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Woolworths Warnervale

Modification Application

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1 INTRODUCTION

Acoustic Logic (AL) has been engaged to assess potential noise impacts associated with the proposed Modification Application **(MP10_0195)** for the DA of Woolworths Warnervale

- Traffic noise generation.
- Operational noise emissions from the carpark and loading dock.
- Noise emissions from mechanical plan to service the project site (in principle).
- Preliminary construction noise and vibration impacts and mitigation measures.

This assessment has been conducted using the ClarkeHopkinsClarke architectural drawings for DA submission (dated 17th April 2025 job ref: 20230057).

2 RELEVANT CONSENT AND MODIFICATION

2.1 ACTIVATED CONSENT

The site benefits from an activated consent being the Warner Vale Town Centre – Woolworths – **MP10_0195**, which was granted approval on the 12th of September 2013 for the following:

- Retail facility with a total GFA of 33,112m2 comprising of:
    - 22,092 m2 of retail floor space (including 1,892m2 bulky goods retail);
    - 3,608 m2 of commercial floor space;
    - 3,742 m2 of entertainment uses (cinema); and
    - 3,669 m2 for circulation space/mall and amenities, toilets etc.
- Car parking totalling 1,524 spaces including 1,283 basement car parking spaces, at grade commuter car park comprising 225 spaces, and on street parking for 16 cars;
- 'Civic Square' straddling the proposed Main Street with a total area of 2,852m2 (including the roadway) and 2,481m2 (excluding the roadway).
- Site preparation and bulk earthworks.
- Road construction within the site including Road W06 and W05, and road works outside the site including the roundabout on Road W05, and Road W08.
- Associated infrastructure works and servicing, including subdivision.
- Use and fit out within the buildings of the proposed Woolworths Supermarket and Big W Discount Department Store.
- Site remediation and landscaping.

2.2 PROPOSED MODIFICATION

Modification to development consent **MP10_0195-Mod-2** is sought to enable the construction and operation of the Warnervale Shopping Centre with the following scope of works:

- Retail facility with a total Gross Floor Area of 12,833 m2 comprising
    - 7,785.8 m2 of retail floor space;
    - 666.8 m2 of commercial floor space;
    - 1,295 m2 of recreation facility (indoor) (gym);
    - 440.2 m2 of medical centre;
    - 2,407.8 m2 of e-commerce facilities;
    - 722.6 m2 for circulation space/ mall and amenities, toilets etc.
- Car parking totalling 490 spaces at grade;
- Site preparation and bulk earthworks;
- Road construction including Gibraltor Road, Woongarrah (Nikko) Road and Cardiff Avenue;
- Associated infrastructure works and servicing, including subdivision;
- Use and fit out within the building of the proposed Woolworths Supermarket; and
- Site remediation and landscaping.

The development seeks to operate 24 hours per day, seven (7) days per week.

3 SITE LOCATION AND CONTEXT

The site is located in Warnervale within the Central Coast Council (LGA). The site is legally described as 5211/-/DP1200804 and has a total area of approximately 9.2 ha. This site is currently vacant and will soon act as a community hub for future growth of the area.

Proposed roads surrounding the site will be utilised for site access with the main ingress/egress road being Woongarrah Road and loading dock access being via the extended Gibralter Road.

The CCN train line is bounds the site to the west with passenger train movements stopping occasionally at Warnervale Station further south of the line.

Plans of proposed development are provided in Figure 1 and Figure 2 below.

AREA BREAKDOWN	
Ground Floor	
NOT RETAIL	
AMENITIES	112.7 m²
BOH	18.4 m²
E-COM	2,407.8 m²
EOT	29.3 m²
MALL	580.6 m²
MEDICAL	440.2 m²
	3,589.0 m²
OUTDOOR AREA	
EAT STREET	661.1 m²
PAVING/WALKWAY	930.6 m²
	1,591.7 m²
RETAIL	
BWS	154.4 m²
COMMERCIAL	172.8 m²
DTB	14.1 m²
F&B	875.3 m²
LARGE FORMAT RETAIL	1,192.9 m²
PHARMACY	348.1 m²
RETAIL	1,224.9 m²
WOOLWORTHS	3,803.3 m²
	7,785.8 m²
SERVICES	
LOADING	149.0 m²
SERVICES	612.4 m²
STORAGE	86.5 m²
	847.8 m²
Ground Floor	13,814.4 m²
Level 1	
RETAIL	
COMMERCIAL	666.8 m²
GYM	791.4 m²
	1,458.1 m²
Level 1	1,458.1 m²
GRAND TOTAL	15,272.6 m²
OUTDOOR SEATING AREA	160m²

Clarke Hopkins Clarke

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NSW Nominated Architect: Jordan Curran (10259)

Job No. 20230057

WOOLWORTHS WARNERVALE

262 HAKONE ROAD, WOONGARRAH

Scale: 1 : 500 @ A1

DRAFT

GROUND FLOOR

17.04.2025

DA2.3 D

Figure 1– Proposed Development Ground Floor Provided by ClarkeHopskinsClarke

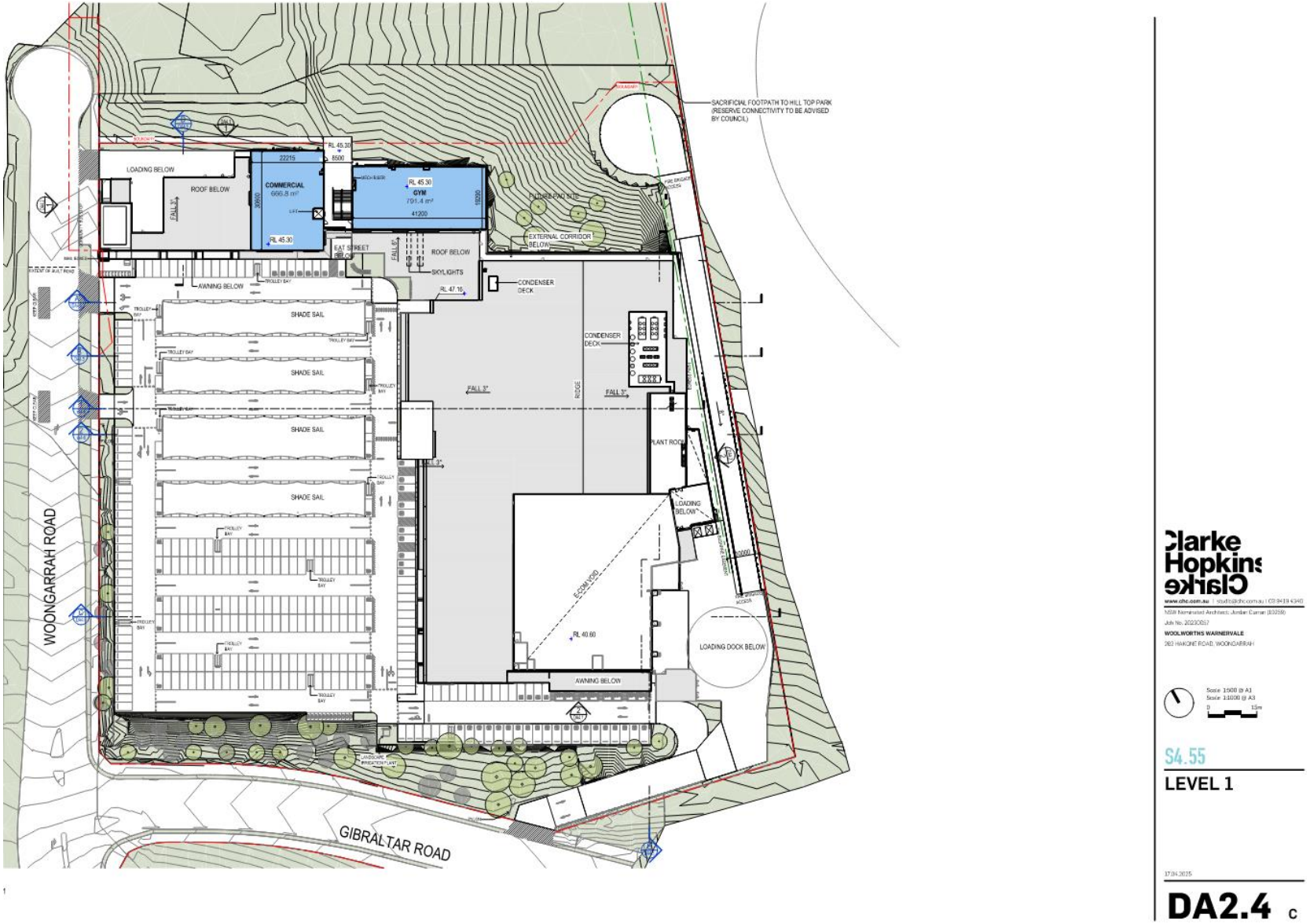


Figure 2– Proposed Development Level 1 Provided by ClarkeHopskinsClarke

3.1 NEAREST SENSITIVE RECEIVERS

The following table lists the nearest sensitive receivers surrounding the site. An aerial photo of the site indicating nearby noise sensitive and measurement locations is presented in Figure 3.

Table 1 – Overview of Sensitive Noise Receivers

Receiver (Refer Figure 1)	Land Use	Comment
R1	Residential	Single and double storey residential dwellings located south of the site on Woongarrah Road.
R2	School	Mackillop Catholic College located south-east of the site at 91 Sparks Road, Woongarrah.
R3	Residential	Existing and future residential developments located east of the site.
R4	Residential	Residential dwellings north of the site located along Hakone Road.
R5	Residential	Residential dwellings west of the site, across the rail line located on Bruce Crescent.

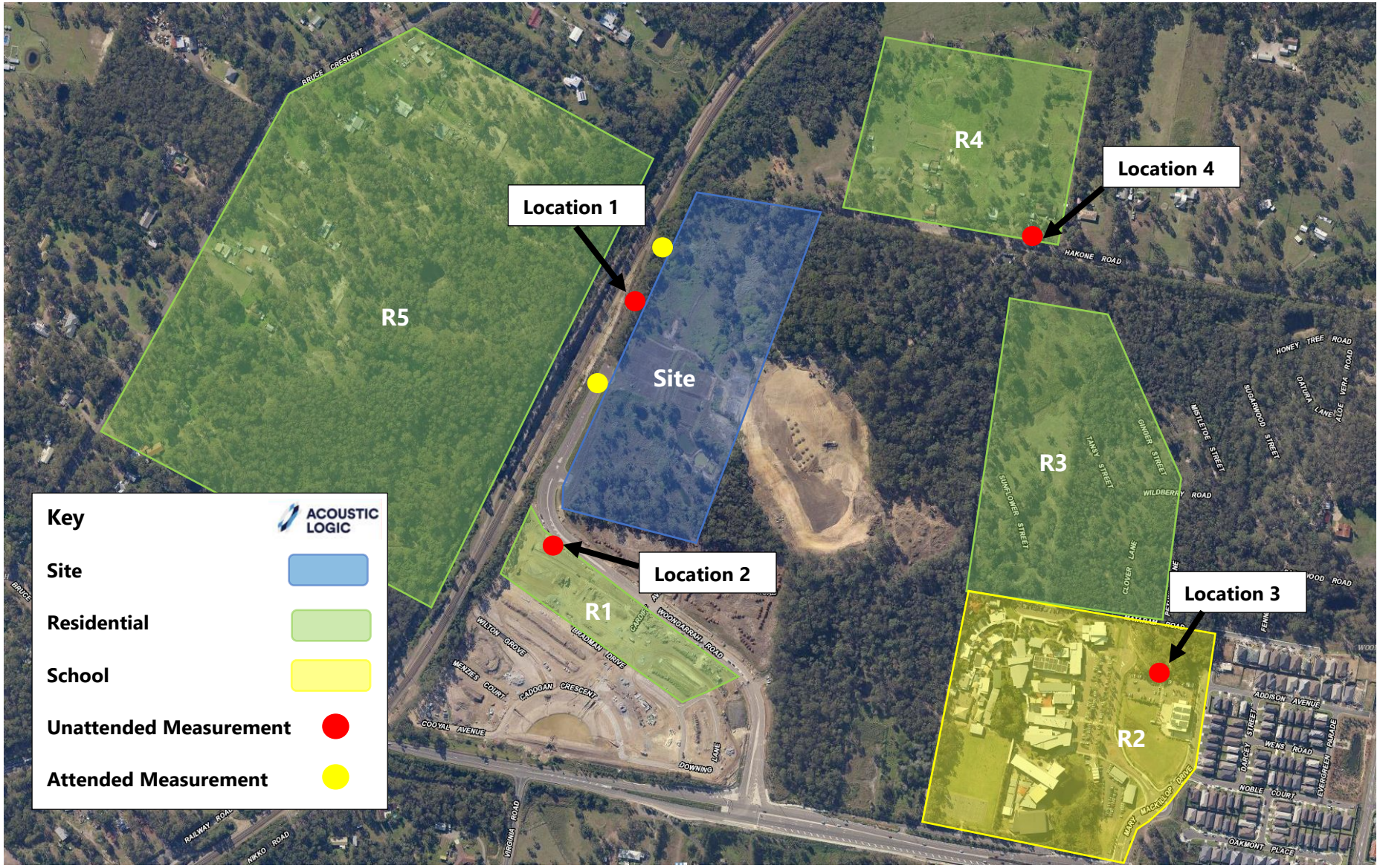


Figure 3– Site map showing surrounding receivers and measurement locations sourced from SIX Maps

4 EXISTING ACOUSTIC ENVIRONMENT

Long term, unattended monitoring has been used to characterise the existing noise environment at the nearby residential properties.

4.1 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. Typically, noise is continuously sampled over a minimum of 1 week of valid data using an unattended logger.

At the end of every 15minute interval, a number of statistical parameters are calculated from the instantaneous noise levels recorded and stored in memory. The recorded 15 minute statistical levels are then downloaded for review and analysis to determine long term trends.

The principal measurement parameters obtained from the data 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 time-varying 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 typical, quiet 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.

4.2 UNATTENDED LONG TERM NOISE MONITORING

4.2.1 Monitoring Equipment

Unattended noise monitoring was conducted using Rion NL-42 (Type 2) noise monitors.

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.

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.

4.2.2 Monitoring Locations and Period

Unattended long-term noise monitoring was conducted at and around the site to obtain existing ambient noise levels at each relative residential receiver. These locations were strategically selected as they are representative of the "worst affected" noise receivers. Refer to Figure 3 for detailed monitoring locations.

Unattended long term noise monitoring was undertaken from Wednesday the 2nd of August to Friday the 11th of August 2023.

4.2.3 Measured Background Noise Levels

Ambient, assessment and rating background levels have been determined from the long term, unattended noise monitoring data based on the methodology in the Noise Policy for Industry Fact Sheet B. Appendix 1 contains the data collected, and the periods identified as being affected by adverse weather conditions or extraneous noise (as defined by INP Fact Sheet B).

Weather data was obtained from records provided by the Bureau of Meteorology for the weather station located at Norah Heads.

The NPfI day, evening and night periods are:

- 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

4.2.3.1 Location 1 – 262 Hakone Road, Woongarrah

Table 2 – Location 1 Summarised Rating Background Noise Level

Time of day	Rating Background Noise Level dB(A)$L_{A90(Period)}$
Day (7am-6pm)	39
Evening (6pm-10pm)	39
Night (10pm-7am)	35

4.2.3.2 Location 2 – 59 Woongarrah Road, Woongarrah

Table 3 – Location 2 Summarised Rating Background Noise Level

Time of day	Rating Background Noise Level dB(A)$L_{A90(Period)}$
Day (7am-6pm)	34
Evening (6pm-10pm)	34 (35)*
Night (10pm-7am)	31

**In-line with the requirements of the NSW EPA, "Noise Policy for Industry 2017," the evening time period have been corrected to be equal to the daytime rating background noise level at the monitoring location.*

4.2.3.3 Location 3 – 28 Mackillop Drive, Woongarrah

Table 4 – Location 3 Summarised Rating Background Noise Level

Time of day	Rating Background Noise Level dB(A)$L_{A90(Period)}$
Day (7am-6pm)	40
Evening (6pm-10pm)	37
Night (10pm-7am)	33

4.2.3.4 Location 4 – 29 Hakone Road, Woongarrah

Table 5 – Location 4 Summarised Rating Background Noise Level

Time of day	Rating Background Noise Level dB(A)$L_{A90(Period)}$
Day (7am-6pm)	38
Evening (6pm-10pm)	35
Night (10pm-7am)	32

5 SITE OPERATION NOISE EMISSION CRITERIA

Noise emissions from the project site shall comply with the requirements of the following documents:

- Conditions of Approval 2013 - *Warner Vale Town Centre – Woolworths* – ***MP10_0195***
- Central Coast Development Control Plan 2022
- NSW Environmental Protection Authority (EPA) *Road Noise Policy* (RNP) 2011, and
- NSW EPA *Noise Policy for Industry* (NPfI) 2017

5.1 CONDITIONS OF APPROVAL (2013)

The Conditions of Approval 2013 (*Warner Vale Town Centre – Woolworths* – ***MP10_0195*** does provide numerical assessment criteria for noise emissions.

5.2 CENTRAL COAST DEVELOPMENT CONTROL PLAN 2022

Chapter 4, Section 4.1 of the Central Coast Development Control Plan 2022 stipulates the below in regard to Acoustics within the Warnervale Town Centre:

6.9 - Acoustics

Objectives

- *To minimise noise and vibration impacts from the railway corridor and Sparks Road*
- *To establish appropriate built forms to mitigate noise and vibration impacts.*
- *To minimise noise impacts on residential uses, places of public worship, hospitals, educational establishments and other noise sensitive buildings in proximity to the railway corridor.*

Controls

a) Provide noise mitigation measures to minimise noise from the railway corridor and Sparks Road. A landscaped acoustic buffer is to be provided between building boundary fences and the nearest road kerb along Sparks Road (refer to Figure 6.5).

b) Provide all practicable mitigation measures for rail noise and vibration as per the Rail Infrastructure Corporation and State Rail Authority Interim Guidelines for Councils: Consideration of Rail Noise and Vibration in the Planning Process, 2003, for development on land within 60m of the north-south rail corridor.

c) Reduce road noise impacts in accordance with the Roads and Traffic Authority Environmental Noise Management Manual, 2001.

d) The environmental noise goal for new dwellings shall be 60dB(A) L10 18 hours at 1 metre from the facade of future dwellings or 45dB(A) L10 18 hours within those dwellings when tested in accordance with the Environmental Protection Authority's Environmental Criteria for Road Traffic Noise, May 1999. The consent authority may consider a variation of the external noise goal, based on an applicant's sound economic and technical considerations and evidence that the internal noise standard specified in AS/NZS 2107-2000 can be reasonably achieved for all affected new dwellings.

e) Submit a noise study prepared by an appropriately qualified acoustic consultant with DAs for properties fronting Sparks Road and in the vicinity of access roads. The noise study is required to identify appropriate noise amelioration measures including dwelling design and acoustic buffer

design. The design noise level shall be based upon estimated traffic flows, speeds and percentage of heavy goods vehicles expected in the next ten years (this information will be supplied by Council).

f) A landscaped acoustic buffer is to be provided along the southern boundary of the school on Sparks Road.

g) Noise amelioration mounds should be treated with stepped construction of subgrade to enable better keying of top soil to the sub-grade mounds. Top soil depth should be 200mm minimum and no slope should have a batter greater than 1:3. Mounds should be constructed with tree planting within batter grass treatments. Grasses should only be planted as a temporary measure so that tree establishment is not hindered by competition with grassing.

h) Any noise mitigation measures are to be located outside the Heath Wrinklewort Reserve.

i) Adopt other mitigation measures, where relevant in consultation with the consent authority.

ii) Mitigate noise impacts on residential areas from non-residential uses by imposing operating hours and other operational measures, as appropriate.

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

5.3 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.

5.3.1 Intrusiveness Criterion

Noise sources covered by this code are mechanical services and plant noise. Section 2.4.3 of the Noise Policy for Industry addresses the effect of changing land use. In the case of Warnervale, the further development of residential subdivisions surrounding the proposed Woolworths will significantly affect the background noise levels. The following changes would be expected to impact the existing background noise levels:

- Introduction of local roadways surrounding the site, expected to carry a mixture of local and through traffic.
- New mechanical plant servicing surrounding residential/commercial dwellings.

When considering the effects of changing use, the NSW EPA Noise Policy for Industry states the following:

> *When land uses in an area are undergoing significant change, for example, residential subdivision with associated development of local and regional roads, the background noise levels would be expected to change, sometimes significantly. The impact of noise from an existing industry on a proposed new residential area should be made using the recommended amenity noise level for the residential land use, not the project intrusiveness level. Where impacts exceed the amenity noise level, consideration should be given to how these impacts can be avoided or mitigated, such as modifying the location of the proposed residential development, placing screening land uses in-between the proposed residences and existing industry, or ensuring residences are built in a manner that provides acceptable indoor noise amenity.*

Considering the above, noise emission requirements as detailed in the Noise Policy for Industry will be determined with reference to the amenity noise levels.

5.3.2 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 NPfI 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 'rural' categorisation for residential receivers.

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

> *$L_{Aeq,15min}$ = 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 – Suburban*	Day	55	53
	Evening	45	43
	Night	40	38
School	When in use	35 (internal)	33 (internal)

*Note-The suburban categorisation as outlined in the NPfI states the following:

> ***Suburban*** *– an area that has local traffic with characteristically intermittent traffic flows or with some limited commerce or industry, This often has the Following characteristic:*
>
> > *Evening ambient noise levels defined by the natural environment and human activity.*

It is stipulated in the Warnervale Town Centre provided by Central Coast Council that the area and its surrounding residences will become a hub / town centre. For this reason, the current / future residential receivers surrounding the site will be assessed against the suburban category.

5.3.3 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	31	40 dB(A)$L_{eq,\ 15min}$ 52 dB(A)L_{Fmax}
R3	33	
R4	32	
R5	35	

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.*

5.3.4 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 all surrounding roads	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)

As some traffic noise levels from monitoring locations 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'*

5.3.5 Summarised Noise Emission Objectives

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

Table 9 – Summarised Noise Emission Objectives

Receiver	Time Period	Project Amenity Criteria dB(A) L_{eq}	NPfI/RNP Criteria for Sleep Disturbance
R1, R3, R4 & R5	Day (7am – 6pm)	53	-
	Evening (6pm – 10pm)	43	-
	Night (10pm – 7am)	38	40 dB(A)$L_{eq,\ 15min}$; 55 dB(A)L_{Fmax} (internally)
R2	When in Use	33 (internal)	-

6 SITE OPERTAION NOISE EMISSIONS ASSESSMENT

6.1 OPERATIONAL NOISE SOURCES

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

- Noise emissions from medium rigid vehicles and large articulated trucks entering and/or exiting via Gibraltor Road for inbound deliveries to loading dock.
- Noise emissions from medium rigid vehicles and large articulated trucks manoeuvring at the 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 – 11:00pm

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 10 – 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 (medium rigid trucks/ semi-trailers)	100 $L_{eq(15\ min)}$
Truck Reversing @ 5km/h (medium rigid trucks/ semi-trailers)	*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):
        - 8 large truck movements (MRV and semi-trailers) including reversing manoeuvres per hour at the Woolworths loading dock.
        - 4 large truck movements (MRV and semi-trailers) including reversing manoeuvres per hour at the north retail loading dock.
    - Night time period (10:00pm-11:00pm and 5:00am-7:00am)
        - 2 large truck movements (MRV and semi-trailers) including reversing manoeuvres per hour at the Woolworths loading dock.
        - 1 large truck movement (MRV and semi-trailers) including reversing manoeuvres per hour at the north retail loading dock.
- Operation of the loading dock will occur between the hours of 5:00am and 11:00pm.
- 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 11pm – 5am to minimise night time noise emissions to nearby residential receivers.

This office has been informed commercial use development will be built along Gibraltar Road south of the project site. The commercial development is assumed to provide acoustic screening to the southern sensitive receivers (R1).

6.3 NOISE GENERATED BY ADDITIONAL TRAFFIC ON PUBLIC ROADS

Noise generated as a result 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 Woongarrah Road and Gibraltor Road with the main connecting road being Woongarrah Road. Predictions of traffic noise generation have been made using the following modelling assumptions:

- Automobiles travelling at 50km/h along all roads.
    - Traffic Flows on Sparks Road would increase by some 180 to 480 vehicles per hour (two-way) in the weekday morning and afternoon peaks.
    - Traffic Flows on Woongarrah Road would increase by some 120 to 800 vehicles per hour (two-way) in the weekday morning and afternoon peaks.
    - Traffic Flows on Cardiff Avenue would increase by some 120 to 240 vehicles per hour (two-way) in the weekday morning and afternoon peaks.
    - Traffic Flows on Gibraltor Road would increase by some 20 to 240 vehicles per hour (two-way) in the weekday morning and afternoon peaks.
- 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 peak traffic counts provided by Colston Budd Rogers & Kafes Pty Ltd. The AADT of the roadways were calculated in the following manner:

- Sparks Road
    - Peak AM/PM 1 hour volumes of 480 vehicles / hour two way.
    - Off-peak daytime levels of 432 vehicles / hour two way (based on 90% of peak hour flow).
    - Night time average levels of 240 vehicles / hour two way (based on 50% of peak traffic flows).
- Woongarrah Road
    - Peak AM/PM 1 hour volumes of 800 vehicles / hour two way.
    - Off peak daytime levels of 720 vehicles / hour (based on 90% of peak hour flow).
    - Night time average levels of 400 vehicles / hour two way (based on 50% of peak daytime traffic flows).
- Cardiff Avenue
    - Peak AM/PM 1 hour volumes of 240 vehicles / hour two way.
    - Off peak daytime levels of 216 vehicles / hour (based on 90% of peak hour flow).
    - Night time average levels of 120 vehicles / hour two way (based on 50% of peak daytime traffic flows).

- Gibraltor Road
    - Peak AM/PM 1 hour volumes of 240 vehicles / hour two way.
    - Off peak daytime levels of 216 vehicles / hour (based on 90% of peak hour flow).
    - Night time average levels of 120 vehicles / hour two way (based on 50% of peak daytime traffic flows).

The above 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 5.3.

Table 11 – Cumulative Traffic Noise Generated by Additional Road Traffic

Receiver Location	Predicted Traffic Noise Level	RNP Criteria	Compliance
R1	< 55dB(A)$L_{eq(1hr)}$	≤ 55 dB(A) $L_{eq(period)}$	Yes
R3			
R4			
R5			

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.

