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# Chisholm Retail Centre, Heritage Drive, Chisholm

# Noise Emission Assessment

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|---|---|
| Project ID | 20211540.1 |
| Document Title | Noise Emission Assessment |
| Attention To | Chisholm SC Pty Ltd ATF Chisholm SC Investment |

| Revision | Date | Document Reference | Prepared By | Checked By | Approved By |
|---|---|---|---|---|---|
| 0 | 14/12/2021 | 20211540.1/1412A/R0/RF | RF | | VF |
| 1 | 16/12/2021 | 20211540.1/1612A/R1/RF | RF | | VF |
| 2 | 21/12/2021 | 20211540.1/2112A/R2/RF | VF | | VF |
| 3 | 21/12/2021 | 20211540.1/2112A/R3/RF | RF | | VF |
| | | | | | |

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# 1 INTRODUCTION

This report has been prepared to assess noise emissions associated with the proposed Chisholm Retail Centre development located at Heritage Drive, Chisholm. The subject site and local context are indicated in Figure 1.

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

# 2 REFERENCED DOCUMENTS

## 2.1 BACKGROUND INFORMATION USED

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

- BN Architecture drawings dated 8/11/2021.
- Traffic and Parking Impact Assessment prepared by McClaren traffic Engineering and Road Safety Consultants (doc ref: 210550.01FA, dated 13/12/2021)

## 2.2 PLANNING GUIDELINES

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

- Maitland Development Control Plan (DCP) 2011;
- NSW EPA – 'Noise Policy for Industry' ("NPfI") October 2017;
- NSW Liquor and Gaming standard noise emission licence conditions.
- AAAC – 'Guideline for Childcare Centre Acoustic Assessment (v3)

# 3 SITE DESCRIPTION AND THE PROPOSAL

The project site is located at Heritage Drive, Chisholm. The primary proposed uses and hours of operation for the development are listed below:

- Retail Centre: 7:00am – 7:00pm
- Supermarket: 7:00am – 10:00pm
- Supermarket Loading Dock: 7:00am – 10:00pm
- Retail Tenancy Loading Dock: 7:00am – 7:00pm
- Licenced venue: 9:00am – midnight
- Gym: 24 hours/7 days
- Childcare Centre: 7:00am – 7:00pm
- Medical Centre: 7:00am – 10:00pm
- Basement and Ground Floor car park accommodating 661 vehicles 7:00am to 10:00pm

## 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 receivers and measurement locations is presented in Figure 1.

**Table 1 – Sensitive Receivers**

| Receiver (Refer Figure 1) | Land Use | Comment |
|---|---|---|
| R1 | Residential | Residential development located along Whitewater Drive to the west |
| R2 | Residential | Residential development located along Duskdarter Street to the south |
| R3 | Residential | Residential development located along Swiftwing Close to the south east |
| R4 | Residential | Future residential development to the south |
| C1 | Commercial | Commercial premises located along Heritage Drive to the north west |
| P1 | Passive Recreation | Whitewater Park to the west |
| CC1 | Childcare Centre | Childcare Centre to the south |
| S1 | School | Primary School located to the north |

## 3.2 ENVIRONMENTAL NOISE AND VIBRATION SOURCES

The following significant environmental noise sources have been identified:

- Traffic noise from Heritage Drive and other surrounding roadways
- Operational noise from nearby Childcare Centre
- Operational noise from nearby school.

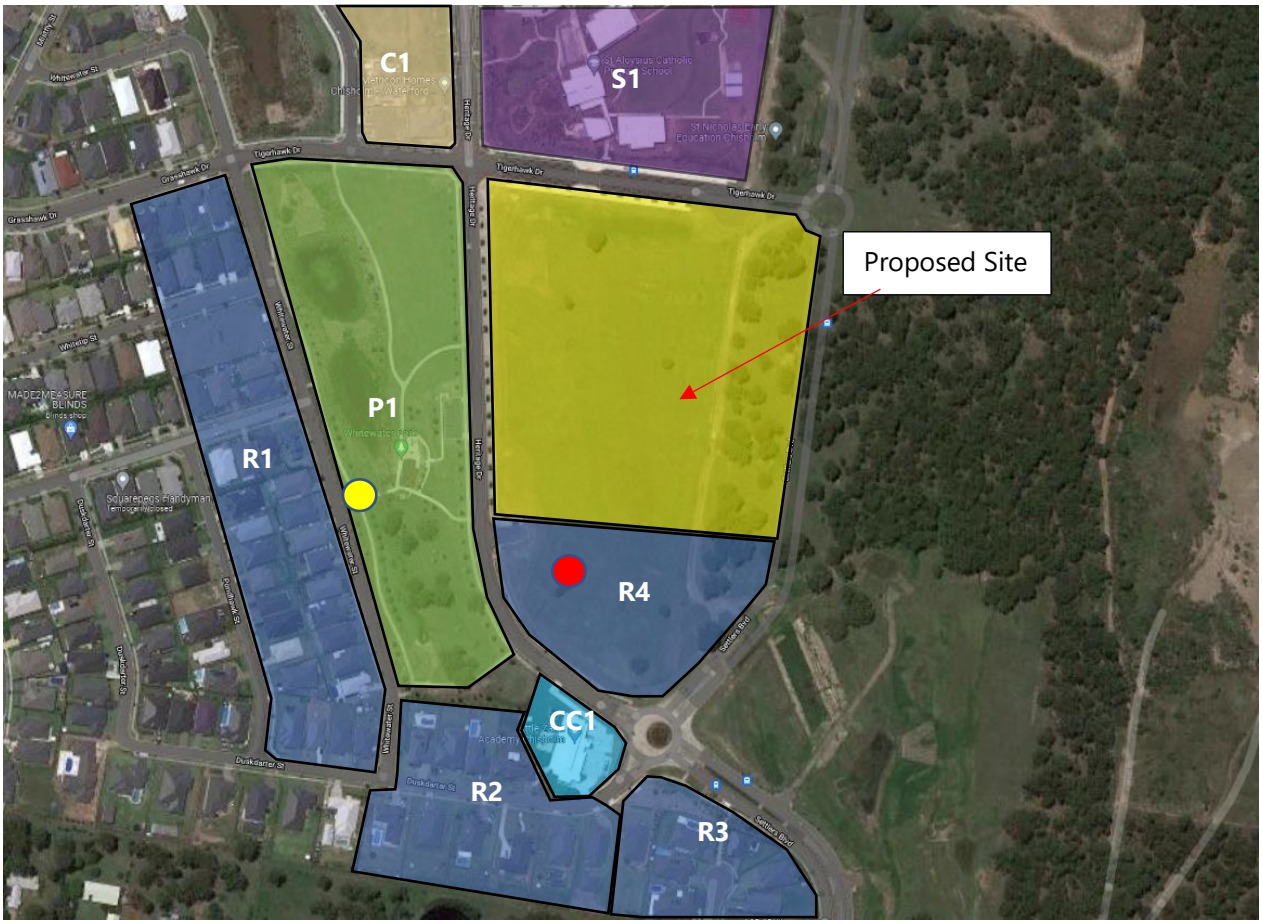



**Figure 1 – Site Plan Showing Monitoring Locations and Surrounding Land Uses/Receivers**

**(SOURCE: Google Maps)**

| | | |
|---|---|---|
| - Unattended Noise Monitoring Location | - Residential | - Childcare Centre |
| - Attended Noise Monitoring Location | - Commercial | - School |
| | - Passive Recreation | |

# 4 AMBIENT NOISE MONITORING

Monitoring has been undertaken to obtain the following background noise levels at the surrounding residential properties.

Figure 1 above shows the monitoring locations used.

## 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.

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).

**$L_{90}$** – 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 Equipment Used

Unattended noise monitoring was conducted using an Acoustic Research Laboratories Pty Ltd Ngara (Type 1) noise monitor.

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 Locations Monitored

The monitor was installed at the existing vacant land at the location of the proposed site. Refer to Figure 1 for detailed location and Figure 2 below for photograph of the installed monitor.

**Figure 2 – Photograph of noise monitor installed on site**

### 4.2.3 Calculated Noise Levels

Rating background noise 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 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 Maitland Airport.

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

The following table summarises the rating background noise levels determined for the day, evening and night periods as defined in the NPfI.

