MATTHEW PALAVIDIS
VICTOR FATTORETTO
MATTHEW SHIELDS

Woolworths Moss Vale - 233 Argyle Street

Development Application

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

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

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1 INTRODUCTION

Acoustic Logic (AL) has been engaged to conduct an acoustic assessment of potential noise impacts associated with the proposed development at the Woolworths Moss Vale - 233 Argyle Street.

This document addresses noise impacts associated with the following:

- Traffic noise generation
- Operational noise emissions from the carpark and loading dock, and
- Noise emissions from mechanical plant to service the project site (in principle).

AL have utilised the following documents and regulations in the noise assessment of the development:

- Wingecarribee Shire Council – *Moss Vale Township Development Control Plan 2021*
- NSW Environmental Protection Authority (EPA) *Road Noise Policy* (RNP) 2011, and
- NSW EPA *Noise Policy for Industry* (NPI) 2017

This assessment has been conducted using the Nettletontribe architectural drawings for DA submission (*drawing number 11663_DA002, dated 16/04/2024).*

2 SITE DESCRIPTION AND NEAREST SENSITIVE RECEIVERS

2.1 SITE DESCRIPTION

The proposed construction of the Woolworths Moss Vale includes an additional 7 tenancy spaces, on-grade car parking and direct to boot spaces, site access via Hoskins and Argyle Street and loading dock access via Argyle Street.

The following trading hours are proposed for the centre:

- Woolworths shopping centre operation hours of 7:00am to 10:00pm.
- Proposed retail and commercial tenancies operation hours of 7:00am to 10:00pm.
- Operation of the loading dock between the hours of 5.00am to 10.00pm.

See Figure 1 below for an aerial layout of the Woolworths Moss Vale and associated Loading Dock.

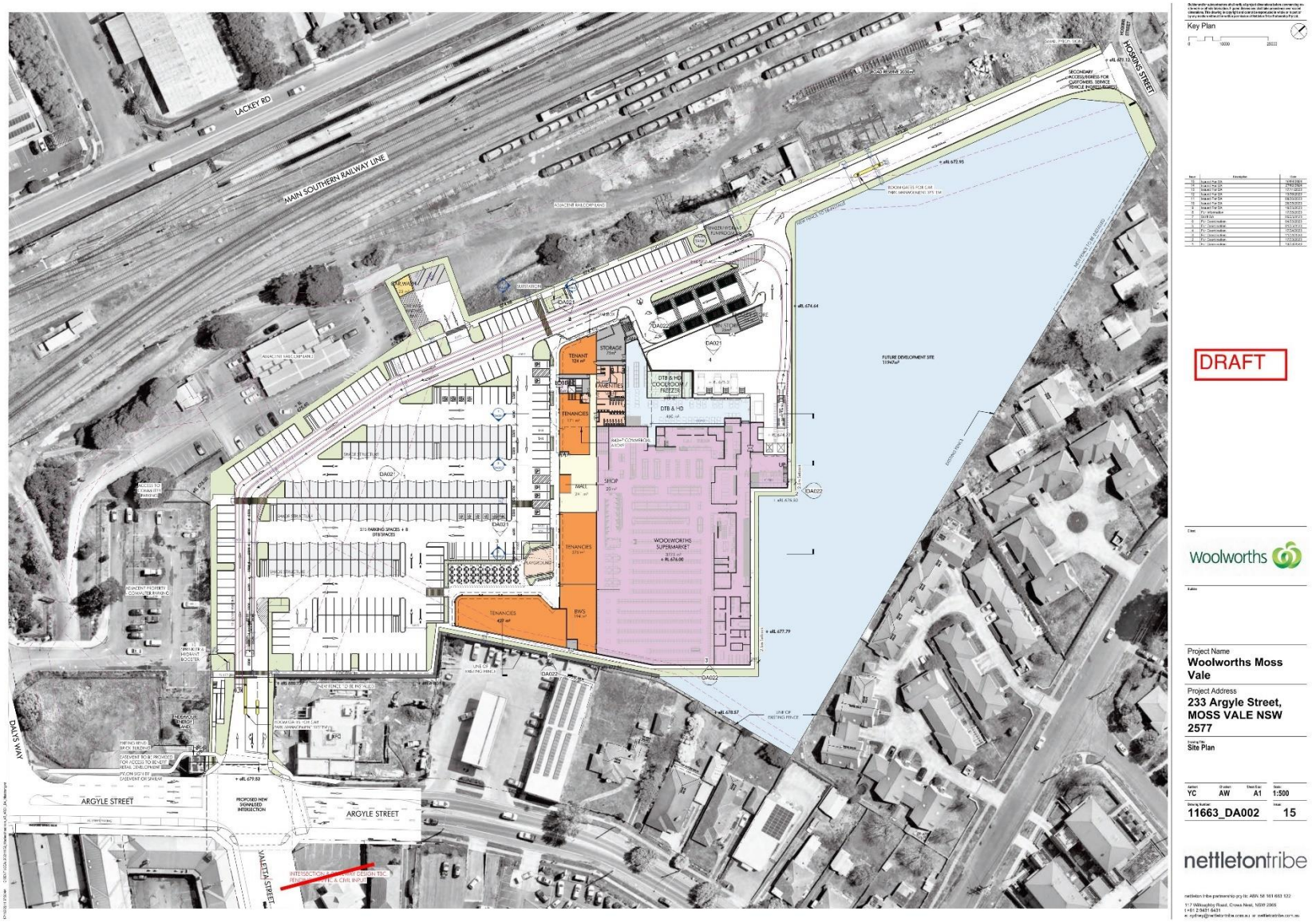


Figure 1 – Aerial Site Plan with Proposed Loading Dock

2.2 NEAREST SENSITIVE RECEIVERS

The nearest noise receivers surrounding the project site are detailed as follows:

- **R1:** Residential Receiver 1 – Single storey residential developments to the south east at 223-219 Argyle Street.
- **R2:** Residential Receiver 2 – Single and 2 storey residential developments to the north at 6-8 Hawkins Street and 10-38 Hoskins Street.
- **R3:** Residential Receiver 3 – Single storey residential dwelling to the north at 45 Hoskins Street.
- **R4:** Residential Receiver 4 – Single storey residential developments to the west at 117-133 Lackey Road.
- **C1:** Commercial Receiver 1 – Commercial development to the south at 225-231 Argyle Street
- **I1:** Industrial Receiver 1 – Industrial receivers west of the development at 135-157 Lackey Street and 1/1A Farmers Place.

A site map, measurement description and surrounding receivers are presented in Figure 2.

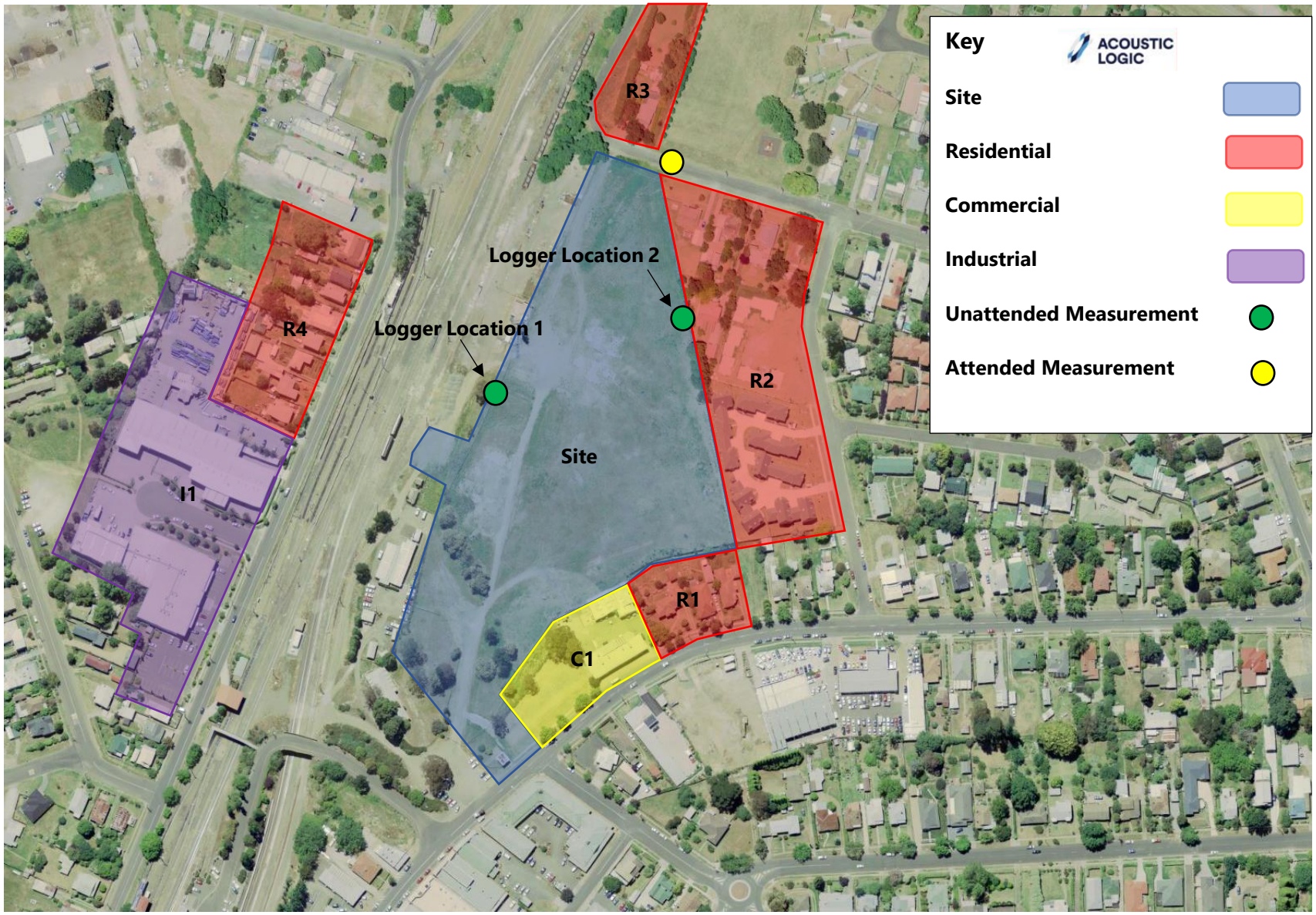


Figure 2 – Project Site (Source: NSW SIX Maps)

3 EXISTING ACOUSTIC ENVIRONMENT

The acoustic environment is categorised by low background noise levels during the day and evening and night.

Acoustic monitoring was conducted onsite to establish the existing noise levels of the project site.

3.1 ENVIRONMENTAL NOISE DESCRIPTORS

Environmental noise constantly varies. 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-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.

In analysing environmental noise, three-principle measurement parameters are used, namely L_{10}, L_{90} and L_{eq}. The L_{10} and L_{90} measurement parameters are statistical levels that represent the average maximum and average minimum noise levels respectively, over the measurement intervals.

The L_{10} parameter is commonly used to measure noise produced by a particular intrusive noise source since it represents the average of the loudest noise levels produced by the source.

Conversely, 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 environmental noise impact as it closely corresponds with human perception of a changing noise environment; such is the character of environmental noise.

The L_{max} parameter represents the loudest instantaneous sound pressure level during a measurement period.

4 EXISTING ACOUSTIC ENVIRONMENT

4.1 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-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 principal 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.

4.2 BACKGROUND NOISE LEVELS

4.2.1 Measurement Equipment

Unattended noise monitoring was conducting using one Acoustic Research Laboratories Pty Ltd noise logger. The logger was programmed to continuously store statistical noise levels as well as audio files 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. Noise logger data is provided in Section 2.2.

4.2.2 Measurement Location and Period

The background noise monitor was located on the boundary of 233 Argyle Road next to the closest adjoining residential receivers. The monitor was conducted in this location to obtain the most representative noise levels of the highest affected receiver. Monitoring was conducted between Monday the 13th of March and Monday the 27th of March 2023.

4.2.3 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 1 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) for Location 1 is presented in Table 1 and Location 2 in Table 2 below..

Table 1 – Location 1 Summarised Rating Background Noise Levels

Date	Measured Noise Levels dB(A) $L_{90(Period)}$		
	Day	Evening	Night
Monday 13th March 2023	45	38	35
Tuesday 14th March 2023	44	38	36
Wednesday 15th March 2023	42	40	39
Thursday 16th March 2023	43	40	38
Friday 17th March 2023	43	39	38
Saturday 18th March 2023	38	41	37
Sunday 19th March 2023	40	43	41
Monday 20th March 2023	46	40	37
Tuesday 21st March 2023	43	37	34
Wednesday 22nd March 2023	41	38	33
Thursday 23rd March 2023	43	37	36
Friday 24th March 2023	42	40	35
Saturday 25th March 2023	42	38	32
Sunday 26th March 2023	40	37	34
Median	**42**	**39**	**36**

Table 2 – Location 2 Summarised Rating Background Noise Levels

Date	Measured Noise Levels dB(A) $L_{90(Period)}$		
	Day	Evening	Night
Monday 13th March 2023	-	38	34
Tuesday 14th March 2023	39	39	36
Wednesday 15th March 2023	41	49	38
Thursday 16th March 2023	43	47	44
Friday 17th March 2023	40	43	40
Saturday 18th March 2023	37	47	38
Sunday 19th March 2023	39	46	44
Monday 20th March 2023	43	40	35
Tuesday 21st March 2023	39	32	30
Wednesday 22nd March 2023	41	38	33
Thursday 23rd March 2023	44	38	35
Friday 24th March 2023	38	38	38
Saturday 25th March 2023	36	37	32
Sunday 26th March 2023	35	37	36
Median	**39**	**39**	**36**

4.2.4 Summarised Measured Noise Levels

Previously undertaken traffic noise levels collated by this office has been used to assess traffic noise levels on Argyle Street. Typically, traffic noise levels are presented as a 15-hour daytime period and 9-hour night time period. However, to apply the high traffic noise affected amenity level, a delineation between day and evening periods has been presented below. Notwithstanding the above, the night time period is the most noise sensitive assessment period.

Table 3 – Measured Traffic Noise Levels

Location	Time of Day	Noise Level – L_{eq}
Argyle Street, Moss Vale	Day & Evening (7am – 10pm)	69 dB(A) (15hr)
	Night (10pm – 7am)	66 dB(A) (9hr)
Hoskins Street, Moss Vale	Day & Evening (7am – 10pm)	54 dB(A) (1hr)
	Night (10pm – 7am)	48 dB(A) (1hr)

Summarised rating background noise levels for the project site and immediate surroundings are presented below. Periods of adverse weather that were determined to have affected the noise data have been eliminated when determining the rating background noise level at the site, which is presented below.

Table 4 – NPfI Rating Background Noise Levels for Receivers

Monitoring Locations	Time of day	Rating Background Noise Level dB(A) $L_{90(Period)}$
Location 1	Day (7am – 6pm)	42
	Evening (6pm – 10pm)	39
	Night (10pm – 7am)	36
Location 2	Day (7am – 6pm)	39
	Evening (6pm – 10pm)	39
	Night (10pm – 7am)	36

*Calculated per Factsheet A3 of the NPfI with relation to shoulder periods.

5 NOISE EMISSION CRITERIA

The noise emission from the project site shall comply with the requirements of the following documents:

- Wingecarribee Shire Council – *Moss Vale Township Development Control Plan 2021*
- NSW Environmental Protection Authority (EPA) *Road Noise Policy* (RNP) 2011, and
- NSW EPA *Noise Policy for Industry* (NPfI) 2017

5.1 WINGECARRIBEE SHIRE COUNCIL – MOSS VALE TOWNSHIP DEVELOPMENT CONTROL PLAN 2021

The Wingecarribee Shire Councils document *'Moss Vale Township Development Control Plan 2021'* does not outline noise criteria in relation to noise emissions from commercial developments in a B5 Business Development Zone or a Hawkins Street zone.

Further reference is made to the NSW Environmental Protection Authority (EPA) document – '*Noise Policy for Industry (NPfI) 2017'*.

5.2 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.

5.2.1 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 do not exceed the background noise level by more than 5 dB(A).

Table 5 – NSW EPA NPfI Intrusiveness Criteria

Receiver	Time of Day	Background Noise Level dB(A)$L_{90(period)}$	Intrusiveness Criteria (Background + 5 dB(A)$L_{eq15\text{-}min}$)
R3 and R4	Day (7:00am – 6:00pm)	42	49
	Evening (6:00pm – 10:00pm)	39	44
	Night (10:00pm – 7:00am)	36	41
R1 and R2	Day (7:00am – 6:00pm)	39	44
	Evening (6:00pm – 10:00pm)	39	44
	Night (10:00pm – 7:00am)	36	41

5.2.2 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 EPA's NPI sets out acceptable noise levels for various localities. The recommended noise amenity area is based upon the measured background noise levels at the sensitive receiver. Based on the measured background noise levels detailed in Section 3, the Noise Policy for Industry suggests the adoption of the 'suburban' categorisation for R1 and R2 and 'urban' categorisation for R3 and R4..

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

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

The amenity levels appropriate for the receivers surrounding the site are presented in the table below.

Table 6 – EPA Amenity Noise Levels

Type of Receiver	Time of day	Recommended Noise Level dB(A)$L_{eq(period)}$	Project Amenity Noise Level dB(A)$L_{eq(15\ minute)}$
Residential – Urban	Day	60	58
	Evening	50	48
	Night	45	43
Residential – Suburban	Day	55	53
	Evening	45	43
	Night	40	38
Commercial	When in use	65	63
Industrial	When in use	70	68

5.2.3 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 7 – Sleep Disturbance Criteria for Residential Receivers

Receiver	Night-time Rating Background Noise Level dB(A)L_{90}	Emergence Level
R1 and R2	36	41 dB(A)$L_{eq,\ 15min}$ 52 dB(A)L_{Fmax}
R3 and R4		

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.*

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

For land use developments with the potential to create additional traffic, the development shall comply with the requirements detailed in the EPA's *RNP*. The criteria detailed in the table below has been applied to assess the future potential acoustic impacts of increased traffic to be generated from the project site once it is operational.

Table 8 – Criteria for Increased Traffic Generation from the Development

Type of Receiver	Time of Day	Acceptable Traffic Noise Levels
Residential Receivers along Argyle Street	Day (7:00am – 10:00pm)	60 dB(A)$L_{eq(15hr)}$ (Arterial/Sub-arterial Roads)
	Night (10:00pm – 7:00am)	55 dB(A)$L_{eq(9hr)}$ (Arterial/Sub-arterial Roads)
Residential Receivers along Hoskins and Hawkins Street	Day (7:00am – 10:00pm)	55 dB(A)$L_{eq(1hr)}$ (Local Roads)
	Night (10:00pm – 7:00am)	50 dB(A)$L_{eq(1hr)}$ (Local Roads)

Given that Argyle Street has measured traffic noise levels that exceed those in the table above, Section 3.4 of the *RNP* is applicable, which requires noise impacts to be reduced through feasible and reasonable measures. However, in determining what is feasible/reasonable, the policy notes the following:

> "*For existing residences and other sensitive land uses affected by additional traffic on existing roads generated by land use developments, any increase in the total traffic noise level should be limited to 2 dB above that of the corresponding 'no build option'*

5.2.5 Summarised Noise Emission Objectives

A summary of noise emission objectives for operational noise associated with proposed development and for noise relating to increased traffic generation is shown in the table below.

Table 9 – Summarised Noise Emission Objectives

Receiver	Time Period	Assessment Background Noise Level dB(A)L_{90}	Project Amenity Criteria dB(A) L_{eq}	Intrusiveness Criteria $L_{eq(15min)}$	NPfI/RNP Criteria for Sleep Disturbance
R1 and R2	Day (7am – 6pm)	39	53	**44**	N/A
	Evening (6pm – 10pm)	39	**43**	44	N/A
	Night (10pm – 7am)	36	**38**	41	**40 dB(A)$L_{eq, 15min}$; 55 dB(A)L_{Fmax} (internally)**
R3 and R4	Day (7am – 6pm)	42	58	**49**	N/A
	Evening (6pm – 10pm)	39	48	**44**	N/A
	Night (10pm – 7am)	36	43	**41**	**40 dB(A)$L_{eq, 15min}$; 55 dB(A)L_{Fmax} (internally)**
Commercial	When in Use	-	**63**	**-**	**-**
Industrial	When in Use	-	**68**	**-**	**-**

Table 10 – Criteria for Increased Traffic Generation from the Development

Receiver	Time of Day	Acceptable Traffic Noise Levels
R1	Day (7:00am – 10:00pm)	71 dB(A)$L_{eq(15hr)}$
	Night (10:00pm – 7:00am)	68 dB(A)$L_{eq(9hr)}$
R2 and R3	Day (7:00am – 10:00pm)	55 dB(A)$L_{eq(1hr)}$
	Night (10:00pm – 7:00am)	48 dB(A)$L_{eq(9hr)}$

6 NOISE EMISSIONS ASSESSMENT

6.1 OPERATIONAL NOISE SOURCES

Assessment of operational noise emissions have been modelled with the following delineations:

- Noise emissions from MRV/delivery trucks entering and/or exiting via Argyle Street for inbound deliveries to the rear loading dock.
- Noise emissions from MRV/delivery trucks manoeuvring at the rear loading dock.
- Key L_{max} events have been separately modelled to determine any influence of night time operations on sleep disturbance. Specifically, car engine starting and door slamming has been modelled as a point source at 1m above the on-grade carpark finished floor height. Articulated truck airbrake release has also been modelled at the rear loading dock as a moving point source during a typical reversing manoeuvre at 1.5m above inbound dock ground height.

6.2 ASSESSMENT OF OPERATIONAL NOISE EMISSIONS

6.2.1 Operating Hours

The proposed hours of operation of the centre are as follows:

- Shopping Centre: 7:00am – 10:00pm
- Loading Dock: 5:00am – 10:00pm

6.2.2 Acoustic Data

The following noise level data for vehicle-related noise sources have been used for the assessment. These noise levels have been taken from measurements conducted by this office.

Table 11 – Sound Power Levels of Typical Automotive Movements Within the Site

Item	Sound Power Level, dB(A)
Car Door Slamming	96 L_{max}
Car Travelling at 10km/h	84 dB(A) L_{eq}
Pallet Jack Operation	100
Truck Manoeuvring @ 10km/h (MRV/delivery truck under 14.7 metres)	100 $L_{eq(15\ min)}$
Truck Reversing @ 5km/h (MRV/delivery truck under 14.7 metres)	*105 $L_{eq(15\ min)}$
Truck Air Brake	114 L_{max}

*A 5 dB(A) penalty has been applied for the reversing beacon.

6.2.3 Operational Assumptions

The following information provided to this office, as well as assumptions made by this office, are features of the existing operational noise SoundPlan model:

- AL assumes that in a worst 1-hour period, there will be:
    - Day/evening time period (7:00am-10:00pm):
        - 4 large truck movements (MRV/delivery truck under 14.7 metres) including reversing manoeuvres per hour at the loading dock.
    - Night time period (5:00am-7:00am)
        - 2 large truck movements (MRV/delivery truck under 14.7 metres) including reversing manoeuvres per hour at the loading dock.
- Operation of the loading dock will occur between the hours of 5:00am and 10:00pm.
- Vehicle movements have been calculated based on the assumption that car entering, exiting and manoeuvring around the carpark will be driving at 10km/h. Trucks entering the loading dock will be driving at 10km/h and reversing at 5km/h.

Deliveries are to be restricted to not occur between 10pm – 5am to minimise night time noise emissions to nearby residential receivers.

6.3 NOISE GENERATED BY ADDITIONAL TRAFFIC ON PUBLIC ROADS

Noise generated as a results of increased traffic on public roads is assessed with reference to the EPA Road Noise Policy utilising the CoRTN road noise module.

