MATTHEW PALAVIDIS
VICTOR FATTORETTO
MATTHEW SHIELDS

711 Hunter Street, Newcastle West

DA Acoustic Assessment

SYDNEY
9 Sarah St
MASCOT NSW 2020
(02) 8339 8000

ABN 98 145 324 714
www.acousticlogic.com.au

Project ID	20220898.1
Document Title	DA Acoustic Assessment
Attention To	Hunter Street JV CO Pty Limited

Revision	Date	Document Reference	Prepared By	Checked By	Approved By
0	10/10/2022	20220898.1/1010A/R0/RF	RF		VF
1	19/10/2022	20220898.1/1910A/R1/RF	RF		VF

TABLE OF CONTENTS

1 INTRODUCTION

This report has been prepared to assess noise impacts associated with the proposed development located at 711 Hunter Street, Newcastle West.

Impacts assessed include:

- Noise impacts from traffic sources near the site
- Noise impacts from surrounding inner city noise including noise from entertainment venues
- Operational noise emissions

The subject site and local context are indicated in Figure 1.

The report has been prepared for the sole purpose of a development application assessment and should not be used or relied on for any other purpose.

2 REFERENCED DOCUMENTS

2.1.1 Background Information Used

The assessment is based on the following drawings, reports and other information:

- Architectural drawings prepared by Plus Architecture, job number 20623, dated 6/10/2022.
- 'Traffic Impact Assessment' prepared by BG& E with document reference N21112_RPT_001 REV / A1, dated 6/10/2022.

2.1.2 Guidelines

The following planning instruments and guidelines have been used in the assessment:

- Newcastle Development Control Plan (DCP) 2012;
- NSW Department of Planning and Environment document – 'State Environmental Planning Policy (SEPP) (TRANSPORT AND INFRASTRUCTURE) 2021';
- NSW Department of Planning and Environment document – 'Developments Near Rail Corridors or Busy Roads – Interim Guideline (2008)';
- NSW EPA – 'Noise Policy for Industry' ("NPfI") October 2017; and
- NSW EPA – 'Road Noise Policy" ("**RNP**") March 2011.

3 SITE DESCRIPTION

The project site is located at 711 Hunter Street, Newcastle East. The key features of the proposal are summarised below:

- Demolition of the existing commercial premises and ancillary structures on-site;
- Construction of a mixed-use precinct forming active ground and podium levels reaching 5 storeys of retail and commercial tenancies, with two tower forms for residential apartments reaching 26 storeys comprising of 258 apartments;
- Podium level car park for 300 cars incorporated within the podium levels;
- Communal open space for residents located on level 5 and 17;
- Vehicle access to the site via Little King Street;
- Associated landscaping with the public domain improvements;
- An urban plaza fronting National Park Street providing opportunities for activation and public art; and
- Construction of ancillary infrastructure and utilities as required.

It is noted that the overall development will form two separate concurrent DAs. Stage 1 will form the northern tower and podium elements and Stage 2 will form the southern tower and podium elements. These separate DA components are explored further below.

Stage 1:

The northern tower will include commercial and retail tenancies at ground level which will be accessible via National Park Street, Little King Street and Hunter Street. The podium levels will be situated above ground and contain car parking for both visitors and residents, accessed via Little King Street. Level 5 to Level 25will contain a mixture of residential apartments ranging from 1 bedroom to 3 bedrooms. A numerical breakdown of Stage 1 is shown below:

- 136 apartments including: 35 one bedroom, 74 two bedroom, 26 three bedroom, 1 four bedroom.
- Total GFA: 13,581sqm.
- Floor space ratio: 5.41:1.
- Total car parking spaces: 165 spaces over 4 podium levels.

Stage 2:

The southern tower will include commercial and retail tenancies at ground level which will be accessible via National Park Street, Little King Street and Hunter Street. The podium levels will be situated above ground and contain car parking for both visitors and residents, accessed via Little King Street. Level 1to Level 25 will contain a mixture of residential apartments ranging from1 bedroom to 3 bedrooms.

- 122 apartments including: 35 one bedroom, 72 two bedroom, 15 three bedroom.
- Total GFA:12,027sqm
- Floor space ratio: 5.43:1
- Total car parking spaces: 135 spaces over 4 podium levels

Both stages will include surrounding landscaping, public domain worksand green spaces. The strata and stratum approach are detailed further in the SEE.

3.1 SENSITIVE RECEIVERS

The following table lists the nearest/potentially most impacted sensitive receivers surrounding the site. An aerial photo of the site indicating nearby noise sensitive receivers and measurement locations is presented in Figure 1.

Table 1 – Sensitive Receivers

Receiver (Refer Figure 1)	Receiver Type	Comment
R1	Residential/Commercial	Commercial development and residential tower currently under construction to the east
R2	Residential/Commercial	Commercial development and residential tower north of the site
C1	Commercial	Commercial tower currently under construction bounding the site to the west.
C2	Commercial	Commercial development to the south
C3	Commercial	Commercial development to the south/south west
P1	Passive Recreation	Birdwood Park to the south west

3.2 ENVIRONMENTAL NOISE SOURCES

The following significant noise sources have been identified as requiring assessment:

- Traffic noise intrusion into the project site from surrounding roadways
- Noise intrusion from surrounding inner city commercial premises and entertainment venues
- Mechanical plant noise emissions (in principle)
- Noise emissions from car park and loading dock
- Noise emissions from use of common areas

Figure 1 – Site Plan Showing Local Context

- Residential Receiver
- Commercial Receiver
- Site

4 EXTERNAL NOISE INTRUSION ASSESSMENT

4.1 NOISE IMPACTING THE PROJECT SITE

Attended and unattended measurements of have been conducted to quantify existing ambient noise impacting the site. The methodology and results of the measurements are detailed in Appendix A.

We note that the site is located in the Newcastle CBD. Site investigation has revealed that noise sources impacting the site include the following:

- Traffic noise from surrounding roadways.
- Mechanical plant noise from surrounding commercial development.
- Patron/music noise from nearby entertainment venues.

4.2 NOISE INTRUSION CRITERIA

A noise intrusion assessment has been conducted based on the requirements of the following acoustic noise criteria and standards:

- Newcastle Development Control Plan (DCP) 2012
- NSW Department of Planning and Environment document – 'State Environmental Planning Policy (SEPP) (TRANSPORT AND INFRASTRUCTURE) 2021'; and
- NSW Department of Planning and Environment document – 'Developments Near Rail Corridors or Busy Roads – Interim Guideline (2008)'.

4.2.1 Newcastle DCP 2012

Section J of the Newcastle DCP 2012 contains the following control for traffic noise intrusion:

> The following controls apply to all forms of residential development
>
> 1. Dwellings that are within 100m of a road corridor with an annual daily traffic (AADT) volume of more than 40 000 vehicles (based on traffic volume data published on the website of the RMS) or 80m from a rail corridor have LAeq measures not exceeding:
>
>   (a) in any bedroom: 35dB(A) between 10pm - 7am
>
>   (b) anywhere else in the building (other than a kitchen, garage, bathroom or hallway): 40dB(A) at any time.
>
> 2. This can be achieved by:
>
>   (a) a full noise assessment prepared by a qualified acoustic engineer; or
>
>   (b) complying with relevant noise control treatment for sleeping areas and other habitable rooms in Appendix C of Draft Guide to Infrastructure development near rail corridors busy roads.

King Street traffic volumes approach /exceed 20,000 annual average and Hunter Steet is identified on the RMS 'Traffic Volume Maps for Noise Assessment' as having traffic volumes between 20,000 and 40,000AADT. As such, Section J of the Newcastle DCP 2012 requires a full noise assessment be undertaken. In addition, King and Hunter Street traffic volumes indicate that internal noise assessment be carried out in accordance with SEPP Transport and Infrastructure 2021 and the NSW EPA 'Development Near rail Corridors or Busy Roads'.

4.2.2 NSW Department of Planning and Environment document – 'State Environmental Planning Policy (SEPP) (TRANSPORT AND INFRASTRUCTURE) 2021'

Clause 2.119: Impact of road noise or vibration on non-road development

(3) If the development is for the purposes of a building for residential use, the consent authority must not grant consent to the development unless it is satisfied that appropriate measures will be taken to ensure that the following L_{Aeq} levels are not exceeded:

a) in any bedroom in the building--35 dB(A) at any time between 10 pm and 7 am,

b) anywhere else in the building (other than a garage, kitchen, bathroom or hallway) --40 dB(A) at any time.

4.2.3 NSW Department of Planning and Environment document – *'Developments near Rail Corridors or Busy Roads – Interim Guideline (2008)'*

Section 3.5

The following provides an overall summary of the assessment procedure to meet the requirements of clauses 87 and 102 of the Infrastructure SEPP. The procedure covers noise at developments for both Road and Rail.*

- *If the development is for the purpose of a building for residential use, the consent authority must be satisfied that appropriate measures will be taken to ensure that the following L_{Aeq} levels are not exceeded:*
  - *in any bedroom in the building: 35dB(A) at any time 10pm-7am*
  - *anywhere else in the building (other than a garage, kitchen, bathroom or hallway): 40dB(A) at any time."*

***We note that clause 102 (road) from 2007 Infrastructure SEPP have been superseded by Clause 2.119 in the 2021 Transport and Infrastructure SEPP revision.**

Section 3.6 of the NSW Department of Planning's 'Development near Rail Corridors and Busy Roads (Interim Guideline) specifies the following noise descriptors for the assessment of traffic noise:

- Day - Leq (15 hour)
- Night - Leq (9 hour)

The guideline also provides guidance on the assessment of natural ventilation. The allowable internal noise goal is permitted to be 10 dB(A) higher than when the windows are closed (i.e. – allowable level in bedrooms becomes 45 dB(A), and 50 dB(A) in living rooms). Where noise levels would exceed this, the NSW Planning guideline recommends that a ventilation system be provided to achieve the ventilation requirements of the BCA with windows closed. We note that where the 'open window/door' scenario cannot be achieved, this does not necessarily mean than there cannot be operable elements on these façades, only that internal noise level requirements will only be met when they are closed.

4.2.4 Summarised External Noise Intrusion Criteria

The internal noise criteria adopted for each internal space is therefore summarised below based on the relevant State, Council and Australian Standard requirements.

Table 2– Adopted Internal Noise Levels

Scenario	Space / Activity Type	Required Internal Noise Level
Windows Closed	Sleeping Areas	35 dB(A)$L_{eq(9\ hour)}$
	Living Areas	40 dB(A)$L_{eq(15\ hour)}$
Windows Open Ventilation	Sleeping Areas	45 dB(A)$L_{eq(9\ hour)}$
	Living Areas	50 dB(A)$L_{eq(15\ hour)}$

4.3 COMPLYING CONSTRUCTIONS

Assessment of façade requirements to achieve required indoor noise levels has been undertaken based on measured noise levels detailed in Appendix A. Dimensions of rooms, setbacks from roadways, window openings and floor areas have been used.

We note that the treatments recommended in this section are for planning approval purposes only and are to be reviewed at CC stage to ensure compliance with the nominated criteria is achieved.

4.3.1 Glazed Windows and Doors

The following constructions are indicated to comply with the project noise objectives. Aluminium framed/sliding glass doors and windows will be satisfactory provided they meet the following criteria. All external windows and doors listed are required to be fitted with Q-lon type acoustic seals. (**Mohair Seals are unacceptable**).

Thicker glazing may be required for structural, safety or other purposes. Where it is required to use thicker glazing than scheduled, this will also be acoustically acceptable. The recommended constructions are detailed in Table 4.

Table 3– Recommended Glazing Construction

Building	Façade	Space	Glazing Thickness	Acoustic Seals
North tower	All except South	Bedrooms	6.38mm laminated	Yes
		Living rooms	6.38mm laminated	
	South	Bedrooms	5mm	
		Living rooms	5mm	
South	All except North	Bedrooms	6.38mm laminated	
		Living rooms	6.38mm laminated	
	North	Bedrooms	5mm	
		Living rooms	5mm	

It is recommended that only window systems having test results indicating compliance with the required ratings obtained in a certified laboratory be used where windows with acoustic seals have been recommended.

In addition to complying with the minimum scheduled glazing thickness, the R_w rating of the glazing fitted into open-able frames and fixed into the building opening should not be lower than the values listed in Table 4 for all areas. Where nominated, this will require the use of acoustic seals around the full perimeter of open-able frames and the frame will need to be sealed into the building opening using a flexible sealant.

Table 4– Minimum R_w of Glazing Assembly (with Acoustic Seals)

Glazing Assembly	Minimum R_w of Installed Window
6.38mm laminated	31
5mm	29

4.3.2 External Roof/Ceiling Construction

External roof construction from concrete or masonry elements will not require acoustic upgrading. Where lightweight roof systems are proposed, they are to be reviewed by the project acoustic consultant. In the event that any penetrations are required through the external skin, an acoustic sealant should be used to minimise all gaps.

4.3.3 External Wall construction

External walls constructed from brick and masonry elements and will not require any additional acoustic treatments. Where lightweight walls are proposed, the following constructions are indicated.

Table 5– Recommended Lightweight External Wall Constructions

Façade	Space	Internal Lining	Stud System	External Lining
All	Bedrooms	13mm plasterboard	92mm stud at 600mm centres lined with 75mm thick, 11kg/m^3 insulation	9mm FC sheet
	Living Rooms			

In the event that any penetrations are required through the external skin, an acoustic sealant should be used to minimise all gaps.

4.3.4 Mechanical Ventilation

With respect to natural ventilation of a dwelling, the NSW Department of Planning document '*Development near Busy Roads and Rail Corridors - Interim Guideline*' dictates that:

"If internal noise levels with windows or doors open exceed the criteria by more than 10dB(A), the design of the ventilation for these rooms should be such that occupants can leave windows closed, if they so desire, and also to meet the ventilation requirements of the Building Code of Australia."

With windows open, the allowable internal noise goal is permitted to be 10dB(A) higher than when the windows are closed (i.e. – allowable level in bedrooms becomes 45dB(A) and living rooms becomes 50dB(A) $L_{eq(worst\ 1hr)}$.

- All façades *will not* be able to achieve required internal noise levels with windows or doors open to 5% of the floor area.

Any supplementary ventilation system proposed to be installed should be acoustically designed to ensure that the acoustic performance of the acoustic treatments outlined above is not reduced and does not exceed Council criteria for noise emission to nearby properties. A mechanical engineer is to confirm if supplementary ventilation (to meet Australian Standard AS1668.2 requirements) will be required to these rooms.

5 NOISE EMISSIONS ASSESSMENT

5.1 NOISE EMISSION CRITERIA

5.1.1 Newcastle Development Control Plan (DCP) 2012

Section I of the Newcastle DCP 2012 states the following regarding noise emissions for residential development:

> The following controls apply to all forms of residential development
>
> 1. All noise generating equipment such as air conditioning units, swimming pool filters, fixed vacuum systems and driveway entry shutters are designed to protect the acoustic privacy of residents and neighbours. All such noise generating equipment must be acoustically screened. The noise level generated by any equipment does not exceed an LAeq (15 min) of 5dB(A) above background noise at the property boundary.

We note that this requirement corresponds to the Noise Policy for Industry 'Intrusiveness' requirement. As such compliance with NPI noise trigger levels will also equate to compliance with the DCP control.

5.1.2 NSW EPA Noise Policy for Industry 2017

Criteria to assess noise emissions from the operation of the proposed development have been developed using the NPfI.

The potentially most impacted receivers surrounding the development site have been identified, and noise assessment trigger levels have been determined for each of the receiver types and locations. The trigger levels have been adopted as criteria that will be used to indicate whether additional mitigation is needed to manage noise emissions.

Appendix A and Appendix B summarise the ambient noise data obtained, and the derivation of trigger levels for each of the receivers. The criteria are summarised in the following table.