**Table 2 – NPfI Rating Background Noise Levels**

| **Location** | **Rating Background Noise Level (dB(A) $L_{90}$)** | | | |
|---|---|---|---|---|
| | Day | Evening | Night | Shoulder Period (10pm – midnight) |
| Residences Surrounding Site | **39** | **38** | **31** | **37** |

## 4.3 ATTENDED SHORT TERM NOISE MONITORING

### 4.3.1 Equipment Used

Attended noise monitoring was conducted using a Norsonic N-131 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.

### 4.3.2 Locations Monitored

The monitoring locations are indicated in Figure 1. The measurements were carried out to obtain the background noise spectrum characterising the area.

### 4.3.3 Results

**Table 3 - L90 Background Noise Spectrum**

| **Date/Time of Measurement** | **31.5Hz** | **63Hz** | **125Hz** | **250Hz** | **500Hz** | **1kHz** | **2kHz** | **4kHz** | **8kHz** | **A-wt** |
|---|---|---|---|---|---|---|---|---|---|---|
| 18/11/2021; between 1:00pm and 2:00pm | 43 | 43 | 36 | 31 | 29 | 29 | 25 | 21 | 17 | 33 |

# 5 NOISE EMISSION CRITERIA

Noise emission goals for the assessment of the various uses within the development have been determined in accordance with the requirements of the following:

- Maitland DCP 2011;
- NSW EPA 'Noise Policy for Industry' (NPfI) 2017; and
- Liquor and Gaming NSW.
- AAAC – 'Guideline for Childcare Centre Acoustic Assessment (v3)

## 5.1 MAITLAND DCP 2011

The Maitland DCP 2011 contains no specific numerical controls for noise emissions from commercial development.

## 5.2 NSW ENVIRONMENTAL PROTECTION AUTHORITY (EPA) *NOISE POLICY FOR INDUSTRY (NPFI) 2017*

The NSW EPA 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 must both be complied with, namely an intrusiveness criterion and amenity criterion.

### 5.2.1 Intrusiveness Criteria

The guideline is intended to limit the audibility of noise emissions at residential receivers and requires that noise emissions measured using the $L_{eq}$ descriptor not exceed the background noise level by more than 5dB(A). The intrusiveness criteria applicable to the development are presented in the table below.

**Table 4 – NPfI Intrusiveness Criteria**

| Time of Day | Rating Background Noise Level dB(A)$L_{90(15min)}$ | Project Noise Trigger Level (Intrusiveness) dB(A)$L_{eq(15min)}$ |
|---|---|---|
| Day (7am – 6pm) | 39 | 44 |
| Evening (6pm-10pm) | 38 | 43 |
| Night (10pm – 6am) | 31 | 36 |

### 5.2.2 Amenity Criteria

The guideline is intended to limit the absolute noise level from all plant 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 4 and zoning, the NPfI suggests the adoption of the 'suburban' categorisation.

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 project site are presented in Table 5 below.

**Table 5 – NPfI Amenity Criteria**

| Type of Receiver | Time of day | Recommended Noise Level dB(A)$L_{eq(period)}$ | Project Amenity Noise Level dB(A)$L_{eq(15min)}$ |
|---|---|---|---|
| Residential (Suburban) | Day (7:00am-6:00pm) | 50 | 48 |
| | Evening (6:00pm-10:00pm) | 45 | 43 |
| | Night (10:00pm-6:00am) | 40 | 38 |
| Commercial | When in use | 65 | 63 |
| Passive Recreation | When in use | 50 | 48 |
| Active recreation area (school playground) | Active recreation area (school playground) | 55 | 53 |
| School classroom – external* | Noisiest 1 hour when in use | 45 | 43 |

***External noise levels account for the 10dB façade reduction described in the EPA Noise Policy for Industry.**

### 5.2.3 Sleep Disturbance (Maximum Noise Level Event Assessment)

The potential for sleep disturbance from maximum noise level events from premises during the night-time period must be considered as the proposed operation extends into night-time hours. Sleep disturbance is considered to be both awakenings and disturbance to sleep stages. Where the subject development night-time noise levels at a residential location exceed:

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

A detailed maximum noise level event assessment should be undertaken.

### Table 6 - Sleep Arousal Emergence Criteria (Night)

| Location | Rating Background Noise Level - dB(A)L90 | Emergence Level |
|---|---|---|
| All Potentially Affected Residential Receivers | 37 (10:00pm – 12:00am) | 42 dB(A)$L_{eq,\ 15min}$; 52 dB(A)$L_{Fmax}$ |

If there are noise events that could exceed the emergence levels detailed in the table above, then an assessment of sleep arousal impact is required to be carried out, taking into account 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 EPA Road Noise Policy. Most relevantly, the Road Noise Policy states:

*For the 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 to two noise events per night with maximum internal noise levels of 65-70dB(A) are not likely to affect health and wellbeing significantly.*

#### 5.2.4 Summarised Noise Policy for Industry Requirements

### Table 7 – EPA NPI Project Noise Trigger Level (Residential)

| Receiver | Time Period | Rating Background Noise Level dB(A)$L_{90}$ | Project Amenity Criteria dB(A) $L_{eq}$ | Intrusiveness Criteria dB(A) $L_{eq(15min)}$ | NPI Criteria for Sleep Disturbance |
|---|---|---|---|---|---|
| Surrounding Residential development (R1/R2/R3) | Day | 39 | 48 | **44** | - |
| | Evening | 38 | 43 | **43** | - |
| | Night | 31 | 38 | **36** | - |
| | Shoulder Period (10:00pm – 12:00am) | 37 | - | - | **42 dB(A)$L_{eq,\ 15min}$; 52 dB(A)$L_{Fmax}$** |

Note: Project Noise Trigger Levels (PNTL) for each receiver/time period are indicated in bold.

### Table 8 – EPA NPI Project Noise Trigger Level (Non-Residential)

| Receiver | Time of Day | Amenity Criteria dB(A) $L_{eq,\ 15min}$ |
|---|---|---|
| School classroom – external | Noisiest 1 hour when in use | 43 |
| Place of worship – external | When in use | 48 |
| Passive recreation area | When in use | 48 |
| Active recreation area (school playground) | When in use | 53 |
| Commercial | When in use | 63 |
| Industrial | When in use | 68 |

## 5.3 NSW LIQUOR AND GAMING

Noise emissions from the licensed tavern must comply with the acoustic requirements generally imposed by the NSW office of Liquor Gaming. These guidelines relate to noise generated by patrons and by music. The requirements are set out below:

- *The $L_{10}$ noise level emitted from the premises shall not exceed 5dB above the background $L_{90}$ sound level in any Octave Band Centre Frequency (31.5kHz to 8kHz inclusive) between the hours of 7.00am to 12.00 midnight when assessed at the boundary of the nearest affected residential premises.*

- *$L_{10}$ noise level emitted from the premises shall not exceed the background $L_{90}$ sound level in any Octave Band Centre Frequency (31.5kHz to 8kHz inclusive) after midnight when assessed at the boundary of the nearest affected residential premises.*

- *After midnight, noise emissions from the Place of Public Entertainment are to be inaudible within any habitable rooms in nearby residential properties.*

The following residential assessment criteria have been determined based on the noise levels measured. These apply when measured outside the open window of a residential facade. The most sensitive period will be between 10pm and midnight, as this is the quietest period in which the premises will operate.

