

Wahroonga Stage 2

Noise and Vibration Impact Assessment

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1 INTRODUCTION

This report has been prepared for the submission to the Department of Planning and Environment (DPE) in support of a State Significant Development Application (SSD-45121248) for the redevelopment of part of the site at 4-12 Neringah Avenue South, Wahroonga for the purposes of delivering additional community health services, seniors housing, as well as upgraded palliative care facilities that will contribute to the broader operation of 'Neringah Hospital.

Specifically, this report will:

- Address relevant local council, State and Australian Standard noise and vibration criteria, applicable to the subject proposal.
- Conduct an external noise (traffic) impact assessment and recommend acoustic treatments to ensure that a reasonable level of amenity is achieved for future occupants of the site.
- Identify potential noise generating sources associated with the subject proposal and determine relevant noise emission goals, ensuring that nearby developments are not adversely impacted by the subject proposal. Conduct an assessment of operational noise emissions (mechanical plant noise in principle).
- Identify nearby noise and vibration sensitive receivers and conduct an assessment of potential noise and vibration impacts resulting from the proposed construction methodology.

The subject site, local context and proposed re-development are indicated in Figures 1 and 2.

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

2 REFERENCED DOCUMENTS AND GUIDELINES

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

- *'State Environmental Planning Policy (Infrastructure & Transport) 2021'* as amended (I&TSEPP).
- NSW Department of Planning document – *'Developments near Rail Corridors or Busy Roads – Interim Guideline'* ("DNRCBR") 2008
- NSW Environmental Protection Authority (EPA) document – *'Noise Policy for Industry'* ("NPfI") 2017
- NSW Environmental Protection Authority (EPA) document – *'Interim Construction Noise Guideline'* ("ICNG") July 2009
- Secretary's Environmental Assessment Requirements (SEARS) document for SSD-45121248
- Architectural drawings prepared by Bickerton Masters Architecture, dated 9th November 2022.
- The traffic and parking impact assessment report prepared by McLaren Traffic Engineering & Road Safety Consultants (ref: 220413.01DB, dated 1st November 2022).

3 ADDRESSED REQUIREMENTS OF SEARS

This report has been prepared to address the requirements detailed in the Secretary's Environmental Assessment Requirements (SEARS) for application number SSD-45121248 and accompanies the Environmental Impact Statement (EIS) in support of the SSD application. The relevant item has been reproduced within this report, as follows:

"12. Noise and Vibration

- *Provide a noise and vibration assessment prepared in accordance with the relevant NSW Environmental Protection Authority (EPA) guidelines. The assessment must detail construction and operational noise and vibration impacts on nearby sensitive receivers and structures and outline the proposed management and mitigation measures that would be implemented"*

4 SITE DESCRIPTION AND THE PROPOSAL

The proposal to re-develop the Neringah Seniors Housing and Hospital, located at 4-12 Neringah Avenue South, Wahroonga is for the purposes of delivering additional health services, aged care and seniors housing, that will contribute to the broader operation of 'Neringah Hospital.' The extent of the redevelopment is shown in Figure 2 below.

Specifically, this SSDA seeks approval for the "Stage 2" works, which comprise of the following:

- Site preparation works comprising:
 - Demolition of the Neringah Hospital building, kiosk, and existing at-grade carparks
 - Clearing of existing vegetation on the proposed development areas
 - Bulk earthworks including basement excavation; and
 - Remediation works where necessary across the site.
- Construction and use of an integrated seniors housing and health services facility across two buildings ranging from 4-5 storeys above ground, comprising:
 - Basement level containing minimum 130 car parking spaces and service dock
 - 12 residential aged care facility beds extension to existing Stage 1
 - 18 palliative care hospice beds (Schedule 3 health services facility)
 - Community healthcare services, including outpatient palliative care, centre for positive aging and Hammond at Home;
 - 57 seniors housing dwellings;
 - On-site administration, amenities, and ancillary operations spaces.
- Ground level and on-building landscaping works, including the provision of a through site pedestrian link connecting Archdale Park and Balcombe Park;
- Public domain works, specifically, regrading of part of the pedestrian walkway known as 'Archdale Walk' to provide accessible connection; and
- Extension and augmentation of infrastructure and services as required.

4.1 NEAREST SENSITIVE RECEIVERS

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

Table 1 – Nearest Sensitive Receivers

Receiver (Refer to Figure 1)	Land Use	Comment
R1	Residential	Multi-storey residential receiver along the northern boundary of the subject site at 14 Neringah Avenue South, Wahroonga.
R2		Multi-storey residential receivers along the north-eastern boundary of the subject site at 7-11 Neringah Avenue South, Wahroonga.
R3		Multi-storey residential receivers along the north-eastern boundary of the subject site at 1-3 Neringah Avenue South and 1625 Pacific Highway, Wahroonga.
R4		Two-storey residential receiver along the north-eastern boundary of the subject site at 1 Woonona Avenue Wahroonga.
R5		Multi-storey residential receivers along the south-western boundary of the subject site at 2 Woonona Avenue Wahroonga.
R6		Two-storey residential receiver along the western boundary of the subject site at 14 Woonona Avenue Wahroonga.
R8		Two-storey residential receiver along the north-western boundary of the subject site at 18 Woonona Avenue Wahroonga.
R9		Multi-storey residential receivers along the north-western boundary of the subject site at 15-17 Woonona Avenue Wahroonga.
C1	Commercial	Multi-storey commercial blocks along the north-eastern boundary of the subject site at 6-8 Warwilla Avenue Wahroonga.
Wahroonga Reservoir	Water Reservoir	Sydney Water Wahroonga Reservoir, to the south of the subject site.

4.2 ENVIRONMENTAL NOISE AND VIBRATION SOURCES

The following significant environmental noise sources have been identified:

- Traffic noise from Pacific Highway which is located south of the subject site
- Noise from adjacent land uses.



Figure 1: Site Map (Source: NSW Six Maps)

- | | |
|--|---|
| Subject Site – Wahroonga Stage 2 | Residential Receiver |
| Existing Wahroonga Stage 1 | Commercial Receiver |
| Unattended noise measurement locations | Sydney Water Wahroonga Reservoir |
| Attended noise measurement locations | |



Figure 2- Proposed Redevelopment Master Plan

5 AMBIENT NOISE MONITORING

Monitoring has been undertaken to obtain the following data:

- Background noise levels at the surrounding residential properties.
- Traffic noise levels impacting the proposed site.
- Noise levels generated by adjacent land uses.

Figure 1 above shows the monitoring locations used.

5.1 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.

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

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).

L₉₀ – 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 L₉₀ 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 L₉₀ level.

L₁₀ 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.

L₁ is sometimes used in place of L_{max} to represent a typical noise level from a number of high level, short term noise events.

5.2 UNATTENDED LONG TERM NOISE MONITORING

5.2.1 Monitoring Equipment

Unattended noise monitoring was conducted using the following monitors:

- Acoustic Research Laboratories Pty Ltd Ngara (Type 1)
- Rion NL-42 (Type 2)

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.

5.2.2 Monitoring Location & Period

Unattended noise monitoring was carried out at two locations, north and south of the subject site, away from any extraneous noise source (i.e., traffic noise, mechanical plant etc.) to specifically obtain existing ambient and background noise levels representative of the nearest affected noise receivers.

Unattended noise monitoring was conducted from Tuesday 5th of July 2022 to Monday 18th of July 2022.

5.2.3 Calculated Noise Levels

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 A and B contain the data collected, the periods identified as being affected by adverse weather conditions or extraneous noise have been omitted from the calculation (as defined by NPfI Fact Sheet B).

Weather data was obtained from records provided by the Bureau of Meteorology for the weather station located in Parramatta.

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

Representative traffic noise levels have been calculated using the guidelines in the NSW EPA Road Noise Policy.

The following table summarises the rating background noise levels determined for the day, evening and night in each monitoring location.

Table 2 – Measured Rating Background Noise Levels (RBL)

Monitor	Time of day	Rating Background Noise Level dB(A)_{L90(Period)}
Location 1 (North of the site, refer to Figure 1)	Day (7am – 6pm)	44
	Evening (6pm – 10pm)	42
	Night (10pm – 7am)	35
Location 2 (South of the site, refer to Figure 1)	Day (7am – 6pm)	45
	Evening (6pm – 10pm)	43
	Night (10pm – 7am)	38

The following table summarises the ambient/traffic noise levels determined for the day and night periods (as per the EPA's RNP) in each monitoring location.

Table 3 – Measured Ambient/Traffic Noise Levels

Monitor	Time of day	Traffic Noise Level dB(A) L_{Aeq}(period)
Location 1 (North of the site, refer to Figure 1)	Day (7am – 10pm)	52 dB(A) L _{eq} (15hr)
	Night (10pm – 7am)	46 dB(A) L _{eq} (9hr)
Location 2 (South of the site, refer to Figure 1)	Day (7am – 10pm)	52 dB(A) L _{eq} (15hr)
	Night (10pm – 7am)	48 dB(A) L _{eq} (9hr)

5.3 ATTENDED SHORT TERM NOISE MEASUREMENTS

5.3.1 Measurement Equipment

Attended noise monitoring was conducted using a Norsonic N-140 Type 1 sound level meter.

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.

5.3.2 Measurement Locations & Period

The measurement locations are indicated in Figure 1 and are described below:

- Measurement 1: At the corner of Neringah Avenue and Pacific Highway, 180° view of Pacific Highway, approx. 9m from nearest road kerb
- Measurement 2: At Logger Location 1
- Measurement 3: Stage 1 development location

Attended noise measurements were undertaken between 11:00am and 12:00pm on Monday 18th of May 2022

5.3.3 Measured Results

Table 4 – Attended Short-Term Noise Measurements

Measurement Location	Time & Period	Measured Noise Level – dB(A)
Measurement 1 At the corner of Neringah Avenue and Pacific Highway, 180° view of Pacific Highway, approx. 9m from road kerb	Monday, 18 th May 2022, between 11:00am and 11:15am	69 dB(A) _{Leq(15-min)} 61 dB(A) _{L90(15-min)}
Measurement 2 At Logger Location 1	Monday, 18 th May 2022, between 11:15am and 11:30am	49 dB(A) _{Leq(15-min)} 47 dB(A) _{L90(15-min)}
Measurement 3 Stage 1 Development Location	Monday, 18 th May 2022, between 11:30am and 11:45am	50 dB(A) _{Leq(15-min)} 46 dB(A) _{L90(15-min)}

6 EXTERNAL NOISE INTRUSION ASSESSMENT

An assessment of traffic noise impacts to the proposed re-development has been undertaken to determine complying constructions to achieve the internal noise levels requirements of the following acoustic noise criteria and standards:

- 'State Environmental Planning Policy (Infrastructure & Transport) 2021' as amended (I&TSEPP).
- NSW Department of Planning document – 'Developments near Rail Corridors or Busy Roads – Interim Guideline' ("DNRCBR") 2008

6.1 NOISE INTRUSION CRITERIA

6.1.1 'State Environmental Planning Policy (Infrastructure & Transport) 2021' as amended (I&TSEPP)

"2.99 Impact of rail noise or vibration on non-road development

- a) This section applies to development for any of the following purposes that is on land in or adjacent to a rail corridor and that the consent authority considers is likely to be adversely affected by rail noise or vibration –*
- a) Residential accommodation,*
 - b) A place of worship*
 - c) A hospital*
 - d) An educational establishment or centre-based child care facility."*

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

- (1) This section applies to development for any of the following purposes that is on land in or adjacent to the road corridor for a freeway, a tollway or a transitway or any other road with an annual average daily traffic volume of more than 20,000 vehicles (based on the traffic volume data published on the website of TfNSW) and that the consent authority considers is likely to be adversely affected by road noise or vibration –*
- a) Residential accommodation,*
 - b) A place of worship*
 - c) A hospital*
 - d) An educational establishment or centre-based child care facility."*

The North Shore rail line is located approx. 160m north-east of the subject site.

Pacific Highway is located approx. 60m south of the subject site and from reviewing the traffic volume data published by Transport for NSW (TfNSW), this roadway carries annual daily traffic volume of approx. 50,000.

6.1.2 NSW Department of Planning document – ‘Developments near Rail Corridors or Busy Roads – Interim Guideline’ (“DNRCBR”) 2008

Table 3.1 of the DNRCBR nominate the following noise criteria applicable to the development:

Table 5 – DNRCBR Internal Noise Level Criteria

Type of Occupancy	Room	Internal Noise Level – dB(A) $L_{eq}(\text{period})$
Residential (Seniors Living)	Sleeping Areas (bedroom)	35 dB(A) $L_{eq}(9\text{hr})$
	Other habitable rooms (excl. garages, kitchens, bathrooms & hallways)	40 dB(A) $L_{eq}(15\text{hr})$
Hospitals	Wards	35 dB(A) L_{eq} (maximum)
	Other noise sensitive areas	45 dB(A) L_{eq} (maximum)

6.2 EVALUATION OF NOISE INTRUSION

Traffic noise from Pacific Highway intruding on the development has been assessed using the formulated traffic noise levels and the CoRTN noise model. Calculations were undertaken taking into account the orientation of windows, barrier effects (if applicable), façade transmission loss and room absorption characteristics. In this way, the likely internal noise levels can be predicted. Below presents the constructions required to comply with the internal noise level criteria determined in Section 5.1.

6.2.1 Complying Constructions

6.2.1.1 Glazing Construction

The following glazing construction will comply with the internal noise level criteria outlined above. Aluminium framed/sliding glass doors and windows will be satisfactory provided that they meet the following specification. All external windows and doors nominated are required to be fitted with Q-Ion type acoustic seals – **Note: Mohair seals are not considered acoustic seals.** Thicker glazing may be required for structural, thermal, safety or other purposes. Where this is required, this will also be acoustically acceptable.

Table 6 – Minimum Complying Glazing Construction

Façade	Area	Glazed Element	Complying Construction	Acoustic Seals
All Façades	All Areas	All Glazed Doors and Windows	6mm float/toughened	Yes

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

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

Table 7 – Minimum R_w of Glazing Assembly (with Acoustic Seals)

Glazing Assembly	Minimum R_w of Installed Glazing System
6mm float/toughened	R_w 29

6.2.1.2 External Wall Construction

External walls are proposed to be of a concrete or masonry construction and therefore, will not require further acoustic upgrading.

In the event where light-weight materials are proposed, it is to be reviewed by the project Acoustic Consultant to ensure that the internal noise levels can be achieved.

6.2.1.3 External Roof/Ceiling Construction

The external roof is proposed to be of a concrete or masonry construction and therefore, will not require further acoustic upgrading.

In the event where light-weight materials are proposed, it is to be reviewed by the project Acoustic Consultant to ensure that the internal noise levels can be achieved.

6.2.1.4 Ventilation Requirements

With respect to natural ventilation to the development, the DNRCBR dictates:

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

With windows open, the allowable internal noise goal is permitted to be 10 dB(A) higher than when the windows are closed (i.e., - allowable internal noise level in bedrooms become 45 dB(A) and 50 dB(A) in living rooms).

All facades are anticipated to achieve the internal noise goals for natural ventilation with windows open.

7 NOISE EMISSIONS ASSESSMENT

An assessment of potential noise emissions from the development has been conducted in accordance with the following criteria.

This assessment will review noise emissions associated with the following areas of the development.

- Use of the loading dock
- Use of the driveway/carpark spaces
- Mechanical plant (in principle).

7.1 NOISE EMISSION CRITERIA

7.1.1.1 NSW Environmental Protection Authority (EPA) document – ‘Noise Policy for Industry’ (“NPfI”) October 2017

The *Noise Policy for Industry (NPfI)* provides a methodology for assessing the need for noise mitigation:

- Determine project specific “trigger” levels.
- Predict noise emissions to surrounding properties and assess against the trigger levels.
- Noise mitigation should be assessed when the predicted noise emissions exceed the trigger levels.

In this assessment, the trigger levels determined using the *NPfI* will be adopted as assessment criteria for permanent plant and equipment.

Project specific noise “trigger” levels are determined based on the land use impacted, ambient noise environment and the time of day.

The EPA *NPfI* has three sets of criteria which are all required to be satisfied, namely “intrusiveness”, “amenity” and “maximum noise levels”. Intrusiveness and amenity are generally assessed at the most affected part of the property, or at the balcony or façade of an apartment or upper level of residence. Maximum noise levels are generally assessed outside bedroom windows.

The derivation of the project specific trigger levels is discussed in the subsequent sections.

7.1.1.1.1 Intrusiveness Criteria

The guideline is intended to limit the audibility of noise emissions at residential receivers only. Noise emissions measured using the L_{eq} descriptor should not exceed the background noise level by more than 5dB(A). Where applicable, the intrusive noise level should be penalised (increased) to account for any annoying characteristics such as tonality (in accordance with Fact Sheet C of the Policy).

Intrusiveness criteria have been determined using the background noise levels in Section 5.2 and are summarised in table 7.

Table 8 – Intrusiveness Criteria

Location	Period/Time	Intrusiveness Noise Emission Trigger Level – dB(A) $L_{eq}(15min)$
Residential Receivers to the North	Day (7am – 6pm)	49
	Evening (6pm – 10pm)	47
	Night (10pm – 7am)	42
Residential Receivers to the South	Day (7am – 6pm)	50
	Evening (6pm – 10pm)	48
	Night (10pm – 7am)	41

7.1.1.1.2 Amenity Criteria

The guideline is intended to limit the absolute noise level from all “industrial” noise sources so that it is consistent with the general environment.

Table 2.2 of the *NPfI* sets out acceptable noise levels for various land uses.

There are 3 categories for residential receivers - rural, suburban, urban. This subject site is most appropriately categorised as ‘Suburban’.

Categories for non-residential uses are also indicated in the table.

Generally, the *NPfI* requires project amenity noise levels to be calculated in the following manner:

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

The applicable amenity goals are provided in the following table.

Table 9 - Amenity Noise Levels

Type of Receiver	Time of day	Recommended Noise Level dB(A) $L_{eq}(\text{period})$	Project Amenity Noise Level dB(A) $L_{eq}(15 \text{ minute})$
Residential – Suburban	Day (7am – 6pm)	55	53
	Evening (6pm – 10pm)	45	43
	Night (10pm – 7am)	40	38
Commercial	When in Use	65	63

7.1.1.1.3 Maximum Noise Level Event Assessment

The procedure nominated in Section 2.5 of *NPfI* has been used to assess residential sleep disturbance impacts from maximum (i.e., short term) noise events. This is summarised below.

Where night time noise emissions outside a residential building exceed:

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

A detailed maximum noise level event assessment should be undertaken.

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

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

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

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

The project specific maximum noise event trigger levels are summarised in table 9.

Table 10 – Maximum Noise Level Event Trigger Levels (Night Time)

Location	$L_{eq, 15min}$ (dB(A))	L_{AFmax} (dB(A))
Residential Receivers to the North	42 dB(A)	52 dB(A)
Residential Receivers to the South	41 dB(A)	52 dB(A)

7.1.2 Traffic Generation

7.1.2.1 NSW Environmental Protection Authority (EPA) document – ‘Road Noise Policy’ (“RNP”) March 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 criteria, detailed in Table 11. This has been applied to assess the future potential acoustic impacts of increased traffic that will result from the development once it is operational.

Table 11 – Criteria for Increased Traffic Generation from the Development

Time of Day	Criteria for Acceptable Traffic Noise Level (Arterial Roads) – dB(A)
Day (7am – 10pm)	60 dB(A) _{Leq(15hr)}
Night (10pm – 7am)	55 dB(A) _{Leq(9hr)}

Given that traffic noise levels measured along Pacific currently exceed the noise levels identified in the above table, the provisions outlined in Section 3.4 of the policy will apply, as follows:

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

7.1.3 Summarised Noise Emission Criteria

The applicable assessment criteria and trigger levels are summarised in the following table. It is noted that all criteria should be satisfied.

Table 12 – Summarised Noise Emission Criteria

Receiver	Time of Day	Project Noise Trigger Level	Project Sleep Emergence Level
Residential Receivers to the North	Day (7am – 6pm)	49	-
	Evening (6pm – 10pm)	43	-
	Night (10pm – 7am)	38	42 dB(A) _{Leq(15-min)} 52 dB(A) _{L_AFmax}
Residential Receivers to the South	Day (7am – 6pm)	50	-
	Evening (6pm – 10pm)	43	-
	Night (10pm – 7am)	38	41 dB(A) _{Leq(15-min)} 52 dB(A) _{L_AFmax}
Commercial	When in Use	63	-

7.2 ASSESSMENT OF POTENTIAL NOISE EMISSIONS

7.2.1 Loading Dock Noise Emissions

Operational noise from the use of the loading dock must comply with the criteria noted in Section 7.1 above.

This assessment has been conducted based on the following operational scenarios:

- The loading dock will allow for 24-hour operation. We note that the loading dock will be utilised by small vans, pathology, ambulance and funeral hearse, as well as for waste collection. It is expected that waste collection within the loading dock will occur between 7am and 6pm, Monday to Saturday and 8am to 6pm on Sundays.
- The loading dock during waste collection activity is to be only occupied by medium rigid vehicles (MRV). Medium rigid vehicles are those considered as vehicles with two axles and six tires, with a gross vehicle weight greater than 4.5t but less than 12t.
- A maximum of four vehicles per hour has been modelled, which corresponds to 1 in a single 15-minute period.
- All vehicles are to enter and exit from Neringah Avenue South.
- The loading dock is partially enclosed, with a "Green Lid" to minimise noise exposure to the nearest affected receivers.

7.2.1.1 Adopted Modelling Parameters

Based on the above scenario, the following modelling parameters will be utilised to determine the predicted noise levels from the operation of the loading dock.

- A sound power level of 91 dB(A) has been adopted for the manoeuvring of a medium-rigid vehicle at low speed.
- A sound power level of 96 dB(A) has been adopted for the reversing of a medium-rigid vehicle at low speed.
- A sound power level of 84 dB(A) has been adopted for the manoeuvring of passenger vehicles and vans at low speed.
- The recommendations outlined in Section 8 have been incorporated.

7.2.1.2 Predicted Noise Levels

Table 13 – Predicted Noise Levels to Residential Receivers (Medium-Rigid Vehicle Movements)

Receiver	Predicted Noise Level	Criteria	Compliance
R1	47	49 Residential Day-time Period (7am – 6pm)	Yes
R2	40		Yes
R3	35		Yes
R4	<30	50 Residential Day-time Period (7am – 6pm)	Yes
R5	<30		Yes
R6	<30		Yes
R7	<30	49 Residential Day-time Period (7am – 6pm)	Yes
R8	<30		Yes
R9	<30		Yes
C1	<30	63 Commercial Receivers (When in Use)	Yes

Table 14 – Predicted Noise Levels to Residential Receivers (Hearses & Vans)

Receiver	Predicted Noise Level	Criteria	Compliance
R1	38	38 Residential Night-time Period (10pm – 7am)	Yes
R2	30		Yes
R3	<30		Yes
R4	<30	38 Residential Night-time Period (10pm – 7am)	Yes
R5	<30		Yes
R6	<30		Yes
R7	<30	38 Residential Night-time Period (10pm – 7am)	Yes
R8	<30		Yes
R9	<30		Yes
C1	<30	63 Commercial Receivers (When in Use)	Yes

7.2.2 Noise Generated by Additional Traffic

Regarding potential traffic noise generation, the following is noted:

- The site is currently an existing aged care facility and hospital which generates a low level of traffic to the surrounding roadways.
- There are no future planned road upgrades for the surrounding roadways which bound the site.
- Given that the noise levels from the surrounding roadways currently exceed those recommended by the RNP, a 2 dB(A) increase in traffic noise level is allowed for.