Table 6 – Project Trigger Levels

Receiver Location	Period	Trigger Noise Level (dB(A) $L_{eq,15min}$)
Residential development surrounding site	Day	58
	Evening	48
	Night	43 Max Event: 48 L_{eq} 58 L_{max}
Commercial	When in use	63
Passive Recreation	When in use	48

5.1.3 Noise Criteria for Communal Spaces

We note that the Noise Policy for industry trigger levels apply only to noise emissions from mechanical plant. There are no guidelines for noise emissions from communal open space, similar to private back yards. For noise emissions from use of common areas, "background noise + 5 dB(A)" will be used to indicate whether typical activities are likely to be audible above the general acoustic environment. The resultant indicator levels being being 64 dB(A) $L_{eq(15\ min)}$ during the day and 57 dB(A) $L_{eq(15\ min)}$ during the evening. Night time use would be regulated as part of being a "good neighbour'".

5.2 ASSESSMENT/RECOMMENDATIONS

5.2.1 Noise From Mechanical Plant Within Proposed Site Generally

Detailed plant selections and location has not been undertaken at this stage. Satisfactory levels will be achievable through appropriate plant selection, location and if necessary, standard acoustic treatments such as duct lining, acoustic silencers and enclosures.

Noise emissions from all mechanical services to the closest residential receiver should comply with the requirements of Section 5.1.

Detailed acoustic review should be undertaken at CC stage to determine acoustic treatments to control noise emissions to satisfactory levels.

5.2.2 Noise From Retail/Commercial Tenancies

The primary sources of noise generated by these commercial uses are likely to be loading dock activities, mechanical plant servicing the building and outdoor patron noise associated with food and beverage outlets. It is expected that all individual retail/commercial tenancies would be subject to a separate development application, at which time the specific measures required to control noise emissions could be addressed. Key acoustic considerations for the proposed tenancies are detailed below.

- Retail outlets are expected to have a minimal impact on the proposed residential uses.
- Licensed tenancies (especially those which are proposed to operate during the night-time period) will likely have a higher potential acoustic impact, pending their capacity and siting. Tenancies of this nature would require a noise impact assessment to be conducted to determine appropriate management controls and treatments in order to mitigate noise impacts to nearby residents of the development.

Notwithstanding the above, it is recommended that all proposed retail/commercial/hospitality uses within the site be subject to a separate development application once specific uses and operators have been determined. At this time, individual tenancies should demonstrate that noise emission requirements are able to be met, and the specific management controls/building treatments which may be implemented to ensure compliance. Further, the cumulative impacts of noise from the combined operation of all retail tenancies should be considered when assessing noise from individual tenancies.

5.2.3 Noise From Communal Areas

We note that two communal areas are located on level 5 and one on Level 17 of the development. An acoustic review of these areas has been undertaken.

Noise predictions to the nearest residential receiver are presented below. Noise predictions take into account barriers where applicable and distance to receivers. We note that compliance at the nearest receiver will result in compliance at all other receivers located further away. We have assumed conservatively that 30 people are using each of the areas at any one time. General use of these areas is expected to be lower.

Table 7 – Noise Prediction From Use of Communal Areas

Receiver	Predicted Noise Level dB(A) $L_{eq(15\ minute)}$	Evening Background + 5 dB(A) dB(A) $L_{eq(15\ minute)}$	Compliance
R1	46	57	Yes

Based on the review we make the following recommendations:

- Use of the roof communal areas should be limited to:
  - 7:00am to 10:00pm.
  - A sign should be installed at the entry to the communal areas outlining the above.
- Use of the outdoor communal area should be subject to normal strata management rules regarding noise generation.

5.2.4 Noise From Carpark/Driveway

5.2.4.1 Data and Assumptions

Assessment of the carpark and driveway noise emissions has been undertaken based on an estimated maximum number of vehicle movements during AM and PM peak hours being the full amount of parking spots. There are approximately 60 car spaces on each of the 4 parking levels. The assessment below has been undertaken on the assumption that all spaces will be vacated or filled within a one-hour period during the typical peak times (i.e., 8am to 9am or 5pm to 6pm).

Generally, use of the car park would be less than this and as such the noise levels presented are suitably conservative, particularly during the evening and night-time period where movements are lower.

Calculations have been made to predict noise levels occurring at the worst affected points for nearest receiver (**R1**).

The following noise emission data for vehicle-related noise sources measured by this office have been used for the assessment.

Table 8– Sound Power Levels of Typical Car Movements

Car Movement	Sound Power Level
Car Manoeuvring @ 10km/h	84 dB(A) L_{eq}
Car Door Slamming	96 dB(A) L_{Fmax}

5.2.4.2 Predicted Noise Levels

The predicted car park/driveway noise emissions from the development are presented in the following table. Predicted noise levels factor in losses due to distance attenuation, barrier effects from and transmission losses through the building structure (where applicable).

Predictions have been presented to the most affected point at the nearest receiver, compliance at which will result in compliance to all other points and receivers located further from the noise source.

Table 9 – Predicted Noise Levels from Use of Driveway/Car Park

Noise Source	Receiver	Time of Day	Predicted Noise Level	Required Noise Level	Comments
Driveway/car park (Cars -Peak Usage)	R1	Peak Periods of Use (8-9am & 5-6pm)	58 dB(A) $L_{eq(15min)}$	≤ 58 dB(A) $L_{eq(15min)}$ **(NPfI Day Time Amenity Level Refer Section 5.1)**	Achieves project noise emission criteria
Carpark (Door slamming/ sleep disturbance)		Night-time 10pm-7am	37 dB(A) L_{Fmax}	58 dB(A)L_{Fmax} **(NPfI Sleep Disturbance Criteria Refer Section 5.1)**	

5.2.5 Noise From Use of Loading Dock/Truck Use Of Driveway

A ground floor loading dock is proposed to service the retail/commercial tenancies within the development. Access to the loading docks is via king Street. Noise emissions from heavy vehicle use of the loading dock and driveway has been assessed. Consideration has been given to the potential for sleep disturbance from peak noise events in the event that it is proposed to operate the loading dock during the night-time period (10:00pm – 7:00am) for large deliveries or waste collection.

The assessment is based on the conservative assumption that one truck would arrive every 15 minutes (there is only space for one truck in the loading dock). The predicted noise levels to the façade of nearest residents at R1 are presented in the table below.

Table 10 – Predicted Noise Levels from Use of Loading Dock

Noise Source	Receiver	Time of Day	Predicted Noise Level	Required Noise Level	Comments
Truck use of driveway	R1	Day & Evening Time 7am – 10pm	<30 dB(A) $L_{eq(15min)}$	≤ 48 dB(A) $L_{eq(15min)}$ **(NPfI Evening Amenity Level Refer Section 5.1)**	Achieves project noise emission criteria
		Night-time 10pm-7am	<30 dB(A) $L_{eq(15min)}$	48 dB(A)L_{eq} **(NPfI Sleep Disturbance Criteria Refer Section 5.1)**	
Truck reverse beeper in loading dock area		Night-time 10pm-7am	43 dB(A) L_{Fmax}	58 dB(A)L_{Fmax} **(NPfI Sleep Disturbance Criteria Refer Section 5.1)**	
Truck reverse beeper on driveway			61 dB(A) L_{Fmax}		Exceeds max event trigger level*

*See discussion/recommendations in following section.

5.2.5.1 Discussion/Recommendations

Use of the driveway/loading dock is expected to achieve project noise emission criteria during the day and evening periods.

Where night time use of the loading dock is proposed, reversing is only to take place in the enclosed loading dock area and not in the driveway.

6 ROAD TRAFFIC NOISE GENERATED BY THE PROPOSED DEVELOPMENT

The impact of additional traffic generated by the proposed development has been assessed using the EPA RNP, which states the following:

- Section 2.3 of the RNP provides criteria for assessing impacts at residential and non-residential receivers, for different road classifications. The total traffic noise level from existing roads and the traffic generating development exceed the 'traffic generating development' criterion for residences in Table 3 or the criteria for non-residential land uses in Table 4.

- Where the existing traffic noise level is close to or exceeds the criteria in Tables 3 or 4, the RNP indicates that an increase of up to 2dB(A) represents a minor impact that is considered barely perceptible to the average person, and for existing residences and other sensitive land uses affected by additional traffic on existing roads generated by land use development, any increase in the total traffic noise level should be limited to 2dB above that of the corresponding 'no build option'.

- Where night time traffic movements are proposed, the impact on sleep from maximum noise events generated by these movements should also be considered for residential receivers.

Traffic noise data obtained from the Traffic Impact Assessment prepared by BG& E with document reference N21112_RPT_001 REV / A1, dated 6/10/2022, indicates the proposed development will generate the following traffic movements:

- 156 trips during AM peak hour period

- 97 trips during AM peak hour period

The assumed distribution of these trips on surrounding roadways is detailed in the following Figure taken from the BG&E traffic Impact Assessment:

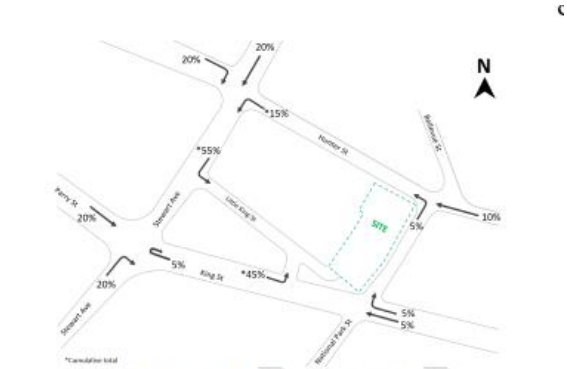


Figure 15 – Assumed Inbound Percentage Distribution

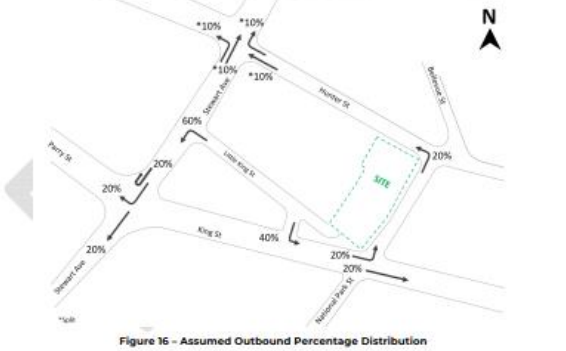


Figure 16 – Assumed Outbound Percentage Distribution

The existing traffic movements are detailed in the following table:

Table 11 – Existing Traffic Movements Around Site

Road	Section	AM V/HR	PM V/HR
King St	West of Little King St	1448	1183
King St	East of Little king St	1080	1460
Little King St	North of Little King St	234	238
National Park Street	North of King St	26	441
National Park Street	South of King St	58	520
Stewart Ave	North of King St	973	1218
Stewart Ave	South of King St	1250	823
Hunter St	West of National Park St	752	508
Hunter St	East of national Park St	477	695

The increase in noise levels have been predicted based on the following:

- The existing and predicted development vehicle movement numbers.
- Vehicle speed of 50 km/hr,
- Hard ground between the source and the measurement location.
- Neutral weather conditions.

The predicted increase in the L_{eq} noise level is < 2 dB(A) for all surrounding roadways.

As the increase in road traffic noise levels are predicted to be ≤2dB, it is concluded that any increase in road traffic noise as a result of the proposal would be inaudible and would therefore not adversely impact any residential receiver.

7 CONCLUSION

This report assesses potential noise and vibration impacts from the construction and operation of the proposed development at 711 Hunter Street, Newcastle.

- Complying constructions have been determined and presented in the report so that internal noise levels within apartments comply with the acoustic requirements of the following documents:

    - Newcastle Development Control Plan (DCP) 2012;
    - NSW Department of Planning and Environment document – 'State Environmental Planning Policy (SEPP) (TRANSPORT AND INFRASTRUCTURE) 2021'; and
    - NSW Department of Planning and Environment document – 'Developments Near Rail Corridors or Busy Roads – Interim Guideline (2008)'.

  A detailed review of façade requirements should be undertaken at CC stage.

- Project noise emission criteria have been determined in accordance with the Noise Policy for Industry where applicable. Noise from the proposed car park and loading dock has been assessed and is expected to comply with project noise trigger levels provided the recommendations in the report are adopted. A detailed review of mechanical plant proposed for the site is to be undertaken at CC stage to ensure compliance with the nominated criteria.

- A review of noise emissions from the proposed communal open space indicates that typical activities during the day and evening would not adversely impact the surrounding properties, and management of night time use is recommended.

- Traffic noise generation has been assessed and found to be compliant with NSW EPA Road Noise Policy requirements.

We trust this information is satisfactory. Please contact us should you have any further queries.

Yours faithfully,

Acoustic Logic Pty Ltd
Ross Ferraro

APPENDIX A AMBIENT NOISE MONITORING

This appendix summarises the ambient noise data measured near the subject site, and the calculated noise level descriptors adopted to characterise the existing noise environment.

Monitoring has been undertaken to provide the following ambient data:

- Background noise levels at the surrounding residential properties.
- Traffic/ambient noise levels.

Noise Descriptors

Ambient noise constantly varies in level from moment to moment, so it is not possible to accurately determine prevailing noise conditions by measuring a single, instantaneous noise level.

To quantify ambient noise, a 15 minute measurement interval is typically utilised. Noise levels are monitored on a continuous basis over this period, and statistical and integrating techniques are used to characterise the noise being measured.

The principal measurement parameters are:

L_{eq} - represents the average noise energy during a measurement period. This parameter is derived by integrating the noise levels measured over the measurement period. L_{eq} is important in the assessment of noise impact as it closely corresponds with how humans perceive the loudness of steady state and quasi-steady state noise sources (such as traffic noise).

L_{90} – This is commonly used as a measure of the background noise level as it represents the noise level heard in the quieter periods during the measurement interval. The L_{90} parameter is used to set noise emission criteria for potentially intrusive noise sources since the disturbance caused by a noise 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.

L_{10} is used in some guidelines to measure noise produced by an intrusive noise source since it represents the average of the loudest noise levels produced at the source. Typically, this is used to assess noise from licenced venues.

L_{max} is the highest noise level produced during a noise event, and is typically used to assess sleep arousal impacts from short term noise events during the night. It is also used to assess internal noise levels resulting from aircraft and railway ground vibration induced noise.

L_1 is sometimes used in place of L_{max} to represent a typical noise level from a number of high level, short term noise events.

A.1 UNATTENDED LONG TERM NOISE MONITORING

A.1.1 EQUIPMENT USED

Unattended noise monitoring was conducted using the following equipment:

- Rion NL-42 (Type 2)
- Rion Sound Level calibrator Type NC 74

The monitoring was continuous, with statistical noise levels recorded at 15-minute intervals throughout the monitoring period. Measurements were taken on "A" frequency weighting and fast time response, unless noted otherwise.

All monitoring equipment used retains current calibration - either manufacturers' calibration or NATA certified calibration. The monitors were field calibrated at the beginning and the end of the measurement with no significant drift in calibration noted.

A.1.2 LOCATIONS MONITORED

The locations monitored are indicated Figure A-1. Photographs of the monitoring locations are provided below:

A.1.3 WEATHER AFFECTED AND EXTRANEOUS/OUTLYING DATA

Periods affected by adverse weather conditions (as defined by Fact Sheet B) are indicated on the following data graphs. Weather data was obtained from records provided by the Bureau of Meteorology for the following station:

- Newcastle

The following periods have been identified as likely to contain significant periods of non-representative data and have been excluded from the assessment:

- 23/9/2022 Day
- 24/9/2022 Day Evening

As the Bureau of Meteorology wind data is typically obtained at an exposed location at 10m above ground level, and the monitoring locations were at approximately 1.5m above ground in more sheltered locations a wind multiplying factor of 0.5 has been applied to the BOM data to estimate the wind speed at the microphone location.

Figure A- 2 – Noise Monitoring Locations

Unattended Monitoring Location

Attended Monitoring Location

PHOTOS OF MONITORS

1

2

A.2 CALCULATION OF REPRESENTATIVE AMBIENT NOISE LEVELS

The ambient, assessment and rating background levels have been determined from the unattended, long-term noise monitoring data based on the methodology in the Noise Policy for Industry Fact Sheet B.

