# Noise & Vibration Impact Assessment For DA

## 11-13 ALBERT ROAD& 2-6 PILGRIM AVENUE, STRATHFIELD 2135

PREPARED FOR

**Convertia Pty Ltd**

PREPARED BY

**Dural Group Pty Ltd**
ABN: 91 619 721 023

Suite-19, 80-82 Bathurst Street
Liverpool, NSW-2170

Phone: +61 2 8729 2288
Mob: 0433411889
Email: info@duralgroup.com.au

## REVISION STATUS

| Rev No. | Description of Revision | Date | Author/Approved by |
|---|---|---|---|
| P3 | DA Issue | 20/06/2021 | **AKM Mahbub Hassan** |
| P4 | DA Issue update | 09/08/2021 |  <br>**AKM Mahbub Hassan**<br>BSc(Eng) , MEng, MIEAust ,CpEng,NER, MAAS<br>Australian Acoustical Society |

# Contents

# 1. Introduction

Dural group consulting has been commissioned to carry out an acoustic assessment at the proposed development of11-13 Albert Road & 2-6 Pilgrim Avenue, Strathfield 2135.

This assessment forms part of the supporting documentation associated with the Development Application (DA) for the proposed development.

## 1.1 PURPOSE

The assessment aims to address the rail & road traffic noise levels and advise on the sound insulation requirements from external noise in line with the existing Code, Policy and guidelines.

The report will also assess potential impact of the operational activities from the development to its surroundings and its residential neighbour.

Dural group also utilised the following documents and regulations in the assessment of noise of the development. Some of which are also discussed in section-2

- Strathfield Council Development Control Plan
- Strathfield Council Local Environmental Plan
- AS 2107:2016 - "Recommended design sound levels and reverberation times for building interiors"
- Development near rail corridors and busy roads– interim guideline
- Construction Noise and Vibration Guideline -2016
- Noise Policy For Industry (NSW EPA, 2017)
- NSW Road Noise Policy
- State Environmental Planning Policy (Infrastructure) 2007
- Kennedy Associates Architects-–Latest Architectural drawings
- AS3671 – 1989 “Acoustics – Road Traffic Noise Intrusion – Building Siting & Construction

## 1.2 SITE DESCRIPTION

The development site is located at 11-13 Albert Road& 2-6 Pilgrim Avenue, Strathfield 2135. An aerial photo of the site and surrounding receivers are shown below in Figure 1.

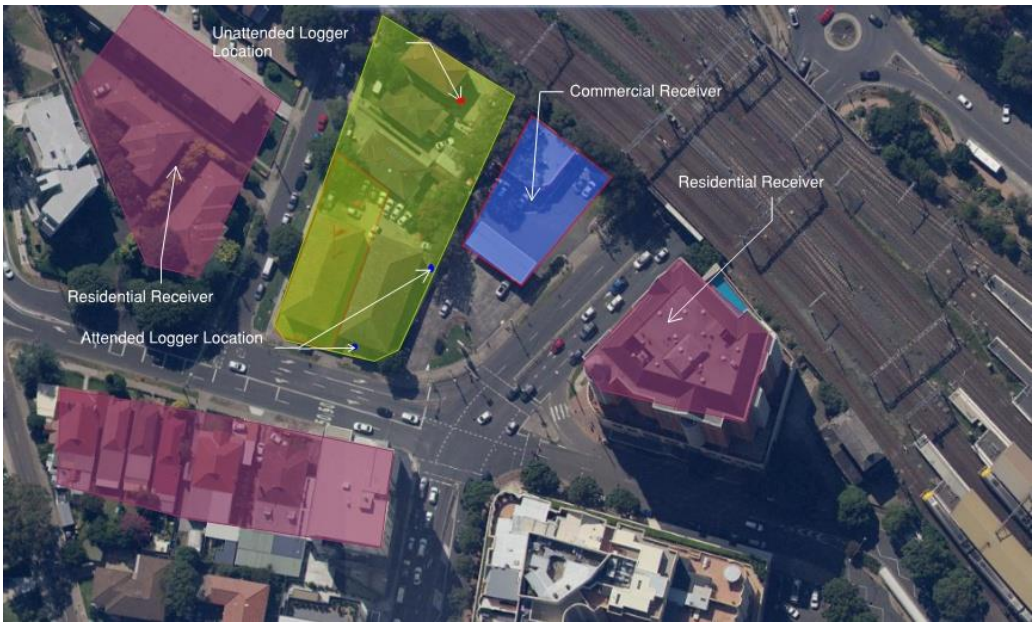



**Figure 1:11-13 Albert Road& 2-6 Pilgrim Avenue, Strathfield**

The site is bounded by the Albert Road to south, Pilgrim Avenue to West, the existing commercial neighbour to East and the rail track is located directly on the northern side of the property

The Strathfield station is located around 200m NE of the development site. A major source of noise for the development is the rail noise that travel to and from Strathfield station which is 20m east to the site. Another potential source is the road traffic noise of the Raw Square road. Refer to figure 1 for an aerial photo of the site.

### 1.3 PROPOSED DEVELOPMENT

It is proposed to demolish the existing multiple two storey residential building and construct a new 14 storey mixed use development consists of 168 residential units, 4 basement level car park and two commercial space. Full details are given in drawings provided by Kennedy Associates Architects. Job No. 1361, Rev F Issued 17/06/2021.

#### 1.3.1 NOISE RECEIVER

The nearest noise receivers around the project site include:

- Receiver 1 - Residential dwellings situated 15m away to West side
- Receiver 2 - Commercial Service Station (Coles Express) situated to the East

# 2. Applicable design criteria

### 2.1 STRATHFIELD COUNCIL

#### 2.1.1 STRATHFIELD COUNCIL DEVELOPMENT CONTROL PLAN -

States in section 1.2 Objective- “To provide an acceptable acoustic environment for residents through appropriate design, layout and construction measures, which mitigate noise and vibration impacts from nearby road and rail transport activities”

Strathfield Council DCP also referenced the Hornsby Shire Council’s publication related to rail noise..

#### 2.1.2 STRATHFIELD LOCAL ENVIRONMENTAL PLAN 2012

The site falls into B4 zone (Mixed Use) where higher density residential development integrated with a range of retail, business, light industrial and community uses permitted.

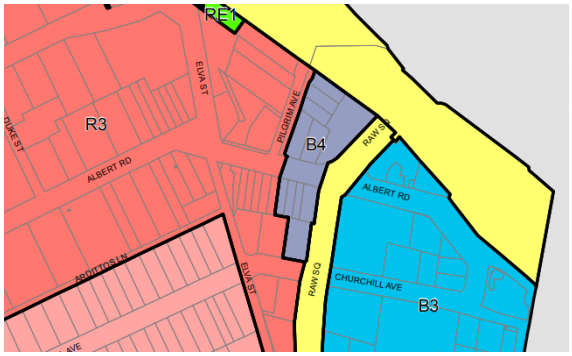



**Figure 2: Strathfield LEP Zone Map**

Strathfield council did not mention any specific goal. Taking this into consideration, external noise impacts on the proposed development will be assessed against the requirements outlined by the Council DCP, State Environmental Planning Policy (Infrastructure) 2007 and the Australian Standard AS2107:2016.

## 2.2 AUSTRALIAN STANDARD:

AS 2107:2016 - "*Recommended design sound levels and reverberation times for building interiors"* provides recommended design sound levels from continuous road traffic noise for different areas of occupancy near major roads, as shown in Table 1 below

| Type of Occupancy | Noise Level $L_{Aeq(15min)}$, dBA |
|---|---|
| Living Areas | 35 to 45 |
| Sleeping Areas (night time) | 35 to 40 |
| Work Areas | 35 to 40 |
| Apartment Common area | 45 to 50 |

**Table 1 Internal Noise Level as per AS 2107**

## 2.3 STATE ENVIRONMENTAL PLANNING POLICY (INFRASTRUCTURE) 2007

**Clause 102 Impact of road noise or vibration on non-road development states that**

*(1) This clause applies to the 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 RMS) and that the consent authority considers is likely to be adversely affected by road noise or vibration:*

*(a) residential accommodation,*

*(3) If the development is for the purposes of residential accommodation, the consent authority must not grant consent to the development unless it is satisfied that appropriate measures will be taken to ensure that the following LAeq levels are not exceeded—*

*(a) in any bedroom in the residential accommodation—35 dB(A) at any time between 10 pm and 7 am,*

*(b) anywhere else in the residential accommodation (other than a garage, kitchen, bathroom or hallway)—40 dB(A) at any time.*

**Clause 87 Impact of rail noise or vibration on non-rail development states that**

*(1) This clause 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,*

*(2) Before determining a development application for development to which this clause applies, the consent authority must take into consideration any guidelines that are issued by the Secretary for the purposes of this clause and published in the Gazette.*

It is also to note that Excavation impact near rail track will not fall part of this report. It is assumed that standard best practice and relevant Australian standard will cover.

## 2.4 NOISE POLICY FOR INDUSTRY (NSW EPA, 2017)

There are two set of criteria that are outlined in the Noise Policy for Industry 2017. The proposed development needs to be satisfied with namely Intrusiveness and Amenity. These are described below:

**Intrusiveness noise level Criteria–**

This refers to the audibility of noise emissions at residential receivers as a result of external sound stimuli from the surrounding environment. The intrusiveness noise level is determined as follows

$LA_{eq}$, 15min = Rating Background Noise Level (RBL) + 5 dB

The RBL represents the 'background' noise in the area, and is determined by measurement of $LA_{90}$ noise levels

**Amenity noise level Criteria**–

This refers to the acceptable range for the 'absolute noise level' created by the facilities such as mechanical units and other industrial noise. It aims to reduce these operational noise outputs to a safe level that is consistent with the surrounding environment.

**Project noise trigger level**-

It provides a benchmark which is the lowest value of intrusiveness or project amenity noise level fit is predicted that the development is exceeded the Project trigger level, it will indicate a potential noise impact on the community. This will 'trigger' a management response and further investigation of mitigation measures will be necessary.