### Table 9 – Noise Emission Objectives Criterion (dB(A) $L_{10,15min}$) – Residential Boundary

| Time | 31.5Hz | 63Hz | 125Hz | 250Hz | 500Hz | 1kHz | 2kHz | 4kHz | 8kHz | A-wt |
|---|---|---|---|---|---|---|---|---|---|---|
| 10:00pm – 12:00am (BG+5dB) | 52 | 52 | 45 | 39 | 38 | 38 | 33 | 30 | 25 | 42 |

## 5.4 CRITERIA FOR NOISE EMISSIONS FROM CHILDCARE CENTRE

### 5.4.1 AAAC Guideline

The AAAC – *'Guideline for Childcare Centre Acoustic Assessment (v3)'* states the following regarding childcare centre noise emissions:

***OUTDOOR PLAY AREA***

***Base Criteria –*** *With the development of child care centres in residential areas, the background noise level within these areas can at certain times, be low. Thus, a base criterion of a contributed Leq,15min 45 dB(A) for the assessment of outdoor play is recommended in locations where the background noise level is less than 40 dB(A).*

***Background Greater Than 40 dB(A) –*** *The contributed Leq,15min noise level emitted from an outdoor play and internal activity areas shall not exceed the background noise level by more than 5 or 10 dB at the assessment location, depending on the usage of the outdoor play area. AAAC members regard that a total time limit of approximately 2 hours outdoor play per morning and afternoon period should allow an emergence above the background of 10 dB (ie background +10 dB if outdoor play is limited to 2 hours in the morning and 2 hours in the afternoon).*

***Up to 4 hours (total) per day –*** *If outdoor play is limited to no more than 2 hours in the morning and 2 hours in the afternoon, the contributed Leq,15 minute noise level emitted from the outdoor play shall not exceed the background noise level by more than 10 dB at the assessment location.*

***More than 4 hours (total) per day –*** *If outdoor play is not limited to no more than 2 hours in the morning and 2 hours in the afternoon, the contributed Leq,15 minute noise level emitted from the outdoor play area shall not exceed the background noise level by more than 5 dB at the assessment location.*

*The assessment location is defined as the most affected point on or within any residential receiver property boundary. Examples of this location may be:*

- *1.5 m above ground level;*
- *On a balcony at 1.5 m above floor level;*
- *Outside a window on the ground or higher floors.*

***OTHER NOISE EMISSION***

*The cumulative Leq,15 minute noise emission level resulting from the use and operation of the child care centre, with the exception of noise emission from outdoor play discussed above, shall not exceed the background noise level by more than 5 dB at the assessment location as defined above. This includes the noise emission resulting from:*

- *Indoor play;*
- *Mechanical plant;*
- *Drop off and pick up;*
- *Other activities/operations (not including outdoor play).*

### 5.4.2 Criteria for Noise Emissions to School

There are no specific Council requirements for childcare noise emissions to schools. However, the AAAC guideline states:

***3.4 Other Sensitive Receivers:*** *Where appropriate, assessment should include consideration of noise emission to other sensitive uses including schools, hospitals, places of worship and parks (active and passive). Depending on the requirements of the state or territory where the centre is located, in the absence of applicable noise criteria for such a sensitive use, the cumulative $L_{eq,15min}$ noise level emitted from the use and operation of the child care centre shall not exceed 65 dB(A), from all activities (including outdoor play), when assessed at the most affected point on or within the sensitive property boundary, and shall not exceed 45 dB(A) internally, with windows or doors of the sensitive receiver open.*

On this basis the school assessment criterion has been set at 55 dB(A) externally at the nearest school building, which corresponds to an internal noise level of 45 dB(A) with receiver windows open.

### 5.4.3 Summarised Noise Emission Criteria for Childcare Centre

**Table 10 – Summarised AAAC Criteria – OUTDOOR PLAY**

| Receiver | Time of Day | Measured Background Noise Level | AAAC Criteria (BG +10) up to four hours play per day | AAAC Criteria (BG +5) More than four hours play per day |
|---|---|---|---|---|
| Residential Receivers R1/R2/R3 | Day (7:00am to 6:00pm) | 39 dB(A) $L_{90}$ | 50* dB(A) $L_{eq\ (15\ min)}$ | 45* dB(A) $L_{eq\ (15\ min)}$ |
| | Evening (6:00pm to 7:00pm) | 38 dB(A) $L_{90}$ | 48 dB(A) $L_{eq\ (15\ min)}$ | 43 dB(A) $L_{eq\ (15\ min)}$ |
| School Receiver S1 | Day (7:00am to 6:00pm) | n/a | 55 dB(A) $L_{eq\ (15\ min)}$ | 55 dB(A) $L_{eq\ (15\ min)}$ |

*45 dB(A) base criterion Refer Section 5.4.1

**Table 11– Summarised AAAC Criteria – INDOOR PLAY**

| Receiver | Time of Day | Measured Background Noise Level | AAAC Criteria (BG +5) |
|---|---|---|---|
| Residential Receivers R1/R2/R3 | Day (7:00am to 6:00pm) | 39 dB(A) $L_{90}$ | 44 dB(A) $L_{eq\ (15\ min)}$ |
| | Evening (6:00pm to 7:00pm) | 38 dB(A) $L_{90}$ | 43 dB(A) $L_{eq\ (15\ min)}$ |
| School Receiver S1 | Day (7:00am to 6:00pm) | 55 dB(A) $L_{eq\ (15\ min)}$ | 55 dB(A) $L_{eq\ (15\ min)}$ |

## 5.5 NSW ROAD NOISE POLICY

This policy provides guidelines for the assessment of traffic noise generated by new developments on existing roads. Criteria set out by the RNP with regard to land use developments with potential to create additional traffic on local roads is detailed in the Table 12 below.

**Table 12– Road Noise Policy Criteria *(Section 2.3 – Table 3,RNP)***

| **Road category** | **Type of project / land use** | **Assessment criteria – dB(A)** | |
|---|---|---|---|
| | | Day (7 am – 10 pm) | Night (10 pm – 7 am) |
| Local Road | Existing residences affected by additional traffic on existing local roads generated by land use developments | 55 dB(A) $L_{eq\ (1hour)}$ (external) | 50 dB(A) $L_{eq\ (1hour)}$ (external) |

# 6 NOISE EMISSION ASSESSMENT

## 6.1 NOISE FROM MECHANICAL PLANT

Plant selection and final location has not been determined at this stage.

Satisfactory levels will be achievable through appropriate plant selection, location and if necessary, standard acoustic treatments such as barriers, duct lining, acoustic silencers and enclosures. Detailed acoustic reviews should be undertaken at CC stage to determine acoustic treatments to control noise emissions to satisfactory levels, as recommended in this assessment.

Notwithstanding the above, a preliminary assessment of mechanical plant noise emissions has been undertaken based on indicative rooftop plant locations provided, indicated in Figure 3 below. We note that, indicatively, noise from rooftop plant areas will be acceptable based on indicative locations detailed in Figure 3, provided each rooftop plant area has a sound power level (or treatment is provided to limit noise emissions) to approximately:

- 6am to 6pm – 84 dB(A)
- 6pm to 10pm – 83 dB(A)
- 10 pm to 7am - 76 dB(A).

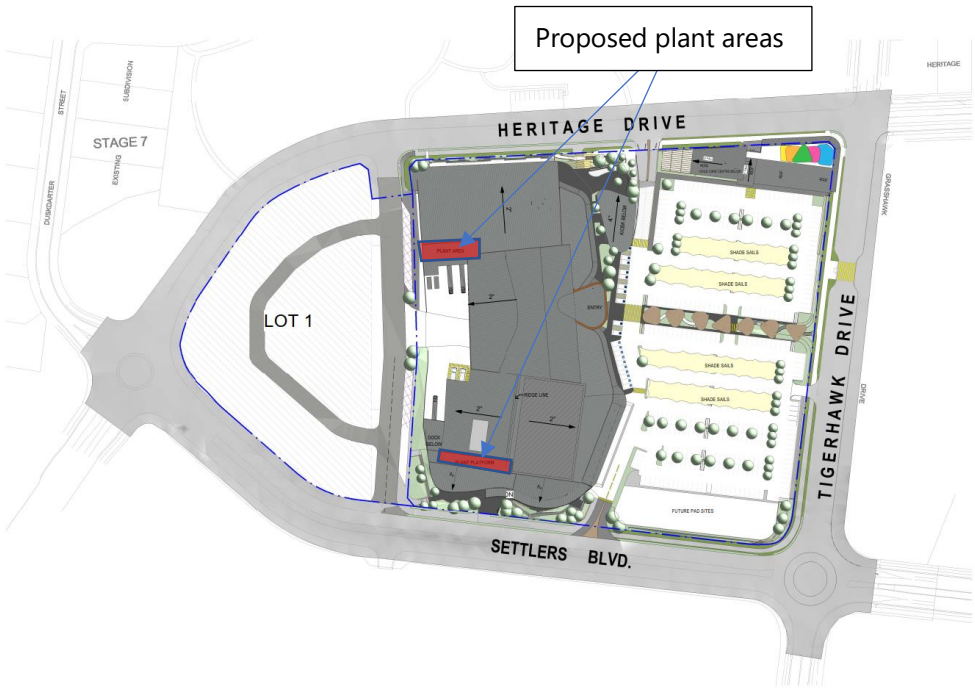



**Figure 3 – Site Plan Including Proposed Rooftop Plant Locations**

## 6.2 NOISE FROM TAVERN

Final layouts and operational details of the proposed licenced tavern are not available at this stage. It is assumed that the tavern will be subject to a separate development application once operators and layouts have been determined.