To achieve a 2 dB(A) increase, the existing total traffic volume would need to increase by at least two-thirds. Given that the estimate traffic generation totals to 28 trips during both AM and PM peak periods, it is concluded that the proposed development would not noticeably change noise generated by traffic on surrounding roadways.

7.2.3 Mechanical Plant (In Principle)

The design and selection of plant has not been undertaken but would generally consist of carpark ventilation plant, air conditioning condensing units (typically on balconies), bathroom ventilation fans (which would typically be small fans located internally) and miscellaneous ventilation fans.

From reviewing the architectural plans prepared by Bickerton Masters, it is expected that most major plant items would be located in an isolated plant room (either on basement or roof levels). Additionally, it is expected that most major plant items would typically discharge at the roof of the development – which is considered to be the furthest away from any nearest external receivers.

The plant would be selected to meet the noise levels required by the noise limits indicated above, and where required would be treated by enclosing the equipment, treating ducting, acoustic louvres, as required to meet limit noise emissions.

Designers should have regard for the fact that allowances should be made in respect of plant locations to minimise impacts on sensitive receivers and to provide sufficient space to incorporate treatment to plant areas to meet the above guidelines.

8 OPERATIONAL RECOMMENDATIONS & MANAGEMENT CONTROLS

In order to achieve compliance with the noise emission criteria outlined in Section 7.1, the following recommendations and management controls are to be incorporated:

- Waste collection within the loading dock is to occur between 7am and 6pm, Monday to Saturday and 8am to 6pm on Sundays only.
- The loading dock during waste collection activity is to be only occupied by medium rigid vehicles (MRV). Medium rigid vehicles are those considered as vehicles with two axles and six tires, with a gross vehicle weight greater than 4.5t but less than 12t.
- MRVs are to switch off engines whilst unloading and loading within the loading dock.
- All vehicles are to enter and exit from Neringah Avenue South.
- Speed humps are to be avoided along driveway and within loading dock.
- Loading dock floor to be of a broom finish to avoid excess tire squeal.

9 CONSTRUCTION NOISE AND VIBRATION ASSESSMENT

An assessment of construction noise and vibration impacts during the construction of the re-development has been undertaken. The assessment includes:

- Identification of the noise and vibration guidelines which will be applicable to this project
- Identification of potentially affected nearby sensitive receivers
- Identification of likely noise sources and vibration generating activities and predicted noise levels at nearby receivers.
- Formulation of a strategy to address the guidelines identified including mitigation treatments.

Whilst a detailed construction staging program is yet to be finalised, construction work (and the associated typical loudest plant/equipment) for the re-development would be expected to comprise of:

- Demolition of existing structures and bulk excavation work. This would typically include excavators with bucket and pneumatic hammer attachments, circular saws, powered hand tools, etc.
- Erection of new building structure. This would typically include powered hand tools for formwork, concrete pumps and vibratory equipment, etc.
- Internal fit out works
- Associated landscaping work.

Standard work hours have been assumed as detailed in the NSW EPA's *Interim Construction Noise Guideline* (ICNG), as detailed:

- Monday to Friday: 7am to 6pm
- Saturday: 8am to 1pm
- Sundays and/or Public Holidays: No work

9.1 NOISE AND VIBRATION GUIDELINES

9.1.1 NSW Environmental Protection Authority (EPA) document – ‘Interim Construction Noise Guideline’ (“ICNG”) July 2009

The NSW EPA’s ICNG assessment requires:

- Determination of noise management levels (based on ambient noise monitoring)
- Review of generated noise levels at nearby development
- Recommendation of noise control strategies when noise management levels are exceeded.

The ICNG adopts differing strategies for noise management depending on the predicted noise level at the nearest residential receivers:

- “*Noise affected*” level. Where construction noise is predicted to exceed the “*noise affected*” level at a nearby residence, the proponent should take reasonable/feasible work practices to ensure noise is effectively managed to the “*noise affected*” level. For residential properties, the “*noise affected*” level occurs when construction noise exceeds the ambient noise levels by more than 10 dB(A)_{Leq(15-min)}
- “*Highly noise affected*” level. Where construction noise emissions are such that nearby properties/receivers are “highly noise affected”, noise controls such as respite periods should be considered. For residential properties, the “highly noise affected” level occurs when construction noise exceeds 75 dB(A)_{Leq(15-min)} at nearby residences.

Additionally, the ICNG adopts appropriate noise management levels depending on the nearest sensitive non-residential land uses. These are summarised in Table 3 of the guideline.

A summary of the appropriate noise management levels stipulated by the ICNG relating to the nearest sensitive receivers are presented in the table below.

Table 15 – ICNG Construction Noise Management Levels (Residential)

Receiver	“ <i>Noise Affected</i> ” Level – dB(A) _{Leq(15-min)}	“ <i>Highly Noise Affected</i> ” Level – dB(A) _{Leq(15-min)}
Residential Receivers to the North	49	75
Residential Receivers to the South	50	

Table 16 – ICNG Construction Noise Management Levels (Non-Residential)

Receiver	Land Use	Management Level – dB(A) _{Leq(15-min)}
C1	Commercial	70 (Externally)

9.1.2 German Standard DIN4150-3 (2016-12) 'Structural Vibration: Effects of Vibration on Structures'

German Standard DIN 4150-3 (2016-12) provides vibration velocity guidelines for use in evaluation the effects of vibration on structures. The vibration levels presented in the standard are detailed in the following table.

It is noted that the peak particle velocity is the value of the maximum of any of the three orthogonal component particle velocities as measured at the foundation, and the maximum levels measured in the x- and y-horizontal directions in the plane of the floor of the uppermost storey.

Table 17 – DIN 4150-3 (2016-12) Safe Limits for Building Vibration

TYPE OF STRUCTURE		PEAK PARTICLE VELOCITY (mms ⁻¹)				
		At Foundation at a Frequency of			Plane of Floor of Uppermost Storey	Floor Slabs, Vertical Direction
		< 10Hz	10Hz to 50Hz	50Hz to 100Hz	All Frequencies	All Frequencies
1	Buildings used in commercial purposes, industrial buildings, and buildings of similar design	20	20 to 40	40 to 50	40	20
2	Dwellings and buildings of similar design and/or use	5	5 to 15	15 to 20	15	20
3	Structures that because of their particular sensitivity to vibration, do not correspond to those listed in Lines 1 or 2 and have intrinsic value (e.g., buildings that are under a preservation order)	3	3 to 8	8 to 10	8	20

9.1.3 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 18 – EPA Recommended Vibration Criteria

		RMS acceleration (m/s²)		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

9.2 ACTIVITIES TO BE CONDUCTED AND THE ASSOCIATED NOISE SOURCES

For this project, the most significant sources of noise or vibration expected to be generated during construction will be demolition and building structure. The following table presents assessment noise levels for typical construction equipment expected to be used during these activities.

Table 19 – Sound Power Levels of Typical Construction Equipment

Construction Stage	Equipment/Process	Sound Power Level – dBA(A)
Demolition & Excavation	Excavator with bucket attachment	105
	Excavator with pneumatic hammer attachment	115
	Circular Saws	105
	Electric Hammer	105
Erection of Structure	Concrete Pump	110
	Concrete Vibrator	110
	Trucks	105
	Site Crane	105
General & Landscaping	Bobcat	105
	Powered Hand Tools	100

Table Notes:

1. The noise levels presented in the above table are derived from the following sources, namely:
 - a. Table A1 of Australian Standards AS2436-2010
 - b. Data held by this office from other similar studies.

9.3 PREDICTED CONSTRUCTION NOISE LEVELS

The predicted noise levels during construction work will depend on:

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

Predicted construction noise levels are presented in the following tables. Predictions take into account the expected noise reduction as a result of distance only.

Table 20 – Predicted Construction Noise to Residential Receiver 1, 9 and 4 (R1, R9 & R4)

Construction Stage	Equipment/Process	Predicted Noise Level – dB(A) _{Leq(15-min)}	Comment
Demolition & Excavation	Excavator with bucket attachment	50-78 (externally)	Minor exceedance of HNAML when working close to site boundary
	Excavator with pneumatic hammer attachment	60-88 (externally)	Exceedance of NAML & HNAML when working close to site boundary
	Circular Saws	55-83 (externally)	
	Electric Hammer	55-83 (externally)	
Erection of Structure	Concrete Pump	55-83 (externally)	
	Concrete Vibrator	55-83 (externally)	
	Site Crane	50 (externally)	Minor exceedance of NML
	Trucks	50-78 (externally)	Exceedance of NAML & HNAML when working close to site boundary
General & Landscaping	Bobcat	50-78 (externally))	Exceedance of NAML & HNAML when working close to site boundary
	Powered Hand Tools	45-73 (externally)	

Table 21 – Predicted Construction Noise to Residential Receiver 2 & Receiver 3 (R2 & R3)

Construction Stage	Equipment/Process	Predicted Noise Level – dB(A)_{Leq(15-min)}	Comment
Demolition & Excavation	Excavator with bucket attachment	48-64 (externally)	Exceedance of NAML when working close to site boundary
	Excavator with pneumatic hammer attachment	58-74 (externally)	Exceedance of NAML & HNAML when working close to site boundary
	Circular Saws	53-69 (externally)	
	Electric Hammer	53-69 (externally)	
Erection of Structure	Concrete Pump	53-69 (externally)	
	Concrete Vibrator	53-69 (externally)	
	Site Crane	48 (externally)	Within NAML & HNAML
	Trucks	48-64 (externally)	Within NAML & HNAML
General & Landscaping	Bobcat	48-64 (externally)	Within NAML & HNAML
	Powered Hand Tools	43-59 (externally)	

Table 22 – Predicted Construction Noise to Residential Receiver 5, 6, 7 & 8 (R5, R6, R7 & R8)

Construction Stage	Equipment/Process	Predicted Noise Level – dB(A) $L_{eq(15-min)}$	Comment
Demolition & Excavation	Excavator with bucket attachment	48-56 (externally)	Exceedance of NAML when working close to site boundary
	Excavator with pneumatic hammer attachment	58-66 (externally)	Exceedance of NAML & HNAML when working close to site boundary
	Circular Saws	53-61 (externally)	
	Electric Hammer	53-61 (externally)	
Erection of Structure	Concrete Pump	53-61 (externally)	
	Concrete Vibrator	53-61 (externally)	
	Site Crane	48 (externally)	Within NAML & HNAML
	Trucks	48-56 (externally)	Within NAML & HNAML
General & Landscaping	Bobcat	48-56 (externally)	Within NAML & HNAML
	Powered Hand Tools	43-51 (externally)	

Table 23 – Predicted Construction Noise to Commercial Receivers (C1)

Construction Stage	Equipment/Process	Predicted Noise Level – dB(A) $L_{eq(15-min)}$ ¹	Comment
Demolition & Excavation	Excavator with bucket attachment	48-64 (externally)	Within NML
	Excavator with pneumatic hammer attachment	58-74 (externally)	Minor exceedance of NML
	Circular Saws	53-69 (externally)	Within NML
	Electric Hammer	53-69 (externally)	Within NML
Erection of Structure	Concrete Pump	53-69 (externally)	Within NML
	Concrete Vibrator	53-69 (externally)	Within NML
	Site Crane	48 (externally)	Within NML
	Trucks	48-64 (externally)	Within NML
General & Landscaping	Bobcat	48-64 (externally)	Within NML
	Powered Hand Tools	43-59 (externally)	

9.4 DISCUSSION OF NOISE IMPACTS

Without mitigation, noise at the nearest sensitive receivers will at times exceed the management levels stipulated in the ICNG.

Reasonable and feasible mitigation measures should be applied in accordance with Section 9.6 and 9.7 below.

9.5 DISCUSSION OF VIBRATION IMPACTS

Given vibration levels are typically difficult to predict, a discussion surrounding the potential vibration impacts to the nearest sensitive receivers is provided. The most intensive of vibration-generating activity likely to occur during the enabling works is during the demolition and excavation stages of the project. This largely stems from the use of pneumatic hammer attachments on excavators and the use of electric hammer drills. Given the distance from the proposed works to the nearest receivers, vibration may marginally exceed the vibration criteria outlined in Section 9.1.

To ensure vibration levels generated by such activity is appropriately managed refer to Sections 9.6, 10, 11 and 12.

In the event of strong campus reaction or scenarios where consistent exceedances of the management levels are recorded, unattended and attended vibration monitoring may be undertaken to determine the cause and effect of the activity and to provide appropriate mitigation where necessary.

9.6 GENERAL SITE RECOMMENDATIONS

Considering the above, the following recommendations should be considered:

- Where feasible for the construction process, locate noisy construction activities or items away from the nearest sensitive receivers. If possible, considerations may be given to localised noise barriers particularly when works are being carried out close to site boundaries.
- All excavation and construction equipment shall be well maintained.
- Stationed equipment shall be located as far as practicable from immediate sensitive receivers.
- Adopt quiet work methods/technologies:
 - The primary noise generating activity at the site will be during the demolition and excavation period. As much as practicable, use of quieter excavation methods is recommended.
 - Trucks should be generally located within the bounds of the site.
- Materials handling/vehicles
 - Trucks and bobcats, in general use on site, are to use a non-tonal reversing beacon where possible (subject to WHS requirements) to minimise potential disturbance of surrounding receivers.
 - Avoid careless dropping of construction materials into empty trucks.
 - Trucks, trailers, and delivery vehicles are to turn off engines when idling to reduce noise impacts (unless required for concrete pumping or similar).
- Complaint's handling:
 - An afterhours contact number is displayed outside of the building site, so that in the event that surrounding development believes that a noise breach is occurring, they may contact the site.
 - In the event of complaint, the procedures outlined in Section 8 are adopted.
- Community consultation:
 - Informing nearby receivers is typically a critical aspect in reducing the risk of complaint when it comes to construction noise. The objective in undertaking a consultation process is to:
 - Inform and educate the groups about the project and noise controls being implemented.
 - Increase understanding of all acoustic issues related to the project and options available.
 - Identify group concerns generated by the project, so they can be addressed.
 - Provide advice about the time and duration of potential noisy activities.
 - Ensure that concerned individuals or groups are aware of and have access to a Site Complaints Register which will be used to address any construction noise related problems should they arise.

10 CONSTRUCTION VIBRATION AND NOISE MONITORING

Below is an overview of the monitoring equipment that can be considered during construction work, the processes in which monitoring is located and reporting of results.

10.1 NOISE AND VIBRATION MONITORING EQUIPMENT

Noise monitoring will be conducted using Acoustic Research Laboratories noise loggers. All monitoring equipment used retains current calibration, either manufacturers' calibration or NATA certified calibration.

Vibration monitoring will be conducted using Texcel ETM type monitors with externally mounted tri-axial geophones. The geophones will be located as close as practicably possible to the location of the sensitive structure. The monitors are to be set to send an SMS message when alert levels have been exceeded at the location of the geophone.

10.2 NOISE AND VIBRATION MONITORING LOCATIONS

Noise and vibration monitoring locations are to be proposed in consultation with the principal contractor and Hammondcare.

10.3 NOISE AND VIBRATION MONITORING RESULTS

Noise and vibration monitoring can be downloaded either on site (typically during a monitoring service visit) or remotely to actively review all monitoring data recorded at each monitoring location. Relating to the vibration monitors, this will include any vibration events found to exceed the trigger levels nominated in Section 9.1.

If multiple vibration events exceeding the nominated trigger levels are recorded, all data recorded by the monitor is to be reviewed and forwarded to a nominated representative of principal contractor. From there, alternative methodologies and procedures can be explored to ensure such activity can be appropriately managed.

10.4 NOISE AND VIBRATION MONITORING PROGRAM AND REPORTING

Monitoring reports are anticipated to be provided at the completion of the monitoring period, documenting all recorded exceedances that can be reviewed by the contractor and actioned accordingly. Monitoring reports will detail the location of all monitors within the vicinity of the site (inclusive of photos), construction work that has been carried to date, recorded noise and/or vibration levels during the works carried out, a comparison of the recorded levels to the associated management criteria and a discussion of exceedances and how they can be appropriately controlled.

In the event that attended monitoring has been carried, a report will be prepared and issued after the monitoring visit has been completed.

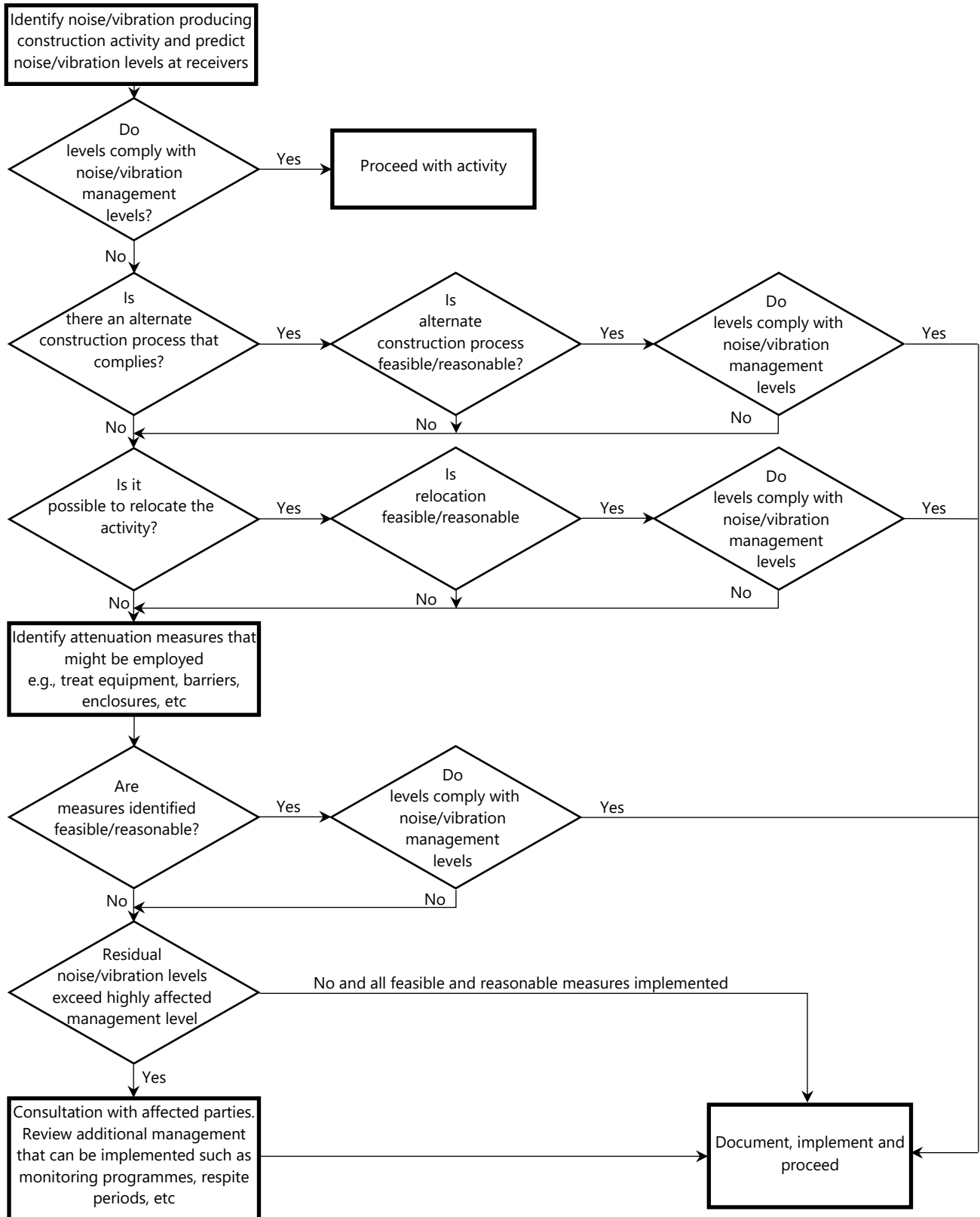
10.5 VIBRATION MONITORING ALERTS

If the nominated vibration trigger level is exceeded, the following personnel will receive SMS alerts:

1. Project acoustic consultant
2. Site foreman
3. Head contractor and any other representative nominated by the project's head contractor

11 CONTROL OF CONSTRUCTION NOISE AND VIBRATION – PRECEDURAL STEPS

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



12 ADDITIONAL NOISE AND VIBRATION CONTROL METHODS

In the event of complaints, there are several noise mitigation strategies available which can be considered. The determination of appropriate noise control measures will be dependent on the activities and construction appliances. This section provides an outline of available methods.

12.1 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.

12.2 ACOUSTIC BARRIER

Given the position of adjacent receivers, it is unlikely that noise screens will provide significant acoustic benefit 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 expected. 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.

12.3 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).

12.4 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.

12.5 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.

12.6 COMBINATION OF METHODS

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

13 COMMUNITY CONSIDERATIONS AND COMPLAINTS HANDLING

13.1 DEALING WITH COMPLAINTS

Should ongoing complaints of excessive noise or vibration recommendations 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 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; and
- Summary of feedback to the complainant.

14 CONCLUSION

This report presents an assessment of potential noise and vibration impacts associated with the redevelopment of part of the site at 4-12 Neringah Avenue South, Wahroonga for the purposes of delivering additional community health services, seniors housing, as well as upgraded palliative care facilities that will contribute to the broader operation of 'Neringah Hospital.

An assessment of traffic noise impacts to the proposed re-development has been undertaken to achieve the internal noise levels requirements of the following acoustic noise criteria and standards:

- 'State Environmental Planning Policy (Infrastructure & Transport) 2021' as amended (I&TSEPP).
- NSW Department of Planning document – 'Developments near Rail Corridors or Busy Roads – Interim Guideline' ("DNRCBR") 2008

Provided the complying constructions summarised in 6.2 are adopted, internal noise levels from noise intruding into the development will be compliant with the criteria noted above.

An assessment of potential noise emissions from the operation of the development has been undertaken in accordance with NSW Environmental Protection Authority (EPA) document – 'Noise Policy for Industry' ("NPfI") 2017. Provided the recommendations and management controls set out in Section 8 are adopted, noise emissions from the operation of the development will be compliant with the NPfI.

