REPORT

ESR WESTLINK

KEMPS CREEK

NOISE AND VIBRATION ASSESSMENT
RWDI # 2101343
April 13, 2022

SUBMITTED TO

Grace Macdonald
Senior Planner
ESR Australia
Level 29, 20 Bond Street
Sydney, NSW, 2000
Grace.Macdonald@esr.com

SUBMITTED BY

Peter Thang
Project Engineer
Peter.Thang@rwdi.com

Davis Lai
Project Manager
Davis.Lai@rwdi.com

RWDI Australia Pty Ltd (RWDI)
Suite 6.02, 80 William Street
Woolloomooloo, NSW, 2011
T: +61.2.9437.4611
E-mail: solutions@rwdi.com
ABN: 86 641 303 871

DOCUMENT CONTROL

Version	Status	Date	Prepared By	Reviewed By
A	Draft	23 December 2020	David Perry	John Wassermann
B	Final	5 February 2021	David Perry	John Wassermann
C	Final	10 November 2021	David Perry	Neil Gross
D	Final	13 April 2022	Peter Thang	Davis Lai

NOTE

All materials specified by RWDI Australia Pty Ltd (RWDI) have been selected solely on the basis of acoustic performance. Any other properties of these materials, such as fire rating, chemical properties etc. should be checked with the suppliers or other specialised bodies for fitness for a given purpose.

The information contained in this document produced by RWDI is solely for the use of the client identified on the front page of this report. Our client becomes the owner of this document upon full payment of our **Tax Invoice** for its provision. This document must not be used for any purposes other than those of the document's owner. RWDI undertakes no duty to or accepts any responsibility to any third party who may rely upon this document.

WILKINSON MURRAY

In October 2020, Wilkinson Murray Pty Limited merged with RWDI Group, a leading international consulting firm. Wilkinson Murrays core practise areas of noise, acoustics, vibration and air quality consulting built since 1962 servicing Australia and Asia-Pacific region will complement RWDI practise areas. Combined, RWDI+Wilkinson Murray is one of the largest teams globally specialising in the area of noise, acoustics, vibration and air quality.

RWDI

RWDI is a team of highly-specialised consulting engineers and scientists working to improve the built environment through three core areas of practice: building performance, climate engineering and environmental engineering. More information is available at www.rwdi.com.

AAAC

This firm is a member firm of the Association of Australasian Acoustical Consultants and the work here reported has been carried out in accordance with the terms of that membership.

QUALITY ASSURANCE

RWDI Australia Pty Ltd operates a Quality Management System which complies with the requirements of AS/NZS ISO 9001:2015. This management system has been externally certified by SAI Global and Licence No. QEC 13457 has been issued for the following scope: The provision of consultancy services in acoustic engineering and air quality; and the sale, service, support and installation of acoustic monitoring and related systems and technologies.

TABLE OF CONTENTS

LIST OF APPENDICES

1 INTRODUCTION

RWDI was retained by ESR Australia to conduct an operational and construction noise and vibration assessment for the proposed warehouse and distribution facility known as the 'ESR Kemps Creek Logistics Park ' (the Project) located on the corner of Abbotts Road and Aldington Road, Kemps Creek.

The following report forms part of the State Significant Development Application for a proposed warehouse and distribution development located across three separate allotments: 290-308 Aldington Road, 59-62 Abbotts Road, and 63 Abbotts Road (the Site).

This report addresses the Secretary's Environmental Assessment Requirements (SEARs) relevant to the development (SSD 9138102) issued in September 2020.

The SEARs relevant to this report have been considered and are addressed as outlined in **Table 1-1**.

Table 1-1 Secretary's Environmental Assessment Requirements (SEARs)

Relevant SEARs	Response
a quantitative noise and vibration impact assessment for construction and operation of the development, including traffic noise, undertaken by a suitably qualified person in accordance with the relevant Environment Protection Authority guidelines and including an assessment of nearby sensitive receivers	This report includes a description of potential noise sources associated with the development. Operational noise including traffic noise is addressed in 6**.** Construction noise and vibration is addressed in 7.
cumulative impacts of other existing and proposed developments	This assessment includes consideration of the cumulative noise impacts of the potential noise emissions from the development via the Amenity Noise Trigger mechanism of the EPA's *NPfI* (refer to 5.3.2**.**
details and justification of the proposed noise mitigation, management and monitoring measures	An assessment of potential impacts on proposed nearby residential receivers has been undertaken for operational noise and construction noise in 6 **and** 7**,** respectively.

Noise from the operation of the proposal has been assessed in accordance with the NSW *Noise Policy for Industry* (NPfI), NSW EPA,2017, which is used to set trigger levels to manage cumulative noise.

- Construction noise has been assessed in accordance with the *Interim Construction Noise Guideline* (ICNG), DECC, 2009.
- Vibration from operation and construction has been assessed in accordance with *Assessing Vibration: A Technical Guideline*, DEC, 2006.
- Traffic noise associated with the site has been assessed in accordance with the NSW *Road Noise Policy* (RNP), DECCW, 2011

2 SITE LOCATION

The site is located at 290-308 Aldington Road, 59-62 Abbotts Road, and 63 Abbotts Road as shown in **Figure 2-1** below. Currently, the Site includes scattered residential dwellings (within a rural setting), vacant land and ancillary farm buildings.

Surrounding land uses currently comprise a predominantly rural typology, with a variety of rural dwellings, rural land, farm dams and scattered vegetation. Beyond this, the Oakdale South industrial estate is located approximately 2.2km to the northeast of the site, and the established large lot residential housing community of Mount Vernon is located to the south east.

Mamre Road is a major arterial road that is located to the west of the Site and this road is planned to be upgraded in the near future in two stages. Investigations for the concept design for Stage 1 (M4 to Erskine Park Road) started in early 2020. Stage 2 will deliver the upgrade in the vicinity of the Site (Erskine Park Road to Kerrs Road); however, a definitive timeline is currently not known.

There are also several infrastructure projects currently being investigated including the Southern Link Road to the north of the Site, the proposed Western Sydney Freight Line and potential Intermodal Terminal located to the west and north-west of the Site along Mamre Road.

Of the many current projects being constructed in the area, the Western Sydney Airport and Aerotropolis will result in increased traffic movements and introduce aircraft movements in the area. This in turn will impact the noise levels in this region.