Notwithstanding the above, a preliminary assessment of noise emissions from the tavern has been presented below based on the information at hand.

### 6.2.1 Assumptions adopted with respect to noise emission calculations

Predicted noise levels from the venue are made based on the following assumptions:

- Proposed operating hours of 9:00am to 12:00am
- 500 patrons internally
- 25 patrons on external terrace
- Music sound pressure levels within the venue (internally) controlled as follows
    - Up to 75dB(A) $L_{10}$ uniform sound pressure level at all operation times.
    - A typical music sound spectrum as follows:

| Noise Source | 63Hz | 125Hz | 250Hz | 500Hz | 1kHz | 2kHz | 4kHz | 8kHz | A-wt |
|---|---|---|---|---|---|---|---|---|---|
| Amplified Music | 71 | 77 | 70 | 72 | 71 | 66 | 57 | 59 | 75 |

- Typical patron vocal sound power levels as follows:
    - Up to 77dB(A)$L_{10}$ with 1 in 2 people speaking (raised voice)
    - A typical sound spectrum of a patron as follows:

| Noise Source | 63Hz | 125Hz | 250Hz | 500Hz | 1kHz | 2kHz | 4kHz | 8kHz | A-wt |
|---|---|---|---|---|---|---|---|---|---|
| Raised Voice | 62 | 70 | 70 | 76 | 73 | 68 | 59 | 47 | 77 |

### 6.2.2 Predicted Noise Emissions

Predicted noise levels are presented below. In all instances, predictions have been made against the most stringent criterion applicable to the residence, school or commercial premises. Compliance with this criterion will result in compliance with all other criteria applicable to the development site.

**Table 13 - Predicted Noise Emissions (Day/Evening) – Most Impacted Residential Receiver (R1)**

| Location | 31Hz | 63Hz | 125Hz | 250Hz | 500Hz | 1kHz | 2kHz | 4kHz | 8kHz | A-wt |
|---|---|---|---|---|---|---|---|---|---|---|
| Predicted Noise Levels dB $L_{10}$ | 27 | 27 | 34 | 33 | 39 | 36 | 31 | 22 | 10 | **40** |
| Criteria dB $L_{10}$ (BG + 5) | 53 | 53 | 46 | 40 | 39 | 39 | 34 | 31 | 26 | **43** |
| Compliance | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

**Table 14 - Predicted Noise Emission (10:00pm to 12:00am) – Most Impacted Residential Receiver (R1)**

| Location | 31Hz | 63Hz | 125Hz | 250Hz | 500Hz | 1kHz | 2kHz | 4kHz | 8kHz | A-wt |
|---|---|---|---|---|---|---|---|---|---|---|
| Predicted Noise Levels dB $L_{10}$ | 27 | 18 | 20 | 15 | 18 | 13 | <10 | <10 | <10 | **40** |
| Criteria dB $L_{10}$ (BG + 5) | 52 | 52 | 45 | 39 | 38 | 38 | 33 | 30 | 25 | **42** |
| Compliance | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

Noise emissions to the school has been assessed based on an intrusiveness criterion of 44 dB(A) (daytime), and the predicted noise level at the closest school building is compliant.

## 6.3 NOISE FROM CHILDCARE CENTRE

Noise emissions from the childcare has been assessed in accordance with the AAAC criteria outlined in Section 5.4.3.

Proposed hours of operation of the childcare centre are Monday to Friday 7am to 7pm.

A total of 112 childcare spaces have been proposed, with a mixture of ages to be accommodated. The current breakdown of numbers is:

- 0-2 years old (babies) – 28 places
- 2-3 year (toddlers) – 40 places
- 3-5 years old (pre school) – 44 places

### 6.3.1 Data and Assumptions

The following noise source data and assumptions will be the basis for the detailed assessment of noise from the childcare centre.

#### 6.3.1.1 Outdoor Play Sound Power Level (SWL)

Noise emissions from outdoor play activities were predicted using the mid- point level of Sound Power Level data recommended by AAAC Technical Guideline Child Care Centre Noise Assessment, detailed in Table 15 below.

**Table 15 –Sound Power Levels (Mid-Point)**
**(Source: AAAC Technical Guideline Child Care Centre Noise Assessment)**

| Number of Children | Age | Sound Power Level |
|---|---|---|
| 10 | 0 – 2 Years | 78 dB(A) |
| 10 | 2 – 3 Years | 85 dB(A) |
| 10 | 3 – 6 Years | 87 dB(A) |

#### 6.3.1.2 Indoor Play / Teaching Sound Pressure Level (SPL)

Noise Levels generated from indoor activities (i.e. lessons) are 75 dB(A) Sound Pressure Level based on data held from measurements at similar sites.

### 6.3.2 Predicted Noise Levels

Predicted noise levels from the operation of the childcare centre are presented below.

#### 6.3.2.1 Outdoor Playing Noise

##### 6.3.2.1.1 Ground Floor Outdoor Play Area

The outdoor play noise has been predicted based on the following assumptions:

- Children evenly distributed in each play area as follows:
  - Southern Play Area
    - 28 x 0-2 years
  - Northern Play Area
    - 40 x 2-3 years
    - 44 x 3-5 years

We note that R1 is the nearest external residential receiver with line of sight to the outdoor play area. Compliance at the worst affected point at R1 will result at compliance at all other external residential receivers.

The predicted cumulative noise levels at the nearest noise receivers have been summarised in Table 16 below. Noise to residential receivers has been assessed against the more stringent evening criterion.

**Table 16 –Predicted Ground Floor Outdoor Play Noise Levels at Receivers**

| Noise Receiver | Predicted Noise Levels | Criteria | Comments |
|---|---|---|---|
| R1<br>Residential | 36 dB(A) $L_{eq}$ | 43 dB(A) $L_{eq\ (15\ min)}$<br>(BG+5 dB(A))<br>**AAC Guideline (evening)** | Complies with noise emission requirements* |
| S1<br>School | 40 dB(A) $L_{eq}$ | 55 dB(A) assuming operates during normal school hours | Complies with noise emission requirements* |

*Refer Section 7.2 for recommended treatments and management controls to achieve compliant noise levels as detailed above.

#### 6.3.2.2 Indoor Play Noise

Noise from indoor play has been calculated based on the assumptions below:

- 112 children total inside the 6 dedicated activity areas as indicated on the architectural drawings.
- All windows/doors to play rooms open as a worst case scenario.

We note that R1 is the nearest external residential receiver with line of sight to the outdoor play area. Compliance at the worst affected point at R1 will result at compliance at all other external residential receivers.

The predicted cumulative noise levels at the nearest noise receivers have been summarised in Table 17.

**Table 17 –Predicted Cumulative Indoor Play Noise Levels at Receivers**

| Noise Receiver | Predicted Noise Levels | Criteria | Comments |
|---|---|---|---|
| R1<br>Residential | **41 dB(A) $L_{eq}$ | 43 dB(A) $L_{eq}$<br>(BG+5 dB(A))<br>**AAC Guideline (Evening)** | Complies with noise emission requirements* |
| S1<br>School | 34 dB(A) $L_{eq}$ | 55 dB(A) assuming operates during normal school hours | Complies with noise emission requirements* |

**We note that façade being fully opened to all play rooms is a worst case scenario. As such, noise emissions are generally expected to be significantly lower as typically the centres are air-conditioned and windows can be closed during higher noise producing activities.

### 6.3.3 Traffic Generation on Existing Roads

Due to the existing low levels of traffic along surrounding roadways, traffic noise generated by the development may result in some level of acoustic impact to adjacent residents. Predicted increases in noise levels from traffic generation have been based on the expected volume of peak period road traffic volumes as a result of the childcare centre as detailed in the Traffic and Parking Impact Assessment prepared by McClaren Traffic Engineering and Road Safety Consultants (doc ref: 210550.01FA, dated 13/12/2021), and is presented in Table 18.

