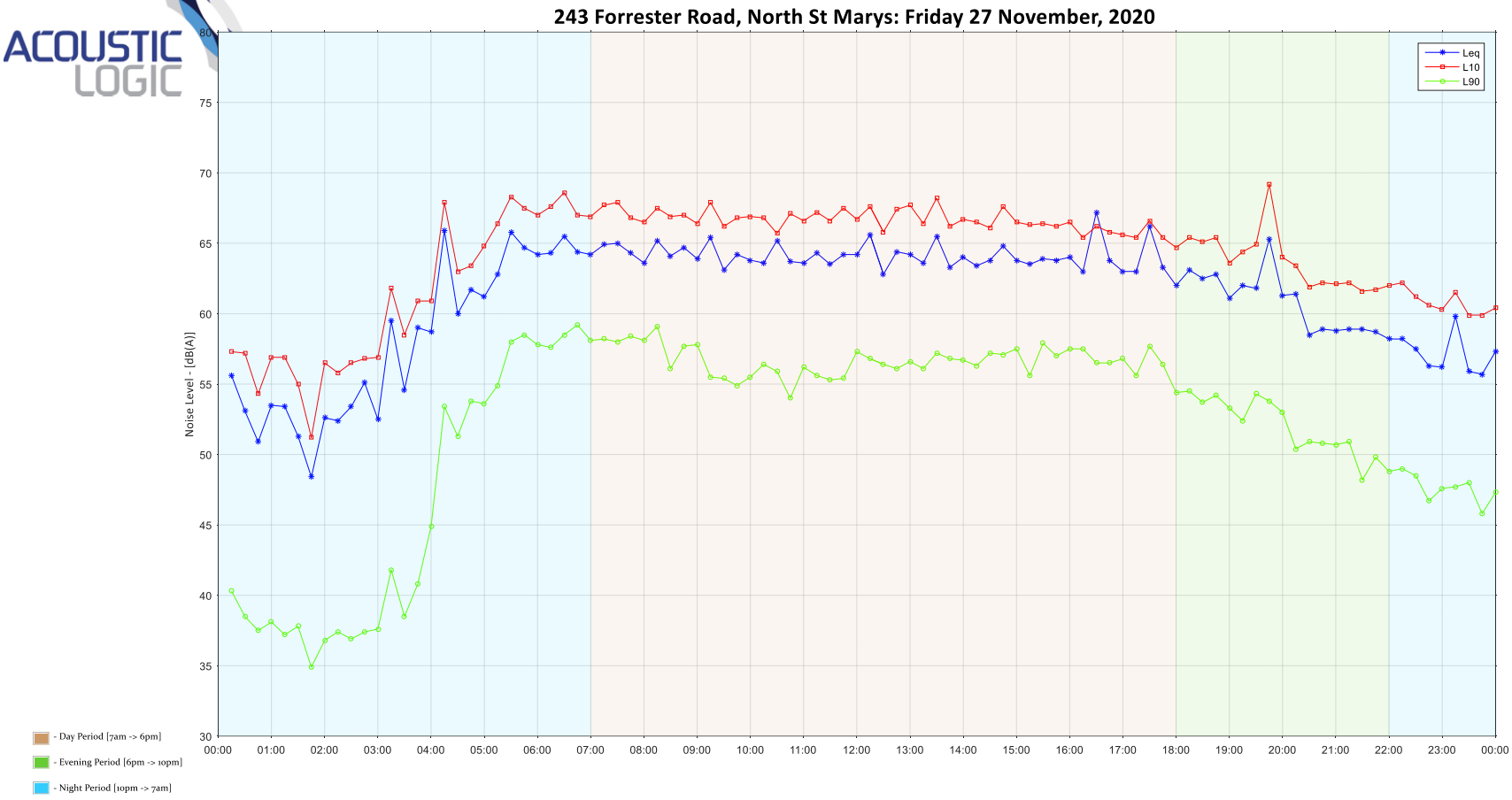
8 APPENDIX A – UNATTENDED NOISE MONITORING

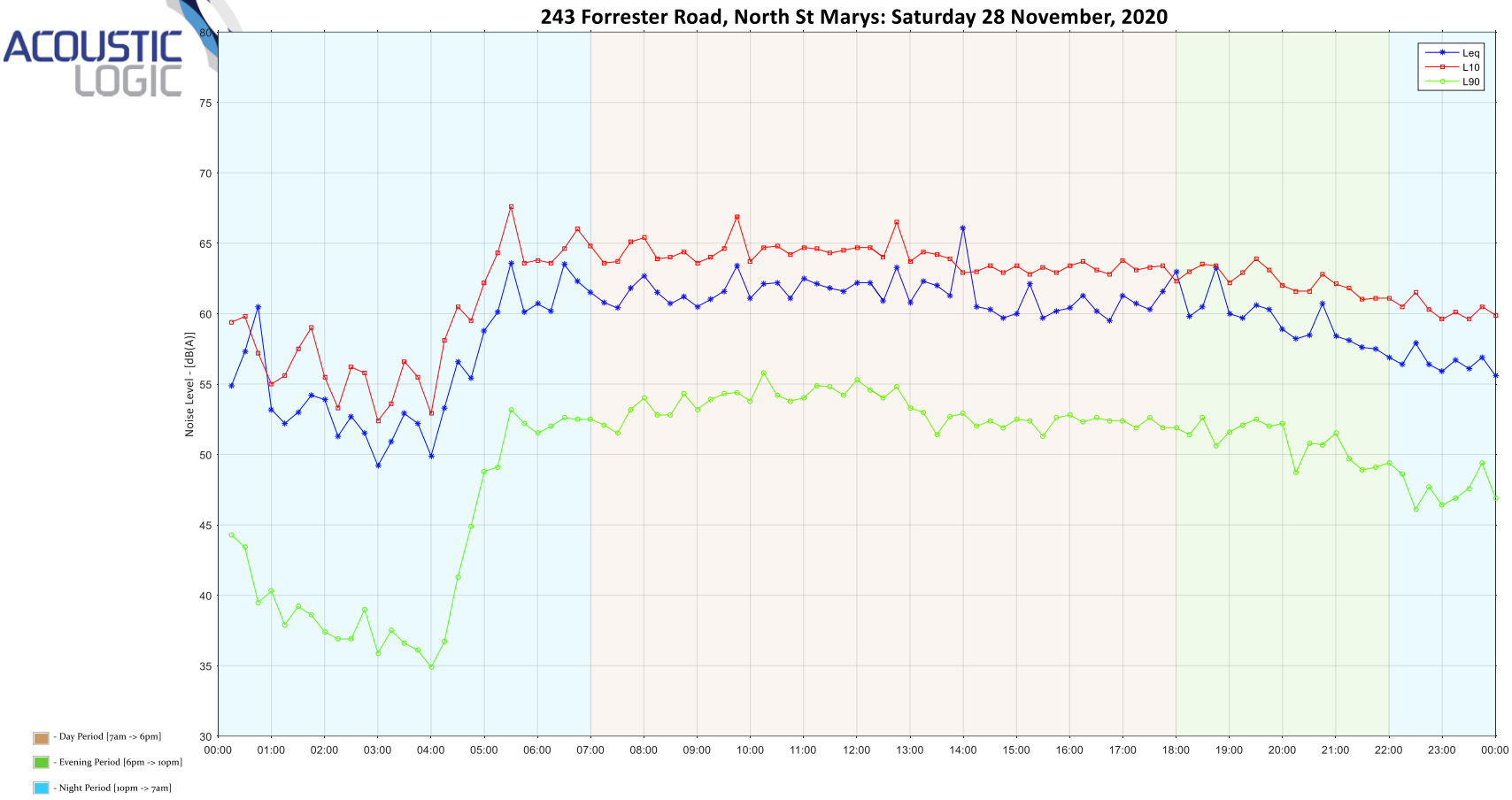
8.1 MONITOR LOCATION 1 – REFER TO FIGURE 1