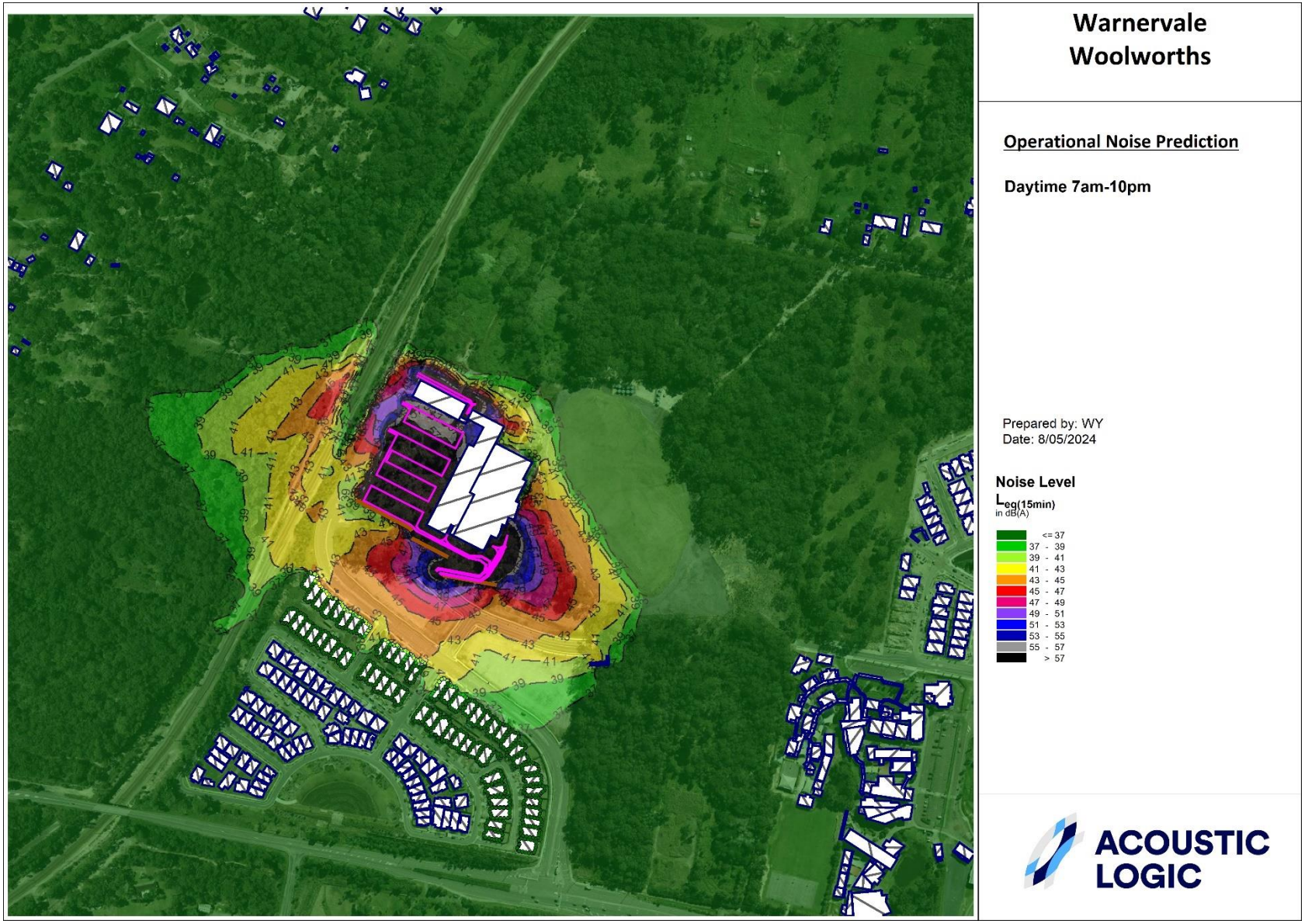
Noise enhancing meteorological have been adopted as recommended by the NPfI, noting that the ISO 9613 modelling approach assumes that all receivers are 'downwind' (i.e., that noise enhancing wind conditions are in effect at all times).

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.

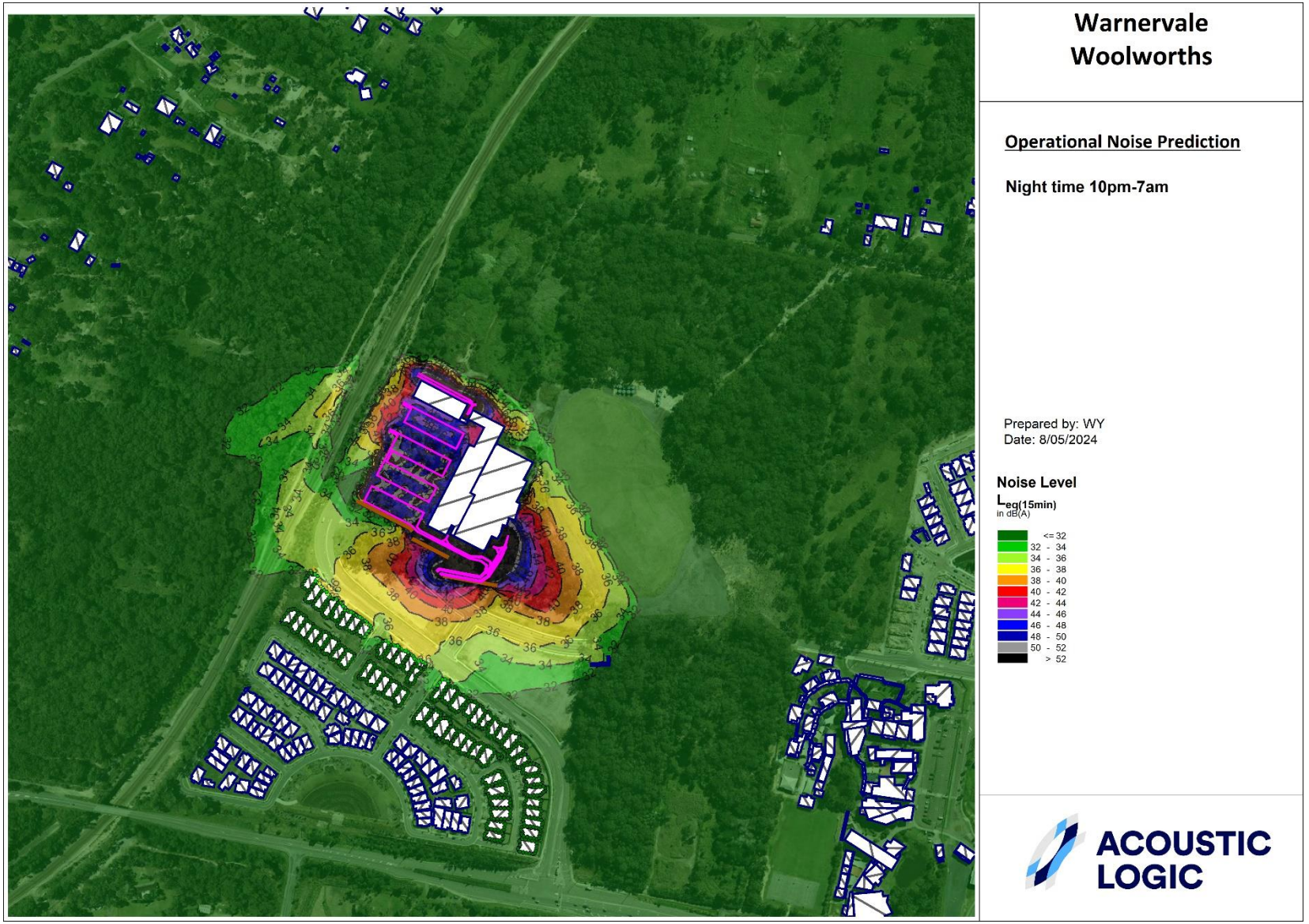
Ground absorption was conservatively calculated with a ground factor of 0 for all areas except for localised lawns and greenery of the development fronting Percy Street with a ground factor of 0.6 as recommended in *Engineering Noise Control* (Bies & Hanson).

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.

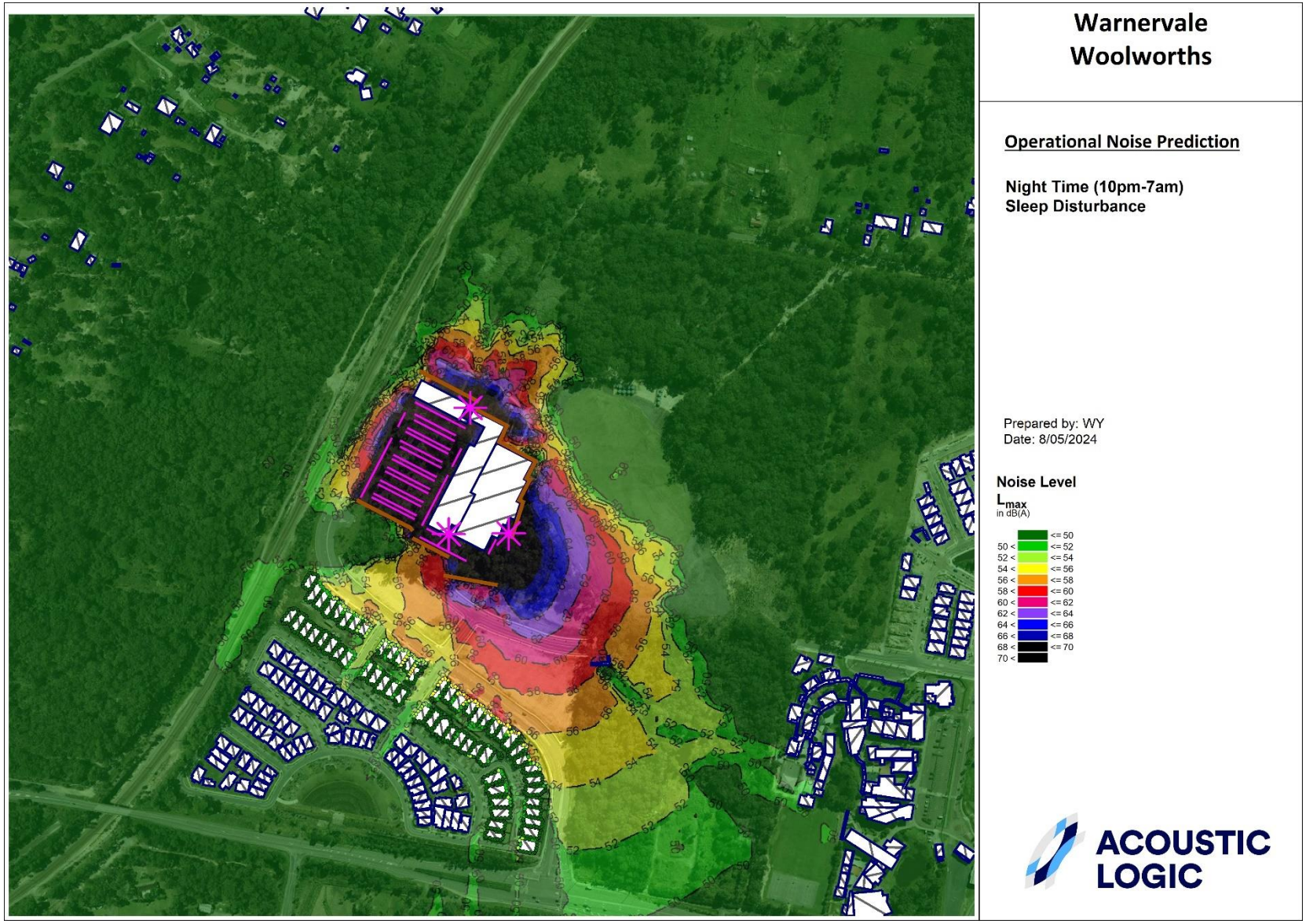
6.4.2 Cumulative Operational Noise Modelling Results – Daytime and Evening



6.4.3 Cumulative Operational Noise Modelling Results – Night



6.4.4 Cumulative Noise Modelling Results – Peak L_{Max}



6.4.5 Predicted Operational Noise Emissions Summary

Cumulative noise emission predictions from all operational noise outlined in Section 5.3 is presented below to the most sensitive receivers surrounding the development. The highest predicted noise level at each sensitive receiver is summarised below.

Table 12 – 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**	43	53 dB(A) L_{eq} Daytime (7am–6pm)	Meets NSW EPA Noise Emission Requirements
			43 dB(A) $L_{eq,}$ Evening (6pm–10pm)	
		36	38 dB(A) $L_{eq,}$ Night (10pm–7am)	
Maximum Noise Event (Refer Section 0)		56	55 dB(A) L_{max} (Internal)	
Cumulative Noise from Site Operation, Including Loading Dock Usage and Carpark	**R3**	<35	53 dB(A) L_{eq} Daytime (7am–6pm)	
			43 dB(A) $L_{eq,}$ Evening (6pm–10pm)	
		<35	38 dB(A) $L_{eq,}$ Night (10pm–7am)	
Maximum Noise Event (Refer Section 0)		<50	55 dB(A) L_{max} (Internal)	
Cumulative Noise from Site Operation, Including Loading Dock Usage and Carpark	**R4**	<35	53 dB(A) L_{eq} Daytime (7am–6pm)	
			43 dB(A) $L_{eq,}$ Evening (6pm–10pm)	
		<35	38 dB(A) $L_{eq,}$ Night (10pm–7am)	
Maximum Noise Event (Refer Section 0)		<50	55 dB(A) L_{max} (Internal)	
Cumulative Noise from Site Operation, Including Loading Dock Usage and Carpark	**R5**	<35	53 dB(A) L_{eq} Daytime (7am–6pm)	
			43 dB(A) $L_{eq,}$ Evening (6pm–10pm)	
		<35	38 dB(A) $L_{eq,}$ Night (10pm–7am)	
Maximum Noise Event (Refer Section 0)		<50	55 dB(A) L_{max} (Internal)	

Table 13 – Predicted Cumulative Noise Levels (Educational Receiver)

Operational Source	Receiver Location	Predicted Noise Level	Criteria	Comment
Cumulative Noise from Site Operation, Including Loading Dock Usage and Carpark	R2	<30	33 dB(A) $L_{eq,}$ (Internal)	Meets NSW EPA Noise Emission Requirements*

*Note L_{Max} external noise levels at receiver facades have been presented in the Table 12. 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 14 - 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	56	46	55 L_{max}	Yes
R3	<35	<25		
R4				
R5				

*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 THE 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 5.3. 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 5.3) 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 THROUGHOUT OPERATION

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 11pm – 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.
- Trucks are to minimise usage of airbrakes as much as practicable.

Noise modelling predicts that noise emissions will comply to all sensitive receivers.

7 CONSTRUCTION NOISE AND VIBRATION REVIEW

The principal objective of this preliminary study is to undertake an evaluation of typical works/ activities to be performed during the demolition, excavation and construction of the project and forecast the potential impacts of noise and vibration. This assessment will be used to formulate and streamline effective regulation and mitigation measures.

The principal issues which will be addressed in this report are:

- Identification of the noise and vibration standards which will be applicable to this project
- Identification of potentially impacted nearby development
- Identify likely sources of noise and vibration generation and predicted noise levels at nearby development, and
- Formulation of a strategy to comply with the standards identified and mitigation treatments in the event that compliance is not achievable.

It is recommended that an updated Construction Noise and Vibration Management Plan be developed in construction stage when the Builder has finalised construction methodology.

7.1 SITE DESCRIPTION

The proposed project includes excavation and construction of the development site. Standard work hours have been assumed as detailed in the *Transport and Accessibility Impact Assessment for Proposed Shopping Centre, Woongarrah Road, Warnervale* by Colston Budd Rogers & Kafes Pty Ltd (dated April 2024).

- Monday to Friday: 7:00am – 7:00pm
- Saturday: 7:00am – 5:00pm
- Sundays or Public Holidays: No work.

These hours will be subject to DPE approval. Work outside these hours may be undertaken, subject to prior approval from the Planning Secretary and Central Coast Council, if works are inaudible, or if NSW Police require deliveries outside normal business hours due to safety concerns.

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A summary of the above noise management levels stipulated by the ICNG is presented in the table below.

Table 15 – ICNG Construction Noise Management Levels – Residential

Location	Time of Day	"*Noise Affected*" Level – dB(A)Leq(15-min)	"*Highly Noise Affected*" Level – dB(A)Leq(15-min)
R1	Day (7am – 6pm)	44	75
R3		50	
R4		48	
R5		49	
R2	When in Use (internal)	45	-

If noise levels exceed the management levels identified in the table above, reasonable and feasible noise management techniques will be reviewed.

7.3.1 NSW Environmental Protection Authority (EPA) document – '*Assessing Vibration: A Technical Guideline*'

The NSW EPA document "*Assessing Vibration: A Technical Guideline*" provides procedures for assessing tactile vibration and regenerated noise within potentially affected buildings and is used in the assessment of vibration impact on amenity.

Relevant criteria are presented below.

Table 16 – EPA Recommended Vibration Criteria

		RMS acceleration (m/s^2)		RMS velocity (mm/s)		Peak velocity (mm/s)	
Place	Time	Preferred	Maximum	Preferred	Maximum	Preferred	Maximum
Continuous Vibration							
Residences	Daytime	0.01	0.02	0.2	0.4	0.28	0.56
Offices		0.02	0.04	0.4	0.8	0.56	1.1
Workshops		0.04	0.08	0.8	1.6	1.1	2.2
Impulsive Vibration							
Residences	Daytime	0.3	0.6	6.0	12.0	8.6	17.0
Offices		0.64	1.28	13.0	26.0	18.0	36.0
Workshops		0.64	1.28	13.0	26.0	18.0	36.0

Note 1: Continuous vibration relates to vibration that continues uninterrupted for a defined period (usually throughout the daytime or night-time), e.g., continuous construction or maintenance activity. (DECC, 2006).

Note 2: Impulsive vibration relate to vibration that builds up rapidly to a peak followed by a damped decay and that may or may not involve several cycles of vibration (depending on frequency and damping), with up to three occurrences in an assessment period, e.g., occasional loading and unloading, or dropping of heavy equipment. (DECC, 2006).

7.4 PRELIMINARY PROPOSED CONSTRUCTION ACTIVITIES

Preliminary review of typical construction activities has been conducted. Noise impacts from construction activities on the amenity of the surrounding identified sensitive receivers, will be predicted in this section. Typically, the most significant sources of noise or vibration generated during a construction project will be the evacuation and civil works for the site (noting no demolition will be undertaken).

The A-weighted sound power levels for the expected loudest equipment/processes for each stage of development are outlined in the table below.

Construction Stage	Equipment /Process	Typical Sound Power Level dB(A)
Excavation	Machine Mounted Hydraulic Drill	113
	Piling Rig (Bored)	112
	Excavator & Trucks	107
	Mobile Crane	104
	Powered Hand Tools (Electric)	102
Construction	Concrete Agitator Truck	109
	Concrete Pump Truck	108
	Excavator & Trucks	107
	Tower Crane	105
	Powered Hand Tools (Electric)	102

The noise levels presented in the above table are derived from the following sources:

1. On-site measurements
2. Table A1 of Australian Standard 2436-2010, and
3. *Data held by this office from other similar studies.

Noise levels take into account correction factors (for tonality, intermittency where necessary).

7.5 NOISE PREDICTIONS

The predicted noise levels during excavation and construction will depend on:

- The activity undertaken.
- The distance between the work site and the receiver. For many of the work areas, the distance between the noise source and the receiver will vary depending on which end of the site the work is undertaken. For this reason, the predicted noise levels will be presented as a range.

Note: predicted noise levels have been modelled to the reasonably worst affected façade of each receiver, i.e., glazed façade of a residential receiver as opposed to the separating brick wall directly adjacent to development site boundary.

Predicted noise levels to the worst affected receivers surrounding the project site are presented below. Predictions take into account the following:

- Noise reduction as a result of distance.
- Barrier effects resulting from shielding of the surrounding buildings (where applicable).

Note: All the predicted noise levels below conservatively assume that works are being conducted at an open façade with direct line of sight to the receiver. Internal works will have an additional 20-30dB(A) reduction than the presented numbers.

Table 17 – Predicted Noise Impacts – Excavation and Construction

Location/Receiver	Cumulative Predicted Noise Levels dB(A) L_{eq}	NML dB(A) L_{eq}	HANML dB(A) L_{eq}	Requires Assessment of Additional Management
R1	60-70	44	75	Yes
R3	56-60	50		
R4	57-64	48		
R5	55-60	49		
R2	56-59	45	-	

7.6 GENERAL DISCUSSION

Noise

Primarily, the use of mounted hydraulic drills and piling rigs (if proposed) are predicted to be the highest noise generating equipment. All noise predictions have been presented as external noise levels. Internal noise levels at all locations are expected to be 20-30 dB(A) lower internally dependant on the façade of each receiver, therefore reducing the noise levels in all internal spaces surrounding the site significantly more than the predicted values of Section 7.5.

Receivers **R1** is the closest of the residential receivers with absolute line of sight to the development throughout construction. It is predicted that noise levels may exceed the noise management levels at all noted sensitive receivers.

Vibration

Typically excavation activities has the greatest potential for generation of vibration. Machine mounted hydraulic drills have the potential to produce vibration levels approaching the criteria set out in Section 7.2 due to excavation being in rock.

The primary potential vibration source will be from use of machine mounted hydraulic drills. The vibration impact on all receivers is expected to be compliant with the structural damage or human comfort/amenity criterion identified in Section 7.2.

7.7 COMPLYING CONSTRUCTIONS AND CONTROLS

Exceedances of the 'Construction Noise Objective' management levels are expected when high noise generating works occur close to project boundaries. In light of the above, the following recommendations are made:

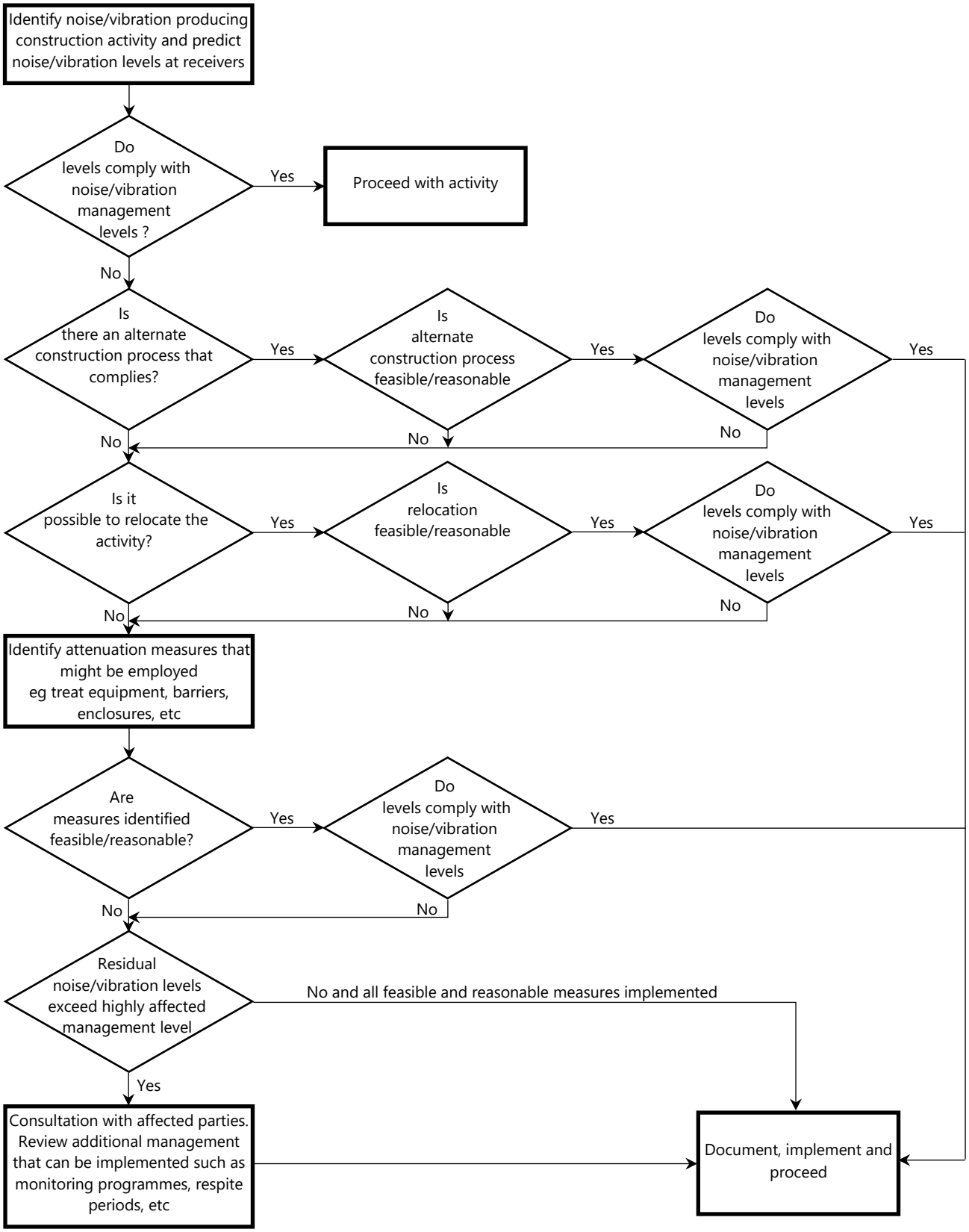
- A detailed noise management plan should be developed by the main contractor that describes in detail the construction phases, programme, processes and equipment used, noise impact assessment and proposed mitigation and management.
- Quiet work methods/technologies:
    - Materials handling/vehicles:
        - Trucks and bobcats to use a non-tonal reversing beacon (subject to OH&S requirements) to minimise potential disturbance of neighbours.
        - Avoid careless dropping of construction materials into empty trucks.
        - Trucks, trailers and concrete trucks (if feasible) should turn off their engines during idling to reduce noise impacts (unless truck ignition needs to remain on during concrete pumping).
- Complaints handling – In the event of complaint, the procedures outlined in Sections below should be adopted.

- Site Induction:
    - A copy of the Noise Management Plan is to be available to contractors. The location of the Noise Management Plan should be advised in any site induction.
    - Site induction should also detail the site contact is to be notified in the event of noise complaint.

The above assessment and complying constructions and controls made are preliminary and based on initial information regarding the general construction requirements for the site.

7.8 CONTROL OF CONSTRUCTION NOISE AND VIBRATION – PROCEDURAL STEPS

The flow chart presented below illustrates the process that will be followed in assessing construction activities.



7.9 ADDITIONAL NOISE AND VIBRATION CONTROL METHODS

In the event of complaints, there are a number of noise mitigation strategies available which can be considered.