A.3 RATING BACKGROUND NOISE LEVELS

The following tables summarise the assessment background noise levels (ABL) for each location. Note that where no ABL is indicated, this is because that period was significantly affected by adverse weather or other extraneous noise.

The day, evening and night periods are as defined in the NPfI, as follows:

- Day - period from 7 am to 6 pm Monday to Saturday or 8 am to 6 pm on Sundays and public holidays
- Evening - the period from 6 pm to 10 pm
- Night - the remaining periods

In accordance with the NPfI:

- If the calculated evening rating background noise level is higher than the day level, the day rating background noise level has been adopted for the evening period.
- If the calculated night rating background noise level is higher than the evening level, the evening rating background noise level has been adopted for the evening period.
- If the calculated day rating background noise level was less than 35 dB(A), a "default" background of 35 dB(A) has been adopted.
- If the calculated evening or night rating background noise level was less than 30 dB(A), a "default" background of 30 dB(A) has been adopted.
- Where monitoring was conducted within 3m of a significant sound reflecting surface, 2.5 dB(A) has been subtracted from the calculated rating background to account for an increase in noise from reflections.

Table 12 –Assessment Background Noise Levels – Location 1

Location	Date	ABL		
		Day	Evening	Night
Logger 1 - North	Tuesday 16 August 2022	-	49.5	42.2
	Wednesday 17 August 2022	61.3	51.5	43.6
	Thursday 18 August 2022	59.4	51.1	41.8
	Friday 19 August 2022	59.1	53.2	42.5
	Saturday 20 August 2022	55.5	54.3	45.7
	Sunday 21 August 2022	51.9	51.5	44.6
	Monday 22 August 2022	58.3	49.4	40.8
	Tuesday 23 August 2022	-	53.9	48.8
	Wednesday 24 August 2022	-	-	41.7
	Thursday 25 August 2022	59.9	52.2	46.9
	Calculated RBL	**59**	**52**	**43**
	Adopted RBL	**59**	**52**	**43**

Table 13 – Assessment Background Noise Levels – Location 2

Location	Date	ABL		
		Day	Evening	Night
Logger 2 - South	Tuesday 16 August 2022	-	51.5	43.9
	Wednesday 17 August 2022	59.2	51.5	43
	Thursday 18 August 2022	58.8	51.1	42.1
	Friday 19 August 2022	58.9	53.5	44.3
	Saturday 20 August 2022	56.6	54	45.6
	Sunday 21 August 2022	53.9	49.1	42.2
	Monday 22 August 2022	-	50.8	39.7
	Tuesday 23 August 2022	-	-	49.5
	Wednesday 24 August 2022	59	53.1	42.8
	Thursday 25 August 2022	59.2	52.9	46.3
	Calculated RBL	**59**	**52**	**44**
	Adopted RBL	**59**	**52**	**44**

A.4 NPFI AMBIENT NOISE LEVELS

The NPfI ambient noise levels calculated for each location are summarised in the following table.

Table 14 –Ambient Noise

Location	Ambient Noise Level (dB(A) $L_{eq,period}$)*		
	Day	Evening	Night
1	67	64	61
2	67	62	58

A.5 AMBIENT NOISE LEVELS – TISEPP/DNRCBR NOISE INTRUSION ASSESSMENT

The $L_{eq,15hr}$ (day period, 7am to 10pm) and $L_{eq,9hr}$ (night period, 10pm to 7am) ambient noise level descriptors adopted in the EPA "Development Near Rail Corridors and Busy Roads" and NSW "Road Noise Policy" guidelines have been calculated from the data, and are summarised in the following table.

Table 15 – ISEPP/DNRCBR Ambient Noise

Location	Ambient Noise Level (dB(A) $L_{eq,period}$)*	
	Day (7am to 10pm)	Night (10pm to 7am)
1	66	61
2	66	58

A.6 ATTENDED MONITORING

A.6.1 EQUIPMENT USED

Attended noise monitoring was conducted using a Norsonic 131 sound level meter

The sound level meter equipment used retain current calibration - either manufacturers' calibration or NATA certified calibration, and were field calibrated at the beginning and the end of the measurement with no significant drift in calibration noted.

A.6.2 LOCATIONS MONITORED

The monitoring locations are indicated in Figure A-1 and are described below:

1. Measurement taken approximately 3m from Hunter Street kerb. Noted that there was construction noise present.

2. Measurement taken approximately 3m from King Street kerb. Noise environment dominated by traffic.

3. Measurement taken approximately 3m from National Park Street kerb. Noted that there was construction noise present.

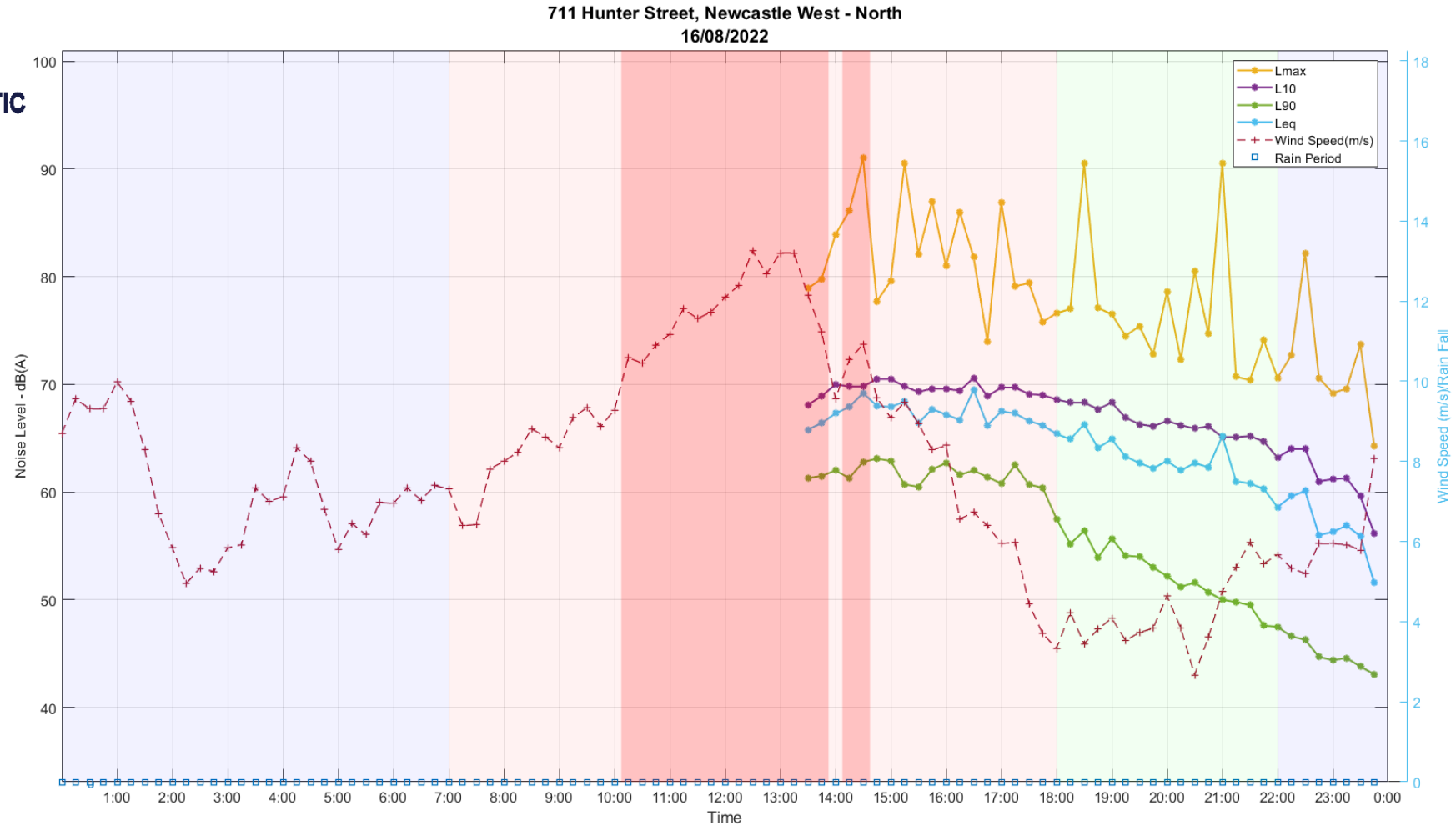
A.6.3 RESULTS

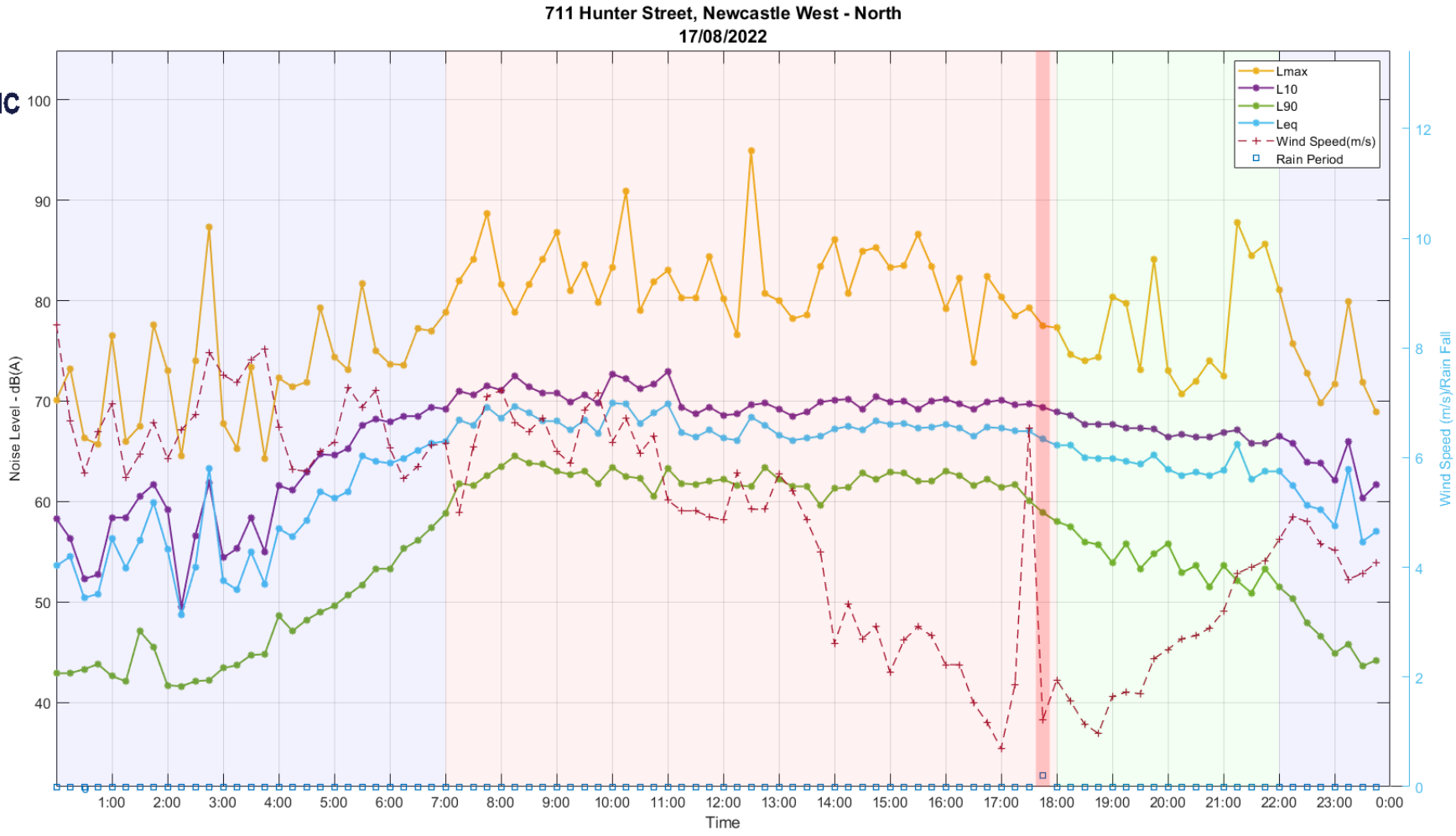
Table 16 – Attended Traffic Noise Measurement Results

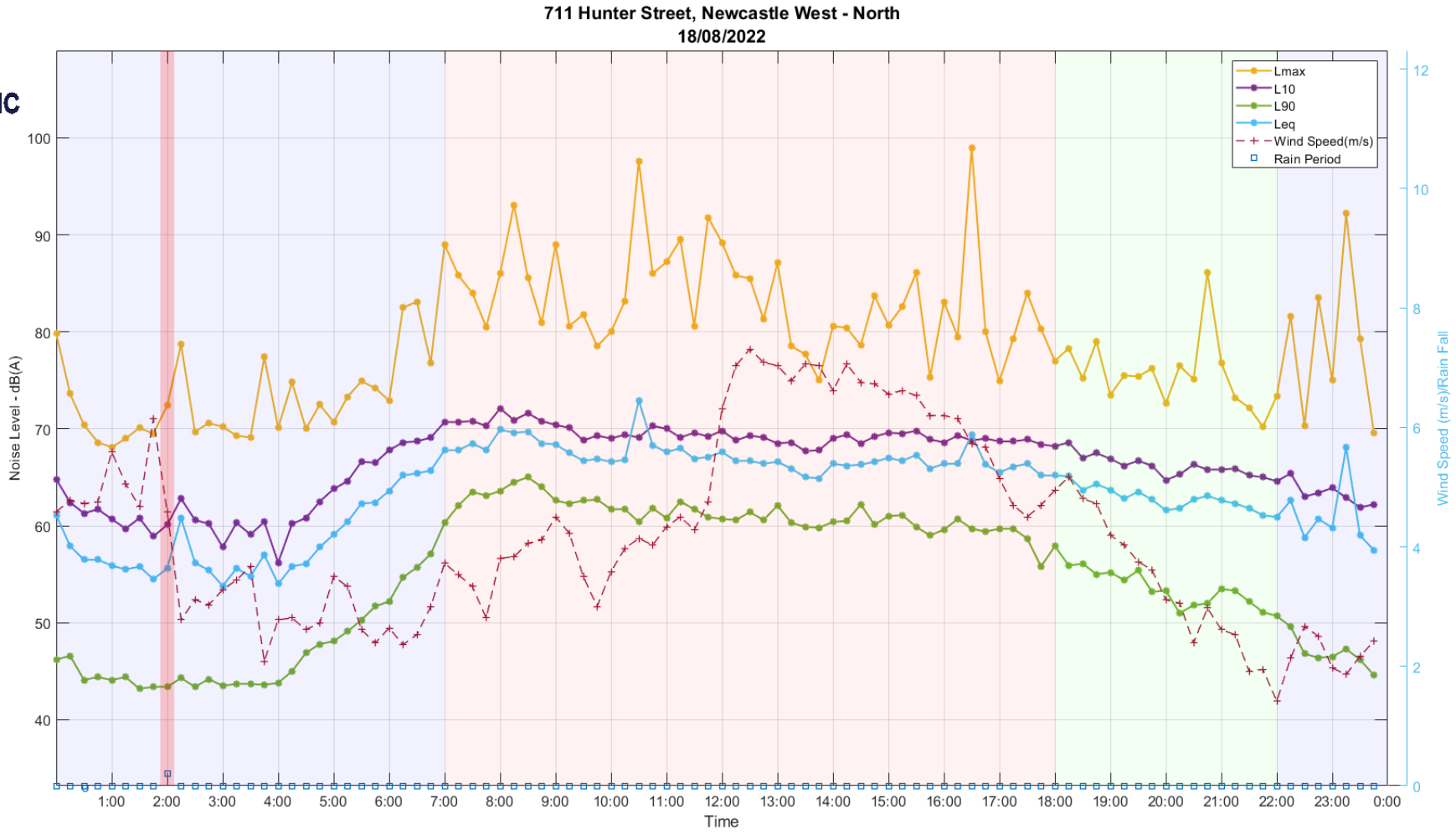
Measurement Location	Measured Noise Level dB(A) $L_{eq\ (15\ min)}$
1	69
2	67
3	66