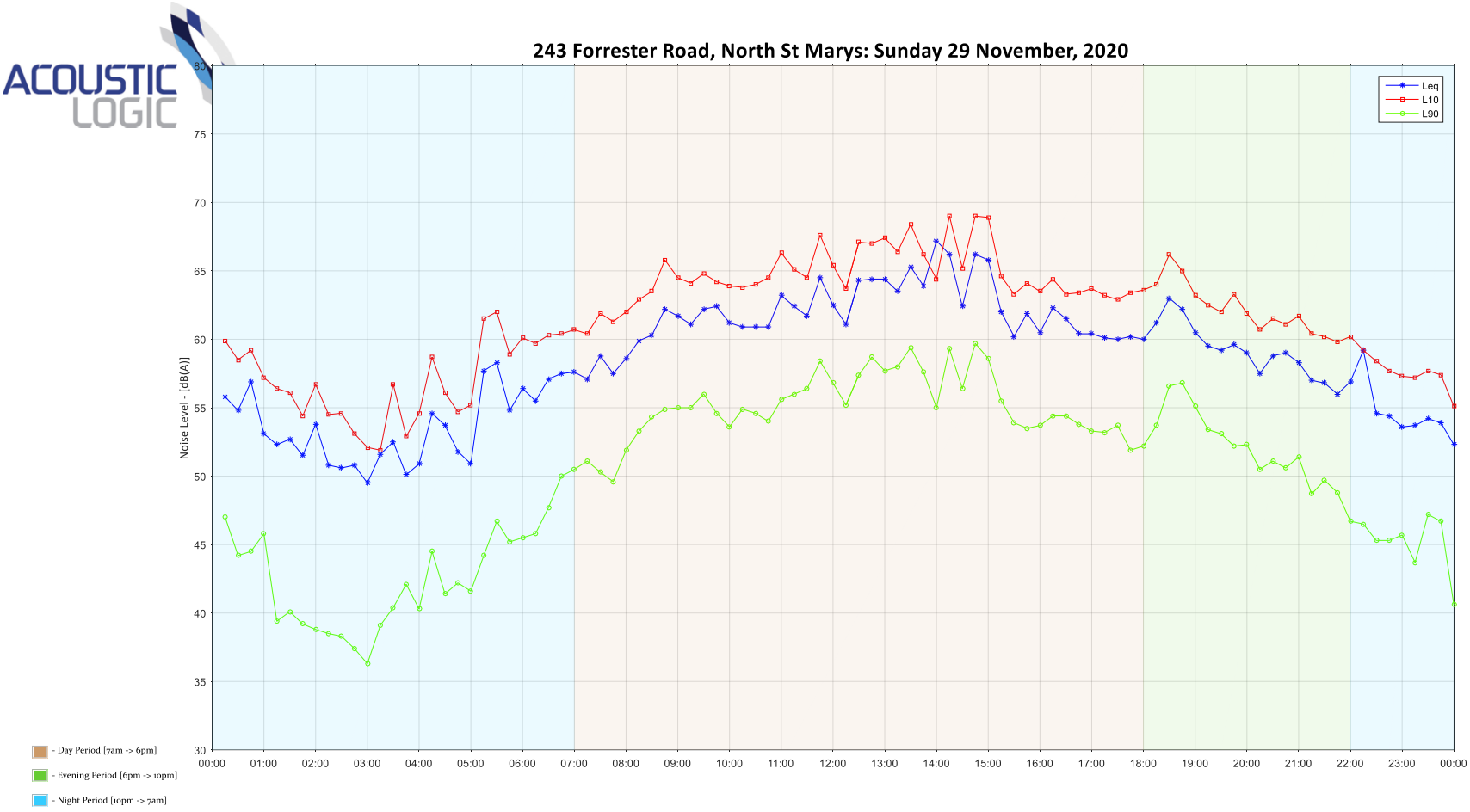


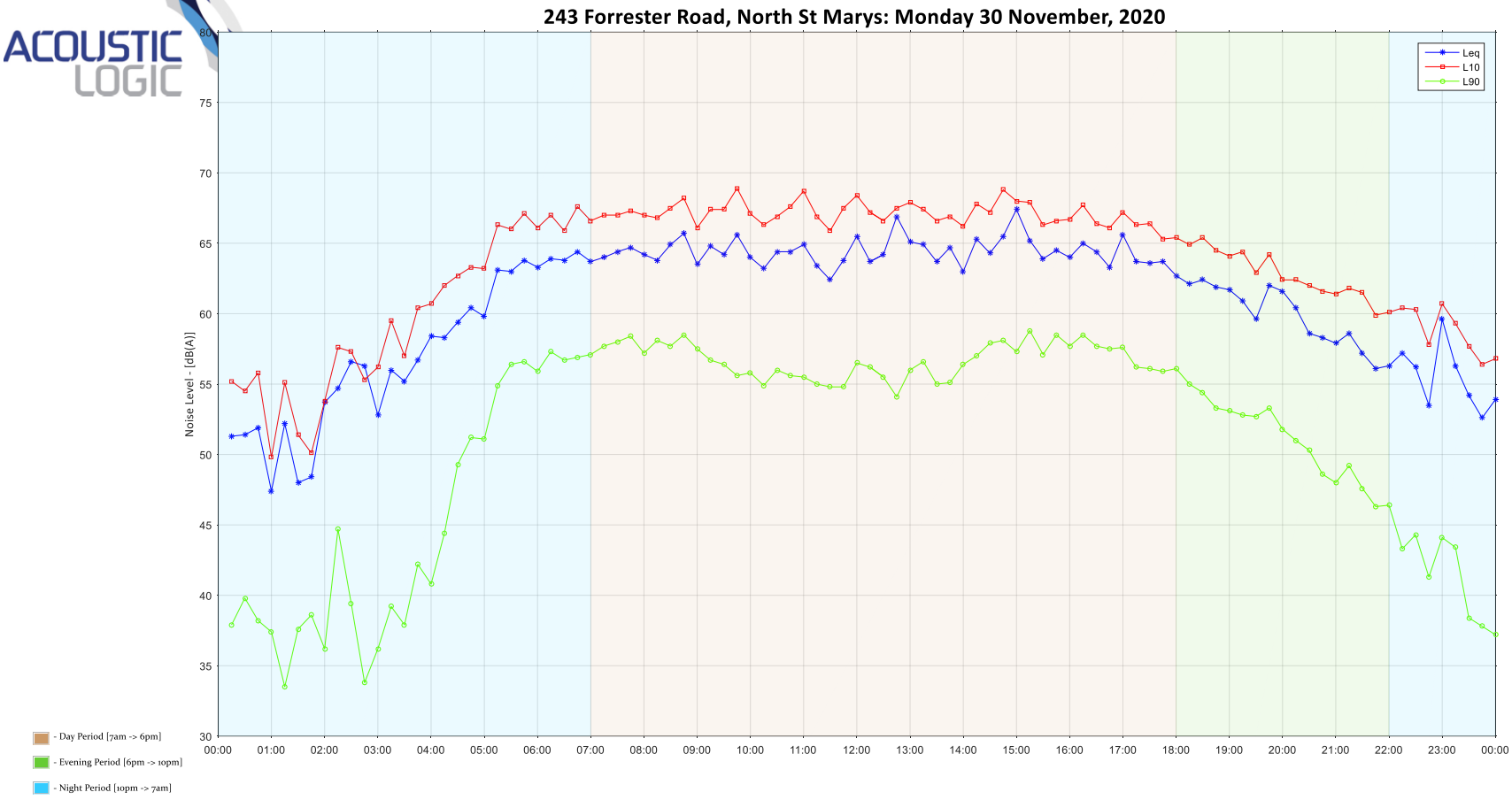


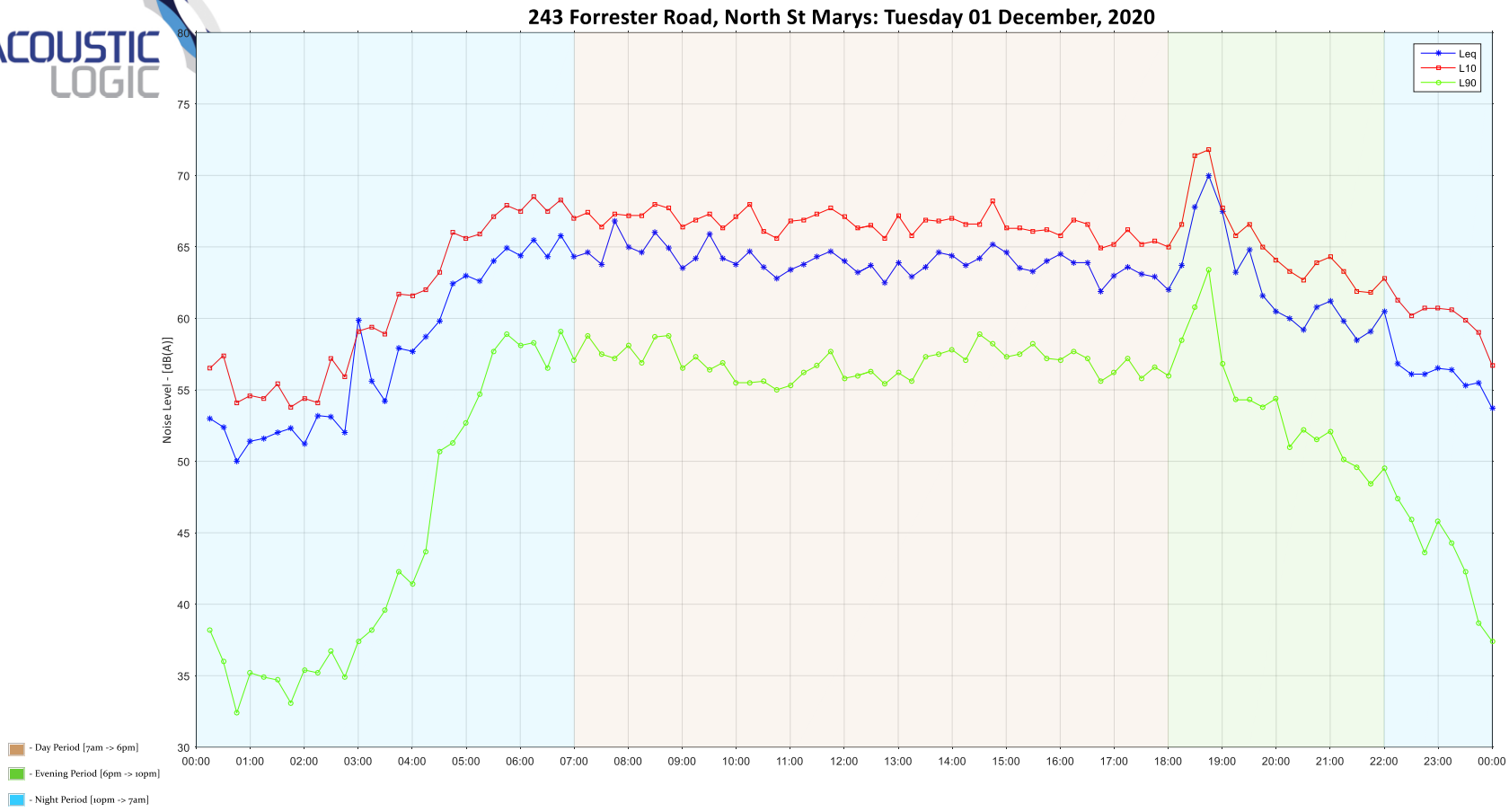