## 2.5 BUILDING CODE OF AUSTRALIA (NCC-2019):

The development comprises of Class-2 & Class-6 building .The acousticre requirement of the relevant class-2 (Residential) part of the building mentioned below in accordance with the following extracted from NCC 2019:

### 2.5.1 PERFORMANCE REQUIREMENT- FP5:

- FP5.1 Sound transmission through floors (Class-2)

  Floors separating—

  *(a) sole-occupancy units; or*
  *(b) a sole-occupancy unit from a plant room, lift shaft, stairway, public corridor, public lobby, or the like, or a part of a different classification, must provide insulation against the transmission of airborne and impact generated sound sufficient to prevent illness or loss of amenity to the occupants.*

- FP5.2 Sound transmission through walls (Class-2)

  *Walls separating sole-occupancy units or a sole-occupancy unit from a plant room, lift shaft, stairway, public corridor, public lobby, or the like, or parts of a different classification, must provide insulation against the transmission of—*

  *(a) airborne sound; and*
  *(b) impact generated sound, if the wall is separating a bathroom, sanitary compartment, laundry or kitchen in one sole-occupancy unit from a habitable room (other than a kitchen) in an adjoining unit, sufficient to prevent illness or loss of amenity to the occupants.*

- FP5.3 Sound transmission through floor and wall penetrations and door assemblies (Class-2)

  *The required sound insulation of a floor or a wall must not be compromised by—*
  *(a) the incorporation or penetration of a pipe or other service element; or*
  *(b) a door assembly.*

### 2.5.2 DEEMED-TO-SATISFY PROVISIONS - F5:

- F5.2 Determination of airborne sound insulation ratings

  *A form of construction required to have an airborne sound insulation rating must—*

  *(a) have the required value for weighted sound reduction index (Rw) or weighted sound reduction index with spectrum adaptation term (Rw + Ctr) determined in accordance with AS/NZS ISO 717.1 using results from laboratory measurements; or*

  *(b) comply with Specification F5.2.*

- F5.3 Determination of impact sound insulation ratings

  *(a) A floor in a building required to have an impact sound insulation rating must—*

  *(i) have the required value for weighted normalised impact sound pressure level (Ln,w) determined in accordance with AS ISO 717.2 using results from laboratory measurements; or*
  *(ii) comply with Specification F5.2.*

  *(b) A wall in a building required to have an impact sound insulation rating must—*

  *(i) for a Class 2 building be of discontinuous construction; and*

  *(c) For the purposes of this Part, discontinuous construction means a wall having a minimum 20 mm cavity between 2 separate leaves, and*
  *(i) for masonry, where wall ties are required to connect leaves, the ties are of the resilient type; and*
  *(ii) for other than masonry, there is no mechanical linkage between leaves except at the periphery.*

- F5.4 Sound insulation rating of floors

  *(a) A floor in a Class 2 building must have an Rw + Ctr (airborne) not less than 50 and an Ln,w (impact) not more than 62 if it separates—*
  *(i) sole-occupancy units; or*
  *(ii) a sole-occupancy unit from a plant room, lift shaft, stairway, public corridor, public lobby or the like, or parts of a different classification.*

- F5.5 Sound insulation rating of walls

  *(a) A wall in a Class 2 building must—*
  *(i) have anRw + Ctr (airborne) not less than 50, if it separates sole-occupancy units; and*
  *(ii) have anRw (airborne) not less than 50, if it separates a sole-occupancy unit from a plant room, lift shaft, stairway, public corridor, public lobby or the like, or parts of a different classification; and*

  *(b) A door may be incorporated in a wall in a Class 2 or 3 building that separates a sole-occupancy unit from a stairway, public corridor, public lobby or the like, provided the door assembly has anRw not less than 30.*

  *(e) Where a wall required to have sound insulation has a floor above, the wall must continue to—*
  *(i) the underside of the floor above; or*
  *(ii) a ceiling that provides the sound insulation required for the wall.*

  *(f) Where a wall required to have sound insulation has a roof above, the wall must continue to—*
  *(i) the underside of the roof above; or*
  *(ii) a ceiling that provides the sound insulation required for the wall.*

- F5.6 Sound insulation rating of internal services

*(a) If a duct, soil, waste or water supply pipe, including a duct or pipe that is located in a wall or floor cavity, serves or passes through more than one sole-occupancy unit, the duct or pipe must be separated from the rooms of any sole-occupancy unit by construction with an Rw + Ctr (airborne) not less than—*

*(i) 40 if the adjacent room is a habitable room (other than a kitchen); or*

*(ii) 25 if the adjacent room is a kitchen or non-habitable room.*

(b) If a storm water pipe passes through a sole-occupancy unit it must be separated in accordance with (a)(i) and (ii).

- F5.7 Sound isolation of pumps

*A flexible coupling must be used at the point of connection between the service pipes in a building and any circulating or other pump.*

## 2.6 SITE SPECIFIC NOISE GOALS

Site-specific internal road traffic noise goals (LAeq, period) in line with the *Department of Planning: Interim Guideline – Development Near Rail Corridors and Busy Roads*' and Australian Standard AS/NZS 2107 are set as.

| Type of Occupancy | Noise Level LAeq(15min), dBA | Applicable time period |
|---|---|---|
| Sleeping areas (bedroom) | 35 | Night 10 pm to 7 am |
| Other habitable rooms | 40 | At any time |
| Apartment Common area | 45 | At any time |

**Table 2 Internal Noise Level goal**

## 2.7 SLEEP DISTURBANCE

There is no set criterion given by the Strathfield council. In the absence of sleep disturbance criteria, we recommend adopting the NSW RNP (NSW Road Noise Policy) which states that they have undertaken research on several sleep disturbance patterns and determined that:

"*From the research on sleep disturbance to date it can be concluded that:*

- *Maximum internal noise levels below 50–55 dB(A) are unlikely to awaken people from sleep*
- *One or two noise events per night, with maximum internal noise levels of 65–70 dB(A), are not likely to affect health and wellbeing significantly."*

We recommend to use this guideline when determining whether sleep disturbance will occur.

# 3. Description of existing noise environment

## 3.1 EXTERNAL NOISE MONITORING

To produce accurate design recommendations, unattended noise monitoring and attended measurements were conducted in the vicinity of the project site to assess the acoustical impact caused by the on-going road traffic and the rail. The findings were then used to determine the treatments proposed further in this report.

## 3.2 DATA LOGGING:

### 3.2.1 UNATTENDED NOISE MEASUREMENTS

Unattended noise measurements were taken, using a consistent methodology throughout the assessment. The sound meter was calibrated both prior to testing and after testing to ensure that results produced were accurate. The logger was programmed to store 1-minute of statistical noise levels throughout the monitoring period. No significant drift was detected. All measurements were taken on A-weighted fast response mode.

Logger Location-L1: (between Thursday 5th November 2020 and Thursday12 November 2020) adjacent to Rail track – to collect background noise data and provide information to set noise emission criteria for the development facing rail track.

Logger LocationL2: (between Thursday 10thJune 2021 and Thursday 17thJune 2021.) at approximately 27m from Raw Square –to collect background noise data and traffic noise from that Road.

### 3.2.1 ATTENDED NOISE MEASUREMENTS

Attended noise data has been taken on 17th June 2021 along Albert road. During site visit moderate to high traffic volume were observed in raw square.

### 3.2.2 INSTRUMENTATION

A SVAN 971, manufactured by Svantech, Type 1 Sound level meter was used to measure the background noise level. Short term measurements were recorded using a SONIK-SE brand, model GA142SE, Type 1 Safety and Environmental Data-logging Type I integrating sound level meter.

Both instruments are integrating sound level meters which are able to process a continuous, variable, intermittent or impulsive signal to give a single integrated level or LAeq for the sampling period. This equipment complies with AS 1259 ‘Acoustics-Sound level meters”, Part 2 “Integrating-Averaging” and the testing procedure with AS 2659 “Guide to the use of sound measuring equipment”.

### 3.2.3 MEASUREMENT PROCEDURE

The acoustical measurements were carried out in accordance with Australian Standards AS 1055. ‘Acoustics –Description and Measurement of Environmental Noise’, (1997) and AS 2702 ‘Acoustics –Methods for the Measurement of Road Traffic Noise’, (1984)

Logging locations are shown in Figure 3.

Logger Location-1

Logger Location-2


**Figure3: Location of logger( Attended & Unattended)**

### 3.3 SURVEY OBSERVATION

The dominant noise source contributing to the existing ambient noise climate at the site was noted to be distant traffic flow on the raw square and passing trains from nearest rail track.. Distant traffic noise is more consistent and sets the general background noise level, whereas passing trains create the peak in ambient noise levels typically prevailing at the site.

There are currently more than 180 electric passenger trains passing the site in 24 hours through T1, T2 line. Passenger trains were noted to be typically four to eight carriages in length and passed the site at a relatively slow-moderate speed. A review of the survey data and current train-timetables show that the first passenger train typically passes the site at just after 04:09AM hours and the last passenger train passes the site at just after 01.11 AM hours.

A number of freight trains also pass the site at slow-moderate speed throughout the course of a 24-hour period. Most of the freight train passes during night time.

There are curved and the lane change track within 90 m from the site (both direction) which cause trains to press brake to slow speed.

During the daytime and night-time site visits, there was no audible noise of an industrial nature impacting on the site (e.g. fixed building services plant, fixed machinery and equipment) except service station which operates 24hrs.

More than 30,000 cars moves through RAW Square which is a major road connecting south-western and western Sydney.

East faced facing raw square has limited windows.

This assessment assumes that the North façade line/elevation is located 4.5m at the site boundary and there is a clear direct line of sight between the noise source (i.e. passing train) and the 1st floor bedroom windows. This is therefore considered to be a worst-case scenario.

## 3.4 NOISE MONITORING RESULTS:

Unattended and attended noise measurements were undertaken at the site to carry out the assessment.

## 3.5 UNATTENDED NOISE DATA:

### 3.5.1 RAIL NOISE

Noise levels immediately next to a railway line normally consist of relatively short periods of high noise levels throughout the day and night periods, separated by longer periods of quiet. It generally occurs in two ways: Air borne Noise and Ground borne noise.

The majority of air-borne noise from rail pass-bys is generated by a combination of noise from the rail vehicle propulsion system and from interaction at the vehicle–track interface. In NSW rail network operates diesel or electric locomotive and integral power unit. Diesel locomotives can be a considerable source of engine noise, with significant engine exhaust noise emitted at a height of approximately four metres above the rail, which occasionally occurs in a day. Electric locomotives are quieter as they produce less mechanical noise and require no exhaust. Measured rail noise data is shown below:

| Rail Noise Level | | |
|---|---|---|
| $LA_{max\ (1Hr)}$ | $L_{eq(15\ hrs)}$ | $L_{eq(9\ hrs)}$ |
| 76.0 | 62 | 51 |

**Table 3: Measured Unattended Data (Rail Noise)**

### 3.5.2 ROAD TRAFFIC NOISE:

Major source of road traffic noise is from Raw Square. Measured noise data from logger-2 is shown below.

| Road traffic Noise Level | | |
|---|---|---|
| $LA_{max\ (1Hr)}$ | $L_{eq(15\ hrs)}$ | $L_{eq(9\ hrs)}$ |
| 74 | 62 | 58.3 |

**Table 4: Measured Unattended Data (Road traffic)**

## 3.6 PROJECT INTRUSIVENESS NOISE LEVEL:

If the level of noise ($LA_{eq}$) from an industrial noise source, measured over a 15 minute period does not exceed the background (RBL) noise level by >5 dB, the intrusiveness of the source is deemed acceptable.

The Rating background level, RBL, is the overall single-figure background level representing each assessment period. Measurement of $LA_{90}$15 minutes is used to determine the RBL.The results of the unattended ambient and traffic noise surveys are presented in Table 2.

| Date | Measured Rating Background level (RBL) dB(A)$L_{90}$ | | | | | | |
|---|---|---|---|---|---|---|---|
| | (Logger-1) | | | (Logger-2) | | | |
| | Day (7AM to 6PM) | Evening (6pm to l0pm) | Night (10pm to 7am) | | Day (7AM to 6PM) | Evening (6pm to l0pm) | Night (10pm to 7am) |
| 05/11/2020 | 51 | 52.5 | 44.2 | 10/6/2021 | 59 | 58 | 50 |
| 06/11/2020 | 49.2 | 48.9 | 44.8 | 11/6/2021 | 57 | 57 | 52 |
| 07/11/2020 | 48.4 | 47.5 | 43.7 | 12/6/2021 | 56 | 55.5 | 51 |
| 08/11/2020 | 47.1 | 48.9 | 43 | 13/6/2021 | 54.9 | 55 | 50 |
| 09/11/2020 | 49.1 | 49.7 | 43.1 | 14/6/2021 | 54.7 | 55 | 50 |
| 10/11/2020 | 49.8 | 49.2 | 42.6 | 15/6/2021 | 56.8 | 56 | 50.6 |
| 11/11/2020 | 49.9 | 50 | 44.2 | 16/6/2021 | 56 | 56 | 51 |
| 12/11/2020 | 50.2 | 50.9 | 43.3 | 17/6/2021 | 57.4 | - | - |

**Table 5: Measured Unattended Data( RBL)**

### 3.6.1 SUMMARISED RATING BACKGROUND NOISE LEVELS

Summarised rating background noise levels for all receivers are presented below.

| Project | Time of Day | RBL(dB(A)$L_{90}$ | |
|---|---|---|---|
| | | Logger-1) | Logger-2) |
| 11-13 Albert Road, Strathfield | Day | 50 | 56 |
| | Evening | 49 | 56 |
| | Night | 44 | 51 |

**Table 6: Summery of the Measured RBL Data**

## 3.7 AMENITY NOISE LEVEL:

The Amenity Guidelines determine the acceptable noise level from all industrial noise sources affecting the proposed development and its inhabitants. It aims to reduce the absolute noise levels from such sources to one that is consistent with the surrounding environment.