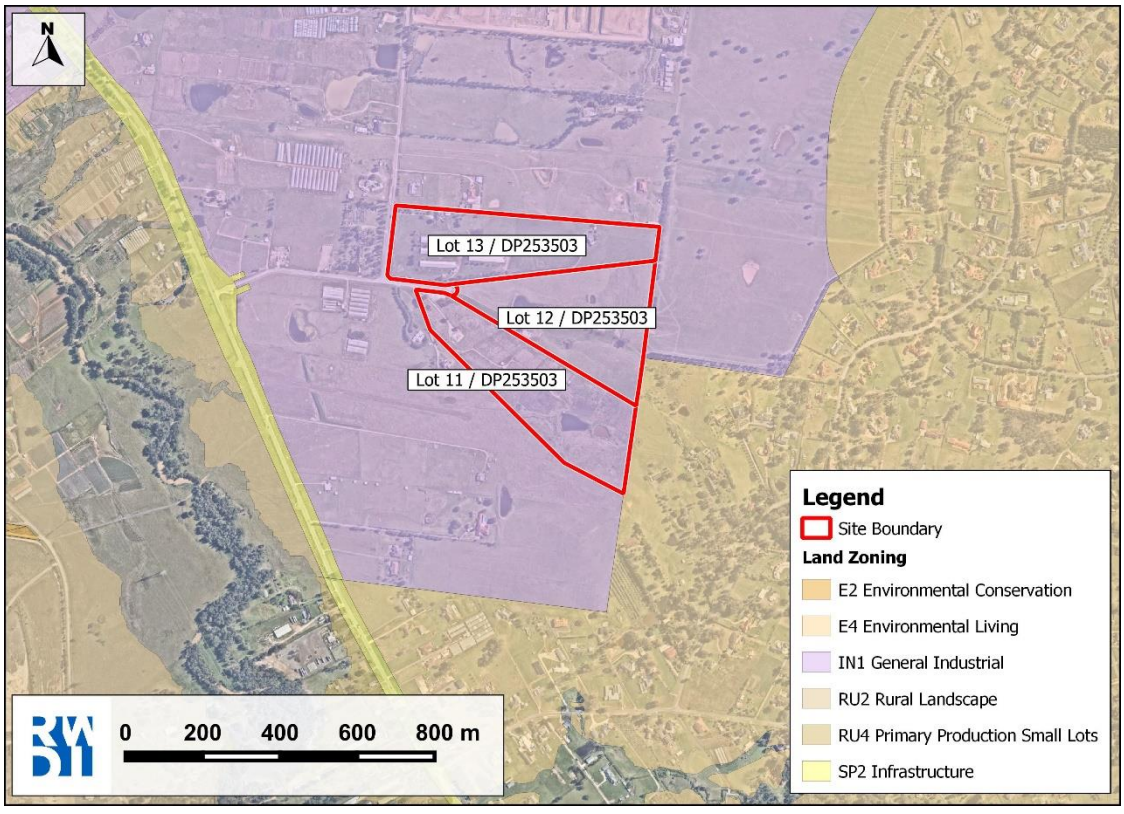


Figure 2-1 Site Aerial

3 PROJECT DESCRIPTION

3.1 Masterplan

The Development Site is located within the Western Sydney Employment Area (WSEA) and is currently zoned IN1 General Industrial under the WSEA State Environmental Planning Policy (SEPP). The proposal seeks to develop Lots 1-6 of the Development Site for warehouse or distribution centres use.

The Masterplan for the site comprising seven industrial buildings, includes:

- an indicative total building area of 150,577 m^2;
- internal road layout and connection to Abbotts Road
- café/amenity area
- building locations, building heights, car parking arrangements, setbacks and built form parameters and;
- associated site landscaping.

This SSDA includes indicative staging plans for construction including site preparation, earthworks and infrastructure work onsite. Accordingly, consent is sought for the following:

- Demolition and clearing of all existing built form structures
- Clearing of all existing vegetation
- Construction of all seven warehouse buildings and ancillary offices
- Site wide bulk earthworks including 'cut and fill' to create flat development platforms for the warehouse buildings, and topsoiling and grassing/site stabilisation works
- Site wide roadworks and access infrastructure
- Stormwater and drainage works including stormwater basins, diversion of stormwater lines, gross pollutant traps and associated swale works
- Sewer and potable water reticulation
- Inter-allotment, road and boundary retaining walls; and
- External road upgrades including Aldington and Abbotts Road and a new signalised intersection at Mamre and Abbotts Road.

3.2 Development Layout

The proposed layout is presented in **Figure 3-1.**

Figure 3-1 Site Layout

4 EXISTING ACOUSTIC ENVIRONMENT

4.1 Sensitive Receiver Locations and Land Use

The State Environmental Planning Policy (Industry and Employment) 2021 has been subject to a recent amendment extending the controls of the SEPP to include the Mamre Road Precinct and rezoning it primarily for General Industrial (IN1).

The eastern boundary of the site has been identified as 'Transition to rural', and hence must be compatible with the adjacent R5 Large Lot Residential zoning at Mount Vernon. Sensitive receivers located in the vicinity of the development are located on the eastern boundary are located on Mt Vernon Road, Kerrs Road, and Bowood Road. The receivers are located at distances between 73 m to 930 m.

Other existing residential properties are located within the General Industrial (IN1) zone surrounding the development boundary. Several of these properties include existing residential dwelling that are unlikely to be inhabited during construction or operational stages. Notwithstanding, consideration of operational and construction noise and vibration impacts for these properties has been included in the assessment, for reference purposes only.

Nearest noise-sensitive receivers have been categorised into Noise Catchment Area (NCA's) in **Figure 4-1**, details of the receivers are summarised in **Table 4-1.**

Table 4-1 Noise Sensitive Receivers

ID	Address	Suburb	Land Zoning	Distance (m)
N01	49 Mount Vernon Road	Mount Vernon	E4	73
N02	40 Mount Vernon Road	Mount Vernon	E4	161
N03	50 Mount Vernon Road	Mount Vernon	E4	210
N04	51 Mount Vernon Road	Mount Vernon	E4	226
N05	52a Mount Vernon Road	Mount Vernon	E4	203
N06	62a Mount Vernon Road	Mount Vernon	E4	249
N07	30/38 Mount Vernon Road	Mount Vernon	E4	138
N08	54 Kerrs Road	Mount Vernon	E4	356
N09	45 Kerrs Road	Mount Vernon	E4	368
N10	30 Kerrs Road	Mount Vernon	E4	416
N11	1114 Mamre Road	Mount Vernon	E4	491
N12	1096 Mamre Road	Mount Vernon	E4	549
N13	62 Mount Vernon Road	Mount Vernon	E4	315
N14	62b Mount Vernon Road	Mount Vernon	E4	358
N15	64 Mount Vernon Road	Mount Vernon	E4	383