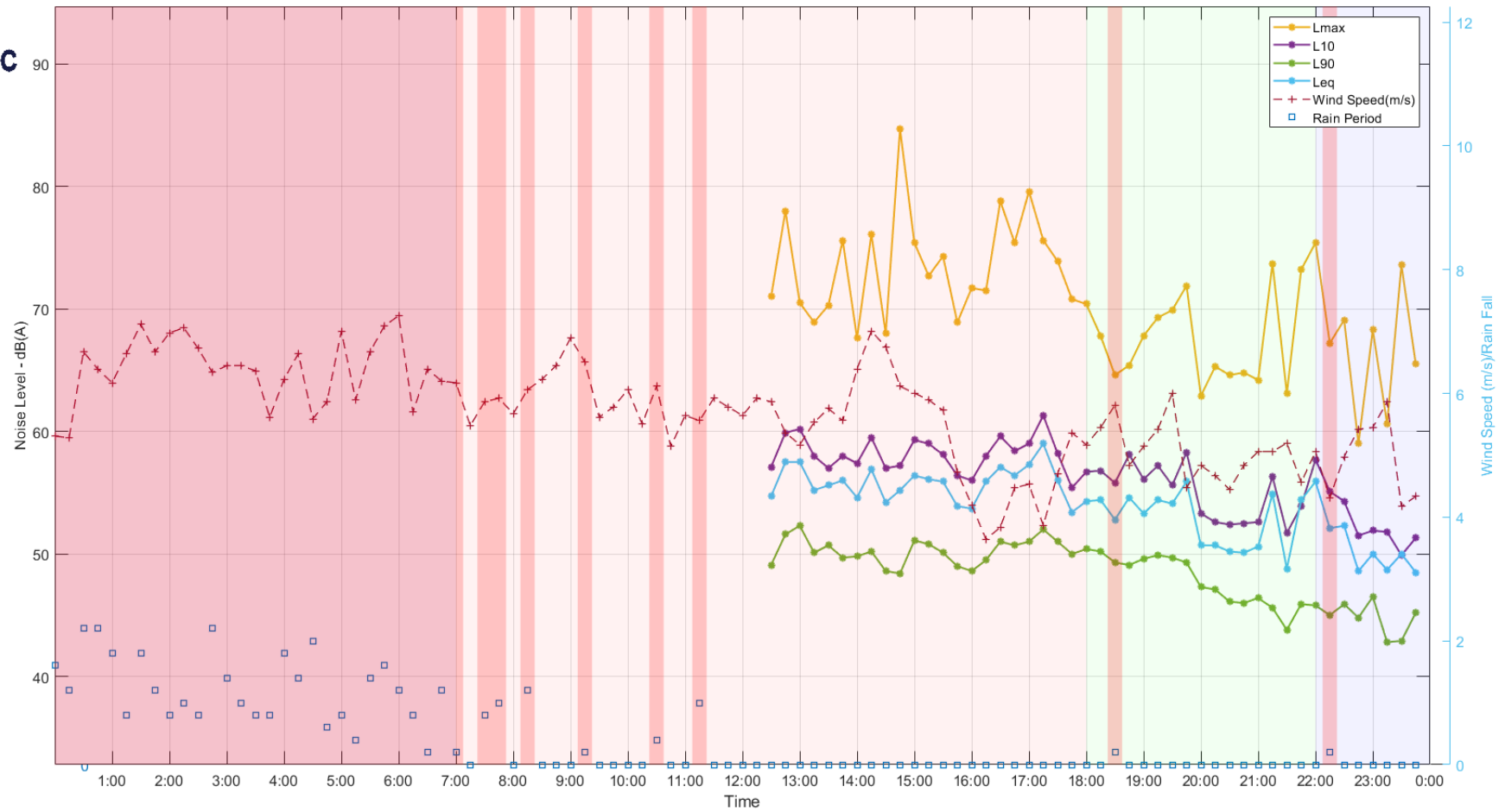
An assessment of construction noise and vibration associated with the construction work during the re-development has been undertaken and is summarised in Section 9. All construction noise and vibration has been assessed against the criteria summarised in Section 9.1. Provided the mitigation measures outlined in these sections (Section 9, 10, 11,12 and 13) are incorporated, construction noise and vibration can be appropriately managed.



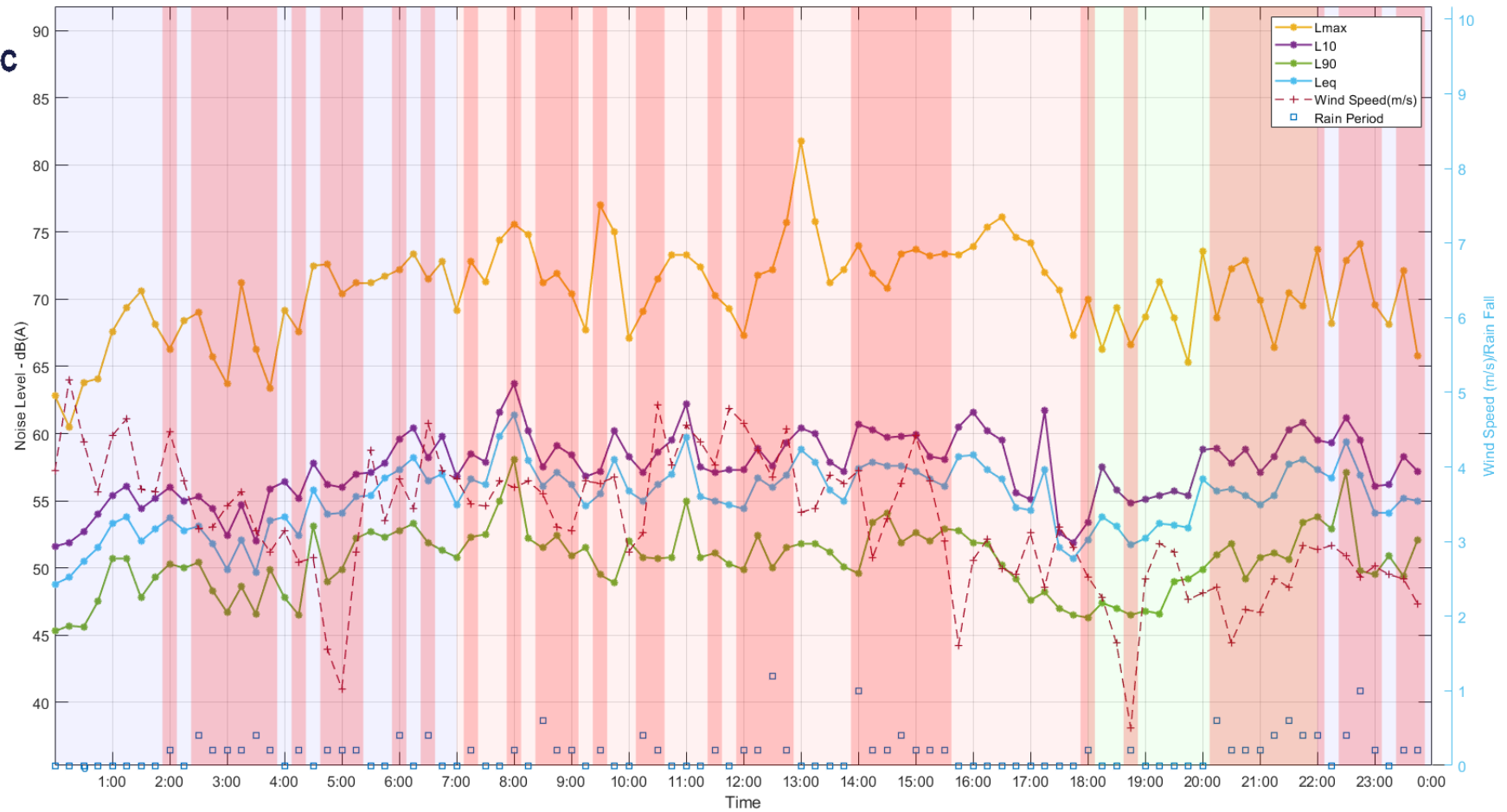
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Lillian Lockett

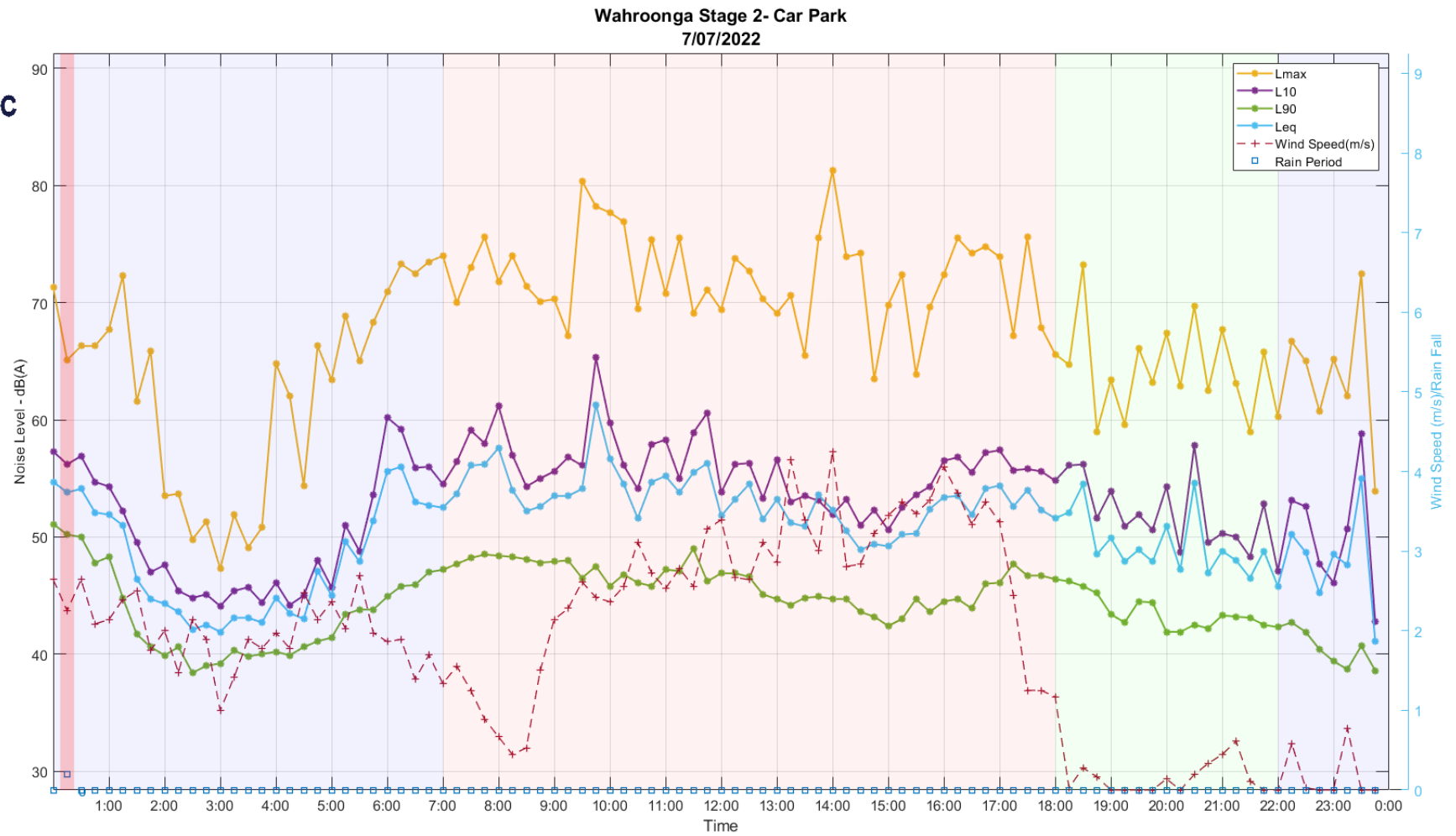
APPENDIX A – UNATTENDED NOISE MONITOR LOCATION 1 (REFER TO FIGURE 1)

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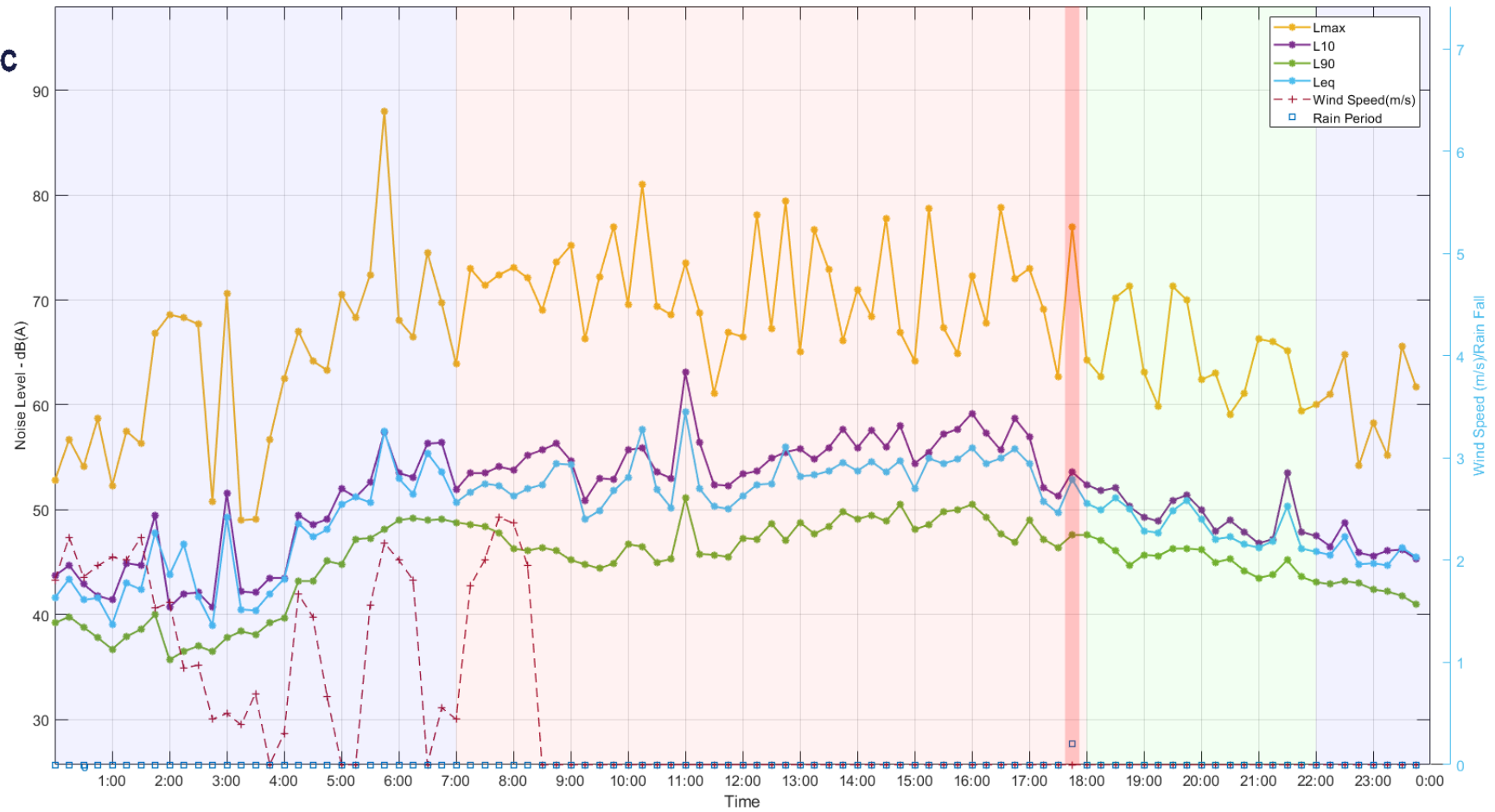


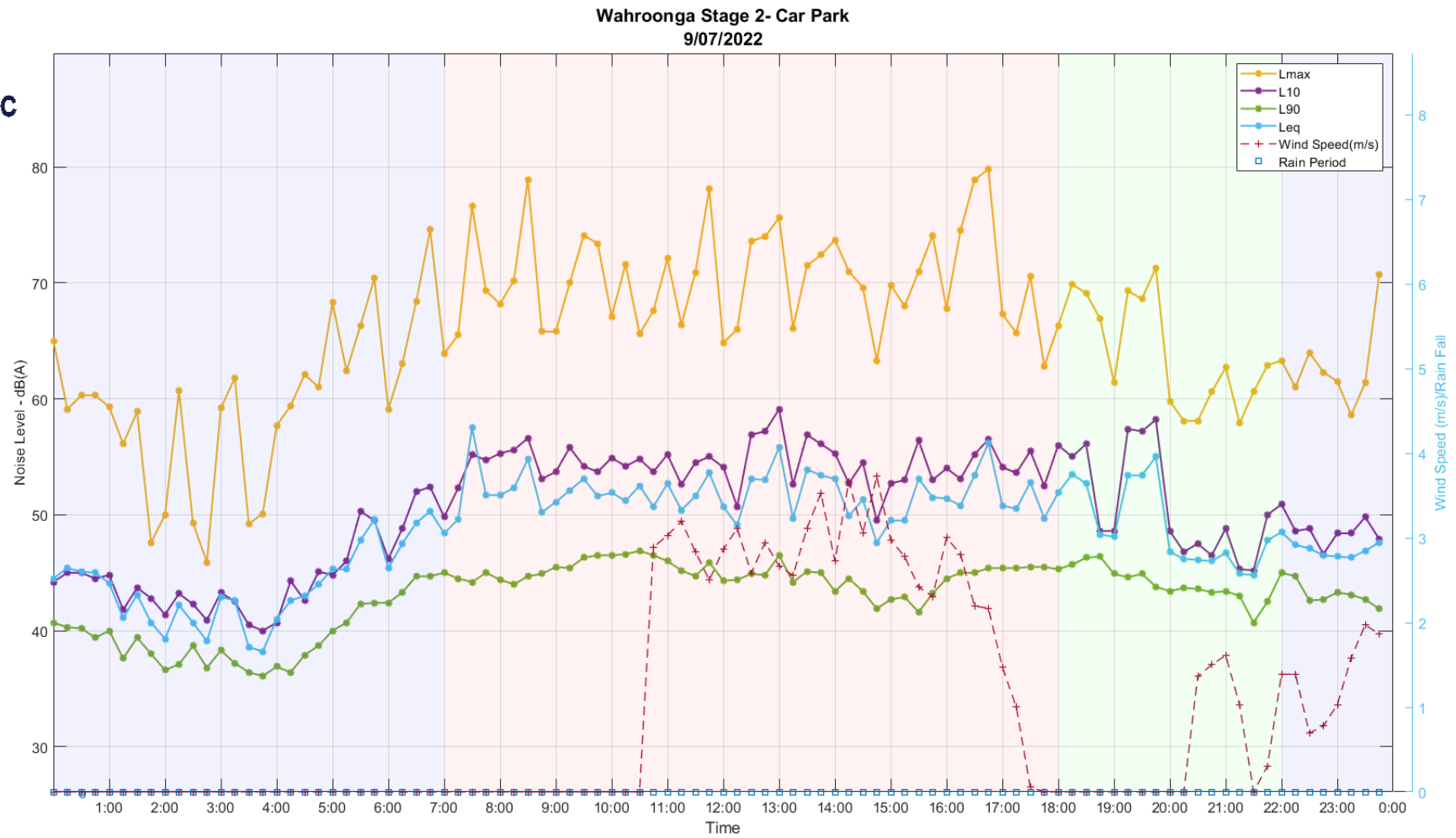
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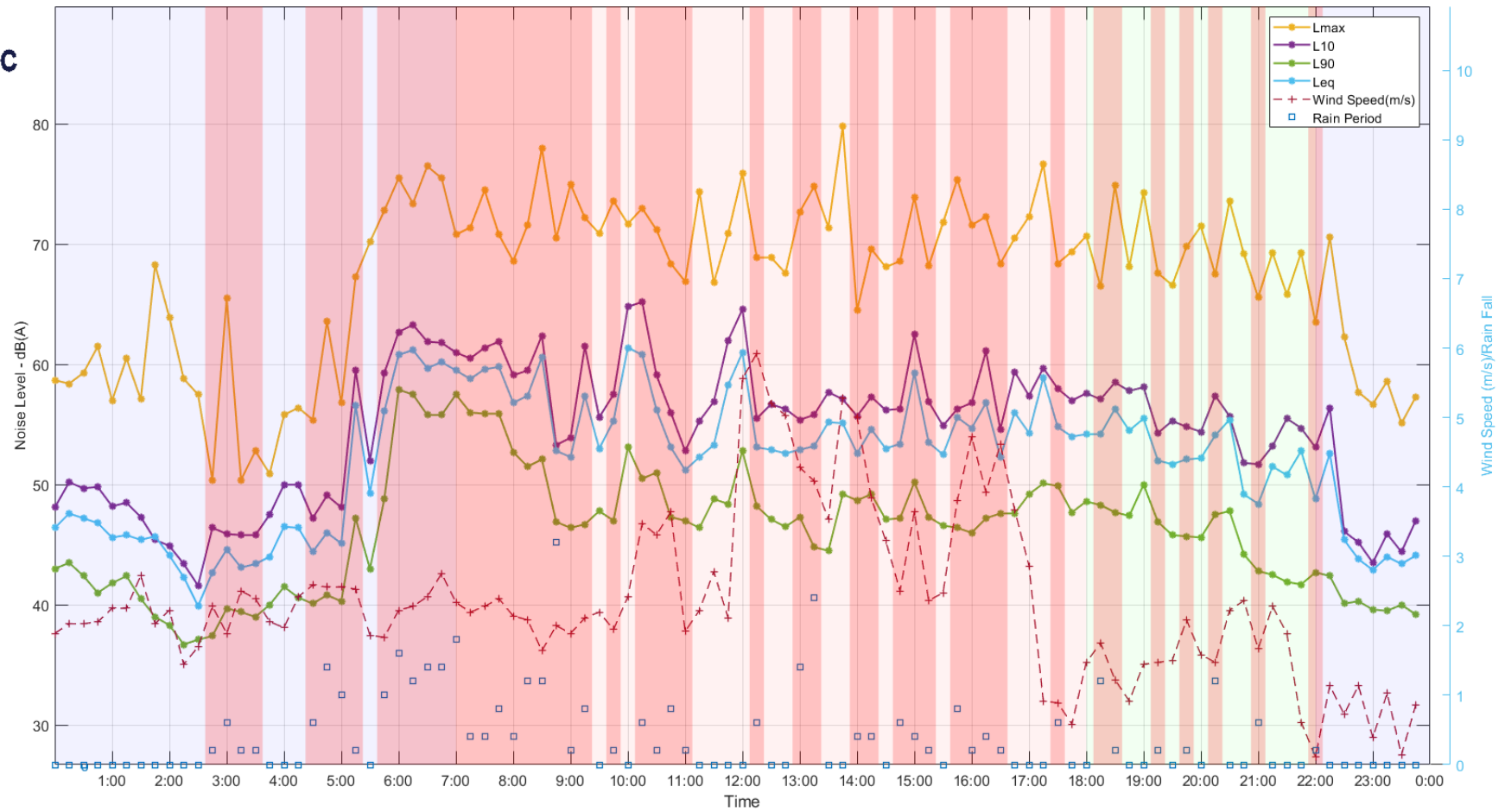