Access/egress to the site will be from Argyle Street and Hoskins Street with the main connecting road being Argyle Street. Predictions of traffic noise generation have been made using the following modelling assumptions:

- Automobiles travelling at 50km/h along all roads.
    - For the typical early morning shoulder period (6am – 7am), the following number of vehicle movements are expected.
        - Total of 1355 automobile movements on Argyle Street (additional 30 movements resulted from the development).
        - Total of 50 automobile movements on Hoskins Street (additional 50 movement resulted from the development)
    - For the typical afternoon shoulder period (5pm - 6pm), the following number of vehicle movements are expected.
        - Total of 1677 automobile movements on Argyle Street (additional 80 movements resulted from the development.
        - Total of 100 automobile movements on Hoskins Street (additional 100 movements resulted from the development).
- All inbound and outbound movements of all vehicle types are equally distributed travelling on each road.

The predicted traffic noise level has been modelled using the PM peak and typical Saturday traffic counts provided by Colston Budd Rogers & Kafes Pty Ltd. Traffic flows were predicted to be between 1255 and 1677 vehicles per hour for Argyle Street and 50 to 100 vehicles per hour for Hoskins Street during the morning and afternoon peak hours respectively.

The AADT of the roadways were calculated in the following manner:

- Argyle Street
  - Peak AM/PM 1 hour volumes of 1516 vehicles / hour two way.
  - Off-peak daytime levels of 1364 vehicles / hour two way (based on 90% of peak hour flow).
  - Night time average levels of 758 vehicles / hour two way (based on 50% of peak traffic flows).
- Hoskins Street
  - Peak AM/PM 1 hour volumes of 75 vehicles / hour two way.
  - Off peak daytime levels of 68 vehicles / hour (based on 90% of peak hour flow).
  - Night time average levels of 38 vehicles / hour two way (based on 50% of peak daytime traffic flows).

The result AADT of all assumed traffic volumes based off the above assumptions is 27,586 for Argyle Road and 1376 for Hoskins Street. These traffic volumes were used to predict noise levels at monitoring locations using the CoRTN road noise module within SoundPlan™ 8.0. A differentiation of 10% trucks to 90% automobiles was used, as this is a conservative approach. Calculated traffic noise levels based on the above assumptions are consistent with those measured on site by long term noise monitoring.

The potential for additional noise from traffic generation associated with the facility were calculated by adding the additional vehicle movements from the site to the calculated traffic volumes.

Noise emissions have been predicted at the worst affected residential receivers and compared against the acoustic criteria set out in Section 5.2. The cumulative traffic noise generated at the worst affected points located at **R1, R2 and R3** is presented below.

Table 12 – Cumulative Traffic Noise Including Noise Generated by Additional Road Traffic

Receiver Location	Predicted Change in Traffic Noise Level	RNP Criteria	Compliance
R1	≤ 2 dB(A)$L_{eq(1hr)}$	≤ 2 dB(A) $L_{eq(period)}$	Yes
R2	≤ 2 dB(A)$L_{eq(1hr)}$		
R3	≤ 2 dB(A)$L_{eq(1hr)}$		

The potential for additional traffic noise generation from the site is negligible.

6.4 CUMULATIVE PREDICTED OPERATIONAL NOISE EMISSIONS

6.4.1 SoundPlan Modelling

Noise levels have been predicted at the receiver locations using SoundPlan™ 8.0 modelling software implementing the ISO 9613-2:1996 "Acoustics – Attenuation of Sound During Propagation Outdoors – Part 2: General Method of Calculation" noise propagation standard.

Noise enhancing meteorological have been adopted as recommended by the NPfI, noting that the ISO 9613 modelling approach assumes that all receivers are 'downwind' (i.e., that noise enhancing wind conditions are in effect at all times).

The following figures detail computational noise modelling for closest noise sensitive receivers and façades relating to the operational noise emissions of the site through the presentation of a façade noise map onto the respective buildings and a grid noise map at 1.5m above the digital ground model. Numerical results are presented in the section below.

Ground absorption was conservatively calculated with a ground factor of 0 for all areas except for localised lawns and greenery of the development fronting Percy Street with a ground factor of 0.6 as recommended in *Engineering Noise Control* (Bies & Hanson).

In line with Factsheet C of the NPI, penalties for annoying noise characteristics should be applied at the receiver, where applicable. Based on the predicted noise levels, no penalty should be applied (either for tonality, intermittency, or otherwise).

6.4.2 Cumulative Noise Modelling Results – Daytime

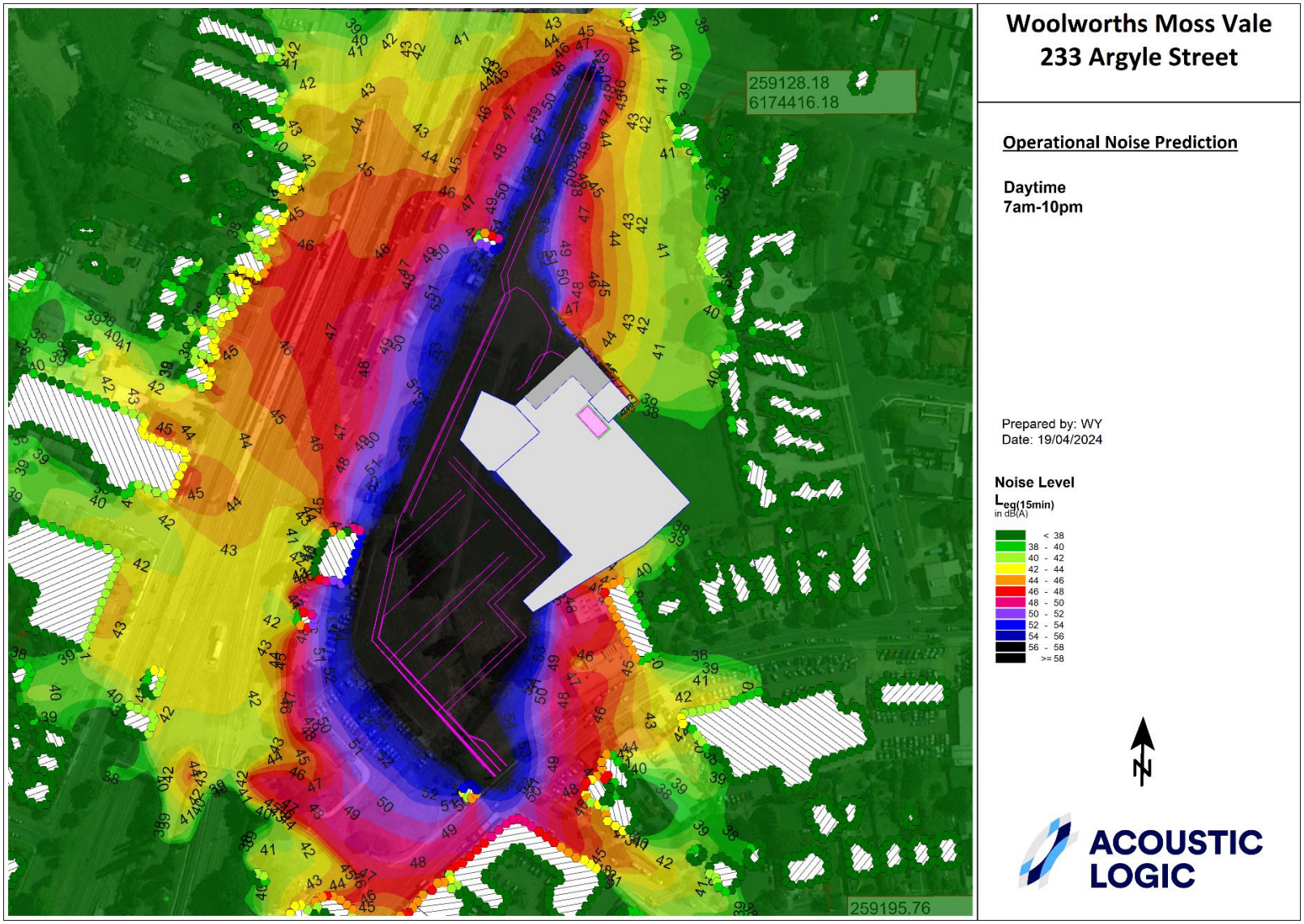


Figure 3 – Day Time Noise Prediction (aerial image)

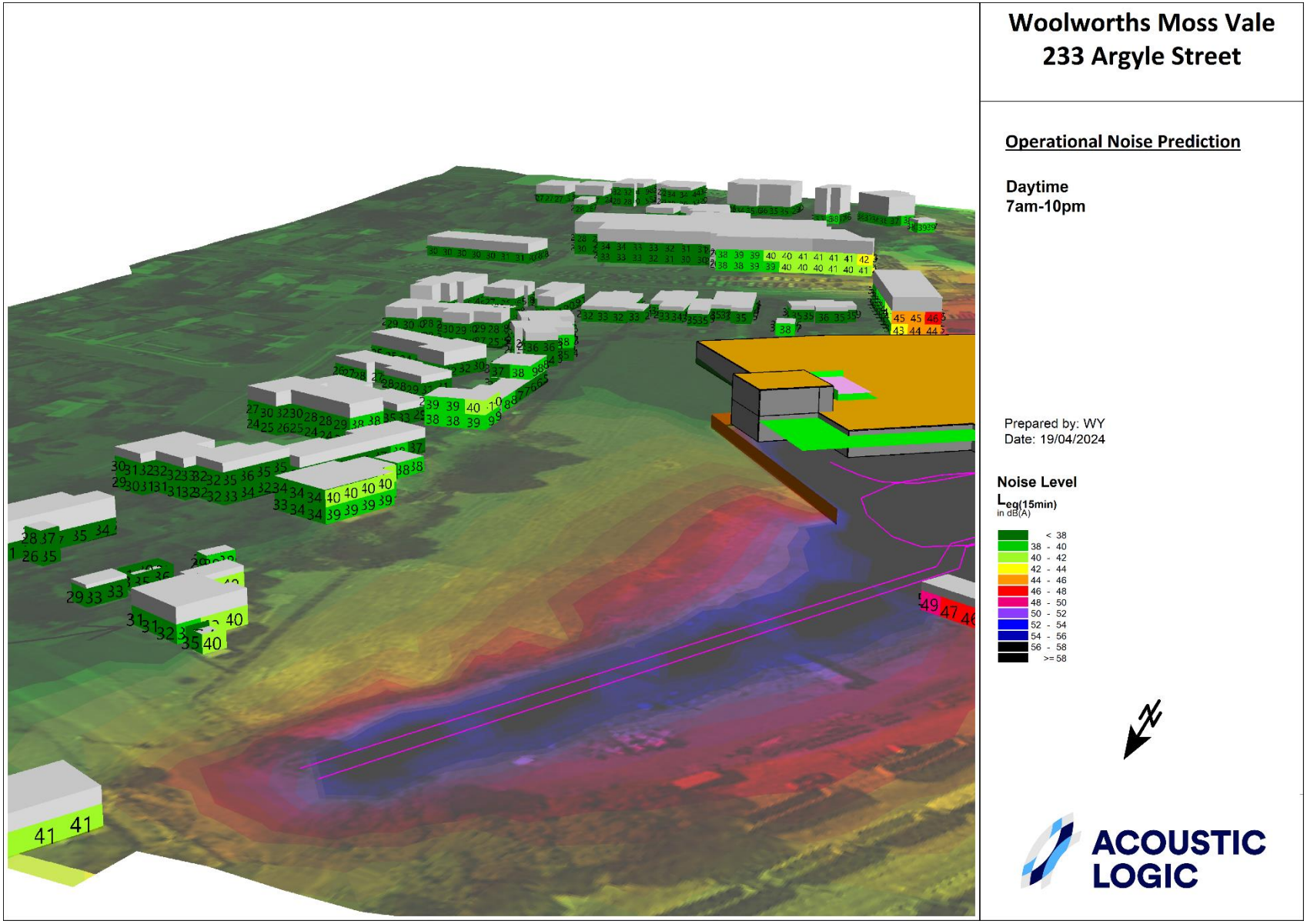


Figure 4 – Day Time Noise Prediction (eastern receivers)

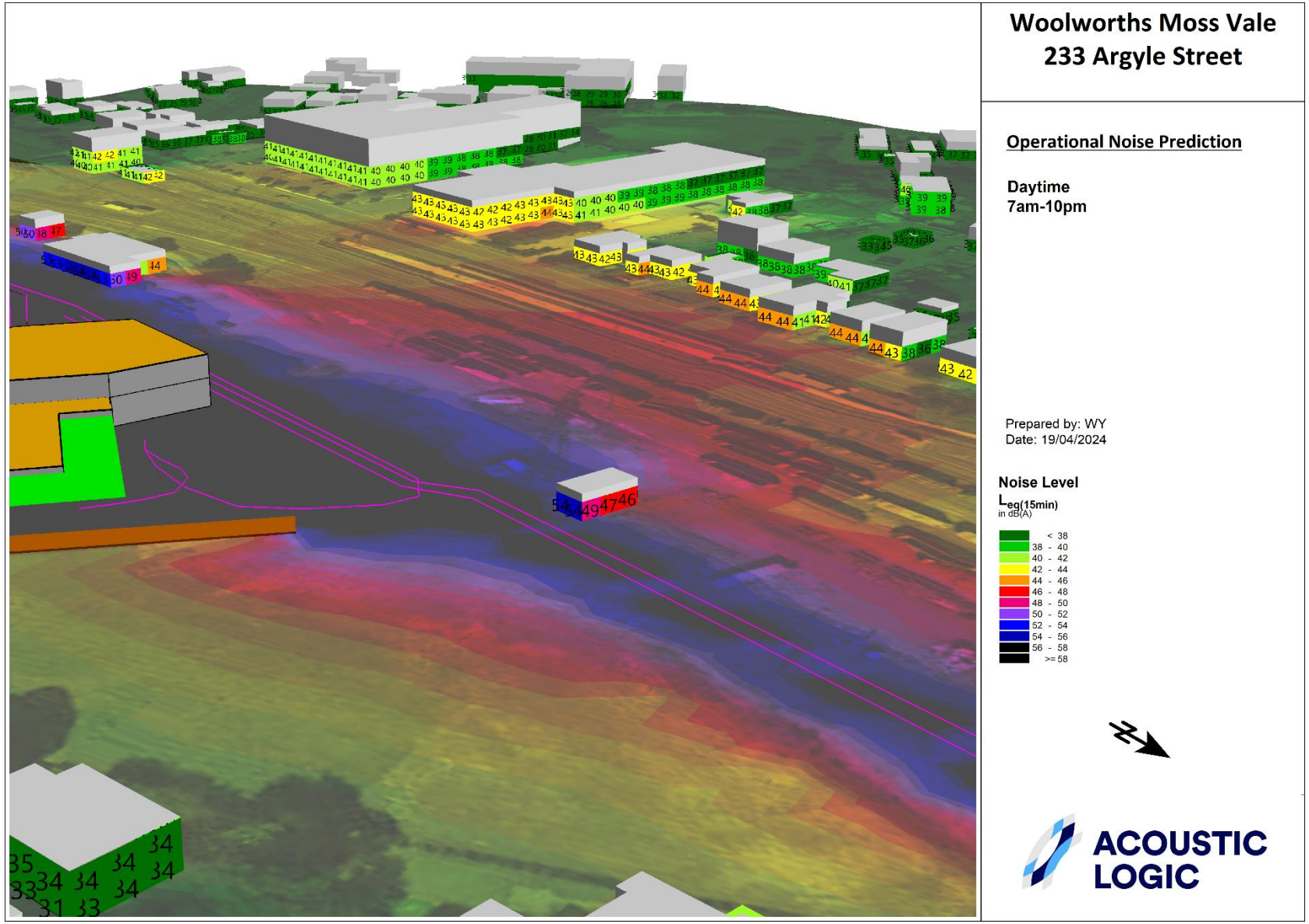


Figure 5 – Day Time Noise Prediction (western receivers)

6.4.3 Cumulative Noise Modelling Results – Night time

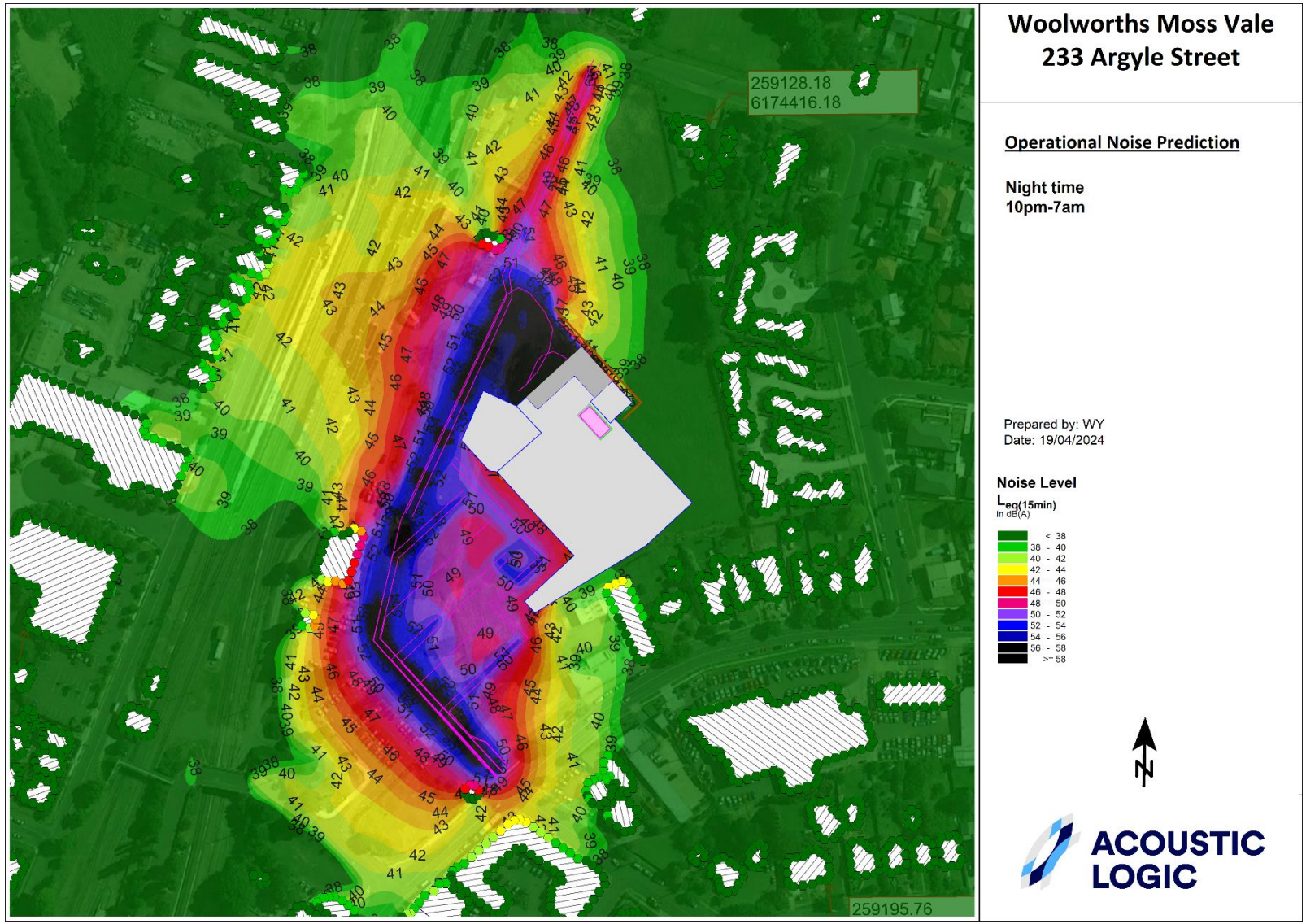


Figure 6 – Night Time Noise Prediction (aerial image)

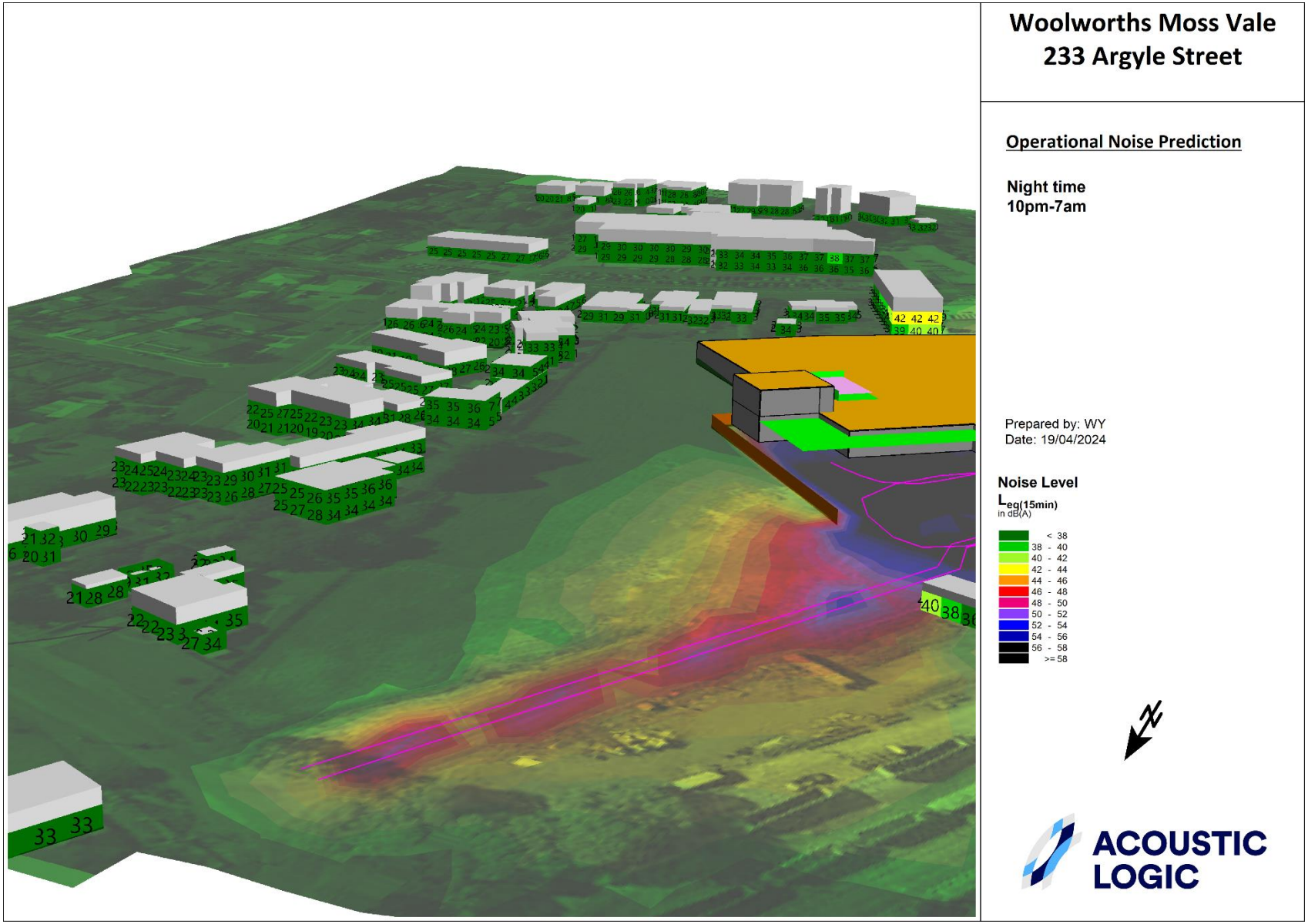


Figure 7 – Night Time Noise Prediction (eastern receivers)