ID	Address	Suburb	Land Zoning	Distance (m)
N16	247 Capitol Hill Drive	Mount Vernon	E4	463
N17	239 Capitol Hill Drive	Mount Vernon	E4	495
N18	231 Capitol Hill Drive	Mount Vernon	E4	536
N19	215 Capitol Hill Drive	Mount Vernon	E4	612
N20	12-22 Bowood Road	Mount Vernon	E4	560
N21	30 Bowood Road	Mount Vernon	E4	645
N22	23-29 Bowood Road	Mount Vernon	E4	646
N23	35 Bowood Road	Mount Vernon	E4	651
N24	43 Bowood Road	Mount Vernon	E4	663
N25	51 Bowood Road	Mount Vernon	E4	695
N26	284a Aldington Road	Kemps Creek	IN1	59
N27	284 Aldington Road	Kemps Creek	IN1	61
N28	272-280 Aldington Road	Kemps Creek	IN1	117
N29	1 Abbotts Road	Kemps Creek	E4	71
N30	1028 Mamre Road	Kemps Creek	IN1	37
N31	1048 Mamre Road	Kemps Creek	IN1	32
N32	1050 Mamre Road	Kemps Creek	IN1	184
N33	1066 Mamre Road	Kemps Creek	IN1	250
N34	37 Kerrs Road	Mount Vernon	IN1	402
N35	269 Aldington Road	Kemps Creek	IN1	58
N36	983b Mamre Road	Kemps Creek	RU2	930
N37	949-965 Mamre Road	Kemps Creek	RU2	588

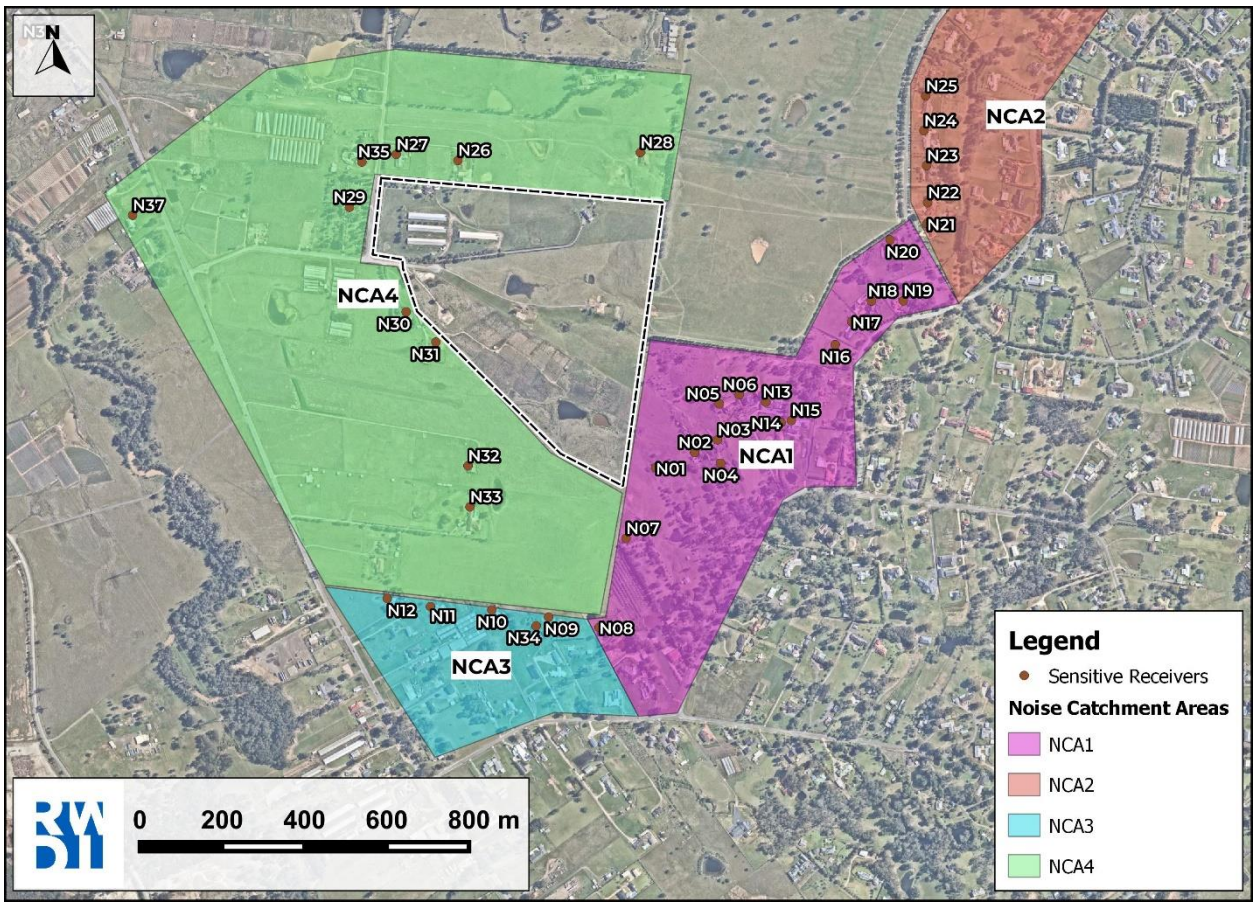


Figure 4-1 Noise Catchment Areas (NCAs)

4.2 Unattended Noise Monitoring

The surrounding area is primarily affected by road traffic noise from Mamre Road and potentially noise from existing nearby commercial/industrial activities. Unattended noise monitoring was conducted between Thursday 18 and Monday 30 November 2020.

4.2.1 Equipment

The noise monitoring equipment used for this measurement consisted of two ARL environmental noise loggers set to A-weighted, fast response, continuously monitoring and recording in 15-minute intervals at locations shown in **Figure 4-2**. Equipment calibration was checked before and after the survey and no significant drift was noted.