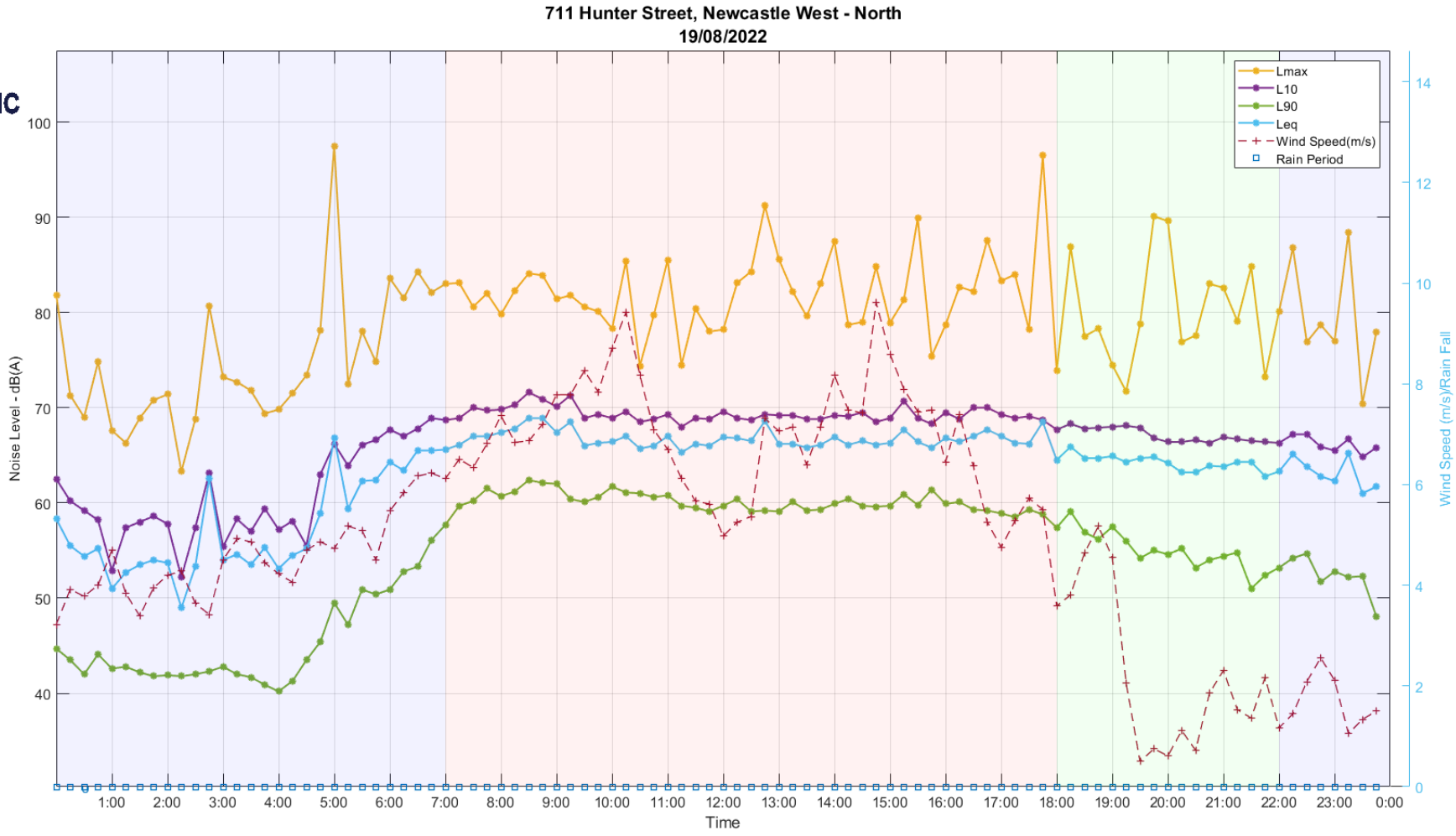
A.7 UNATTENDED MONITORING DATA GRAPHS

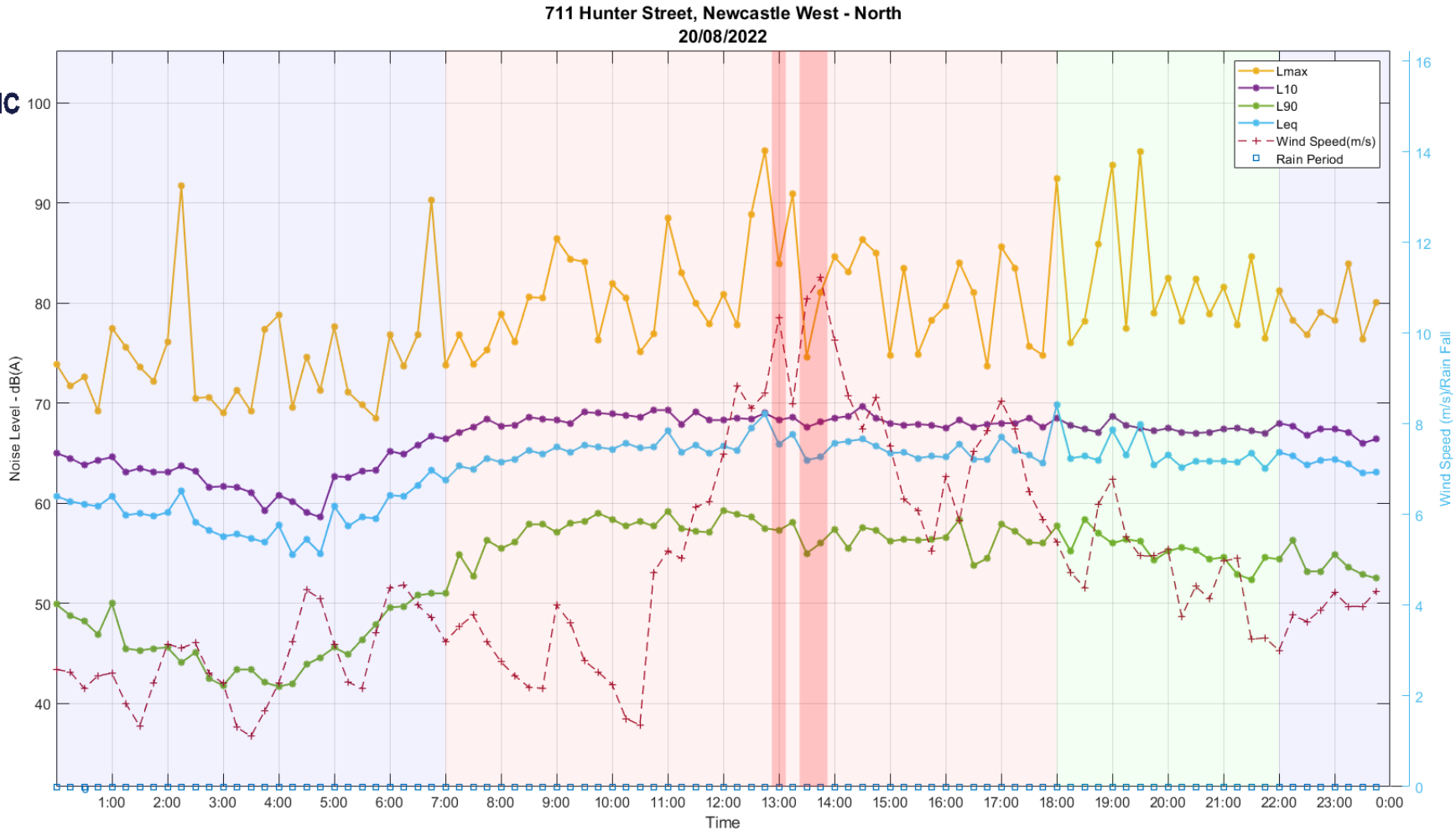
MONITOR 1 - North

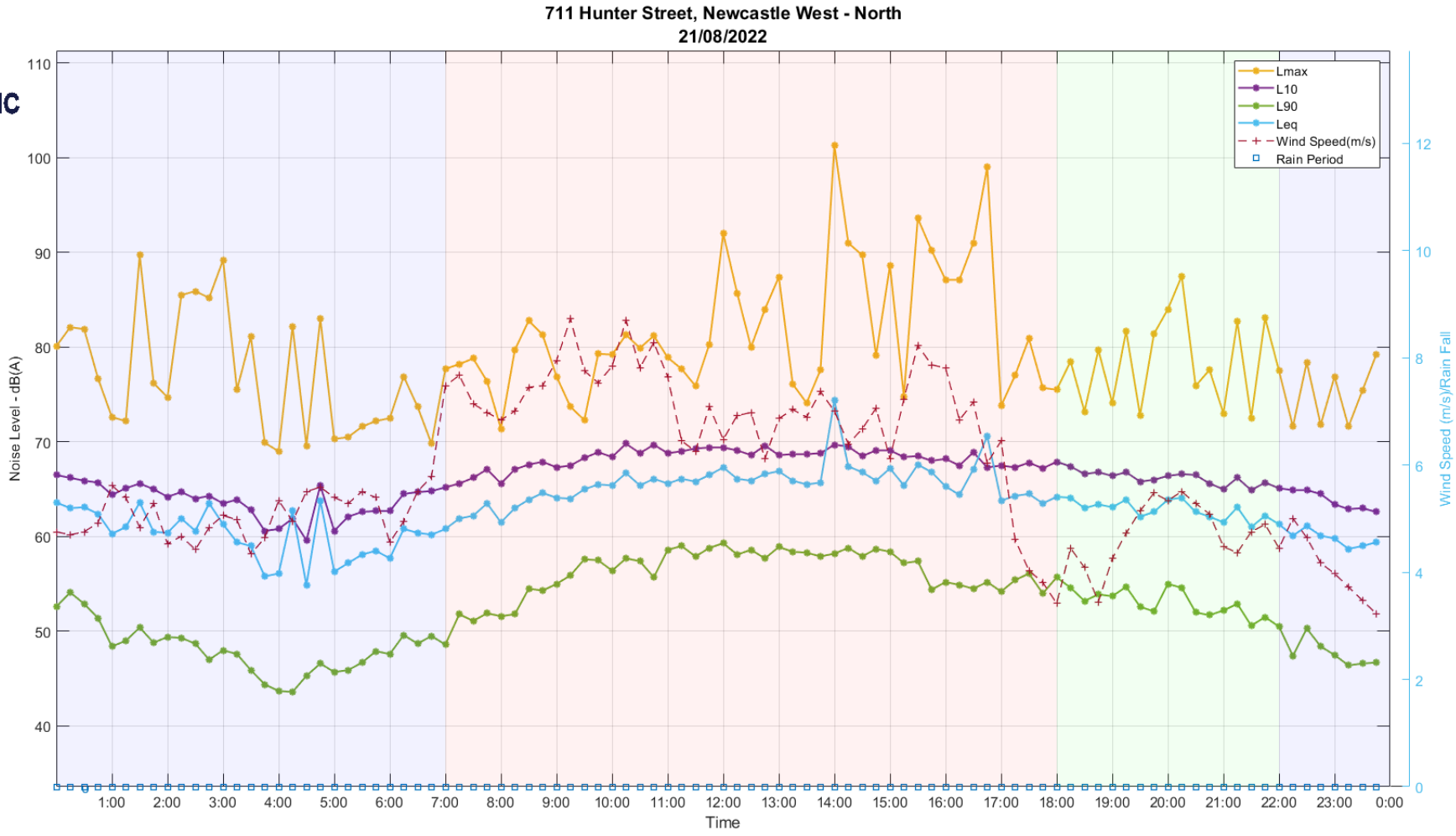

711 Hunter Street, Newcastle West - North
16/08/2022
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
18
16
14
12
10
8
6
4
2
0
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00

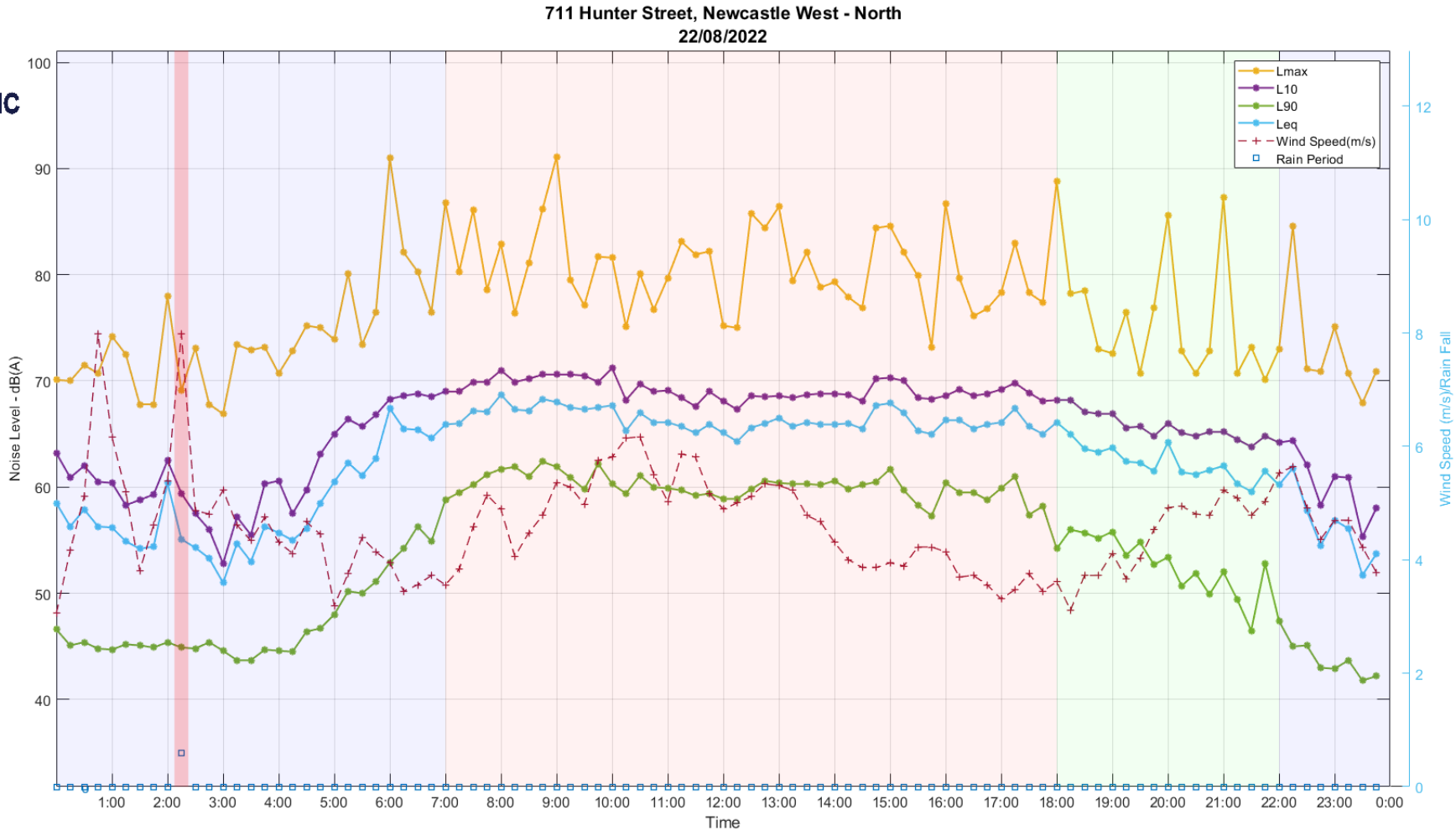

711 Hunter Street, Newcastle West - North
17/08/2022
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
12
10
8
6
4
2
0
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00