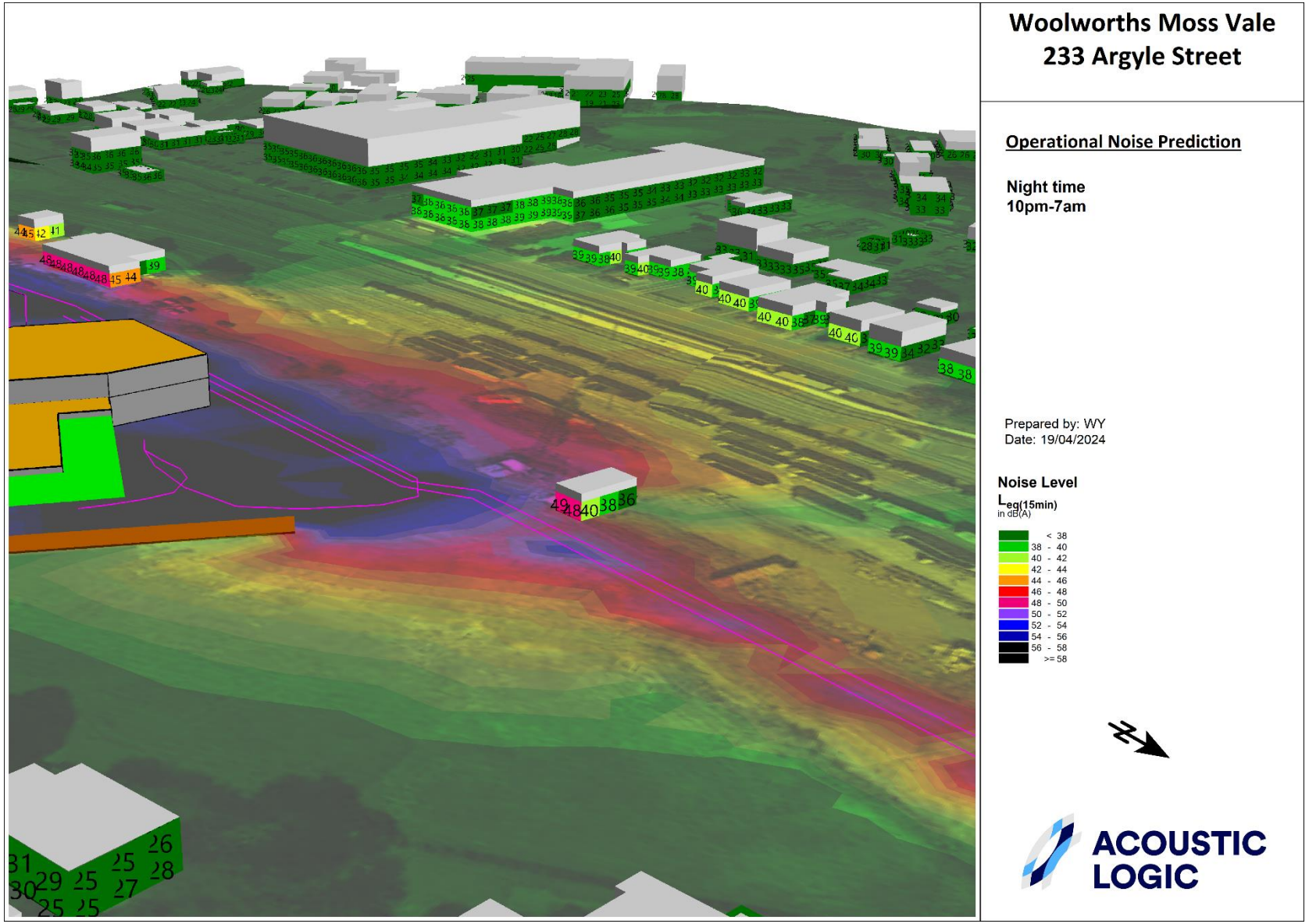


Figure 8 – Night Time Noise Prediction (western receivers)

6.4.4 Cumulative Noise Modelling Results - Peak L_{Max} Events

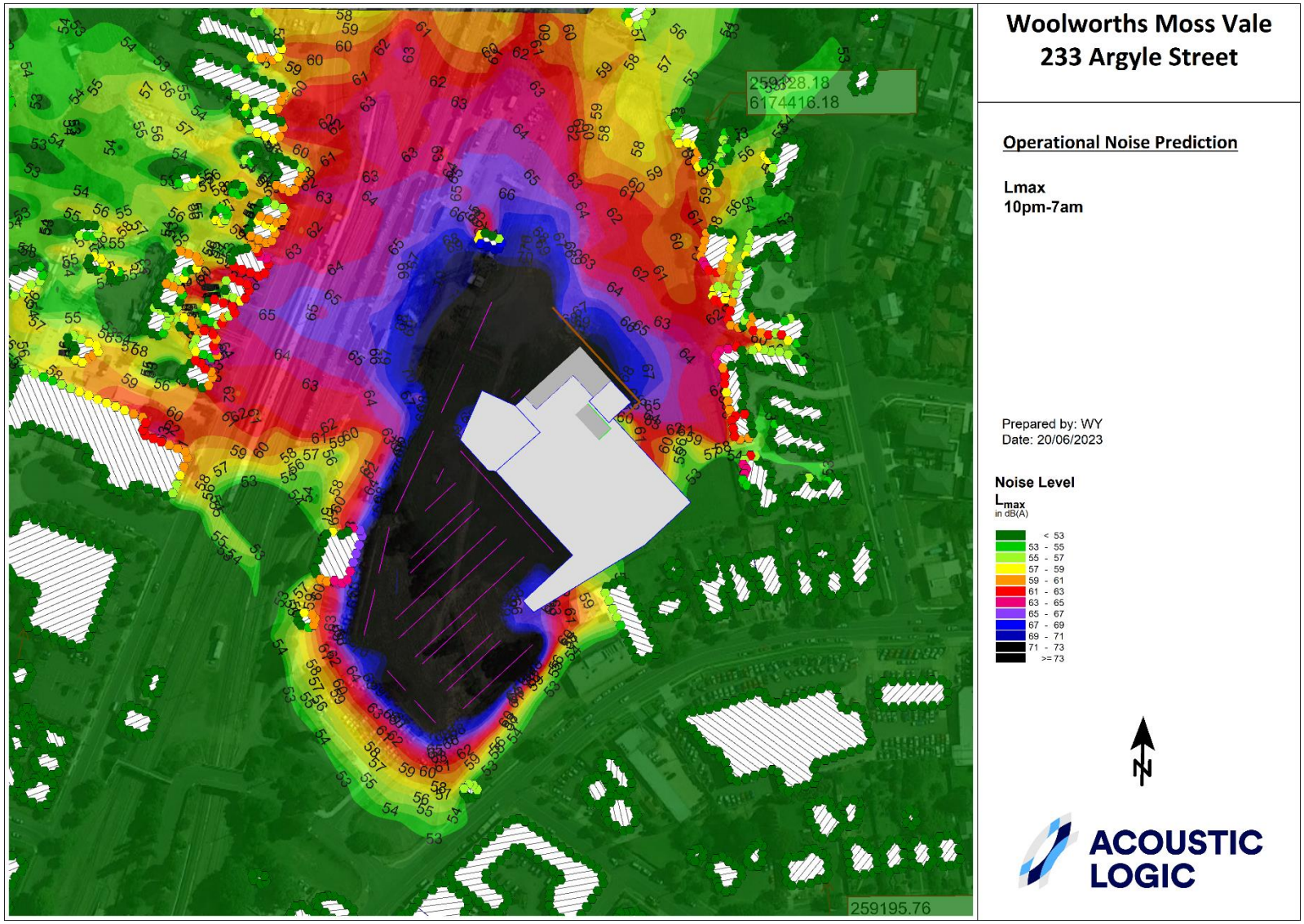


Figure 9 – Peak L_{Max} Noise Events Prediction (aerial image)

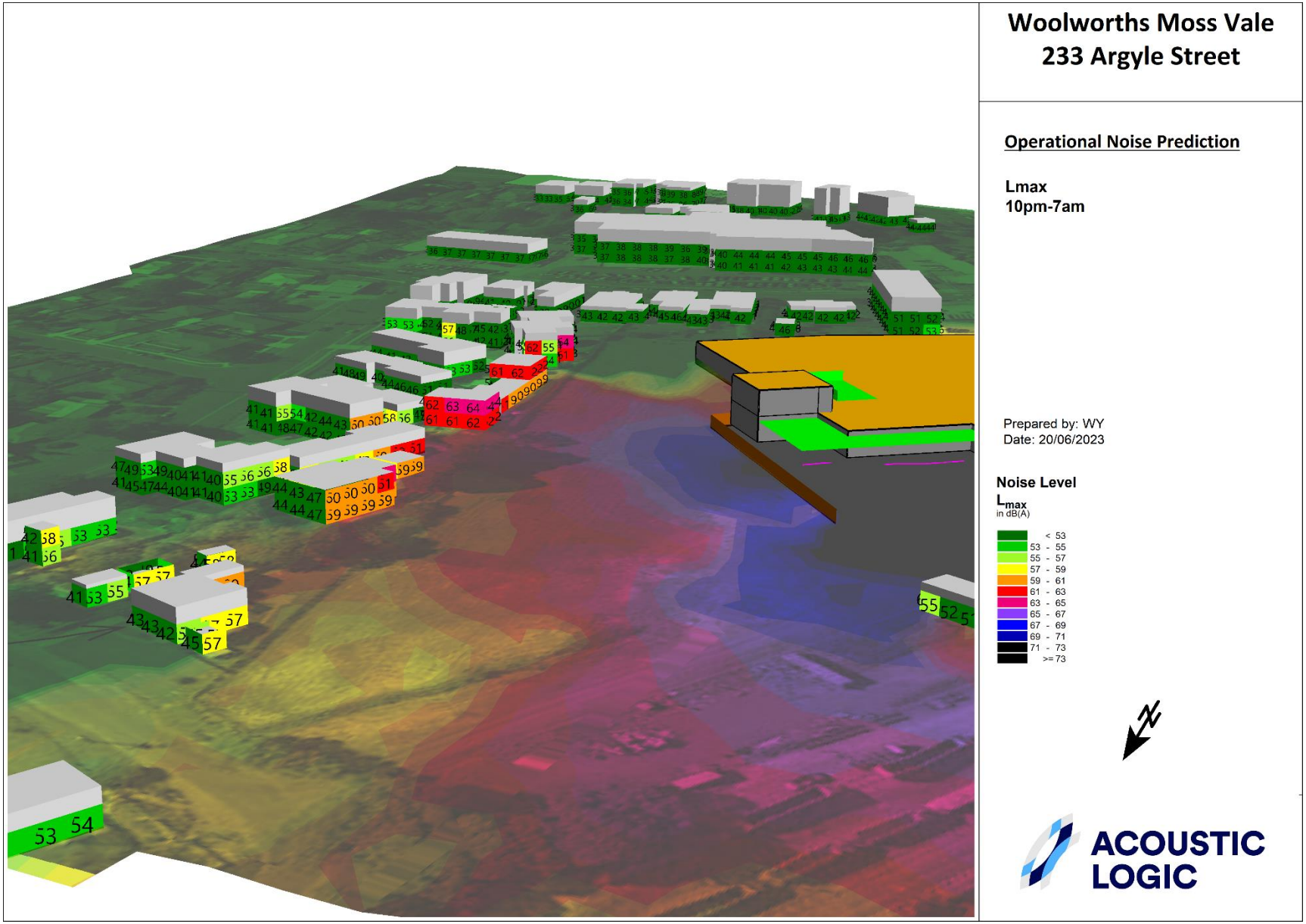


Figure 10 – Peak L_{Max} Noise Events Prediction (eastern receivers)

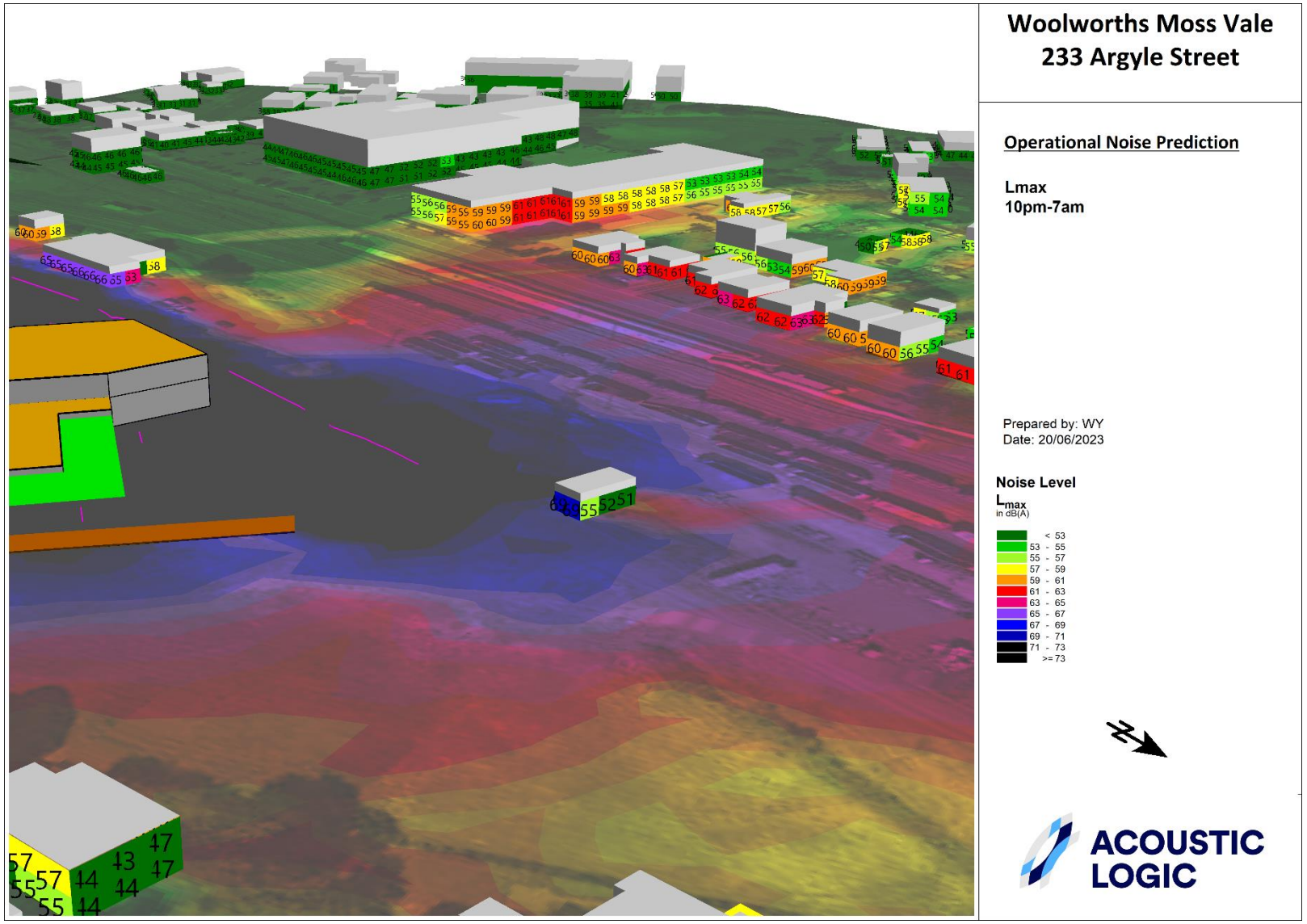


Figure 11 – Peak L_{Max} Noise Events Prediction (western receivers)

6.4.5 Predicted Noise Emissions Summary

Cumulative noise emission predictions from all operational noise as outlined in Section 6.2 is presented below to the most sensitive receivers around the development. The highest predicted noise level at each receiver is summarised below.

Table 13 – Predicted Cumulative Noise Levels (Residential Receivers)

Operational Source	Receiver Location	Predicted Noise Level	Criteria	Comment
Cumulative Noise from Site Operation, Including Loading Dock Usage and Carpark	**R1**	< 38 dB(A) $L_{eq(15min)}$	44 dB(A) L_{eq} Daytime (7am–6pm)	Meets NSW EPA Noise Emission Requirements*
			43 dB(A) $L_{eq,}$ Evening (6pm–10pm)	
			38 dB(A) $L_{eq,}$ Night (10pm–7am)	
Maximum Noise Event (Refer Section 6.2.2)		<52 L_{max}	55 dB(A) L_{max} (Internal)	
Cumulative Noise from Site Operation, Including Loading Dock Usage and Carpark	**R2**	40-42 dB(A) $L_{eq(15min)}$	44 dB(A) L_{eq} Daytime (7am–6pm)	
			43 dB(A) $L_{eq,}$ Evening (6pm–10pm)	
		<38 dB(A) $L_{eq(15min)}$	38 dB(A) $L_{eq,}$ Night (10pm–7am)	
Maximum Noise Event (Refer Section 6.2.2)		63-65 L_{max}	55 dB(A) L_{max} (Internal)	
Cumulative Noise from Site Operation, Including Loading Dock Usage and Carpark	**R3**	42-44 dB(A) $L_{eq(15min)}$	49 dB(A) L_{eq} Daytime (7am–6pm)	
			44 dB(A) $L_{eq,}$ Evening (6pm–10pm)	
		<38 dB(A) $L_{eq(15min)}$	41 dB(A) $L_{eq,}$ Night (10pm–7am)	
Maximum Noise Event (Refer Section 6.2.2)		60 L_{max}	55 dB(A) L_{max}(Internal)	
Cumulative Noise from Site Operation, Including Loading Dock Usage and Carpark	**R4**	44-46 dB(A) $L_{eq(15min)}$	49 dB(A) L_{eq} Daytime (7am–6pm)	
			44 dB(A) $L_{eq,}$ Evening (6pm–10pm)	
		40-42 dB(A) $L_{eq(15min)}$	41 dB(A) $L_{eq,}$ Night (10pm–7am)	
Maximum Noise Event (Refer Section 6.2.2)		63-65 L_{max}	55 dB(A) L_{max} (Internal)	

**Section 4.2 of the Noise Policy for Industry states that the residual noise impacts of an individual scenario that is no greater than 2dB(A) above respective criteria is considered negligible and that it would 'not be discernible by the average listener and therefore would not warrant receiver-based treatments or controls'.*

Table 14 – Predicted Cumulative Noise Levels (Non-Residential Receivers)

Operational Source	Receiver Location	Predicted Noise Level	Criteria	Comment
Cumulative Noise from Site Operation, Including Loading Dock Usage and Carpark	I1	42-44 dB(A) $L_{eq(15min)}$	68 dB(A) L_{eq}	Meets NSW EPA Noise Emission Requirements
	C1	48-50 dB(A) $L_{eq(15min)}$	63 dB(A) L_{eq}	

*Note L_{Max} external noise levels at receiver facades have been presented in the Table 13. Typically, a 10dB(A) noise reduction occurs through a window open for natural ventilation. The below table presents the corrected maximum noise events to each residential receiver.

Table 15 - Predicted Internal Noise Level L_{max} with Windows Open

Receiver	Predicted External Noise Level L_{max}	Predicted Internal Noise Level L_{max}	Criteria*	Compliance
R1	<52 L_{max}	<42 L_{max}	55 L_{max}	Yes
R2	63-65 L_{max}	53-55 L_{max}		
R3	60 L_{max}	50 L_{max}		
R4	63-65 L_{max}	53-55 L_{max}		

*Note: EPA RNP 2011 states *"Maximum internal noise levels between 50-55 are unlikely to awaken people from sleep."*

6.5 NOISE FROM MECHANICAL PLANT WITHIN PROPOSED SITE GENERALLY

Detailed plant selection 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 and commercial receivers should comply with the requirements of Section 5. Detailed acoustic review should be undertaken at CC stage to determine acoustic treatments to control noise emissions to satisfactory levels.

As a preliminary measure, major plant has been modelled based on the assumptions and advice below to account for a cumulative noise emissions level for the site.

6.5.1 Preliminary Mechanical Treatment Advice

An indicative assessment of initial design of primary plant items is presented below.

- Generators may be used for standby power, to ensure compliance these may require attenuation to radiators and air intakes, as well as silencers/mufflers to the exhaust.
- Refrigeration equipment:
    - Refrigeration plant is recommended to be located within enclosure plant rooms.
    - Noise screening (using either a dedicated noise screen or the building shell between the plant and noise sensitive buildings) is recommended. This will include blanking off any plant room louvres.
    - Night time operational speeds shall be restricted.
- Major fans (typically with a sound power over 80dB(A) – such as kitchen exhaust, major toilet exhaust and major relief air fans) may require acoustic treatment if located externally near sensitive receivers. 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 and with attenuators if necessary. Indicatively a 1d unpodded attenuator with 2m of 50mm internally lined ductwork.
- All mechanical plant other than refrigeration plant required to run at all hours is to be turned off outside of operational hours.

Cumulative assessment of both plant noise with other noise sources is recommended when conducting acoustic design of plant items. Compliance with EPA acoustic criteria (as set out in Section 5) will be achievable, provided that detailed acoustic review of plant items is undertaken once plant is selected, and acoustic treatments similar to those outlined above are adopted.

The above recommendations are indicative. Detailed acoustic review should be undertaken at CC stage to determine acoustic treatments to control noise emissions to satisfactory levels.

6.6 ACOUSTIC RECOMMENDATIONS

Predicted noise levels from the operation of the proposed development show that it is capable of meeting the noise emission requirements at all times. It is noted that the noise level from loading dock and carpark activities (identified as the most noise intensive use) meets the early morning shoulder period noise emission level and is not currently proposed to operate between 10pm – 5am.

It is recommended that a review and detailed design of all mechanical plant associated with the site be undertaken prior to the issue of a construction certificate to ensure plant noise levels meet the noise emission requirements detailed in Section 5. Any review of mechanical plant noise should take into consideration the operational noise levels from the site, such that the cumulative noise does not exceed the PNTL's.

All feasible and reasonable noise mitigation measures have been applied to reduce noise levels and the following recommendations are presented:

- Engines should be turned off during loading and unloading movements, thus effectively having no idling noise during the loading and unloading operations.
- Only 4 truck movements (MRV/delivery truck under 14.7 metres) are to be allowed in any given 1-hour period during the day and evening 7am-10pm period. Deliveries shall be managed accordingly.
- Only 2 truck movements (MRV/delivery truck under 14.7 metres) are to be allowed in any given 1-hour period during the early morning 5am-7am period. Deliveries shall be managed accordingly.
- Site accessibility for MRV or delivery trucks restricted to Argyle Street entry/exit only.
- Trucks are to minimise usage of air brakes as much as practicable.
- Acoustic barriers and panelling are to be implemented as per Section 6.6.1.

Noise modelling predicts that noise emissions will comply to all sensitive receivers. If an increase of the loading dock usage is expected, additional acoustic review will be required.

6.6.1 Acoustic Barrier and Panelling

Acoustic Logic note that due to the close proximity of the residential receivers to the loading dock, an acoustic barrier is required.