The following table summarises the recommended amenity noise levels for urban residential receivers surrounding the subject site and the measured data from logger-2.

| Receiver | Time of day | Recommended amenity noise level($LA_{eq}$, dB(A) | Measured Traffic Noise level ($L_{Aeq,traffic}$,dB(A) |
|---|---|---|---|
| Residential | Day | 60 | 62 |
| | Evening | 50 | 61 |
| | Night | 45 | 58 |
| Commercial premises | When in use | 65 | |

**Table 7: Recommended amenity noise level&measured traffic noise level**

## 3.8 SUMMARY OF PROJECT CRITERIA

Due to high traffic on the Raw square, the noise in the area is dominated by traffic noisefor the evening and night periods. The Project Amenity noise level (ANL) is lower than the RBL.Soas per Section 2.4.1(High Traffic Noise) of the Noise Policy for Industry, were adopted to derive the project amenity trigger levels

The following table presents the noise emission criteria for the project, based on the criteria listed above

The following table presents the noise emission criteria for the project, based on the criteria listed above.

| Receiver type | Time of Day | Rating Background Noise level | Intrusiveness Criteria dB(A)Leq | Amenity Criteria dB(A) Leq (as per clause 2.4 of INP) | Project Trigger level dB(A) Leq (as per clause 2.4.1 of INP) |
|---|---|---|---|---|---|
| Residential receiver | Day | 56 | 61 | 50 | 50 |
| | Evening | 56 | 61 | 49 | 49 |
| | Night | 51 | 56 | 46 | 46 |
| Commercial | When in use | - | - | 63 | 63 |

**Table 8: Summery of the project noise level**

# 4. Vibration Assessment:

## 4.1 VIBRATION DUE TO TRAIN PASS-BYS:

Ground-borne noise/vibration level from rail vehicle pass-bys varies from vehicle to vehicle due to changes in carriage and track conditions. Vibration effects from rail movements may include annoyance, discomfort and interference with typical activities.

Department of Environment and conservation provided guideline in “Assessing Vibration – A technical Guideline” in terms of Vibration Dose Value (VDV). It is a single value representing vibration in each axis using frequency weightings, and assessment of the fourth power of acceleration between 0.5 and 80 Hz. The acceptable value for the residential receiver presented below.

| Location | Daytime(7AM-10PM) | | Nightime(10PM-7AM) | |
|---|---|---|---|---|
| | Preferred Value | Maximum value | Preferred Value | Maximum value |
| Residence | 0.2 | 0.40 | 0.13 | 0.26 |

British Standard 6472-1:2008: Guidelines to Evaluation of Human Exposure to Vibration in Buildings (Part 1) specifies similar value as Daytime (02-0.4) and Nightime (0.1-0.2). Within that limit adverse comment are not expected and above that limit adverse comment is very likely.

### 4.1.1 VIBRATION SURVEY:

Ground vibration survey was conducted for both passenger and freight trains along the site boundary adjacent to the railway track on 06/8/2021. The vibration levels from rail pass-bys measured along three orthogonal axes (x-, y- and z-directions as defined by AS 2670.2)

### 4.1.2 EQUIPMENT:

A SVAN 958A, manufactured by Svantech, Class 1 Four-channel Sound & Vibration Analyser was used to measure the PPV and VDV value. Due to security issue the base plate were buried hard soil and the placed near boundary 10m from the rail track..

**Figure4: Location of vibration Ground Vibration Accelerometer**

### 4.1.3 OBSERVATION & DATA:

There was found to be no noticeable vibration in the ground at the site boundary for passenger and freight trains during the site visits. Some degree of damping/attenuation is provided by a separation distance generated by the steep embankment.

The maximum measured VDV (on a given axis) for electric passenger train was 0.04 $ms^{1.75}$ and for freight train 0.93 $ms^{-1.75}$

$$VDV = \left( \int_0^T a^4(t)dt \right)^{0.25}$$

*Where VDV is the vibration dose value (in $ms^{-1.75}$)*

*a(t) is the frequency-weighted acceleration ($ms^{-2}$)*

*T is the total period of the day (in seconds) during which vibration may occur*

VDV's are used to analyse the cumulative effects of bursts of intermittent vibration and can be estimated by combining the VDV's of individual events according to the fourth power law.

$$VDV_T = \{(VDV1)^4 + (VDV2)^4 \ldots\ldots)\}^{0.25}$$

Table below presents the predicted daytime and night-time VDV's taking into consideration the maximum measured VDV on any given axis for both a passenger and a freight train. In accordance with BS 6472, an allowance should be made for the transfer function between the measurement position and the point of entry to the body (i.e. within the building).

It is necessary to use a transfer function that would represent the likely effect that the foundation would have on the vibration magnitude as it propagates into the building structure.

| | Calculated VDV $m/s^{1.75}$ | |
|---|---|---|
| | **Daytime Period (07:00 – 22:00hrs)** | **Night-Time Period (22:00 – 07:00hrs)** |
| Predicted in apartment unit | 0.29 | 0.18 |

The predicted VDV's are below recommended maximum limit. It suggest that there is a low probability of adverse comment during the daytime period and the night-time period within bedrooms at first floor level. This assessment assumes that nearest units are 4 metres from the survey point and 14 m from the nearest rail track.

On the basis of this assessment, it is considered that on-site vibration levels should not cause a constraint to the development and further mitigation with regard to vibration will not be required. However, care to be taken to reduce ground born vibration, like construction method, break of continuity with boundary barrier and the building structure.

## 4.2 ANNOYING CHARACTERISTICS

Some annoying characteristics are a common part of noise from rail operations. During site visit some tonality and impulsive noise were observed from some of the electric train. This is due to sharp curve in the rail track or flat spot on wheel or rail joint noise as the wheels pass discontinuities in the track.

To analyse further another set of noise data were taken on 6th August 2021 near the rail track adjacent to the boundary.

Maximum low frequency noise is 65. Detail of octave band noise data shown in Appendix-7.1

| 31.5 Hz | 63 Hz | 125 Hz | 250 Hz |
|---|---|---|---|
| 65.49 | 65.15 | 72.27 | 73.04 |

### 4.3 CROSS FLOW VENTILATION (WINDOWS PARTIALY OPEN):

Noise will travel through any leakage. Mitigation measures mentioned in this report are based on windows and closed doors. In that case, provision of mechanical ventilation will be required.

In accordance with the research article, sound decay is expected to occur due to the height and distance. It is expected that some units will achieve a noise level of 55dbA during night time, which is the acceptable limit for sleep disturbance (mentioned in section 2.7). This will allow the occupants to keep the windows partial open for the cross-ventilation purpose during night.

A potential suitable option with regard to providing required ventilation whilst maintaining a high level of sound insulation would be to use a Positive Input Ventilation (PIV) system (either central or individual). An appropriate system would allow occupants to leave windows closed on the worst-case façades whilst achieving satisfactory ventilation rates.

As an alternative mitigation option to PIV units, acoustically rated ventilator units could be installed to worst-case habitable rooms to allow background ventilation whilst maintaining a high level of sound insulation.
Example suppliers of acoustically rated ventilator units include:

*https://silenceair.com, Location: Unit 12, 5 Parsons Street, Rozelle NSW 2039, Australia*

### 4.4 INTERNAL NOISE LEVELS

The internal noise level ($L_p$) in various rooms of the proposed development is found from the formula:

$L_p = L_N$ -Rw + 10 Log10 (S/A) – K + 6 dBA

Where: $L_N$is the external noise level;
Rw is the weighted sound reduction index of the partition;
S is the area of the partition (window or glazed door);
A is the room acoustic absorption; and
K is an angle of view correction.

The glazed areas are normally the weakest acoustic partition in the room façades.

### 4.5 WINTER GARDEN AMBIENT NOISE LEVELS

There is winter garden at the roof of the first floor facing raw square. WHO (World Health Organisation) recommends that the noise level within outdoor areas, does not exceed 55 dB LAeq, when measured over a 16-hour period.

The survey results indicate that daytime noise levels are 62 dB (LAeq, 15 hour) and 58 dB at night time at the site boundary line. Approximately 4 dB of attenuation is achieved through distance separation which will not reach required level. To maintain required sound level a 1.8m solid/Glass barrier to be provided. External noise levels are therefore expected to be in the region 48 – 52 dB (LAeq, 16hour) within gardens once the proposed residential development is in place. Moreover, barrier also provides attenuation to some units facing raw square.

### 4.6 ASSESSMENT OF NOISE EMISSION FROM CARPARK

The following assumptions were used for estimating the noise emissions from operational use of the car park, including van deliveries and from cars entering and exiting the premise.

- Peak hour 80 cars entering and exiting the car park at 10km/hr speed with a typical sound power level of 75dB(A)
- Peak hour one van movements into and out of the car park at 10km/hr speed with a typical sound power level of 85dB(A).

Predicted noise levels at the nearest noise sensitive receivers from the operation of the car park will be assessed against the intrusiveness criterion as detailed above for residential receivers

Predicted noise levels are taken from the similar nature of activities, presented in the table below:

| Noise Source | Receiver | Assessment Location | Predicted Noise Level dB(A)$_{Leq(15min)}$ | Allowable Noise Level dB(A)$L_{eq(15min}$ |
|---|---|---|---|---|
| 80 Cars and 1 Van Movement into and out of the Car Park in 1 Hour (Peak) | Receiver 1 | Adjacent to Site boundary | 60 | 61 |

**Table 9: Predicted Noise Levels from Carpark**

### 4.7 MECHANICAL EQUIPMENT:

At this DA stage of the project, the location of key plant items has not been selected so the detailed assessment of mechanical services noise could not be undertaken.

An assumption is made that different condenser, supply and exhaust fan units will be installed outdoors on the roof. To achieve compliance, the placement and location of the units must be carefully considered and if necessary, supplemented with additional acoustical dampeners such as duct lining, enclosures and silencers.

### 4.8 LOADING DOCK NOISE

It is likely that delivery vehicles will be attending the site on a regular basis in order to supply goods and remove waste. The loading bay is to be protected by a long solid masonry fence.

It is assumed that two standard rubbish truck pick-ups per week may come which will generate noise 59dbA while idling. No significant impact is expected.

### 4.9 EXCAVATIONS AND EARTHWORKS

Impact on excavation and earthwork during construction phase does not fall into this report. It is assumed that the standard construction best practice, NSW Occupational Health and Safety Regulation and EPA Interim Construction Noise Guideline will cover that.

# 5. Recommended Noise Mitigation Measures

Based on the predicted noise data following recommendation has been made in line with the proposed architectural design:

### 5.1 EXTERNAL WALL:

It is assumed that external wall constructions will be constructed either from 150mm concrete panel, or 220mm double brick with cement render on each side systems. In that case the external wall is constructed from concrete or a masonry construction, no further acoustic upgrading will be required as wall constructions will provide a sound insulation performance 50 – 55 dB Rw+Ctr

If penetrations through any external wall are required, all gaps remaining in the penetration are to be filled with an acoustic grade sealant which provides an equal or better performance to the system being penetrated.