**Table 18 –Predicted Car Park Noise Levels at Receivers**

| Noise Receiver | Predicted Noise Levels | Criteria dB(A) $L_{eq}$ | Compliance |
|---|---|---|---|
| R1<br>(Residential West) | 48 dB(A) $L_{eq(1hour)}$<br>(External) | 55dB(A)$L_{eq(1hour)}$<br>(External) | Yes |

## 6.4 NOISE FROM LOADING DOCK

Noise from use of the loading dock will be assessed to comply with the NSW EPA Noise Policy for Industry criteria detailed in Section 5.2.

### 6.4.1 Assumptions adopted with respect to noise emission calculations

Noise emissions from use of loading dock have been predicted based on the following assumptions:

- Sound power level of truck manoeuvring of 100 dB(A)
- Peak vehicle movement of 1 truck per 15 minute period
- The recommendations in Section 7 of this report are implemented

### 6.4.2 Predicted Noise Emissions

Predictions have been made to the nearest receivers during the most stringent time periods, compliance at which will result in compliance at all other receivers and time periods.

**Table 19 – Predicted Loading Dock Noise Emissions**

| Noise Source | Receiver | Time of Day | Predicted Noise Level | Criteria | Compliance |
|---|---|---|---|---|---|
| Truck Movement | R4 | Evening (6:00pm – 10:00pm) | 43 dB(A) $L_{eq(15min)}$ | 43 $L_{eq(15min)}$ **(NPfI Evening Intrusiveness Criteria – Refer Section 5.2.4)** | Yes |

## 6.5 NOISE FROM CAR PARK

Noise emissions from the car park servicing the development are based on the estimated traffic generation created by the development, detailed in the Traffic and Parking Impact Assessment prepared by McClaren traffic Engineering and Road Safety Consultants (doc ref: 210550.01FA, dated 13/12/2021).

Estimated traffic generation is as follows:

- Weekday AM peak traffic period: 590 trips
- Weekday PM peak traffic period: 1106 trips
- Weekend Midday peak traffic period: 1189 trips

### 6.5.1 Predicted Car Park Noise Emissions

**Table 20 – Predicted Car Park Noise Emissions**

| Time of Day | Predicted Noise Level dB(A) $L_{eq(15min)}$ | Criteria dB(A) $L_{eq(15min)}$ | Comments |
|---|---|---|---|
| Weekday AM peak traffic period | 34 | 44 | Achieves project noise emission criteria |
| Weekday PM peak traffic period | 37 | 44 | |
| Weekend midday peak traffic period | 38 | 44 | |

Noise emissions from vehicles outside peak period will be significantly lower. The car spaces are sufficiently distant from any residential receivers so that night time movements will not adversely impact the nearest residential receivers.

## 6.6 NOISE FROM RETAIL TENANCIES

Most of the future tenancies are expected to be low noise emitters. However, as the actual uses will depend on the actual uses of the tenants. While general retail uses would not emit significant noise, it is recommended that the larger of the proposed retail/commercial/hospitality uses within the site, non-typical uses (amusement centres and the like) and all plant proposed to be installed be subject to a separate development application once specific uses and operators have been determined. At this time, individual tenancies should demonstrate that noise emission requirements are able to be met, and the specific management controls/building/plant treatments which may be implemented to ensure compliance. Furthermore, the cumulative impacts of noise from the combined operation of all retail tenancies should be considered when assessing noise from individual tenancies.

# 7 RECOMMENDATIONS

## 7.1 TAVERN

Noise emissions from the tavern to the school located to the north during school operating hours and residences to the west at night will need to be managed to achieve compliance with the proposed noise objectives. This may include one or more of the following:

- Façade glazing to be heavy glazing with acoustic seals to all opening windows/doors.
- Limit the area of façade openings (windows and doors) openings to the tavern facade during school hours.
- Install additional barriers to the boundary of terrace.
- Limit outdoor seating.
- Indoor patron capacity limits.
- Music inside the venue to be electronically limited.
- No music to be played in the outdoor seating areas.
- Signage to be displayed at venue instructing patrons to depart in a quiet and orderly manner.

A separate, detailed assessment be carried out prior to development approval of the tavern assessing noise emissions from patrons, music and plant proposed. It should consider noise emissions to residential receivers and the school (during school hours) so as not to exceed the noise levels recommended in this report and make appropriate physical and management recommendations.

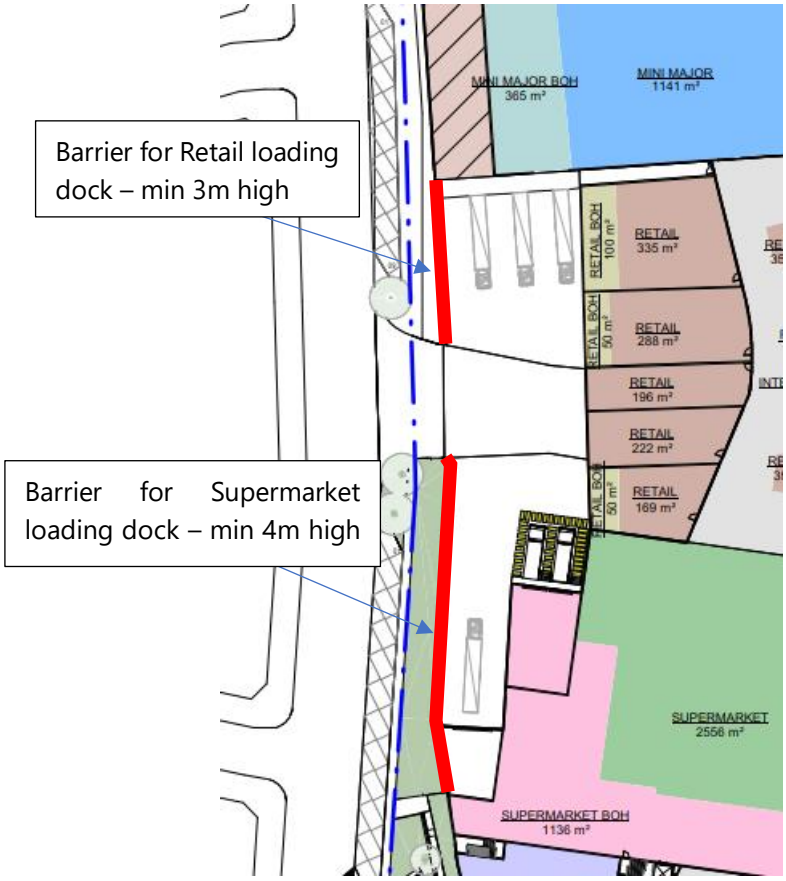
## 7.2 CHILDCARE CENTRE OPERATION

Recommended building treatments and management controls to control noise emissions from the indoor/outdoor play area of the childcare centre are detailed below.

- A 1.5m high barrier is to be constructed along the northern, southern and western boundaries of the childcare centre as indicated on architectural drawings.
- Barriers are to be constructed of solid, imperforate material with no gaps having a surface density exceeding 8 kg/m2.
- Signs reminding staff and visitors to minimise noise at all times shall be installed at entry / exit points from the childcare centre.
- Management is to ensure children are supervised at all times to minimise noise generated by the children whenever practical and possible.
- Install a contact phone number at the front of the centre so that any complaints regarding centre operation can be made.
- The facility must not hold more than 112 children at any one time.
- Regular landscape maintenance which requires powered tools should be undertaken during daytime hours only (7am – 6pm).
- Internal cleaning activities should be undertaken with all façades (windows and doors) closed and may be undertaken at any time.

## 7.3 LOADING DOCK

- Loading docks are to be screened from the residences to the south with a minimum 4m high barrier for the Supermarket and 3m high for the general retail. See markup below for extent of barriers.
- Barriers are to be constructed of solid, imperforate material with no gaps having a surface density exceeding 8 kg/m2.




## 7.4 FUTURE ASSESSMENTS

It is recommended that a more detailed assessment of noise emissions be carried out as part of any development application (when additional details are known) for the following tenancies:

- Major tenancies, gym, entertainment uses.
- Plant and equipment.