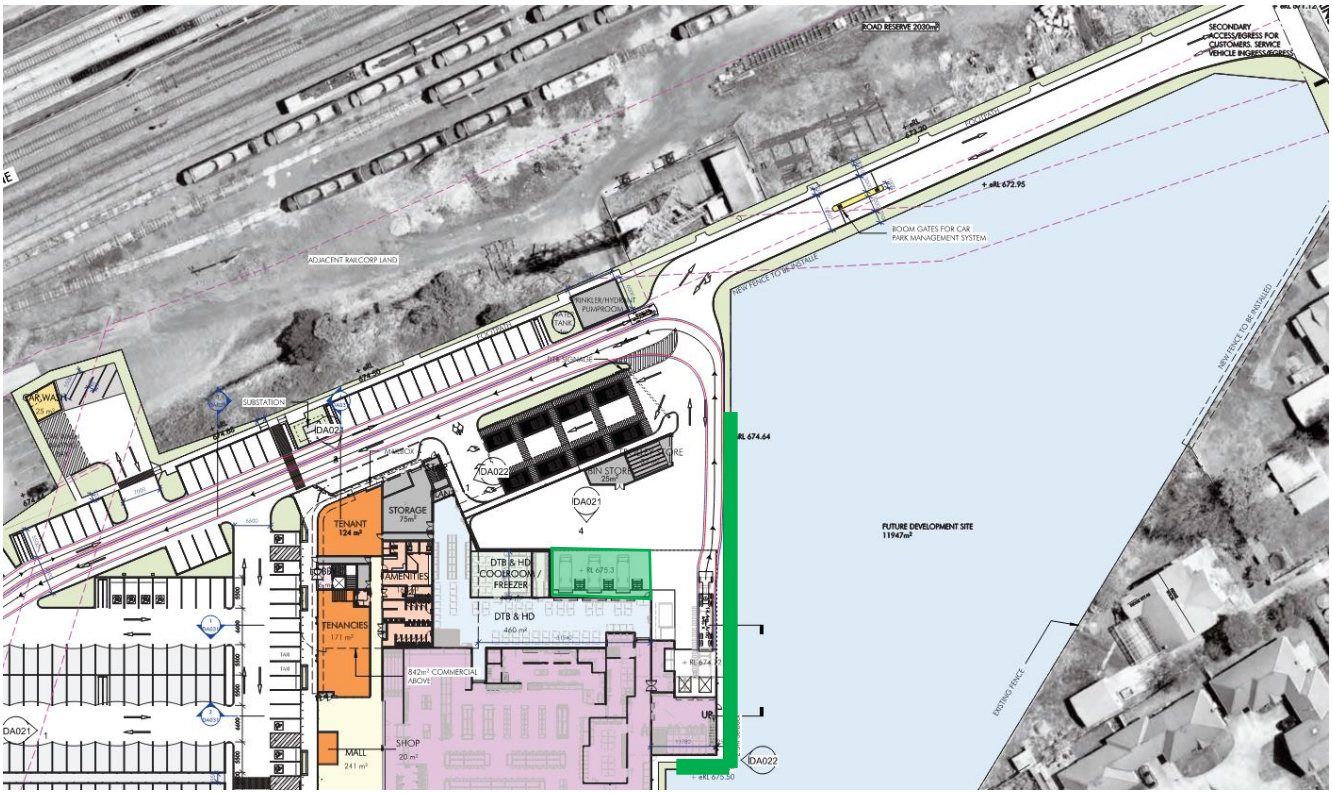


Figure 12 – Proposed Acoustic Barrier

- Recommended acoustic barrier around the loading dock is presented in Figure 12 above. Barriers are to be constructed to the minimum height outlined from the RL as presented in the Site Plan provided to this office.

- Install minimum 3m high localised imperforate acoustic barriers as marked. The barrier may be constructed of lapped and capped timber, plexiglass, 4mm Perspex, Colorbond, 9mm fibrous cement sheet or equivalent, installed with no gaps between the panels, and maximum of a 20mm gap at the bottom to allow water flow if required.

- Install Stratocell Whisper 100mm or equivalent acoustic absorption panelling on the ceiling of the loading dock awning with a related NRC of 1.

7 CONCLUSION

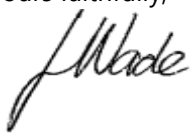
This report presents an acoustic assessment of noise impacts associated with the development to be located at the Woolworths Moss Vale - 233 Argyle Street.

Provided that the complying controls presented in Section 6 are adopted, operational noise emissions will satisfy the requirements of the following documents:

- Wingecarribee Shire Council – *Moss Vale Township Development Control Plan 2021*
- NSW Environmental Protection Authority (EPA) *Road Noise Policy* (RNP) 2011, and
- NSW EPA *Noise Policy for Industry* (NPfI) 2017