The determination of appropriate noise control measures will be dependent on the particular activities and construction appliances. This section provides an outline of available methods.

7.9.1 Selection of Alternate Appliance or Process

Where a particular activity or construction appliance is found to generate excessive noise levels, it may be possible to select an alternative approach or appliance. For example; the use of a hydraulic hammer on certain areas of the site may potentially generate high levels of noise. Undertaking this activity using bulldozers, ripping and/or milling machines will result in lower noise levels. This measure has the potential to reduce noise emissions by 10 dB(A) or more.

7.9.2 Acoustic Barriers

Given the position of adjacent development, it is unlikely that noise screens will provide significant acoustic benefit for commercial or residential receivers but will provide noticeable improvement for those on ground level.

The placement of barriers at the source is generally only effective for static plant. Equipment which is on the move or working in rough or undulating terrain cannot be effectively attenuated by placing barriers at the source.

Barriers can also be placed between the source and the receiver.

The degree of noise reduction provided by barriers is dependent on the amount by which line of sight can be blocked by the barrier. If the receiver is totally shielded from the noise source reductions of up to 15dB(A) can be affected. Where only partial obstruction of line of sight occurs, noise reductions of 5 to 8dB(A) may be achieved. Where no line of sight is obstructed by the barrier, generally no noise reduction will occur.

As barriers are used to provide shielding and do not act as an enclosure, the material they are constructed from should have a noise reduction performance that is approximately 10dB(A) greater than the maximum reduction provided by the barrier. In this case the use of a material such as 10mm or 15mm thick plywood (radiata plywood) would be acceptable for the barriers.

7.9.3 Material Handling

The installation of rubber matting over material handling areas can reduce the sound of impacts due to material being dropped by up to 20dB(A).

7.9.4 Treatment of Specific Equipment

In certain cases, it may be possible to specially treat a piece of equipment to dramatically reduce the sound levels emitted.

7.9.5 Establishment of Site Practices

This involves the formulation of work practices to reduce noise generation. A more detailed management plan will be developed for this project in accordance with the construction methodology outlining work procedures and methods for minimising noise.

7.9.6 Combination of Methods

In some cases, it may be necessary that two or more control measures be implemented to minimise noise.

7.10 ADDRESSING COMPLAINTS

Should ongoing complaints of excessive noise or vibration levels occur immediate measures shall be undertaken to investigate the complaint, the cause of the exceedances and identify the required changes to work practices.

If a noise complaint is received the complaint should be recorded. Any complaint form should list the following:

- The name and address of the complainant (if provided).
- The time and date the complaint was received.
- The nature of the complaint and the time and date the noise was heard.
- The name of the employee who received the complaint.
- Actions taken to investigate the complaint, and a summary of the results of the investigation.
- Required remedial action, if required.
- Validation of the remedial action.
- Summary of feedback to the complainant.

A permanent register of complaints should be held.

8 CONCLUSION

This report presents a Noise and Vibration Impact Assessment of the proposed Woolworths to be located at Warnervale. Noise intrusion and noise emission impacts have been identified and assessed in addition to construction noise and traffic noise from the developments vehicle generation.

Provided that the recommendations set out in this Noise and Vibration Impact Assessment the development will satisfy the requirements of the relevant council and NSW statutory documents.

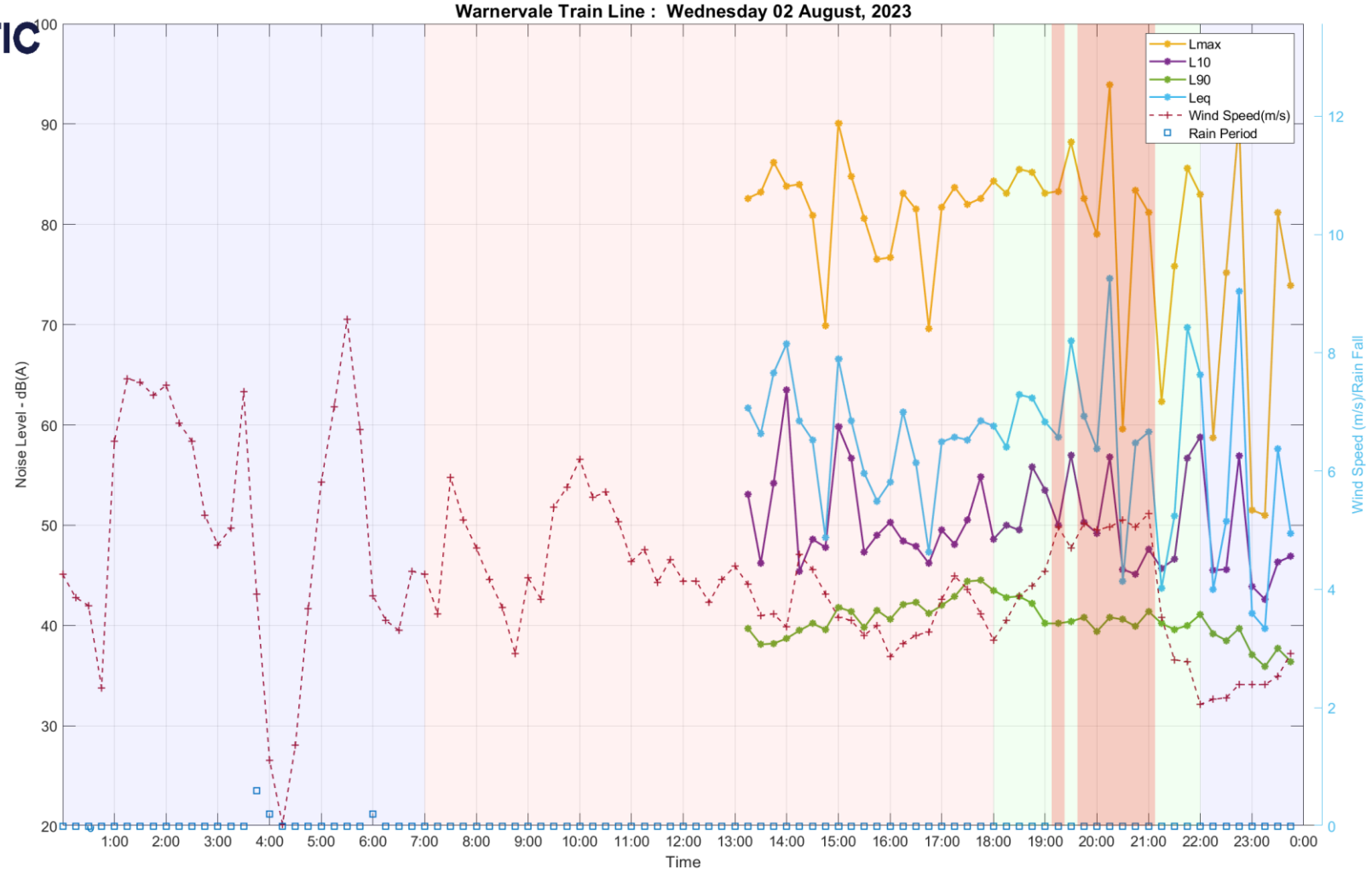
We trust this information is satisfactory. Please contact us should you have any further queries.