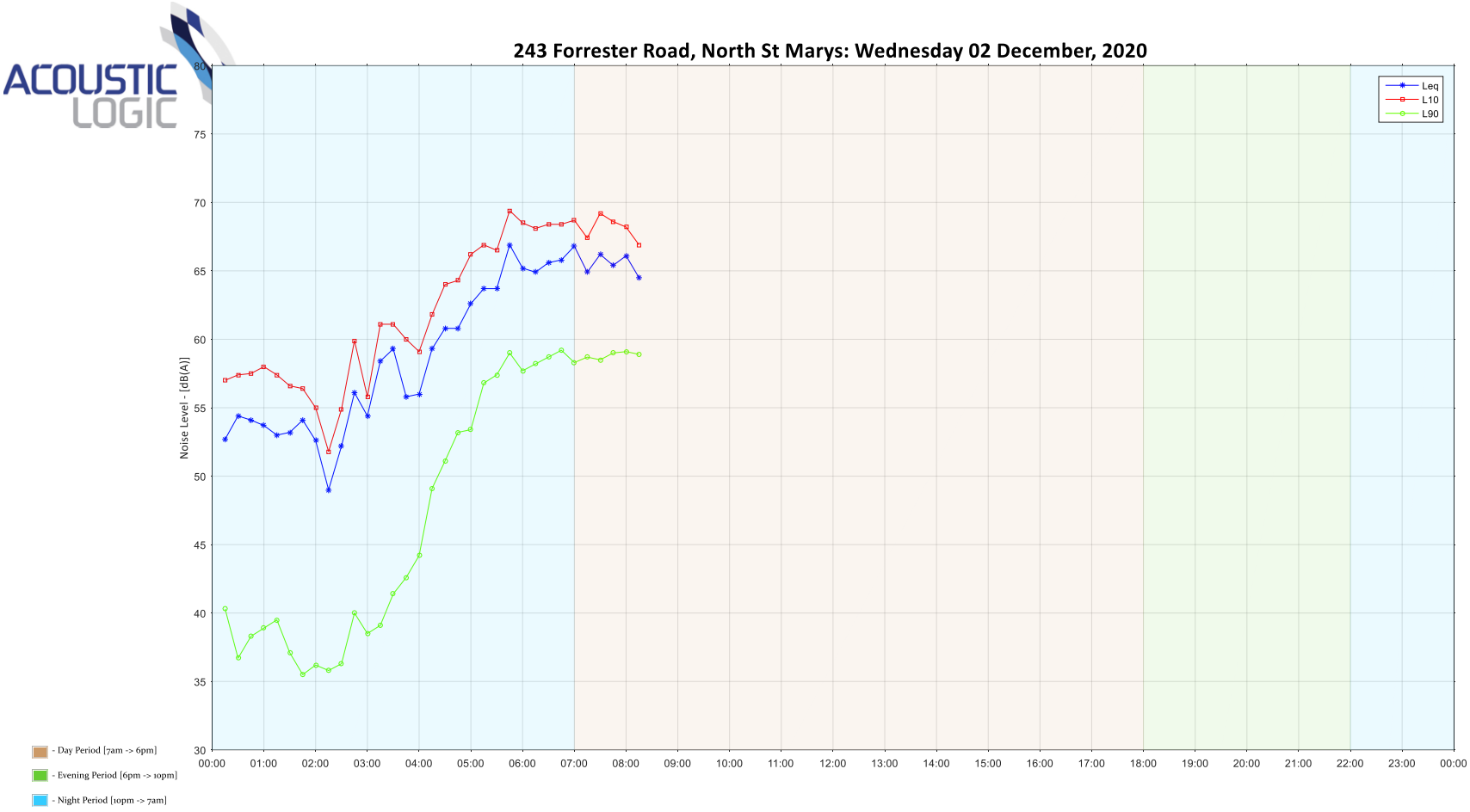




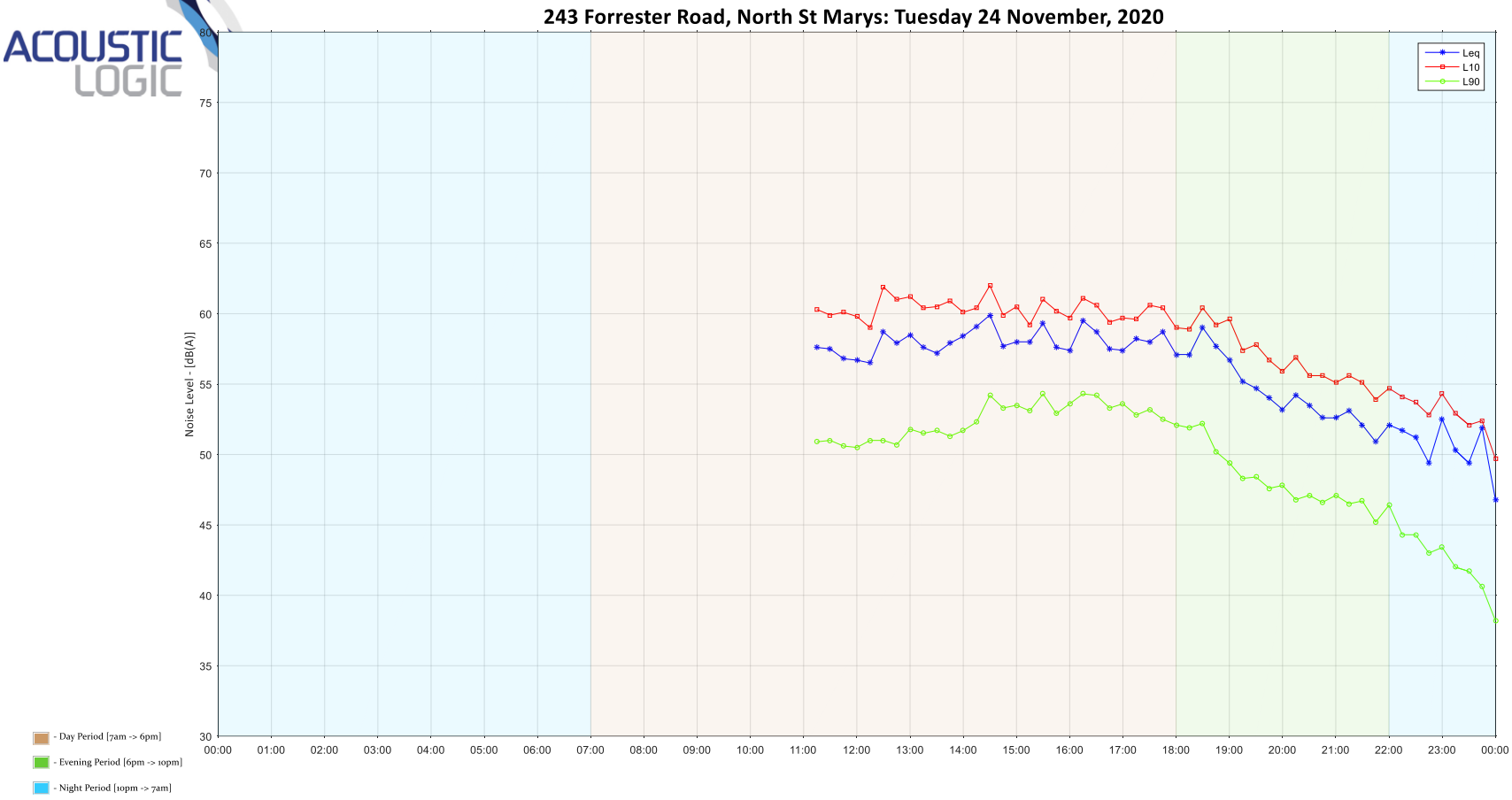