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

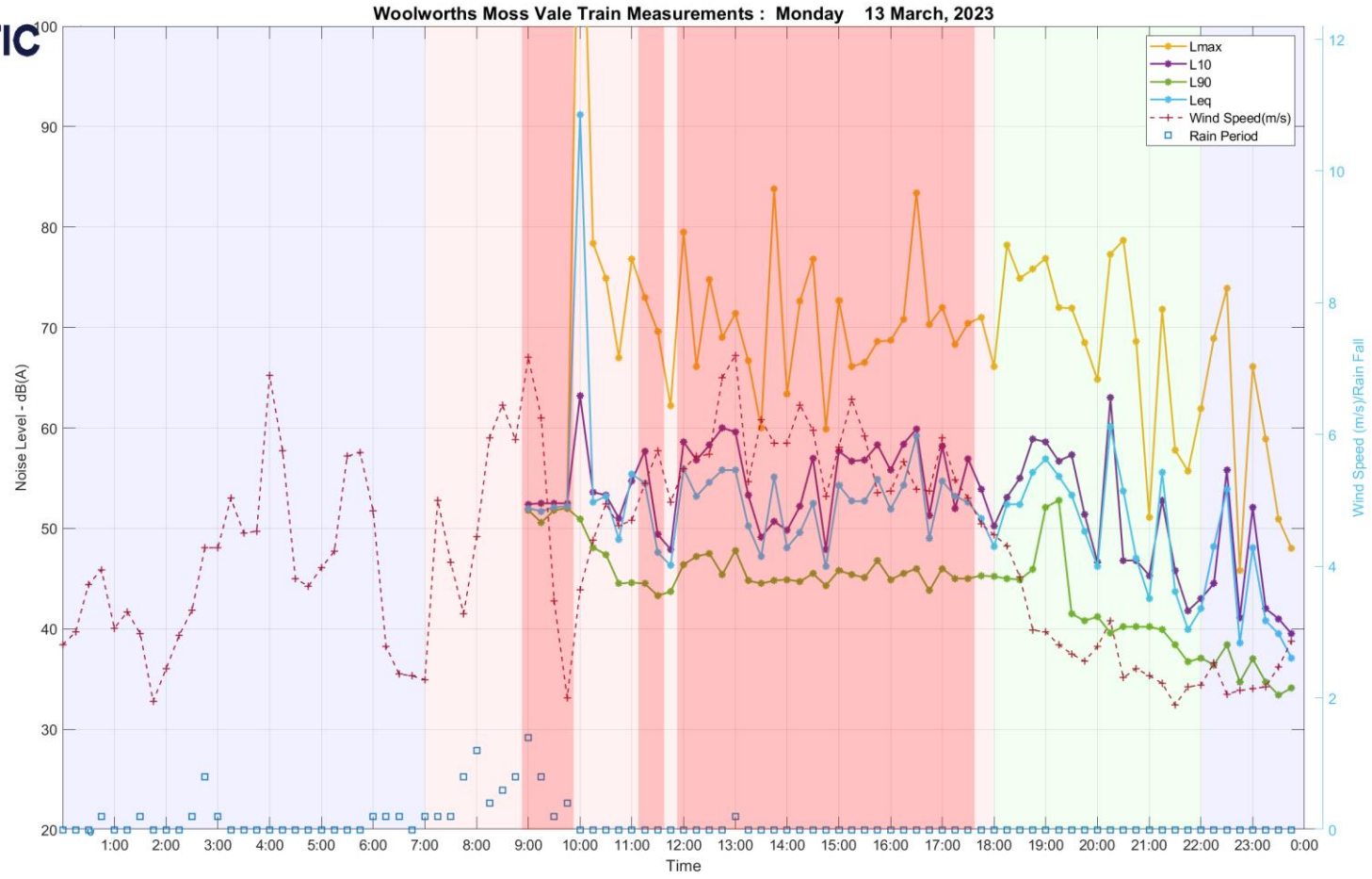
Yours faithfully,

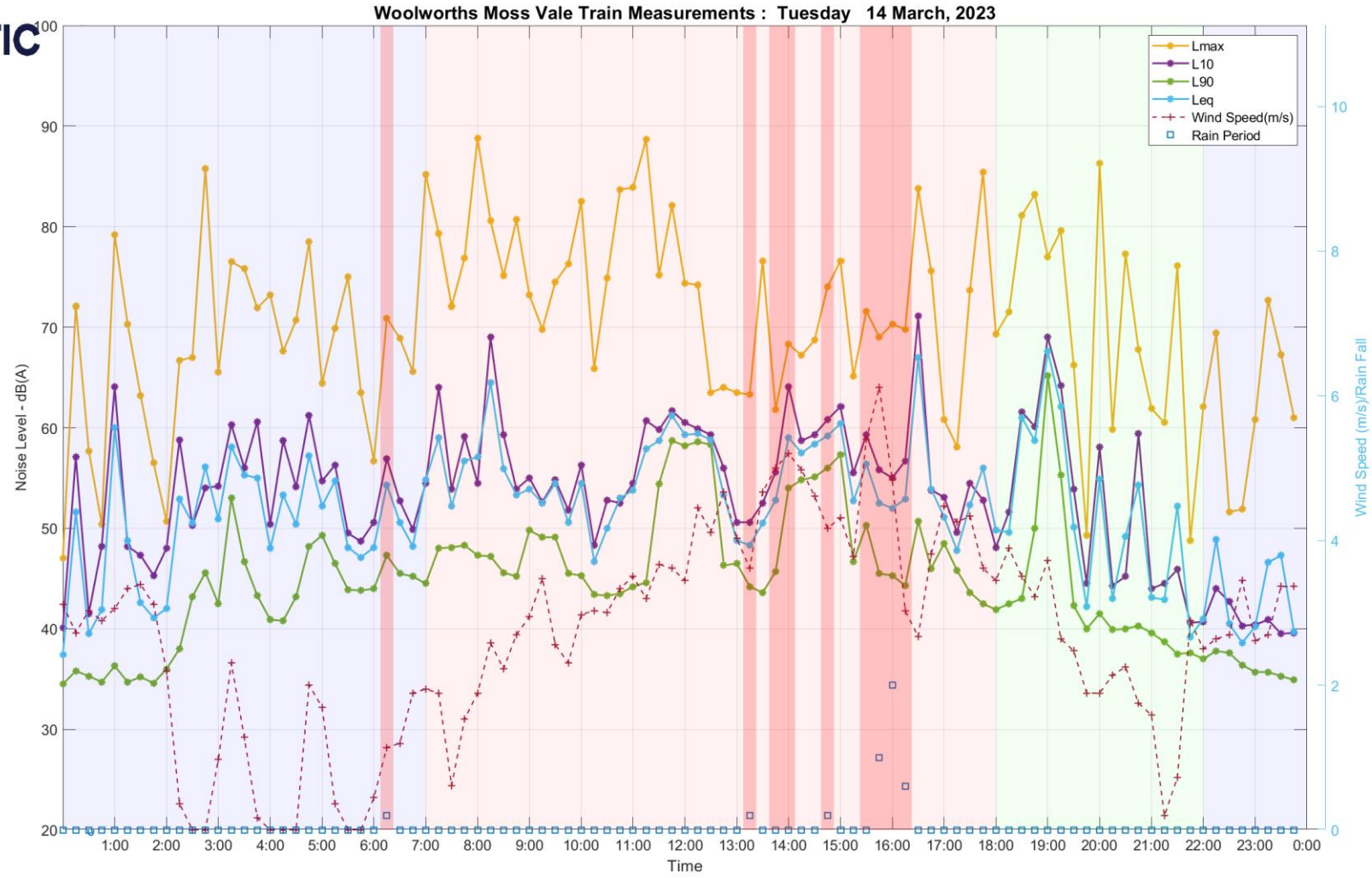


Acoustic Logic Pty Ltd
Justine Wade

APPENDIX ONE – UNATTENDED NOISE MONITORING CHARTS

LOGGER LOCATION 1

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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
20
10
8
6
4
2
0
1:00
2:00
3:00
4:00
5:00
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7:00
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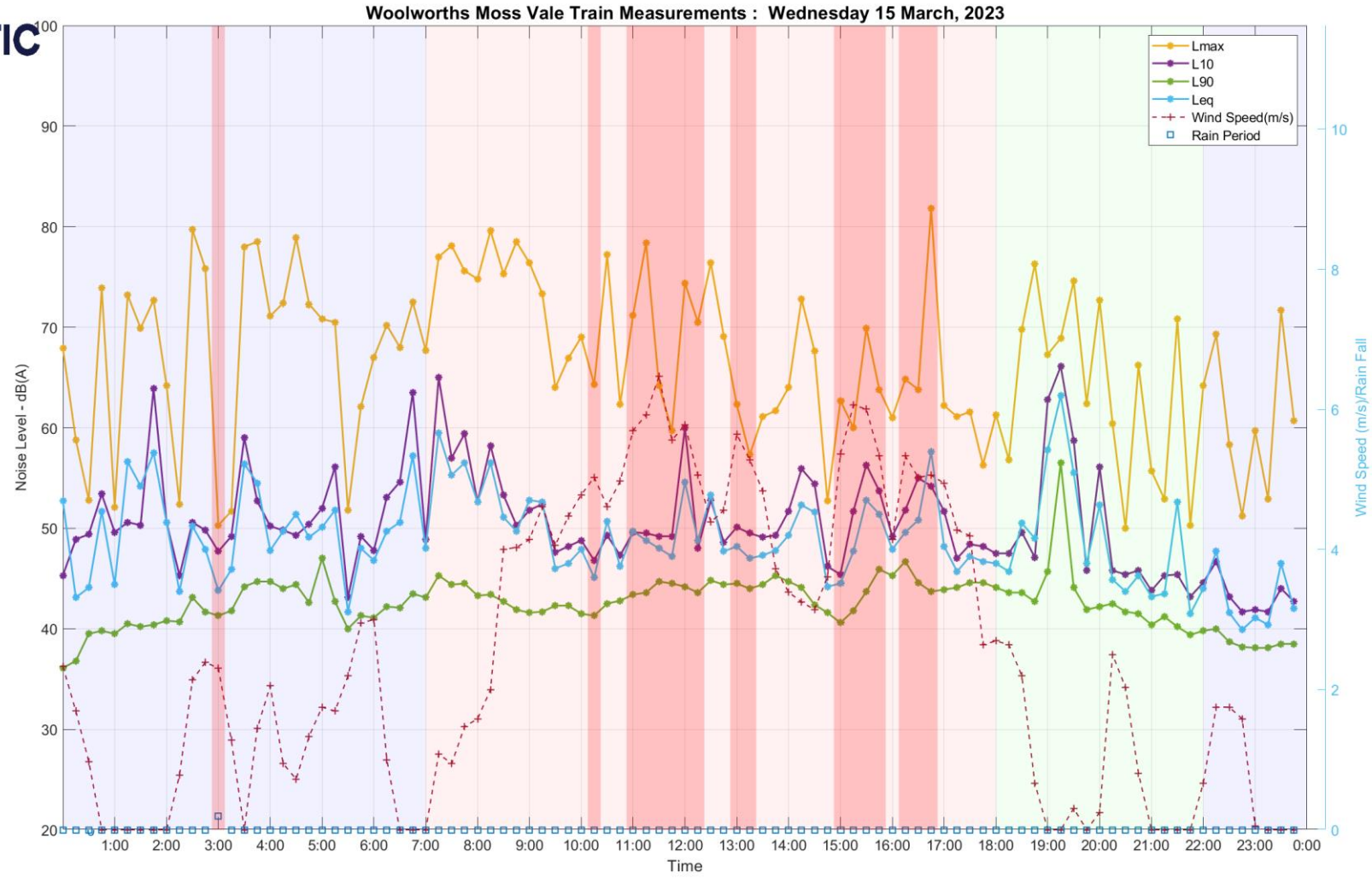
Woolworths Moss Vale Train Measurements : Wednesday 15 March, 2023
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
10
8
6
4
2
0
1:00
2:00
3:00
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5:00
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10:00
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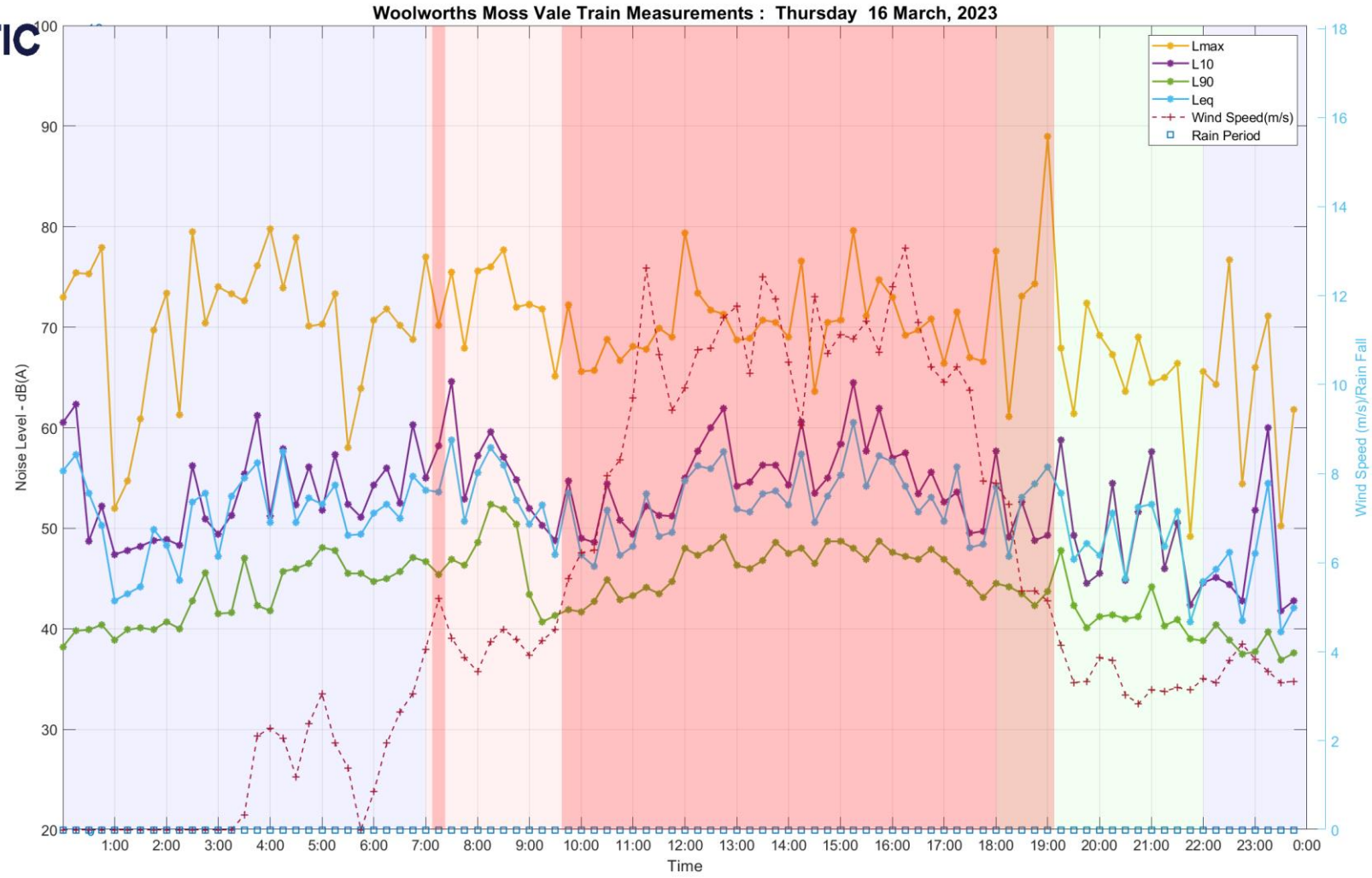
Woolworths Moss Vale Train Measurements : Thursday 16 March, 2023
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
18
16
14
12
10
8
6
4
2
0
1:00
2:00
3:00
4:00
5:00
6:00
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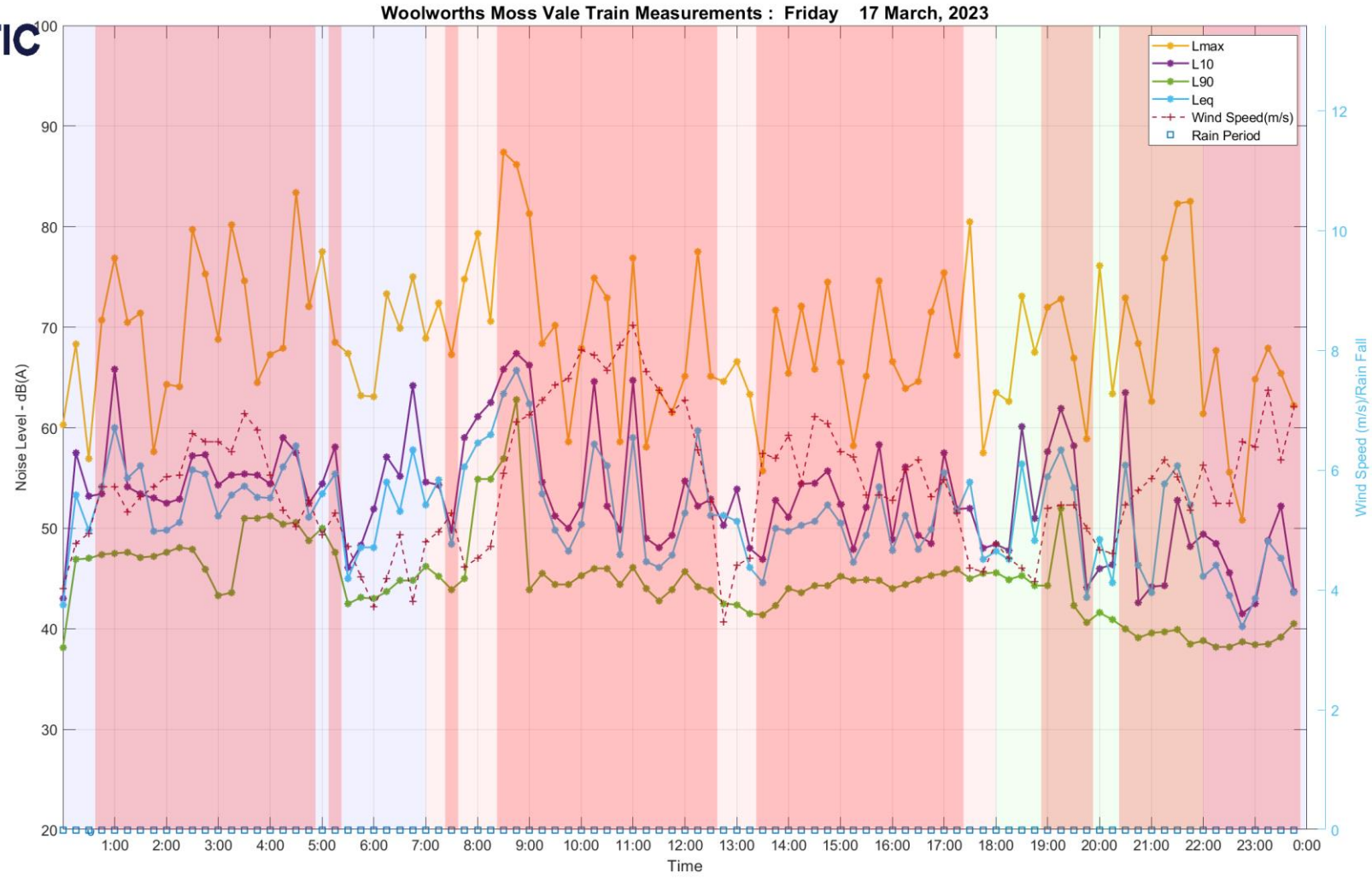
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Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
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80
70
60
50
40
30
20
12
10
8
6
4
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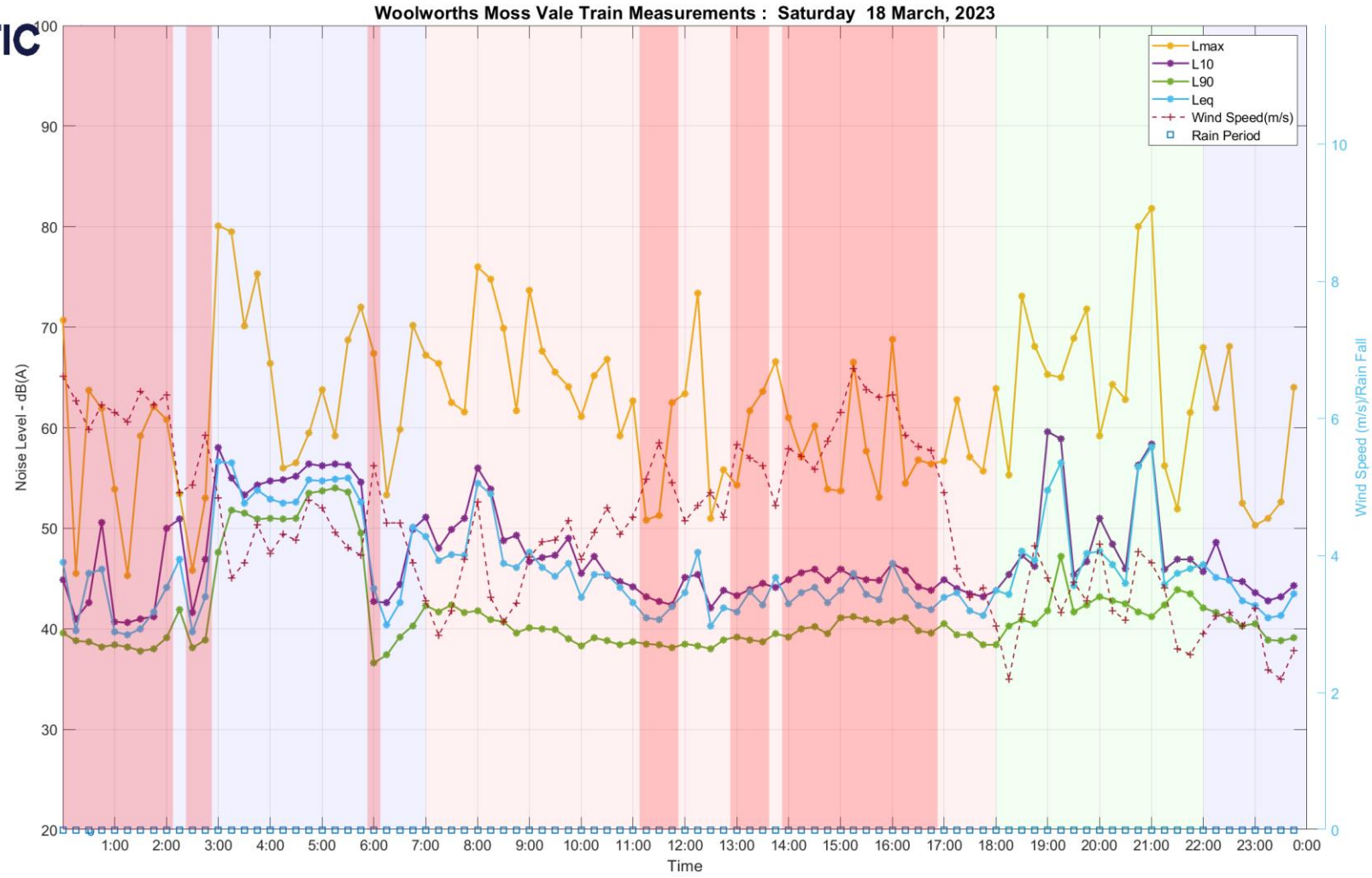
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Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
10
8
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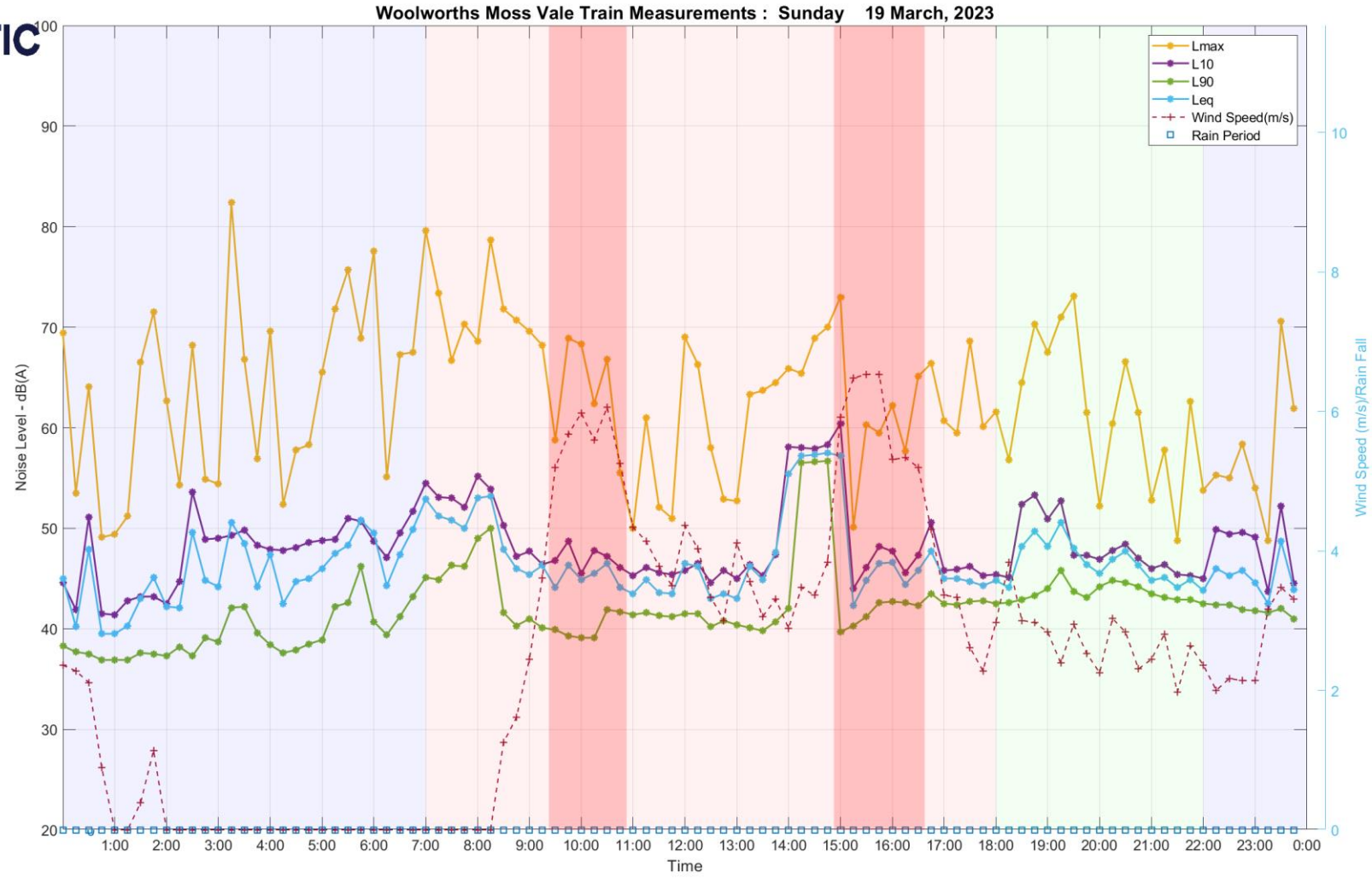
Woolworths Moss Vale Train Measurements : Sunday 19 March, 2023
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
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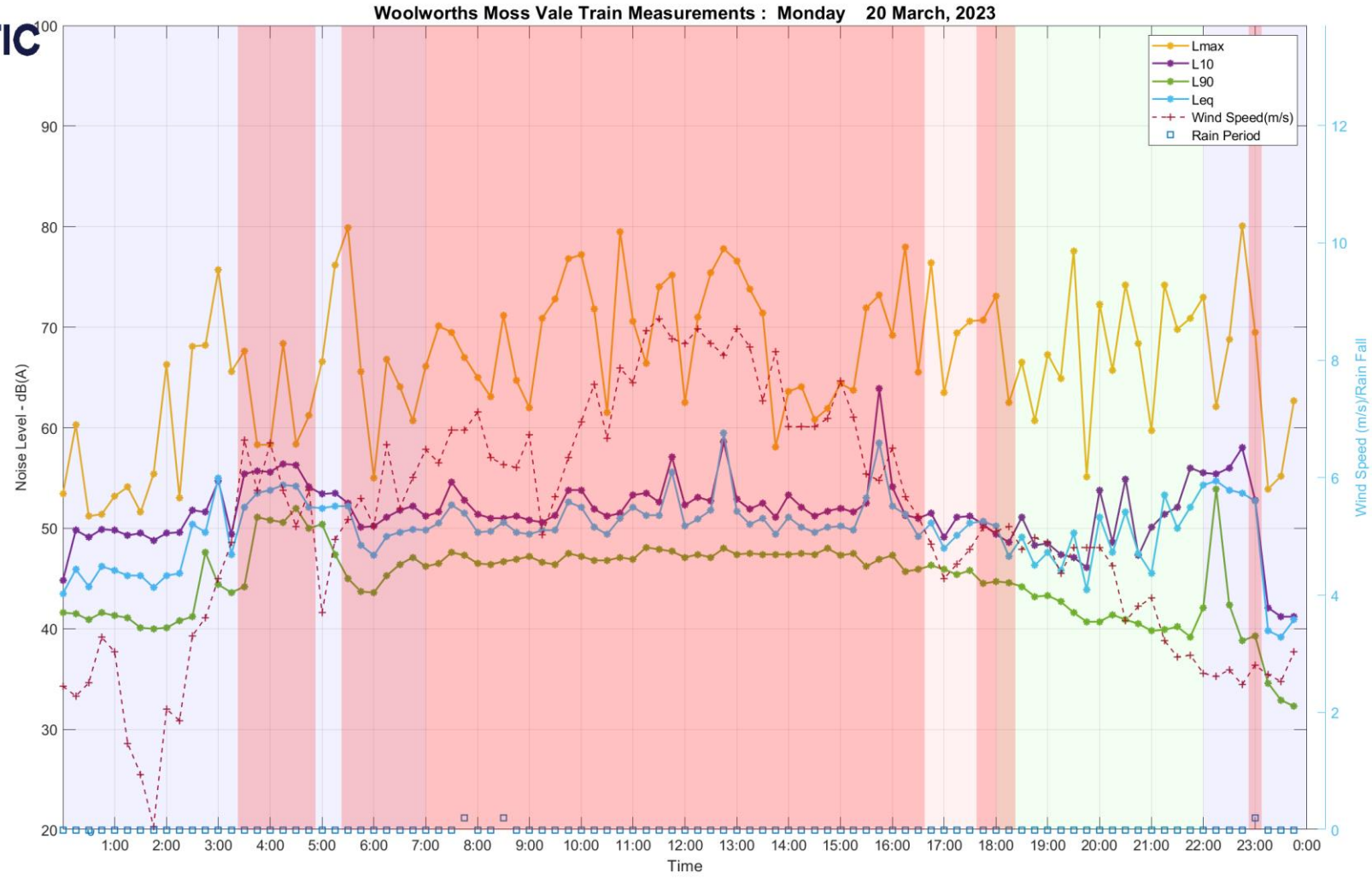