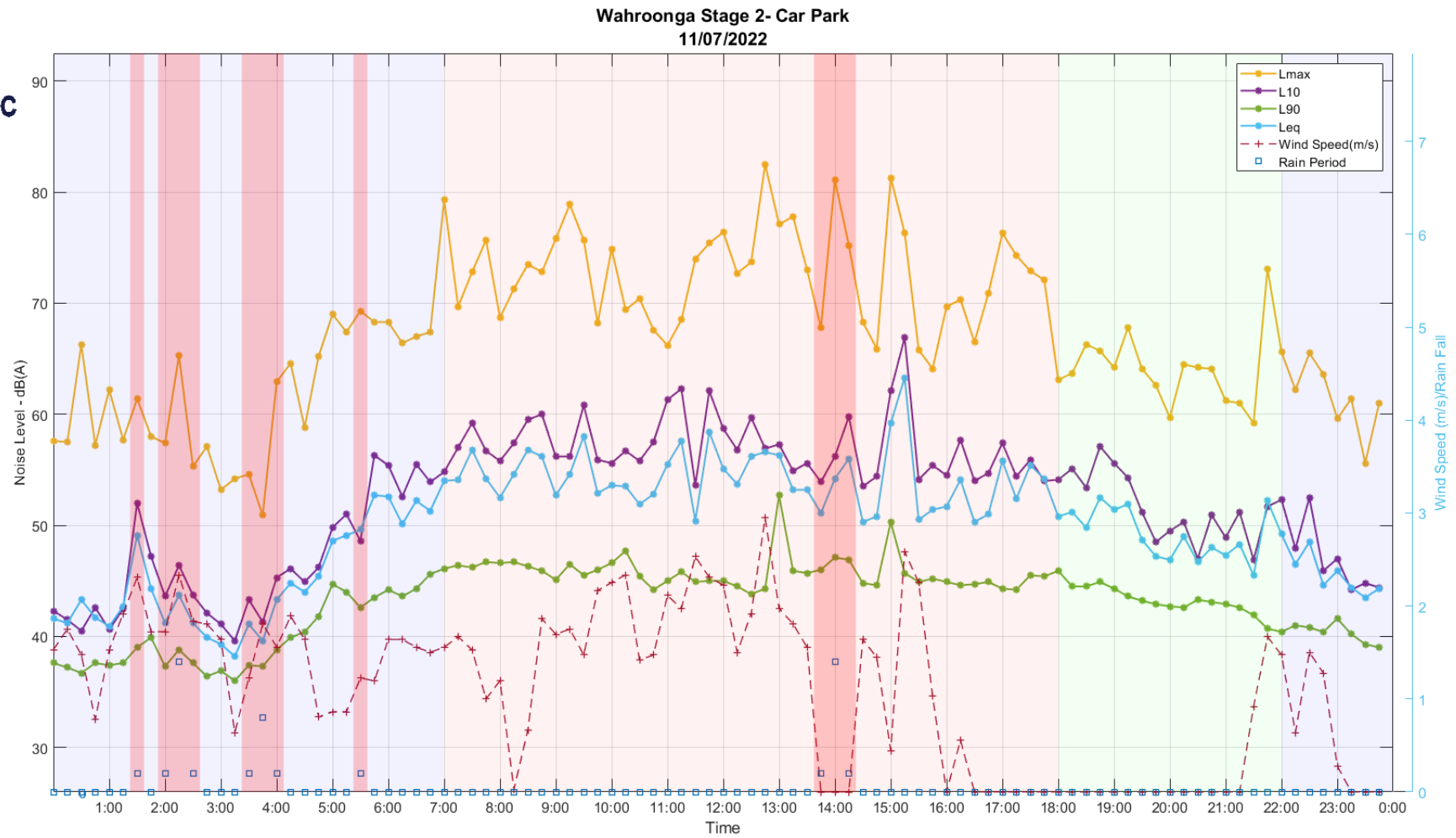
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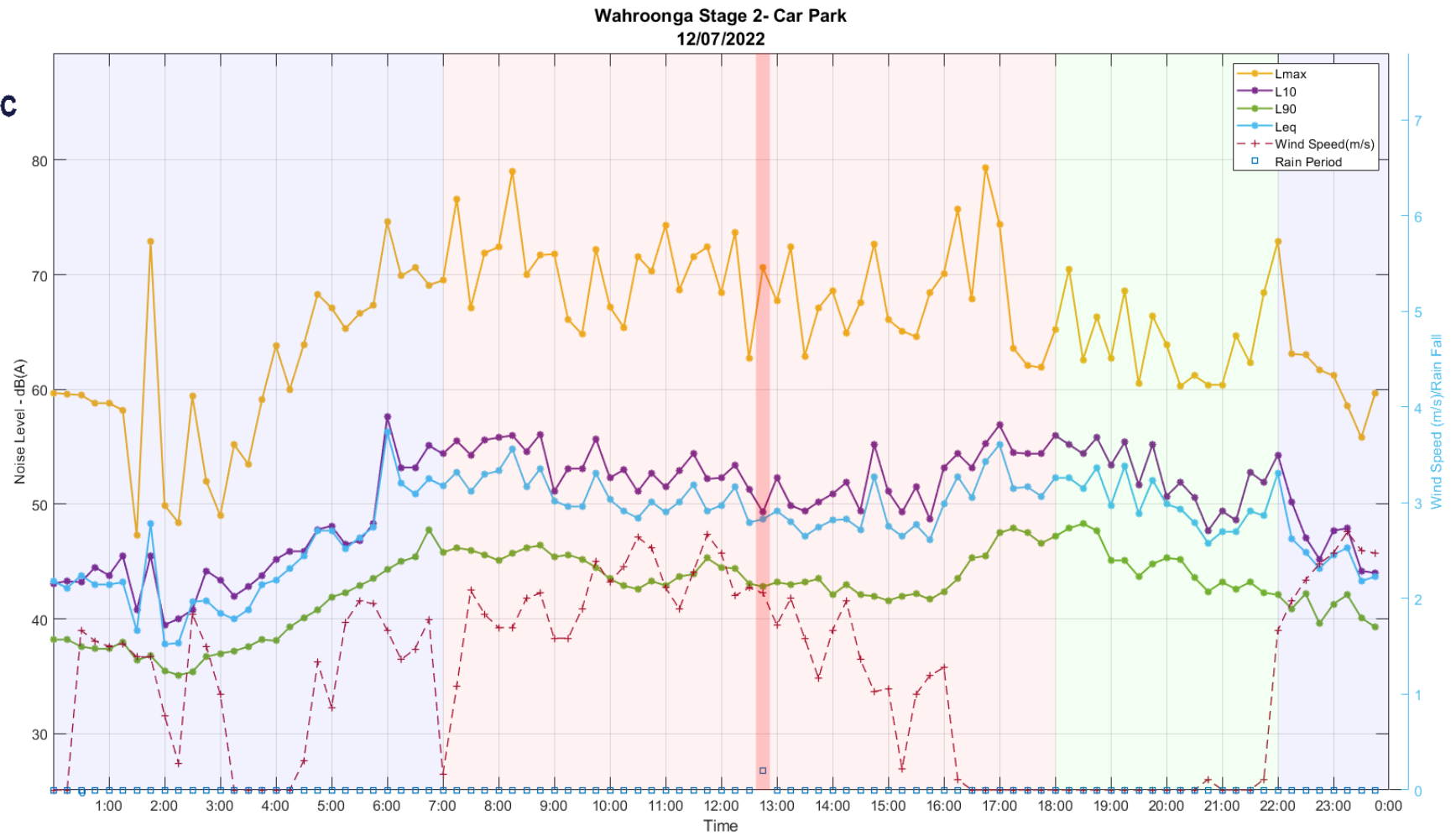


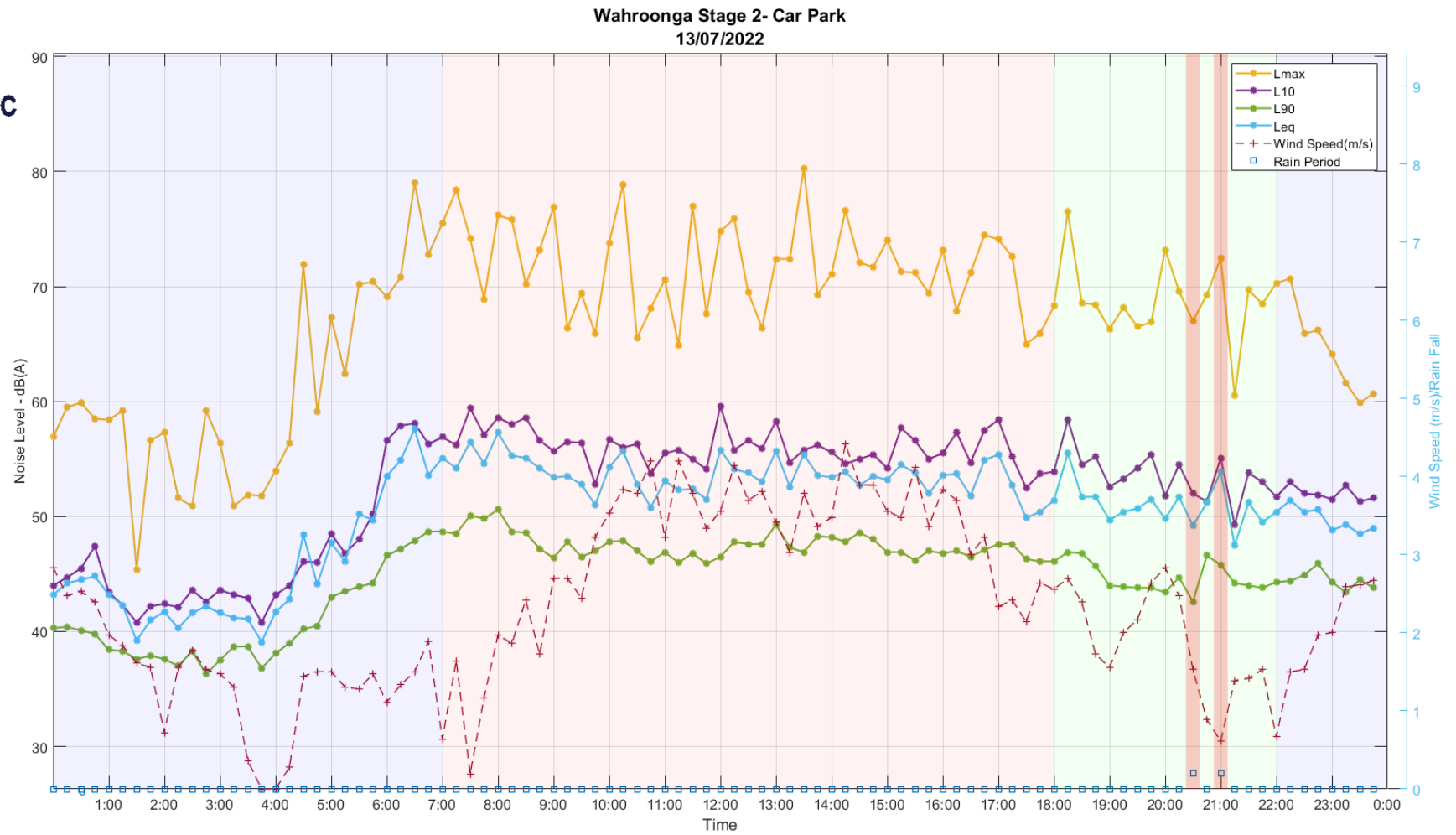


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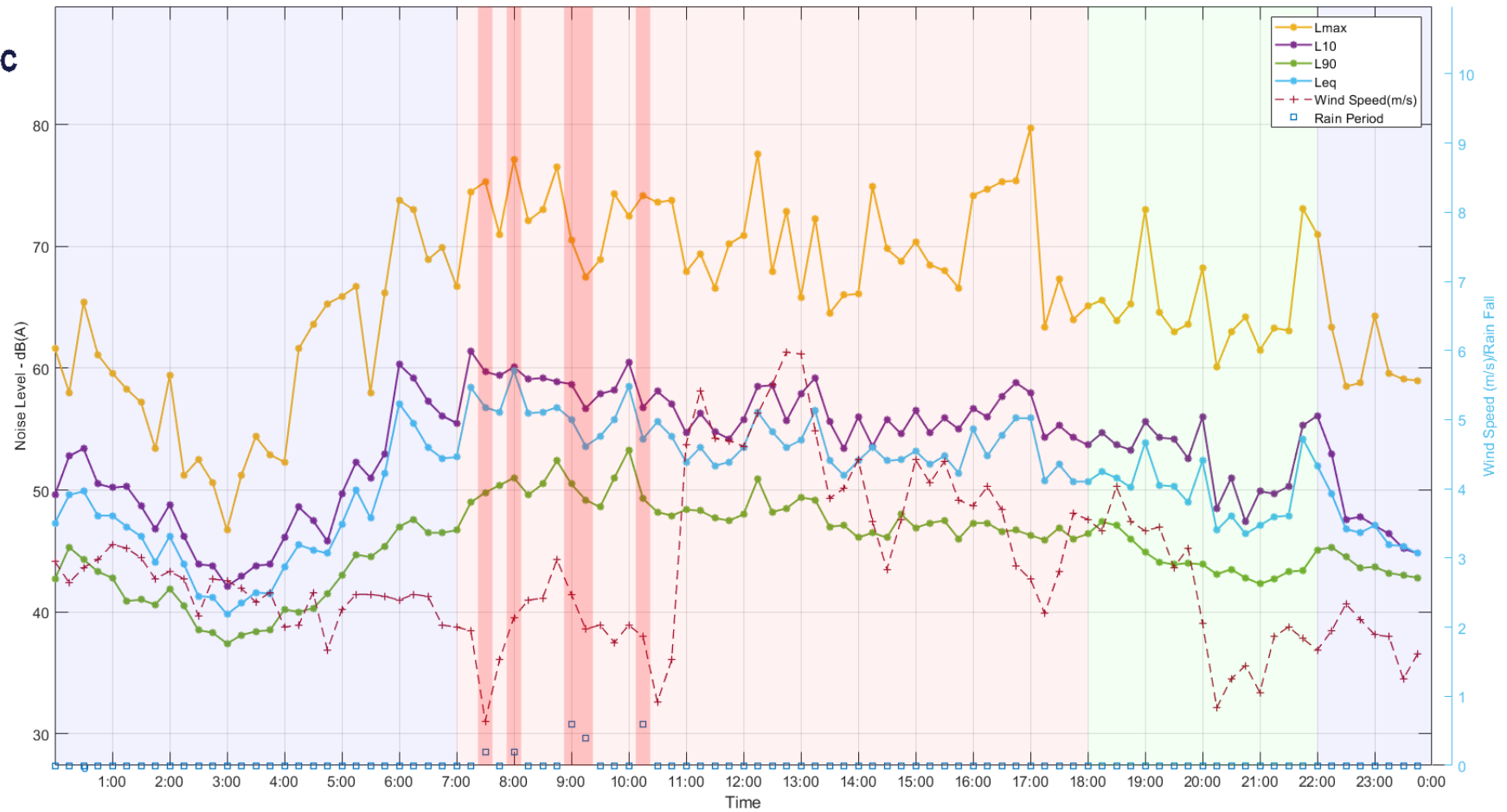