Yours faithfully,

Acoustic Logic Pty Ltd
Laura Keen

APPENDIX ONE – UNATTENDED NOISE MONITORING CHARTS

MONITOR LOCATION 1


Warnervale Train Line : Wednesday 02 August, 2023
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
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
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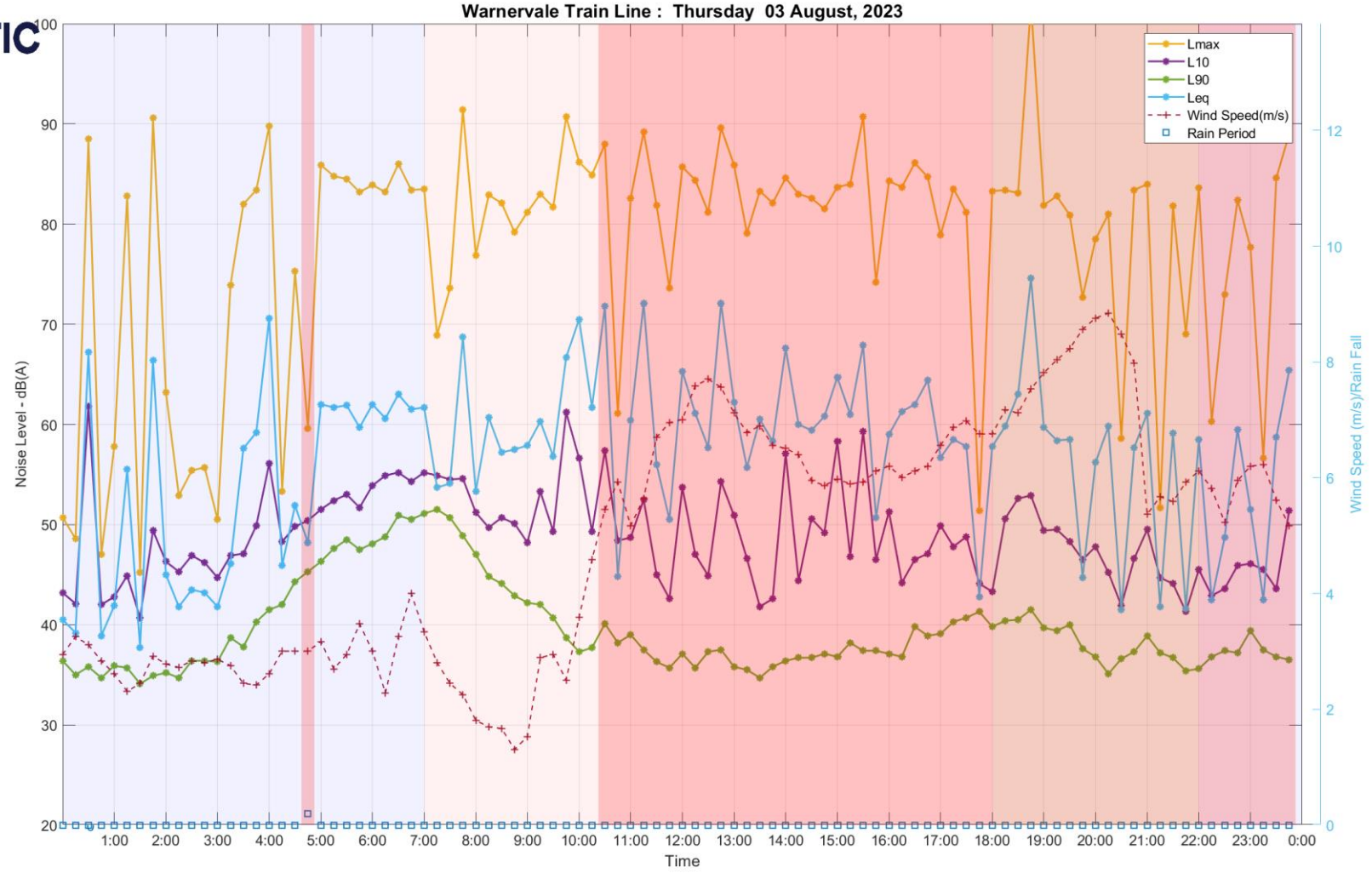
Warnervale Train Line : Thursday 03 August, 2023
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
12
10
8
6
4
2
0
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
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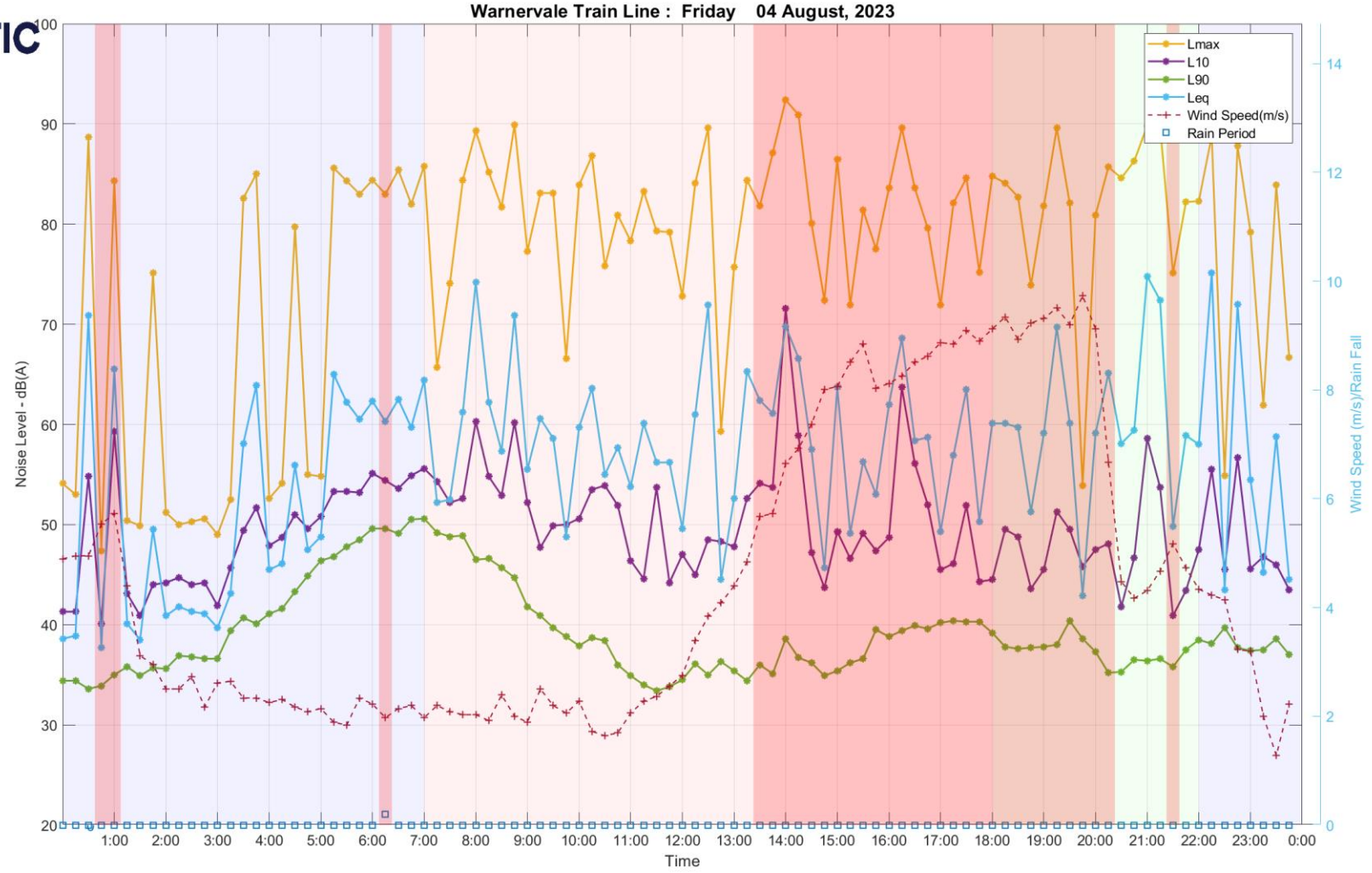
Warnervale Train Line : Friday 04 August, 2023
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
14
12
10
8
6
4
2
0
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
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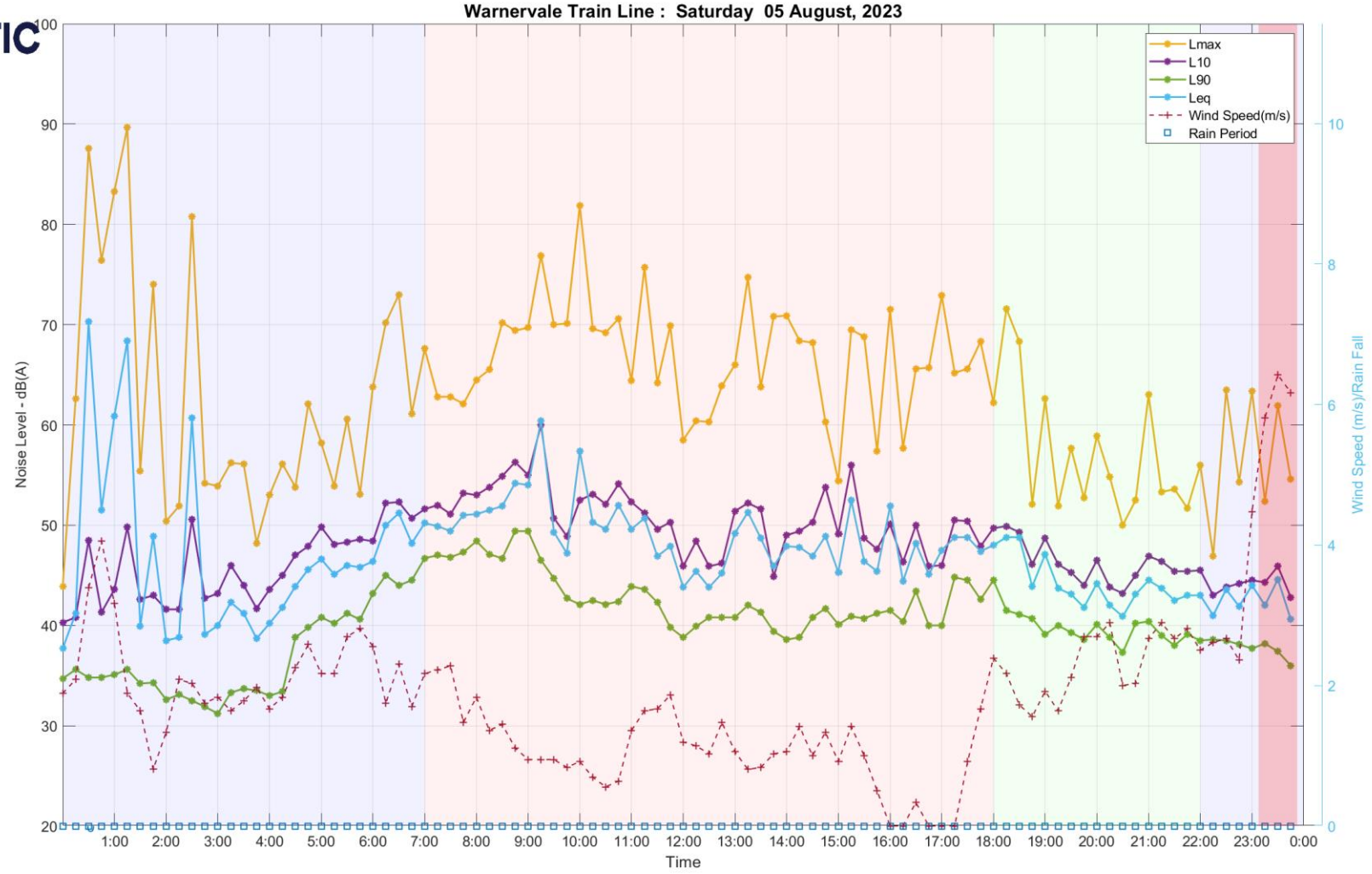
Warnervale Train Line : Saturday 05 August, 2023
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
10
8
6
4
2
0
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
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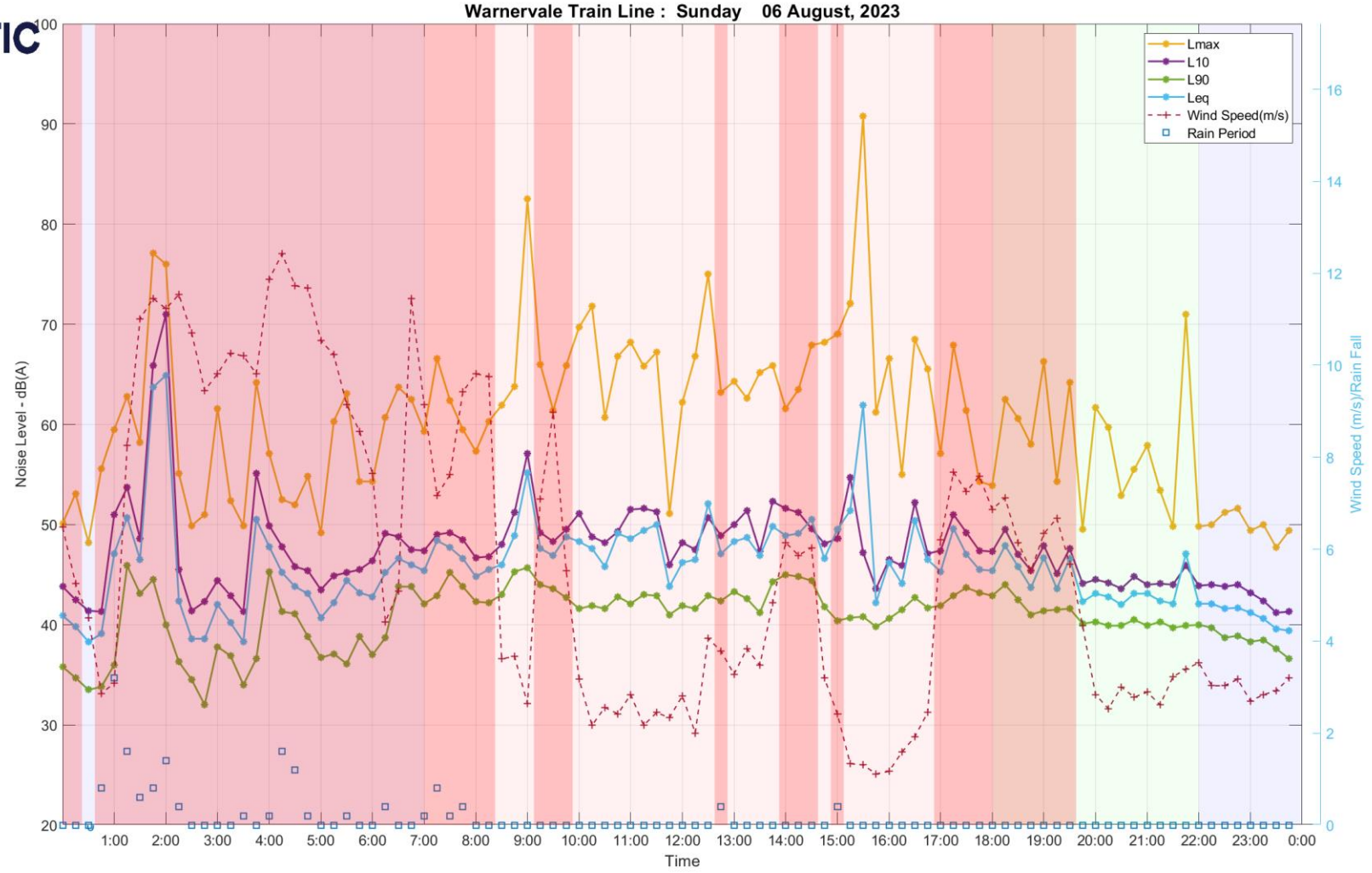
Warnervale Train Line : Sunday 06 August, 2023
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
16
14
12
10
8
6
4
2
0
1:00
2:00
3:00
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9:00
10:00
11:00
12:00
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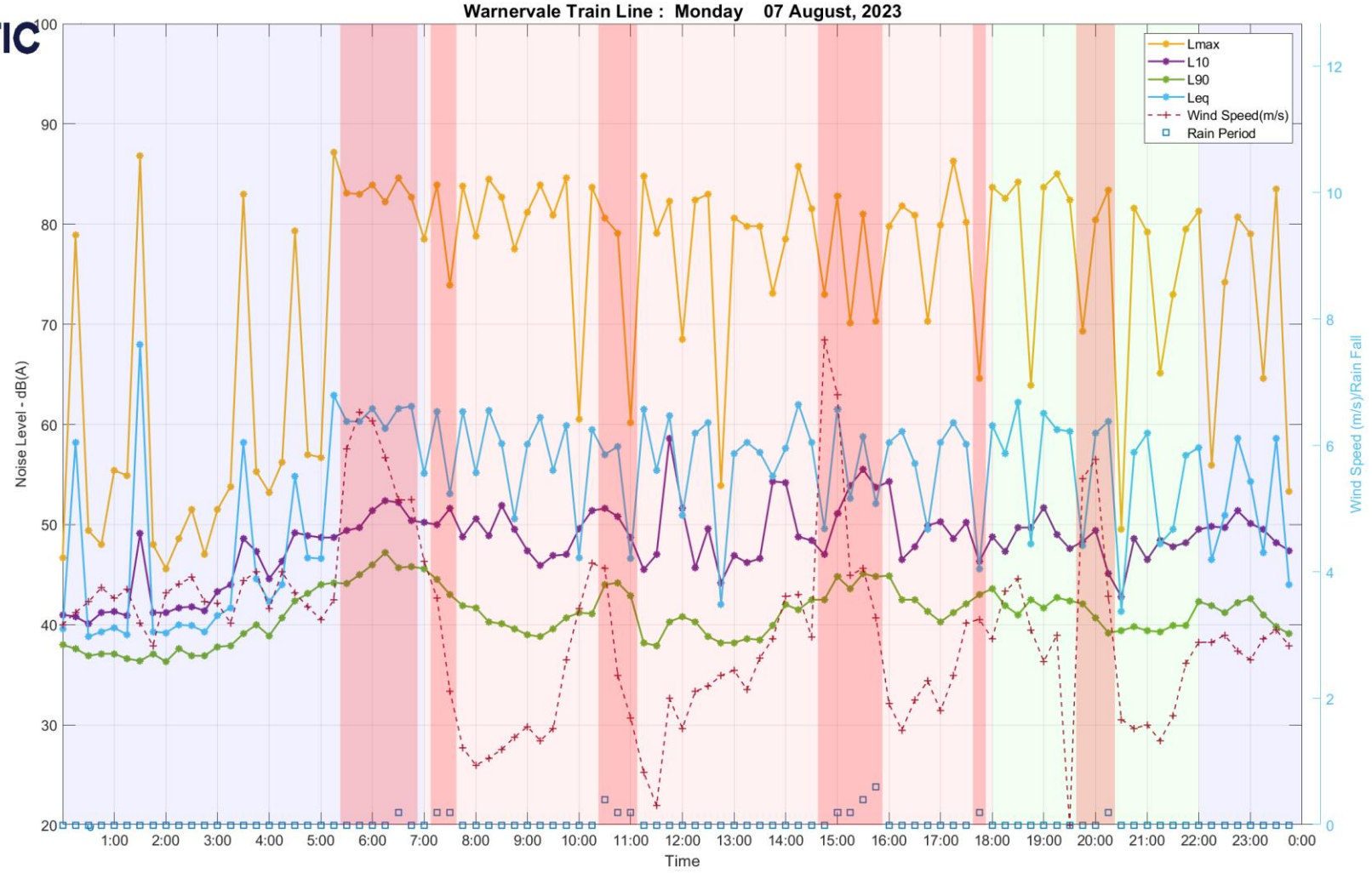
Warnervale Train Line : Monday 07 August, 2023
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
12
10
8
6
4
2
0
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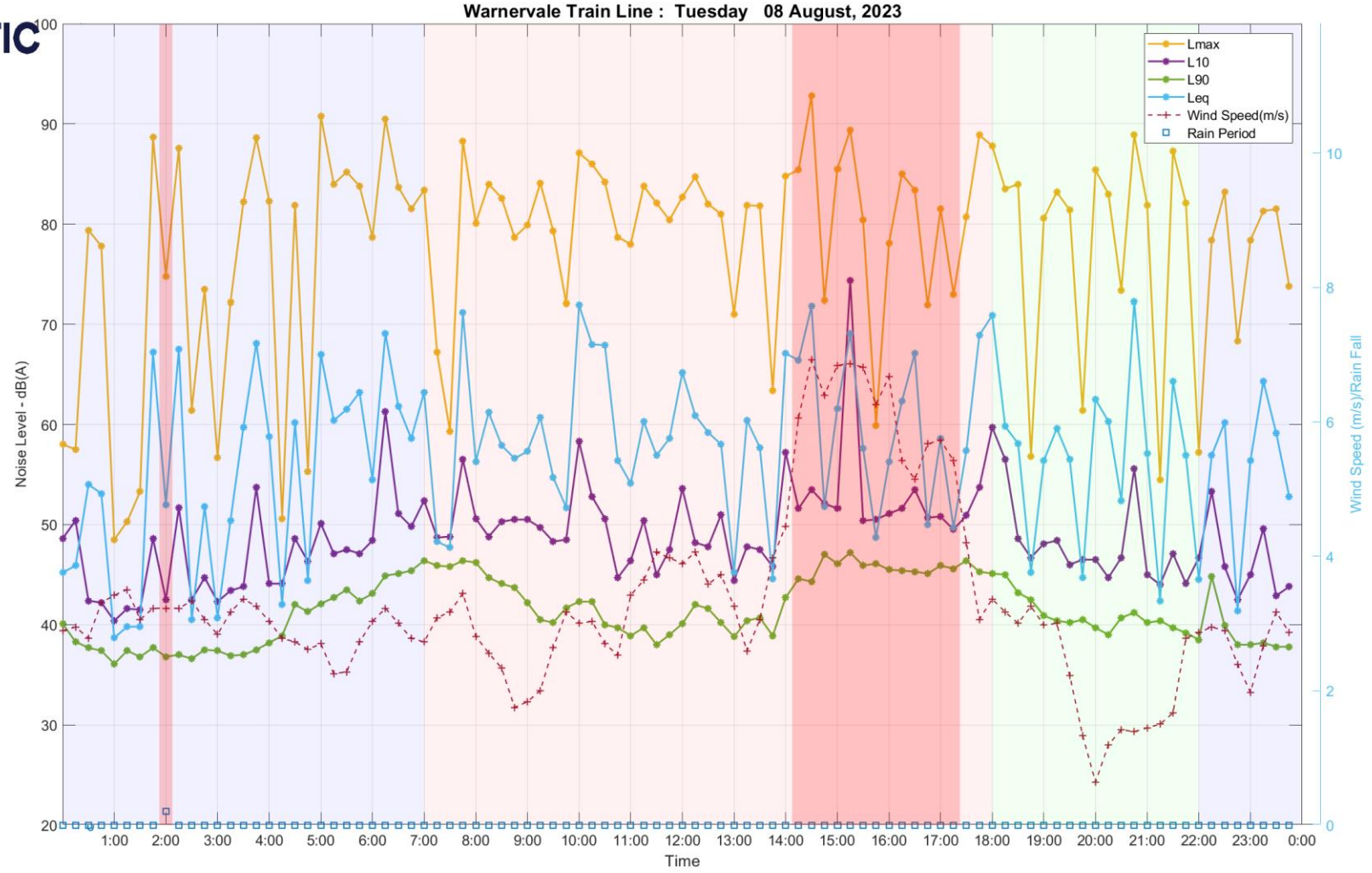
Warnervale Train Line : Tuesday 08 August, 2023
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
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30
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8
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1:00
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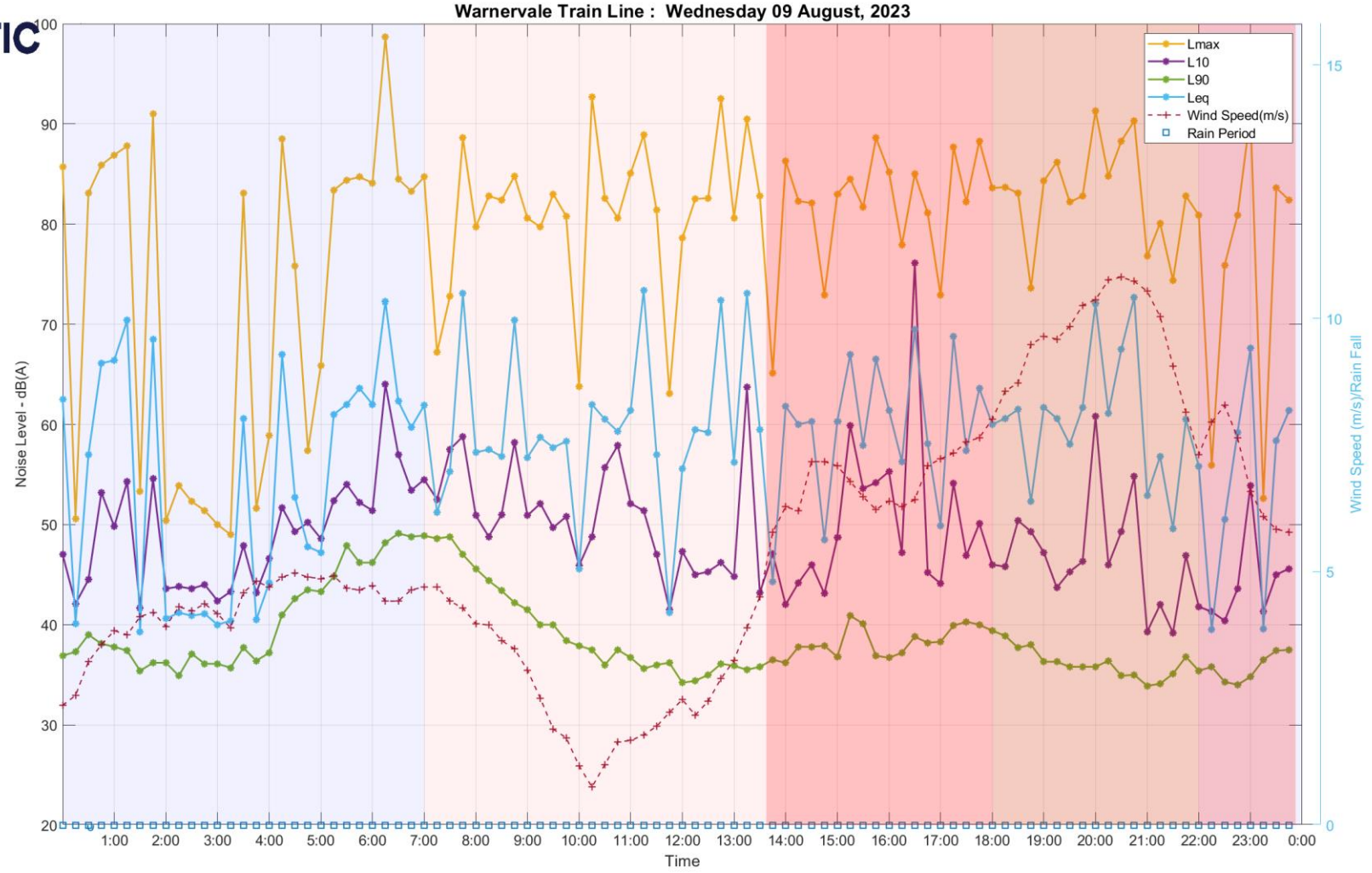
Warnervale Train Line : Wednesday 09 August, 2023
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
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50
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30
20
15
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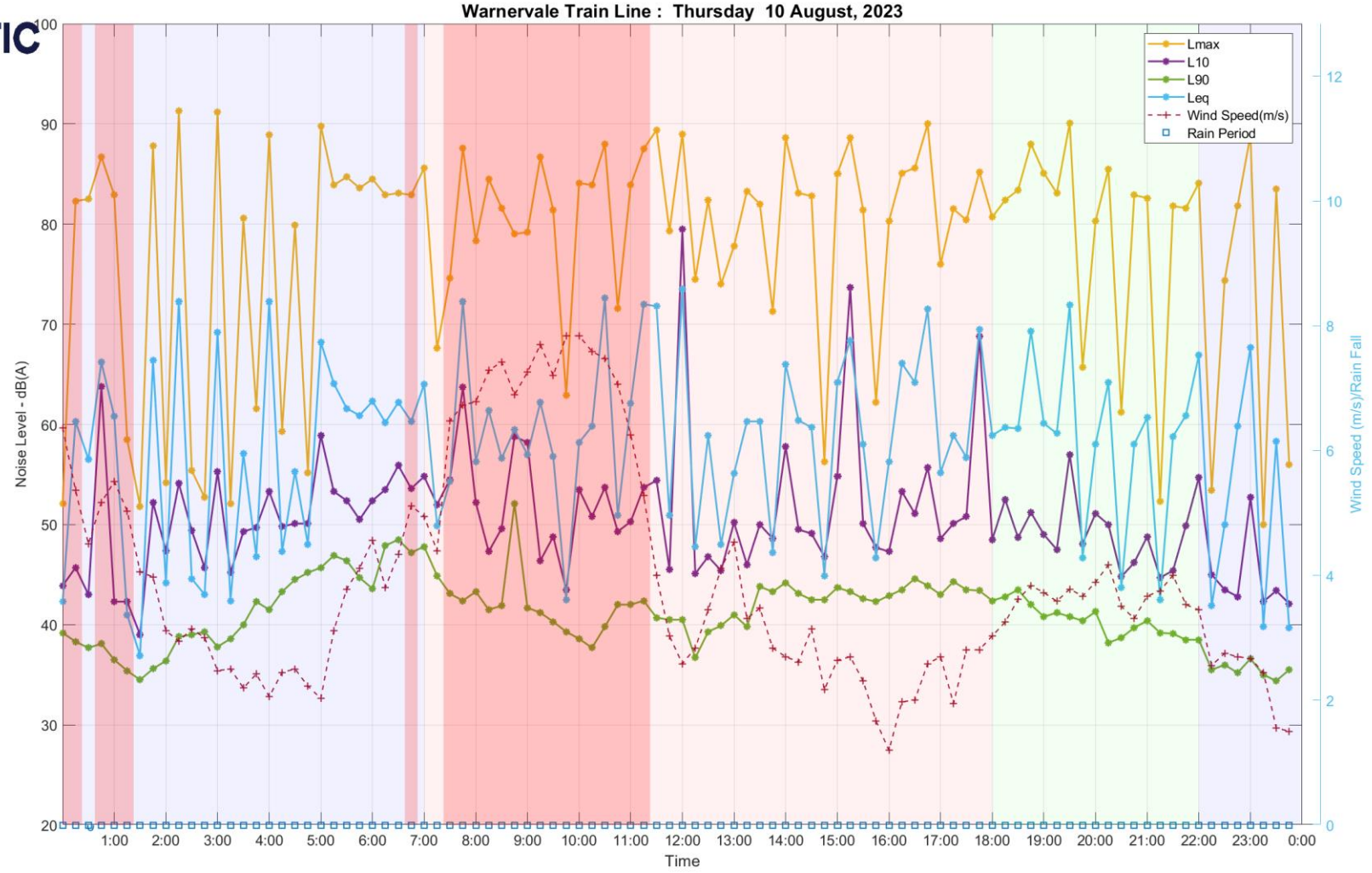
Warnervale Train Line : Thursday 10 August, 2023
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
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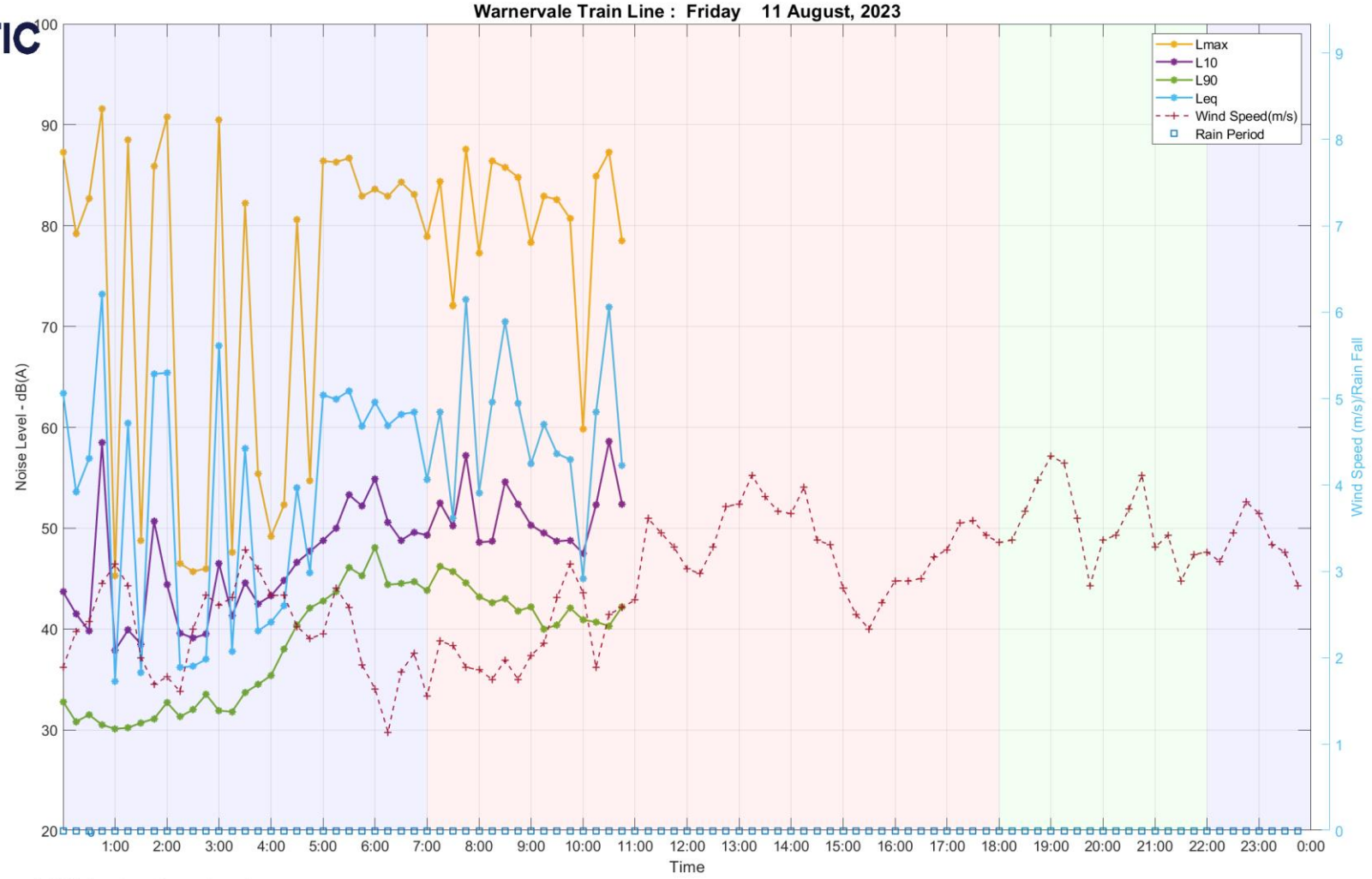
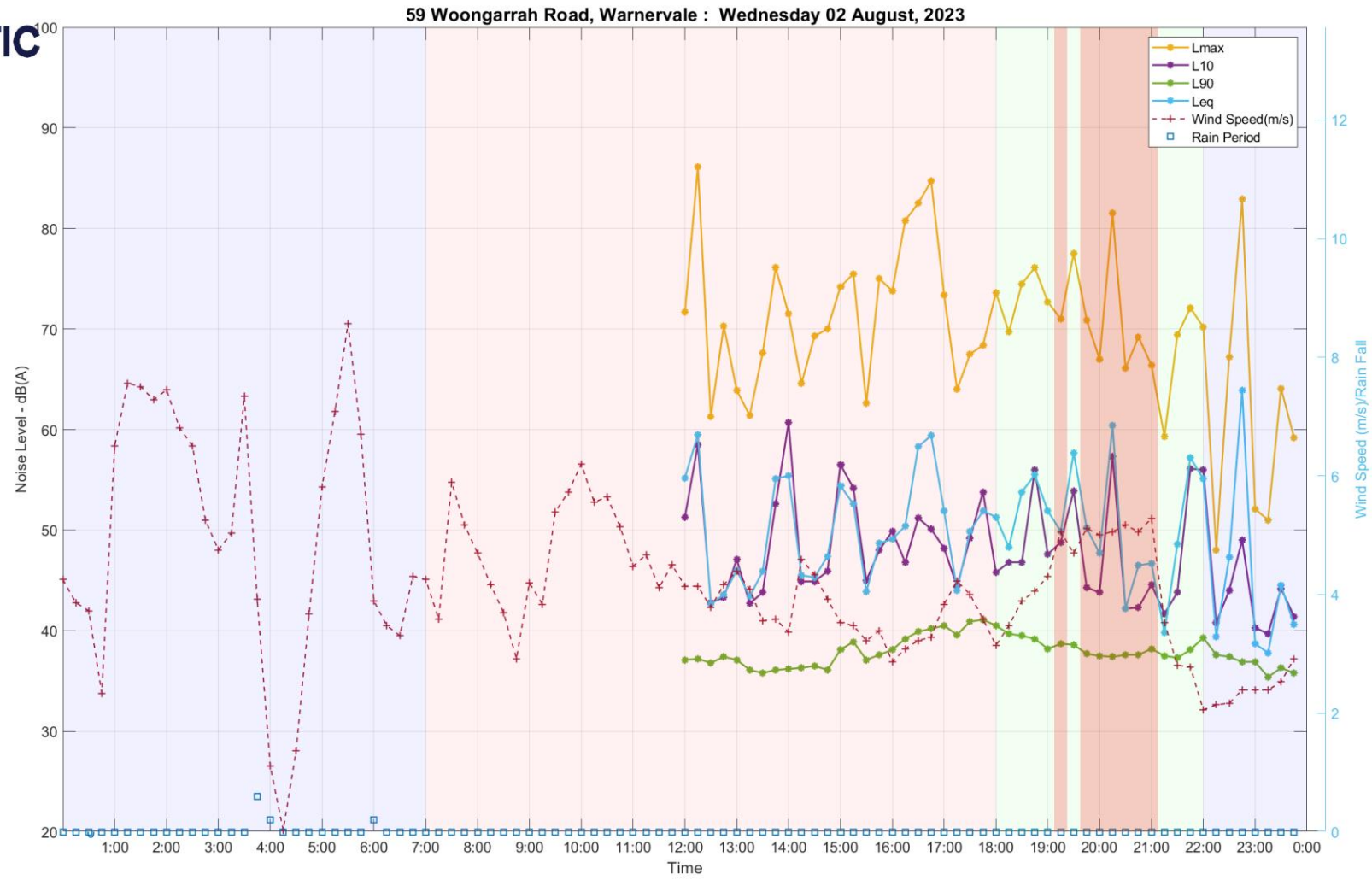