Woolworths Moss Vale Train Measurements : Monday 20 March, 2023
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
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40
30
20
12
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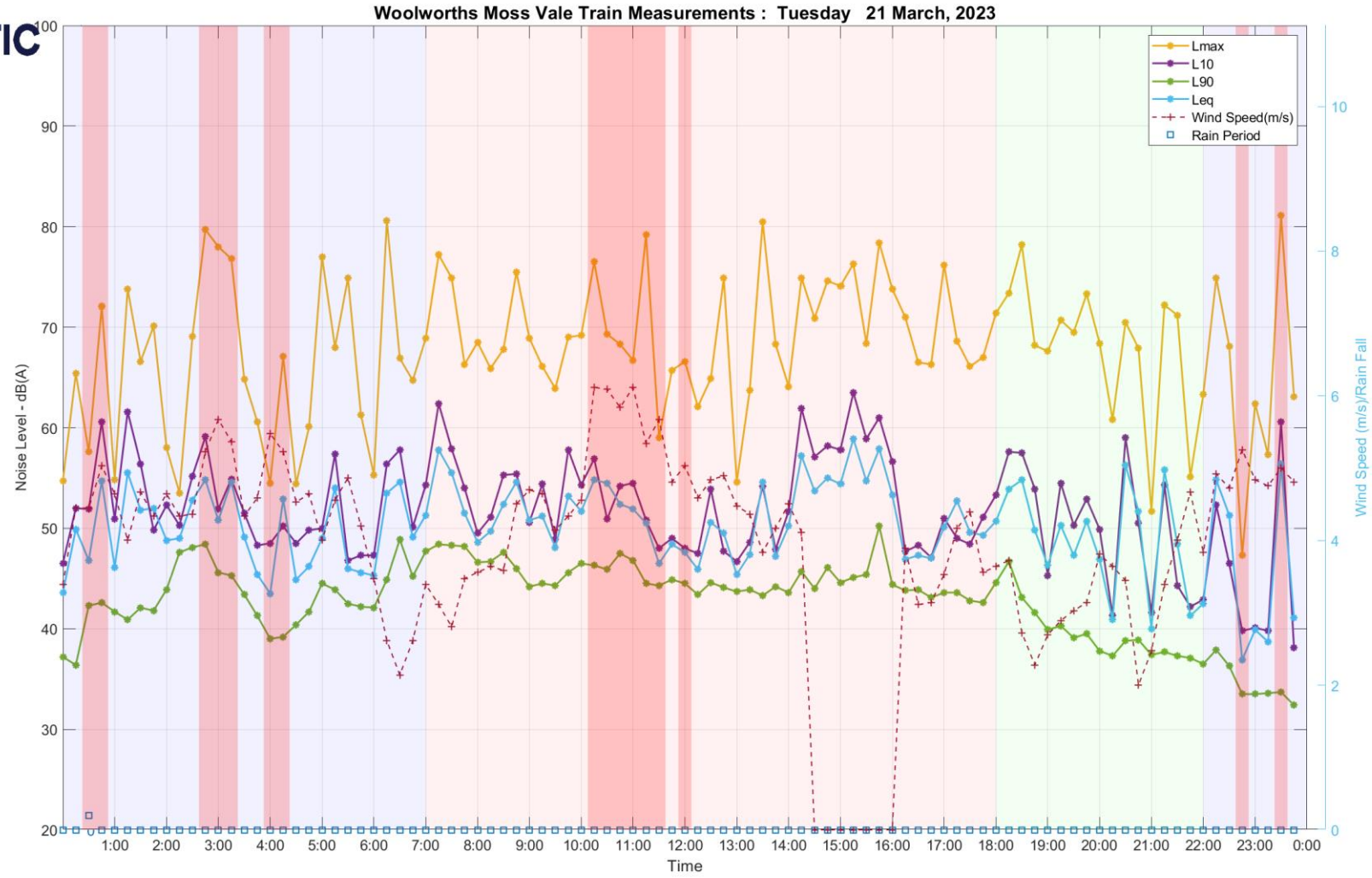
Woolworths Moss Vale Train Measurements : Tuesday 21 March, 2023
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
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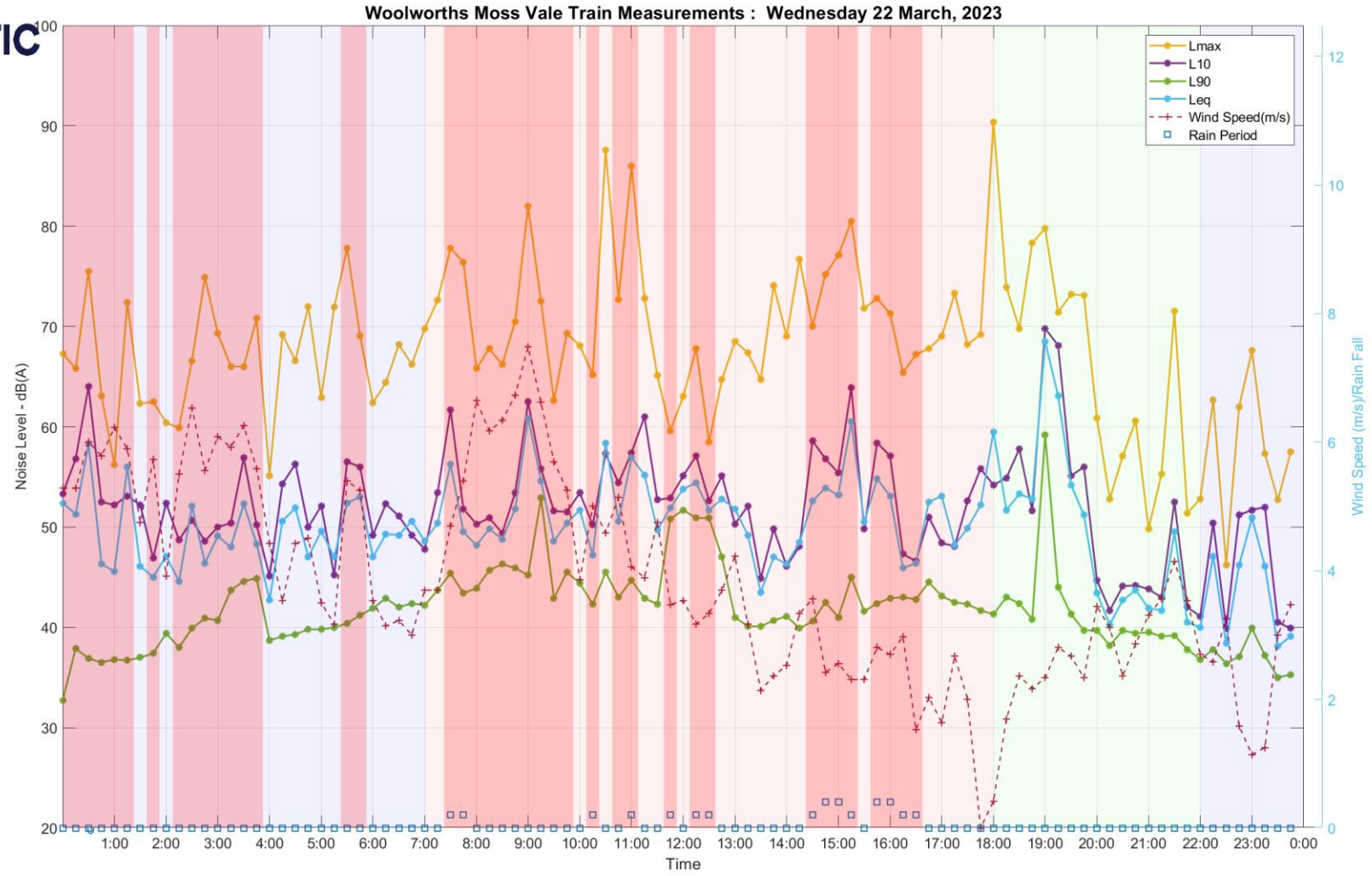
Woolworths Moss Vale Train Measurements : Wednesday 22 March, 2023
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
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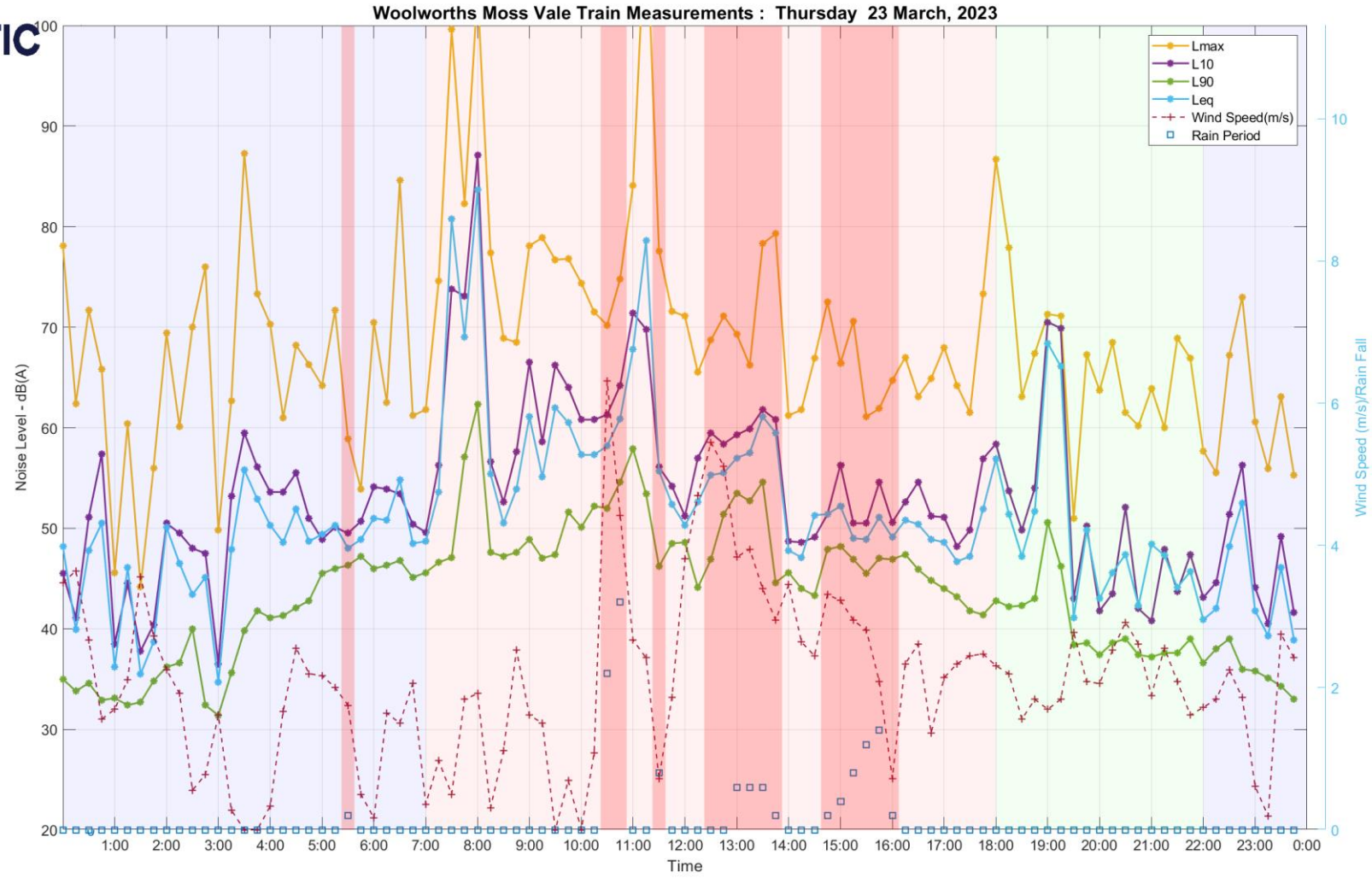
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Lmax
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Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
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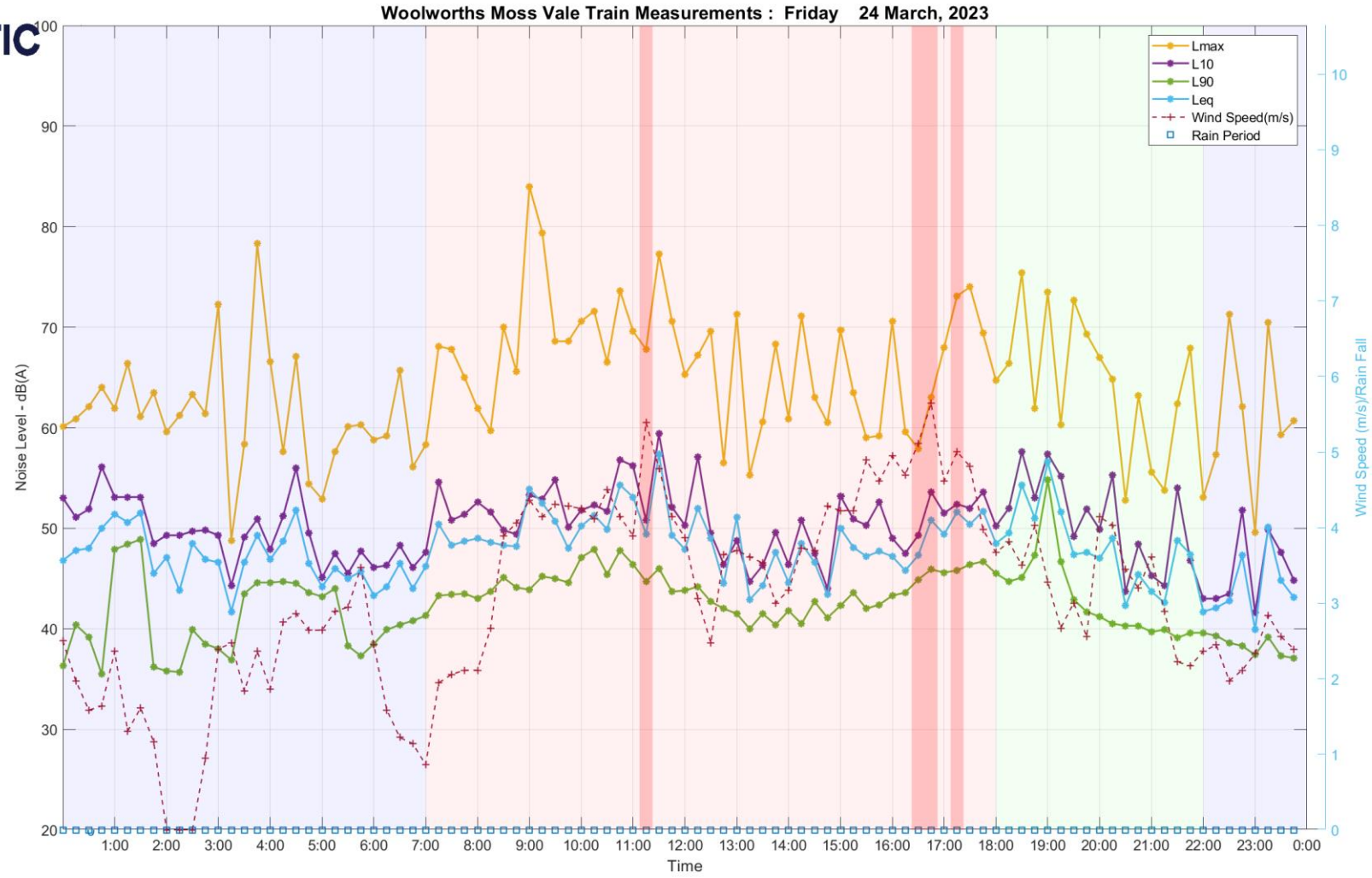
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Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
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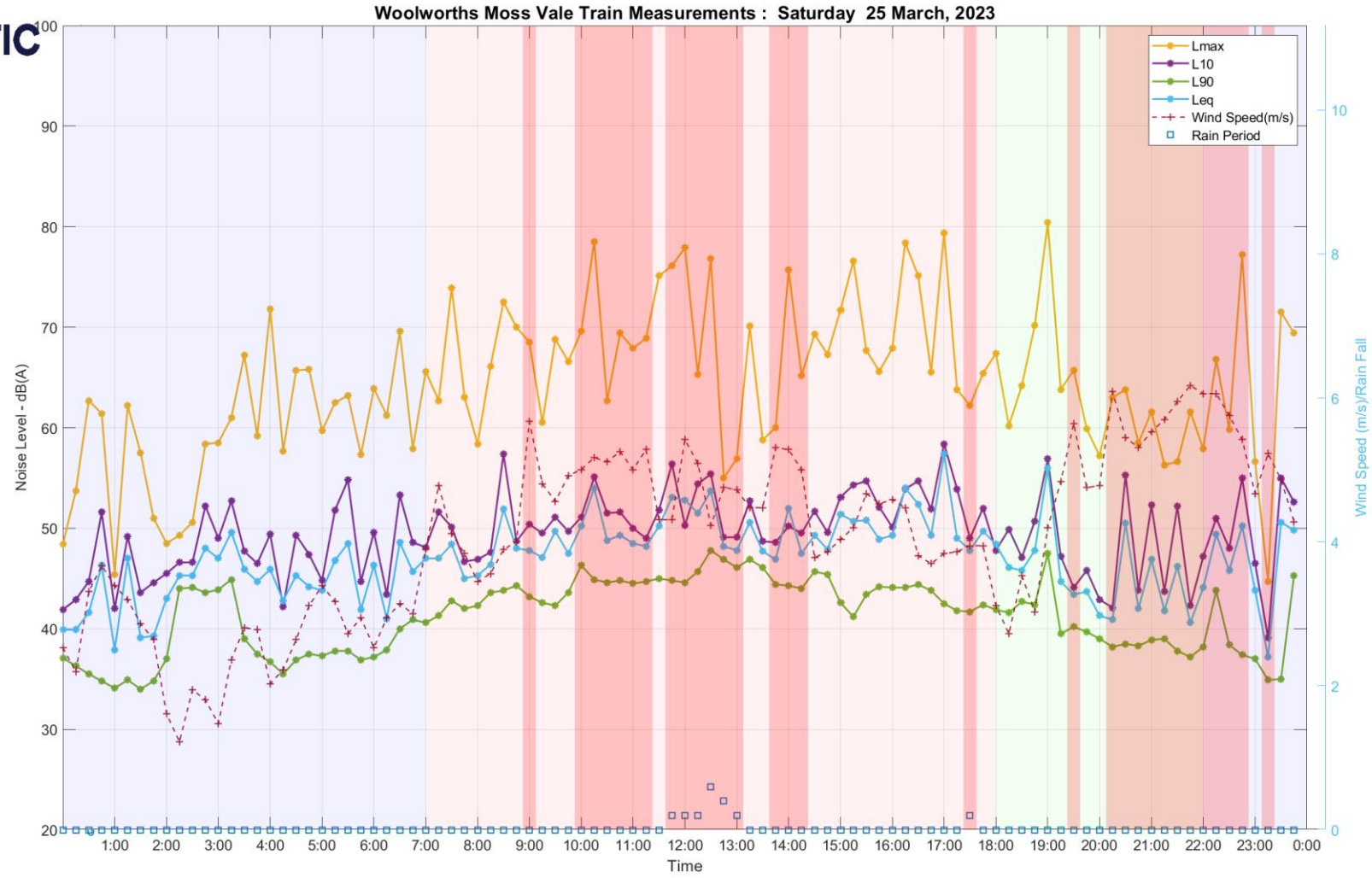
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Lmax
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L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
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80
70
60
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40
30
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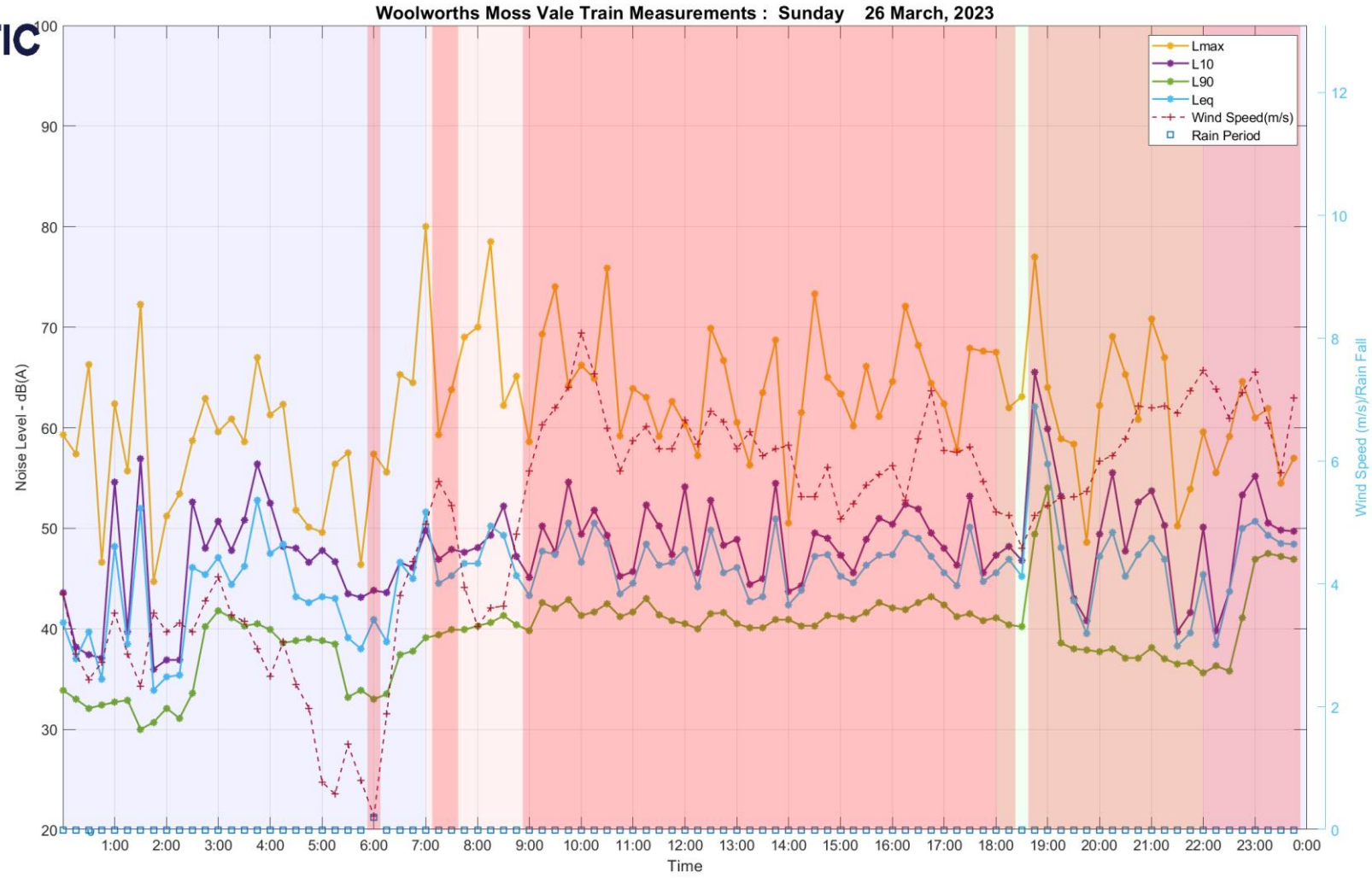
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L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
12
10
8
6
4
2
0
1:00
2:00
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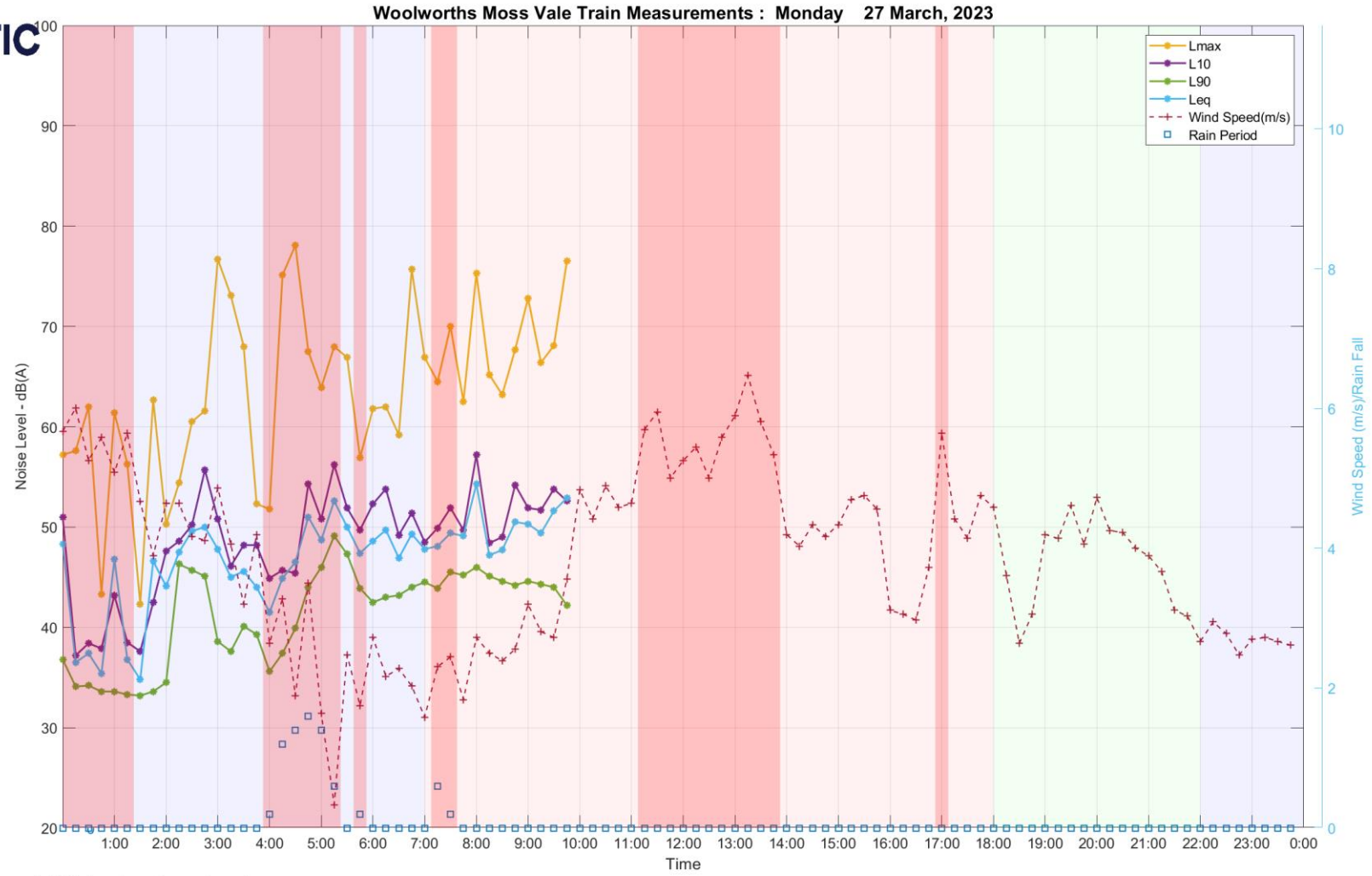
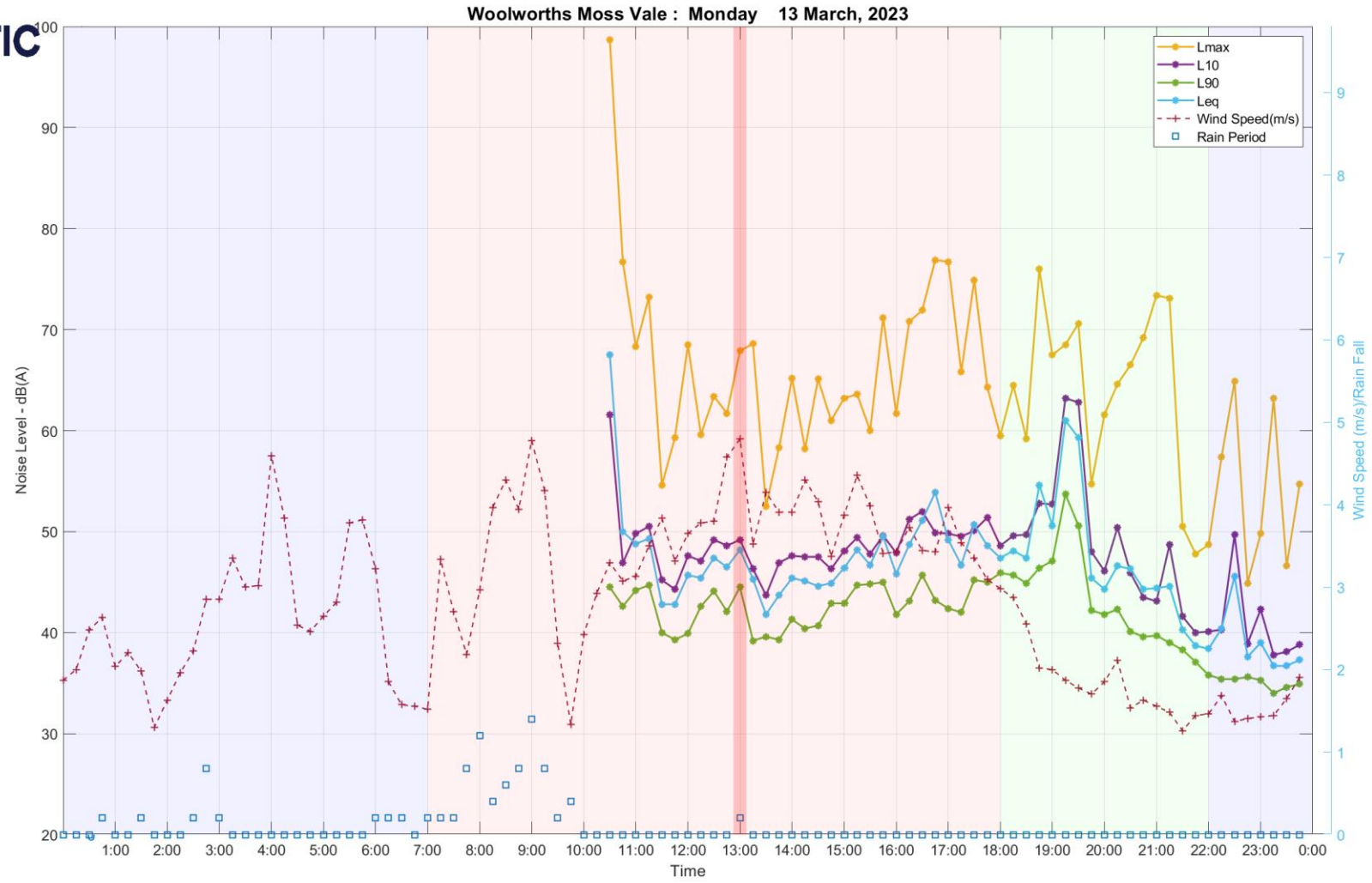
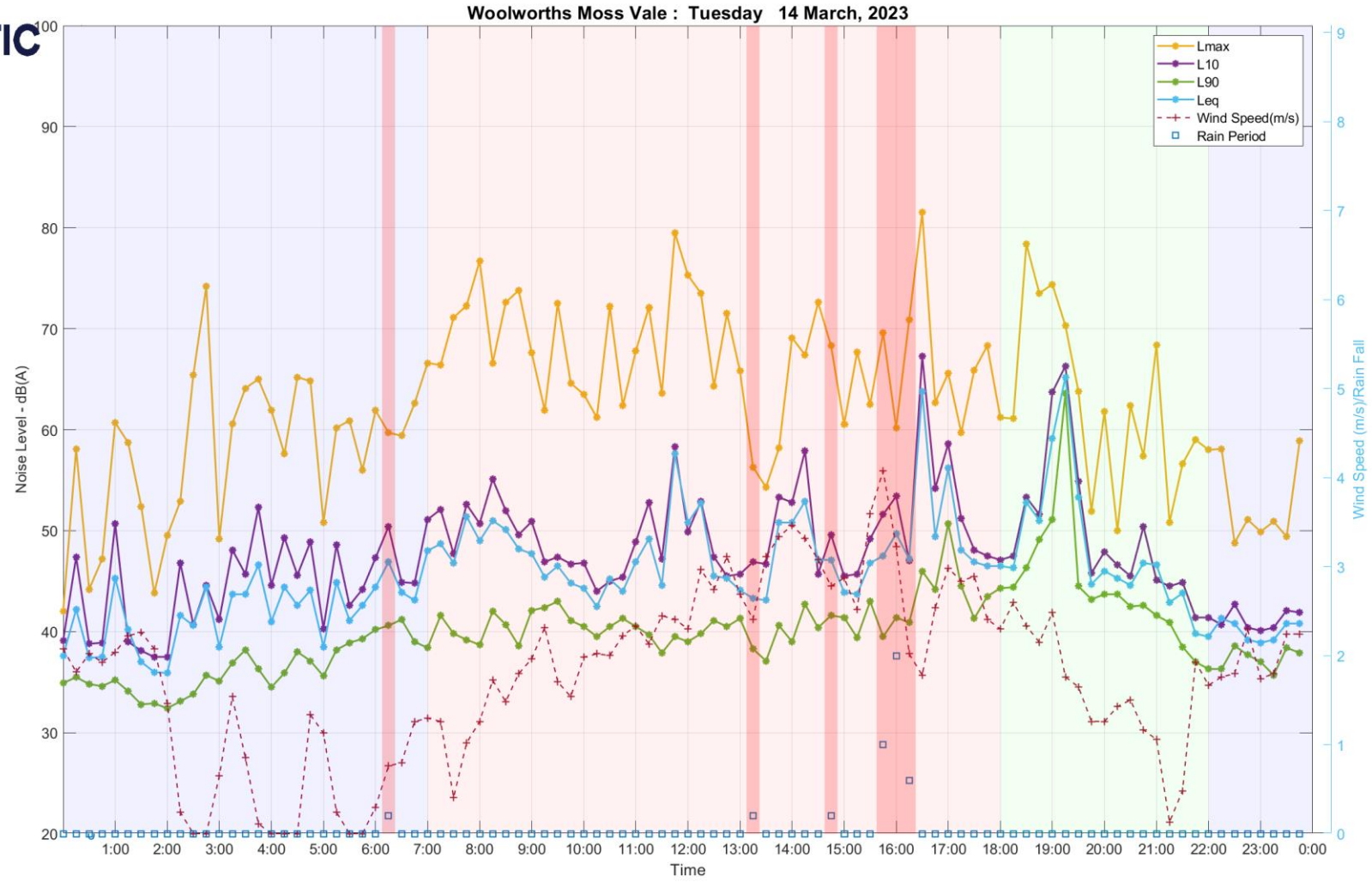