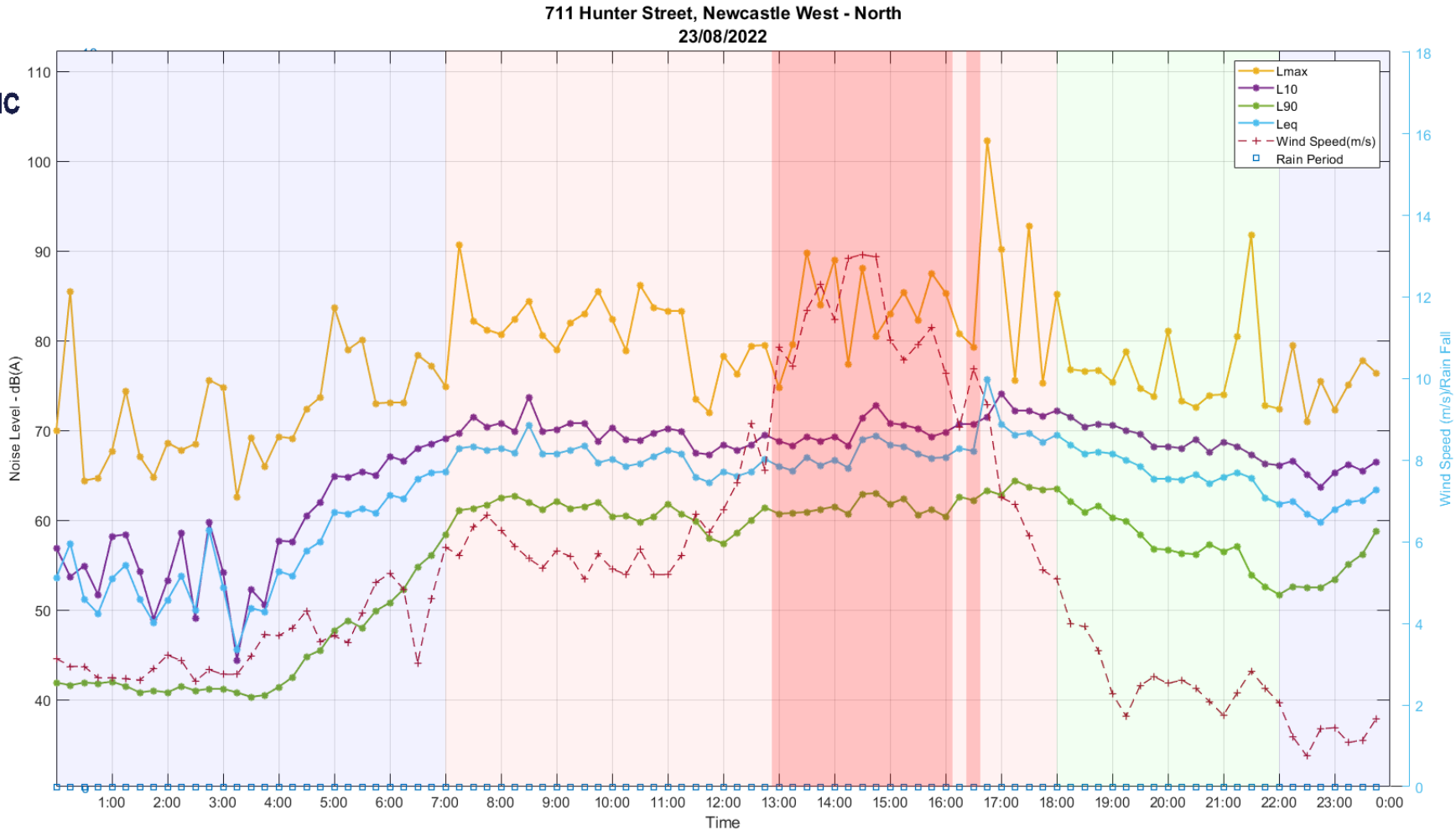

711 Hunter Street, Newcastle West - North
18/08/2022
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
12
10
8
6
4
2
0
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00

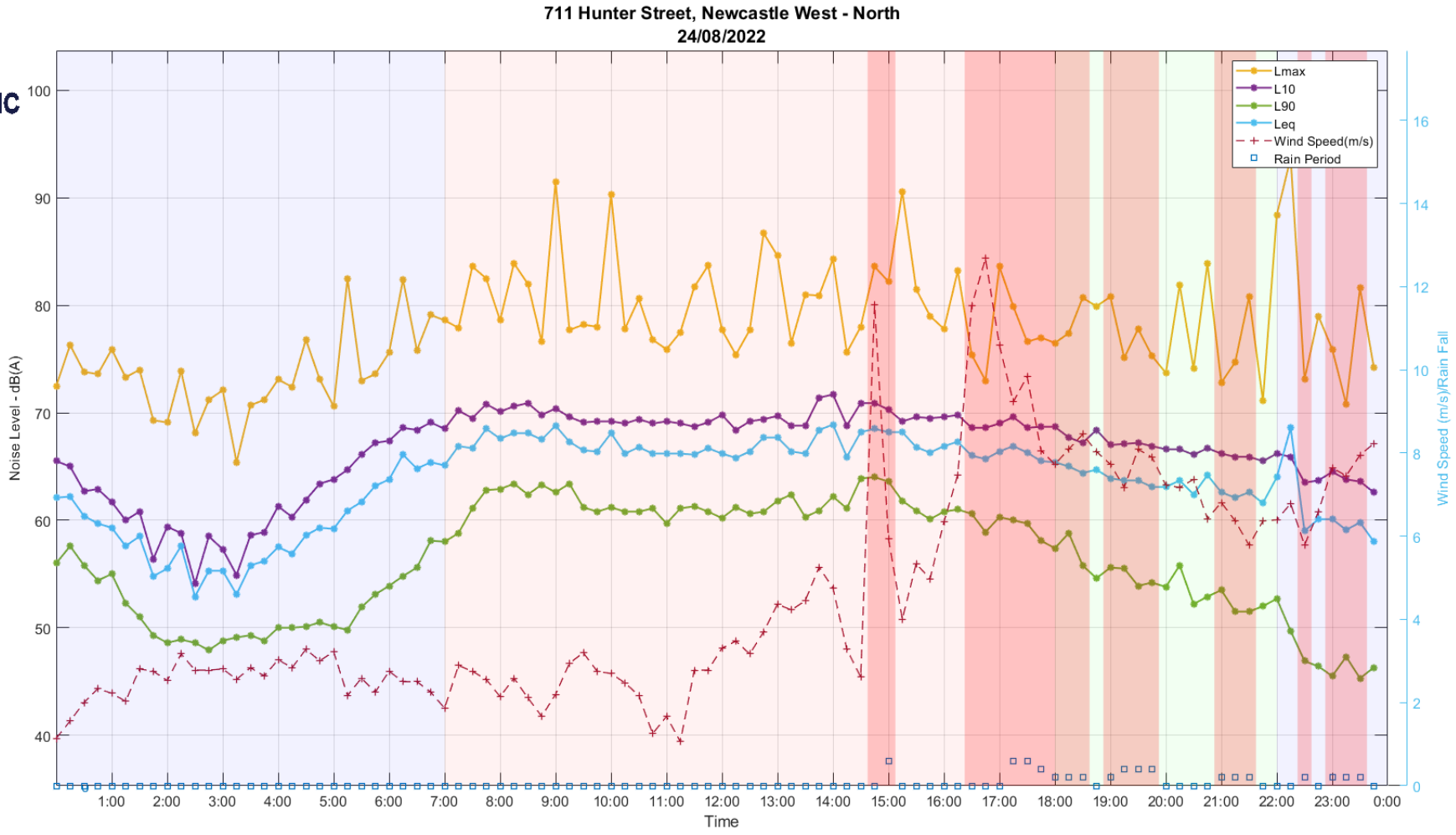

711 Hunter Street, Newcastle West - North
19/08/2022
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
14
12
10
8
6
4
2
0
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00

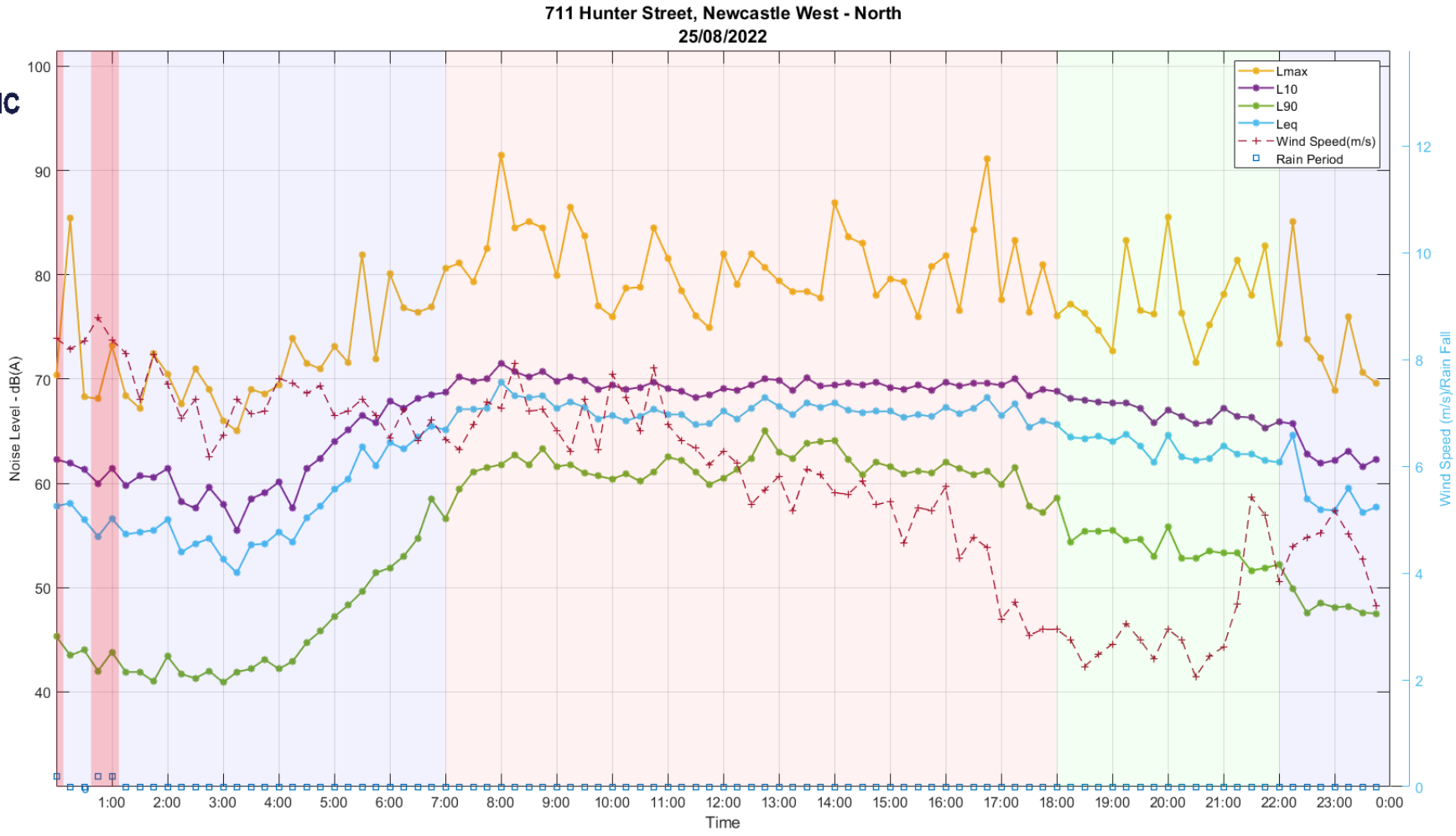

711 Hunter Street, Newcastle West - North
20/08/2022
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
16
14
12
10
8
6
4
2
0
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00


711 Hunter Street, Newcastle West - North
21/08/2022
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
110
100
90
80
70
60
50
40
12
10
8
6
4
2
0
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00

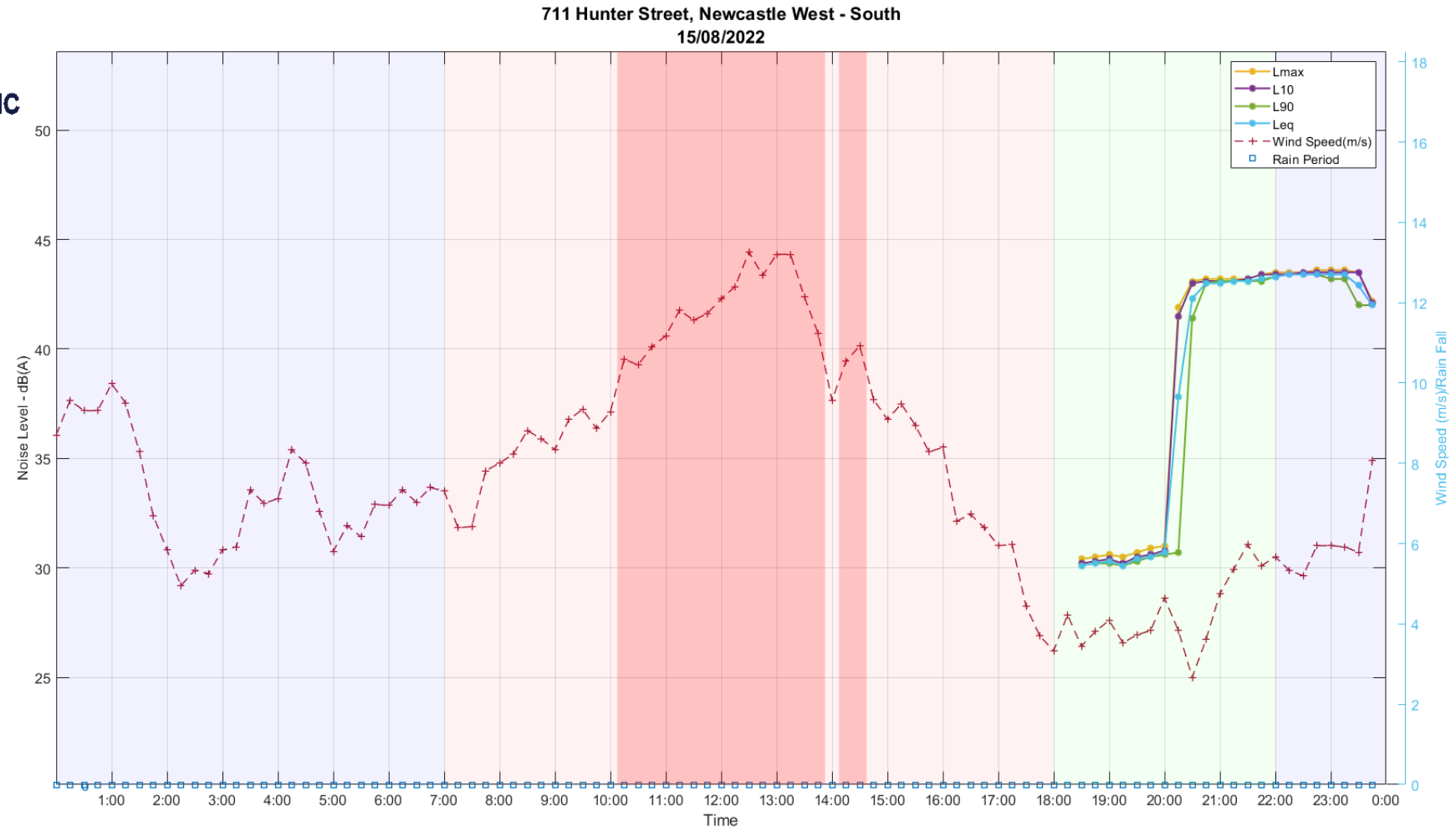

711 Hunter Street, Newcastle West - North
22/08/2022
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
12
10
8
6
4
2
0
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00