Wind Speed is corrected using factor 1.0000 based on logger location

MONITOR LOCATION 2


59 Woongarrah Road, Warnervale : Wednesday 02 August, 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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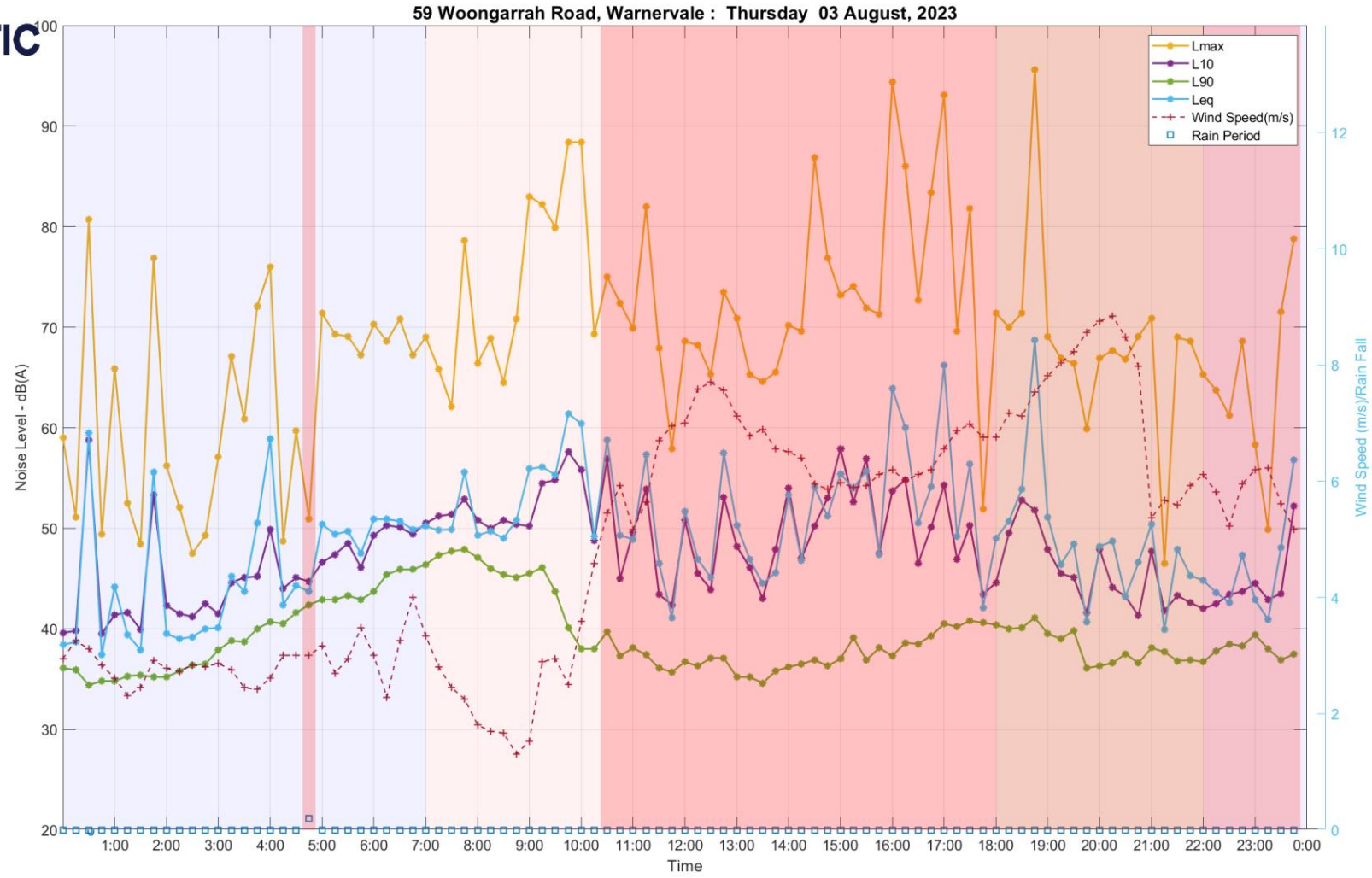
59 Woongarrah Road, Warnervale : Thursday 03 August, 2023
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
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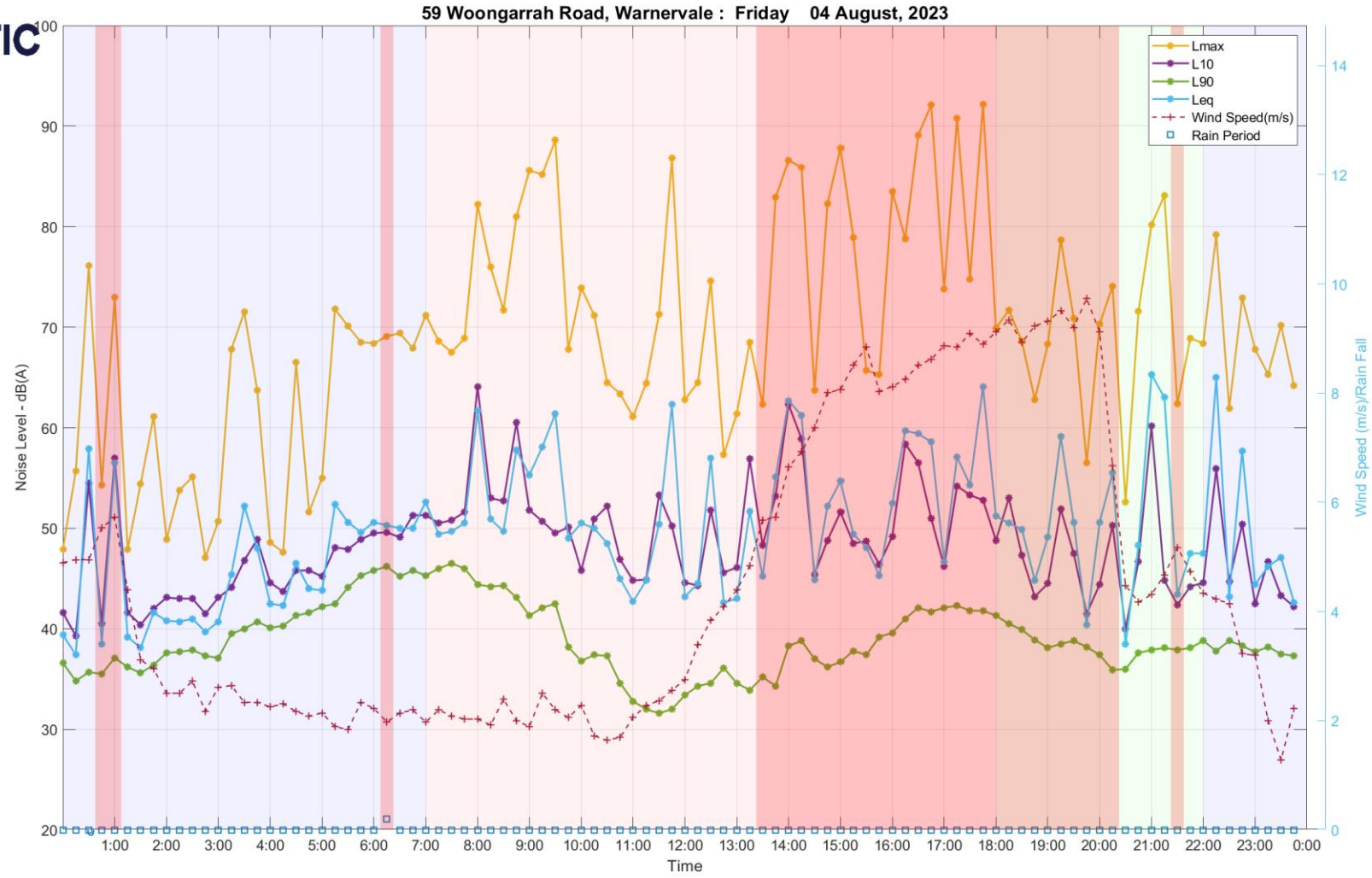
59 Woongarrah Road, Warnervale : Friday 04 August, 2023
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
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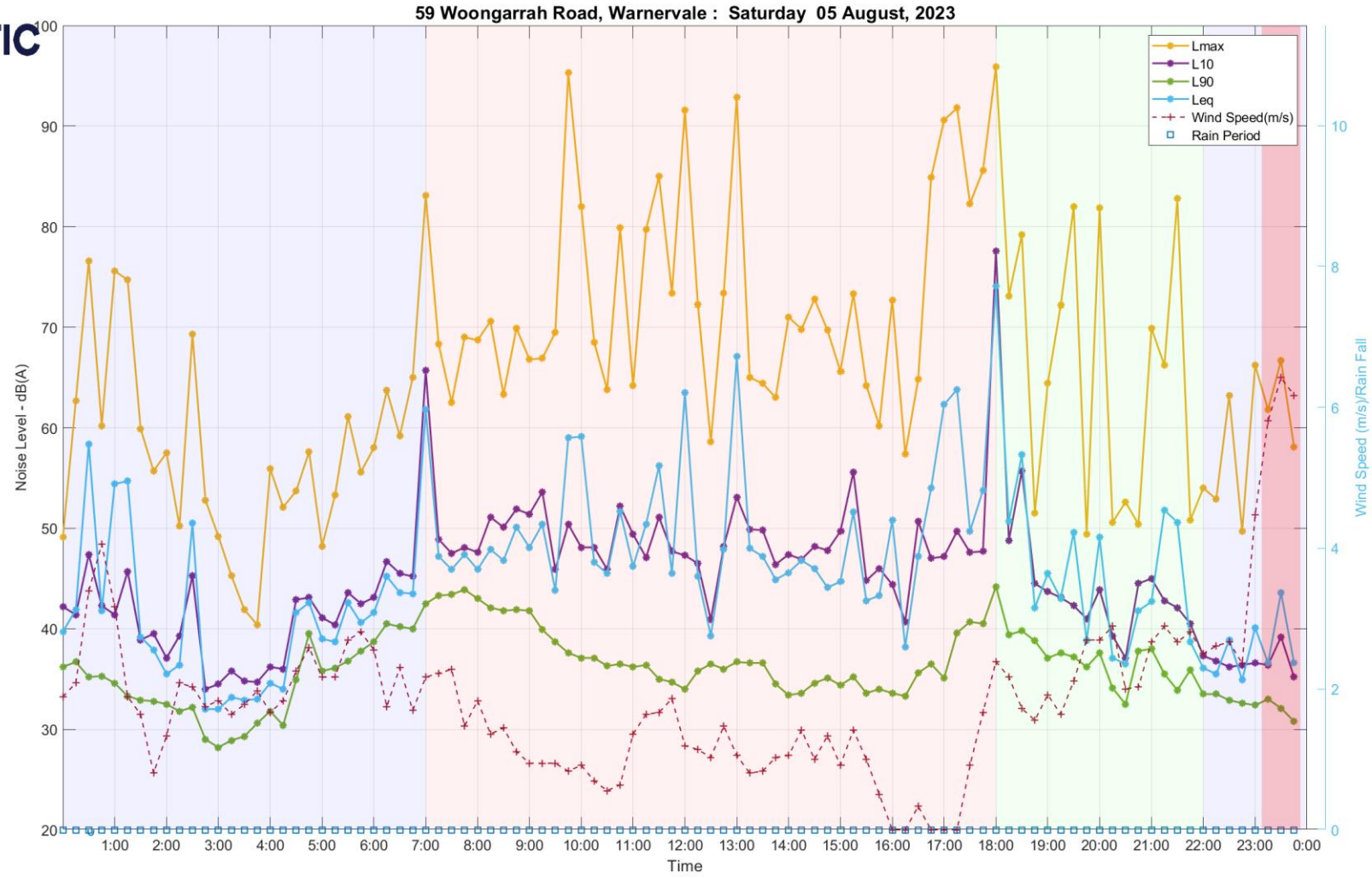
59 Woongarrah Road, Warnervale : Saturday 05 August, 2023
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
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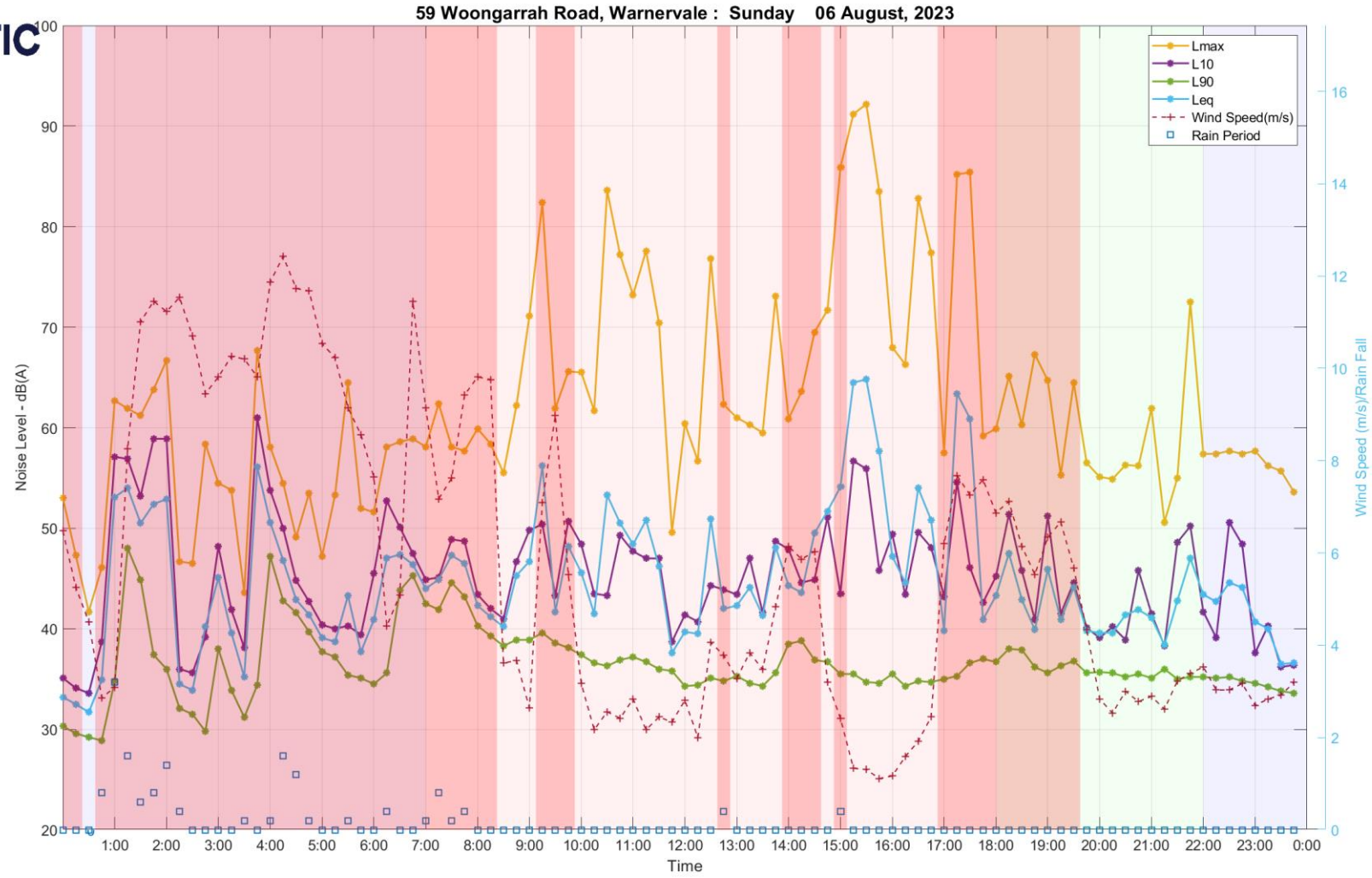
59 Woongarrah Road, Warnervale : Sunday 06 August, 2023
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
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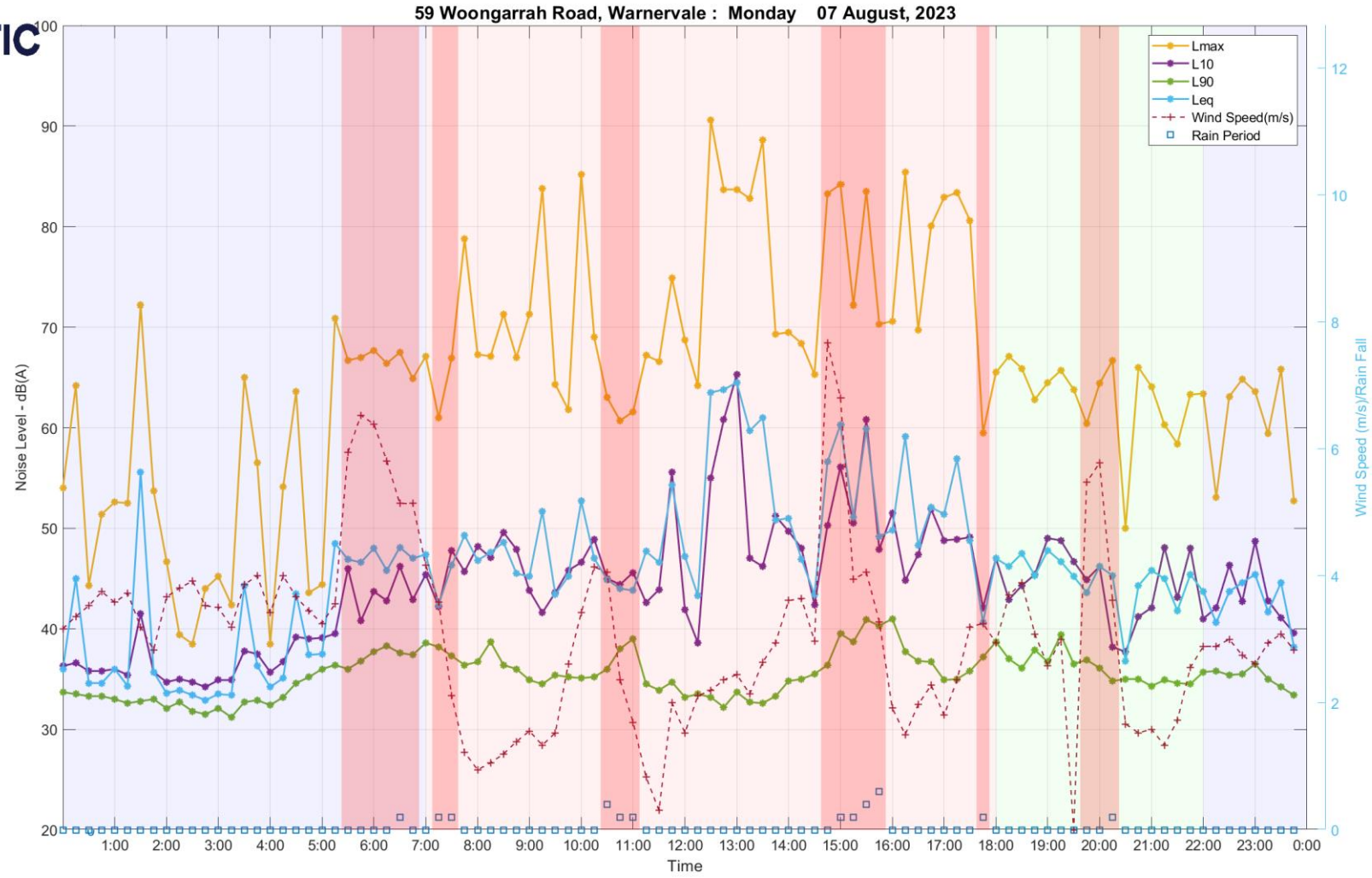
59 Woongarrah Road, Warnervale : Monday 07 August, 2023
Lmax
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L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
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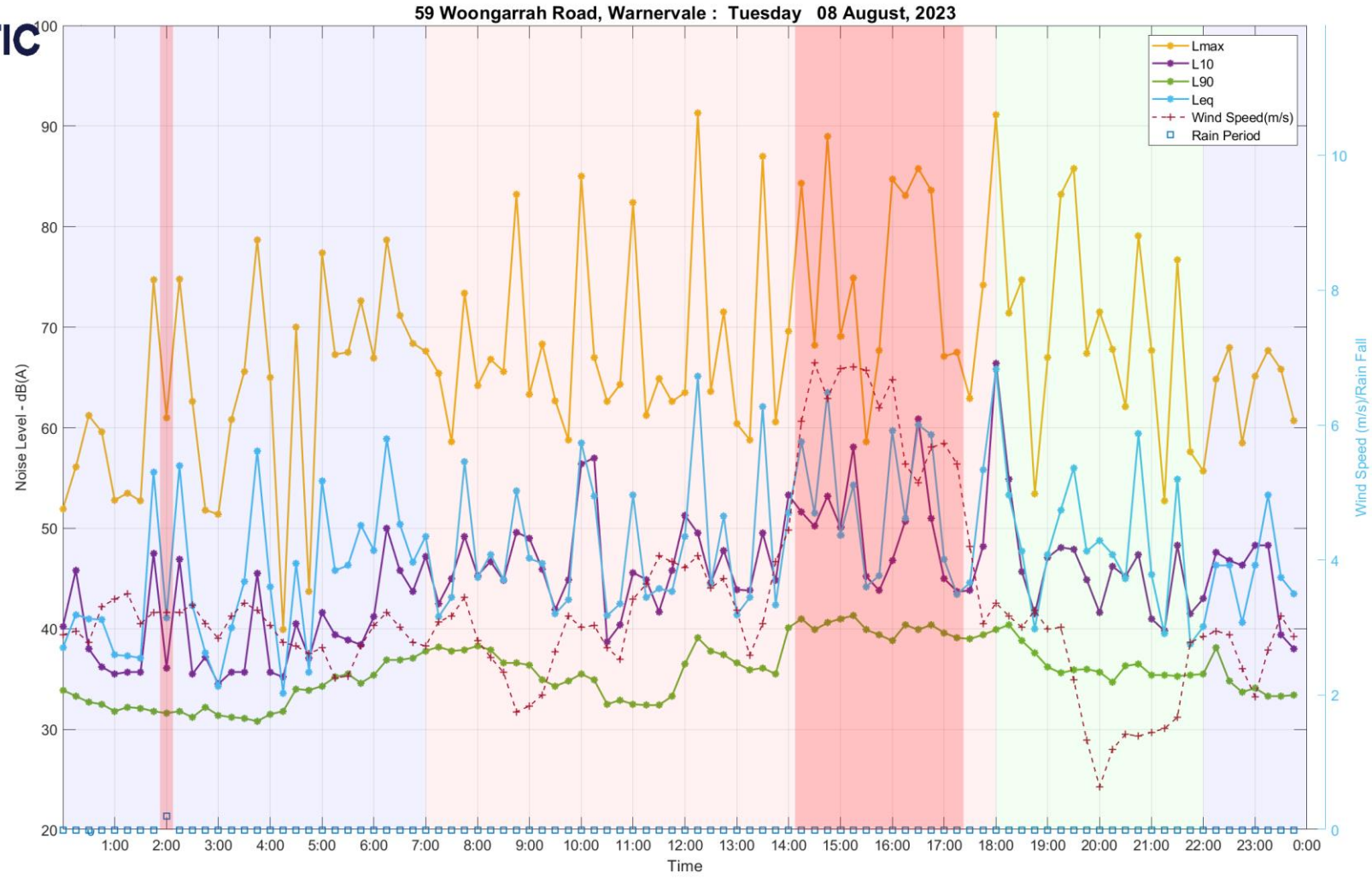
59 Woongarrah Road, Warnervale : Tuesday 08 August, 2023
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
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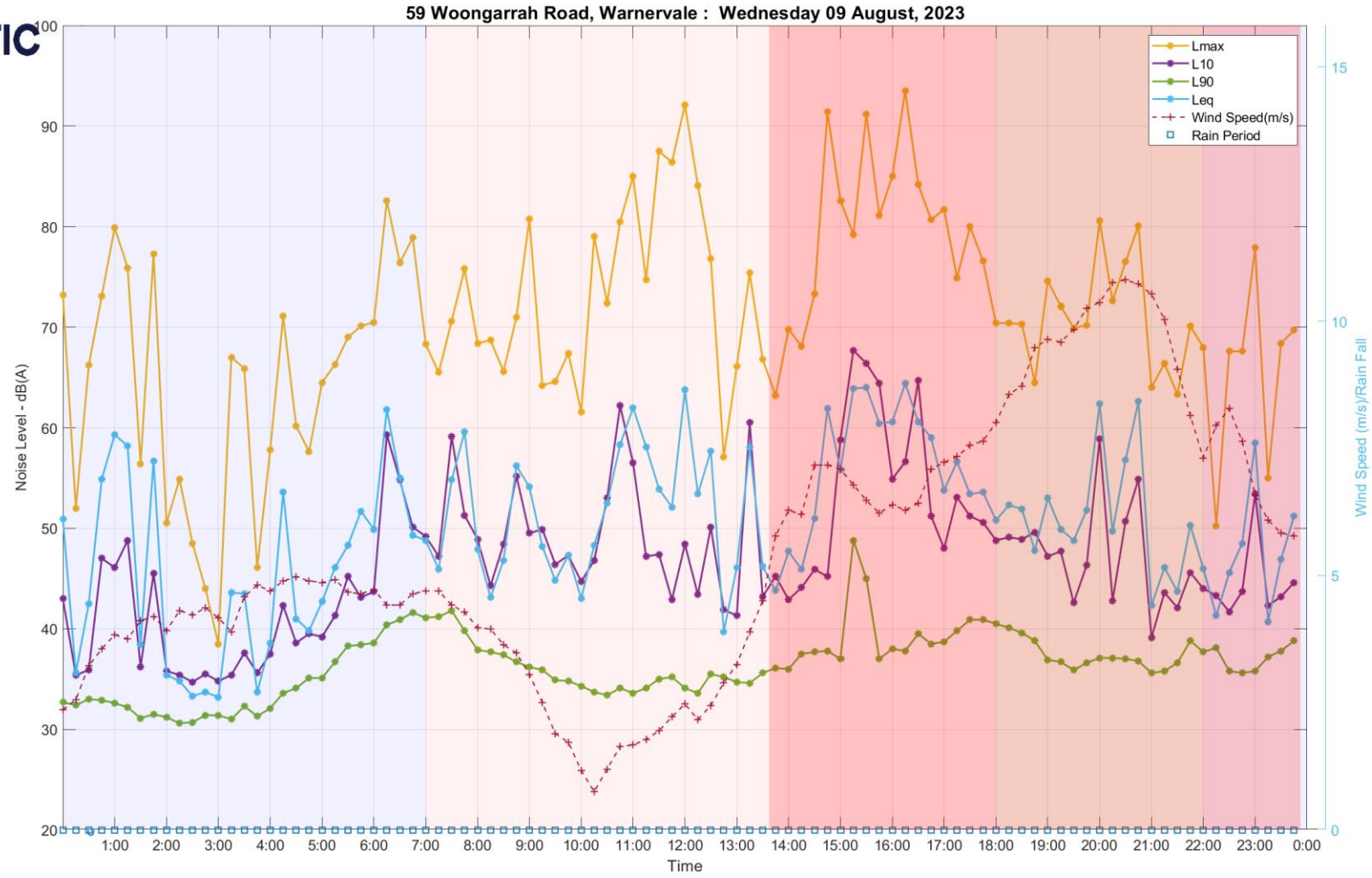
59 Woongarrah Road, Warnervale : Wednesday 09 August, 2023
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
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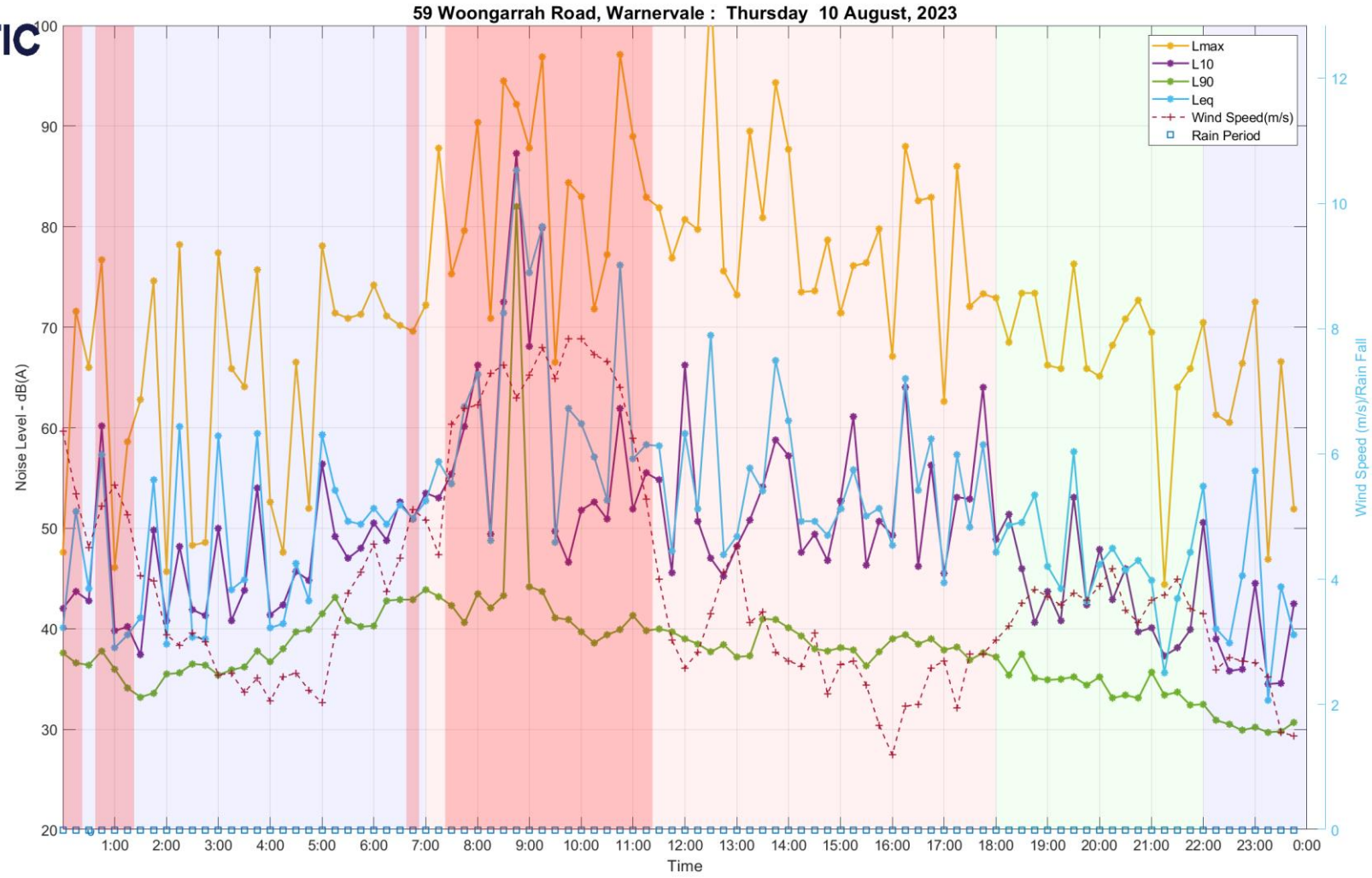
59 Woongarrah Road, Warnervale : Thursday 10 August, 2023
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
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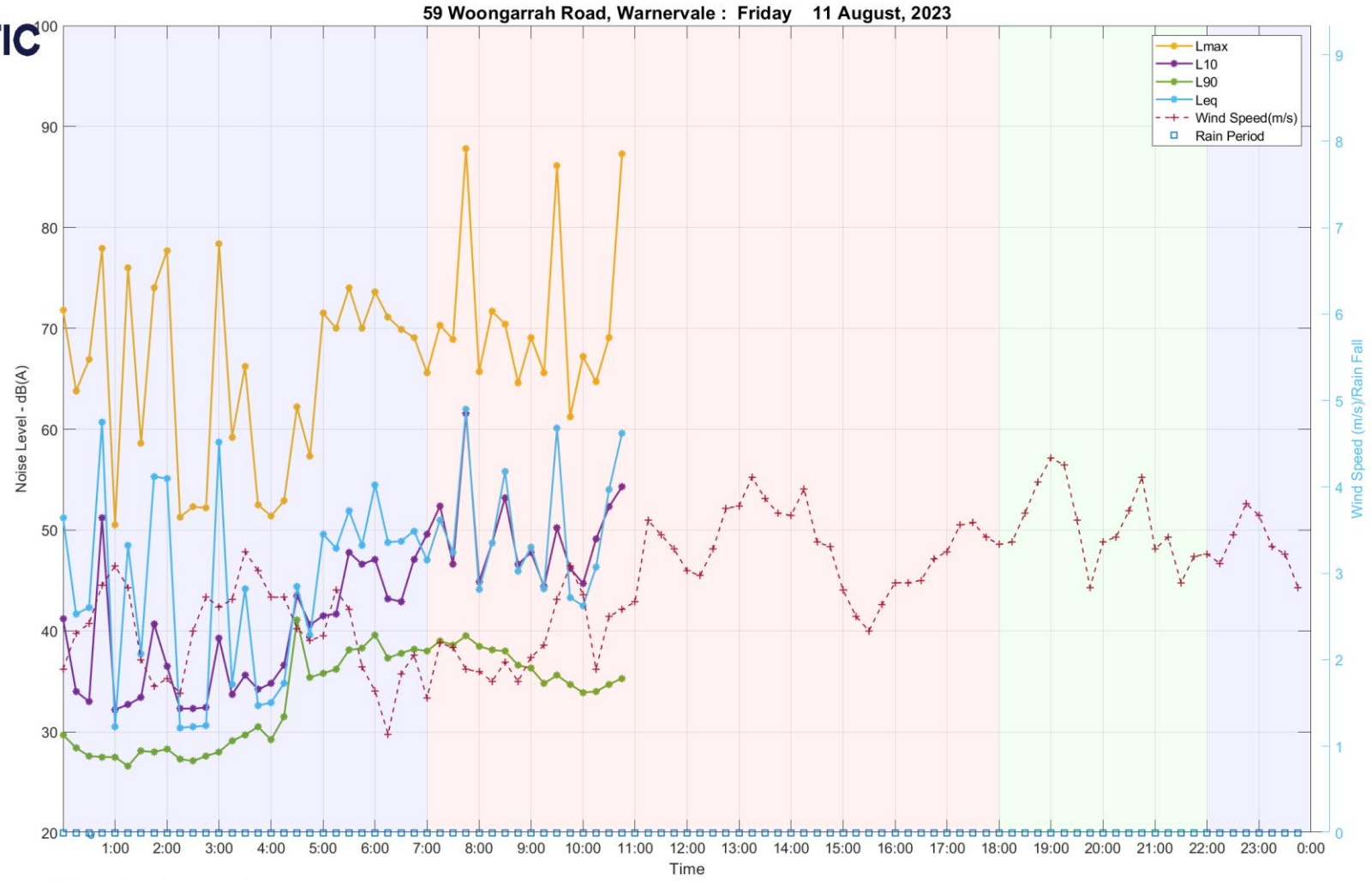
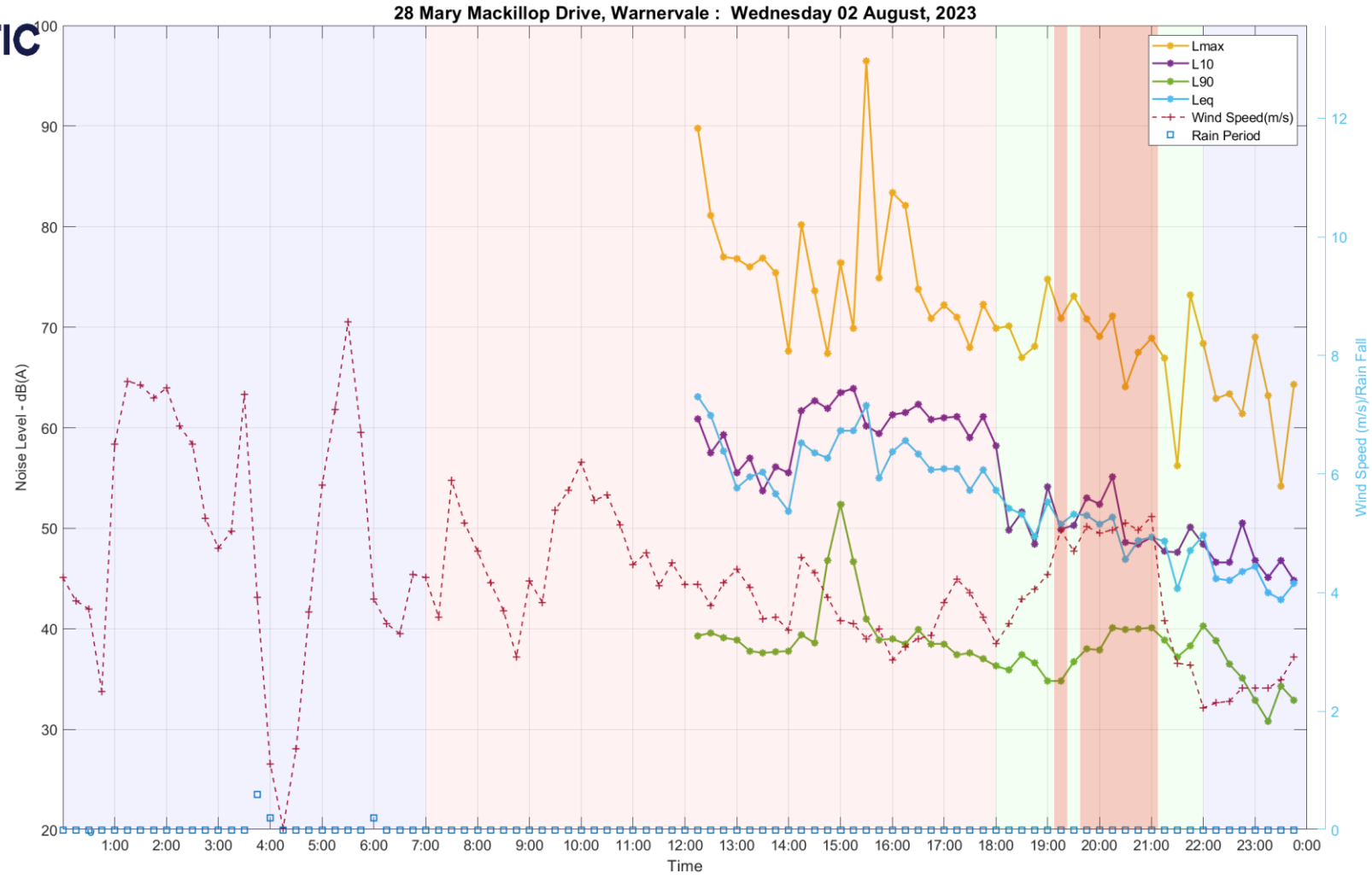