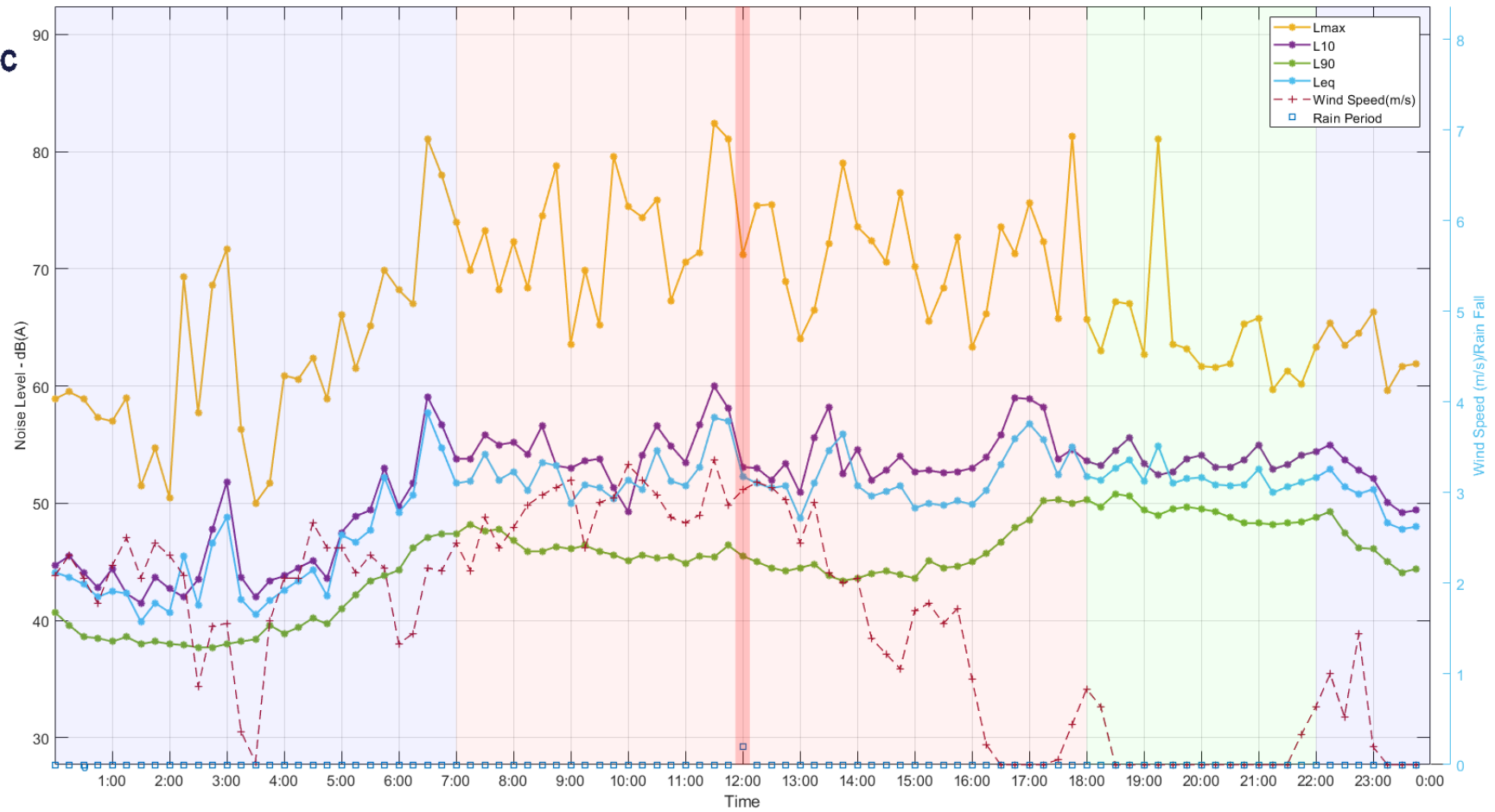


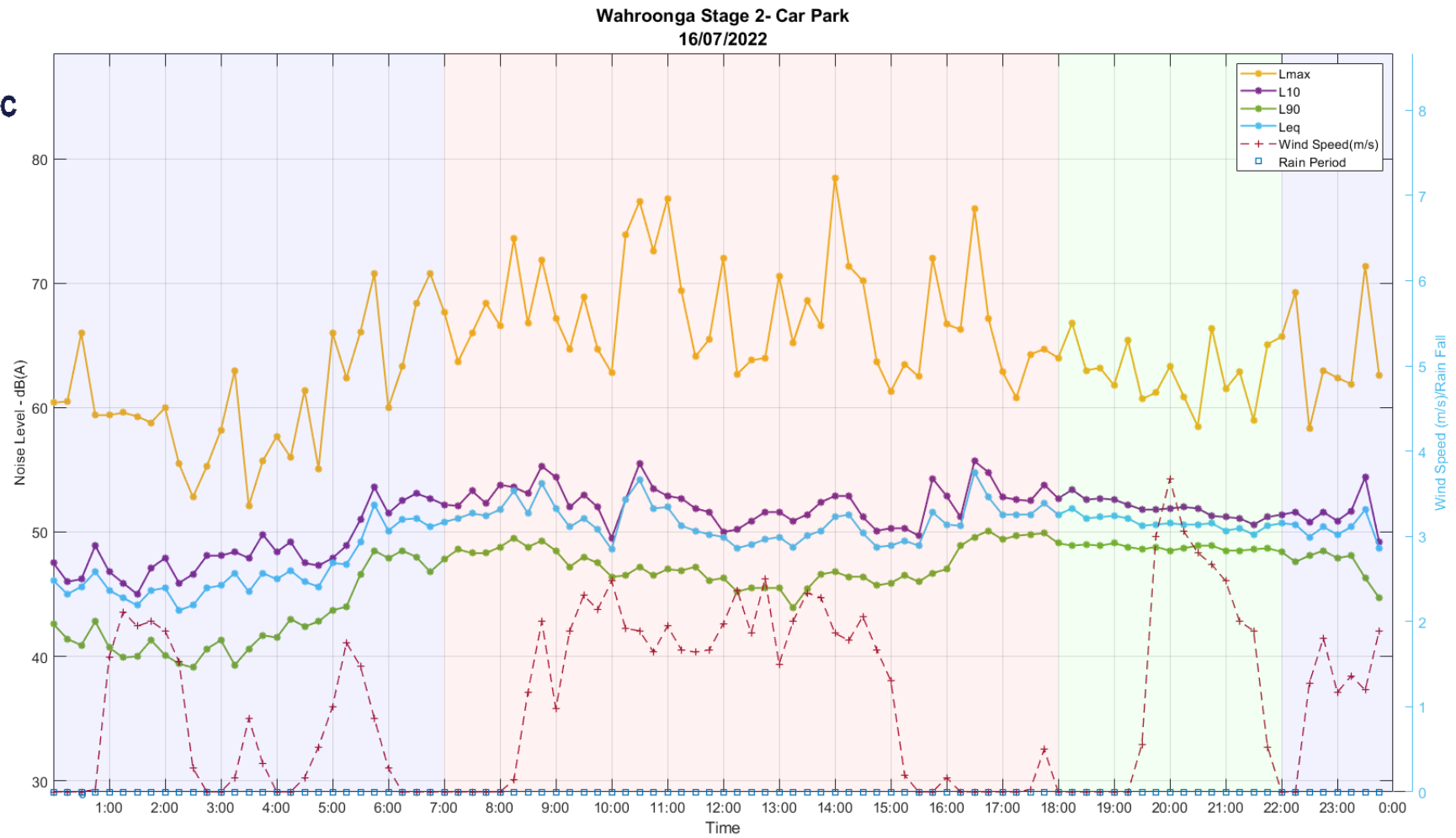


Wahroonga Stage 2- Car Park
14/07/2022

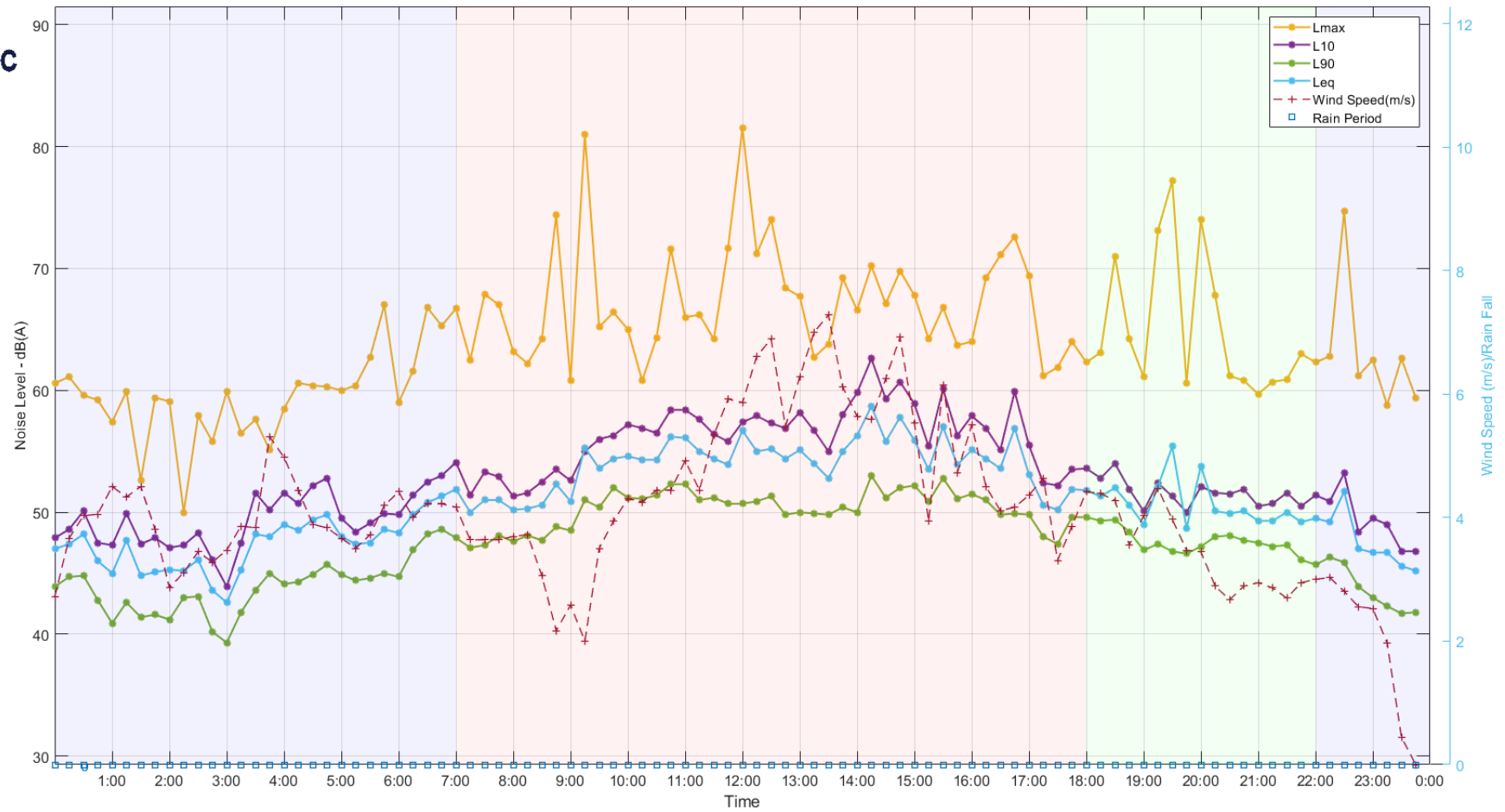


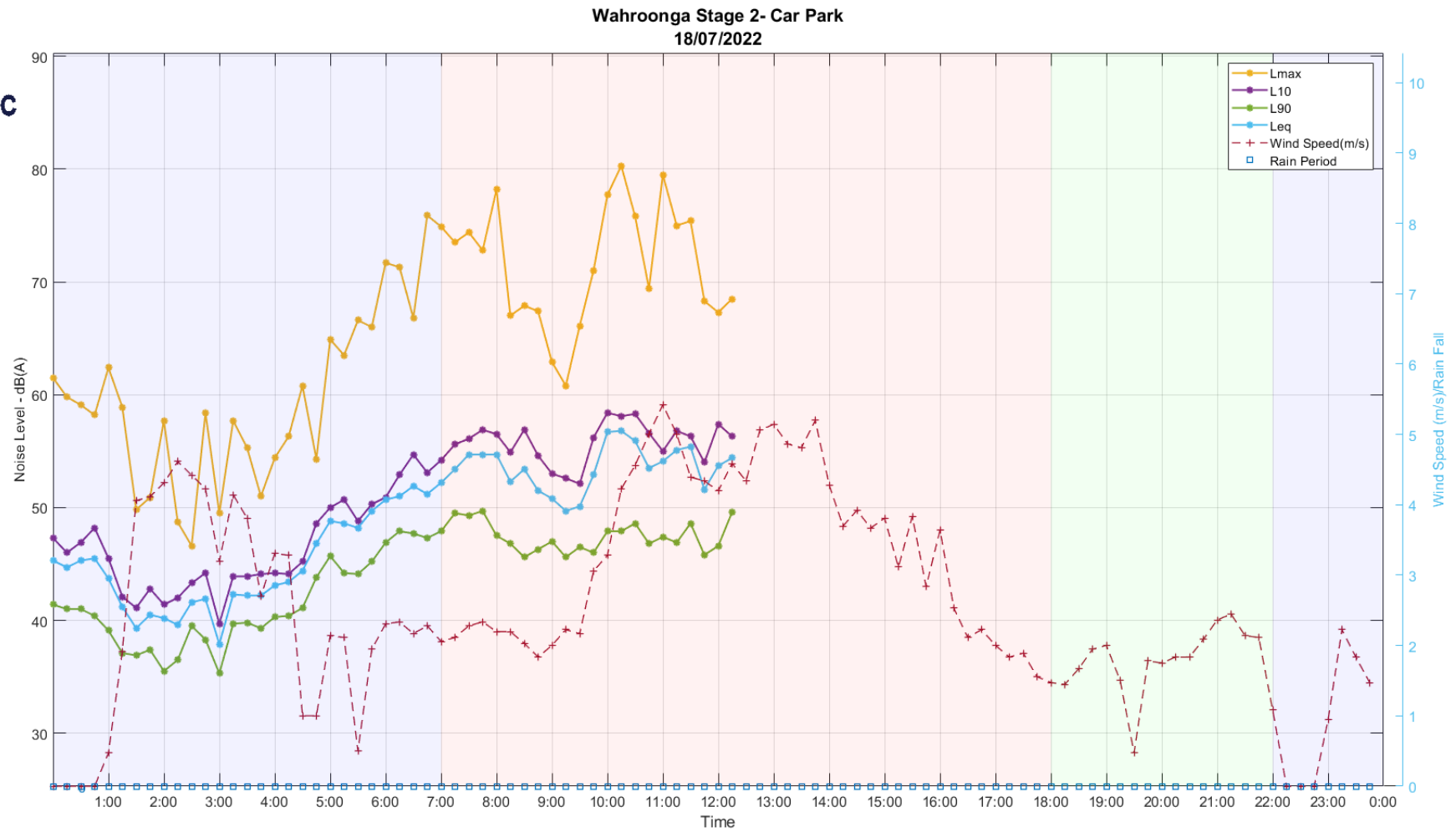
Wahroonga Stage 2- Car Park
15/07/2022





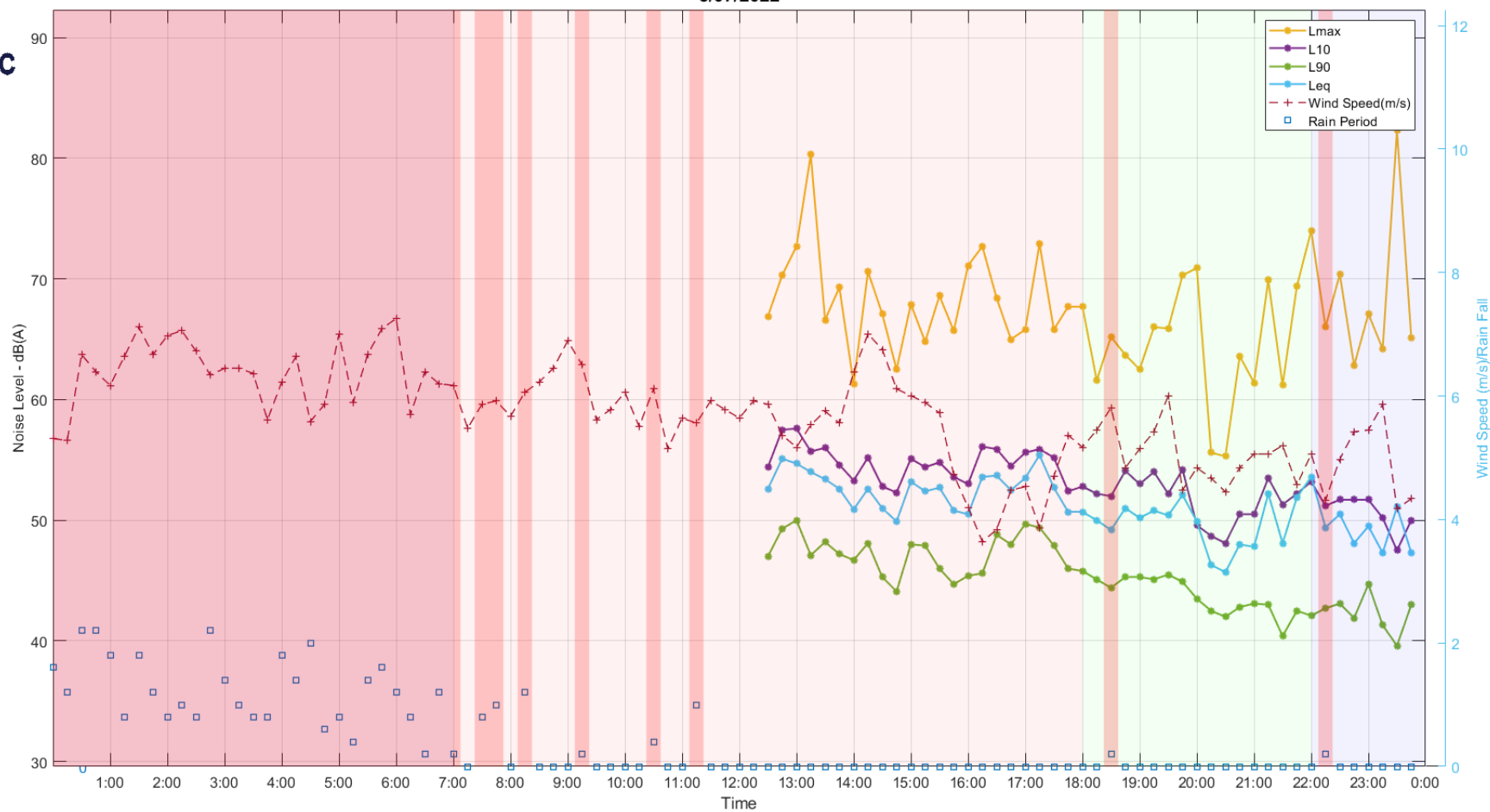
Wahroonga Stage 2- Car Park
17/07/2022



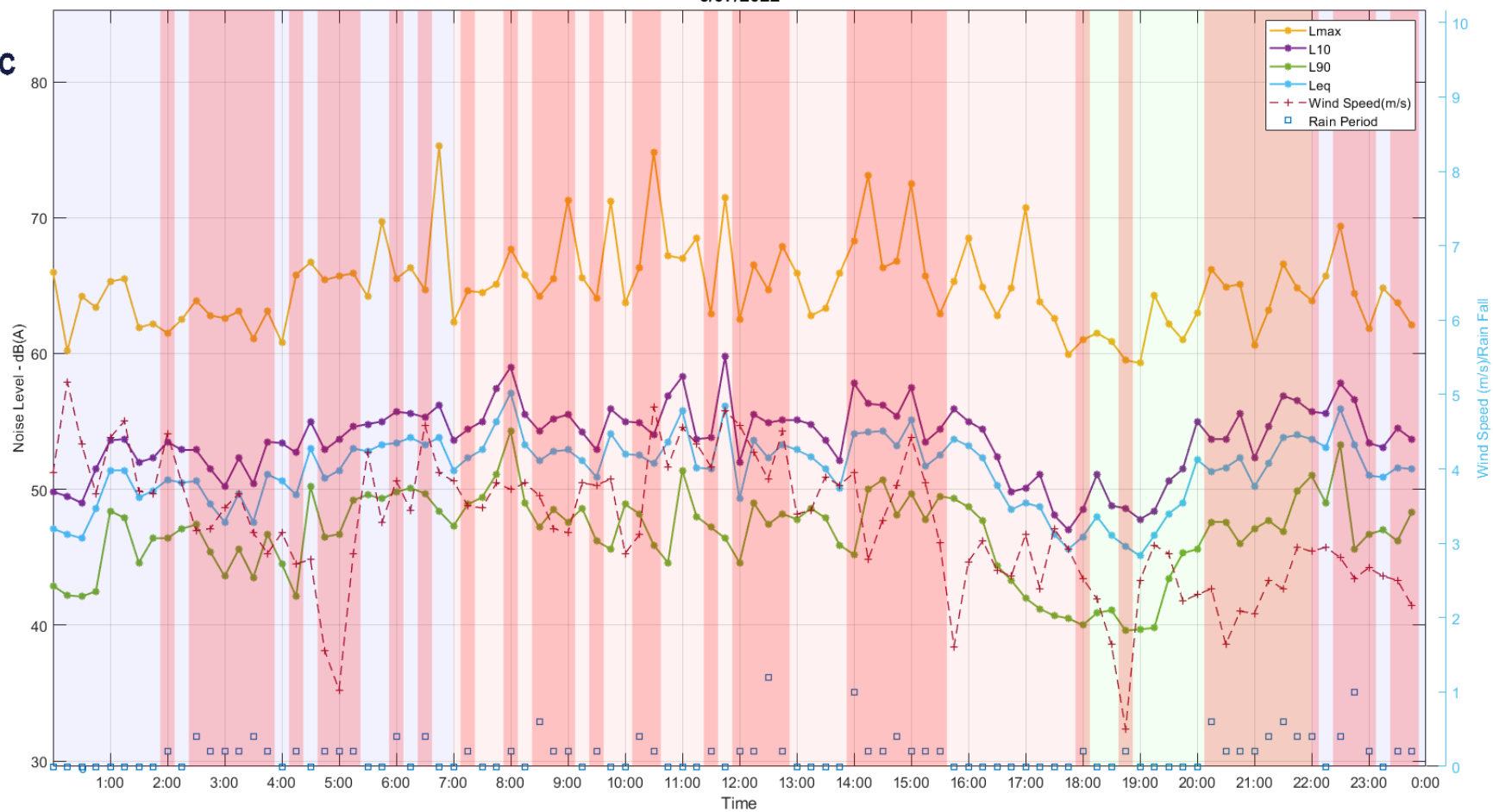


APPENDIX B – UNATTENDED NOISE MONITOR LOCATION 2 (REFER TO FIGURE 1)