### 5.2 COMMON WALL - SAPERATING UNITS (SOU):

It is assumed that common wall separating between two SOU will be:

75 mm thick autoclaved aerated concrete wall panel with a row of 64 mm steel studs and 50 mm thick glass and wool insulation with a density of 11 kg/m3 at both side of the panel. One layer of 13 mm fire protective grade Plasterboard fixed to the outside face of the studs.

### 5.3 CEILING AND ROOF SYSTEM:

150 mm thick concrete slab with 28 mm metal furring channels and isolation mounts fixed to underside of slab with 65 mm thick polyester insulation with a density of 8 kg/m3, positioned between furring channels and one layer of 13 mm plasterboard fixed to furring channels.

### 5.4 FLOOR BETWEEN SOU:

200 mm thick concrete slab with carpet on underlay.

### 5.5 EXTERNAL SOLID DOORS:

All external doors are to be 35mm solid core timber construction with acoustic seal. Any glass inserts in the door should be 6.38mm.

### 5.6 GLAZING:

Normal window and doors with weather seals can reduce outside noise intrusion by 26 to 28dBa. In general window and door frame may be either sliding or awning style. Thicker the glass better performance will achieve.

| Room | Ref<br>Glazing /Level | Recommended Glazing<br>Minimum Thickness | Required Minimum Rw (dB) |
|---|---|---|---|
| East Facade | All level ( ) | 6+12+6 double glazed glass with Acoustic Seal | 35 |
| Northern Facade | Building-A ( ) | 10.38 mm laminated glass with Acoustic Seal | 33 |
| | Building-P ( ) | 12.38 mm laminated glass with Acoustic Seal | 36 |
| Western Facade | Ground( ) | Single or double glazed glass with Acoustic Seal | 30 |
| | All other level( ) | 6.38 mm single float glass with Acoustic Seal | 28 |
| Sothern Facade | All level ( ) | 6+12+6 double glazed glass or single with Acoustic Seal | 32 |

It is important that any sound leakage paths around the windows be sealed off.
Note that glazing selection is also coordinated with the basix requirement.

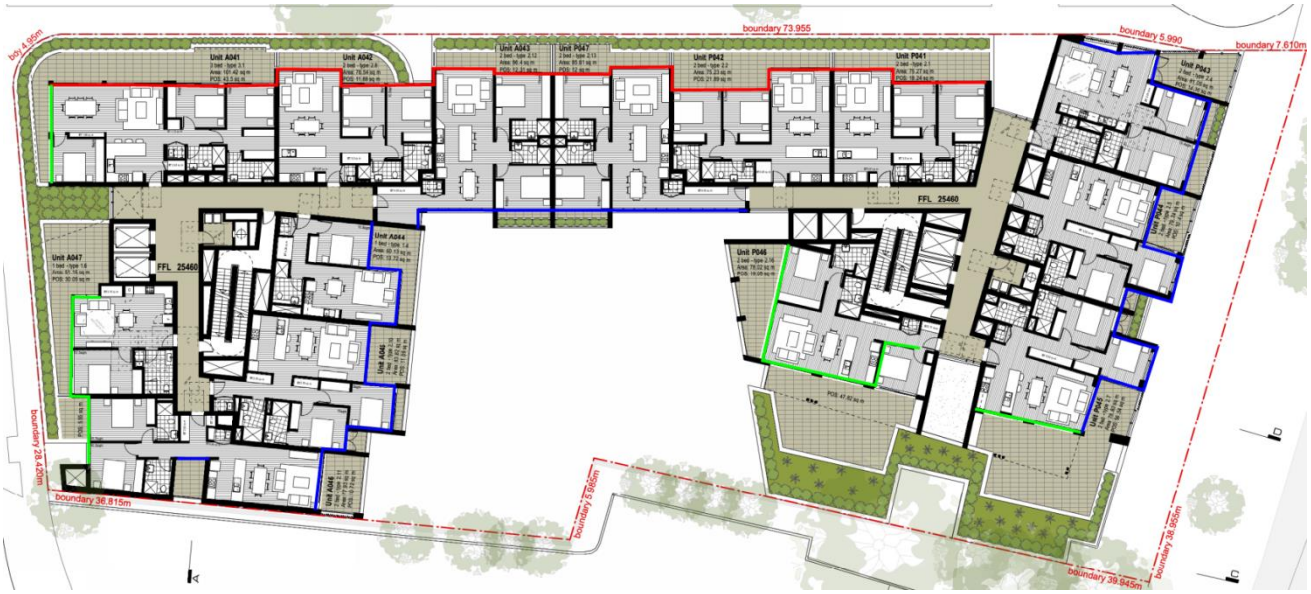



**Fig4: Typical Floor Plan**

### 5.7 OTHER:

- Provide 3.0m masonry barrier above rail track level to north & 3.0m above ground level to East side.
- Limit Car entering and exit speed to 5km/hr. Signage to be posted accordingly.
- Minimise noise and follow Best practice guideline during construction.
- Care to be taken to reduce ground born vibration, like construction method, break of continuity with boundary barrier and the building structure ( Like soft soil), maintain steep embankment from rail track and ground.

### 5.8 MECHANICAL EQUIPMENT:

At this DA stage of the project, the location of key plant items has not been selected so the detailed assessment of mechanical services noise could not be undertaken. Noise output from the mechanical equipment should not be more than 61 dB(A) to the nearest boundary.

It is also anticipated that the mechanical major exhaust fan will be located on the roof.

# 6. Conclusion:

This report presents an acoustic assessment of noise impacts associated with the proposed 14 storey mixed use developmentat11-13 Albert Road& 2-6 Pilgrim Avenue, Strathfield 2135. The acoustic treatments set out in this report shall comply with the council DCP, Code and SEPP.

The recommendations in this report are presented for the purpose of the council approval process and not for construction detailing. Final design requirement will depend on the council approval conditions.

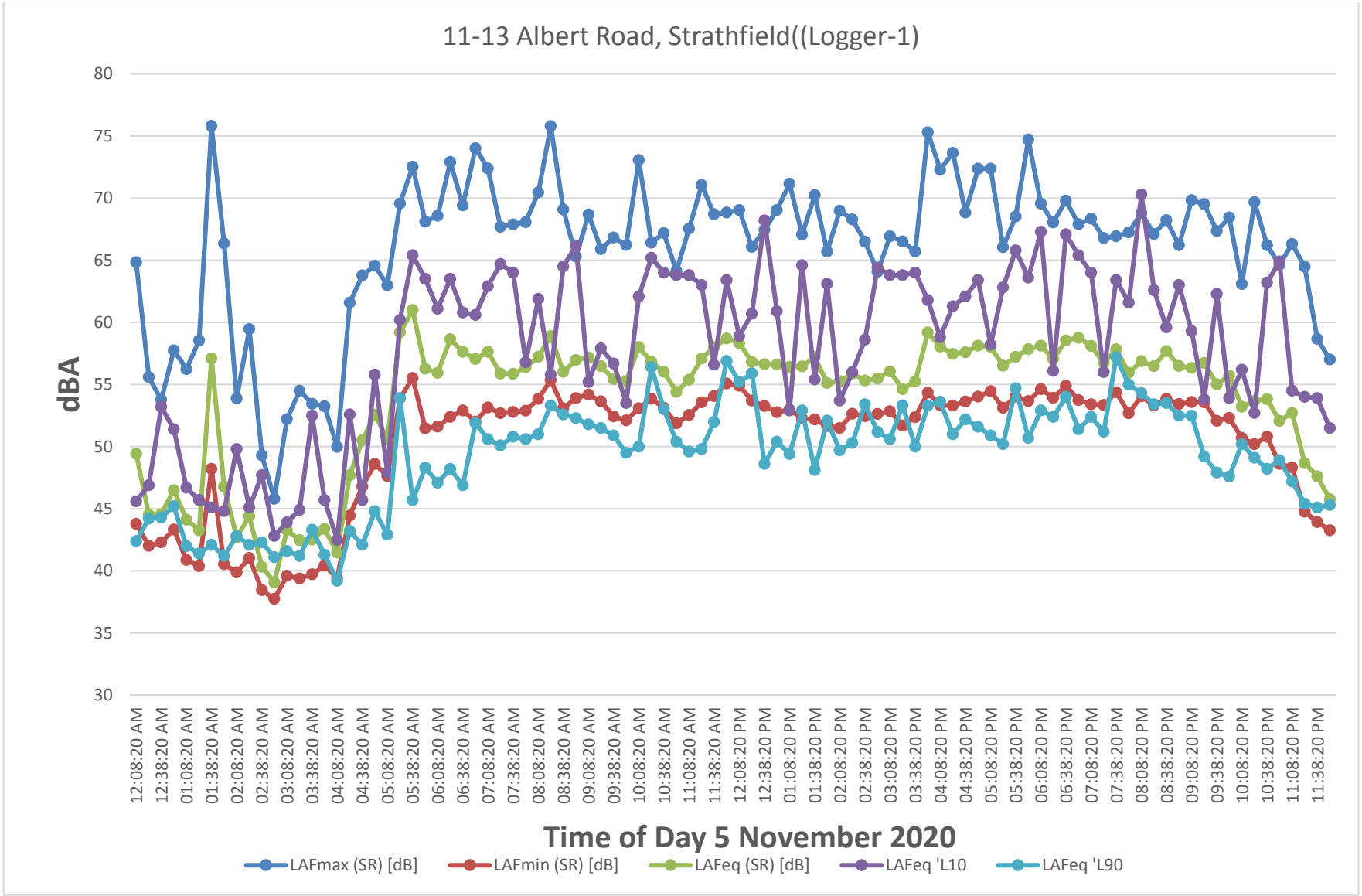
# 7. APPENDIX:-

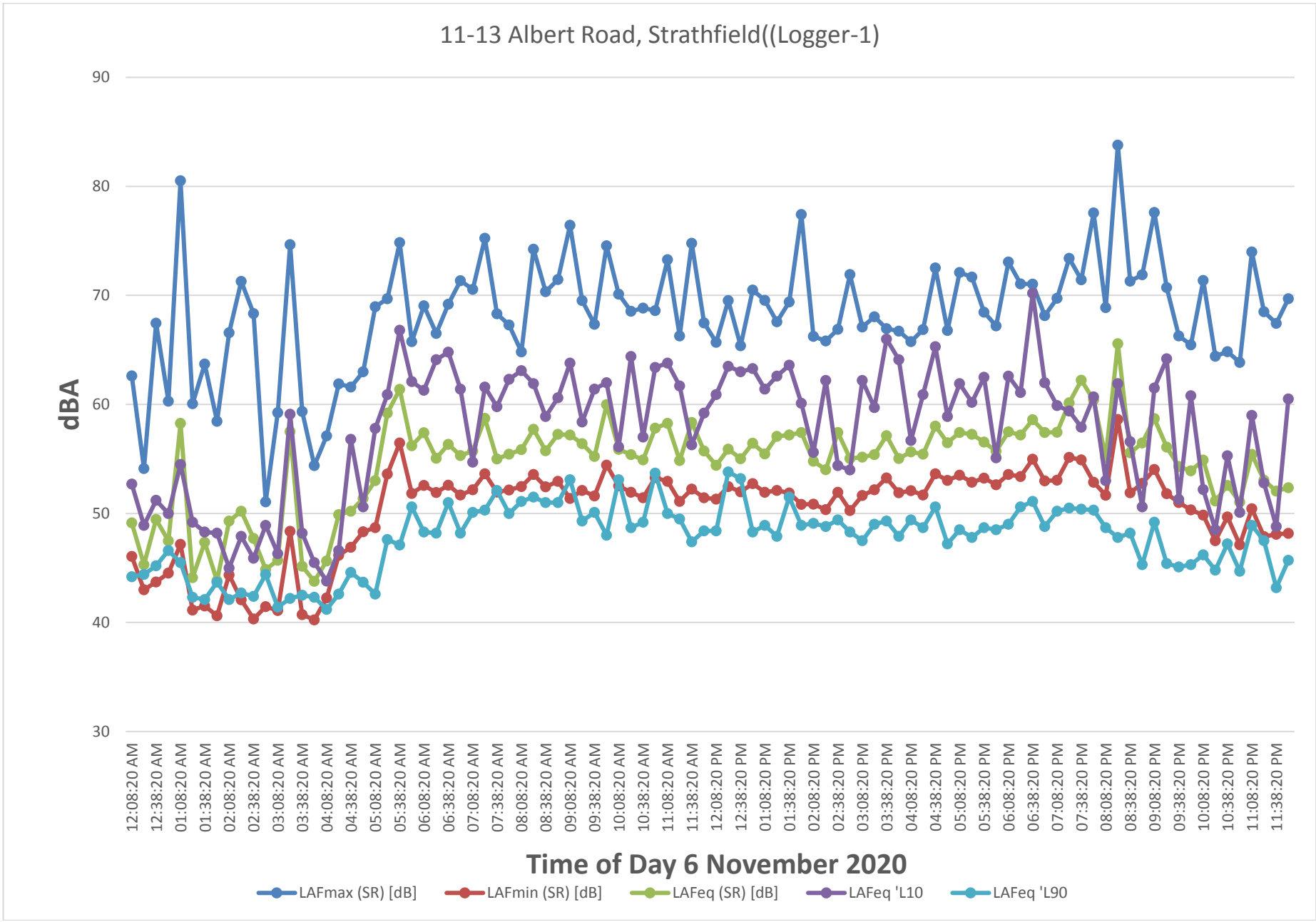
## 7.1 RAIL NOISE DATA:

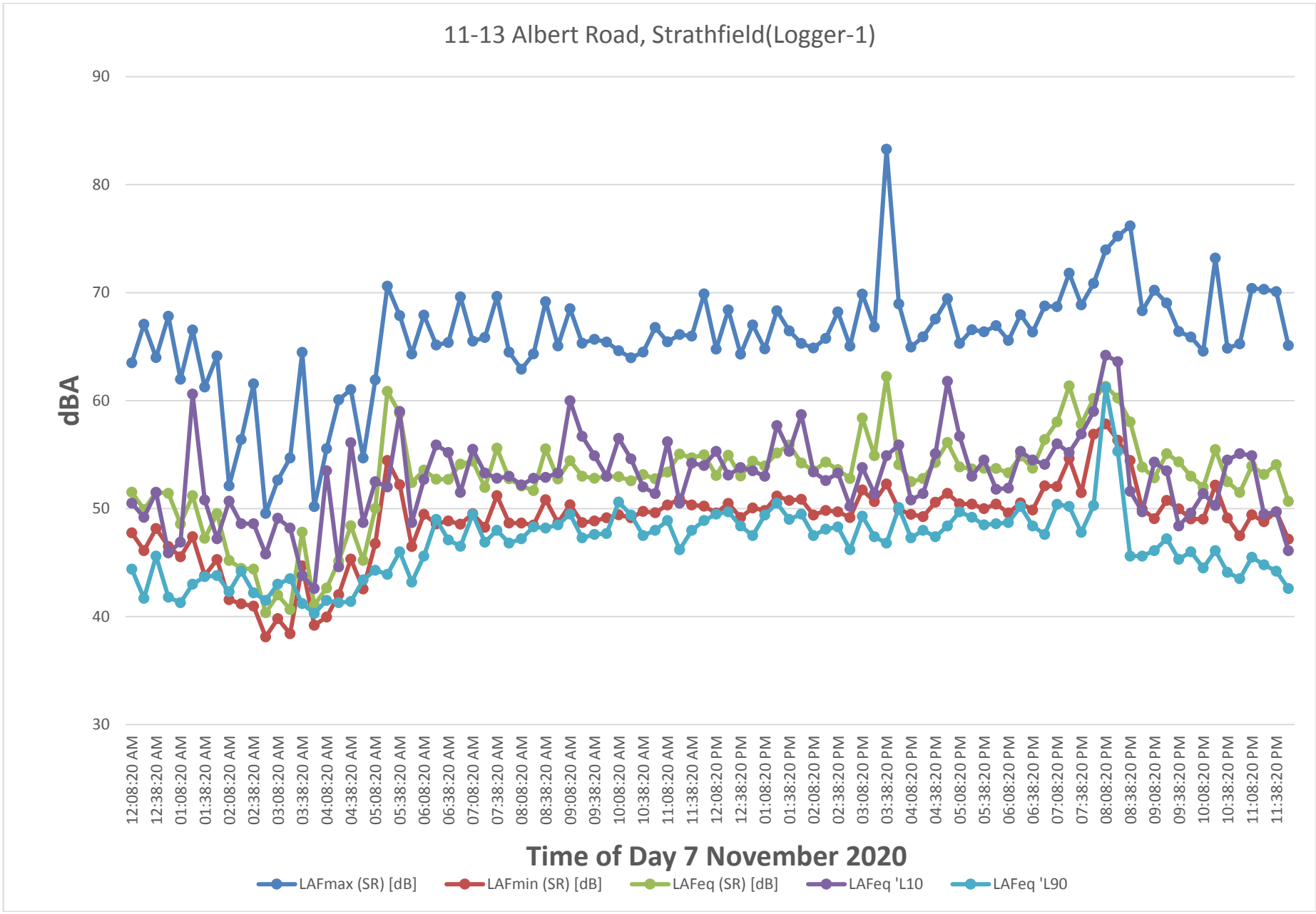
| Date | Time | Octave Band | | | | | | | | | | LAeq (for pass-by) | Pass-by Duration (seconds) | Type of Train |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 31.5 Hz | 63 Hz | 125 Hz | 250 Hz | 500 Hz | 1000 Hz | 2000 Hz | 4000 Hz | 8000 Hz | 16000 Hz | Total A | | |
| 08/05/2021 | 09:02 PM | 88.04 | 84.9 | 81.77 | 78.82 | 82.75 | 92.04 | 78.21 | 69.04 | 58.31 | 50.76 | 92.39 | 35 | Electric |
| | 09:03 PM | 66.04 | 67.29 | 68.52 | 70.09 | 68.31 | 72.67 | 76.22 | 78.8 | 77.54 | 70.9 | 83.47 | 55 | Diesel |
| | 09:07 PM | 62.17 | 62.48 | 73.21 | 73.92 | 66.18 | 65.98 | 64.2 | 70.18 | 70.29 | 59.46 | 75.49 | 33 | Electric |
| | 09:10 PM | 62.61 | 65.23 | 72.57 | 74.46 | 65.55 | 64.97 | 63.41 | 65.59 | 61.49 | 54.33 | 72.38 | 45 | Electric |
| | 09:22 PM | 62.05 | 63.21 | 73.09 | 73.74 | 66.14 | 65.93 | 63.86 | 70.11 | 67.68 | 58.47 | 74.81 | 33 | Electric |
| | 09:25 PM | 67.82 | 67.17 | 73.28 | 75.04 | 68.26 | 66.91 | 72.8 | 77.56 | 76.78 | 70.45 | 81.77 | 33 | Electric |
| | 09:40 PM | 61.13 | 63.12 | 72.33 | 73.83 | 64.83 | 63.98 | 65.64 | 72.19 | 67.2 | 58.4 | 75.72 | 33 | Electric |
| | 09:52 PM | 65.94 | 63.35 | 75.52 | 75.53 | 69.69 | 69.58 | 66.09 | 64.03 | 67.97 | 58.56 | 75.19 | 33 | Electric |
| | 09:55 PM | 62.07 | 66.1 | 72.64 | 71.99 | 64.06 | 62.04 | 65.03 | 64.24 | 60.52 | 50.81 | 71.4 | 33 | Electric |
| | 10:07 PM | 63.63 | 64.47 | 70.94 | 71.65 | 63.78 | 64.28 | 70.7 | 72.81 | 68.81 | 61.05 | 77.17 | 33 | Electric |
| | 10:10 PM | 60.58 | 63.18 | 72.41 | 73.75 | 65.76 | 65.28 | 63.76 | 67.76 | 64.5 | 54.82 | 73.33 | 33 | Electric |
| | 10:22 PM | 62.95 | 65.02 | 72.72 | 74.2 | 66.57 | 65.37 | 62.53 | 66.68 | 66.71 | 61.33 | 73.38 | 33 | Electric |
| | 10:25 PM | 60.73 | 61.11 | 68.8 | 69.19 | 62.34 | 60.62 | 65.14 | 69.13 | 69.06 | 60.69 | 73.93 | 33 | Electric |
| | 10:37 PM | 61.39 | 65.02 | 72.43 | 74.26 | 64.75 | 64.19 | 63.48 | 62.63 | 58.78 | 48.97 | 71.37 | 33 | Electric |
| | 10:40 PM | 61.18 | 63.99 | 72.7 | 73.71 | 65.79 | 65.47 | 62.46 | 62.89 | 58.62 | 48.18 | 71.44 | 33 | Electric |
| | 10:52 PM | 63.37 | 63.27 | 73.25 | 73.94 | 66.62 | 66.54 | 63.5 | 65.38 | 63.53 | 54 | 72.9 | 33 | Electric |
| | 11:01 PM | 60.57 | 64.17 | 72.5 | 73.83 | 65.04 | 63.46 | 65.29 | 68.3 | 63.17 | 53.94 | 73.4 | 33 | Electric |
| | 11:27 PM | 59.37 | 60.79 | 70.75 | 71.57 | 64.06 | 63.76 | 62.17 | 67.03 | 63.24 | 53 | 72.01 | | Electric |
| 08/06/2021 | 01:10 AM | 59.5 | 61.62 | 61.18 | 67.68 | 55.41 | 51.18 | 51.94 | 46.84 | 37.72 | 24.08 | 61.48 | 30 | Electric |
| | 01:10 AM | 58.71 | 59.99 | 58.59 | 68.17 | 53.27 | 49.35 | 49.37 | 44.2 | 35.47 | 26.98 | 61.14 | 30 | Electric |