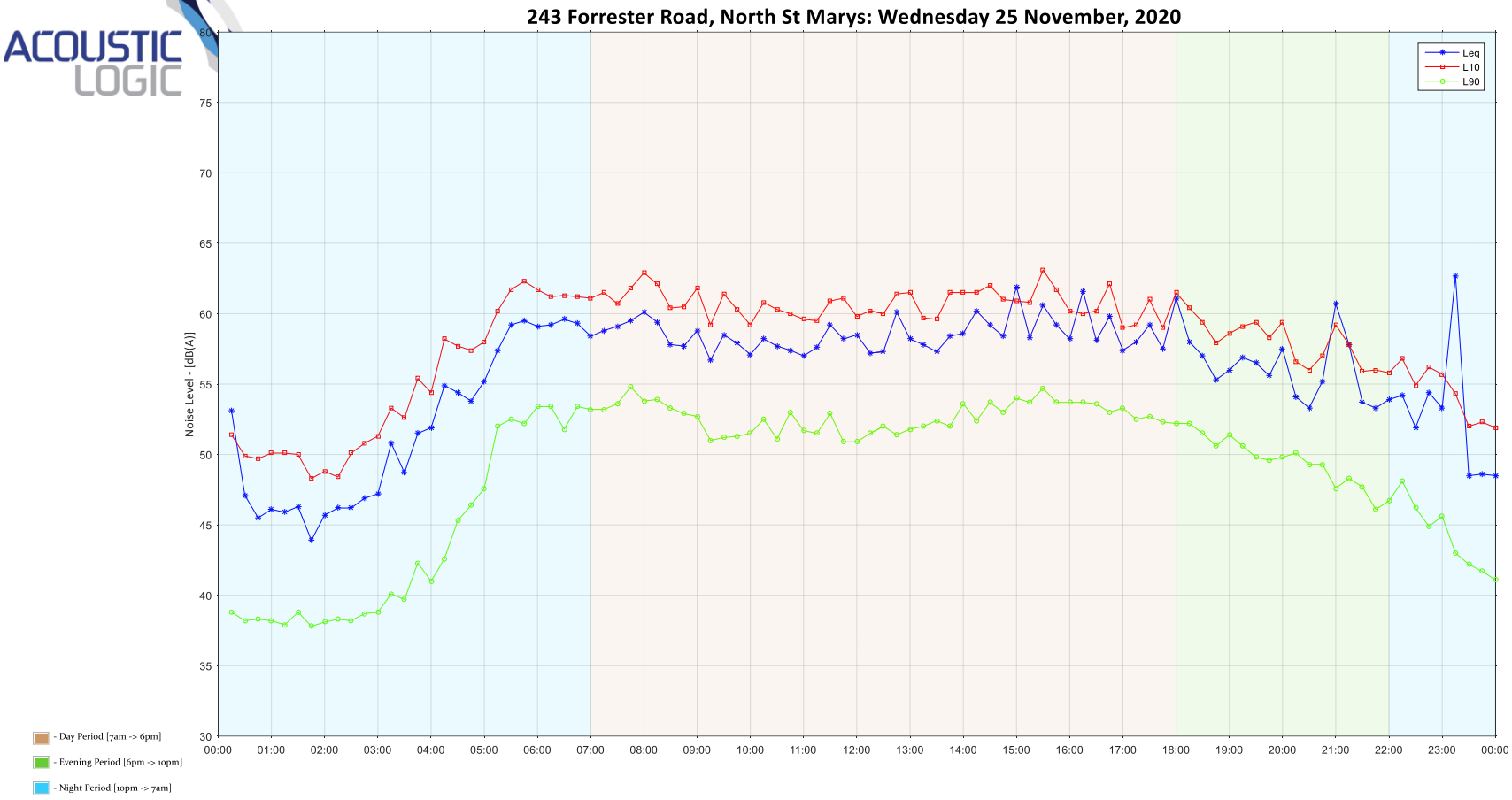


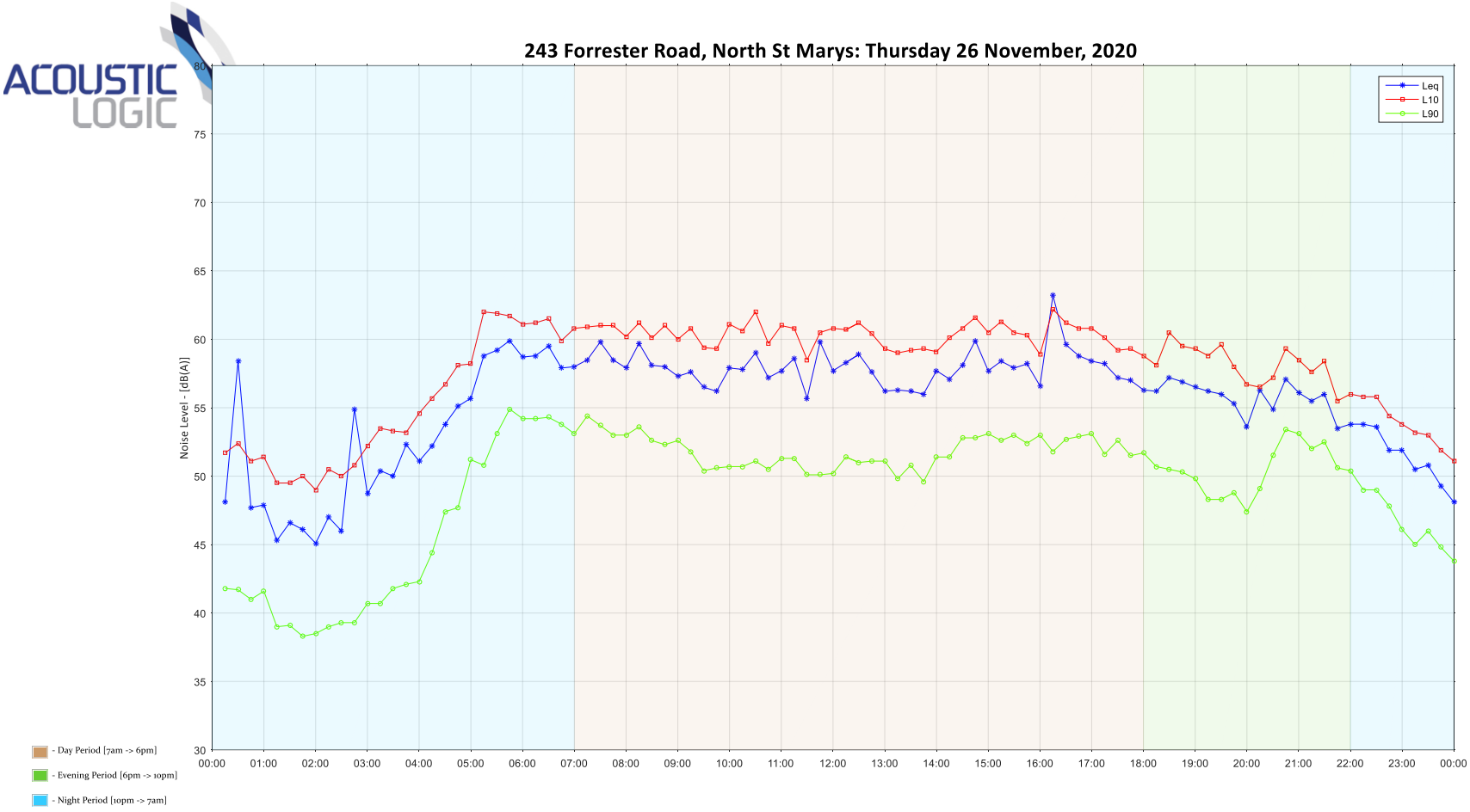




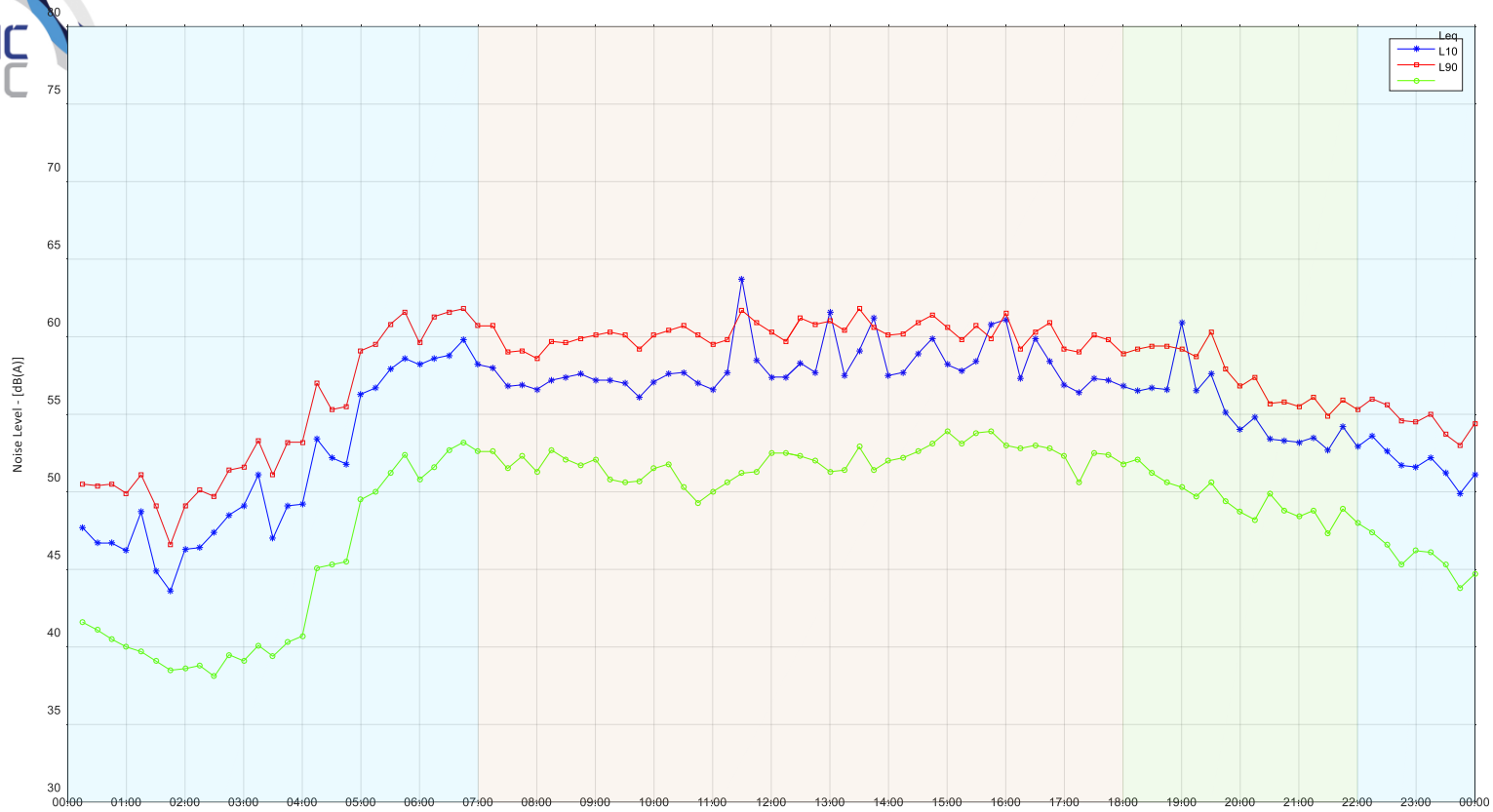