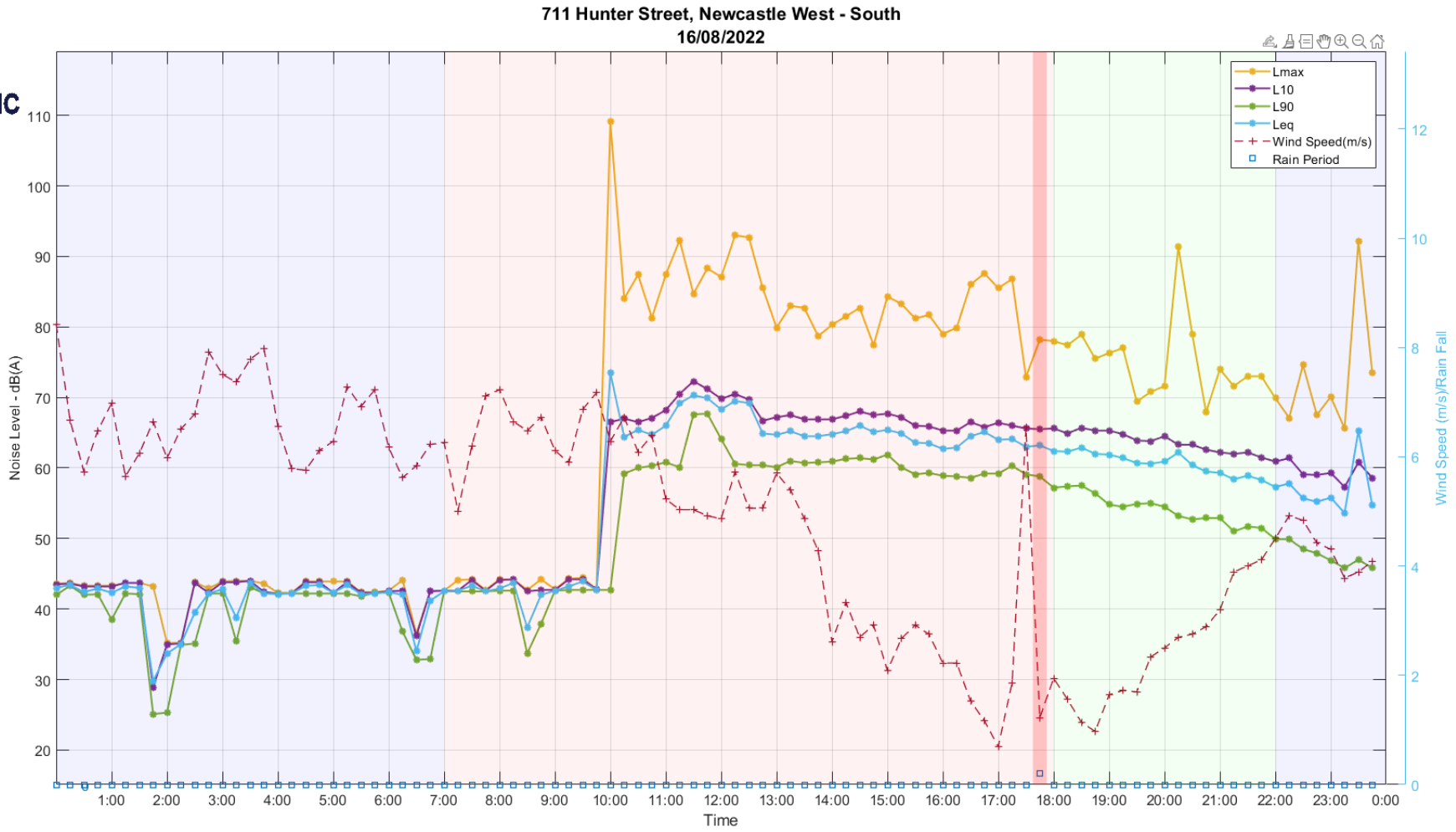

711 Hunter Street, Newcastle West - North
23/08/2022
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
110
100
90
80
70
60
50
40
18
16
14
12
10
8
6
4
2
0
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00

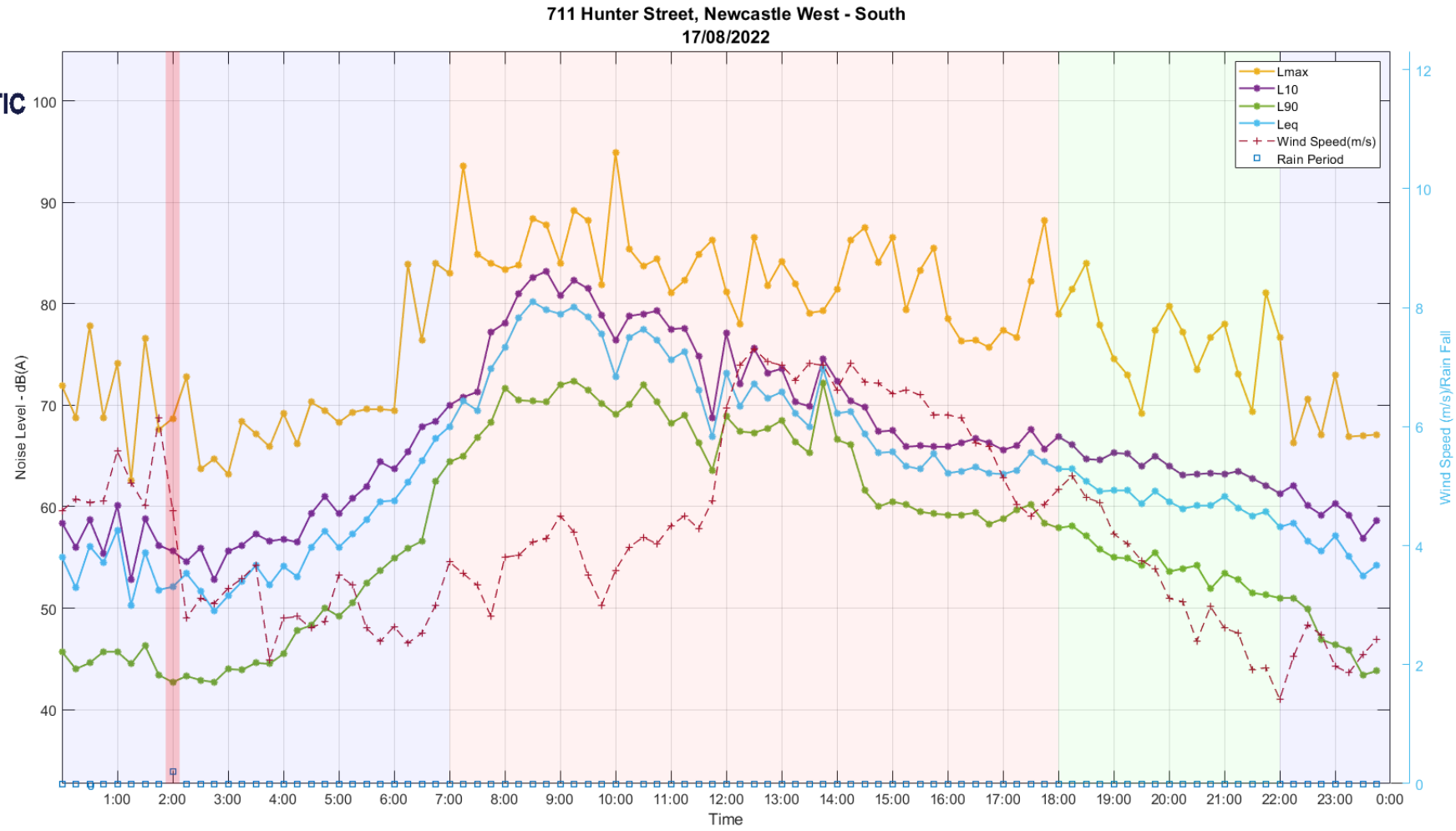

711 Hunter Street, Newcastle West - North
24/08/2022
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
16
14
12
10
8
6
4
2
0
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00

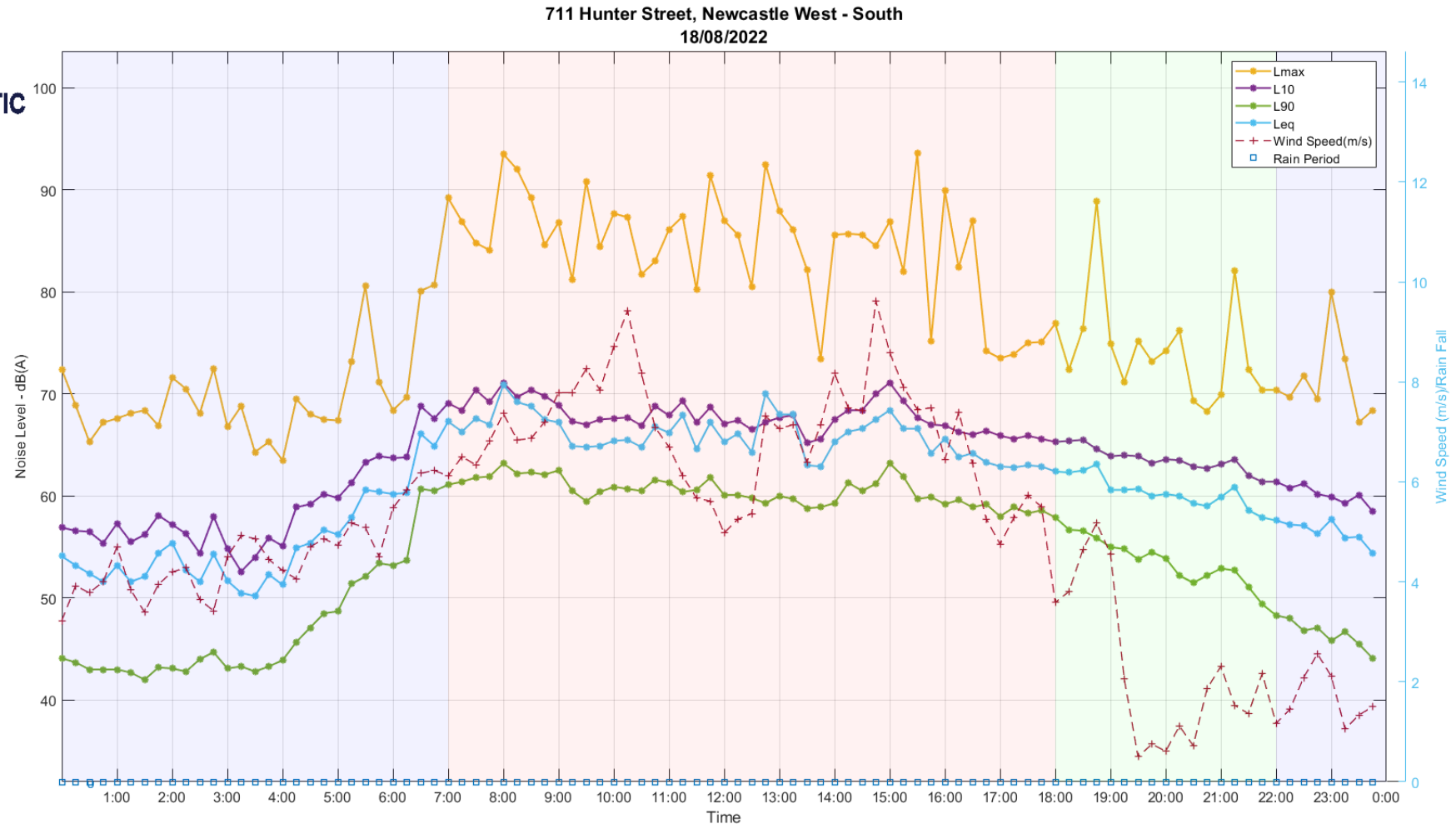

711 Hunter Street, Newcastle West - North
25/08/2022
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
12
10
8
6
4
2
0
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00