Wind Speed is corrected using factor 1.0000 based on logger location

MONITOR LOCATION 3


28 Mary Mackillop Drive, Warnervale : Wednesday 02 August, 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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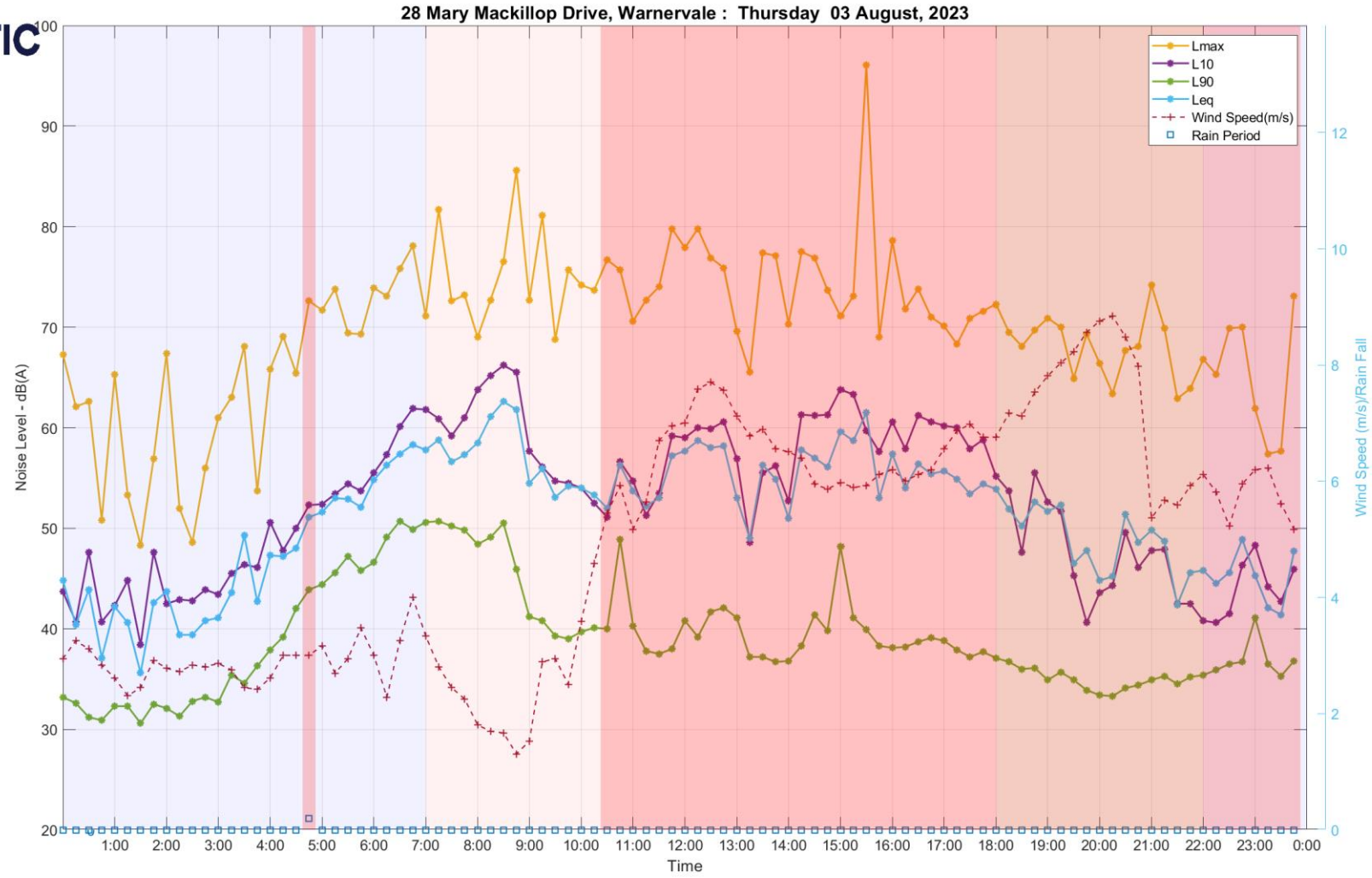
28 Mary Mackillop Drive, Warnervale : Thursday 03 August, 2023
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
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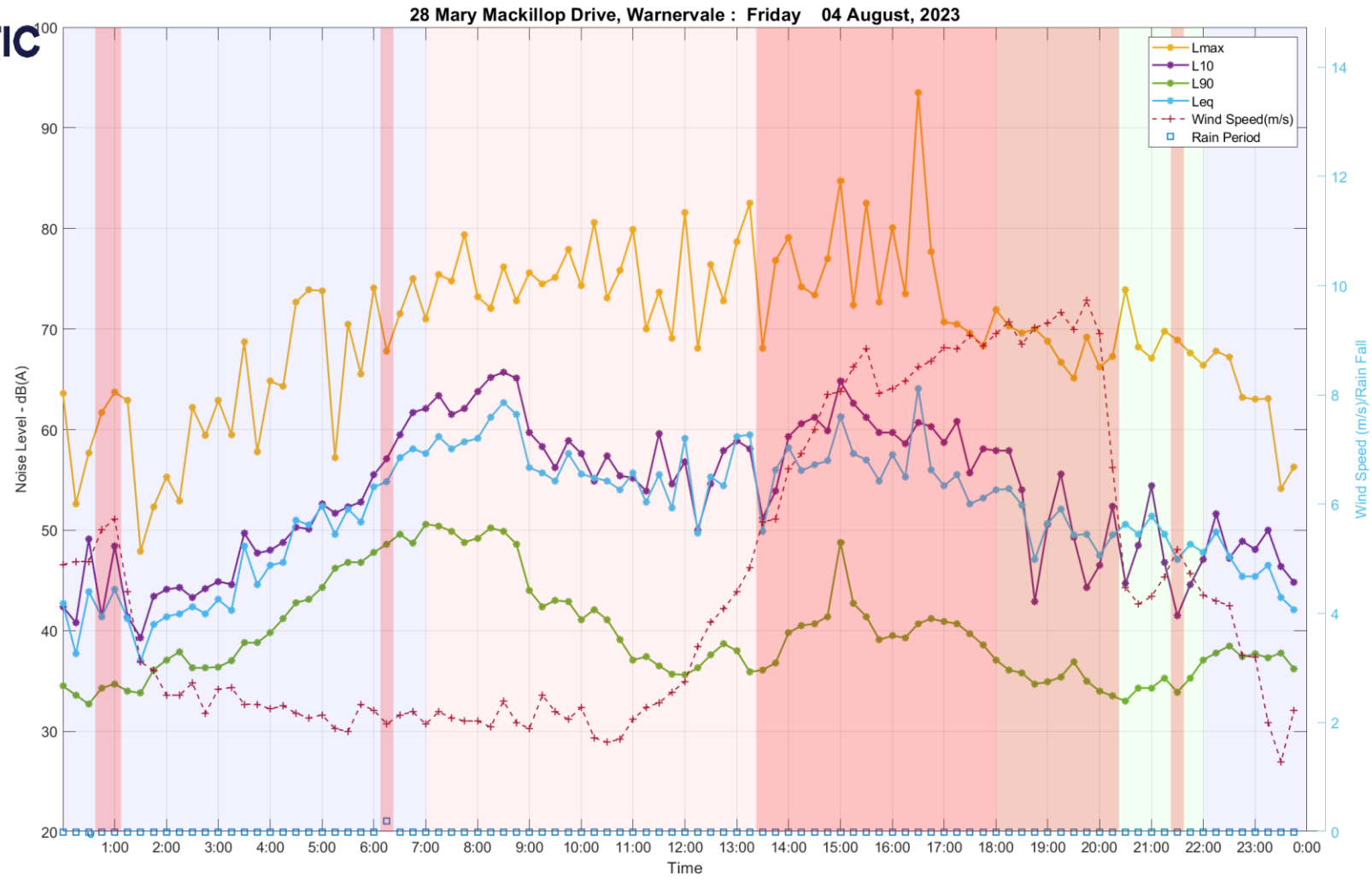
28 Mary Mackillop Drive, Warnervale : Friday 04 August, 2023
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
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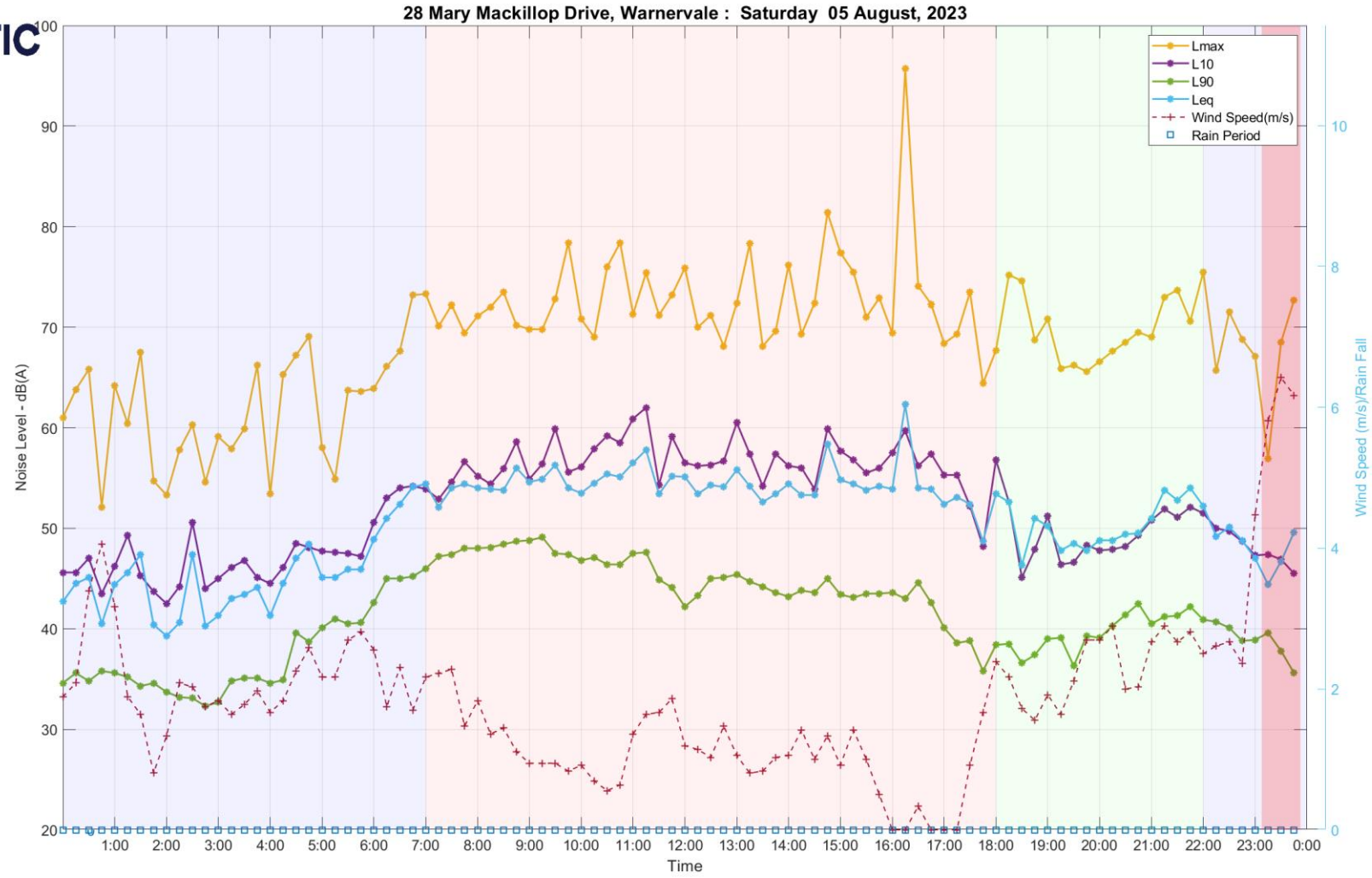
28 Mary Mackillop Drive, Warnervale : Saturday 05 August, 2023
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
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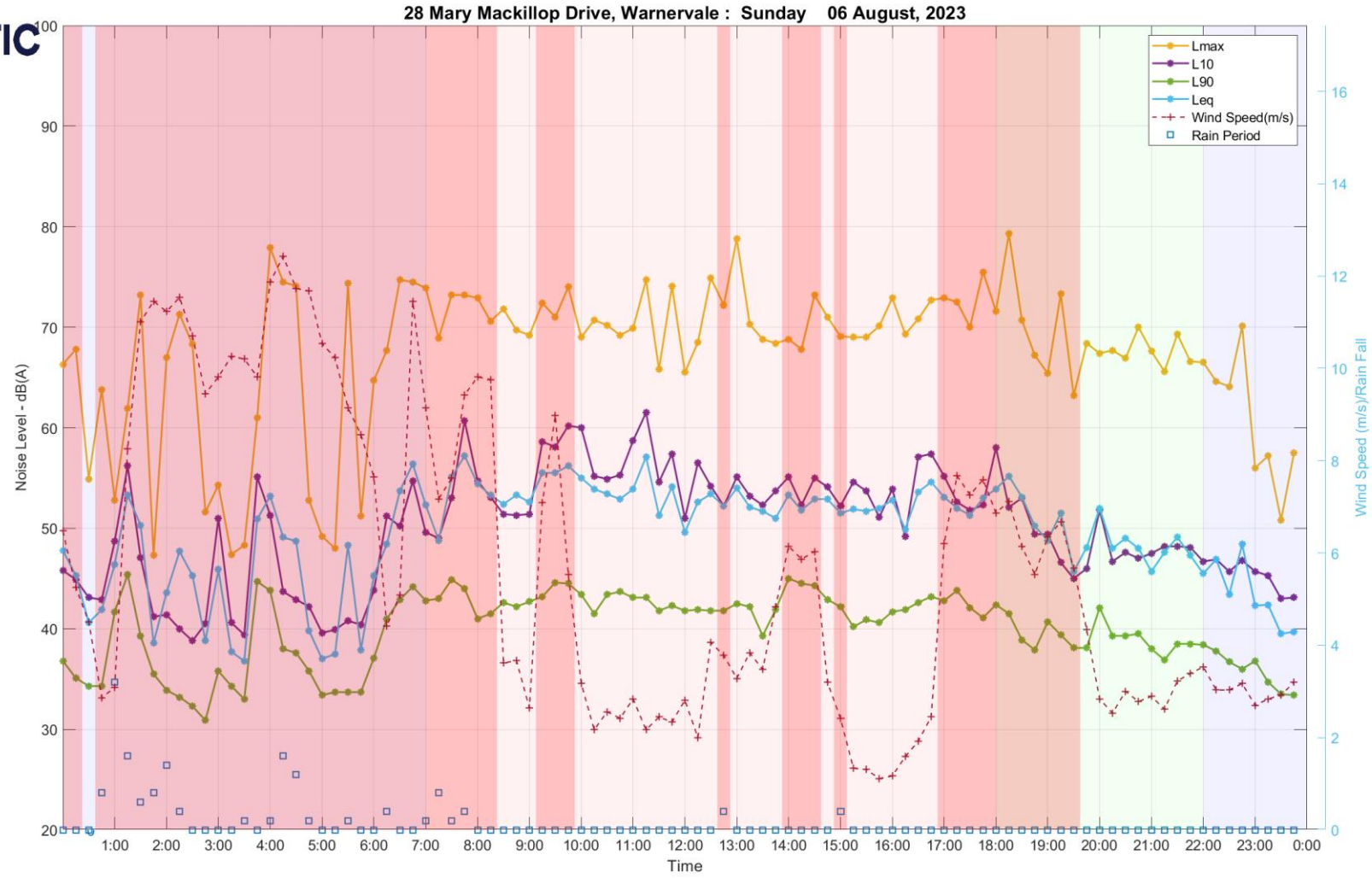
28 Mary Mackillop Drive, Warnervale : Sunday 06 August, 2023
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
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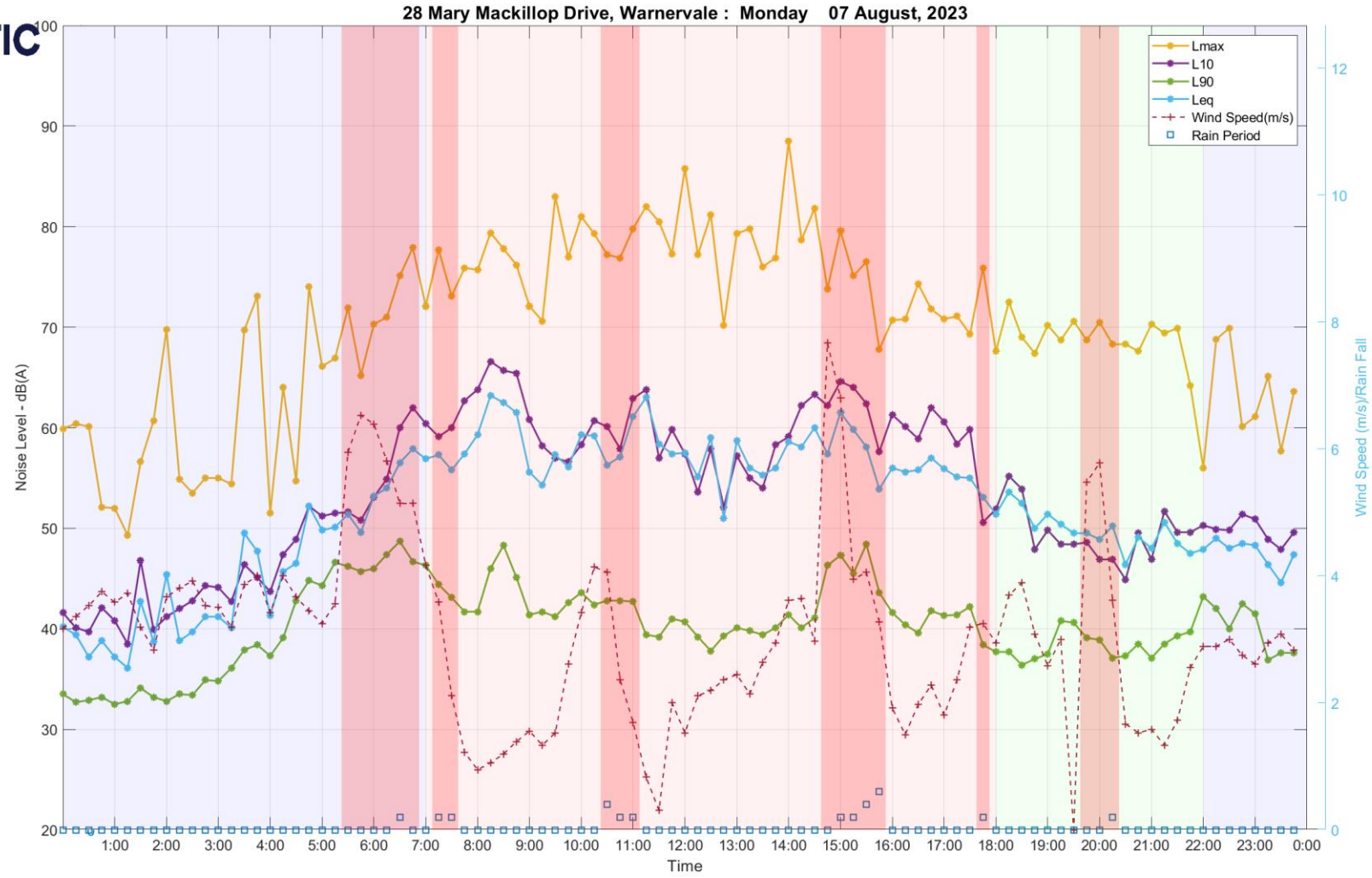
28 Mary Mackillop Drive, Warnervale : Monday 07 August, 2023
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
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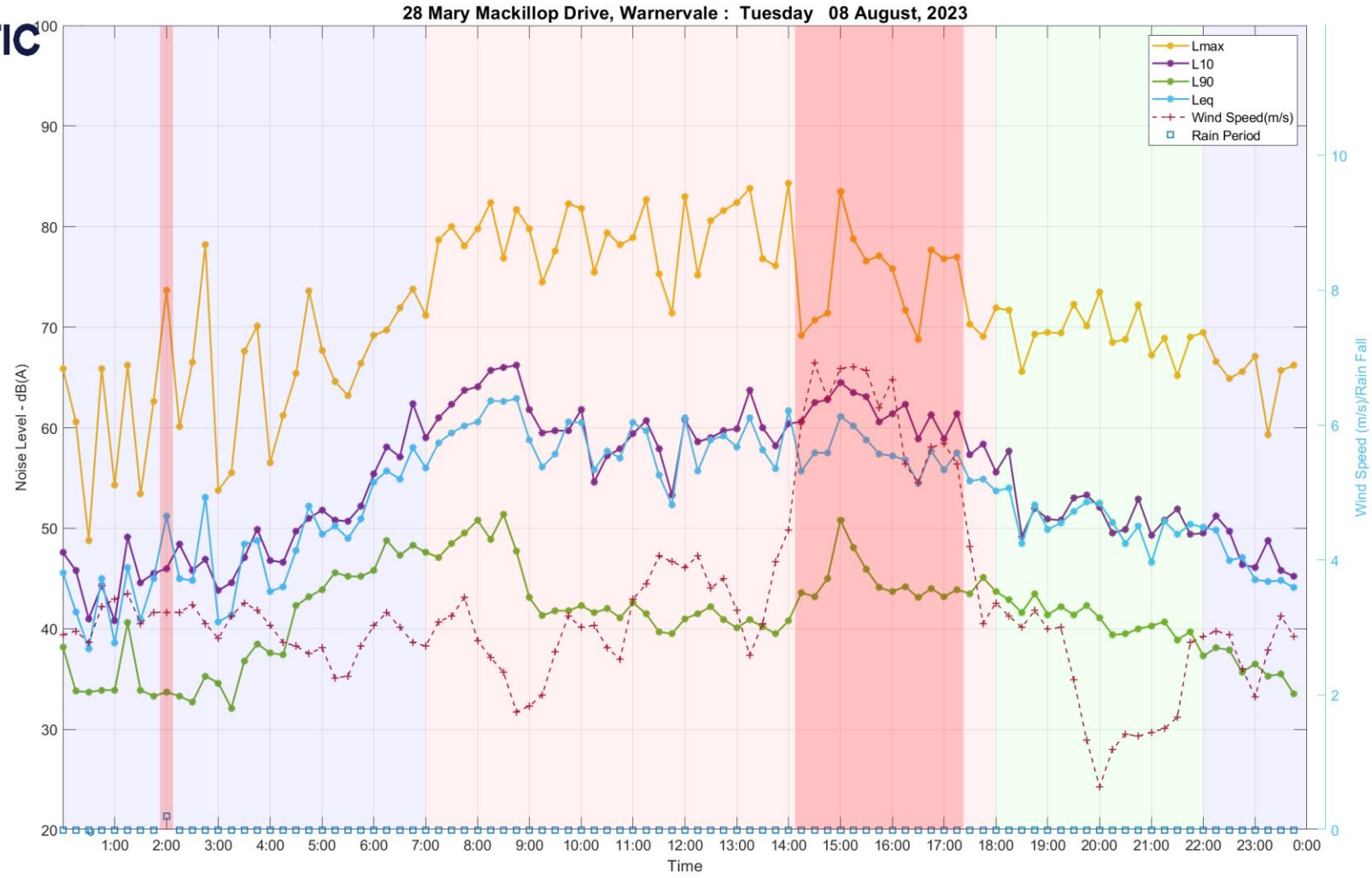
28 Mary Mackillop Drive, Warnervale : Tuesday 08 August, 2023
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
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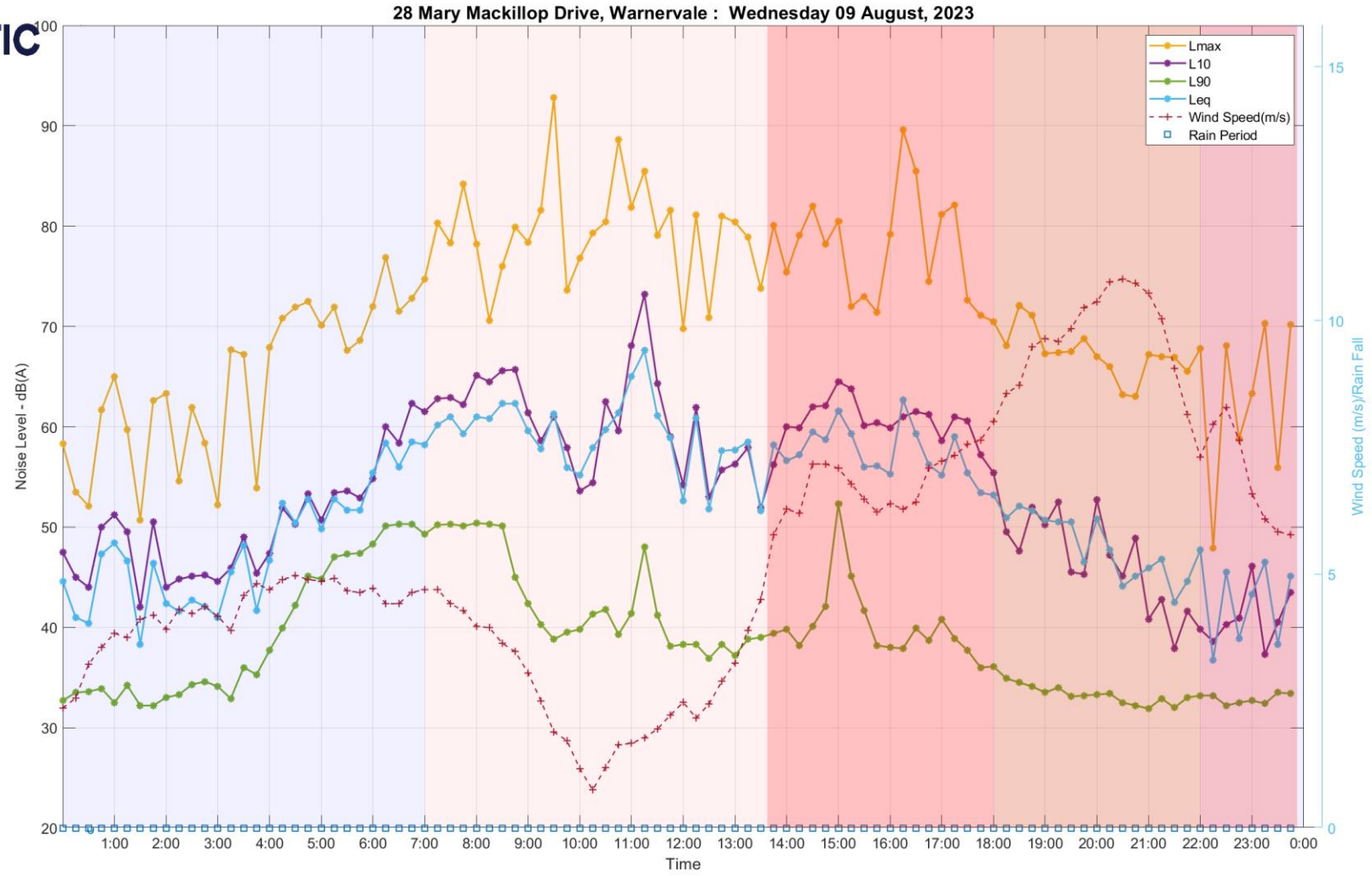
28 Mary Mackillop Drive, Warnervale : Wednesday 09 August, 2023
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
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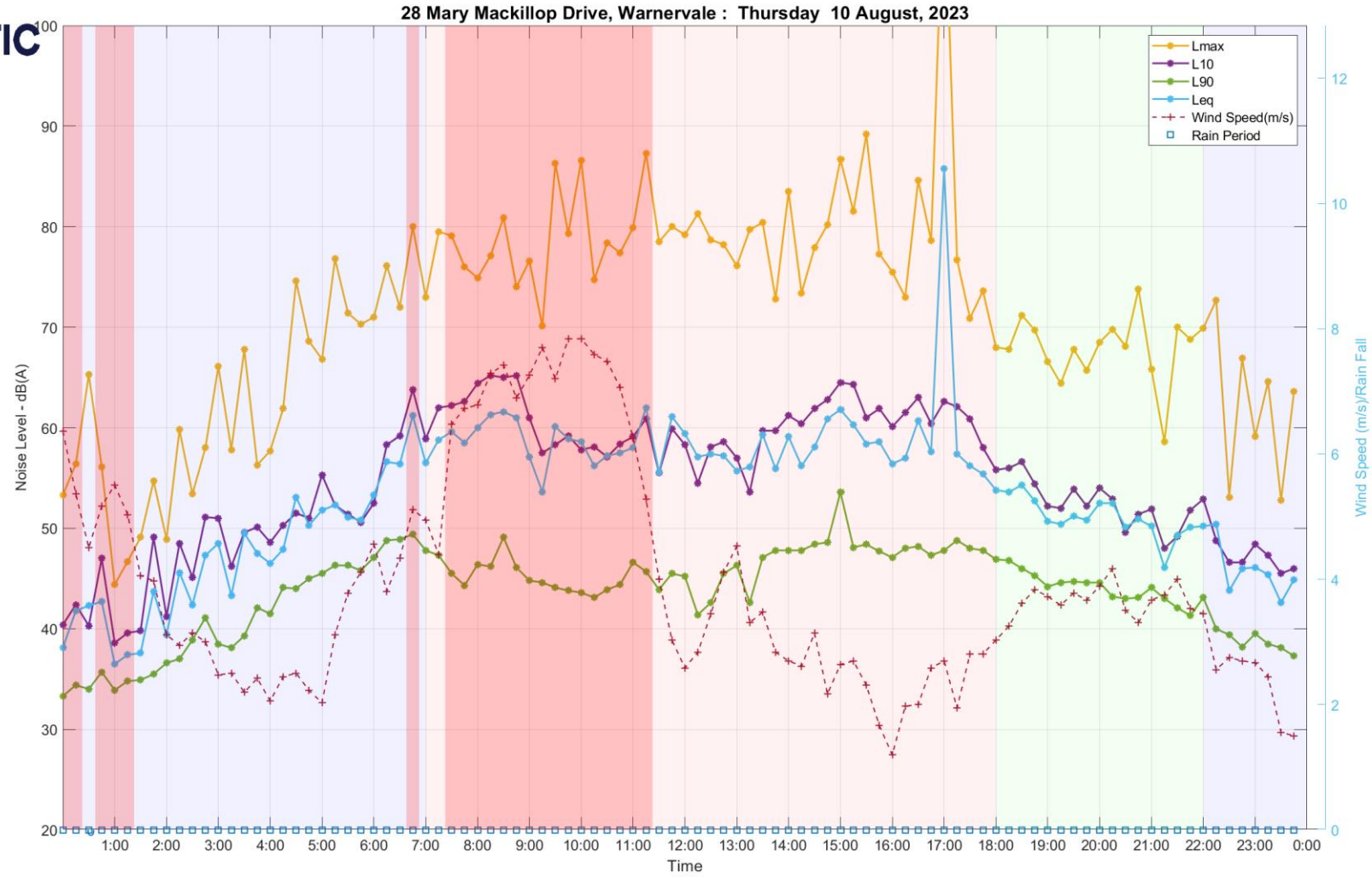
28 Mary Mackillop Drive, Warnervale : Thursday 10 August, 2023
Lmax
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L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
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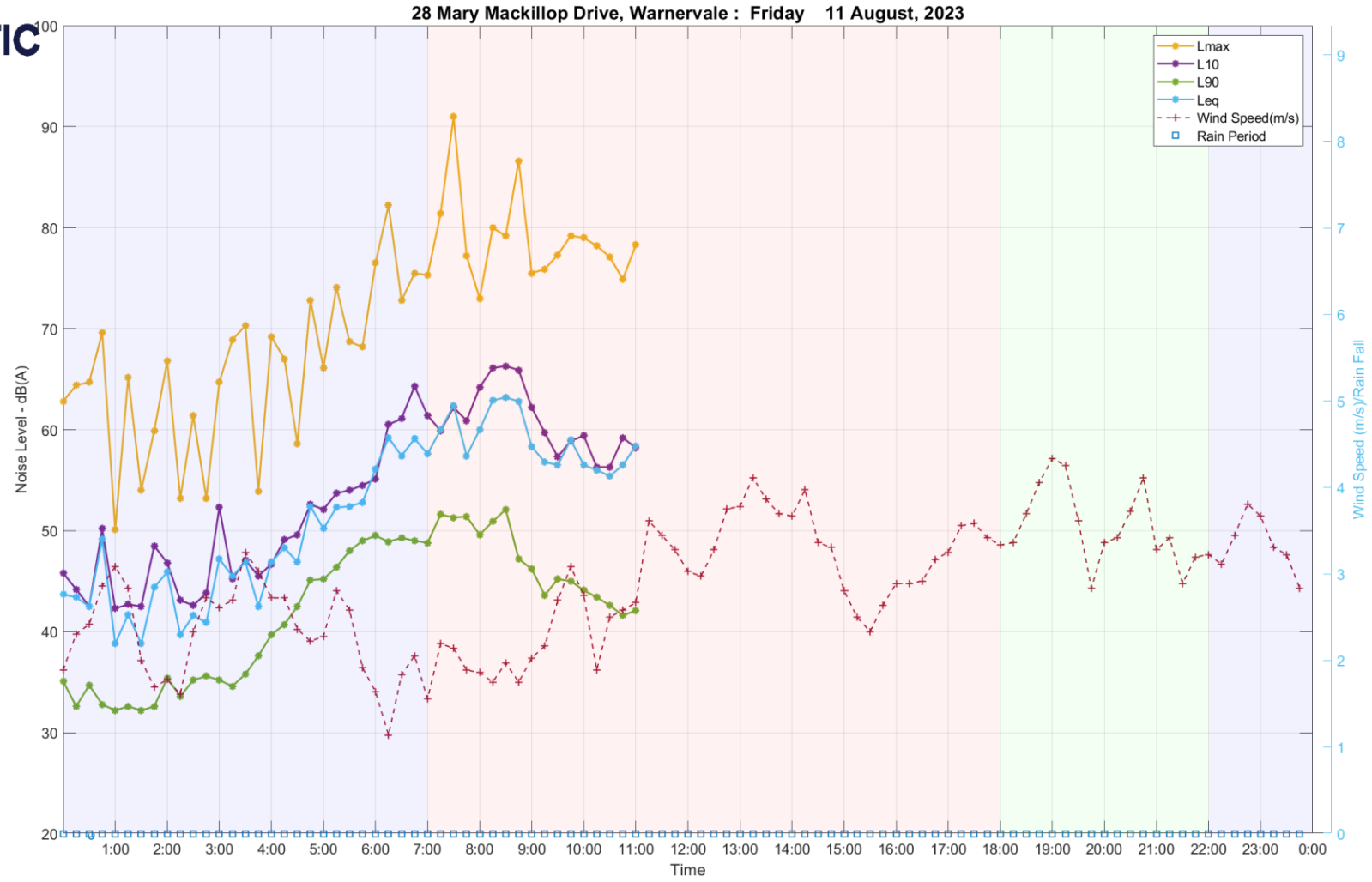
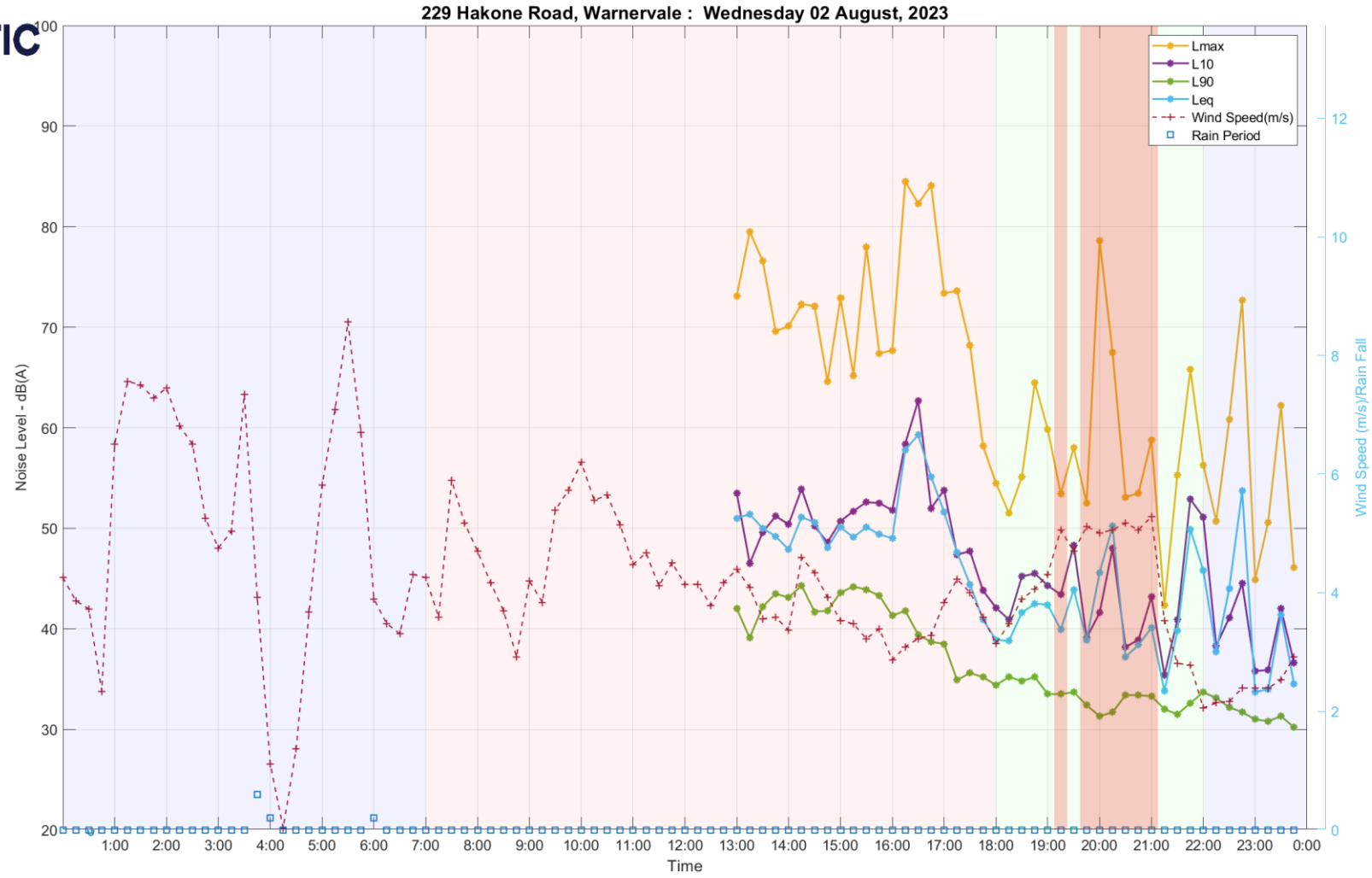