8.2 MONITOR LOCATION 2 – REFER TO FIGURE 1







243 Forrester Road, North St Marys: Friday 27 November, 2020



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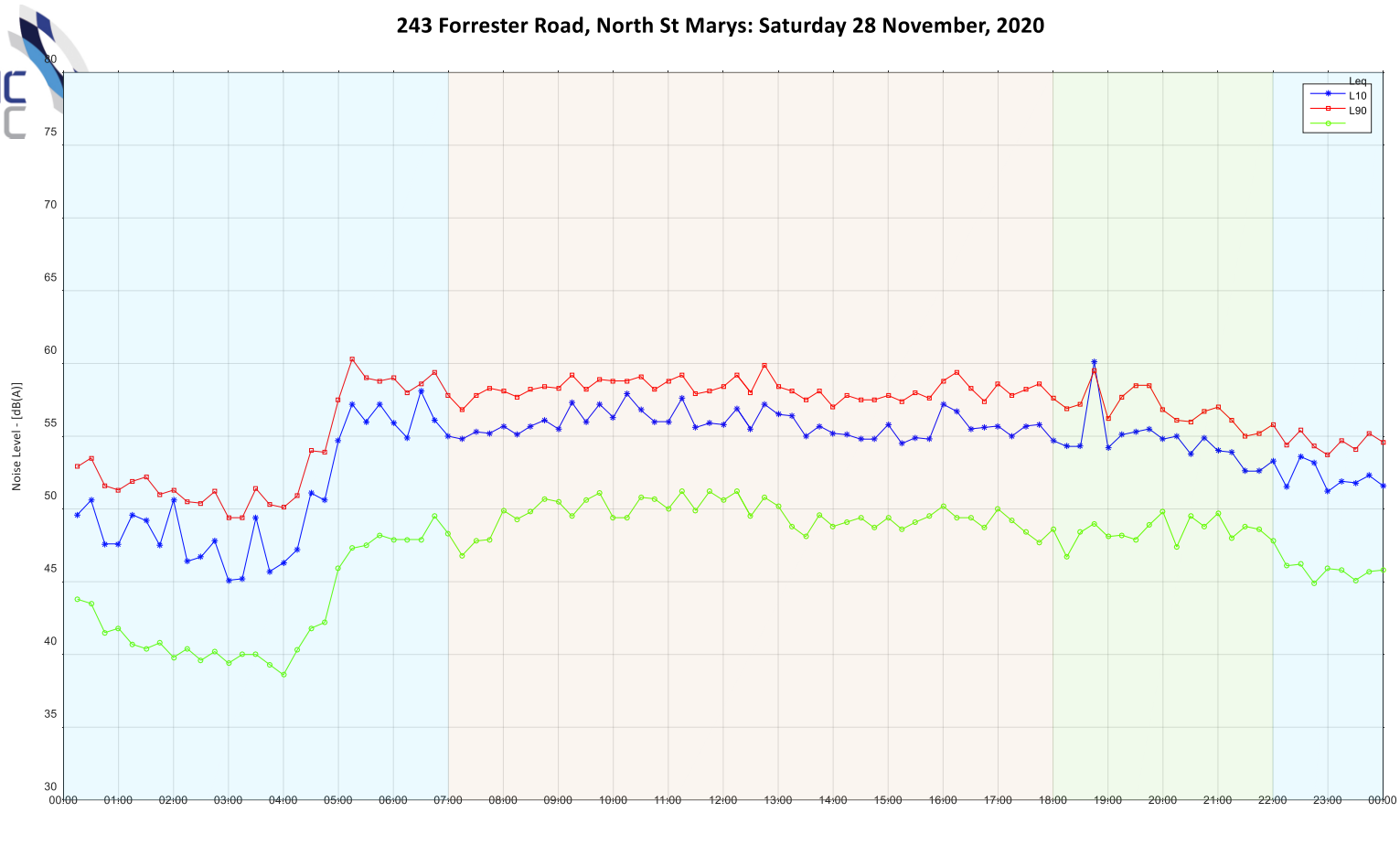