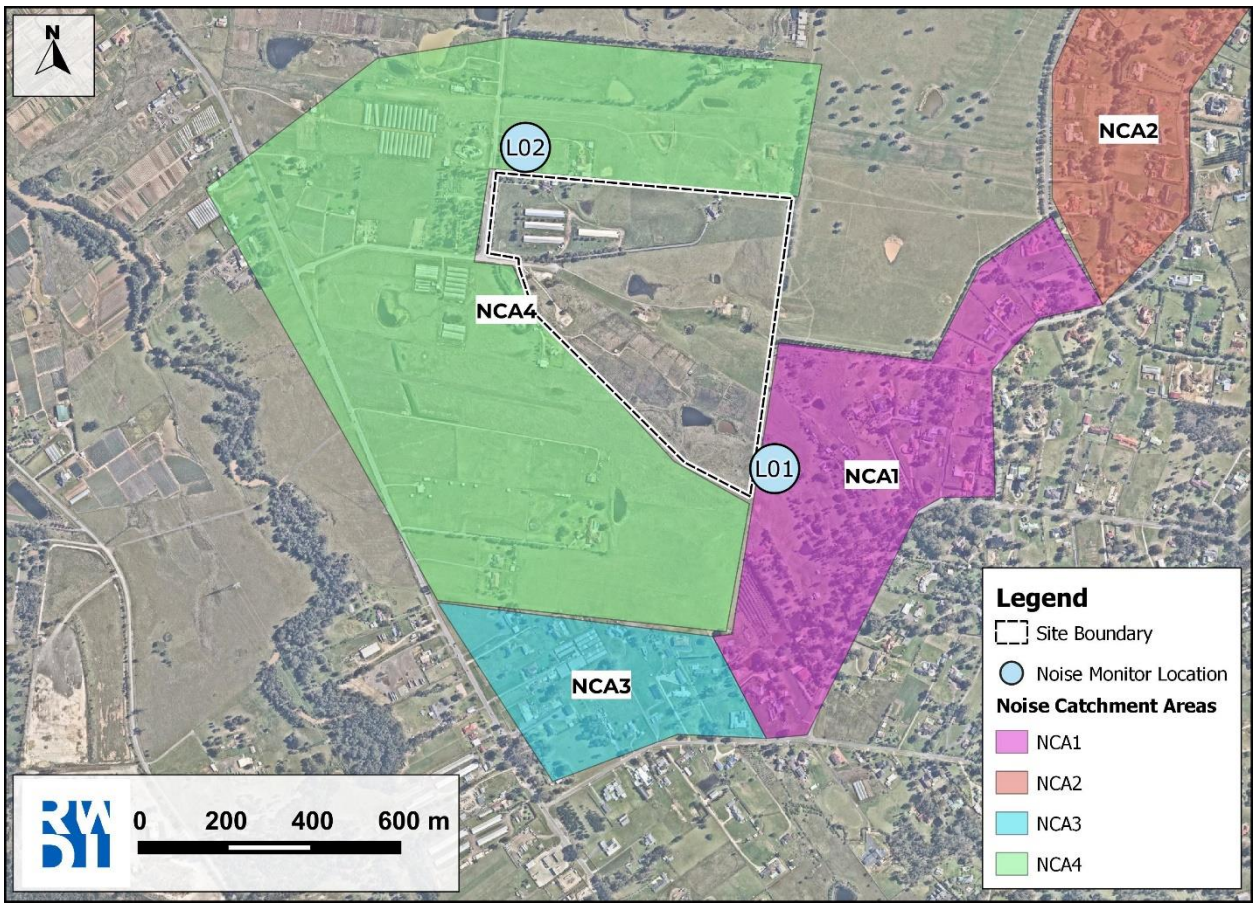


Figure 4-2 Noise Monitoring Locations

The loggers determine L_{Amax}, L_{A10}, L_{A90} and L_{Aeq} levels of the ambient noise. L_{A10} and L_{A90} are the levels exceeded for 10% and 90% of the sample time respectively. The L_{Amax} is indicative of maximum noise levels due to individual noise events. This is used for the assessment of sleep disturbance. The L_{A90} level is normally taken as the background noise level during the relevant period.

To quantify and characterise the existing ambient noise environment around the project site a baseline noise survey was undertaken at sensitive receiver locations to the north and south. The noise monitoring locations detailed in **Table 4-2** were selected to be representative of the surrounding sensitive receivers potentially affected by the construction and operation of the development.

The measured noise levels have been used to establish appropriate noise goals for operation of the development and as a basis for assessing potential noise impacts during construction and operation.

Table 4-2 Unattended noise monitoring details

Noise Monitoring Location ID	Relevant Noise Catchment Area	Equipment Serial Number
L01	NCA01/ 02 / 03	ARL-16-707-014
L02	NCA04	ARL-16-707-015

4.3 Ambient Noise Levels

The following tables present the measured existing ambient noise levels from the unattended noise survey. Any periods of inclement weather or extraneous noise are omitted from the measured data prior to determining the overall results.

The measured rating background noise levels (RBL) and L_{Aeq}, period were determined in accordance with the NSW Noise Policy for Industry with levels for the different monitoring locations presented in **Table 4-3**. The unattended noise monitoring data has been filtered with meteorological data obtained from Horsley Park weather station as per *NPfI* methodology.

Minimum assumed rating background noise levels have been applied as per *NPfI* methodology. Night-time noise levels influenced by high levels of insect activity and adjusted to be no greater than the Daytime or Evening noise levels as per *NPfI* methodology. Full noise monitoring graphs are provided in **Appendix A**.

Table 4-3 Measured RBL and $L_{Aeq,period}$ levels

Noise Logger	RBL			$L_{Aeq,period}$ (dBA) [1]		
	Daytime	Evening	Night-time	Daytime	Evening	Night-time
L01	35 (actual 32)[2]	33	33 (actual 38)[3]	44	46	52
L02	35 (actual 34)[2]	34	33	47	48	46

Note 1: Daytime (6am – 7pm), Evening (7pm – 10pm), and Night-time (10pm – 6am) during weekdays and Saturday (8am – 1pm).

Note 2: Minimum assumed rating background noise level have been applied as per NPfI methodology.

Note 3: Adjusted to be no greater than the Daytime or Evening noise levels as per NPfI methodology.

4.4 Meteorological Effects

At relatively large distances from a source, the resultant noise levels at receivers can be influenced by meteorological conditions, particularly temperature inversions and gradient winds. Where these factors are a feature of an area their effect on resultant noise levels should be considered.

The *NPfI* defines standard meteorological conditions and noise-enhancing meteorological conditions to be considered for the assessment. The definition of those conditions is provided in Table D1 of Fact Sheet D, which is reproduced in **Table 4-4** below.

Table 4-4 Standard and Noise-Enhancing Meteorological Conditions

Meteorological conditions	Meteorological parameters
Standard Meteorological Conditions	Day/evening/night: stability categories A-D with wind speed up to 0.5 m/s at 10 m AGL.
Noise-Enhancing Meteorological Conditions	Daytime/evening: stability categories A-D with light winds (up to 3 m/s at 10 m AGL). Night-time: stability categories A-D with light winds (up to 3 m/s at 10 m AGL) and/or stability category F with winds up to 2 m/s at 10 m AGL.

Notes: m/s = metres per second; m = metres; AGL = above ground level; where a range of conditions is nominated, the meteorological condition delivering the highest predicted noise level should be adopted for assessment purposes. However, feasible and reasonable noise limits in consents and licences derived from this process would apply under the full range of meteorological conditions nominated under standard or noise-enhancing conditions as relevant. All wind speeds are referenced to 10m AGL. Stability categories are based on the Pasquill-Gifford stability classification scheme.