Wind Speed is corrected using factor 1.0000 based on logger location

LOGGER LOCATION 2




Woolworths Moss Vale : Tuesday 14 March, 2023
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
20
9
8
7
6
5
4
3
2
1
0
1:00
2:00
3:00
4:00
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6:00
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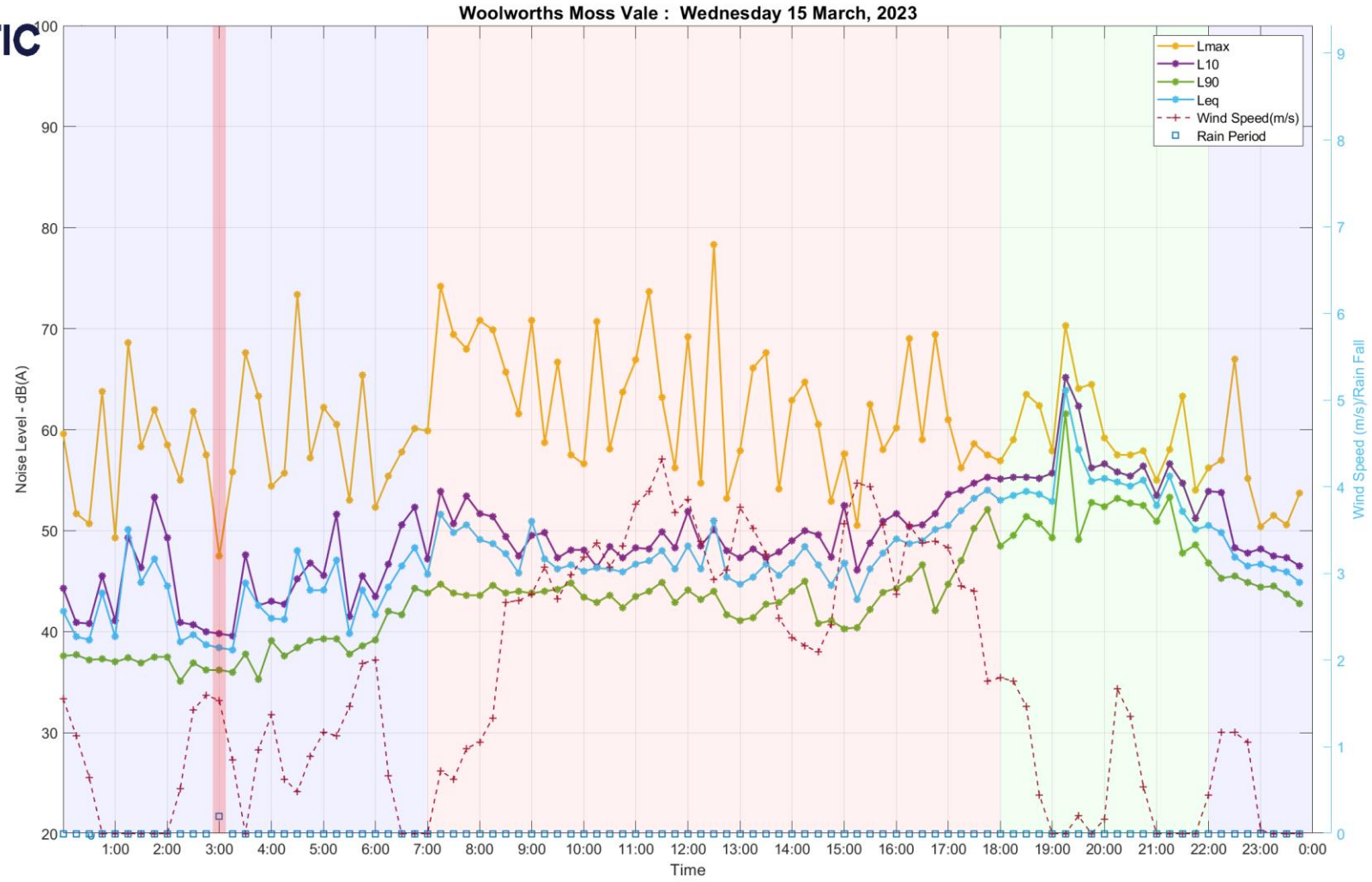
Woolworths Moss Vale : Wednesday 15 March, 2023
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
9
8
7
6
5
4
3
2
1
0
1:00
2:00
3:00
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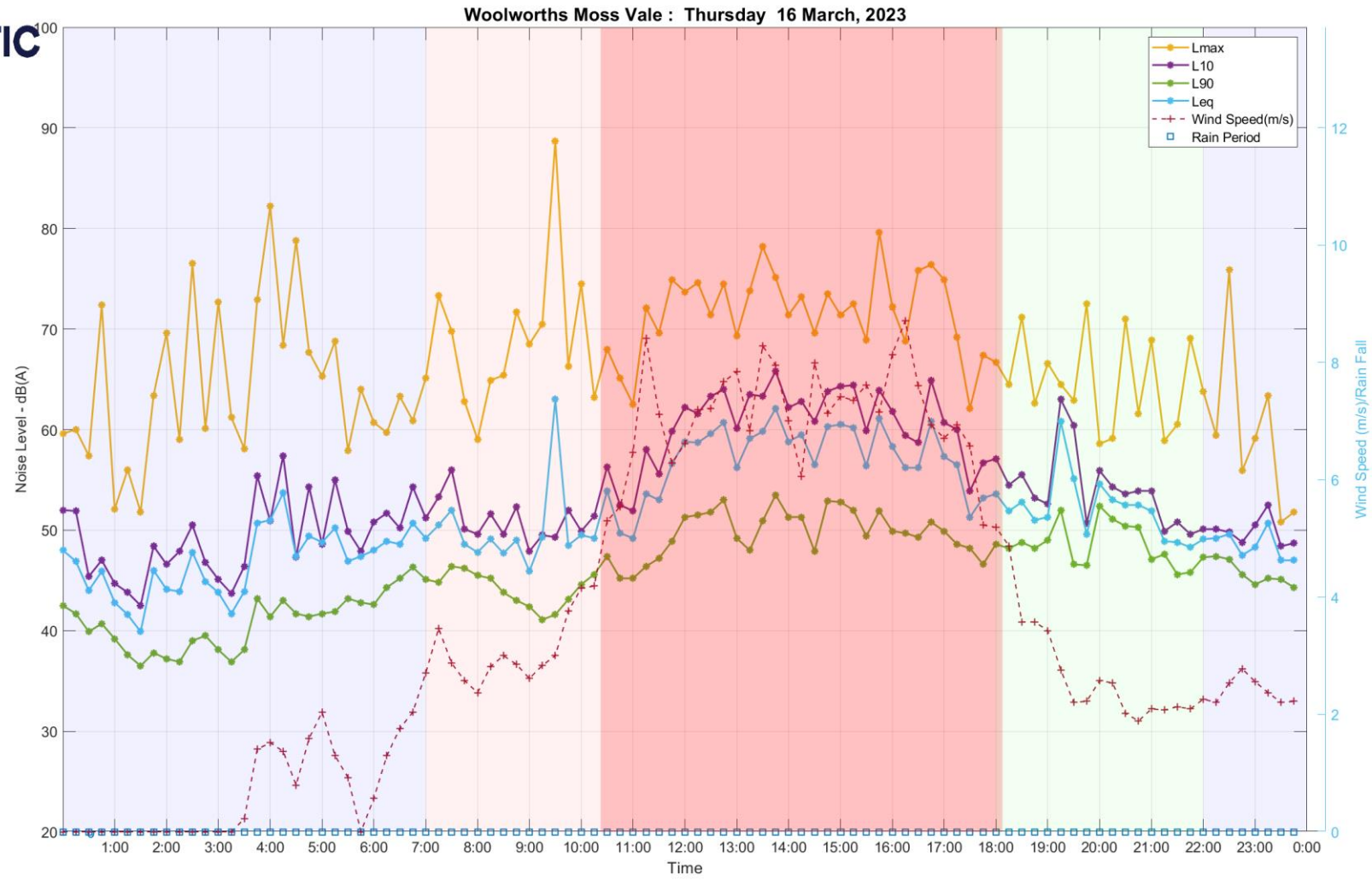
Woolworths Moss Vale : Thursday 16 March, 2023
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
12
10
8
6
4
2
0
1:00
2:00
3:00
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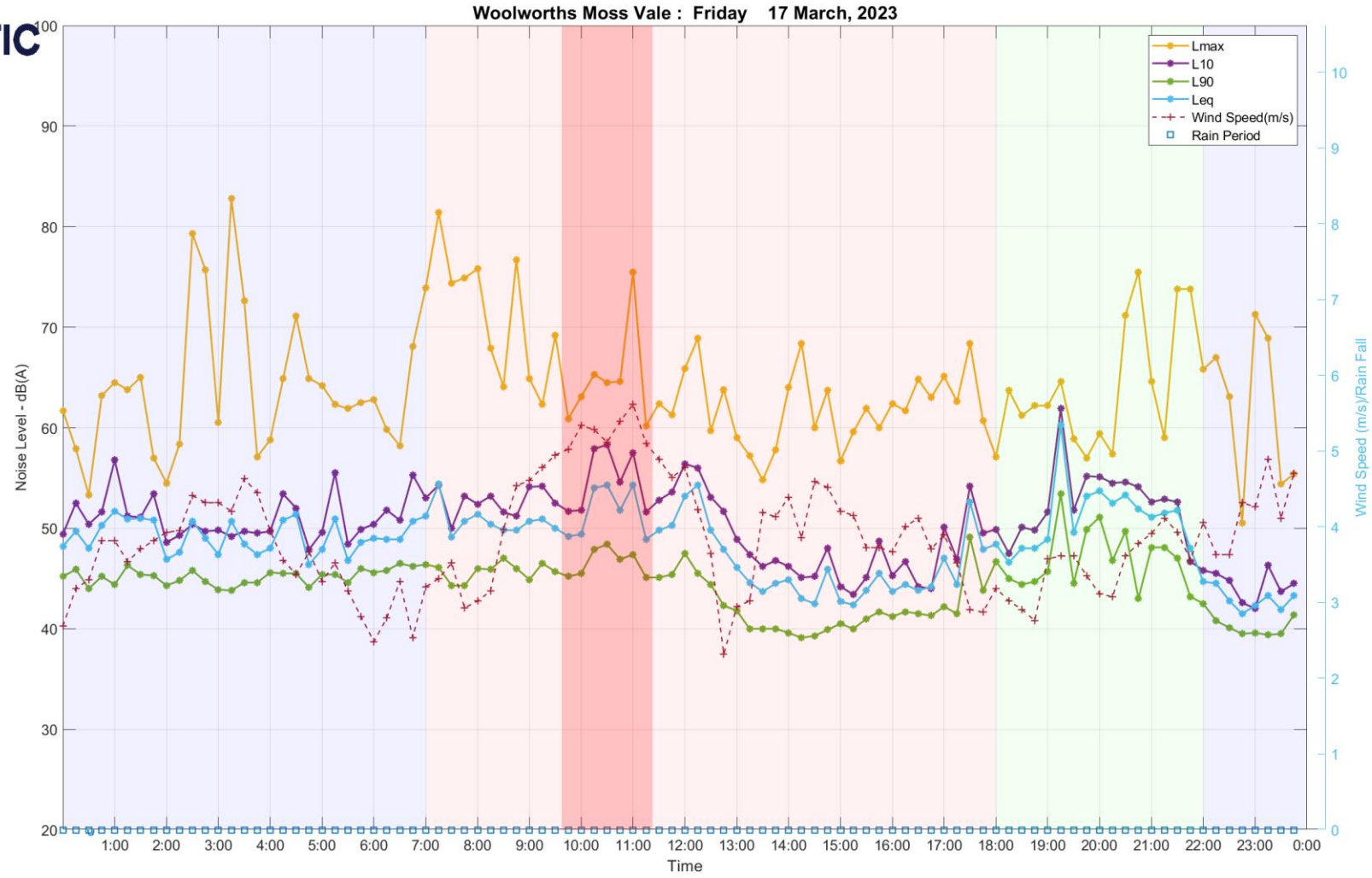
Woolworths Moss Vale : Friday 17 March, 2023
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
10
9
8
7
6
5
4
3
2
1
0
1:00
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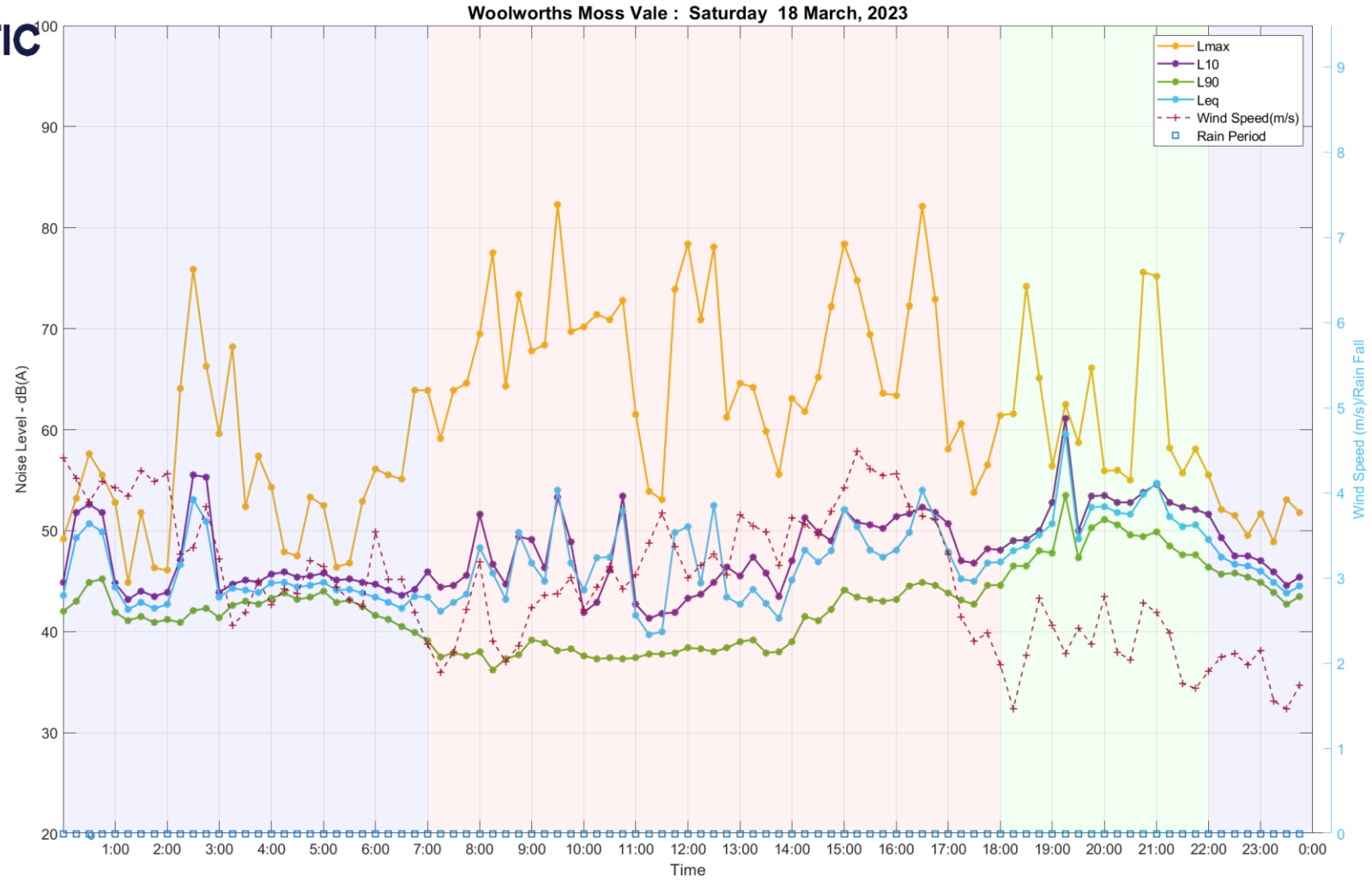
Woolworths Moss Vale : Saturday 18 March, 2023
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
9
8
7
6
5
4
3
2
1
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1:00
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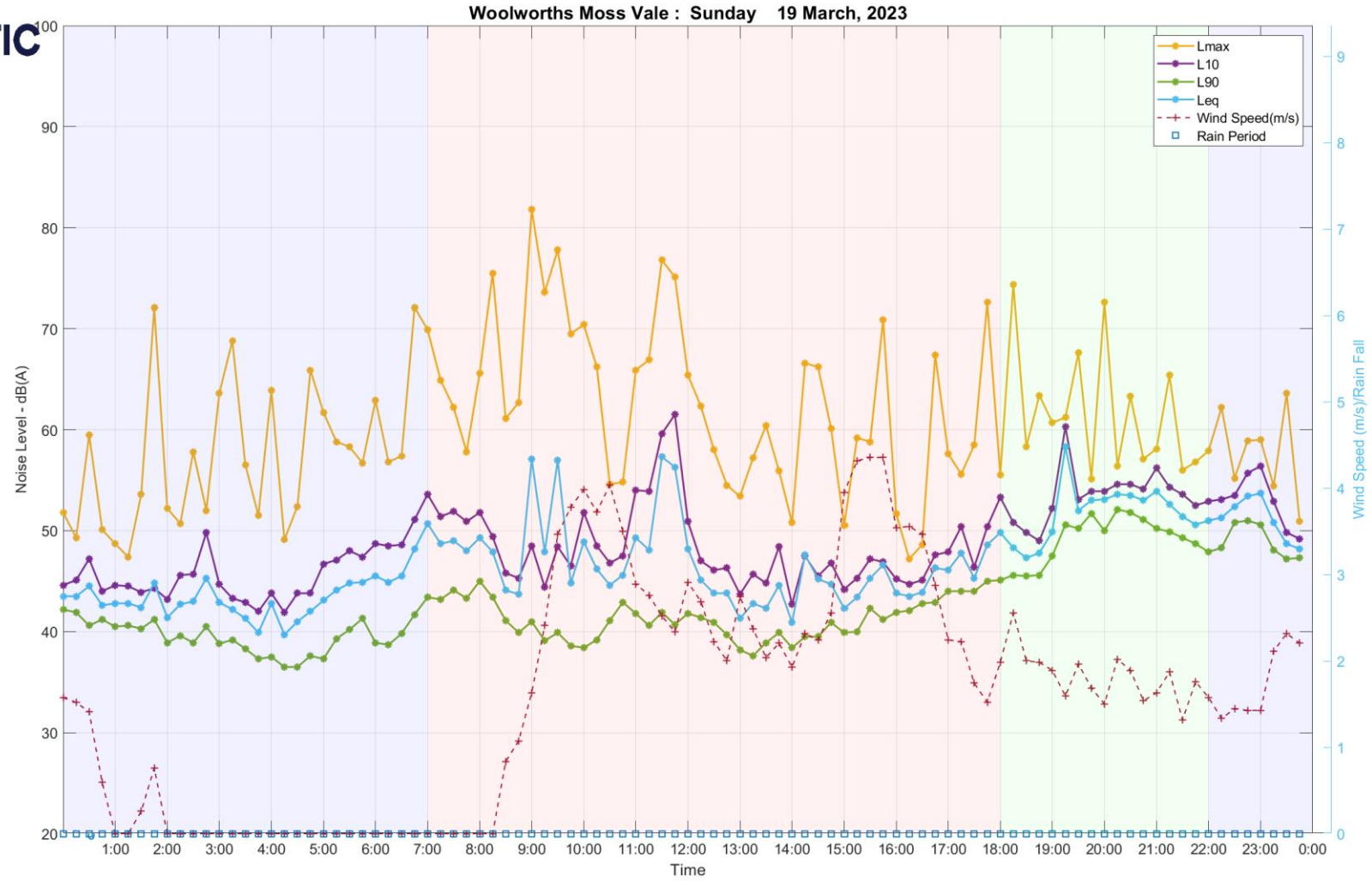
Woolworths Moss Vale : Sunday 19 March, 2023
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
9
8
7
6
5
4
3
2
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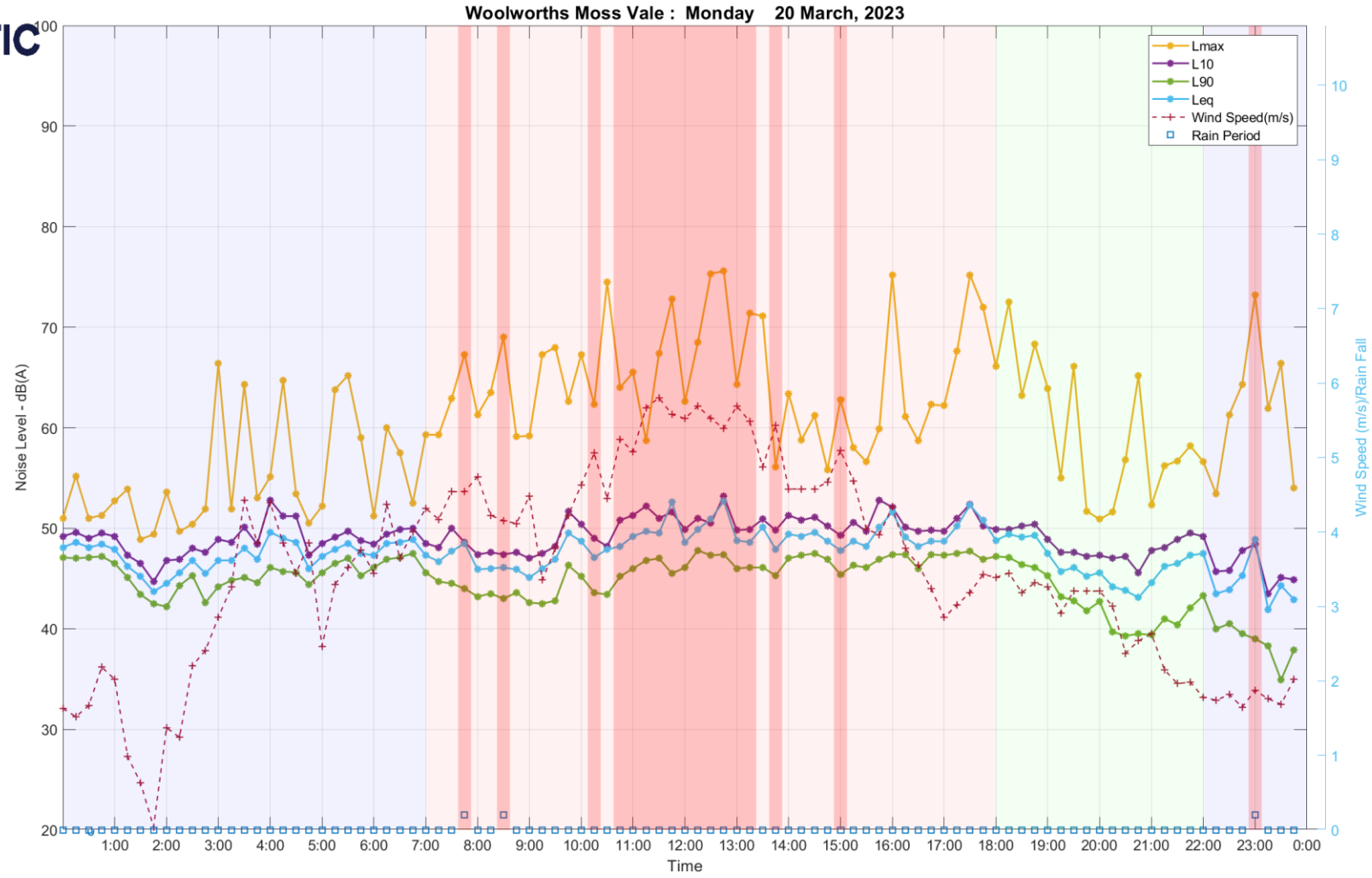
Woolworths Moss Vale : Monday 20 March, 2023