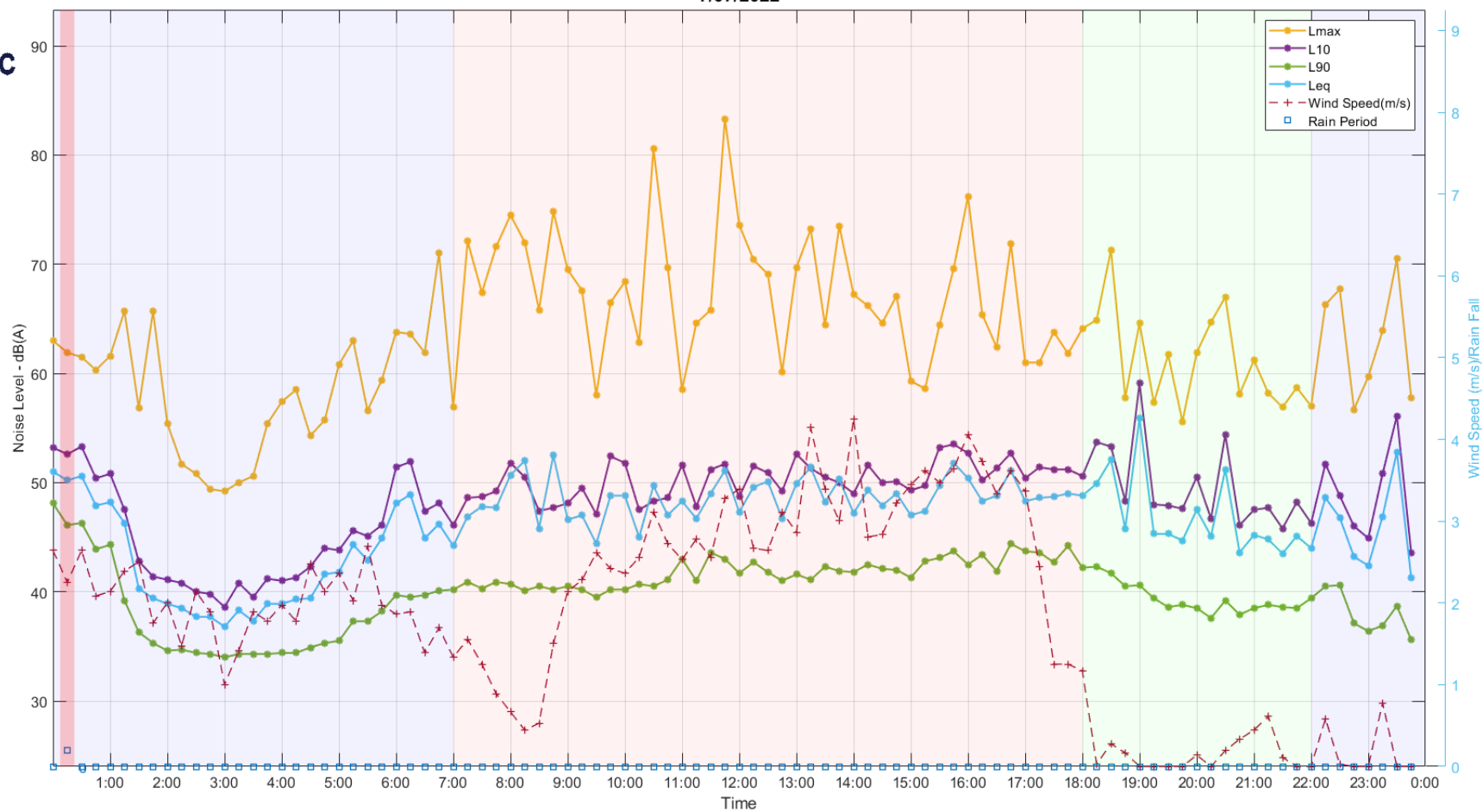
Wahroonga Stage 2- Empty Lot
5/07/2022



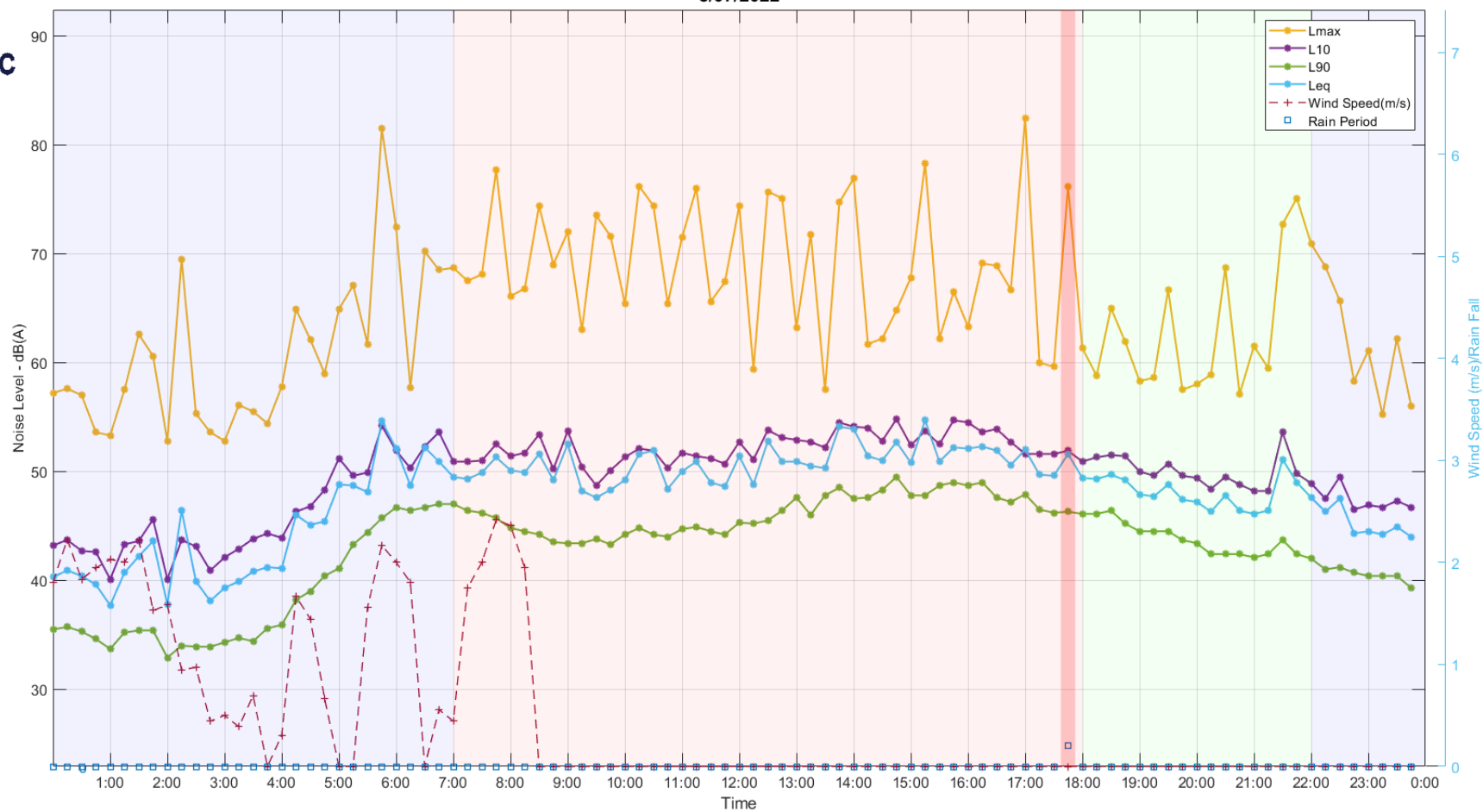
Wahroonga Stage 2- Empty Lot
6/07/2022



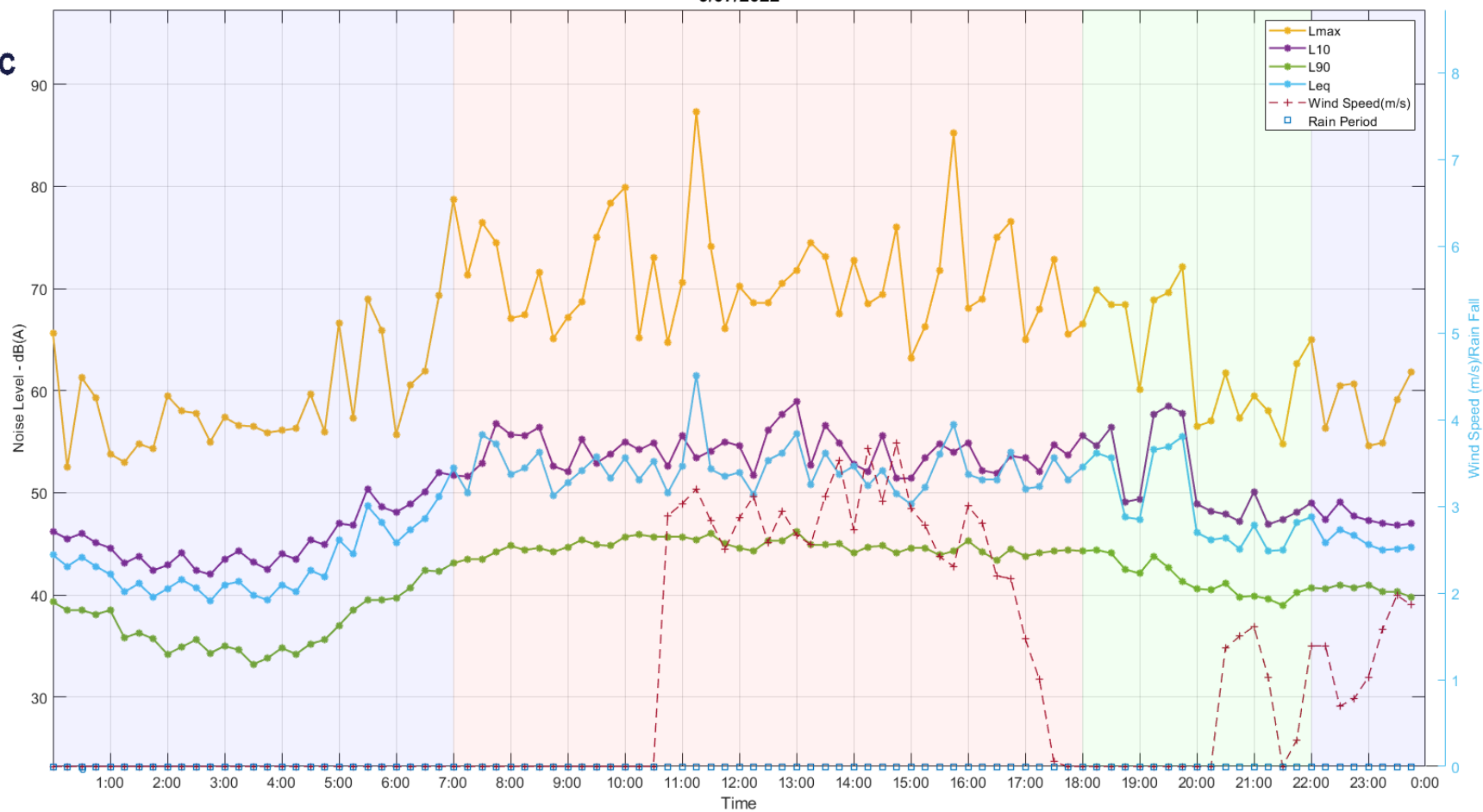
Wahroonga Stage 2- Empty Lot
7/07/2022



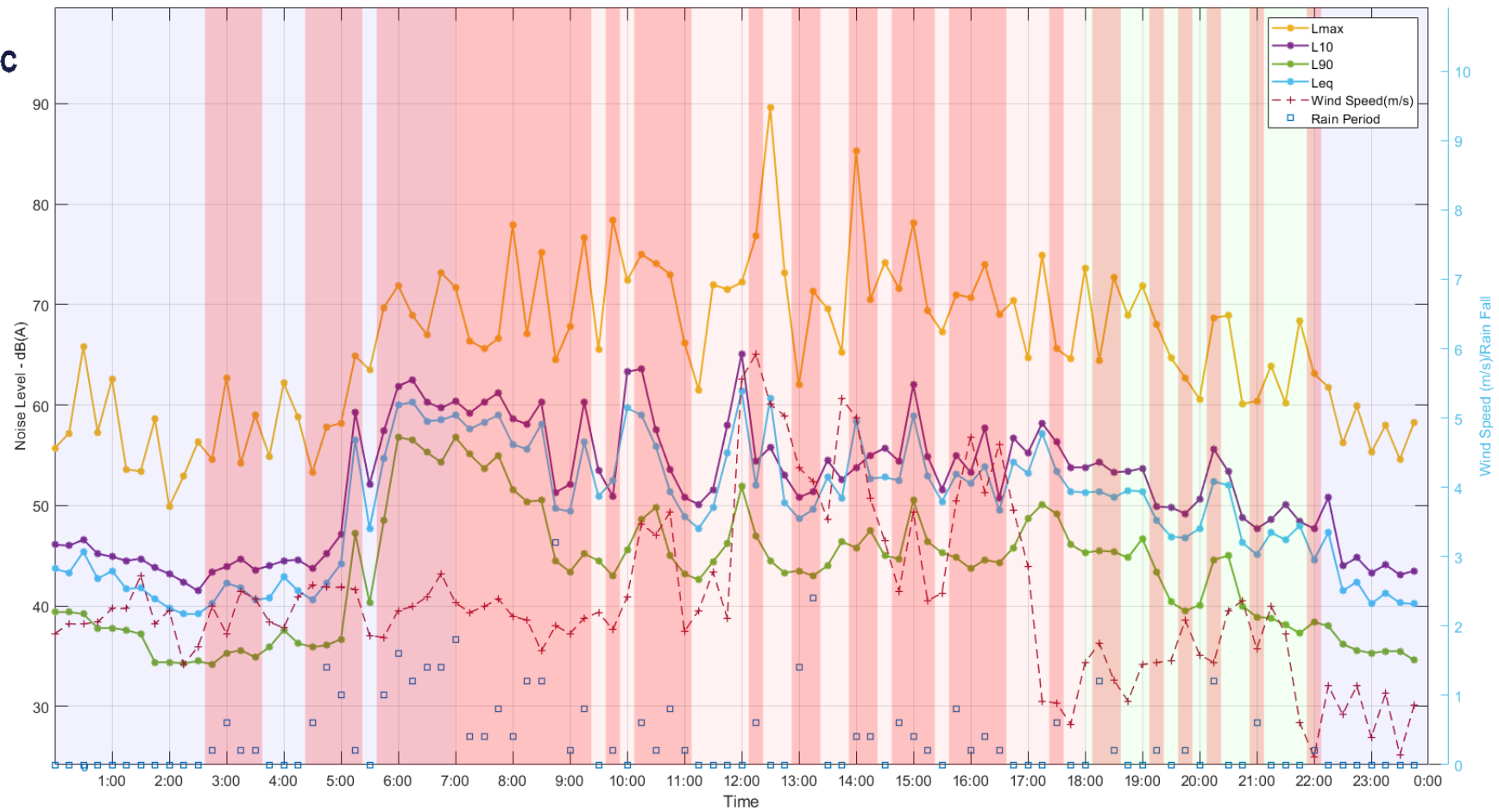
Wahroonga Stage 2- Empty Lot
8/07/2022



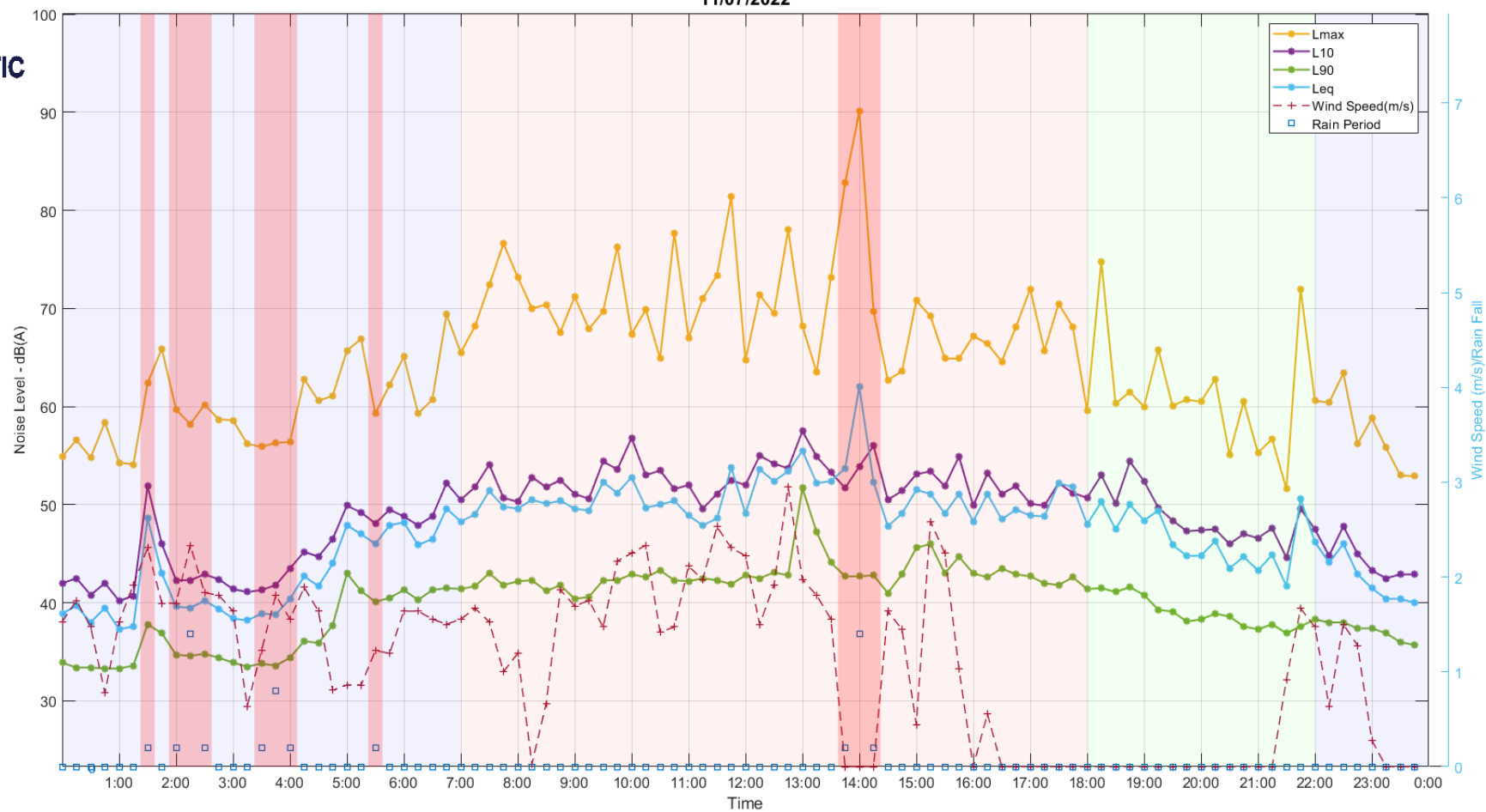
Wahroonga Stage 2- Empty Lot
9/07/2022



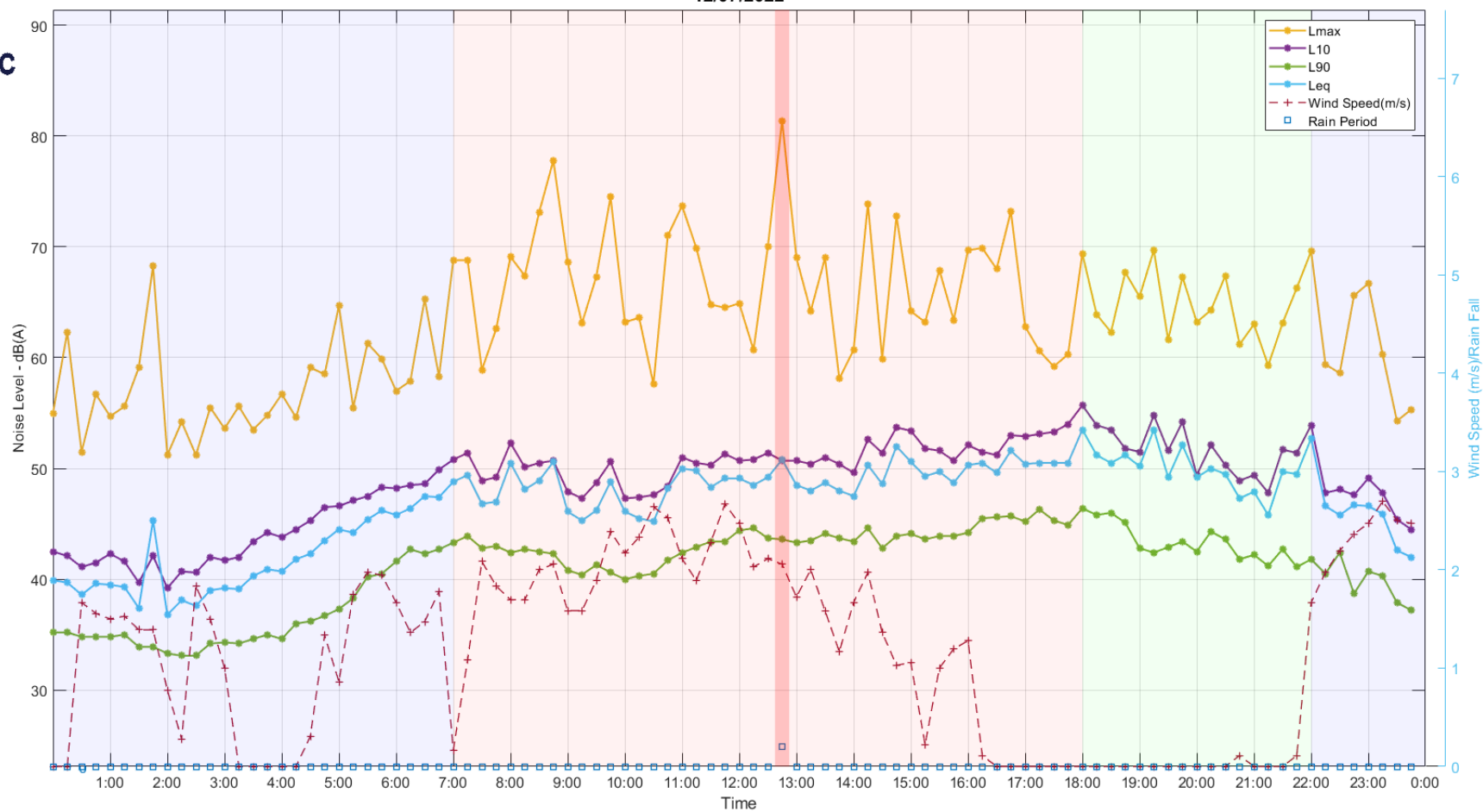
Wahroonga Stage 2- Empty Lot
10/07/2022



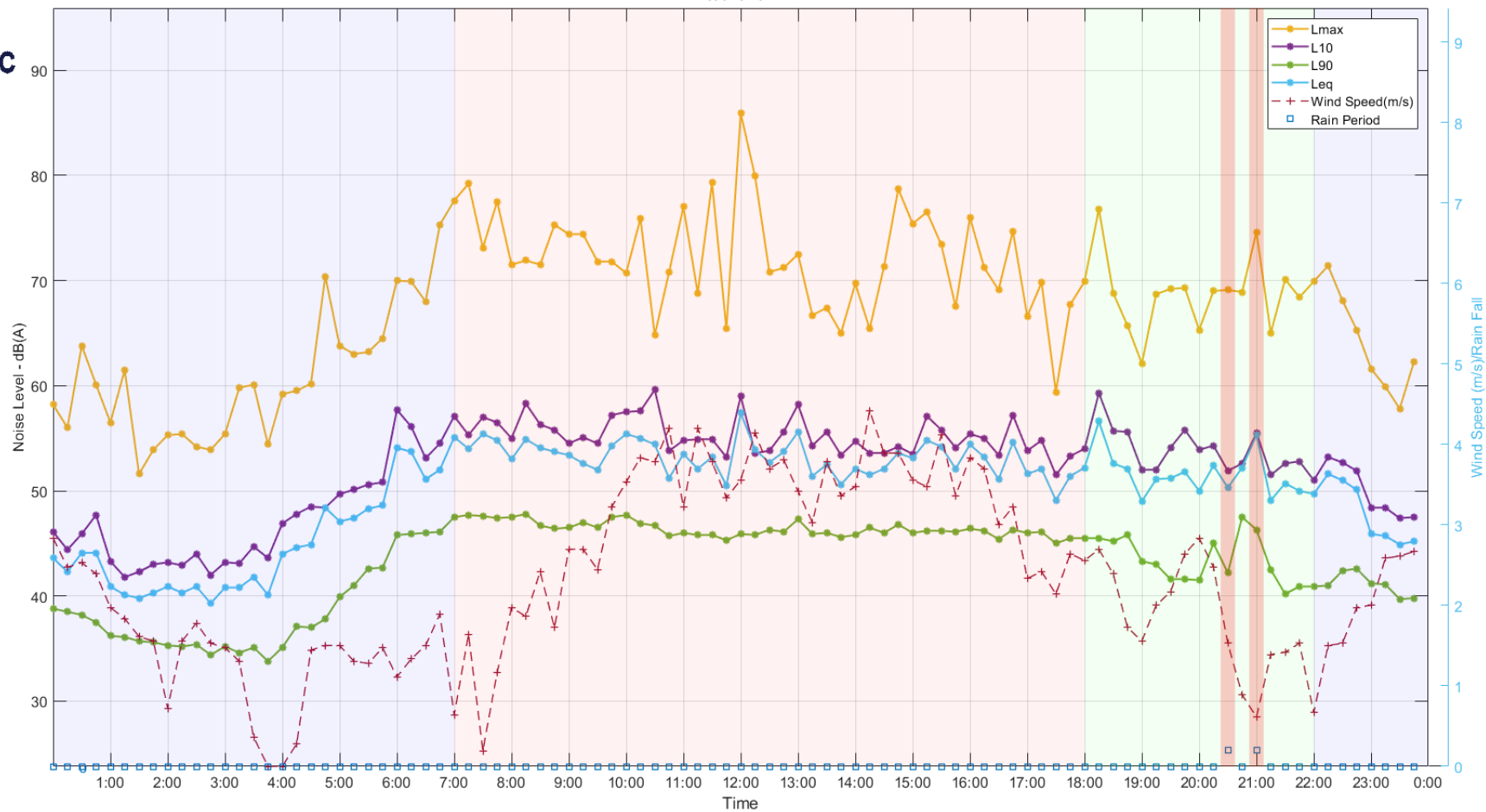
Wahroonga Stage 2- Empty Lot
11/07/2022



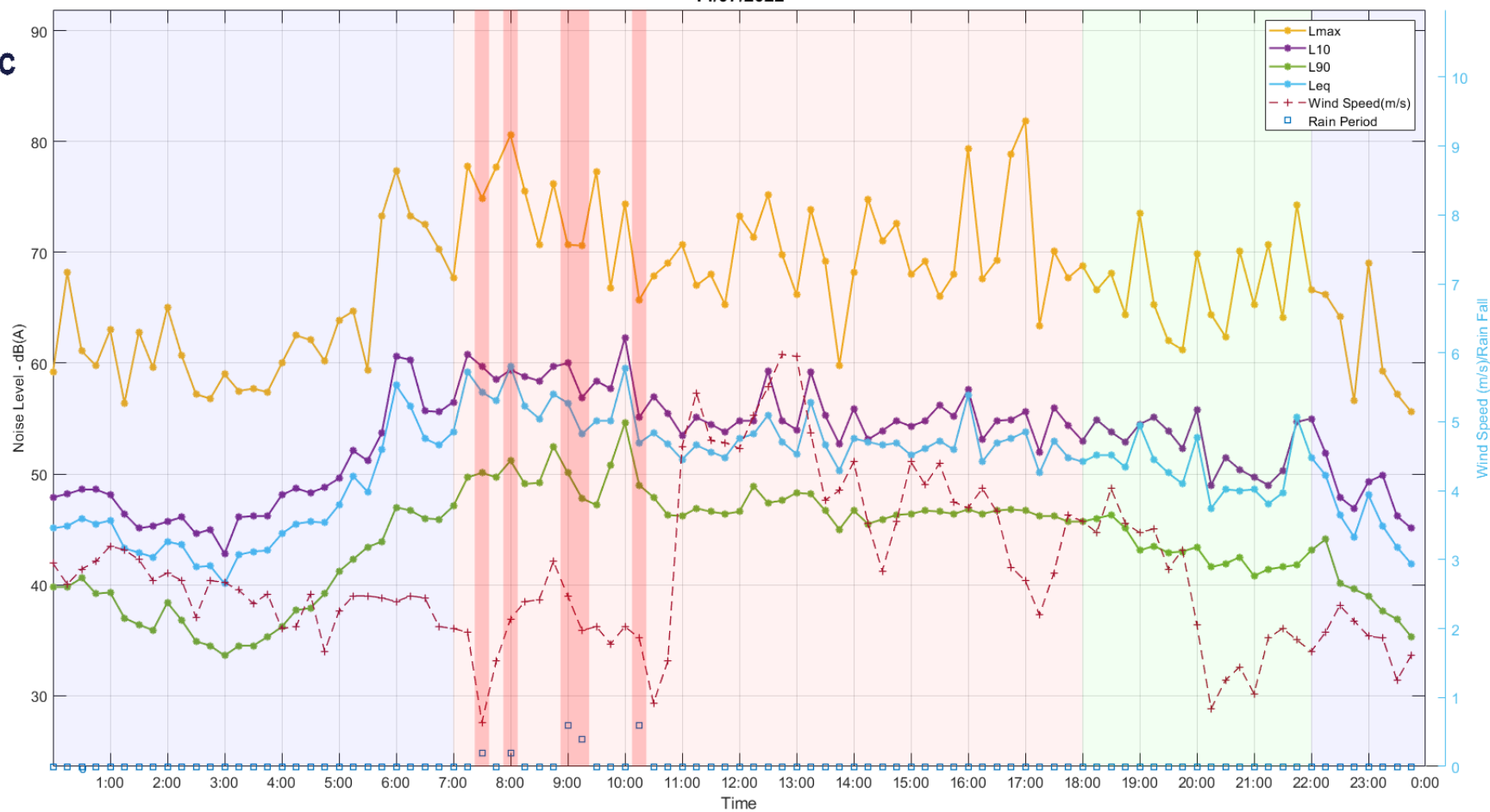
Wahroonga Stage 2- Empty Lot
12/07/2022



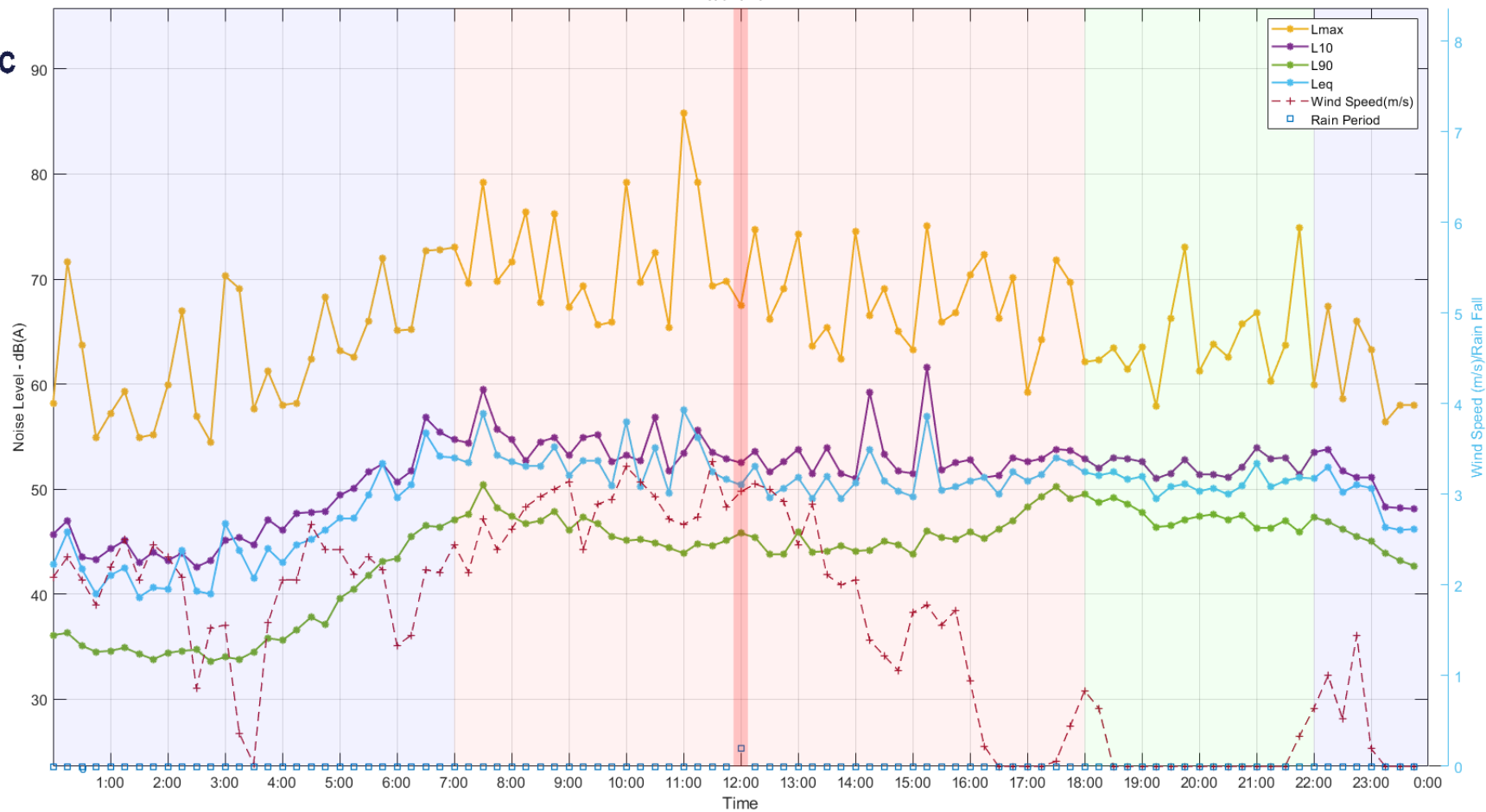
Wahroonga Stage 2- Empty Lot
13/07/2022

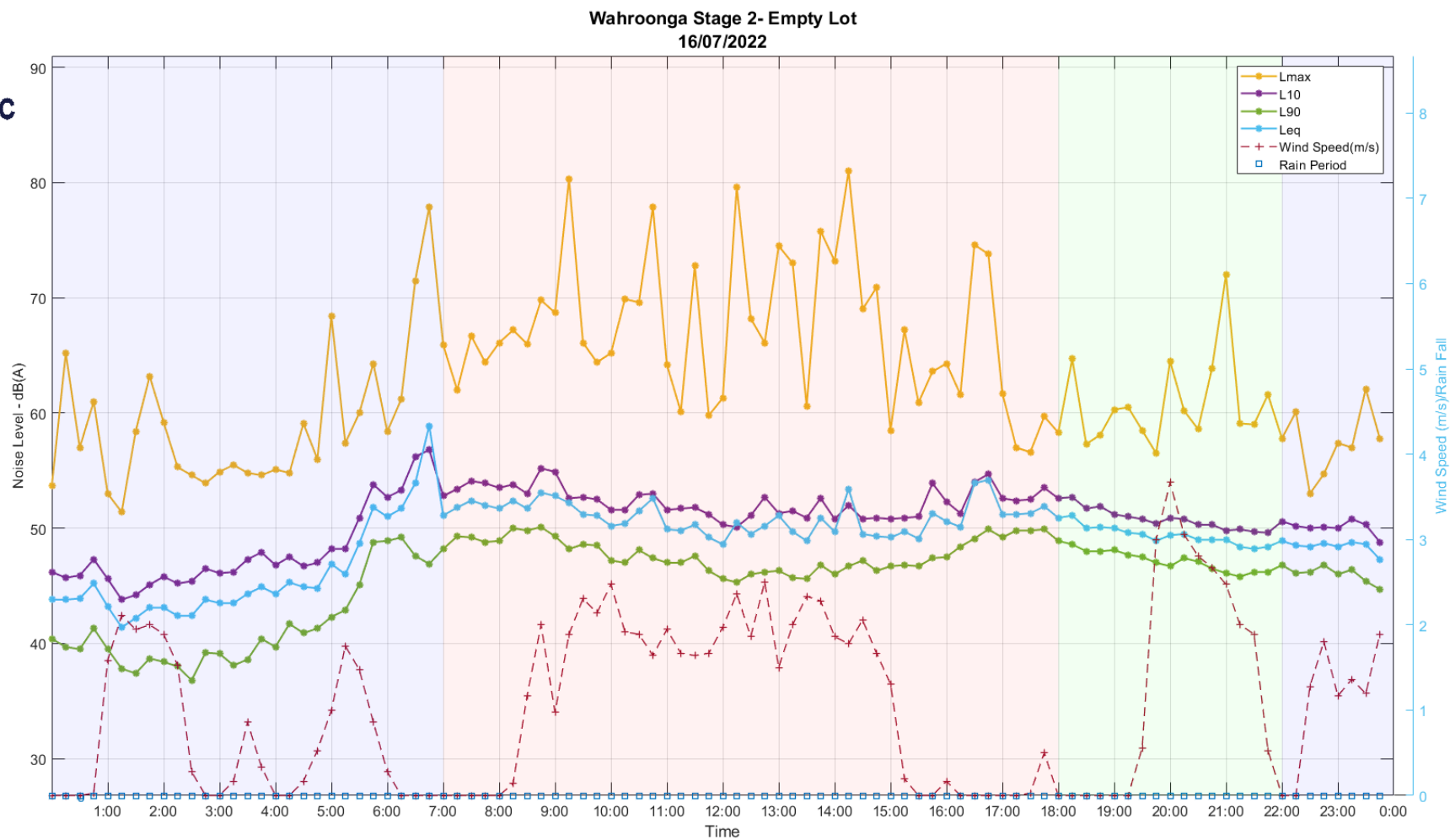


Wahroonga Stage 2- Empty Lot
14/07/2022

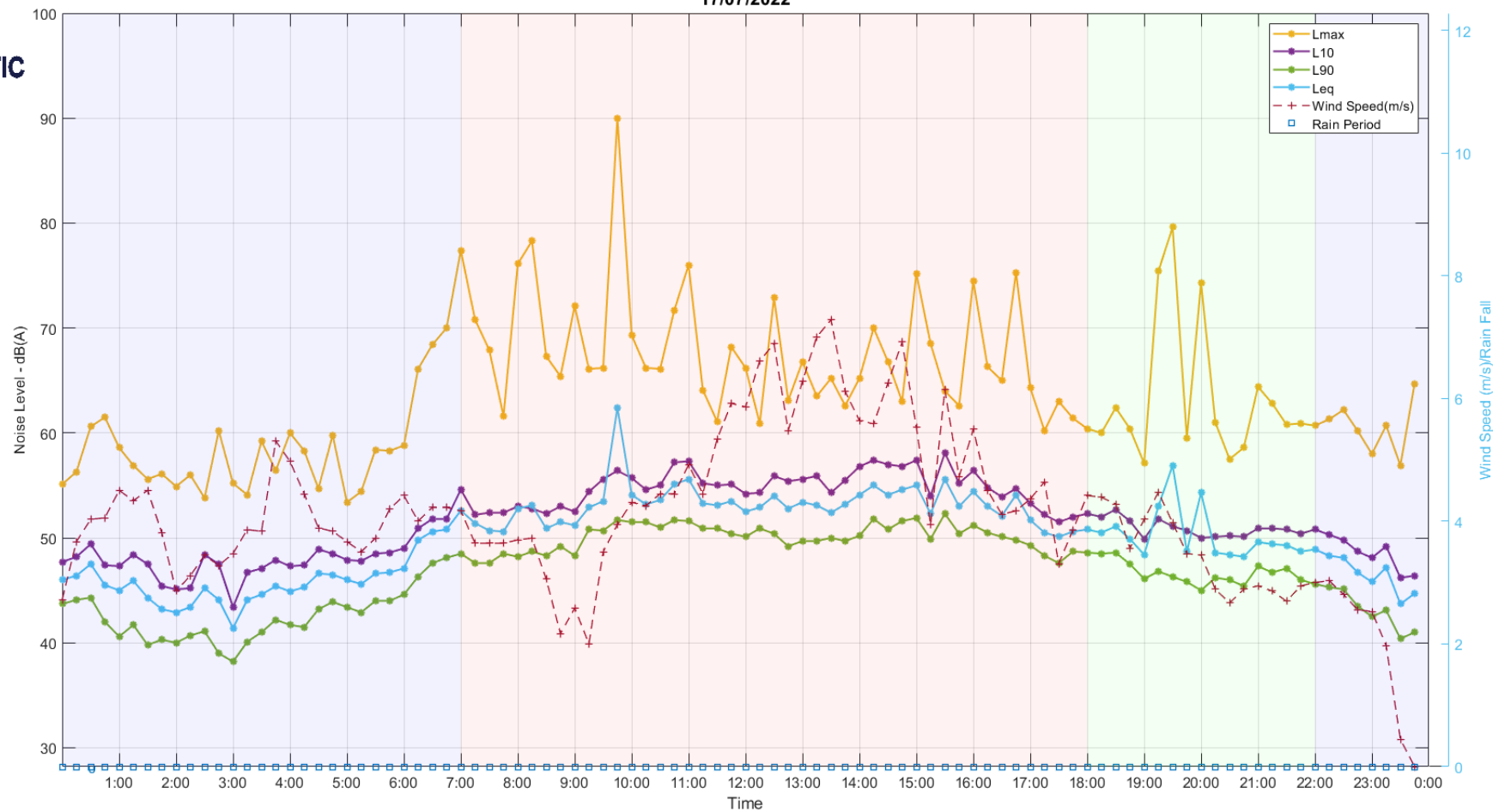


Wahroonga Stage 2- Empty Lot
15/07/2022

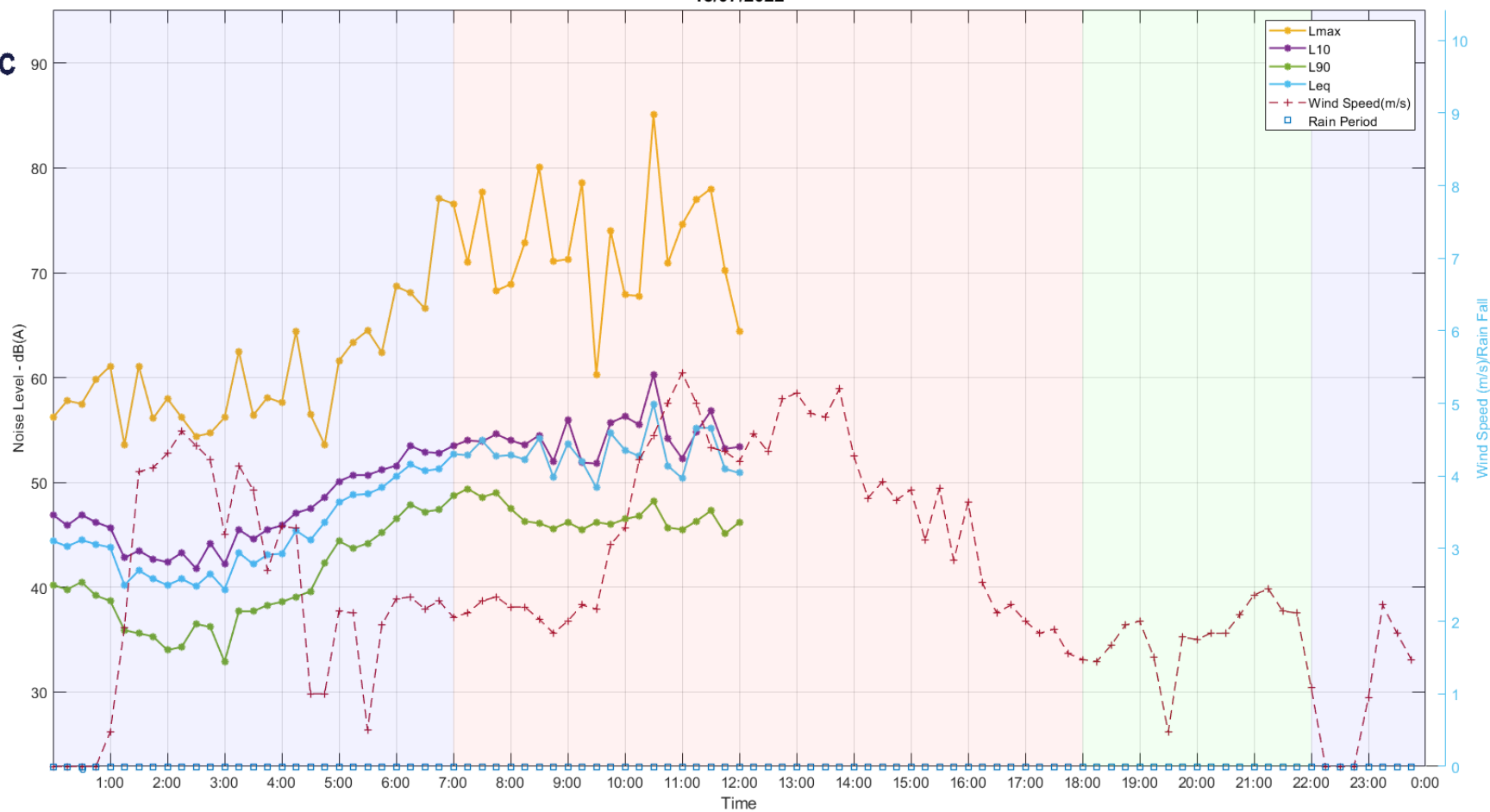




Wahroonga Stage 2- Empty Lot
17/07/2022



Wahroonga Stage 2- Empty Lot
18/07/2022



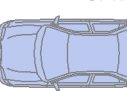
APPENDIX C – ARCHITECTURAL DRAWINGS

Number	Name
B1.02	STORAGE
B1.03	BIN STORE - APT
B1.04	LIFT LOBBY
B1.05	LIFT LOBBY
B1.06	MSSB
B1.07	BACK OF HOUSE
B1.08	STORAGE
B1.10	CENTRAL UPS ROOM
B1.11	BOH LOBBY
B1.14	STAFF ROOM
B1.15	ACC WC
B1.16	AMB WC
B1.17	AMB WC
B1.18	COMMERCIAL KITCHEN
B1.19	COLD ROOM
B1.20	COLD ROOM
B1.21	SA FAN ROOM
B1.23	SPRINKLER PUMP ROOM
B1.24	LOADING DOCK