The *NPfI* provides two options when considering meteorological effects:

1. Conservatively adopt noise-enhancing meteorological conditions without processing meteorological data local to the site; or
2. Determine the significance of noise-enhancing meteorological conditions based on meteorological data local to the site and adopt significant noise-enhancing conditions for the assessment. Where noise-enhancing meteorological conditions are deemed non-significant, standard meteorological conditions may be adopted.

The second option has been adopted with refence to a previous metrological analysis suitable for the project.

Assessment of prevailing weather conditions was carried for a neighbouring development (*Mirvac Projects Pty Ltd Aspect Industrial Estate*) located 1100 m to the north west by SLR Consulting in 2020 (ref. 610.19127-R2).

Outcomes of the metrological analysis determined that standard weather conditions should be used during the daytime and evening periods, with noise-enhancing weather conditions during the night-time period. The night-time noise-enhancing weather conditions defined as F-class temperature inversion with a 2 m/s source to receiver drainage flow.

5 NOISE AND VIBRATION CRITERIA

5.1 Mamre Road Precinct Development Control Plan

The Mamre Road Precinct Development Control Plan (DCP) 2021 applies to the Mamre Road Precinct within the Industry and Employment State Environmental Planning Policy 2021. Section 4.3.1 relates to Noise and Vibration and is presented below.

4.3.1 Noise and Vibration

Objectives

a) To ensure noise and vibration do not adversely impact human health and amenity
b) To ensure building design adequately protects workers from noise and vibration

Controls

1) *Any machinery or activity considered to produce noise emissions from a premise shall be adequately sound-proofed so that noise emissions are in accordance with the provisions of the Protection of the Environment Operations Act 1997.*
2) *Noise should be assessed in accordance with Noise Policy for Industry (EPA, 2017) and NSW Road Noise Policy (Department of Environment, Climate Change and Water, 2011).*
3) *An acoustic Report by a qualified acoustical engineer must be submitted where proposed development, including traffic generated by that development, will create noise and/or vibration impacts, either during construction or operation, that impacts on adjoining developments or nearby rural-residential areas. The Acoustic Report should outline the proposed noise amelioration strategies and management methods.*
4) *An Acoustic Report shall be prepared for developments within 500m of rural-residential areas and other sensitive receivers, including educational establishments.*
5) *Acoustic Reports for individual developments must assess cumulative noise impacts, including likely future noise emissions form the development and operation of the Precinct. The consultant should liaise with the relevant consent authority to determine acceptable amenity goals for individual industrial developments and background noise levels.*
6) *The use of mechanical plant and equipment may be restricted in areas close to sensitive receivers, such as adjoining rural-residential development and educational establishments.*
7) *Building design is to incorporate noise amelioration features. Roof elements are to control potential breakout noise, having regard to surrounding topography.*
8) *Boundary fences are to incorporate noise amelioration features and control breakout noise having regard to developments adjoining rural-residential areas.*
9) *Development shall comply with the relevant Australian Standards for noise and vibration*
10) *A qualified acoustical consultant is to certify any acoustic design measures have been satisfactorily incorporated into the development at construction certificate stage and validate the criteria at occupation certificate stage.*

Section 2.11 is concerned with Aviation Safeguarding and is presented below:

Noise

3) Development is constructed in accordance with Australian Standards AS2021 – Acoustics Noise Intrusion – Building Siting and Construction.

5.2 AS2021 – Acoustics Noise Intrusion – Building Siting and Construction

With regard to requirement Section 2.11 of the Mamre Road Precinct Development Control Plan (DCP), Table 2.1 of AS 2021:2015 specifies the following requirements for building siting in relation to ANEF contours and is reproduced below in **Table 5-1**.

Table 5-1 AS2021 – Aircraft Noise Intrusion – Building Siting and Construction[1]

Building Type	ANEF Zone of Site		
	Acceptable	Conditionally Acceptable	Unacceptable
Light Industrial	Less than 30 ANEF	30 to 40 ANEF	Greater than 40 ANEF
Other Industrial	Acceptable in all ANEF zones		

Note 1: To be used in conjunction with Table 5.2.

Table 3.3 of AS 2021:2015 sets limits for noise intrusion when a new development is located in an area within ANEF (Aircraft Noise Exposure Forecast) contours and is reproduced below in **Table 5-2**.

Table 5-2 Indoor sound design levels for aircraft noise

Building type and activity	Indoor design sound level (dBA)
Commercial buildings, offices, and shops	
Drafting, open offices	65
Industrial	
Inspection, analysis, precision work	75
Light machinery, assembly, bench work	80

The Project is located across the 20-25 ANEF contour.

5.3 Noise Policy for Industry

Assessment of noise in accordance with NSW *Noise Policy for Industry* (2017) has two main components: intrusiveness and amenity criteria. These are compared to each other (after conversion of amenity noise level to $L_{Aeq,15min}$ equivalent level) to determine the overall project noise trigger level.

5.3.1 Intrusiveness noise level

The intrusiveness noise level is based on the $L_{Aeq,15min}$ associated with commercial activity being less than or equal to the measured L_{A90} Rating Background Level + 5dB as per Section 2.3 of the policy. A modifying factor should also be added where appropriate to allow for tonality, impulsiveness, and intermittency or low frequency effects.

5.3.2 Amenity noise level

The amenity noise level is determined in accordance with Section 2.3 of the policy based on the land use and relevant noise criteria specified in Tables 2.3 and 2.2, respectively.

The NSW *Noise Policy for Industry* sets out acceptable noise levels for various locations. Under the policy, receivers are assessed against 'rural' and 'industrial' criteria. As defined in the policy rural category is an area that is dominated by natural sounds, having little or no road traffic noise and generally characterised by low background noise levels. Under the policy, the industrial receiver category is described as 'an area defined as an industrial zone on a local environment plan'.

For this assessment, all NCA1, NCA2, and NCA3 have been assessed as 'rural' with recommended $L_{Aeq,period}$ amenity limits of 50 dBA day, 45 dBA evening and 40 dBA night time.

5.3.3 Modifying factors

The NSW *Noise Policy for Industry* includes correction factors such as tonal noise, low-frequency noise, intermittent noise and duration. Where two or more modifying factors are present, the maximum adjustment to a noise source level is 10 dBA (excluding duration correction).

5.3.4 Sleep disturbance

The potential for sleep disturbance from maximum noise level events from premises during the night-time period needs to be considered. Sleep disturbance is considered to be both awakenings and disturbance to sleep stages.