Wind Speed is corrected using factor 1.0000 based on logger location

MONITOR LOCATION 4


229 Hakone Road, Warnervale : Wednesday 02 August, 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
4:00
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11:00
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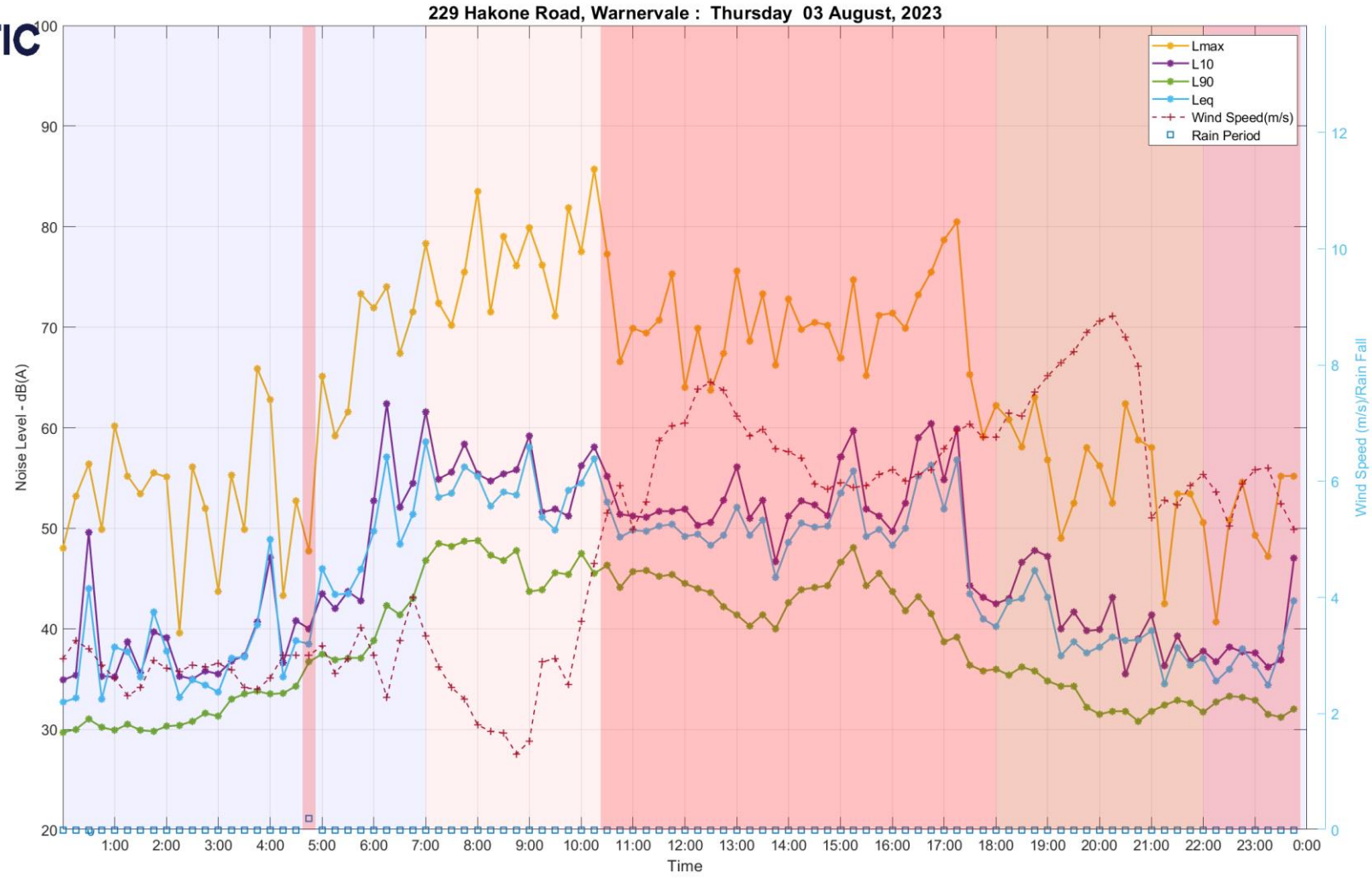
22:00
23:00
0:00