B1.25	BIN STORE
B1.26	PALL CARE STORE
B1.27	RESI CARE STORE
B1.28	MAINT. WSHOP
B1.29	BACKUP GENERATOR
B1.30	EXHAUST FAN ROOM
B1.31	RESI CARE STORE
B1.32	PALL CARE STORE
B1.33	BOH LOBBY
B1.34	CLEAN STORE
B1.35	STORE
CHUTE	CHUTES
DB	DB
HR	HYD RISER
L.05	BOH LIFT
L.06	BOH LIFT
MR	MECH RISER
S.01	STAIR 01

- 12 x

SENIORS LIVING

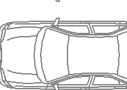
AS 2890.6 COMPLIANT CAR SPACES


- 26 x

VISITOR CAR SPACES


- 92 x

HAMMOND CARE/STAFF CAR SPACES


- 1 x

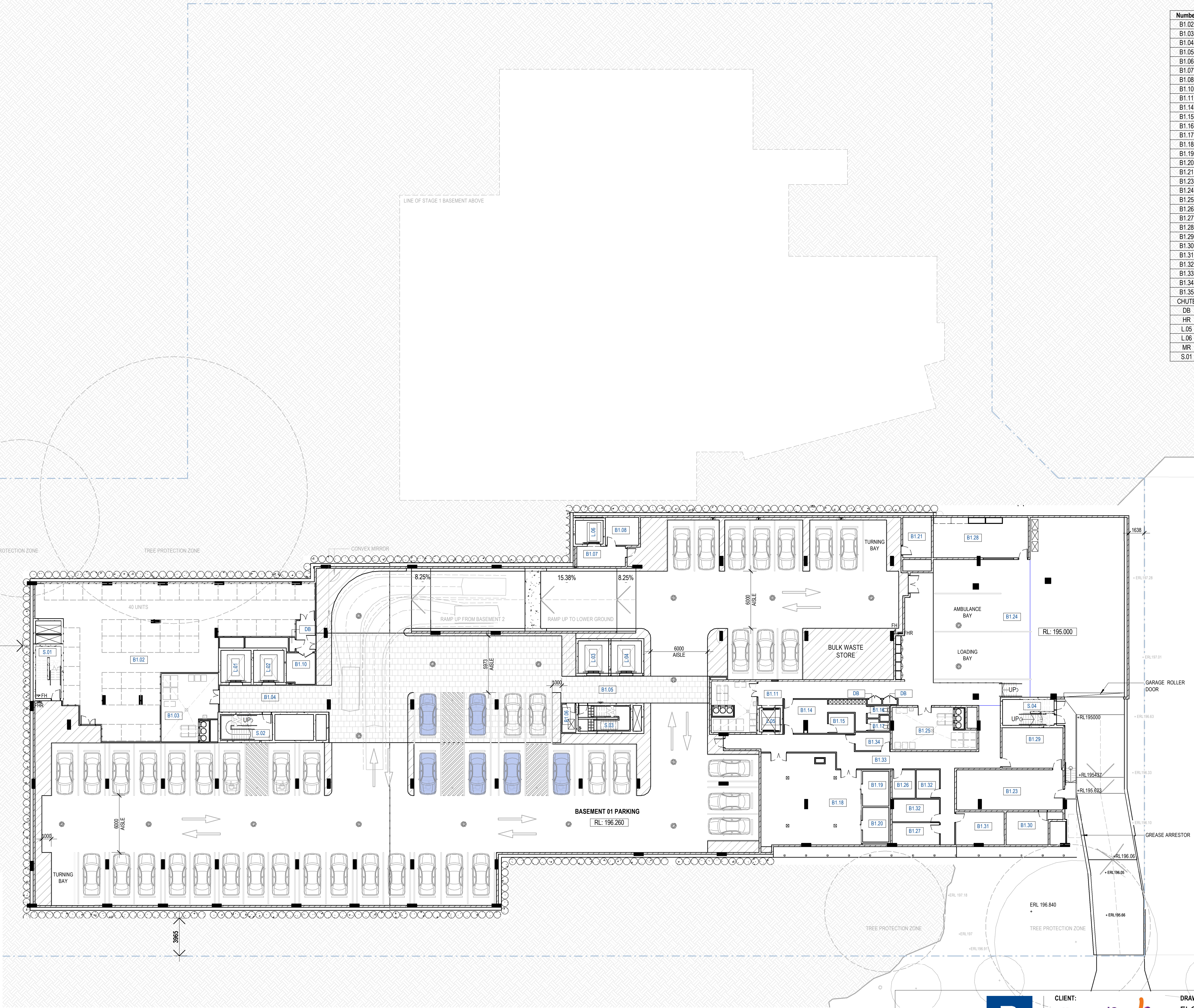
CAR WASH BAY


- TOTAL 130 CAR SPACES

AS 2890.6 COMPLIANT

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CLIENT:

HammondCare
Champion Life

PROJECT: 01368

WAHROONGA STAGE 2

4-12 NERINGAH AVE S,

WAHROONGA NSW 2076

DRAWING TITLE:

FLOOR PLAN - BASEMENT 1

DATE: OCT 2022

CHECKED: BF

DRAWN: RW, JC

SCALE: 1 : 200 @ A1

REVISION:

DG-03-02 P11

10/11/2022 5:19:21 PM

NSW NOMINATED ARCHITECT: ANDREW MASTERS (9037)

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Champion Life
PROJECT: 01368
WAHROONGA STAGE 2
4-12 NERINGAH AVE S,
WAHROONGA NSW 2076

DRAWING TITLE:
**FLOOR PLAN - LOWER
GROUND**
DATE: OCT 2022 SCALE: 1:200 @ A1
CHECKED: BF DRAWING: REVISION:
DRAWN: RW, JC DG-03-03 P10

10/11/2022 5:19:34 PM

NSW NOMINATED ARCHITECT: ANDREW MASTERS (9037)

- 12 x SENIORS LIVING
AS 2890.6 COMPLIANT CAR SPACES
- 26 x VISITOR CAR SPACES
- 92 x HAMMOND CARE/STAFF CAR SPACES
- 1 x CAR WASH BAY
- TOTAL 130 CAR SPACES**
AS 2890.6 COMPLIANT