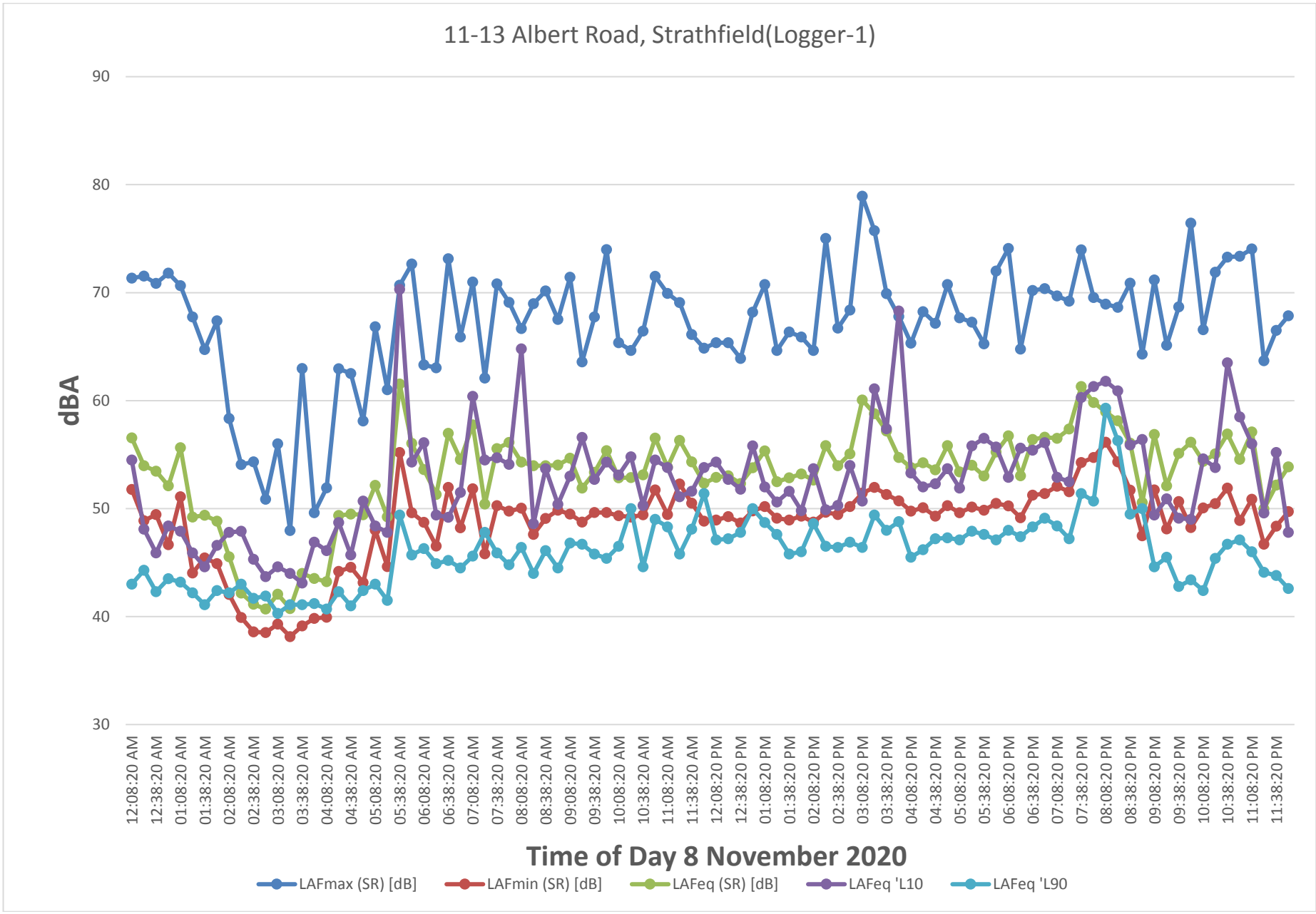
| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 01:11 AM | 59.29 | 62.25 | 68.59 | 70.53 | 61.23 | 62.08 | 62.89 | 69.19 | 65.98 | 59.9 | 73.06 | | Electric |
| | 01:12 AM | 58.39 | 62.02 | 70.97 | 72.91 | 63.5 | 64.38 | 60.1 | 63.51 | 59.12 | 49.71 | 70.45 | | Electric |
| | 01:33 AM | 59.75 | 60.29 | 69.73 | 71.68 | 62.64 | 62.01 | 61.4 | 66.08 | 64.72 | 57.65 | 71.51 | | Electric |
| | 03:47 AM | 58.42 | 51.85 | 44.33 | 45.51 | 43.55 | 40.55 | 36.36 | 28.66 | 12.8 | 0.37 | 45.21 | 58 | Electric |
| | 04:16 AM | 64.87 | 54.62 | 50.19 | 51.66 | 49.87 | 45.84 | 49.7 | 34.95 | 19.08 | 2.59 | 53.64 | 90 | Diesel |
| | 04:37 AM | 61.46 | 54.16 | 47.55 | 45.69 | 43.3 | 41.51 | 36.99 | 39.04 | 31.05 | 6.06 | 46.79 | 62 | Diesel |
| | 05:07 AM | 63.89 | 60.22 | 55.1 | 55.79 | 51.71 | 48.99 | 44.47 | 38.64 | 26.59 | 6.88 | 53.86 | 30 | Electric |
| | 05:27 AM | 60.96 | 63.2 | 65.07 | 69.14 | 62.21 | 58.23 | 56.98 | 53.17 | 43.42 | 29.39 | 65.68 | 62 | Diesel |
| | 05:36 AM | 60.72 | 63.59 | 64.96 | 66.81 | 62.75 | 63.81 | 57.95 | 53.29 | 43.56 | 28.37 | 66.89 | 33 | Electric |
| | 05:57 AM | 61.59 | 63.54 | 64.23 | 65.64 | 63.21 | 61.36 | 59.27 | 53.06 | 42.81 | 26.7 | 66.14 | 33 | Electric |
| | 06:21 AM | 61.56 | 64.9 | 71.89 | 71.63 | 63.92 | 64.08 | 59.85 | 54.98 | 44.4 | 31.28 | 68.82 | 33 | Electric |
| | 06:48 AM | 61.52 | 62.15 | 72.65 | 74.39 | 65.43 | 64.85 | 60.41 | 55.03 | 47.51 | 32.84 | 70.21 | 45 | Electric |
| | 07:18 AM | 64.61 | 65.6 | 73.86 | 75.28 | 66.85 | 66.76 | 67.89 | 72.65 | 68.01 | 60.19 | 76.91 | 33 | Electric |
| | 07:21 AM | 65.49 | 65.15 | 72.27 | 73.04 | 65.14 | 65.29 | 69.65 | 72.24 | 70.13 | 58.34 | 77 | 33 | Electric |

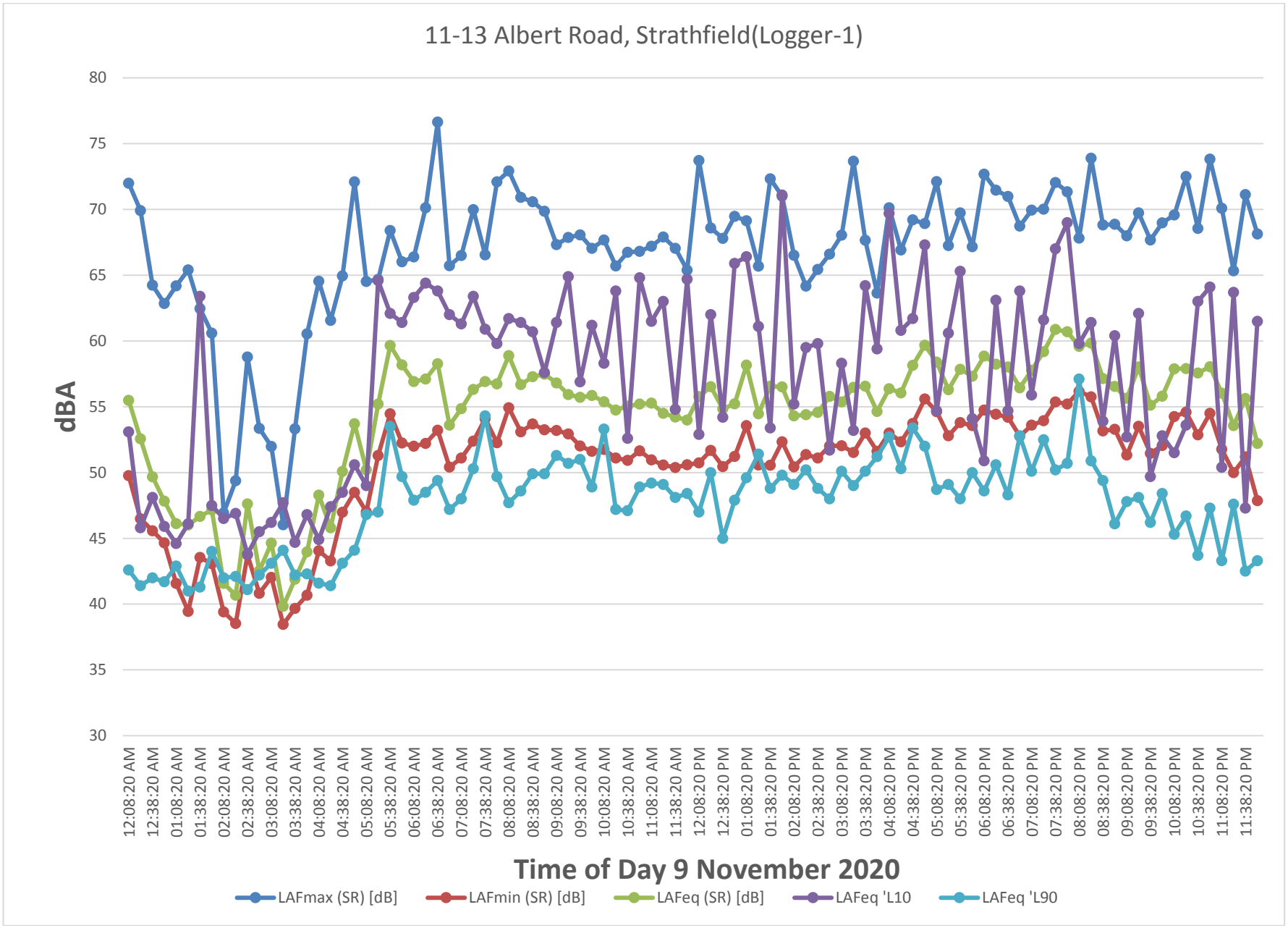
## 7.2 UNATTENDED NOISE DATA( RAIL-LOGGER-1)