Further assessments prior to CC determination and detailed design may also be required, particularly in respect of plant emissions as detailed selections may only be available at that time.

# 8 CONCLUSION

The report presents our investigation into noise emissions from the proposed Chisholm Retail Centre development to be located at Heritage Drive, Chisholm.

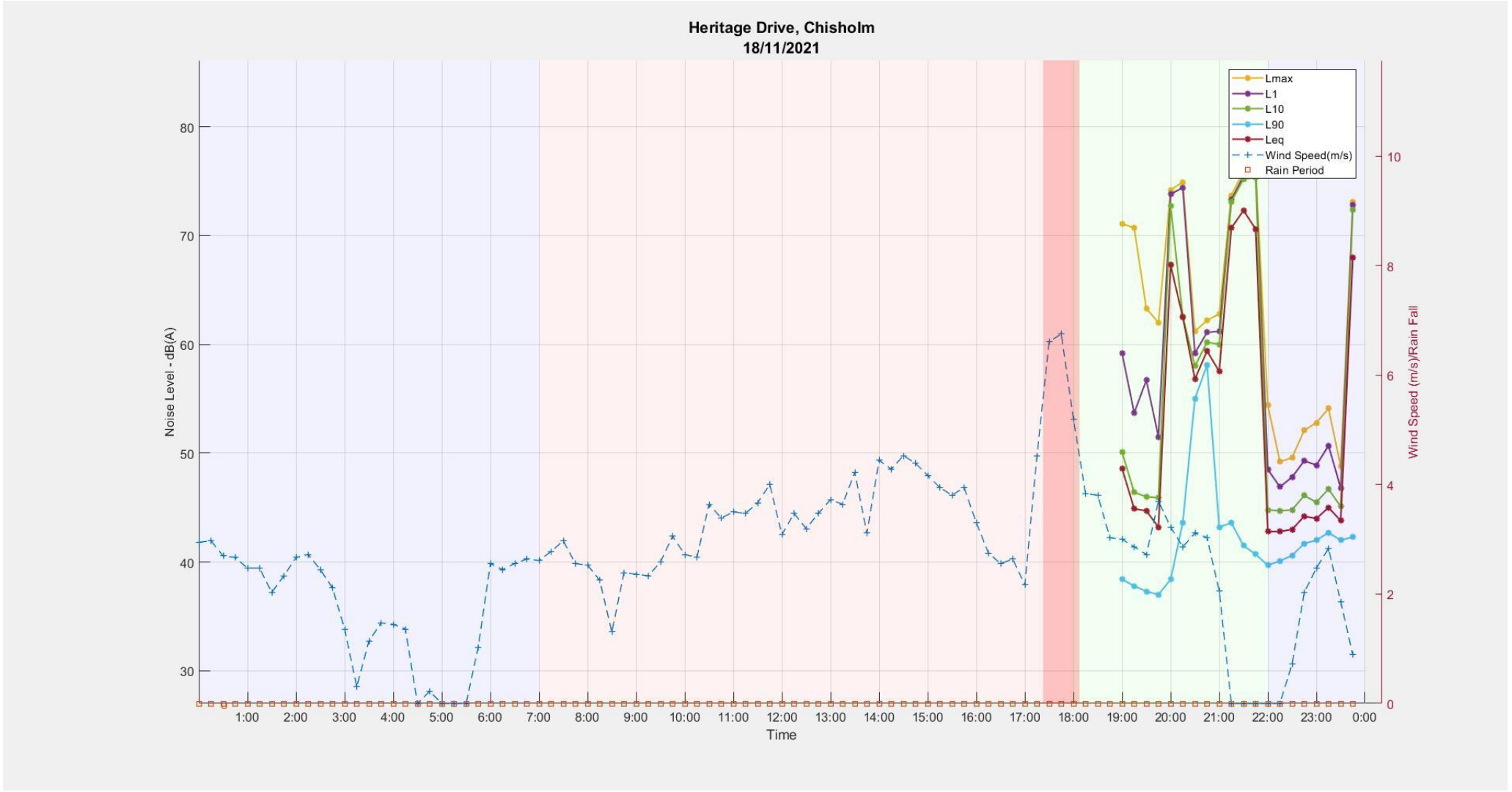
Provided the recommendations made in Section 7 of this report are implemented, the development will be capable of achieving the noise emission criteria outlined in Section 5. A further detailed noise assessment is to be undertaken for each separate use once operators, layouts and operational details are finalised.