LINE OF RESERVOR ABOVE

TREE PROTECTION ZONE

TREE PROTECTION ZONE

LOWER GROUND PARKING
RL: 199.600

HATCH DENOTES EXTENT
OF NEW WORK WITHIN
EXISTING BUILDING

EXISTING
WAHROONGA
BUILDING

STAGE 1

LANDSCAPED
'GREEN LID'
RL 199.525



NORTH

Number	Name
DB	DB
HR	HYD RISER
LG.01	BOH STORE
LG.02	STAFF ROOM
LG.03	SITTING
LG.04	POOL PLANT
LG.05	BIKE STORE
LG.06	MAIN COMMS ROOM
LG.07	FUNCTION ROOM
LG.08	FUNCTION ROOM
LG.09	FUNCTION ROOM
LG.10	LIFT LOBBY
LG.11	RECEPTION & WAITING
LG.12	AIRLOCK
LG.13	ACC WC
LG.14	AMB
LG.15	AMB
LG.16	FAMILY RM
LG.17	MTG
LG.18	DEBOXING
LG.19	SHOP
LG.20	COLD ROOM
LG.21	VEST.
LG.22	PARLOUR
LG.23	PARL. WC
LG.24	LIBRARY
LG.25	LAUNDRY
LG.26	LOUNGE
LG.27	DINING
LG.29	BOH CORRIDOR
LG.30	PANTRY
LG.31	DIN WC
LG.32	CORRIDOR
LG.33	BOH
LG.34	LINEN
LG.36	DIRTY
LG.37	TV RM
LG.38	LIFTER BAY
LG.39	LINEN
LG.40	SITTING
LG.41	STAFF ROOM
LG.42	FAN ROOM
LG.43	MAIN SWITCH ROOM
LG.44	COMMS
LG.45	CLEAN STORE
LG.46	STORE
LG.47	STORE
LG.48	STORE
LG.49	KITCHEN
LG.50	BEDROOM
LG.51	BEDROOM
LG.52	BEDROOM
LG.53	BEDROOM
LG.54	BEDROOM
LG.55	BEDROOM
LG.56	BEDROOM
LG.57	BEDROOM
LG.58	BEDROOM
LG.59	BEDROOM
LG.60	BEDROOM
LG.61	BEDROOM
LG.62	ENSUITE
LG.63	ENSUITE
LG.64	ENSUITE
LG.65	ENSUITE
LG.66	ENSUITE
LG.67	ENSUITE
LG.68	ENSUITE
LG.69	ENSUITE
LG.70	ENSUITE
LG.71	ENSUITE
LG.72	ENSUITE
LG.73	ENSUITE
LG.74	STORE
LG.75	LIFTER BAY
LG.76	STAFF WC
LG.77	BIN STORE
LG.78	STORE
LG.79	LIFTER BAY
MR	

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Number	Name
B	BEDROOM
DB	DB
E	ENS
G.01	POOL
G.02	COMMUNITY
G.03	GYM
G.04	CHANGE ROOM
G.05	COMMS
G.06	ACC WC
G.07	CLEANER / STORE
G.08	ACC WC
G.09	AIRLOCK
G.10	AMB WC
G.11	ADMIN
G.12	MCC CPD
G.13	MTG
G.14	QUIET
G.15	QUIET
G.16	QUIET
G.17	FIRE TUNNEL
G.18	FIRE TUNNEL
G.19	FIRE TUNNEL
G.20	BOH CORRIDOR
G.21	OVERNIGHT STAY
G.22	MTG
G.23	CAFE
G.24	GROUP THERAPY
G.25	MAIL
G.26	STAFF ROOM
G.27	CONCIERGE
G.28	WC
G.29	WC
G.30	BOH
G.31	SALON
G.32	STORE
G.33	BARBER
G.34	CHAPEL
G.35	ENTRY LOBBY
G.36	CONCIERGE
G.37	CONS
G.38	CONS
G.39	CONS
G.40	CONS
G.41	KITCHENETTE & LOUNGE
G.42	HUDDLE
G.43	N.U.M.
G.44	OVERNIGHT STAY - BATHROOM
G.45	KITCHEN
G.46	LIVING
G.47	KITCHEN
G.48	DINING
G.49	BEDROOM
G.50	ENS
G.51	DIN. WC
G.52	RECEPTION & WAITING
G.53	CONS
G.54	GROUP THERAPY
G.55	ACC WC
G.56	CONS
G.57	CONS
G.58	CONS
G.59	LIVING
G.60	CORRIDOR
G.61	CLEAN
G.62	MEDS
G.63	COMMS
G.64	STAFF WC
G.65	PHARMACY
G.66	GENERAL STORE
G.67	STAFF (MDT)
G.68	CLEANER
G.69	DIRTY
G.70	SITTING
G.71	CORRIDOR
G.72	SITTING
G.73	ACC WC
G.74	BOX ST.
G.75	CORRIDOR
G.76	BOH
G.77	DINING WC
G.78	DINING
G.79	STORAGE
G.80	STORAGE
G.81	EQUIPMENT STORE
G.82	JR DR
G.83	DR
G.84	KITCHEN
G.85	STORE
HR	HYD RISER
MCC	MCC CPD
MR	MECH RISER
S	STORAGE

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CLIENT:
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Champion Life

PROJECT: 01368
WAHROONGA STAGE 2
4-12 NERINGAH AVE S,
WAHROONGA NSW 2076

DRAWING TITLE:
FLOOR PLAN - GROUND

DATE: OCT 2022 SCALE: 1 : 200 @ A1

CHECKED: BF DRAWING: REVISION:
DRAWN: RW, JC DG-03-04 P10

9/11/2022 5:47:41 PM

NSW NOMINATED ARCHITECT: ANDREW MASTERS (9037)

Number	Name
H1	H1
H2	H2
L1.01	LIFT LOBBY
L1.02	CORRIDOR
L1.03	LIFT LOBBY
L1.04	CORRIDOR 1
L1.05	SHOWER TROLLEY
L1.06	HOIST
L1.07	
L1.08	REFUSE
L1.09	HWB
L1.10	DIRTY
L1.11	LIFTER BAY
L1.12	SHR T BAY
L1.13	ST. HWB
L1.14	SAFE ZONE
L1.15	DB
L1.16	DIRTY
L1.17	REFUSE
L1.18	COMMS
MCC	MCC CPD
MR	MECH RISER



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DRAWING TITLE:
FLOOR PLAN - LEVEL 1

DATE: OCT 2022
CHECKED: BF
DRAWN: RW, JC
SCALE: 1 : 200 @ A1
DRAWING: DG-03-05
REVISION: P10

9/11/2022 5:47:52 PM

NSW NOMINATED ARCHITECT: ANDREW MASTERS (9037)

Number	Name
L2.01	LIFT LOBBY
L2.02	CORRIDOR 1
L2.03	REFUSE
L2.04	HWB
L2.05	DIRTY
L2.06	LIFTER BAY
L2.07	SHR T BAY
L2.08	REFUSE
L2.09	SAFE ZONE
L2.10	DB
L2.11	SERVICES
L2.12	DIRTY
L2.13	HOIST
L2.14	SAFE ZONE
L2.15	SHOWER TROLLEY
L2.16	LIFT LOBBY
L2.17	COMMS
MR	MECH RISER



NERINGAH AVENUE



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WAHROONGA STAGE 2
4-12 NERINGAH AVE S,
WAHROONGA NSW 2076

DRAWING TITLE:
FLOOR PLAN - LEVEL 2

DATE: OCT 2022 SCALE: 1:200 @ A1

CHECKED: BF DRAWING: REVISION:

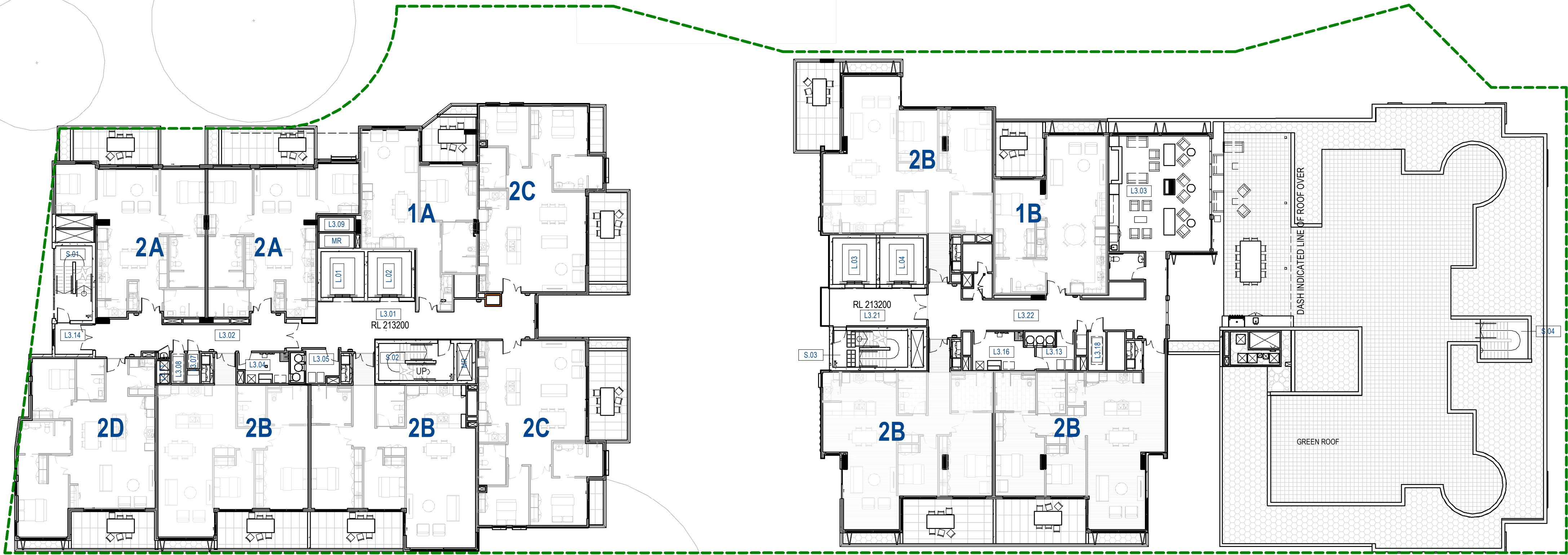
DRAWN: DG-03-06 P10

RW, JC

9/11/2022 5:48:05 PM

NSW NOMINATED ARCHITECT: ANDREW MASTERS (9037)

Number	Name
L3.01	LIFT LOBBY
L3.02	CORRIDOR 1
L3.03	COMMUNITY
L3.04	DIRTY
L3.05	REFUSE
L3.06	HWB
L3.07	LIFTER BAY
L3.08	SHR T BAY
L3.09	MECH RISER
L3.10	MECH RISER
L3.11	MECH RISER
L3.12	MECH PLANT
L3.13	REFUSE
L3.14	SAFE ZONE
L3.15	HOIST
L3.16	DIRTY
L3.17	DB
L3.18	SHOWER TROLLEY
L3.19	ACC WC
L3.20	AMB WC
L3.21	LIFT LOBBY
L3.22	CORRIDOR
MR	REF. PIPE RISER



NERINGAH AVENUE



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4-12 NERINGAH AVE S,
WAHROONGA NSW 2076

DRAWING TITLE:
FLOOR PLAN - LEVEL 3

DATE: OCT 2022 SCALE: 1:200 @ A1

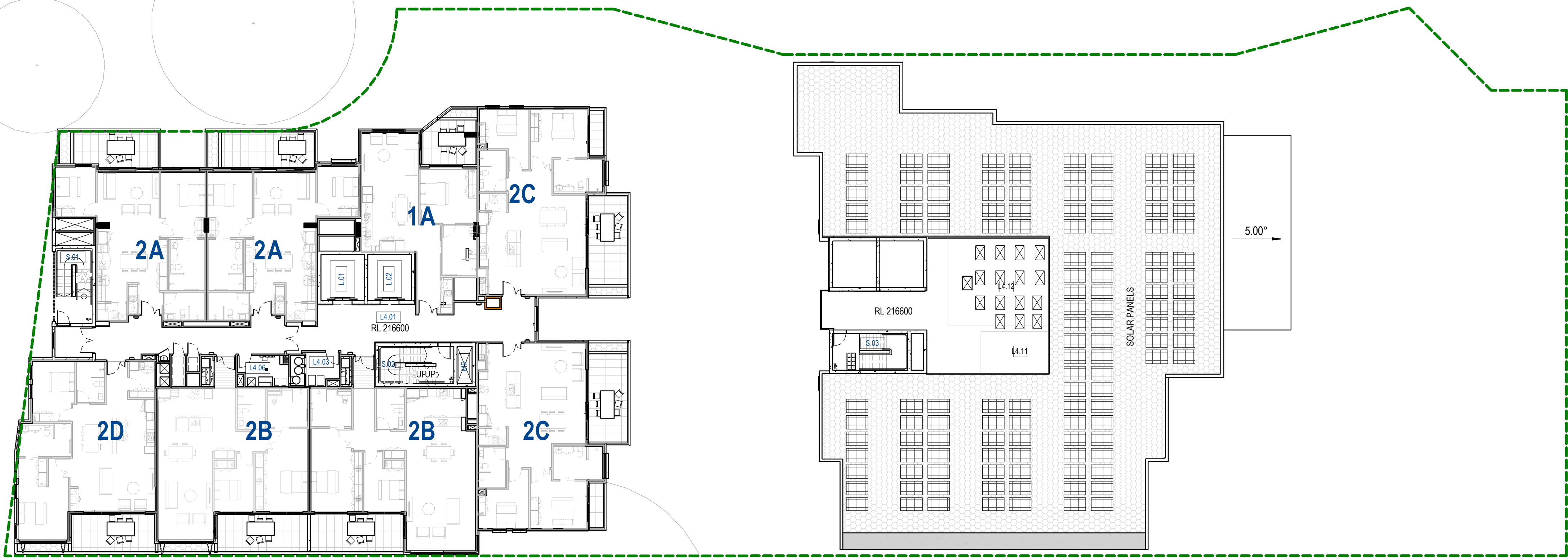
CHECKED: BF DRAWING: REVISION:

DRAWN: RW, JC DG-03-07 P10

9/11/2022 5:48:20 PM

NSW NOMINATED ARCHITECT: ANDREW MASTERS (9037)

Number	Name
L4.01	LIFT LOBBY
L4.02	CORRIDOR 1
L4.03	REFUSE
L4.04	HWB
L4.05	SHR T BAY
L4.06	DIRTY
L4.07	MECH RISER
L4.08	LIFTER BAY
L4.09	SAFE ZONE
L4.10	VERT. CIRCULATION
L4.11	HOT WATER PLANT
L4.12	PLANT
MR	MECH RISER



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PROJECT: 01368
WAHROONGA STAGE 2
4-12 NERINGAH AVE S,
WAHROONGA NSW 2076

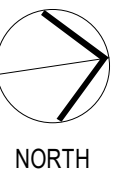
DRAWING TITLE:
FLOOR PLAN - LEVEL 4

DATE: OCT 2022 SCALE: 1 : 200 @ A1

CHECKED: BF DRAWING: REVISION:

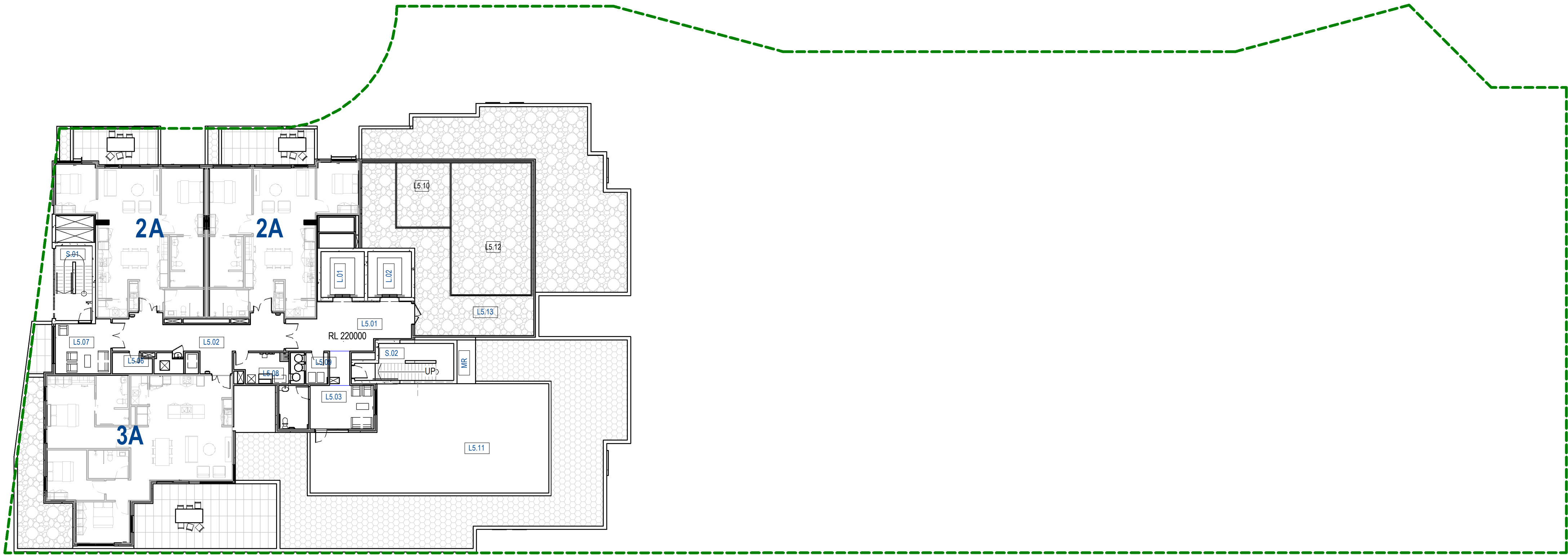
DRAWN: RW, JC DG-03-08 P10

NSW NOMINATED ARCHITECT: ANDREW MASTERS (9037)



NORTH

L5.01	LIFT LOBBY
L5.02	CORRIDOR 1
L5.03	OPEN LOUNGE
L5.04	ACC WC
L5.05	LIFTER BAY
L5.06	AMB WC
L5.07	FIREWORK LOUNGE
L5.08	DIRTY
L5.09	REFUSE
L5.10	HOT WATER PLANT
L5.11	GREEN ROOF
L5.12	MECH PLANT
L5.13	PLANT AREA
MR	MECH RISER



NORTH

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WAHROONGA STAGE 2
4-12 NERINGAH AVE S,
WAHROONGA NSW 2076

DRAWING TITLE:
FLOOR PLAN - LEVEL 5

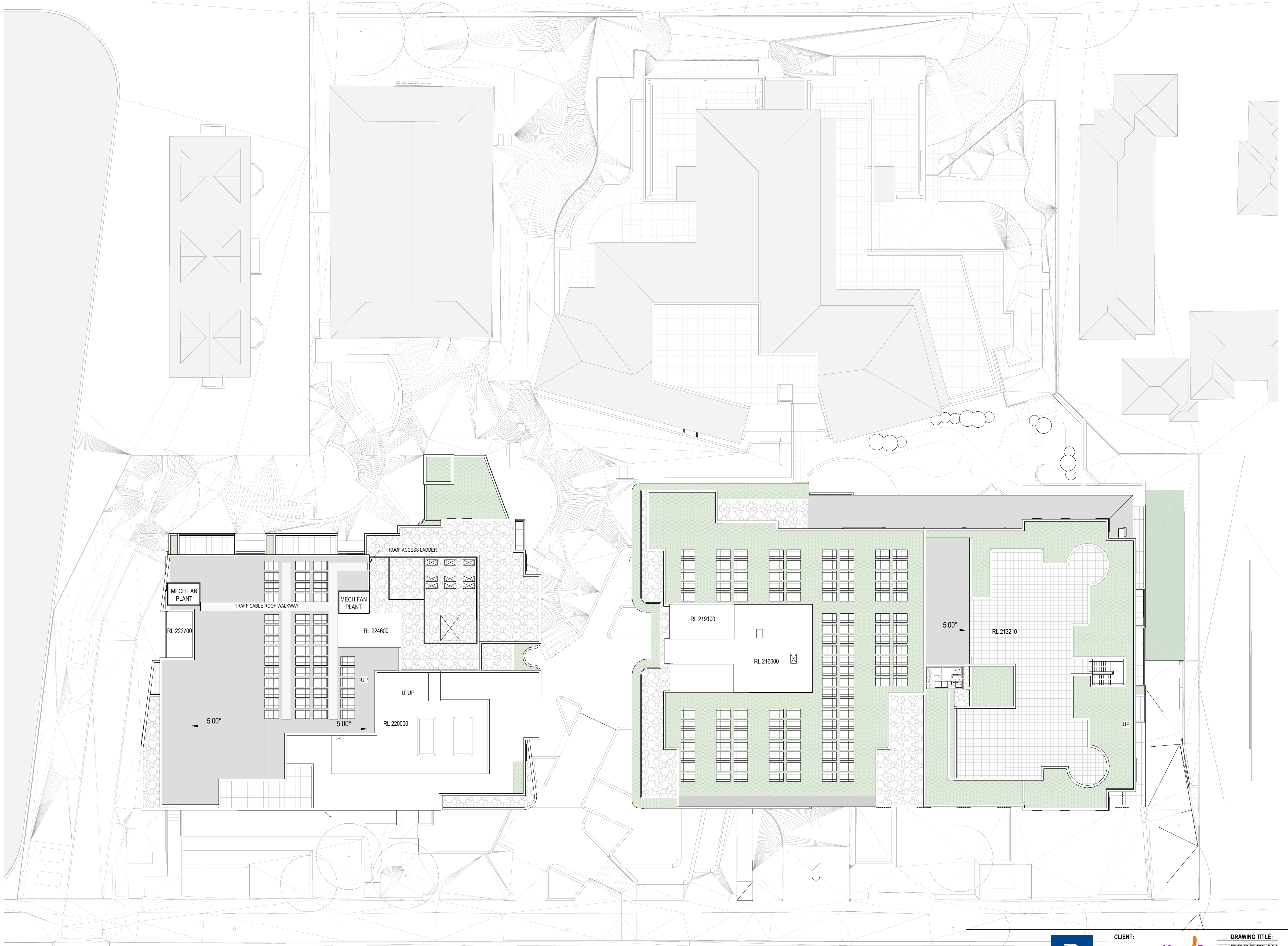
DATE: OCT 2022 SCALE: 1 : 200 @ A1

CHECKED: BF DRAWING: REVISION:

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NSW NOMINATED ARCHITECT: ANDREW MASTERS (9037)



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PROJECT: 01368
WAHROONGA STAGE 2
4-12 NERINGAH AVE S,
WAHROONGA NSW 2076

DRAWING TITLE:
ROOF PLAN

DATE: OCT 2022 SCALE:
CHECKED: BF DRAWING: REVISION:
DRAWN: RW, JC, SB DG-03-10 P4