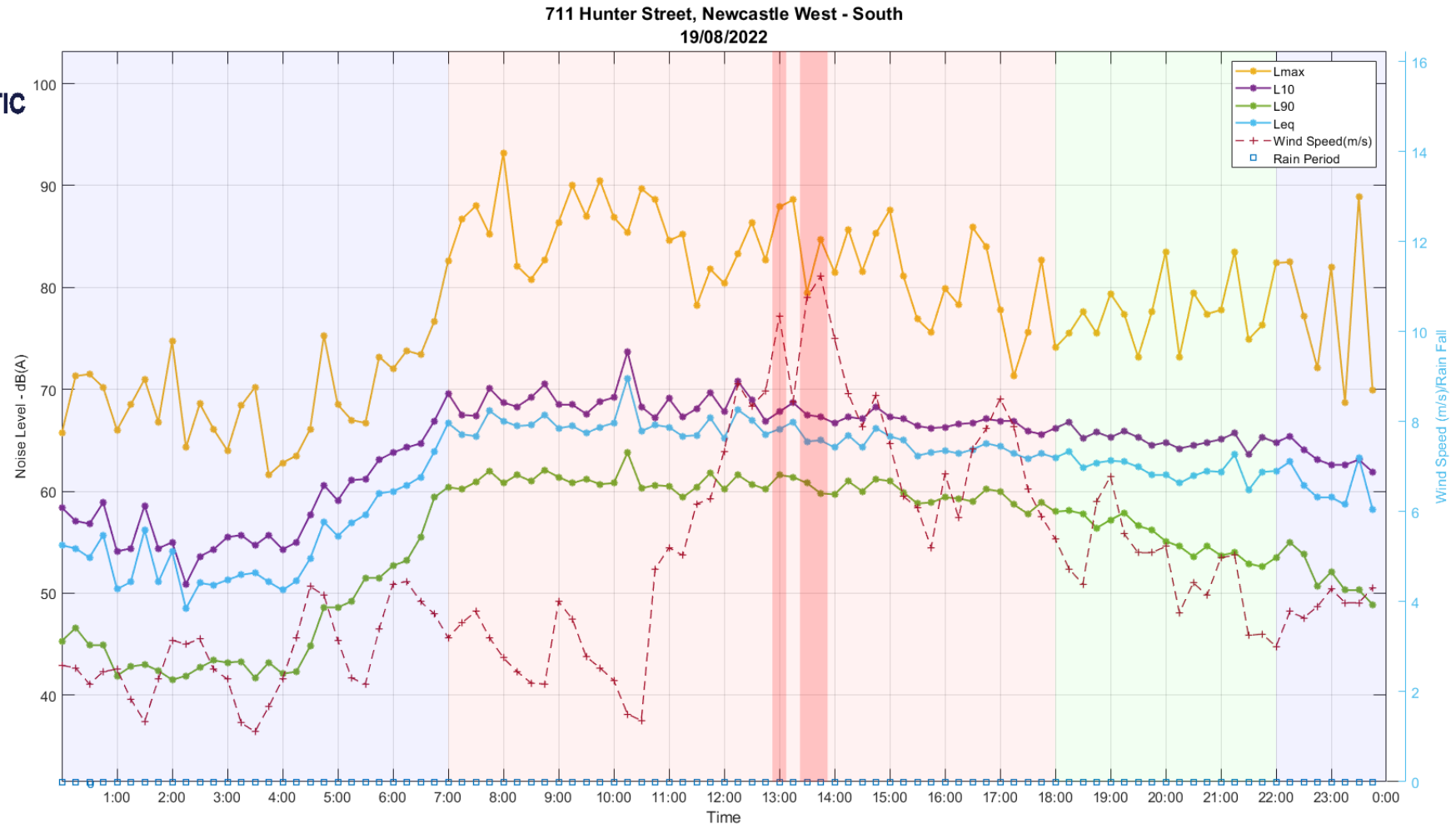
MONITOR 2 - SOUTH

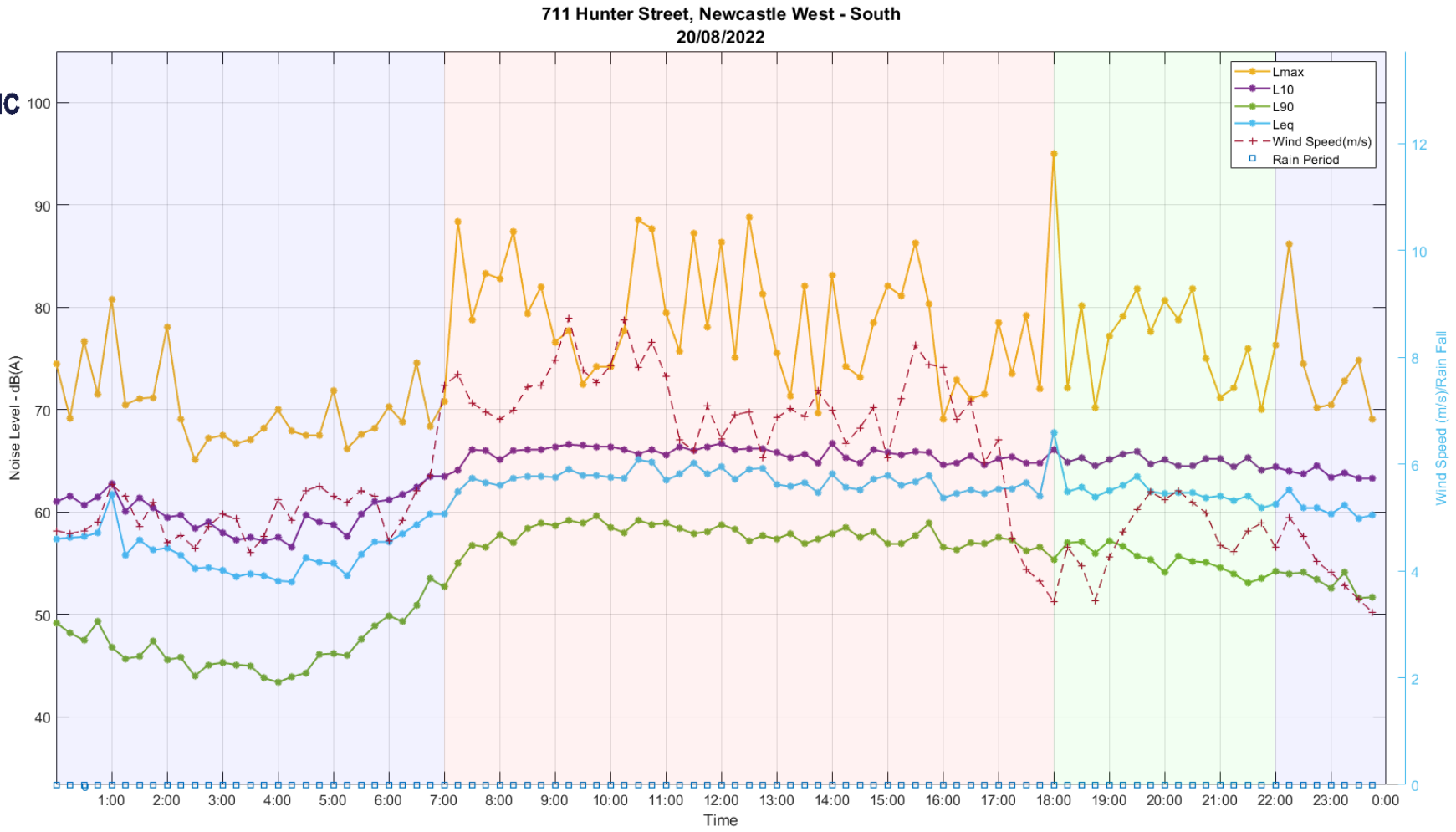

711 Hunter Street, Newcastle West - South
15/08/2022
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
50
45
40
35
30
25
18
16
14
12
10
8
6
4
2
0
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00

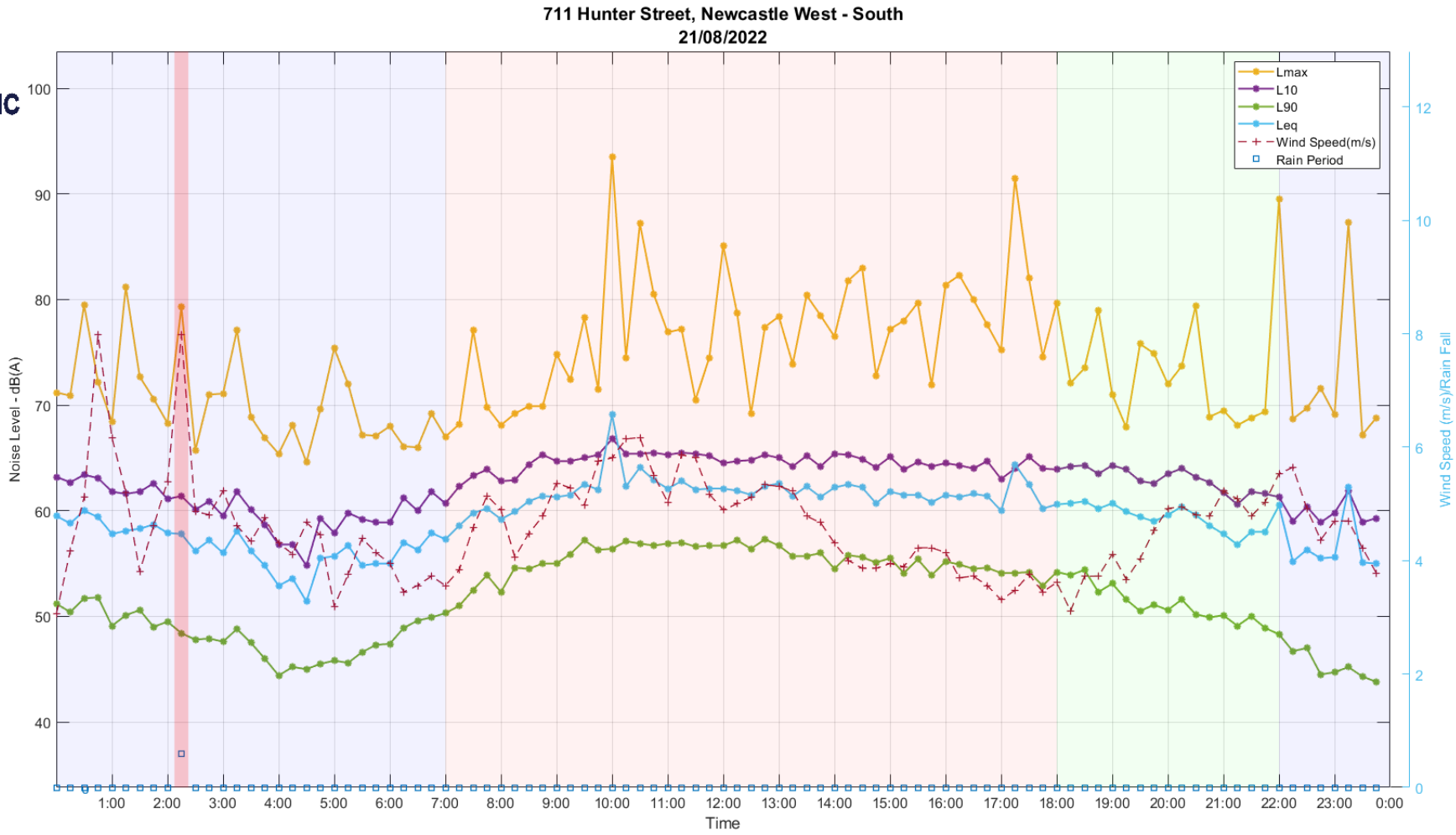

711 Hunter Street, Newcastle West - South
16/08/2022
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
110
100
90
80
70
60
50
40
30
20
12
10
8
6
4
2
0
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00

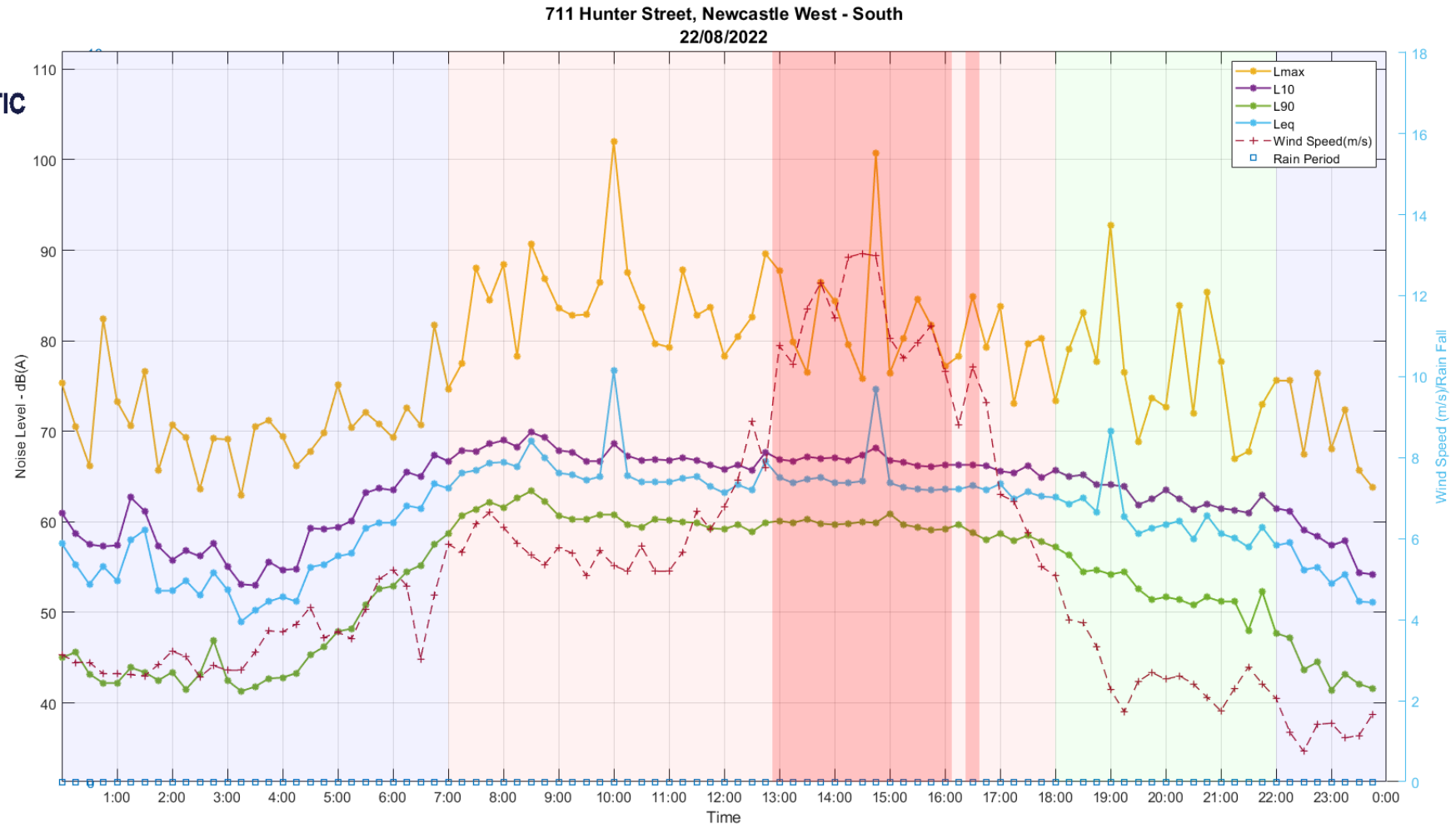

711 Hunter Street, Newcastle West - South
17/08/2022
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
12
10
8
6
4
2
0
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00

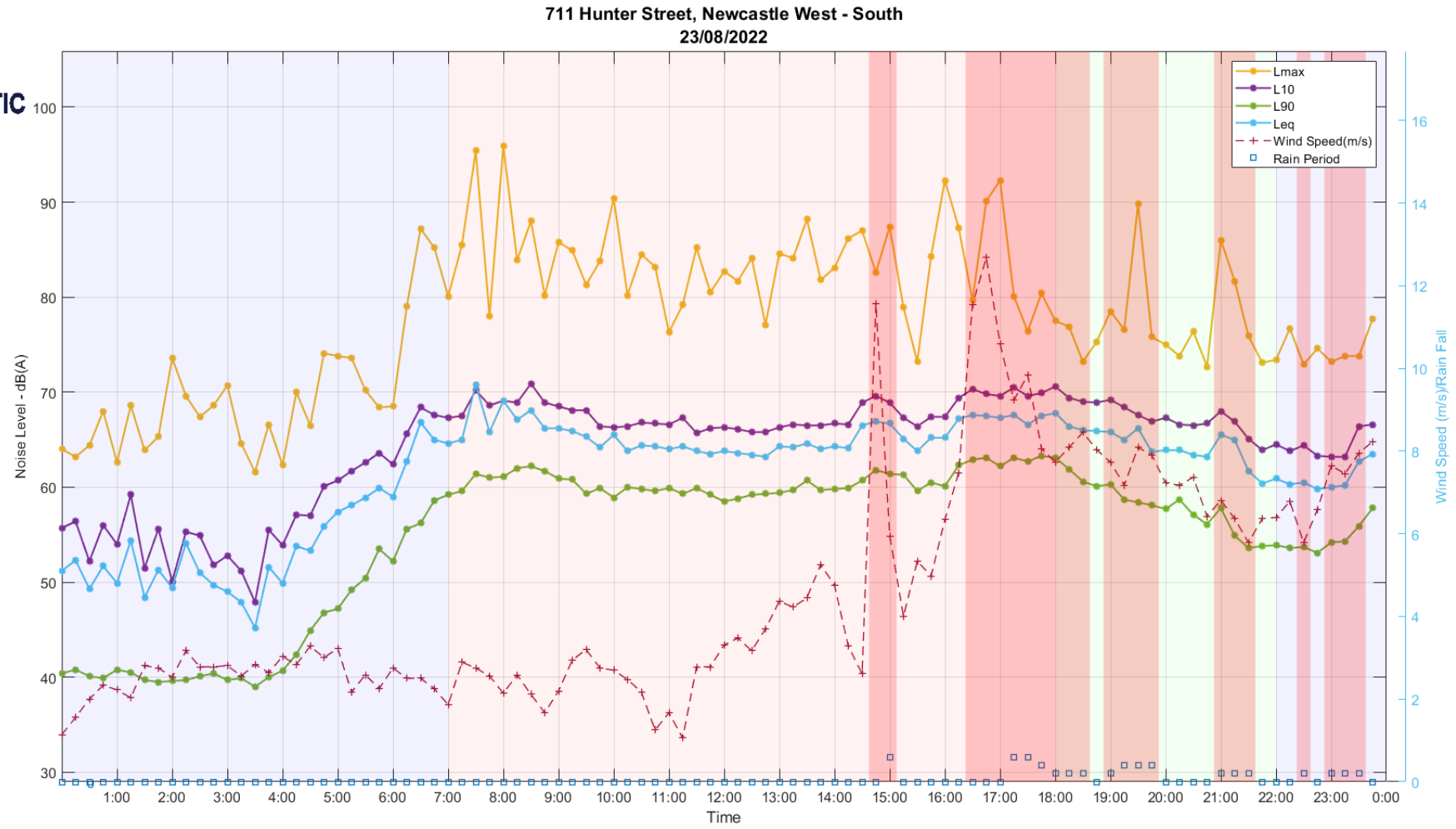

711 Hunter Street, Newcastle West - South
18/08/2022
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
14
12
10
8
6
4
2
0
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00