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

Yours faithfully,

Acoustic Logic Pty Ltd
Ross Ferraro

# APPENDIX A - UNATTENDED NOISE MONITORING DATA


Heritage Drive, Chisholm
18/11/2021
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
Lmax
L1
L10
L90
Leq
Wind Speed(m/s)
Rain Period
80
70
60
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40
30
10
8
6
4
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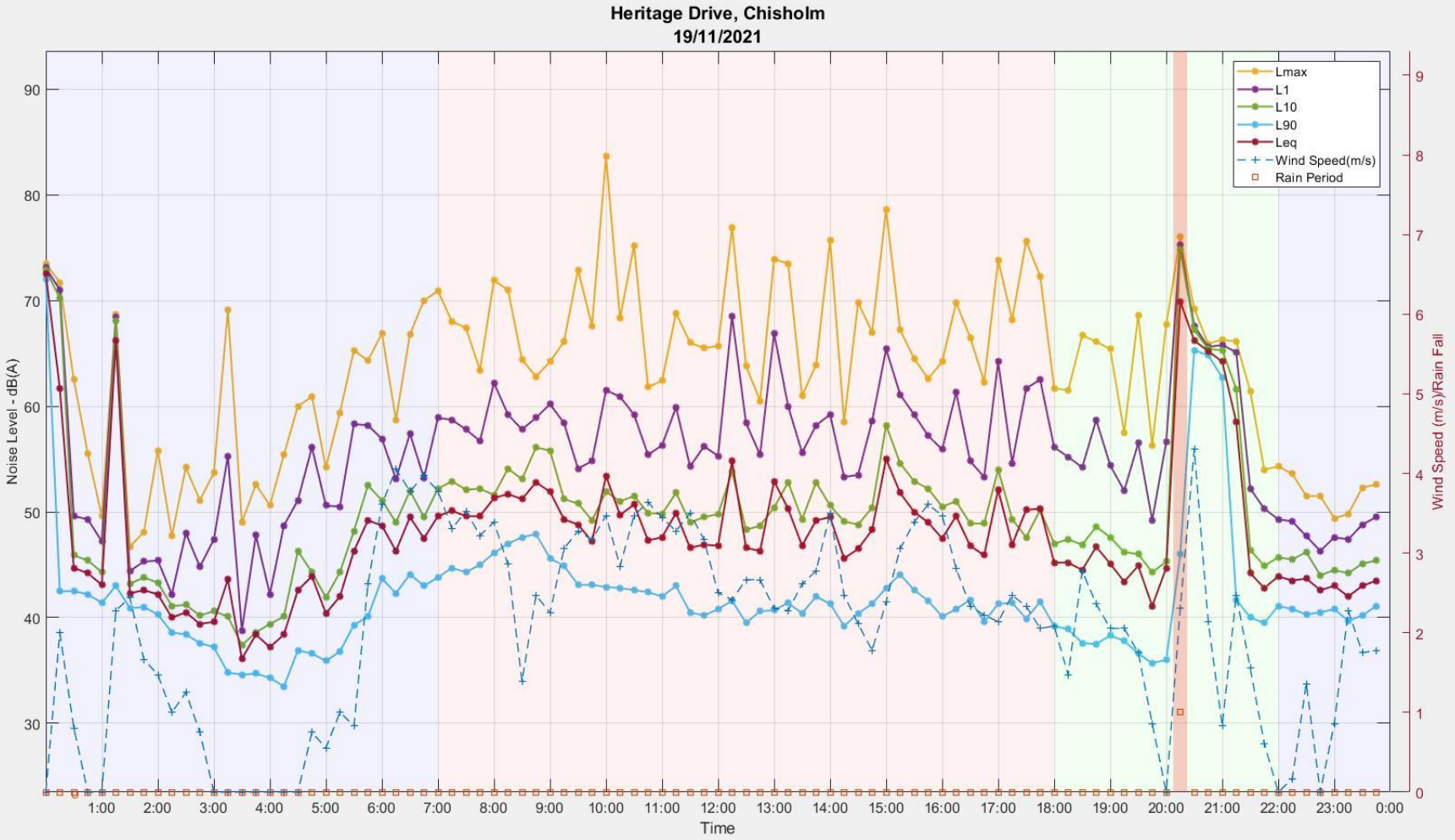
Heritage Drive, Chisholm
19/11/2021
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Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
Time
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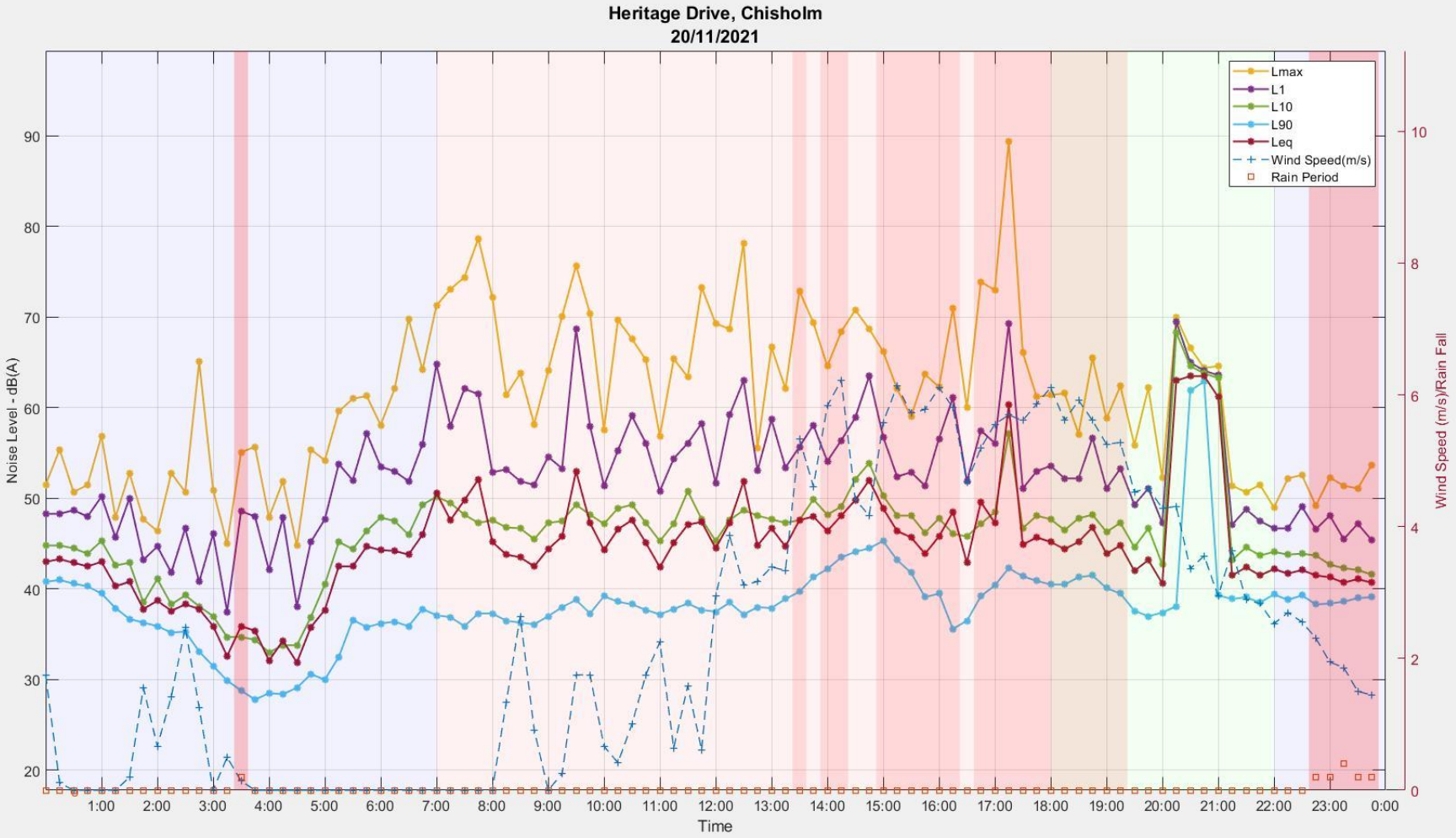
Heritage Drive, Chisholm
20/11/2021
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Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