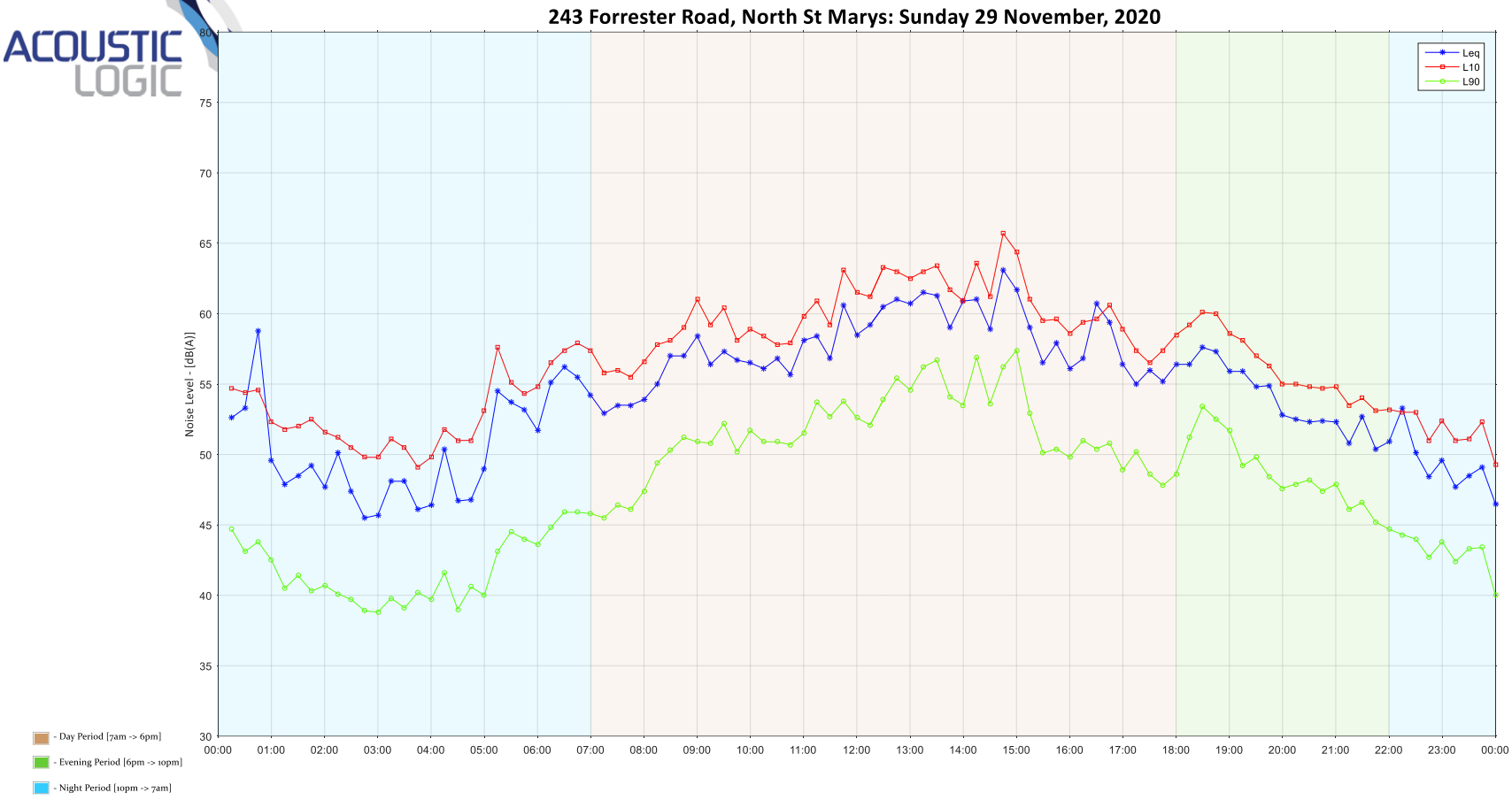

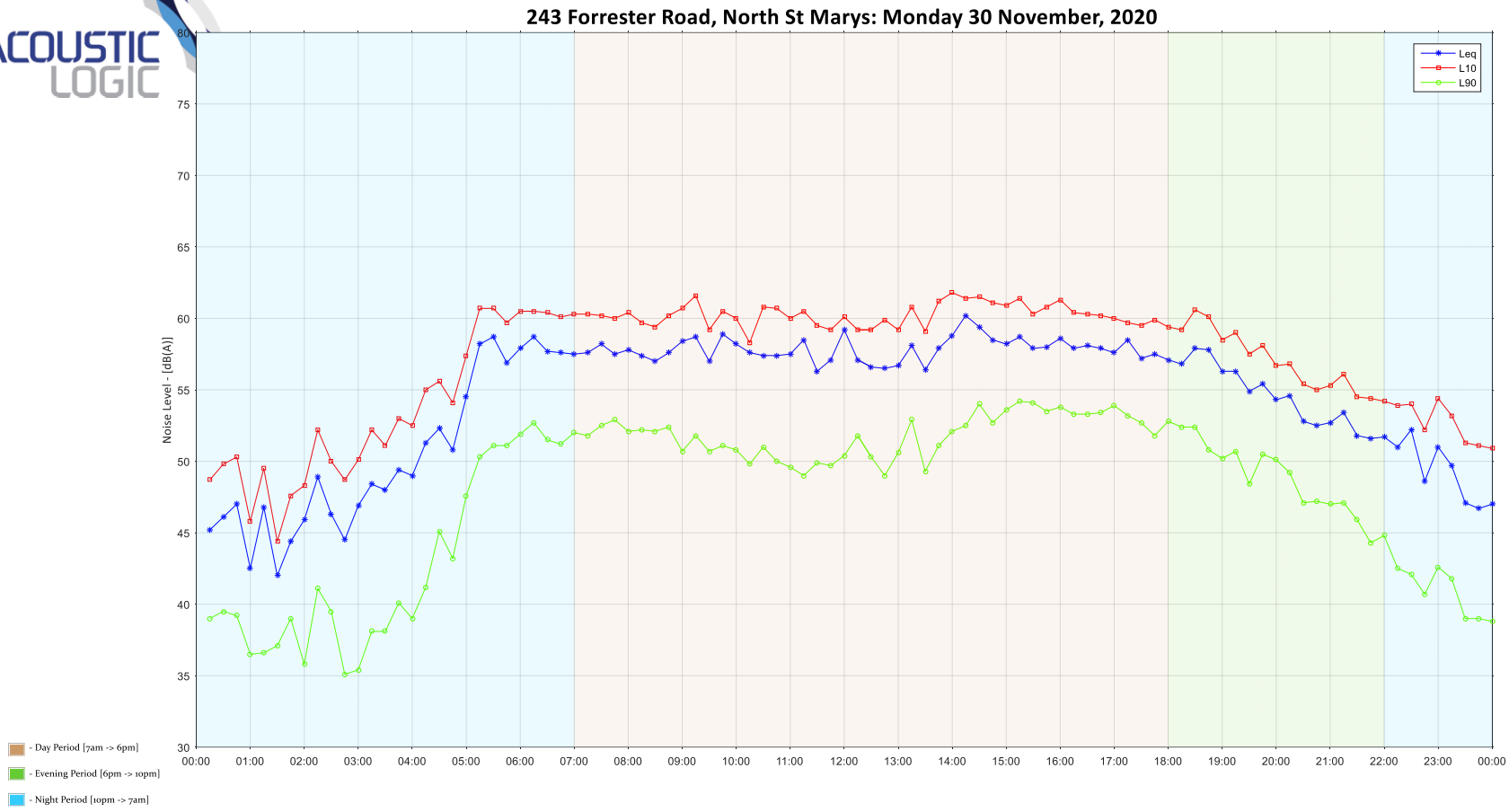