Where the subject development/premises night-time noise levels at a residential location exceed the following screening criteria:

- $L_{Aeq,15min}$ 40 dBA or the prevailing RBL plus 5 dB, whichever is the greater, and/or
- L_{AFmax} 52 dBA or the prevailing RBL plus 15 dB, whichever is the greater,

a detailed maximum noise level event assessment should be undertaken.

5.3.5 Project noise trigger level

To determine the project trigger noise level, the amenity noise level must first be standardised to an equivalent $L_{Aeq,15min}$ in order to compare to the intrusiveness noise level. This is done in accordance with Section 2.2 of the NPfI as follows;

$$L_{Aeq,15min} = L_{Aeq,\ period} + 3dB$$

Therefore, based on the measured data presented in Section Table 5-3 the project specific noise limits are determined below in Table 5-3.

Table 5-3 Project Noise Trigger Level (PNTLs)

Receiver Location	Time of Day	ANL $L_{Aeq(period)}$	Measured RBL[3] $L_{A90,15min}$3	Measured Noise Level[4] $L_{Aeq(period)}$	Criteria for New Sources		
					Intrusive $L_{Aeq,15min}$	Amenity[5, 6] $L_{Aeq,15min}$	Sleep Disturbance (L_{Amax})
NCA01 NCA02 NCA03	Day	50[1]	35[6]	44	**40**	48	-
	Evening	45[1]	33	46	**38**	43	-
	Night	40[1]	33[7]	52	38	**38**	**52**
NCA04	Day	70[2]	35[6]	47	**40**	68	-
	Evening	70[2]	34	48	**39**	68	-
	Night	70[2]	33[7]	46	**38**	68	**52**
Industrial[5]	When in Use	70	-	-	-	**68**	-

Note 1: ANL = "Acceptable Noise Level" for receivers in a Rural area.

Note 2: ANL = "Acceptable Noise Level" for receivers in an Industrial area.

Note 3: RBL = "Rating Background Level".

Note 4: Assuming existing noise levels are unlikely to decrease in the future.

Note 5: The *NPfI* does not require that intrusive noise be assessed at industrial premises. For industrial receivers, only the amenity criteria apply. Also, the NPfI states for isolated residences within an industrial zone the industrial amenity would apply.

Note 6: Minimum assumed RBL applied as measured noise level < 35 dB

Note 7: Measured noise level < 35 dB. Evening RBL applied as *NPfI* recommends Night to be no greater than Day or Evening period

5.4 Assessing Vibration: A Technical Guideline 2006

5.4.1 Types of vibration

There are three types of vibration as classified in the guide.

- *Continuous* - vibration continues uninterrupted for a defined period (usually throughout daytime and/or night-time). This type of vibration is assessed on the basis of weighted RMS (root mean squared) acceleration values.

- *Impulsive* - rapid build up to a peak followed by a damped decay that may or may not involve several cycles. The duration is short, typically less than 2 seconds. Impulsive vibration (no more than three occurrences in an assessment period) is assessed on the basis of acceleration values.

- *Intermittent* - interrupted periods of continuous (e.g. a drill) or repeated periods of impulsive vibration (e.g. a pile driver), or continuous vibration that varies significantly in magnitude. Assessed on the basis of vibration dose values.

5.4.1.1 Acceptable values for continuous and impulsive vibration (1-80Hz)

Table 5-4 Preferred weighted RMS vibration acceleration values

Type	Location	Assessment period	Preferred values m/s²		Maximum values m/s²	
			z-axis	x- and y-axis	z-axis	x- and y-axis
Continuous vibration	Critical areas	Day or Night-time	0.005	0.0036	0.01	0.0072
	Residences	Daytime	0.01	0.0071	0.02	0.014
		Night-time	0.007	0.005	0.014	0.01
	Offices, schools, educational institutions and places of worship	Day or Night-time	0.02	0.014	0.04	0.028
	Workshops	Day or night time	0.04	0.029	0.08	0.058
Impulsive vibration	Critical areas	Day or night time	0.005	0.0036	0.01	0.0072
	Residences	Daytime	0.3	0.21	0.6	0.42
		Night-time	0.1	0.071	0.2	0.14
	Offices, schools, educational institutions and places of worship	Day or Night-time	0.64	0.46	1.28	0.92
	Workshops	Day or night time	0.64	0.46	1.28	0.92

5.4.1.2 Acceptable values for intermittent vibration

Intermittent vibration is assessed using the vibration dose value (VDV) root-mean-quad method. VDV accumulates the vibration energy received over the daytime and night-time periods. The vibration dose methodology is as per standard BS 6472–1992.

6 OPERATIONAL NOISE IMPACT ASSESSMENT

6.1 Noise Modelling

Noise modelling of the development site was undertaken using the CONCAWE noise prediction algorithm in CadnaA modelling software.

The noise model was constructed from a combination of aerial photography, existing ground topography, design ground topography for the development. The local terrain, design of the development, receiver buildings and structures have been digitised in the noise model to develop a three-dimensional representation of the operations of the development and surrounding environment.Ground effect area or ground absorption has been modelled as 50% soft ground (G=0.5).

Noise modelling was conducted for day, evening and night time as the warehouses would be operating 24 hours per day.

Based on the analysis of prevailing weather conditions discussed in Section 4.4; the noise model includes standard weather conditions during the daytime and evening periods, with noise-enhancing weather conditions during the night time period, using an F-class temperature inversion with a 2 m/s source to receiver drainage flow.

6.2 Acoustic Data

The following noise level data for vehicle-related noise sources has been used for the assessment. These noise levels are taken from RWDI's internal database and external assessments of similar subject sites.

Table 6-1: Sound Power Reference Levels (SWL) – dBA

Noise Source	Noise Characteristic	SWL, dBA
Gas Powered Forklift operational on hardstand	Quasi-steady	93 L_{Aeq}
Light Vehicles on site, up to speed of 40 km/h	Quasi-steady	90 L_{Aeq}
Medium Vehicle @ 10 km/h	Quasi-steady	91 L_{Aeq}
Medium Vehicle reversing @ 5 km/h	Quasi-steady	96 L_{Aeq}
Heavy Vehicle[1] @ 25 km/h	Quasi-steady	106 L_{Aeq}
Heavy Vehicle[1], unloaded @ 10 km/h	Quasi-steady	106 L_{Aeq}
Heavy Vehicle[1], loaded @ 10 km/h	Quasi-steady	107 L_{Aeq}
Heavy Vehicle[1], reversing[2] @ 5 km/h	Quasi-steady	111 L_{Aeq}
Truck Engine Starting	Instantaneous	100 L_{Amax}
Truck Airbrake Release[2]	Instantaneous	115 L_{Amax}

Note 1: Heavy vehicle defined as any cargo vehicle with three or more axles with gross vehicle weight > 12,000 kg.