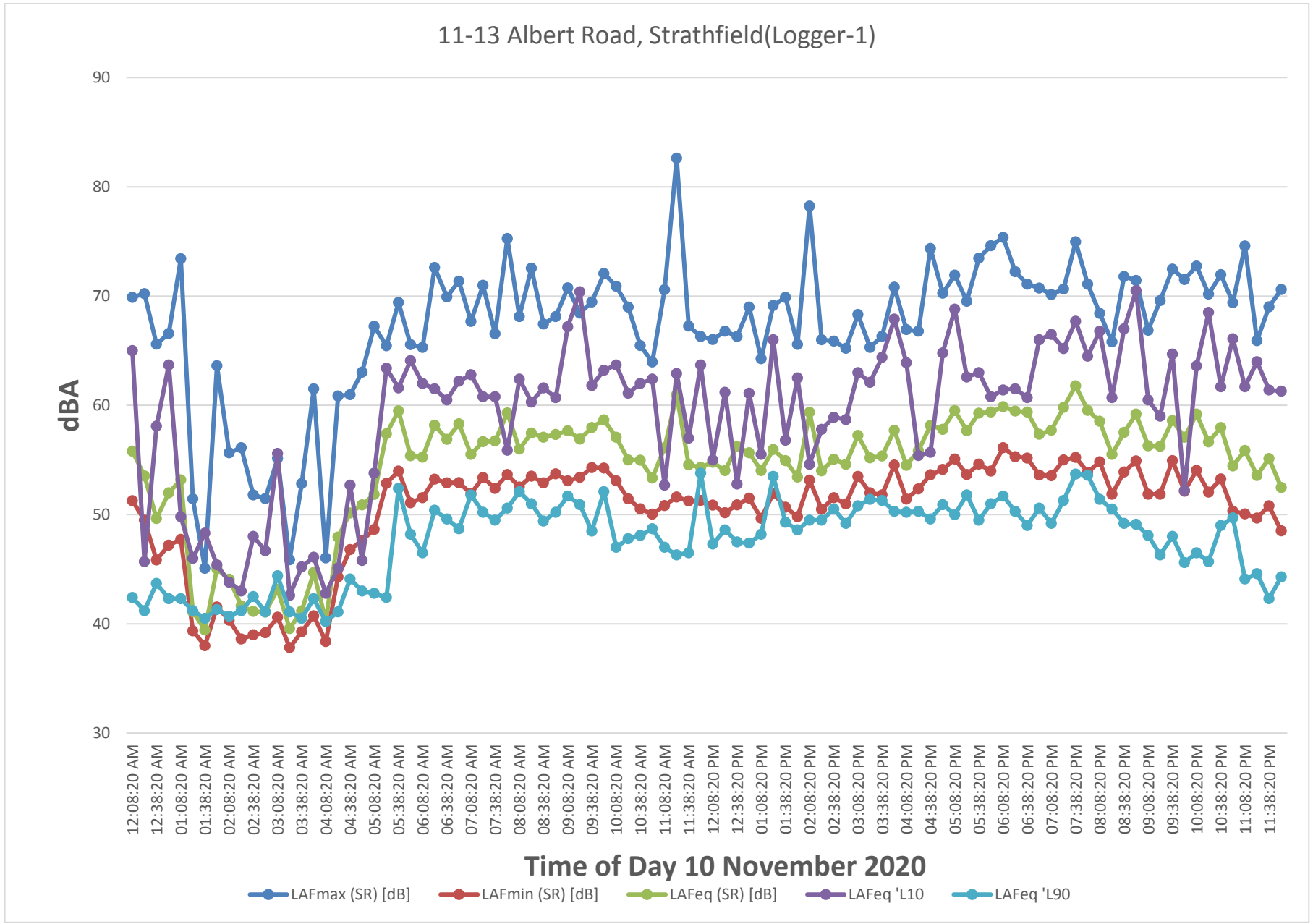


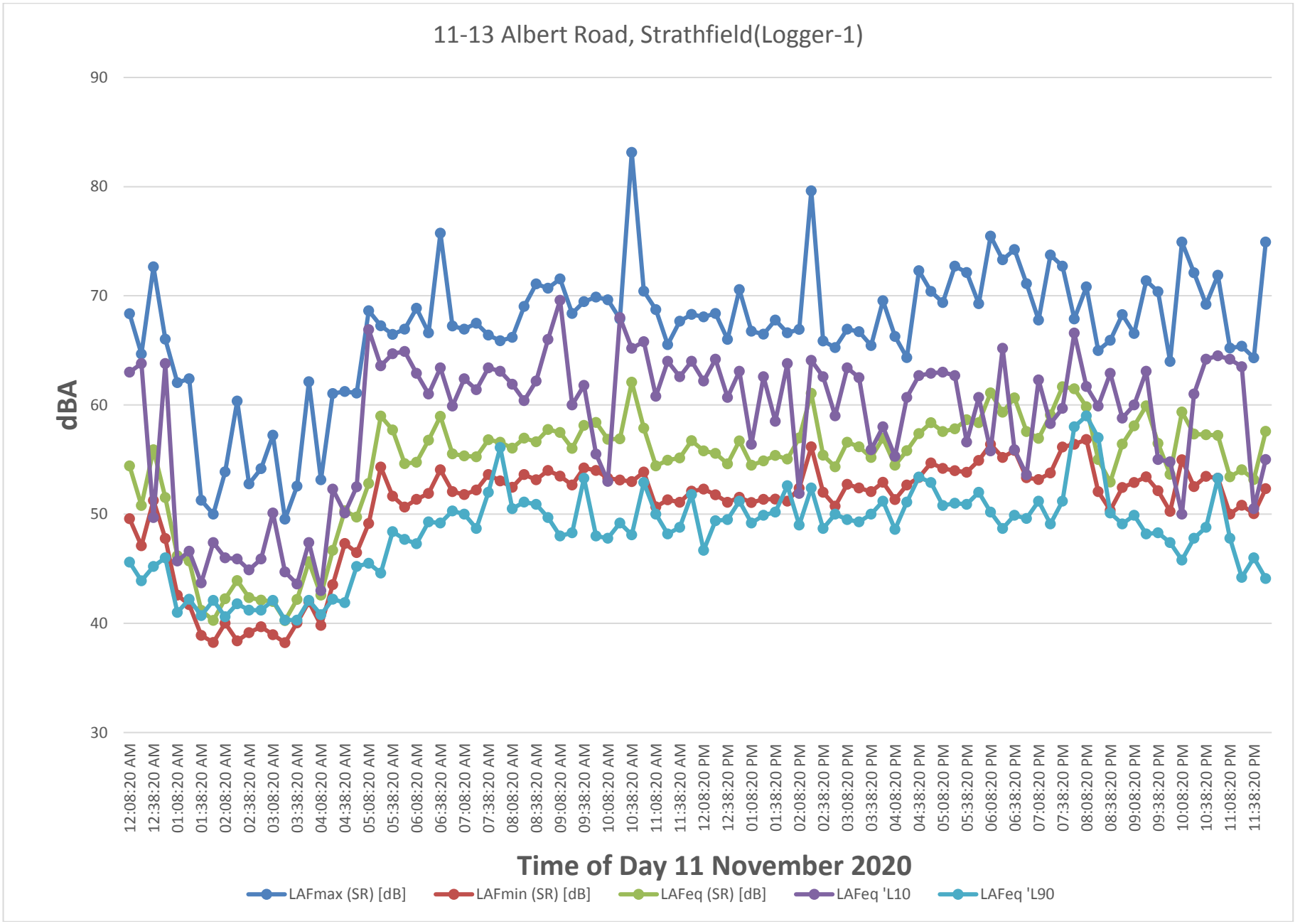

11-13 Albert Road, Strathfield((Logger-1)
90
80
70
60
50
40
30
dBA
12:08:20 AM
12:38:20 AM
01:08:20 AM
01:38:20 AM
02:08:20 AM
02:38:20 AM
03:08:20 AM
03:38:20 AM
04:08:20 AM
04:38:20 AM
05:08:20 AM
05:38:20 AM
06:08:20 AM
06:38:20 AM
07:08:20 AM
07:38:20 AM
08:08:20 AM
08:38:20 AM
09:08:20 AM
09:38:20 AM
10:08:20 AM
10:38:20 AM
11:08:20 AM
11:38:20 AM
12:08:20 PM
12:38:20 PM
01:08:20 PM
01:38:20 PM
02:08:20 PM
02:38:20 PM
03:08:20 PM
03:38:20 PM
04:08:20 PM
04:38:20 PM
05:08:20 PM
05:38:20 PM
06:08:20 PM
06:38:20 PM
07:08:20 PM
07:38:20 PM
08:08:20 PM
08:38:20 PM
09:08:20 PM
09:38:20 PM
10:08:20 PM
10:38:20 PM
11:08:20 PM
11:38:20 PM
Time of Day 6 November 2020
LAFmax (SR) [dB]
LAFmin (SR) [dB]
LAFeq (SR) [dB]
LAFeq 'L10
LAFeq 'L90

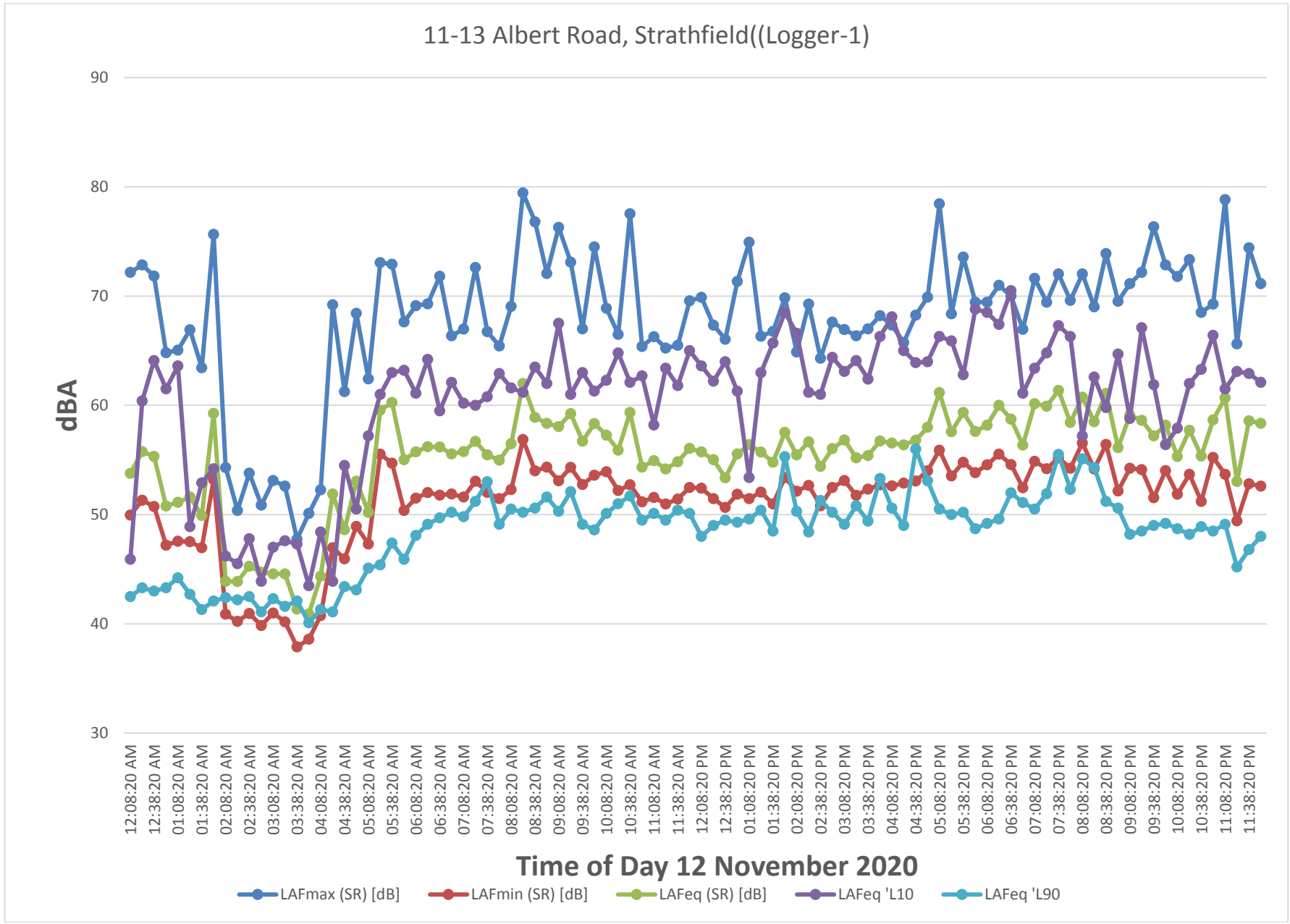

11-13 Albert Road, Strathfield(Logger-1)
dBA
90
80
70
60
50
40
30
12:08:20 AM
12:38:20 AM
01:08:20 AM
01:38:20 AM
02:08:20 AM
02:38:20 AM
03:08:20 AM
03:38:20 AM
04:08:20 AM
04:38:20 AM
05:08:20 AM
05:38:20 AM
06:08:20 AM
06:38:20 AM
07:08:20 AM
07:38:20 AM
08:08:20 AM
08:38:20 AM
09:08:20 AM
09:38:20 AM
10:08:20 AM
10:38:20 AM
11:08:20 AM
11:38:20 AM
12:08:20 PM
12:38:20 PM
01:08:20 PM
01:38:20 PM
02:08:20 PM
02:38:20 PM
03:08:20 PM
03:38:20 PM
04:08:20 PM
04:38:20 PM
05:08:20 PM
05:38:20 PM
06:08:20 PM
06:38:20 PM
07:08:20 PM
07:38:20 PM
08:08:20 PM
08:38:20 PM
09:08:20 PM
09:38:20 PM
10:08:20 PM
10:38:20 PM
11:08:20 PM
11:38:20 PM
Time of Day 7 November 2020
LAFmax (SR) [dB]
LAFmin (SR) [dB]
LAFeq (SR) [dB]
LAFeq 'L10
LAFeq 'L90