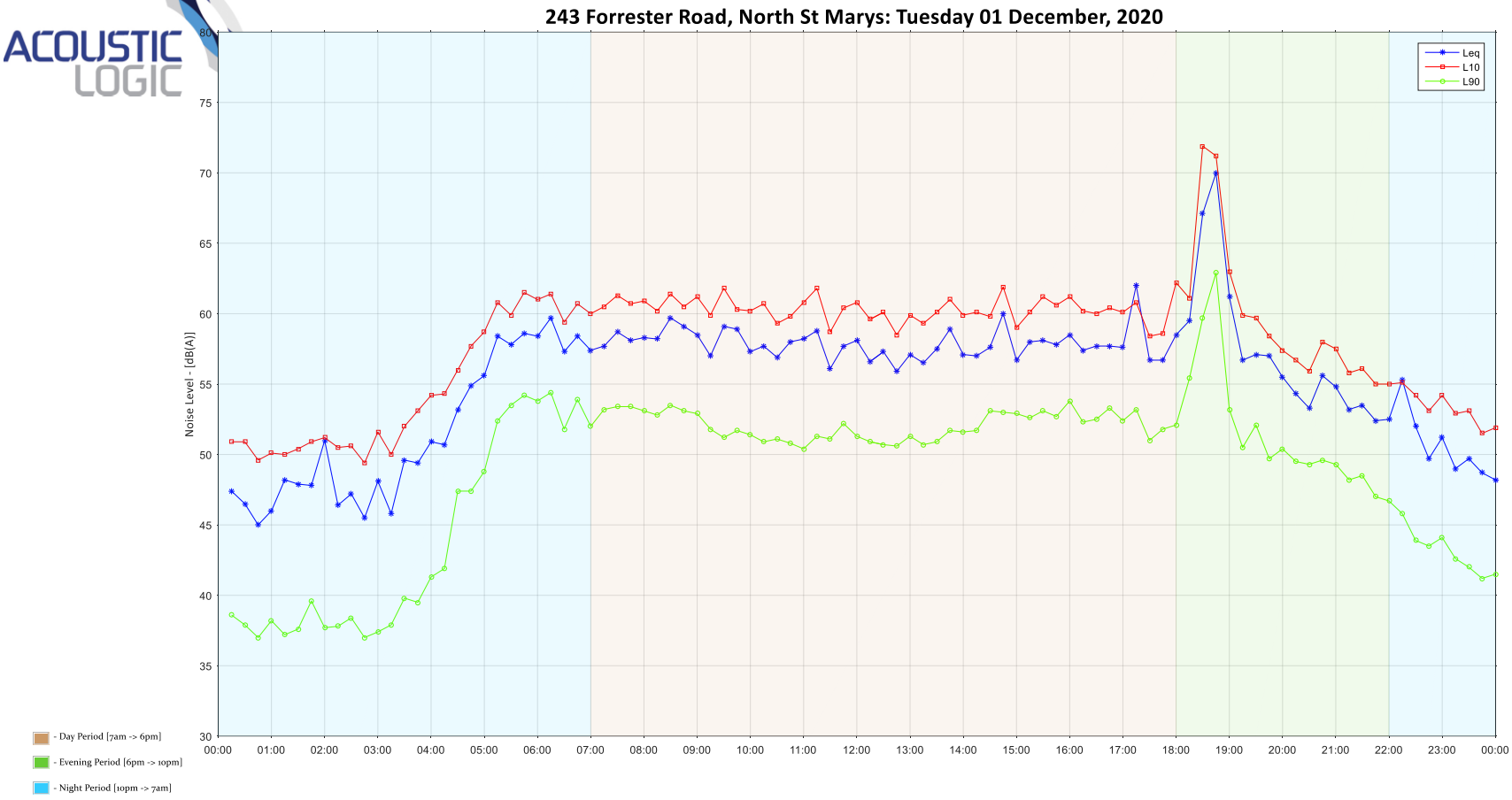

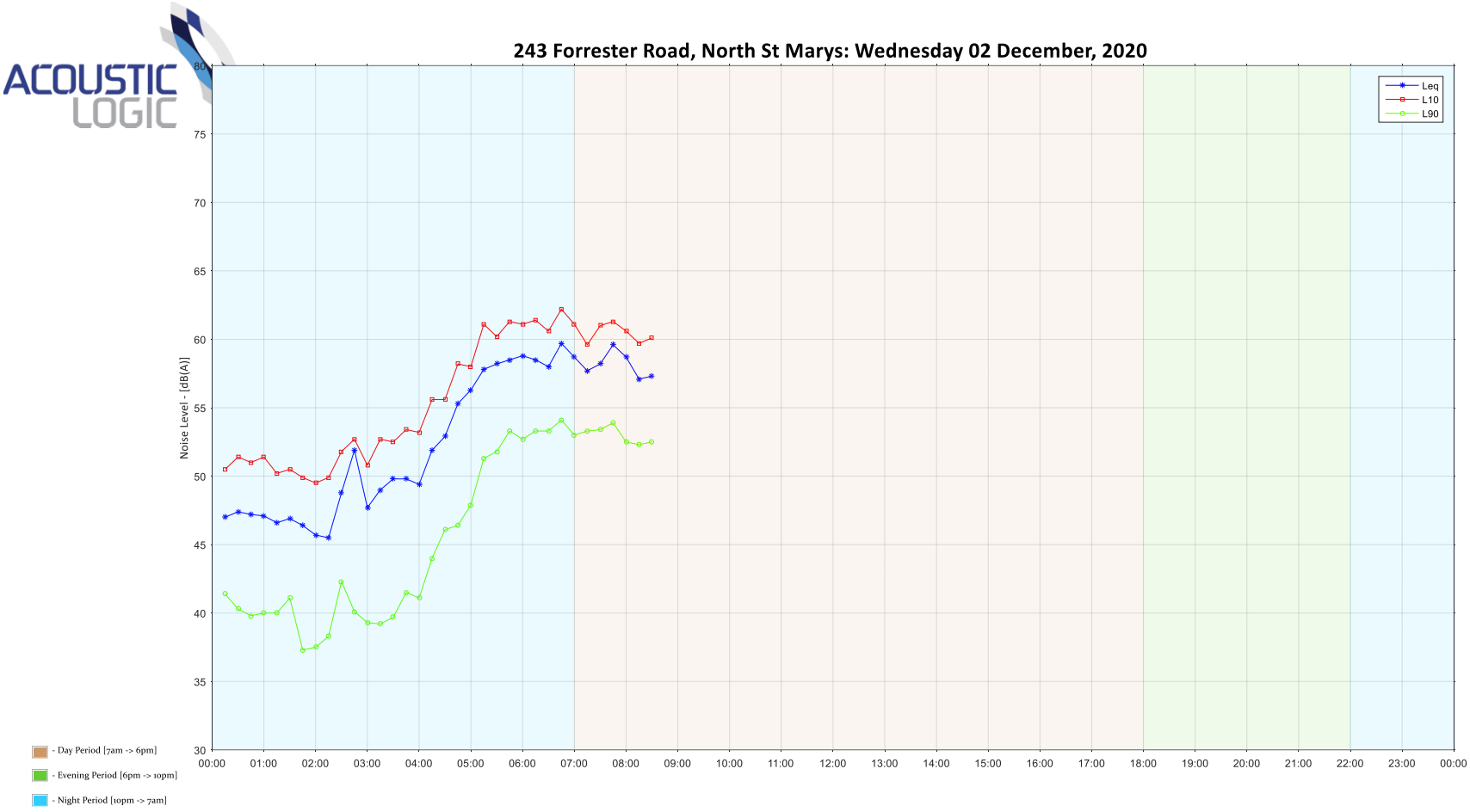

9 APPENDIX B – PREDICTED TRAFFIC VOLUMES