Note 2: Assume that reversing operation will not take more than 30 seconds for each vehicle, includes reversing alarm and air brake release.

6.3 Modelled Onsite Vehicle Movements

Estimated onsite vehicle movements were provided by the client on behalf of Ason Group.

The following 15-min traffic volumes during the day, evening, and tight time periods are derived from the predicted 1-hour traffic data supplied by Ason Group. The hour with the greatest 'A-double' trucks was chosen as it represents the worse-case scenario with the highest operational traffic noise emissions.

The vehicle movements have been modelled to reflect realistic operations, with heavy vehicles accessing and manoeuvring hardstand areas to load and unload items via forklift and light vehicles utilising carparking facilities.

Summary of vehicle movements is presented below in **Table 6-2**.

Table 6-2 Onsite vehicle movements

Warehouse Lot	Assessment Period[1]	Total Vehicles per 15min[2]	Light Vehicles per 15min[2]	Heavy Vehicles per 15min[2]	Heavy Vehicle (HV) Breakdown			
					Rigid	Semi-trailer	B-double	A-double
Lot 1	Day	25	15	10	6	1	0	2
	Eve	12	9	3	2	0	0	1
	Night	31	25	6	4	0	0	2
Lot 1a	Day	6	4	2	2	0	0	1
	Eve	3	2	1	1	0	0	0
	Night	8	6	2	1	0	0	0
Lot 1b	Day	4	3	2	1	0	0	0
	Eve	2	2	1	0	0	0	0
	Night	6	4	1	1	0	0	0
Lot 3	Day	15	9	6	4	0	0	1
	Eve	7	5	2	1	0	0	0
	Night	18	15	4	3	0	0	1
Lot 4	Day	13	8	5	3	0	0	1
	Eve	6	5	2	1	0	0	0
	Night	17	13	3	2	0	0	1
Lot 5	Day	11	7	4	3	0	0	1
	Eve	5	4	1	1	0	0	0
	Night	14	11	3	2	0	0	1

Note 1: Daytime (7am – 6pm), Evening (6pm – 10pm), Night-time (10pm – 7am).
Note 2: Rounding errors may result in different totals

6.4 Modelled Line Sources

Light vehicles are represented as line sources travelling 40 km/hr with a sound power level (SWL) of 90 dBA and a height of 0.5 m.

Heavy vehicle traffic movements on Access Road are represented as line sources travelling 25 km/hr with a SWL of 106 dBA.

Heavy vehicle movements over hardstand and loading areas within each lot have been modelled travelling at 5 km/hr with a sound power level of 105 dBA. Locations where heavy vehicles require greater engine capacity, such as accelerating from a stationary position, cornering, or accessing entry/exit ramps have been modelled as line sources travelling 5 km/hr with a SWL of 111 dBA.

Heavy vehicles reversing into delivery docks, including reversing alarm and airbrake release have been modelled as a single line source with a SWL of 115 dBA at the location most affecting the nearest sensitive receiver within each lot. Duration of heavy vehicle reversing is assumed to be not greater than 30 seconds and includes reversing alarm and air-break release events.

Source height for heavy vehicles is 1.5 m with the exception of the reversing alarm and air-brake release modelled at 1 m.

Figures showing the locations of the onsite traffic movements are presented in **Appendix B**.

6.5 Modelled Point Sources

Warehouse noise sources such as roof top mechanical plant and forklifts in hardstand areas have been modelled throughout the development.

Consistent with other ESR developments external gas powered forklifts have been modelled as point sources with a SWL of 93 dBA at 1 m in height. It has been assumed that forklifts would operate continuously during any one 15-minute period. One forklift for every two heavy vehicles onsite has been modelled operating externally in the hardstand areas for each of the warehouses.

Fixed noise sources with a reference sound power level (80 SWL) have been modelled at rooftop locations around the development to provide a worst-case prediction of noise impacts on the surrounding sensitive receivers. By predicting the noise levels at the sensitive receivers using this method, we are able to determine the maximum SWL of plant items required to meet the noise criteria.

Noise emissions associated with internal warehouse activity with a total reverberant sound pressure level of 75 dBA ($L_{Aeq,15min}$) have been modelled inside each warehouse (with roller doors open) to assess potential noise impacts to nearby receivers.

Table 6-3 presents indicative mechanical plant evenly distributed on warehouse rooftops across Lots 1 to 5 with no night-time operation for Lot 5 due to its proximity to sensitive receivers.

Table 6-3 Rooftop mechanical plant

Lot Number	Rooftop mechanical plant items
Lot 1 Warehouse 1	10
Lot 1a Warehouse 1a	6
Lot 1b Warehouse 1b-1 and 1b-2	6
Lot 3 Warehouse 3	4
Lot 4 Warehouse 4a and 4b	4
Lot 5 Warehouse 5	4[1]

NOTE 1: Daytime and Evening operation only, no operation during Night period.

6.6 Predicted Operational Noise Impacts

Predicted operational levels for the worst affected receivers within each NCA are presented in **Table 6-4**, with predicted operational levels at each of the receivers presented in **Table 6-5**.

Noise contours for the daytime, evening , night time (standard meteorological conditions) and night time (adverse meteorological conditions) periods are presented in **Figure 6-1**, **Figure 6-2**, **Figure 6-3**, and **Figure 6-4** respectively.

Table 6-4 Predicted Operational Noise Levels

Receiver Location	Time of Day[1]	Criteria for New Sources $L_{Aeq,15min}$ dBA	Worst-Case Predicted $L_{Aeq,15min}$ dBA	Exceedance
NCA1	Day	40	37	-
	Evening	38	37	-
	Night	38	33	-
	Night (adverse)	38	34	-
NCA2	Day	40	19	-
	Evening	38	18	-
	Night	38	19	-
	Night (adverse)	38	19	-

Receiver Location	Time of Day[1]	Criteria for New Sources $L_{Aeq,15min}$ dBA	Worst-Case Predicted $L_{Aeq,15min}$ dBA	Exceedance
NCA3	Day	40	28	-
	Evening	38	26	-
	Night	38	27	-
	Night (adverse)	38	28	-
NCA4	Day	40	48	8
	Evening	39	43	4
	Night	38	46	8
	Night (adverse)	38	47	9

Note 1: Daytime (7am – 6pm), Evening (6pm - 10pm), Night-time (10pm – 7am)