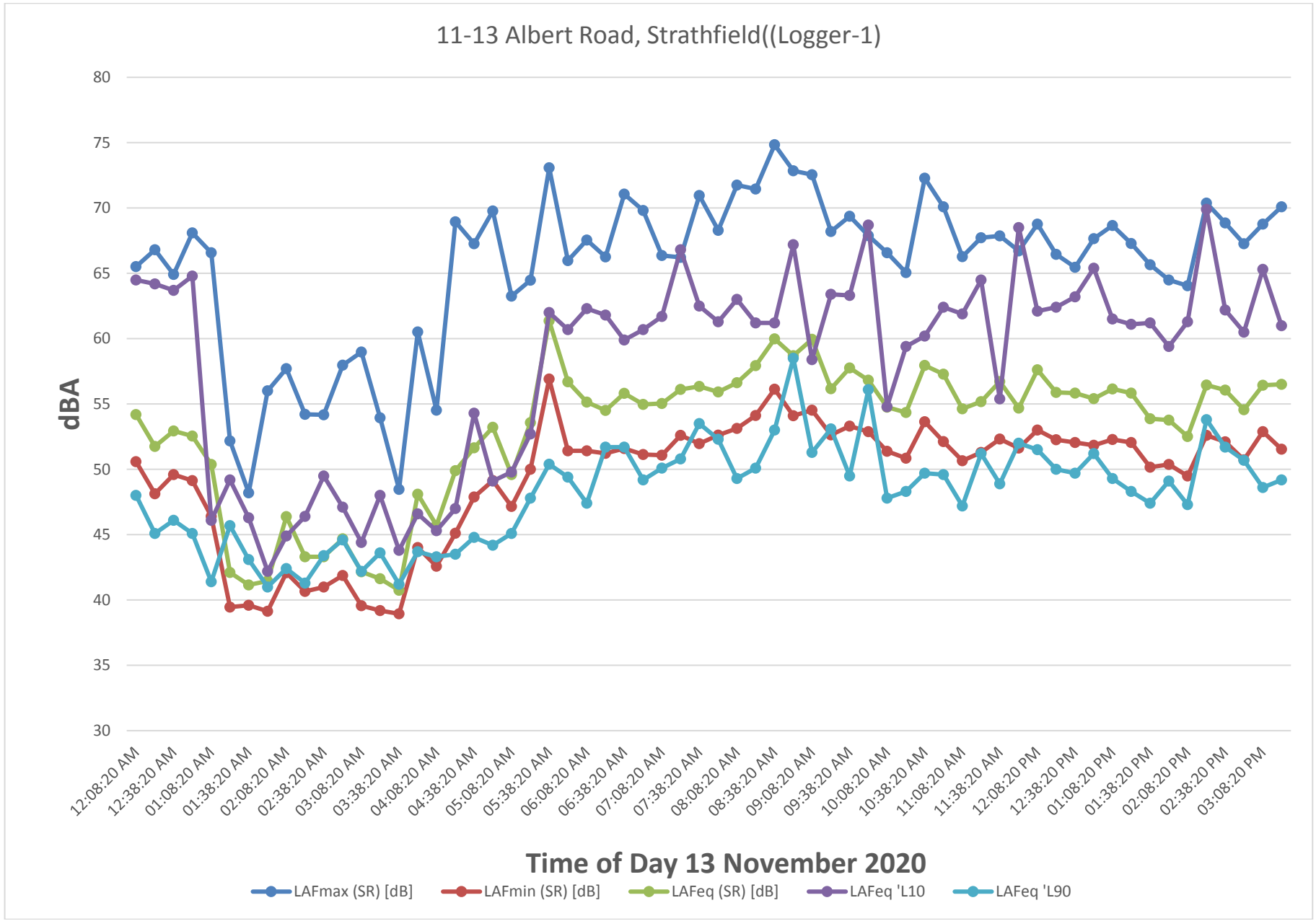

11-13 Albert Road, Strathfield(Logger-1)
dBA
90
80
70
60
50
40
30
12:08:20 AM
12:38:20 AM
01:08:20 AM
01:38:20 AM
02:08:20 AM
02:38:20 AM
03:08:20 AM
03:38:20 AM
04:08:20 AM
04:38:20 AM
05:08:20 AM
05:38:20 AM
06:08:20 AM
06:38:20 AM
07:08:20 AM
07:38:20 AM
08:08:20 AM
08:38:20 AM
09:08:20 AM
09:38:20 AM
10:08:20 AM
10:38:20 AM
11:08:20 AM
11:38:20 AM
12:08:20 PM
12:38:20 PM
01:08:20 PM
01:38:20 PM
02:08:20 PM
02:38:20 PM
03:08:20 PM
03:38:20 PM
04:08:20 PM
04:38:20 PM
05:08:20 PM
05:38:20 PM
06:08:20 PM
06:38:20 PM
07:08:20 PM
07:38:20 PM
08:08:20 PM
08:38:20 PM
09:08:20 PM
09:38:20 PM
10:08:20 PM
10:38:20 PM
11:08:20 PM
11:38:20 PM
Time of Day 8 November 2020
LAFmax (SR) [dB]
LAFmin (SR) [dB]
LAFeq (SR) [dB]
LAFeq 'L10
LAFeq 'L90


11-13 Albert Road, Strathfield(Logger-1)
dBA
80
75
70
65
60
55
50
45
40
35
30
12:08:20 AM
12:38:20 AM
01:08:20 AM
01:38:20 AM
02:08:20 AM
02:38:20 AM
03:08:20 AM
03:38:20 AM
04:08:20 AM
04:38:20 AM
05:08:20 AM
05:38:20 AM
06:08:20 AM
06:38:20 AM
07:08:20 AM
07:38:20 AM
08:08:20 AM
08:38:20 AM
09:08:20 AM
09:38:20 AM
10:08:20 AM
10:38:20 AM
11:08:20 AM
11:38:20 AM
12:08:20 PM
12:38:20 PM
01:08:20 PM
01:38:20 PM
02:08:20 PM
02:38:20 PM
03:08:20 PM
03:38:20 PM
04:08:20 PM
04:38:20 PM
05:08:20 PM
05:38:20 PM
06:08:20 PM
06:38:20 PM
07:08:20 PM
07:38:20 PM
08:08:20 PM
08:38:20 PM
09:08:20 PM
09:38:20 PM
10:08:20 PM
10:38:20 PM
11:08:20 PM
11:38:20 PM
Time of Day 9 November 2020
LAFmax (SR) [dB]
LAFmin (SR) [dB]
LAFeq (SR) [dB]
LAFeq 'L10
LAFeq 'L90


11-13 Albert Road, Strathfield(Logger-1)
dBA
90
80
70
60
50
40
30
12:08:20 AM
12:38:20 AM
01:08:20 AM
01:38:20 AM
02:08:20 AM
02:38:20 AM
03:08:20 AM
03:38:20 AM
04:08:20 AM
04:38:20 AM
05:08:20 AM
05:38:20 AM
06:08:20 AM
06:38:20 AM
07:08:20 AM
07:38:20 AM
08:08:20 AM
08:38:20 AM
09:08:20 AM
09:38:20 AM
10:08:20 AM
10:38:20 AM
11:08:20 AM
11:38:20 AM
12:08:20 PM
12:38:20 PM
01:08:20 PM
01:38:20 PM
02:08:20 PM
02:38:20 PM
03:08:20 PM
03:38:20 PM
04:08:20 PM
04:38:20 PM
05:08:20 PM
05:38:20 PM
06:08:20 PM
06:38:20 PM
07:08:20 PM
07:38:20 PM
08:08:20 PM
08:38:20 PM
09:08:20 PM
09:38:20 PM
10:08:20 PM
10:38:20 PM
11:08:20 PM
11:38:20 PM
Time of Day 10 November 2020
LAFmax (SR) [dB]
LAFmin (SR) [dB]
LAFeq (SR) [dB]
LAFeq 'L10
LAFeq 'L90


11-13 Albert Road, Strathfield(Logger-1)
dBA
90
80
70
60
50
40
30
12:08:20 AM
12:38:20 AM
01:08:20 AM
01:38:20 AM
02:08:20 AM
02:38:20 AM
03:08:20 AM
03:38:20 AM
04:08:20 AM
04:38:20 AM
05:08:20 AM
05:38:20 AM
06:08:20 AM
06:38:20 AM
07:08:20 AM
07:38:20 AM
08:08:20 AM
08:38:20 AM
09:08:20 AM
09:38:20 AM
10:08:20 AM
10:38:20 AM
11:08:20 AM
11:38:20 AM
12:08:20 PM
12:38:20 PM
01:08:20 PM
01:38:20 PM
02:08:20 PM
02:38:20 PM
03:08:20 PM
03:38:20 PM
04:08:20 PM
04:38:20 PM
05:08:20 PM
05:38:20 PM
06:08:20 PM
06:38:20 PM
07:08:20 PM
07:38:20 PM
08:08:20 PM
08:38:20 PM
09:08:20 PM
09:38:20 PM
10:08:20 PM
10:38:20 PM
11:08:20 PM
11:38:20 PM
Time of Day 11 November 2020
LAFmax (SR) [dB]
LAFmin (SR) [dB]
LAFeq (SR) [dB]
LAFeq 'L10
LAFeq 'L90


11-13 Albert Road, Strathfield((Logger-1)
dBA
90
80
70
60
50
40
30
12:08:20 AM
12:38:20 AM
01:08:20 AM
01:38:20 AM
02:08:20 AM
02:38:20 AM
03:08:20 AM
03:38:20 AM
04:08:20 AM
04:38:20 AM
05:08:20 AM
05:38:20 AM
06:08:20 AM
06:38:20 AM
07:08:20 AM
07:38:20 AM
08:08:20 AM
08:38:20 AM
09:08:20 AM
09:38:20 AM
10:08:20 AM
10:38:20 AM
11:08:20 AM
11:38:20 AM
12:08:20 PM
12:38:20 PM
01:08:20 PM
01:38:20 PM
02:08:20 PM
02:38:20 PM
03:08:20 PM
03:38:20 PM
04:08:20 PM
04:38:20 PM
05:08:20 PM
05:38:20 PM
06:08:20 PM
06:38:20 PM
07:08:20 PM
07:38:20 PM
08:08:20 PM
08:38:20 PM
09:08:20 PM
09:38:20 PM
10:08:20 PM
10:38:20 PM
11:08:20 PM
11:38:20 PM
Time of Day 12 November 2020
LAFmax (SR) [dB]
LAFmin (SR) [dB]
LAFeq (SR) [dB]
LAFeq 'L10
LAFeq 'L90


11-13 Albert Road, Strathfield((Logger-1)
dBA
80
75
70
65
60
55
50
45
40
35
30
12:08:20 AM
12:38:20 AM
01:08:20 AM
01:38:20 AM
02:08:20 AM
02:38:20 AM
03:08:20 AM
03:38:20 AM
04:08:20 AM
04:38:20 AM
05:08:20 AM
05:38:20 AM
06:08:20 AM
06:38:20 AM
07:08:20 AM
07:38:20 AM
08:08:20 AM
08:38:20 AM
09:08:20 AM
09:38:20 AM
10:08:20 AM
10:38:20 AM
11:08:20 AM
11:38:20 AM
12:08:20 PM
12:38:20 PM
01:08:20 PM
01:38:20 PM
02:08:20 PM
02:38:20 PM
03:08:20 PM
Time of Day 13 November 2020
LAFmax (SR) [dB]
LAFmin (SR) [dB]
LAFeq (SR) [dB]
LAFeq 'L10
LAFeq 'L90

## 7.3 UNATTENDED NOISE DATA ( RAW SQUARE-LOGGER-2)