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
10
9
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6
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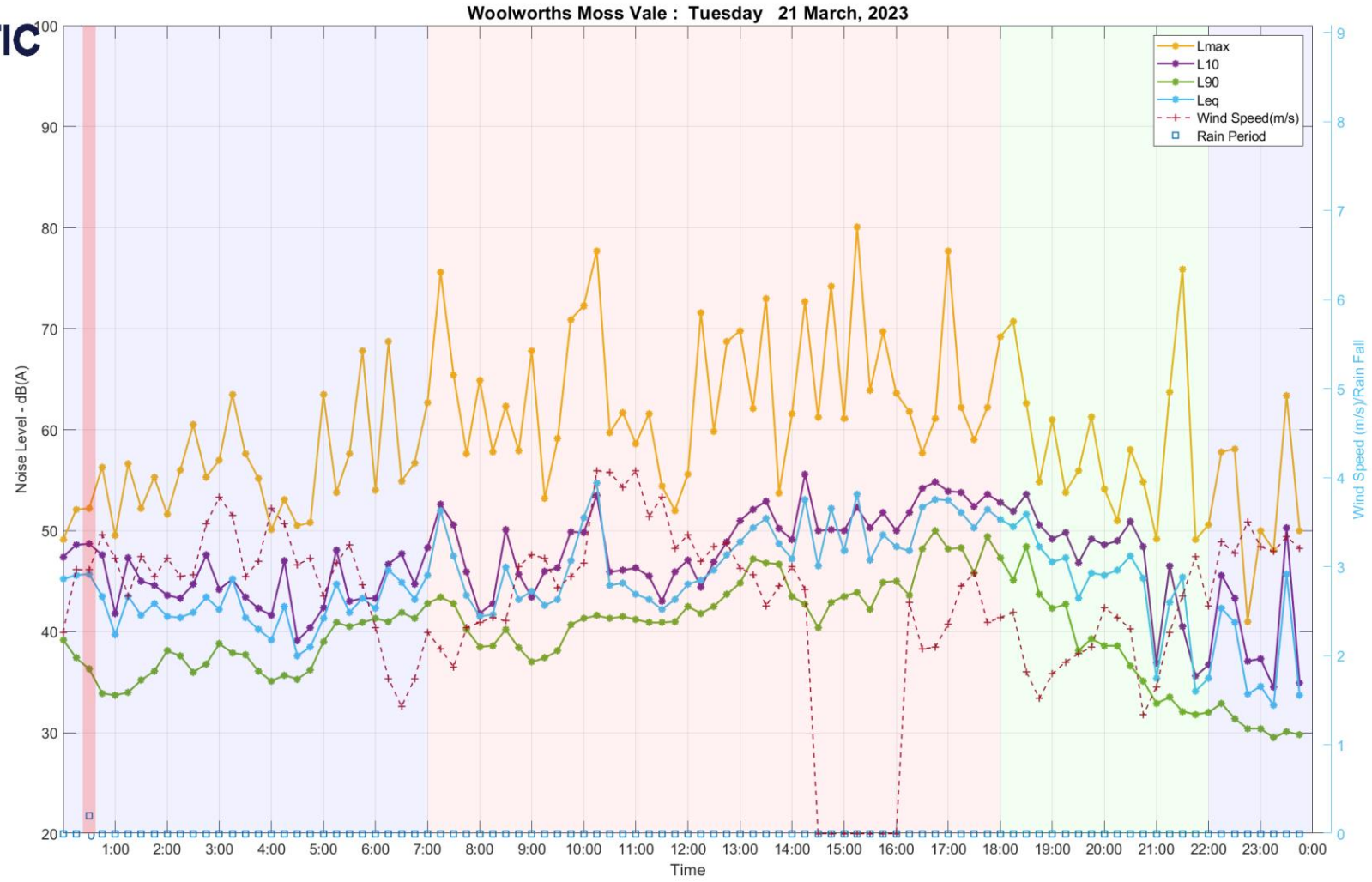
Woolworths Moss Vale : Tuesday 21 March, 2023
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
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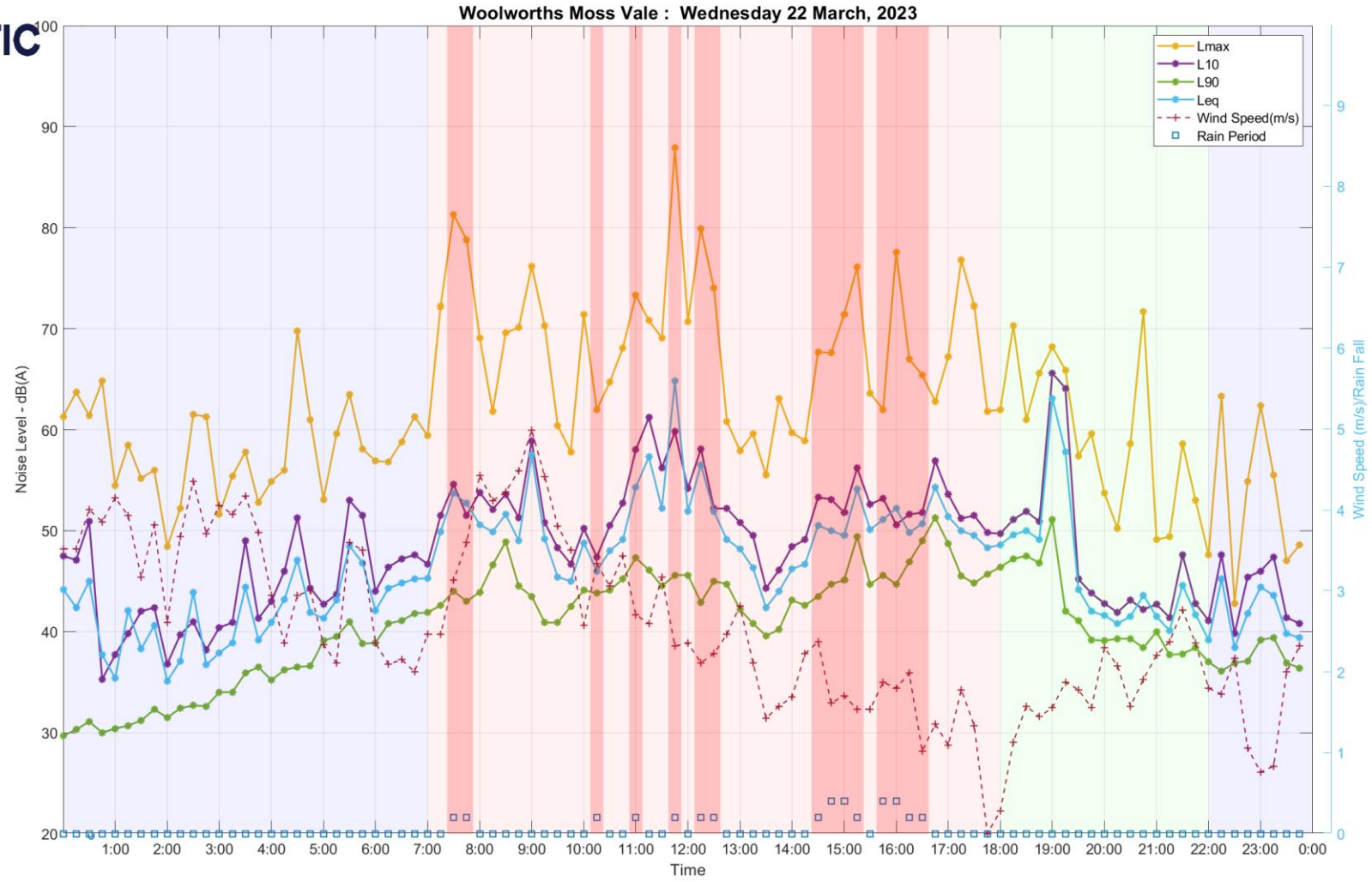
Woolworths Moss Vale : Wednesday 22 March, 2023
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
9
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7
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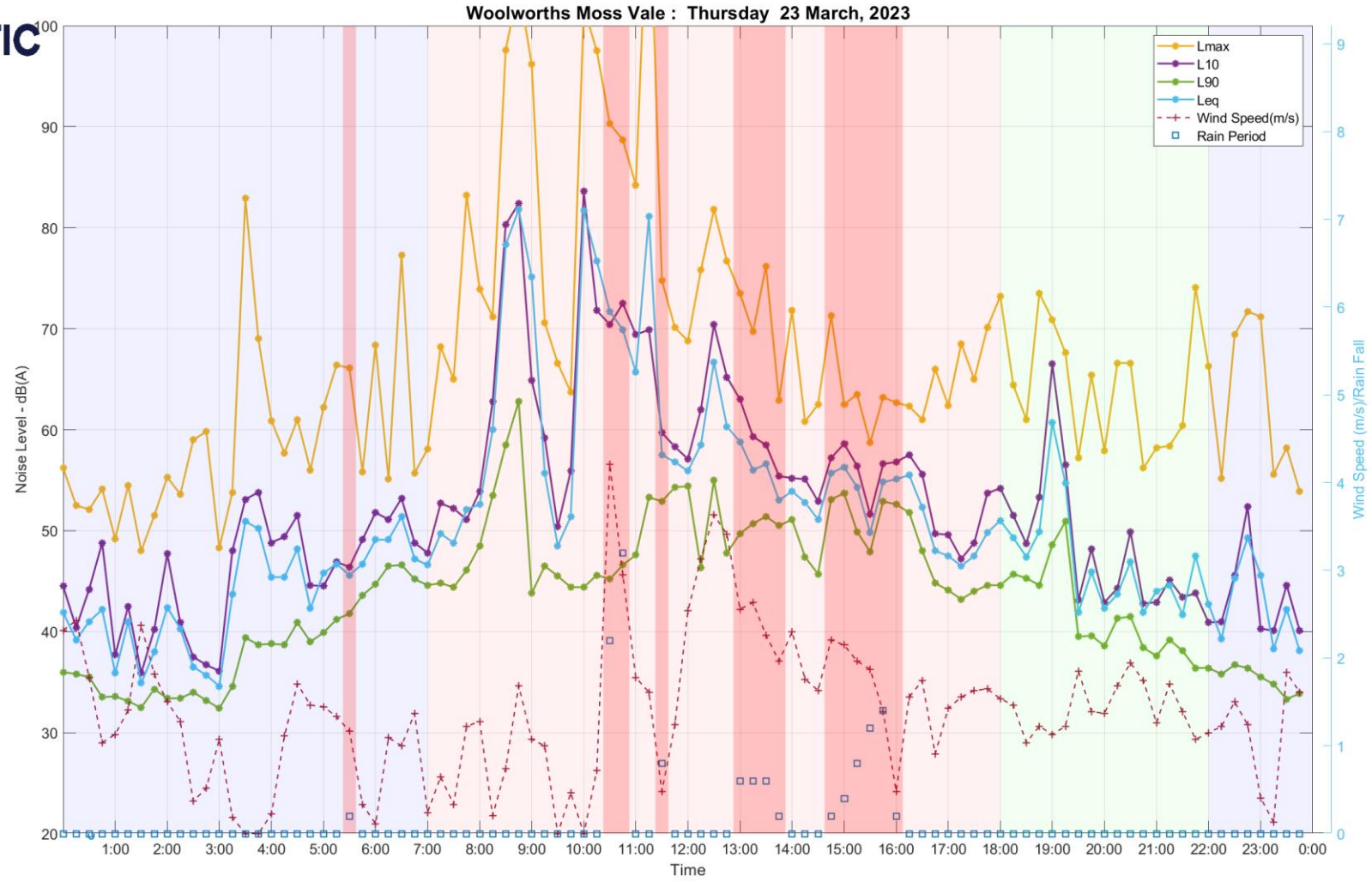
Woolworths Moss Vale : Thursday 23 March, 2023
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
9
8
7
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1:00
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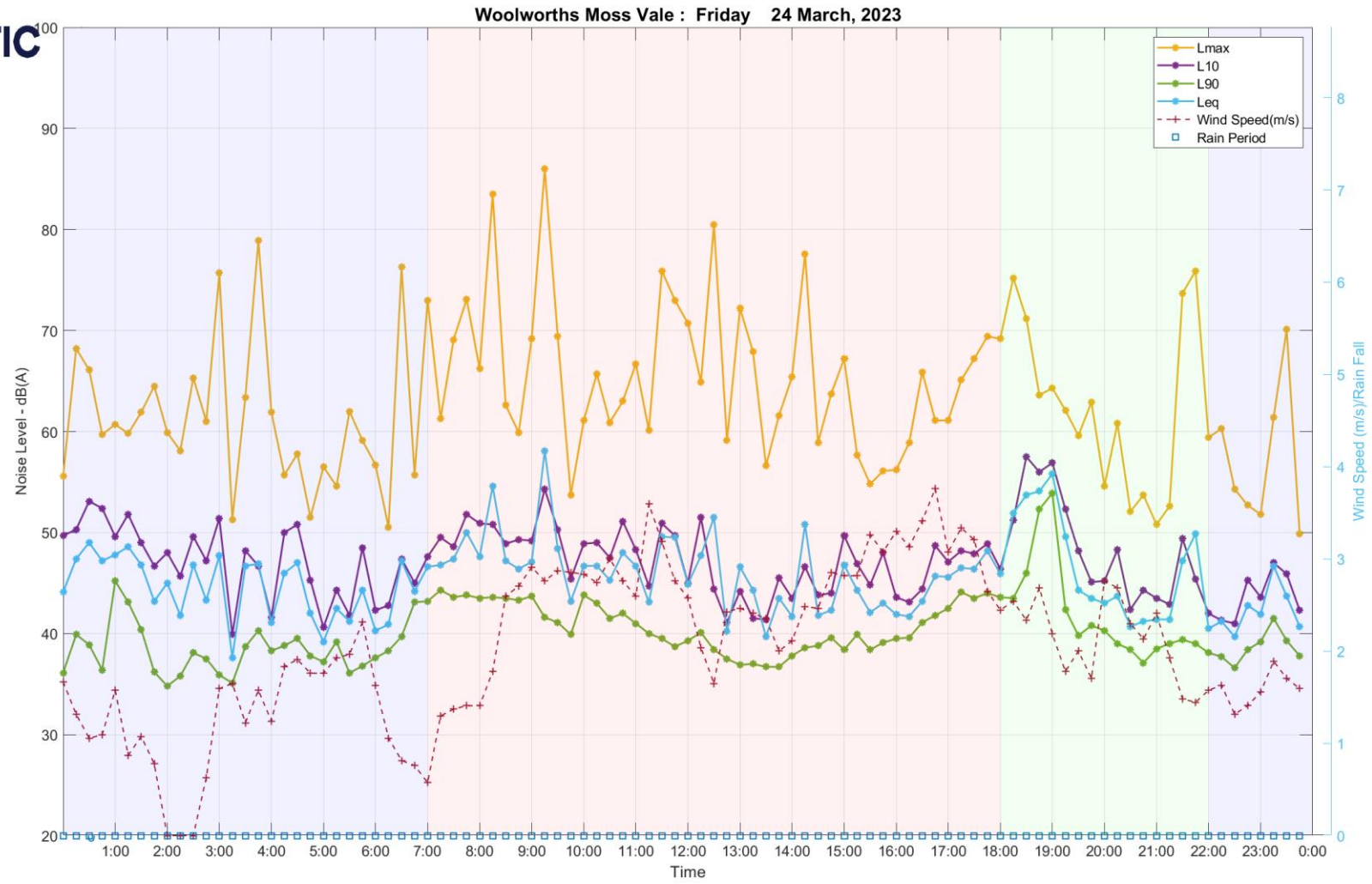
Woolworths Moss Vale : Friday 24 March, 2023
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
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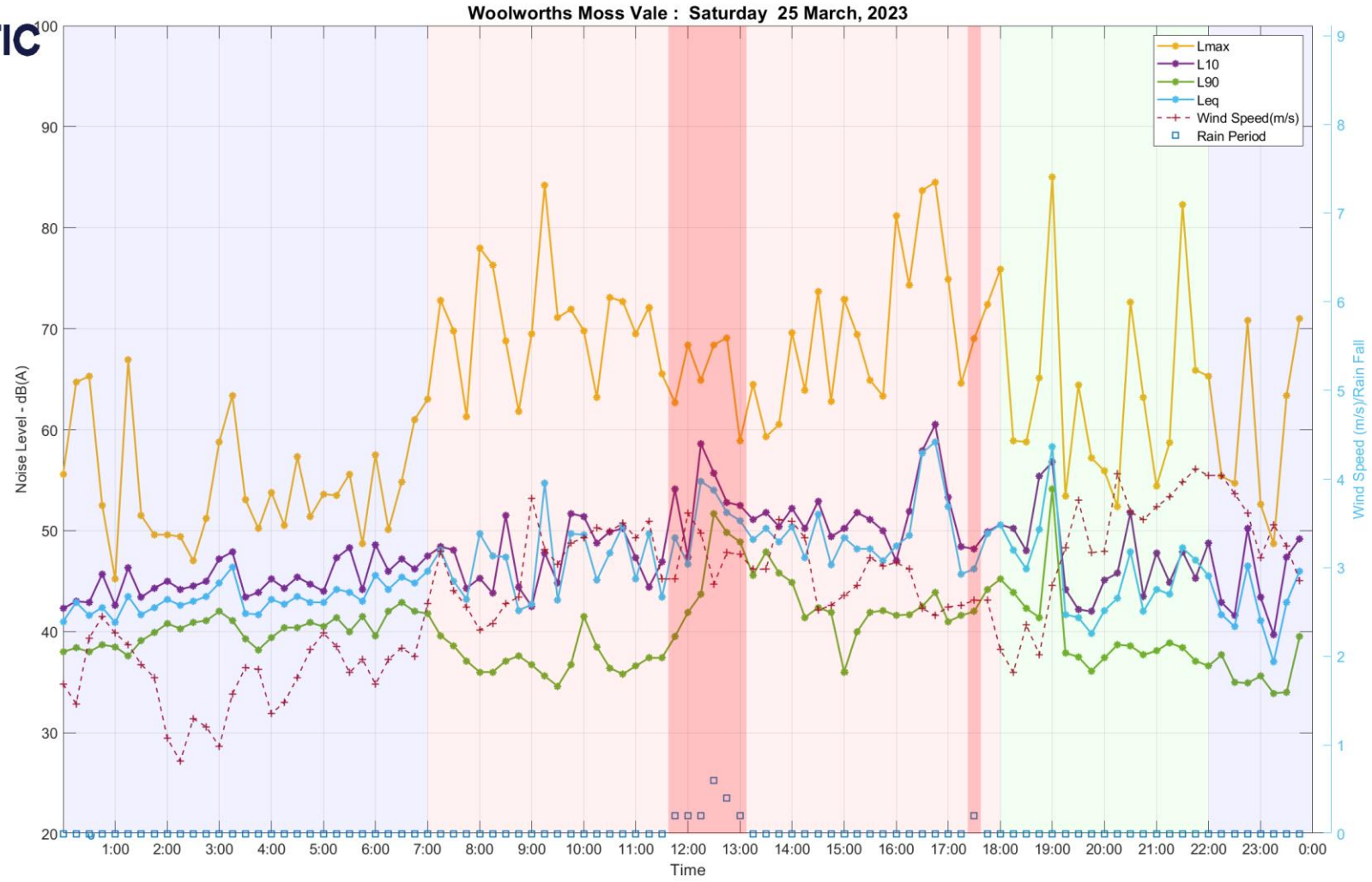
Woolworths Moss Vale : Saturday 25 March, 2023
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
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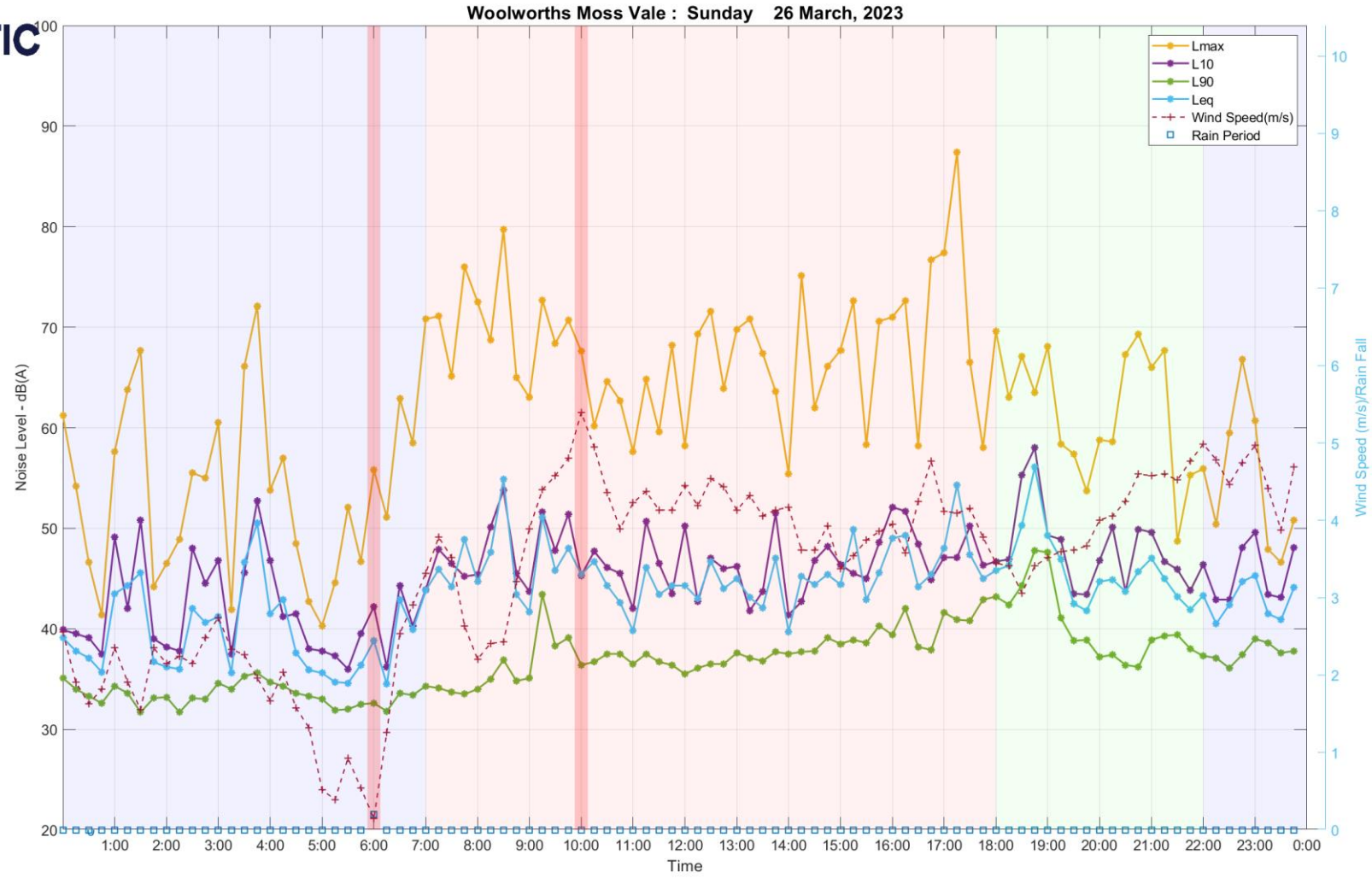
Woolworths Moss Vale : Sunday 26 March, 2023
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
10
9
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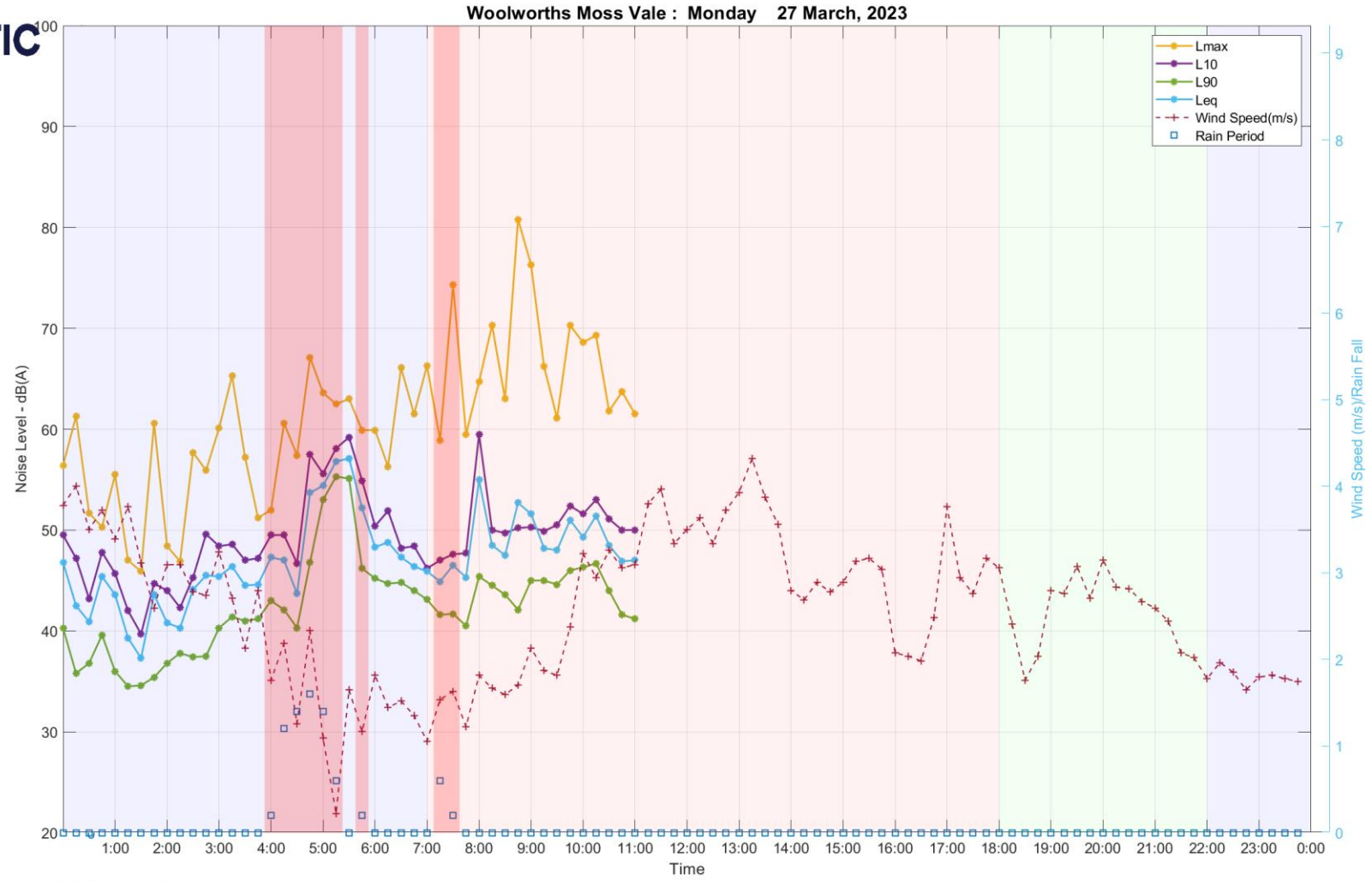

Wind Speed is corrected using factor 0.6667 based on logger location