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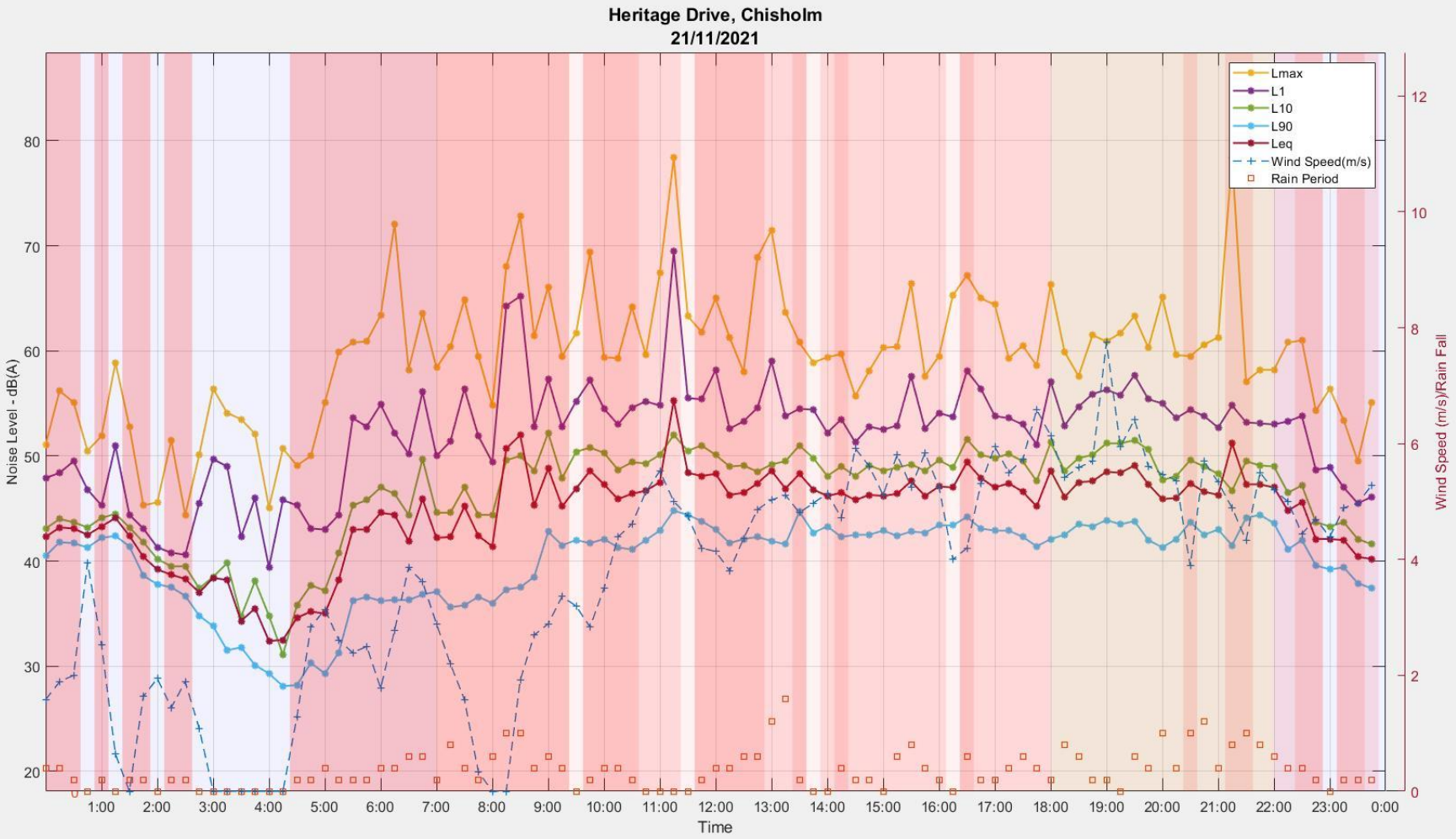
Heritage Drive, Chisholm
21/11/2021
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Wind Speed(m/s)
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Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
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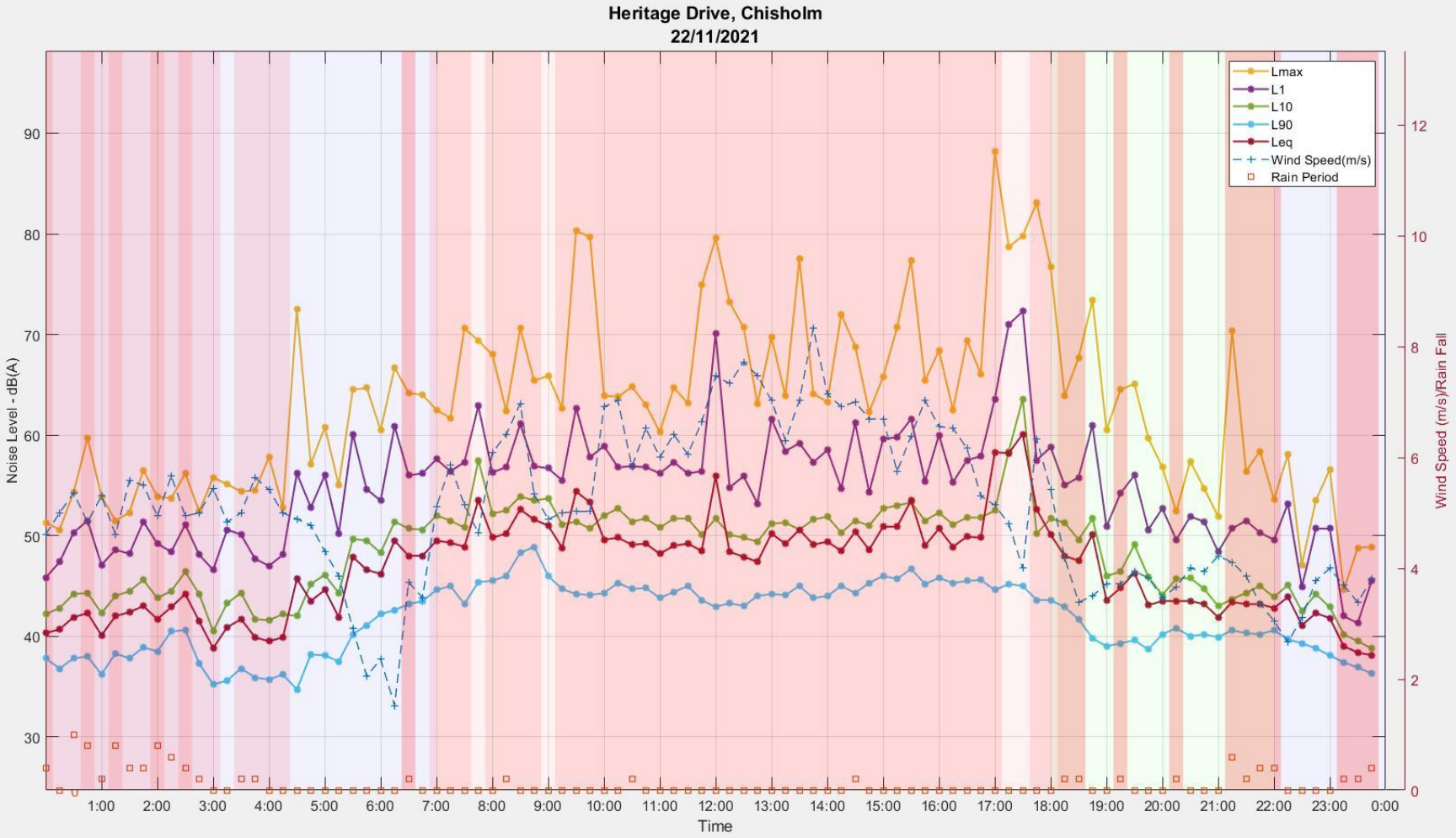
Heritage Drive, Chisholm
22/11/2021
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Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
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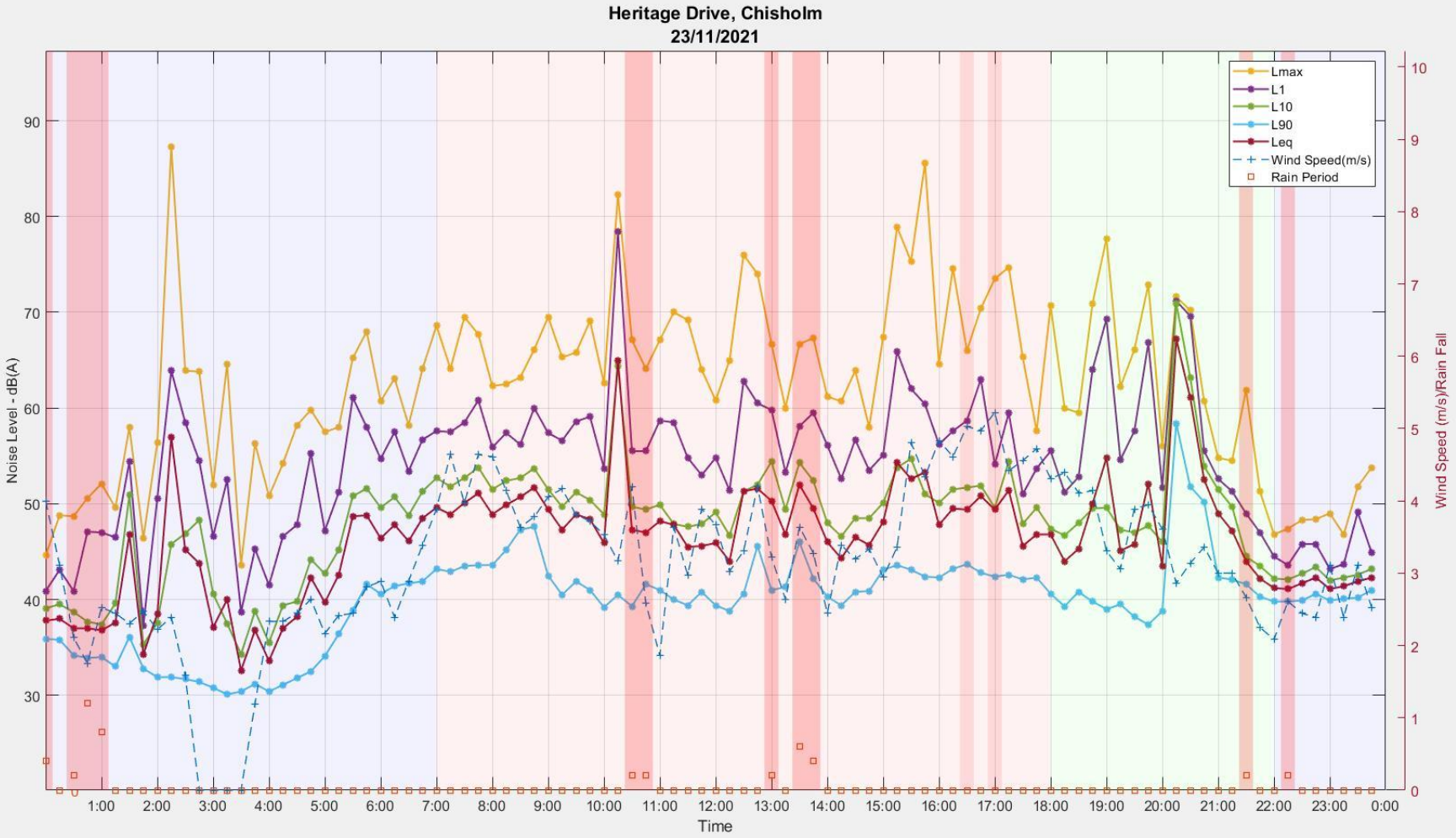
Heritage Drive, Chisholm
23/11/2021
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Wind Speed(m/s)
Rain Period
Noise Level - dB(A)
Wind Speed (m/s)/Rain Fall
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