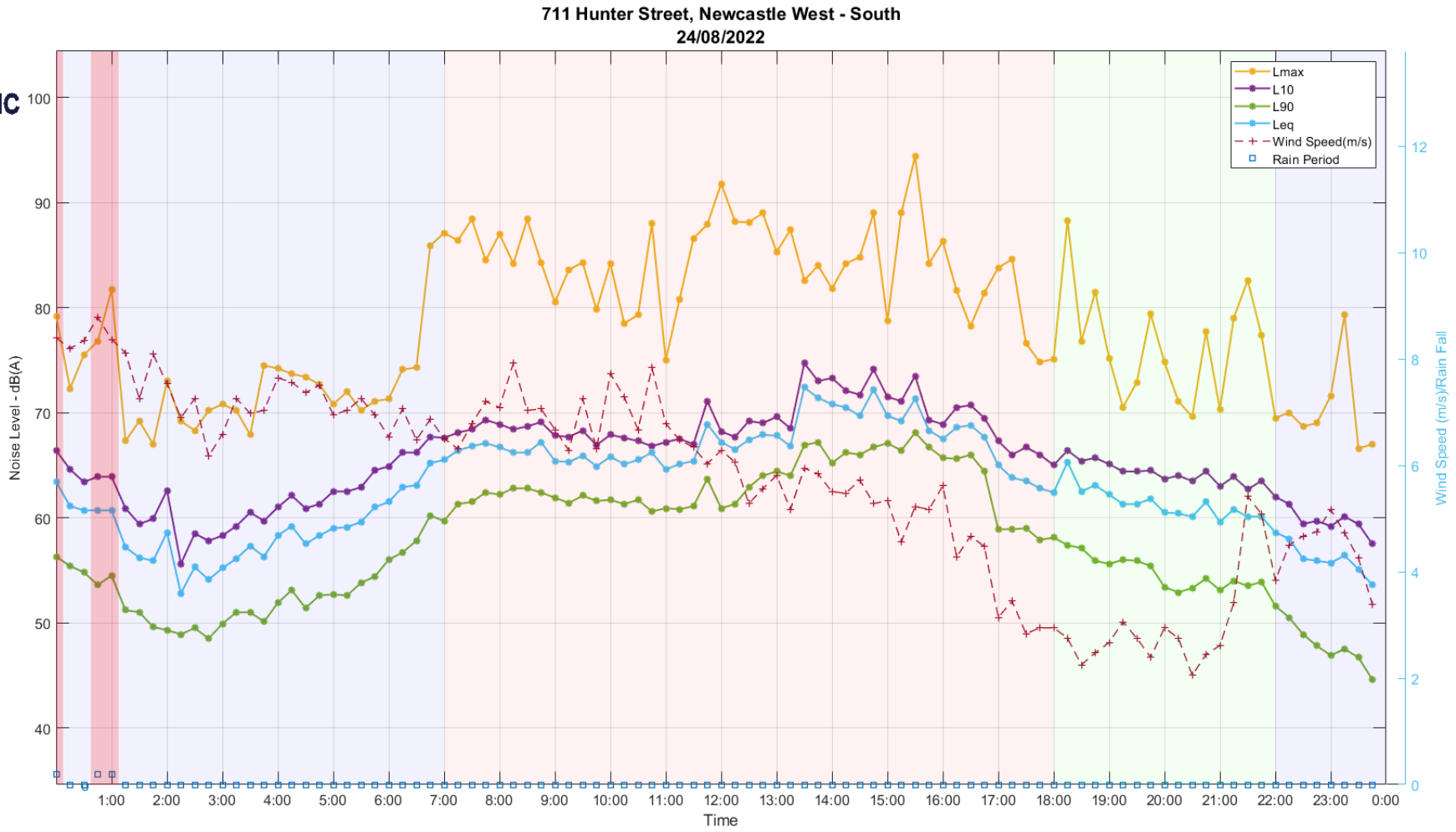

711 Hunter Street, Newcastle West - South
19/08/2022
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
16
14
12
10
8
6
4
2
0
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00

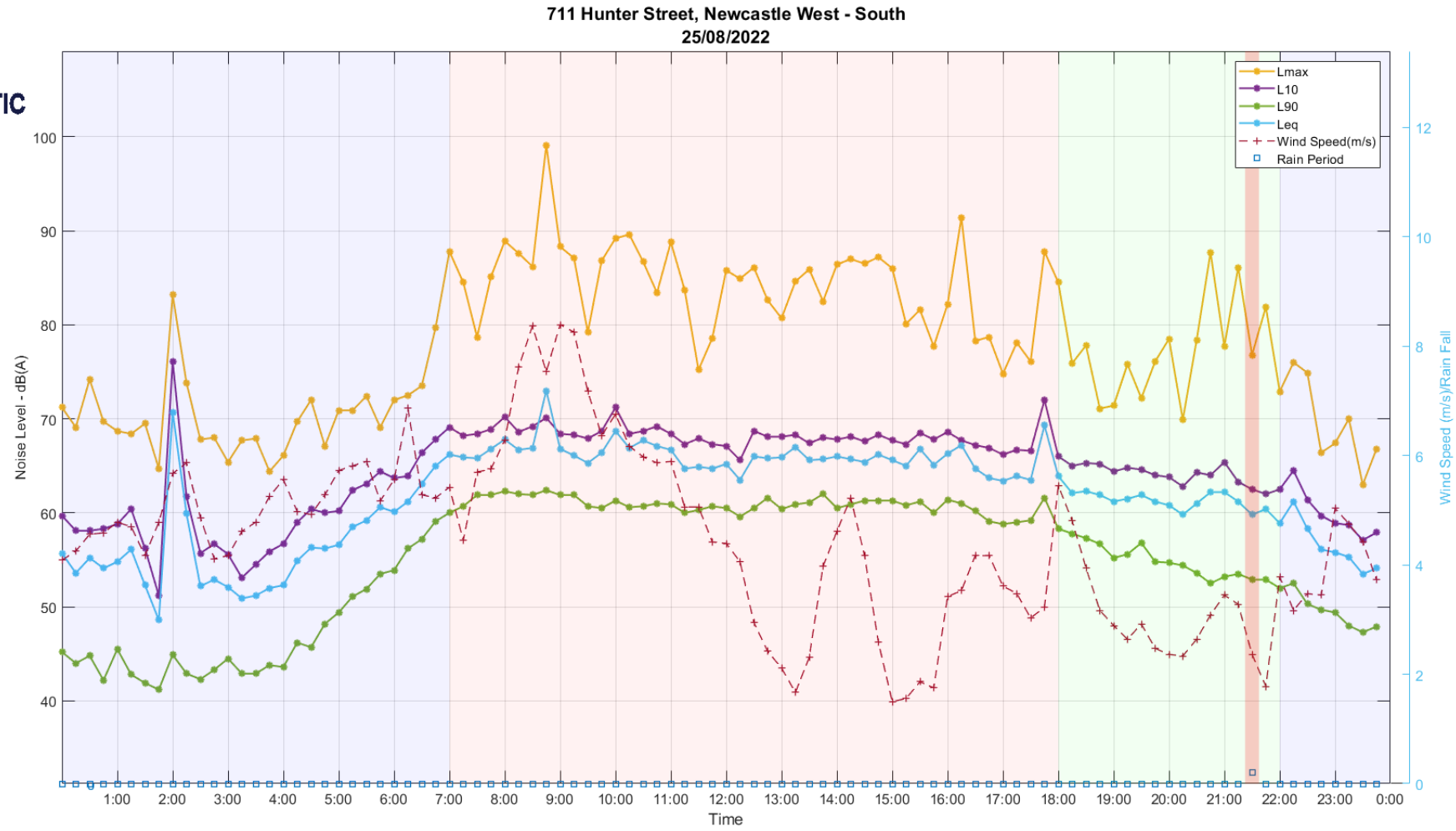

711 Hunter Street, Newcastle West - South
20/08/2022
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
12
10
8
6
4
2
0
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00


711 Hunter Street, Newcastle West - South
21/08/2022
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
12
10
8
6
4
2
0
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00


711 Hunter Street, Newcastle West - South
22/08/2022
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
110
100
90
80
70
60
50
40
18
16
14
12
10
8
6
4
2
0
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00


711 Hunter Street, Newcastle West - South
23/08/2022
ACOUSTIC LOGIC
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
16
14
12
10
8
6
4
2
0
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00


711 Hunter Street, Newcastle West - South
24/08/2022
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
12
10
8
6
4
2
0
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00


711 Hunter Street, Newcastle West - South
25/08/2022
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
12
10
8
6
4
2
0
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00

APPENDIX B EPA NOISE POLICY FOR INDUSTRY TRIGGER LEVELS

Project specific assessment trigger levels have been determined for each noise source applying at the identified potentially most impacted receivers.

B.1 NPFI TRIGGER LEVELS

NPfI nominates three types of trigger levels – intrusiveness, amenity and maximum noise event.

For residential receivers the NPfI requires emissions to be assessed against all three trigger levels. For other receiver types only the amenity trigger level is relevant.

B.1.1 Intrusiveness

This purpose of this trigger level is to limit the audibility of noise emissions. The intrusiveness trigger level is measured using the $L_{eq,15min}$ descriptor, and is set at a level that is 5dB(A) above the rating background noise level. Where applicable, the intrusive noise level should be modified (increased or decreased) to account for characteristics such as tonality, low frequency, duration, etc according to NPfI Fact Sheet C.

B.1.2 Amenity

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

Table 2.2 of the NPfI (repeated below) sets out acceptable noise levels for various receiver types.

There are 3 categories of residential receivers - rural, suburban, urban. The nearest residential receivers to the subject site are categorised as "suburban" receivers. Categories for non-residential uses are also indicated in the table.

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

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

Where applicable, the intrusive noise level should be modified (increased or decreased) to account for characteristics such as tonality, low frequency, duration, etc according to NPfI Fact Sheet C.

Section 2.4 of the NPfI states:

Where cumulative industrial noise is not a necessary consideration because no other industries are present in the area, or likely to be introduced into the area in the future. In such cases the relevant amenity noise level is assigned as the project amenity noise level for the development.

The NfPI permits the project specific amenity level to be increased in areas where ambient noise levels already significantly exceed the levels in Table 2.2 of the NPfI.

The level of transport noise, road traffic noise in particular, may be high enough to make noise from an industrial source effectively inaudible, even though the L_{Aeq} noise level from that industrial noise source may exceed the project amenity noise level. In such cases the project amenity noise level may be derived from the $L_{Aeq,\ period(traffic)}$ minus 15 dB(A).

This high traffic project amenity noise level may be applied only if all of the following apply:

- *traffic noise is identified as the dominant noise source at the site.*
- *the existing traffic noise level (determined using the procedure outlined in A2, Fact Sheet A, that is, measuring traffic instead of industrial noise) is 10 dB or more above the recommended amenity noise level for the area.*
- *it is highly unlikely traffic noise levels will decrease in the future.*

NPfI *Table 2.2: Amenity* Noise Levels			
Receiver	***Noise Amenity Area***	***Time of* Day**	***Recommended* Amenity Noise Level L_{Aeq}**
Residential	*Rural*	*Day*	*50*
		Evening	*45*
		Night	*40*
	Suburban	*Day*	*55*
		Evening	*45*
		Night	*40*
	Urban	*Day*	*60*
		Evening	*50*
		Night	*45*
Hotels motels caretakers' quarters holiday accommodation permanent resident caravan parks	*See column 4*	*See column 4*	*5 dB(A) above the recommended amenity noise level for a residence for the relevant noise amenity area and time of day*
School classroom – internal	*All*	*Noisiest 1-hour period when in use*	*35 (see notes for table)*
Hospital ward internal external	*All* *All*	*Noisiest 1-hour* *Noisiest 1-hour*	*35* *50*
Place of worship – internal	*All*	*When in use*	*40*
Area specifically reserved for passive recreation (e.g. national park)	*All*	*When in use*	*50*
Active recreation area (e.g. school playground golf course)	*All*	*When in use*	55
Commercial premises	*All*	*When in use*	*65*
Industrial premises	*All*	*When in use*	*70*
Industrial interface (applicable only to residential noise amenity areas)	*All*	*All*	*Add 5 dB(A) to recommended noise amenity area*

Notes: 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. The levels represent outdoor levels except where otherwise stated.

Types of receivers are defined as follows:

• rural residential – see Table 2.3

• suburban residential – see Table 2.3

• urban residential – see Table 2.3

• industrial interface – an area that is in close proximity to existing industrial premises and that extends out to a point where the existing industrial noise from the source has fallen by 5 dB or an area defined in a planning instrument. Beyond this region the amenity noise level for the applicable category applies. This category may be used only for existing situations (further explanation on how this category applies is outlined in Section 2.7)

• commercial – commercial activities being undertaken in a planning zone that allows commercial land uses

• industrial – an area defined as an industrial zone on a local environment plan; for isolated residences within an industrial zone the industrial amenity level would usually apply.

Time of day is defined as follows:

• day – the period from 7 am to 6 pm Monday to Saturday or 8 am to 6 pm on Sundays and public holidays

• evening – the period from 6 pm to 10 pm

• night – the remaining periods.

(These periods may be varied where appropriate, for example, see A3 in Fact Sheet A.)

In the case where existing schools are affected by noise from existing industrial noise sources, the acceptable L_{Aeq} noise level may be increased to 40 dB $L_{Aeq(1hr)}$.

B.1.3 Maximum Noise Level Assessment

The purpose of this assessment is to identify whether discrete, night time noise events have the potential to produce adverse sleep reactions.

Section 2.5 of NPfI recommends the following procedure to assess the potential for adverse sleep disturbance.

Where the subject development/ premises night -time noise levels at a residential location exceed:

- *$L_{eq(15min)}$ 40 dB(A) or the prevailing RBL (L_{90}) plus 5 dB, whichever is the greater, and/or*
- *L_{max} 52 dB(A) or the prevailing RBL (L_{90}) plus 15 dB, whichever is the greater,*

a detailed maximum noise level event assessment should be undertaken.

The detailed assessment should cover the maximum noise level, the extent to which the maximum noise level exceeds the rating background noise level, and the number of times this happens during the night-time period. Some guidance on possible impact is contained in the review of research results in the NSW Road Noise Policy.

Other factors that may be important in assessing the extent of impacts on sleep include:

- *how often high noise events will occur*
- *the distribution of likely events across the night-time period and the existing ambient maximum events in the absence of the subject development*
- *whether there are times of day when there is a clear change in the noise environment (such as during early-morning shoulder periods)*
- *current scientific literature available at the time of the assessment regarding the impact of maximum noise level events at night.*

Maximum noise level event assessments should be based on the L_{AFmax} descriptor on an event basis under 'fast' time response. The detailed assessment should consider all feasible and reasonable noise mitigation measures with a goal of achieving the above trigger levels.

B.2 PROJECT SPECIFIC TRIGGER LEVELS

The following table summarises the trigger levels applying at each of the identified "most impacted" receivers, assessed based on the NPfI methodology described above and the measured rating background noise levels.

The trigger levels in bold indicate the most stringent trigger level at each location.

Table B1 –Project Specific Trigger Levels

Location	Period	RBL dB(A) L_{90}	Trigger Noise Level (dB(A) $L_{eq,15min}$)		
			Intrusiveness	Amenity	Max Event
1. North	Day (7am-6pm)	59	64	**53**	-
	Evening (6pm-10pm)	52	57	**48**	-
	Night (10pm-7am)	43	48	**43**	**48 L_{eq} 58 L_{max}**
2. South	Day (7am-6pm)	59	64	**53**	**-**
	Evening (6pm-10pm)	52	57	**48**	**-**
	Night (10pm-7am)	44	49	**43**	**49 L_{eq} 59 L_{max}**
Commercial	When in use	N/A	N/A	**63**	N/A
Passive Recreation	When in use	N/A	N/A	**48**	N/A

APPENDIX C NOISE ENHANCING WEATHER CONDITIONS ASSESSMENT

The significance of noise-enhancing conditions has been assessed using the procedures outlined in NPfl Fact Sheet D including:

- Where nighttime operation is proposed, this involves assessing the significance of temperature inversions (F and G class stability categories) for the nighttime period.
    - When determining the significance of F class stability category, F and G class conditions should be assessed and the combined occurrence used.
    - Where F class conditions are relevant for the assessment, any wind vectors that can occur up to 2 m/s wind speed at 10 metres above ground level (AGL) while F class conditions are maintained should be considered.
- The significance of light winds up to and including 3 m/s for all assessment periods during stability categories other than E, F or G.

Significance is based on a threshold of occurrence of 30%. Where the significance of noise-enhancing meteorological conditions has been tested, it can result in different meteorological conditions being applied to each assessment period.

Where noise-enhancing for less than 30% of the time, standard meteorological conditions may be adopted for the assessment.

Standard meteorological conditions have been adopted for this assessment for all locations and periods.