229 Hakone Road, Warnervale : Thursday 03 August, 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
4:00
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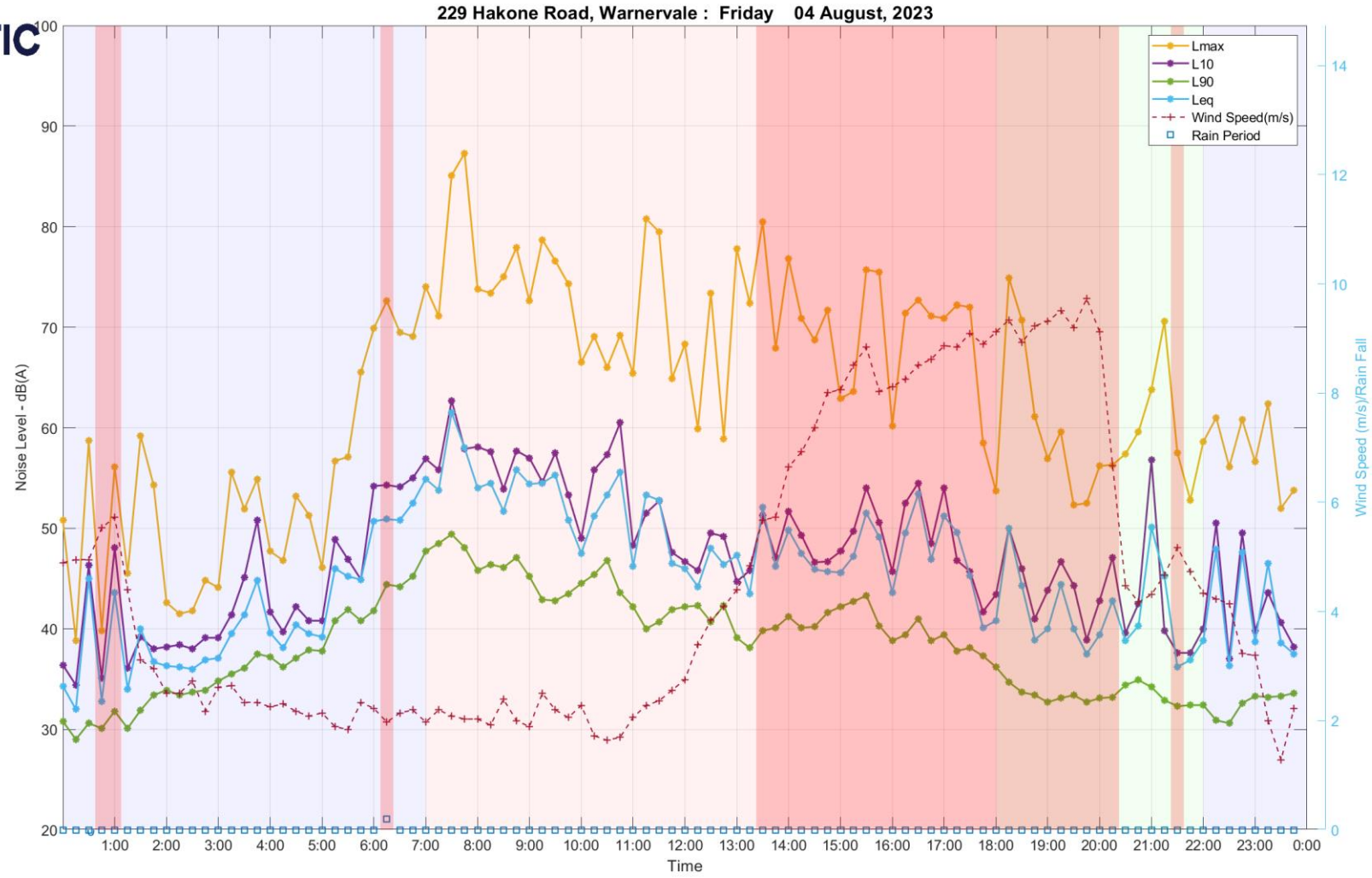
229 Hakone Road, Warnervale : Friday 04 August, 2023
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
14
12
10
8
6
4
2
0
1:00
2:00
3:00
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23:00
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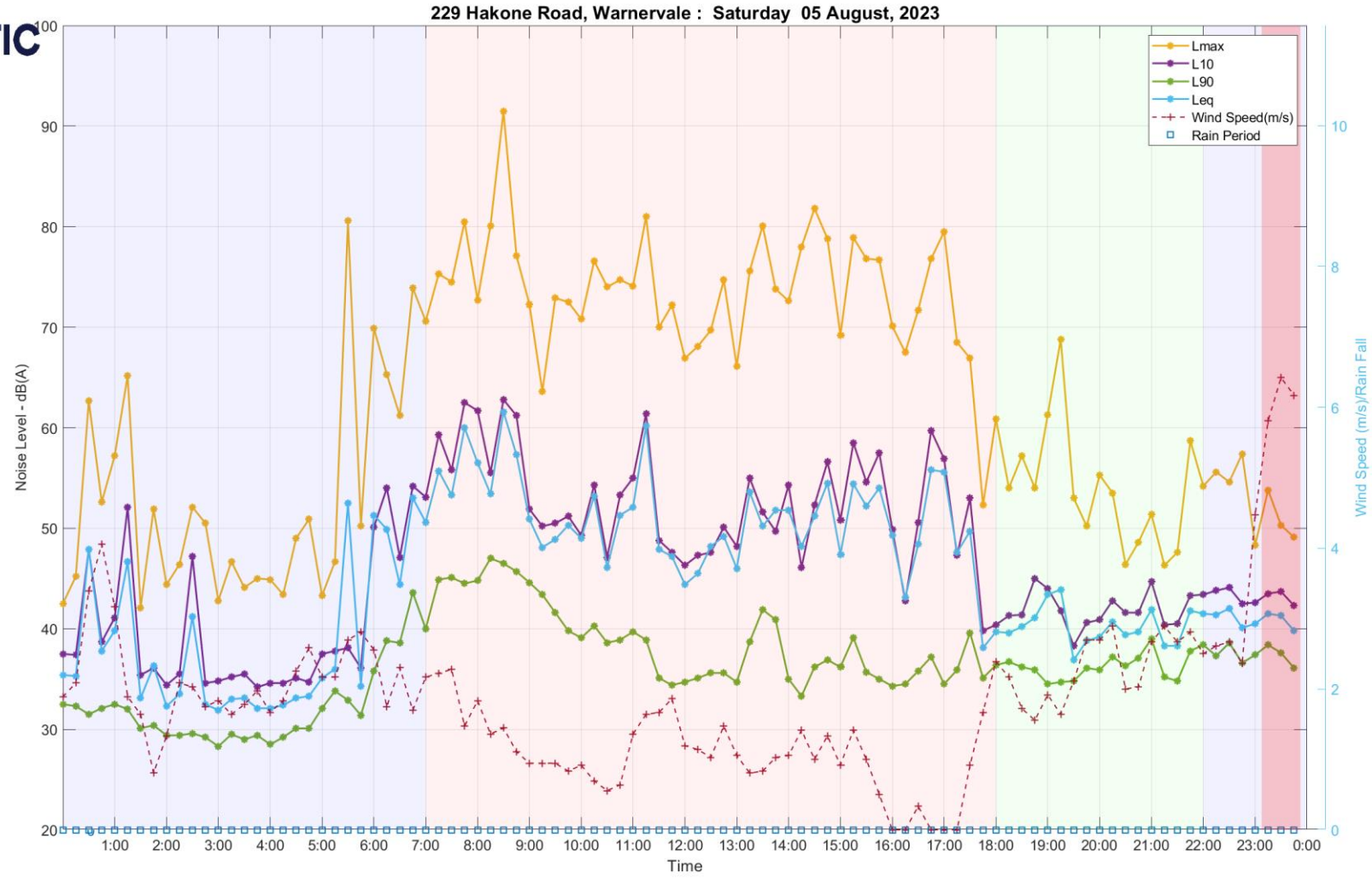
229 Hakone Road, Warnervale : Saturday 05 August, 2023
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
10
8
6
4
2
0
1:00
2:00
3:00
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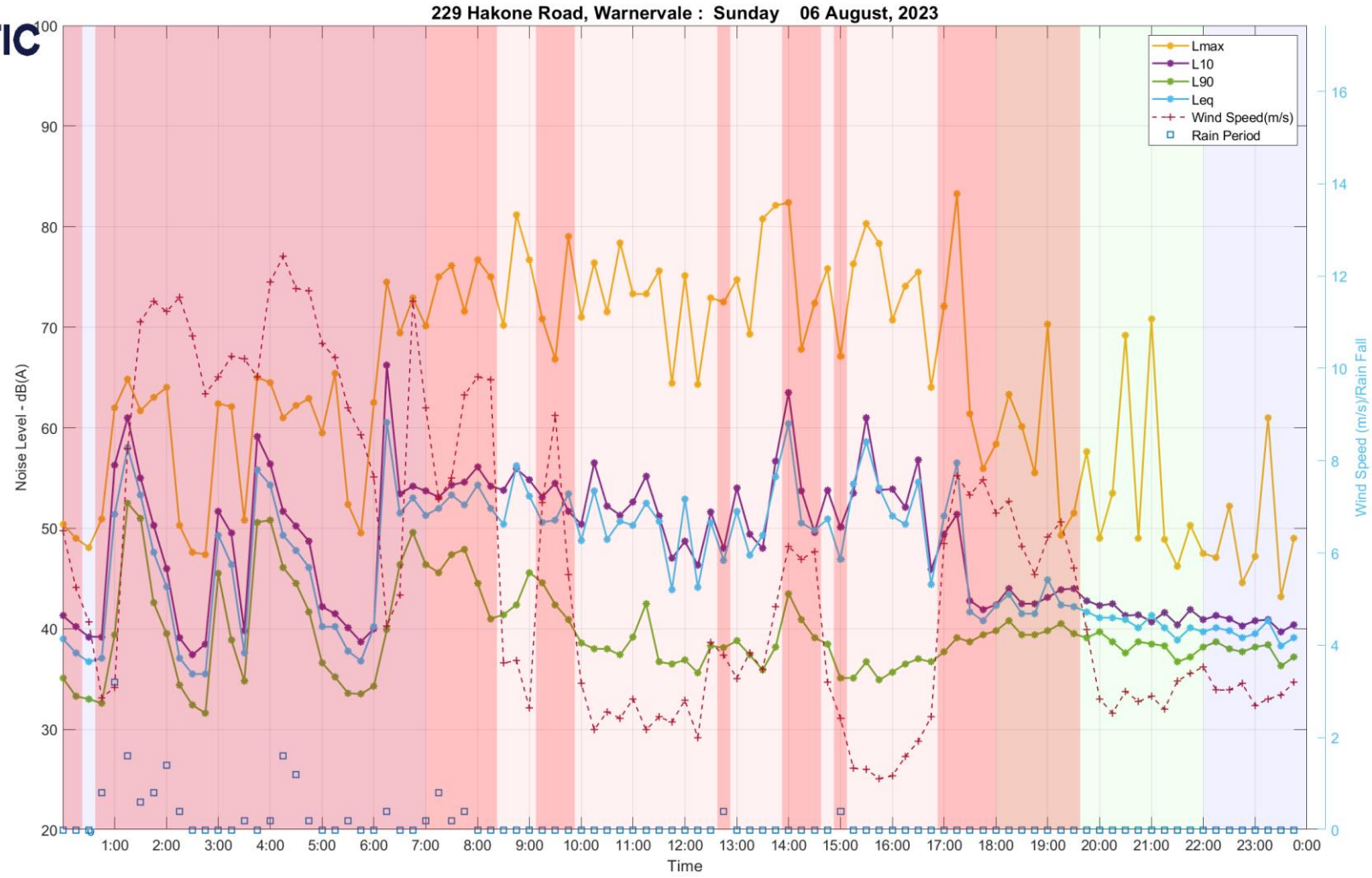
229 Hakone Road, Warnervale : Sunday 06 August, 2023
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
16
14
12
10
8
6
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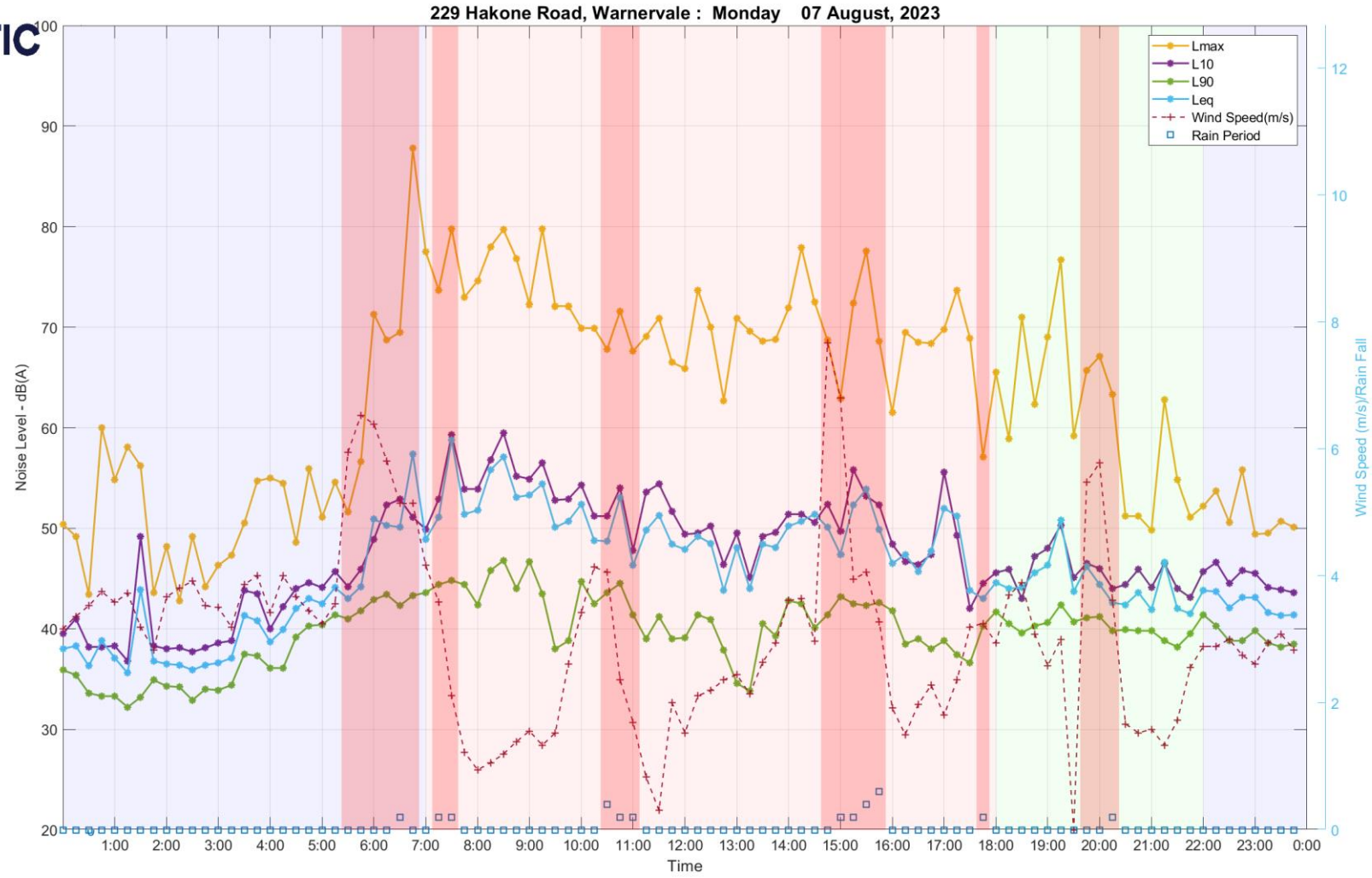
229 Hakone Road, Warnervale : Monday 07 August, 2023
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
12
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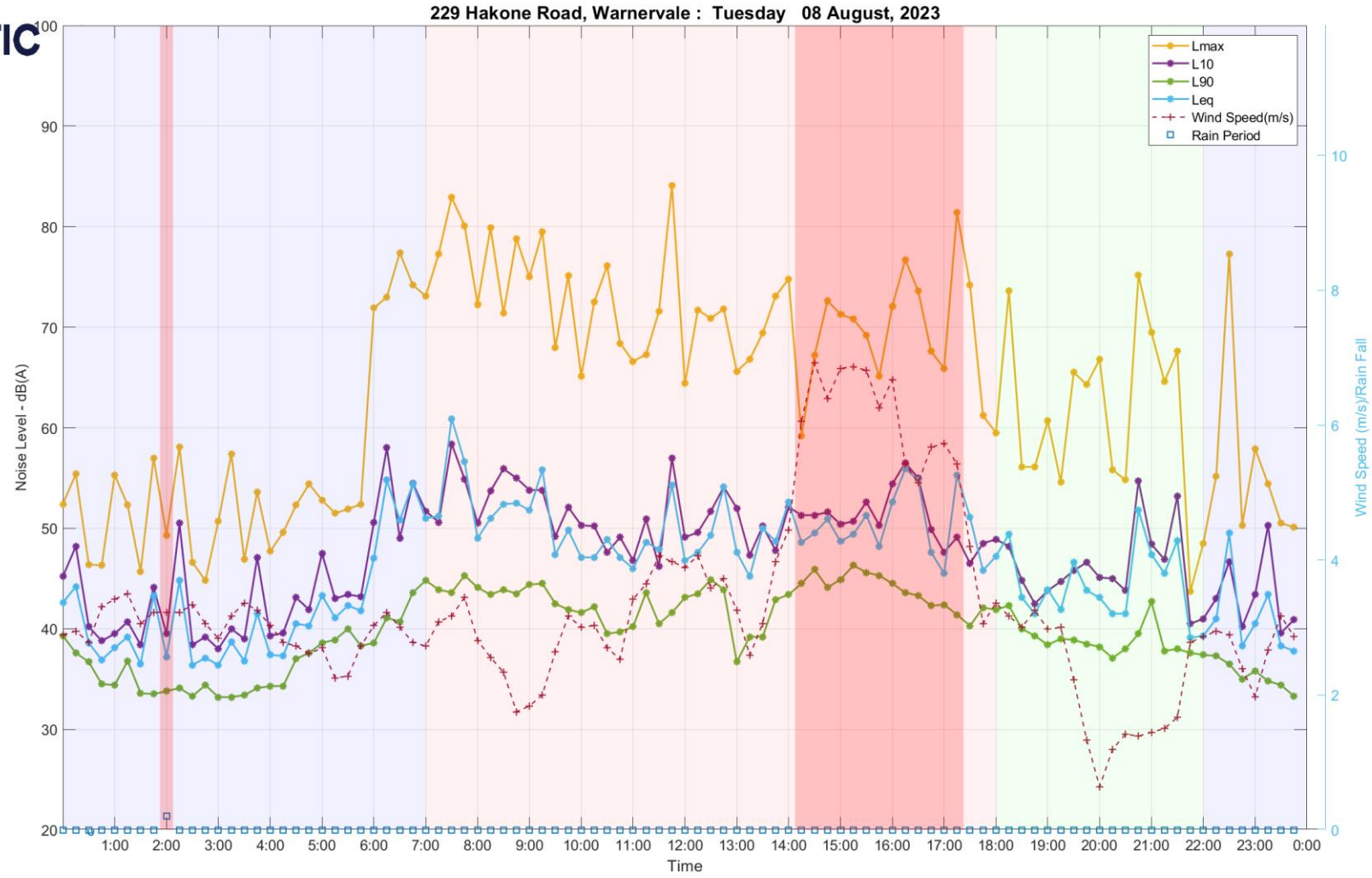
229 Hakone Road, Warnervale : Tuesday 08 August, 2023
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
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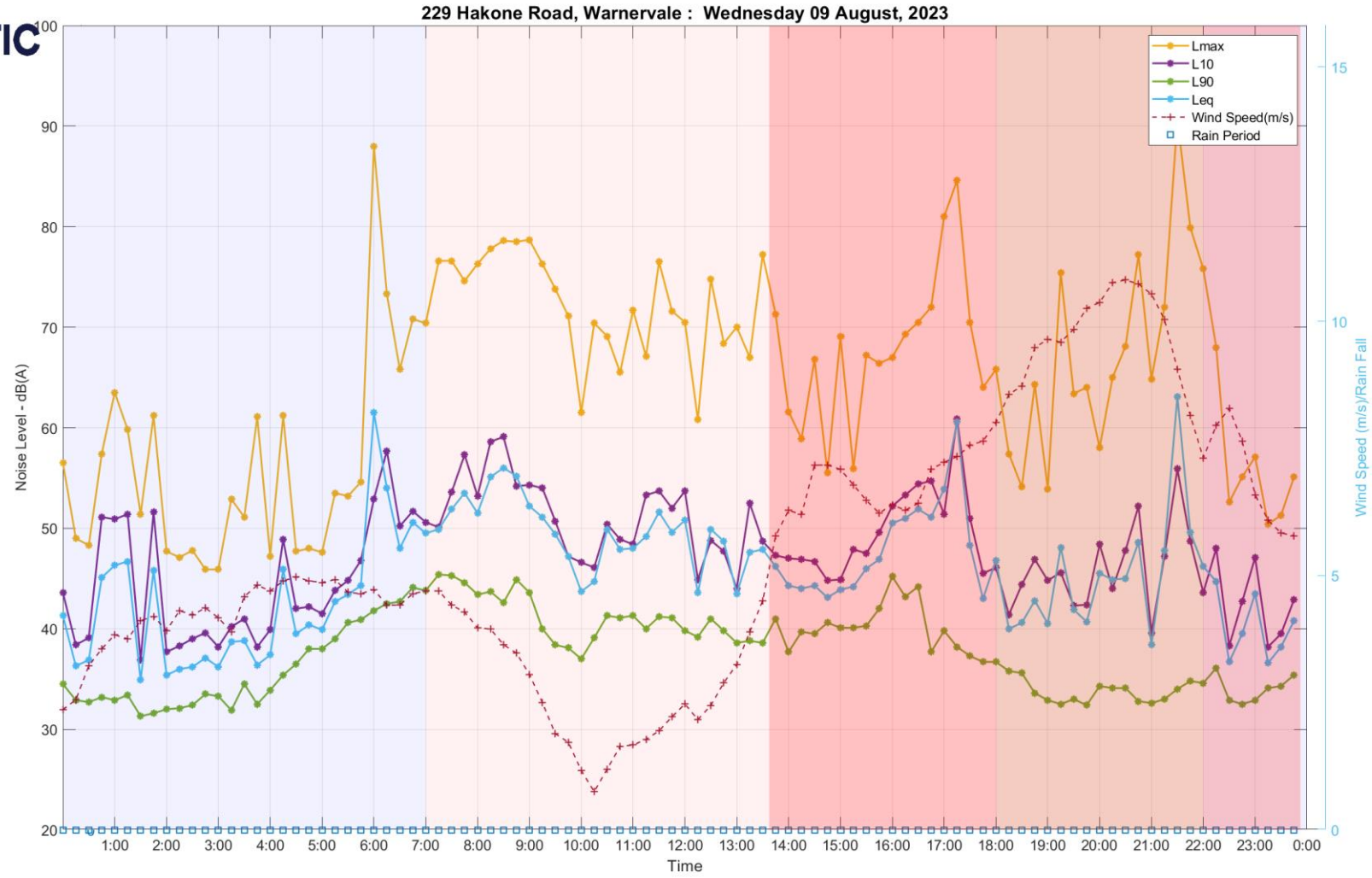
229 Hakone Road, Warnervale : Wednesday 09 August, 2023
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
70
60
50
40
30
20
15
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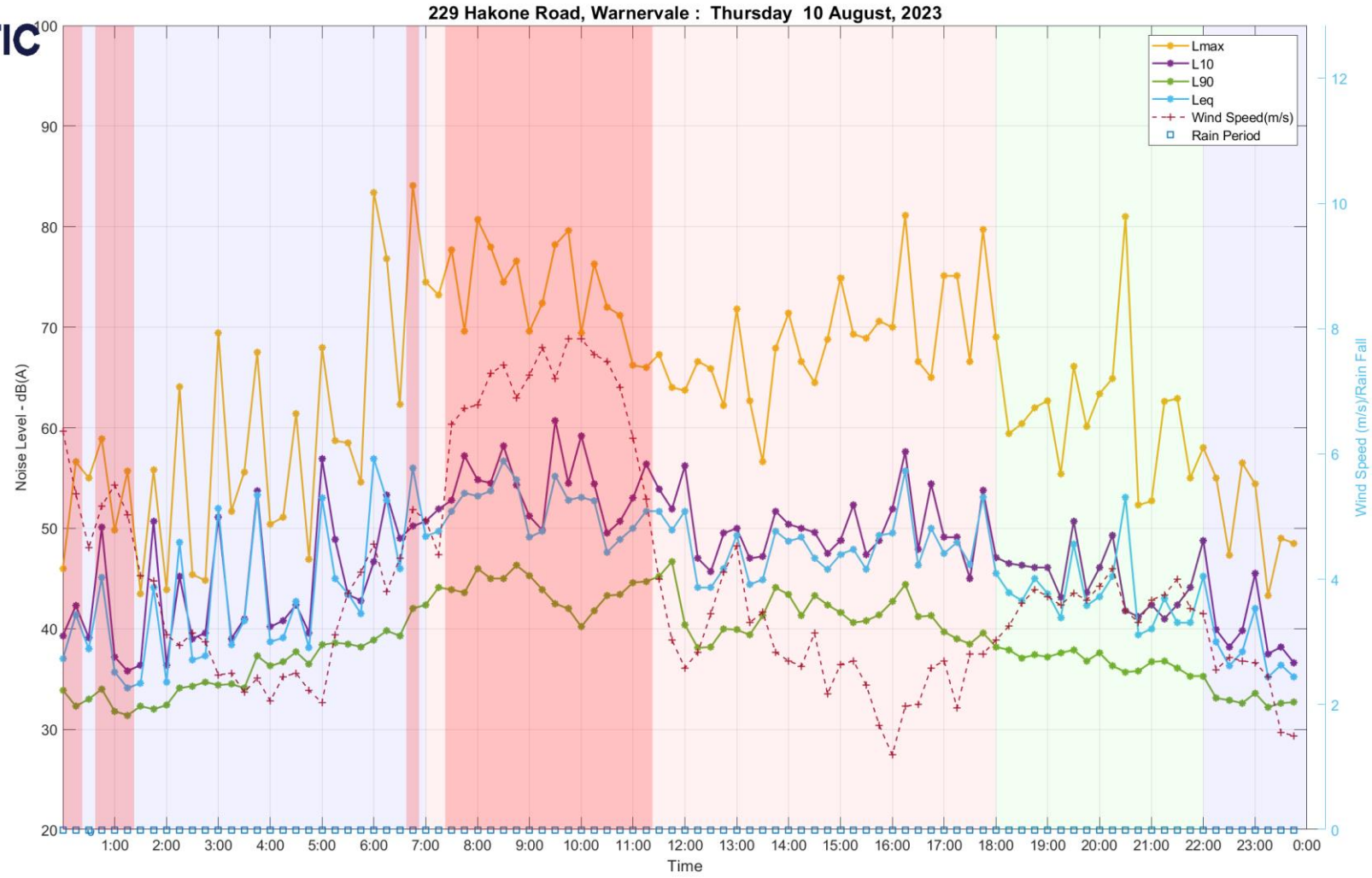
229 Hakone Road, Warnervale : Thursday 10 August, 2023
Lmax
L10
L90
Leq
Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
100
90
80
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60
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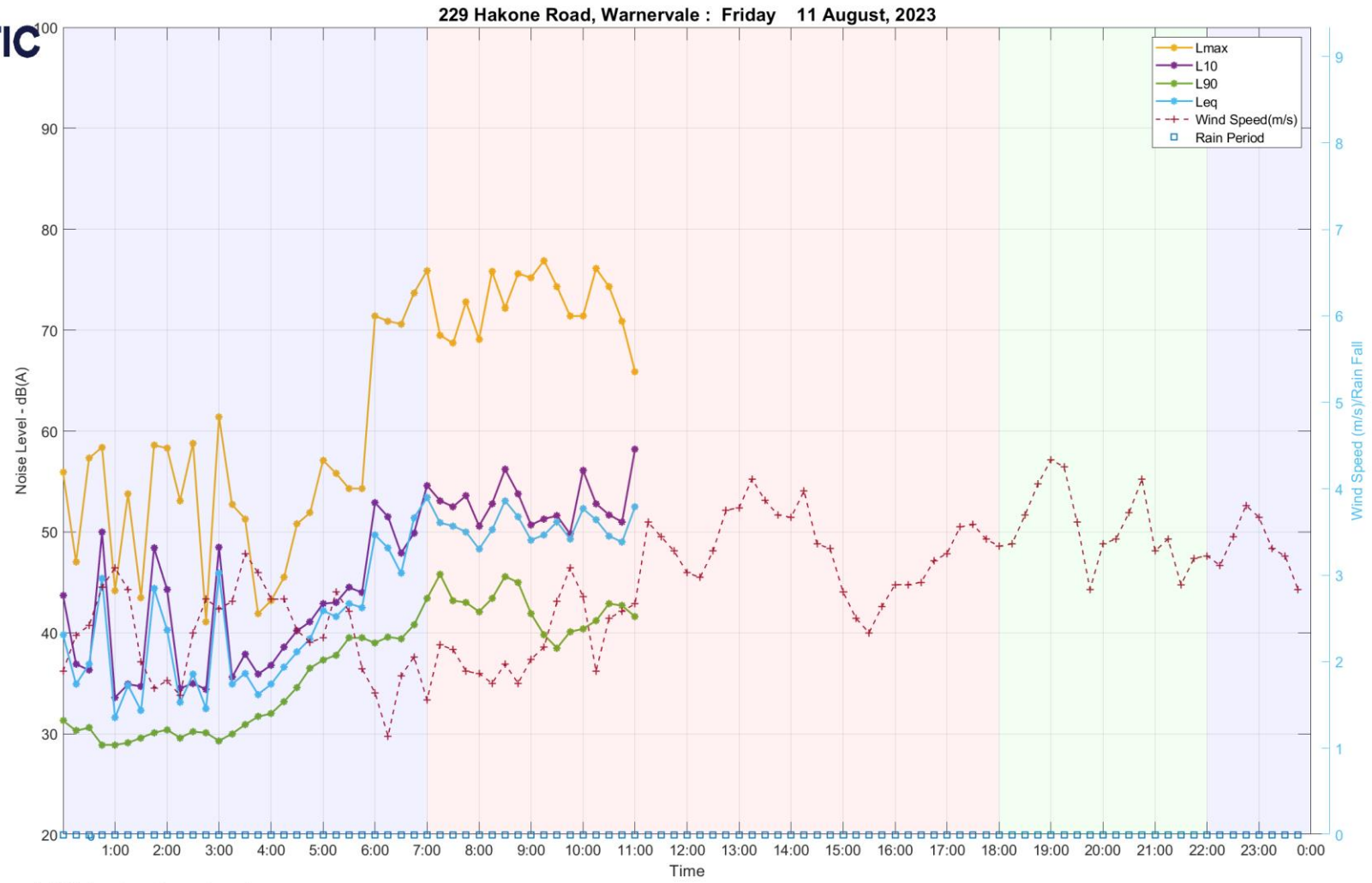

Wind Speed is corrected using factor 1.0000 based on logger location