Table 6-5 Predicted Operational Noise Levels

ID	NCA	Address	Criteria for New Sources $L_{Aeq,15min}$ dBA			Worst-Case Predicted $L_{Aeq,15min}$ dBA				Exceedance above PNTL dBA			
			Day	Eve	Night	Day	Eve	Night	Night (adverse)	Day	Eve	Night	Night (adverse)
N01	NCA01	49 Mount Vernon Road	40	38	38	37	37	33	34	-	-	-	-
N02	NCA01	40 Mount Vernon Road	40	38	38	26	25	24	25	-	-	-	-
N03	NCA01	50 Mount Vernon Road	40	38	38	29	29	28	29	-	-	-	-
N04	NCA01	51 Mount Vernon Road	40	38	38	25	24	23	24	-	-	-	-
N05	NCA01	52a Mount Vernon Road	40	38	38	33	33	32	33	-	-	-	-
N06	NCA01	62a Mount Vernon Road	40	38	38	30	30	29	30	-	-	-	-
N07	NCA01	30/38 Mount Vernon Road	40	38	38	21	20	19	20	-	-	-	-
N08	NCA01	54 Kerrs Road	40	38	38	15	14	14	14	-	-	-	-
N09	NCA03	45 Kerrs Road	40	38	38	18	16	17	18	-	-	-	-
N10	NCA03	30 Kerrs Road	40	38	38	24	22	23	24	-	-	-	-
N11	NCA03	1114 Mamre Road	40	38	38	28	26	27	27	-	-	-	-
N12	NCA03	1096 Mamre Road	40	38	38	28	26	27	28	-	-	-	-
N13	NCA01	62 Mount Vernon Road	40	38	38	28	27	27	28	-	-	-	-

ID	NCA	Address	Criteria for New Sources $L_{Aeq,15min}$ dBA			Worst-Case Predicted $L_{Aeq,15min}$ dBA				Exceedance above PNTL dBA			
			Day	Eve	Night	Day	Eve	Night	Night (adverse)	Day	Eve	Night	Night (adverse)
N14	NCA01	62b Mount Vernon Road	40	38	38	23	23	22	24	-	-	-	-
N15	NCA01	64 Mount Vernon Road	40	38	38	23	23	22	23	-	-	-	-
N16	NCA01	247 Capitol Hill Drive	40	38	38	25	24	24	25	-	-	-	-
N17	NCA01	239 Capitol Hill Drive	40	38	38	23	22	23	24	-	-	-	-
N18	NCA01	231 Capitol Hill Drive	40	38	38	21	20	21	22	-	-	-	-
N19	NCA01	215 Capitol Hill Drive	40	38	38	20	18	19	20	-	-	-	-
N20	NCA01	12-22 Bowood Road	40	38	38	21	20	21	22	-	-	-	-
N21	NCA02	30 Bowood Road	40	38	38	19	18	18	19	-	-	-	-
N22	NCA02	23-29 Bowood Road	40	38	38	19	18	18	19	-	-	-	-
N23	NCA02	35 Bowood Road	40	38	38	19	18	19	19	-	-	-	-
N24	NCA02	43 Bowood Road	40	38	38	19	18	19	19	-	-	-	-
N25	NCA02	51 Bowood Road	40	38	38	19	18	18	19	-	-	-	-
N26	NCA04	284a Aldington Road	40	39	38	35	35	35	36	-	-	-	-
N27	NCA04	284 Aldington Road	40	39	38	28	27	28	29	-	-	-	-
N28	NCA04	272-280 Aldington Road	40	39	38	33	33	33	34	-	-	-	-
N29	NCA04	1 Abbotts Road	40	38	38	34	30	33	34	-	-	-	-
N30	NCA04	1028 Mamre Road	40	39	38	48	43	46	47	8	4	8	9
N31	NCA04	1048 Mamre Road	40	39	38	44	40	42	43	4	1	4	5
N32	NCA04	1050 Mamre Road	40	39	38	41	38	39	40	1	-	1	2
N33	NCA04	1066 Mamre Road	40	39	38	34	32	33	34	-	-	-	-
N34	NCA03	37 Kerrs Road	40	39	38	18	16	17	17	-	-	-	-
N35	NCA04	269 Aldington Road	40	39	38	29	26	28	28	-	-	-	-
N36	NCA04	983b Mamre Road	40	39	38	20	17	19	19	-	-	-	-
N37	NCA04	949-965 Mamre Road	40	39	38	28	25	26	27	-	-	-	-

During standard metrological conditions, no exceedances above the PNTLs are predicted for receivers located in NCA01, NCA02 and NCA03. Exceedances are predicted during all time periods for three receivers located in NCA04 (receivers N30, N31, and N32). Exceedances are in the range of 1-9 dB.

During night time period under adverse metrological conditions; exceedances of 2-9 dB above the PNTLs are predicted at three receivers located in NCA04 (receivers N30, N31, and N32). Exceedances are predominantly due to the heavy vehicle movements on the access road at the entry of the site.

It should be noted that predictions are based off assumed traffic movement generation. The actual use of these warehouses is not known at this stage and therefore the actual traffic movement generation is not known at this stage. Furthermore, predictions assume all warehouses are operating at a high level of capacity concurrently.

However, the receivers where exceedances are expected are in close proximity the project site on land that is currently being redeveloped for industrial usage. These properties are unlikely to be inhabited during construction or operational stages and even more unlikely to be inhabited when all warehouses are occupied and operating.

6.7 Cumulative Noise

Cumulative noise has been considered for residential receivers outside of the Mamre Road Precinct (NCA01-NCA03).

The project amenity noise level is the main mechanism of the *NPfI* for controlling the total noise level from all industrial noise sources affecting a receiver. **Table 6-6** presents the predicted noise levels and compares them against the project amenity noise level.

Table 6-6 Cumulative Noise Contribution - $L_{Aeq,15min}$

Receiver	Day	Evening	Night[1]
Project Amenity Noise Level (rural)	**48**	**43**	**38**
NCA01	37	37	34
NCA02	19	18	19
NCA03	28	26	28

From **Table 6-6**, the highest predicted noise levels are for receivers in NCA01 with the highest being 4 dB less than the project amenity noise level for rural receivers and 9 dB less than the recommended amenity noise level for rural receivers. This means an additional 1-2 and 7-8 sources of equal contribution would be required to exceed the night time project amenity noise level and recommended amenity noise level, respectively. However, based on the location of the site in context of the MRP only 1 other source would be able to contribute significantly to the residential receivers in NCA01.

For receivers in NCA02 and NCA03, the levels are greater than 10 dB less than the recommended amenity noise level for rural receivers. This means that noise from the Project would likely be inaudible or undiscernible from other industrial noise. The low levels will allow for more contribution from other sources. Furthermore, shielding from other industrial premises would be expected in the noise transmission path from the Project to the receiver, further reducing the contribution of this Project on the noise level at the receiver.

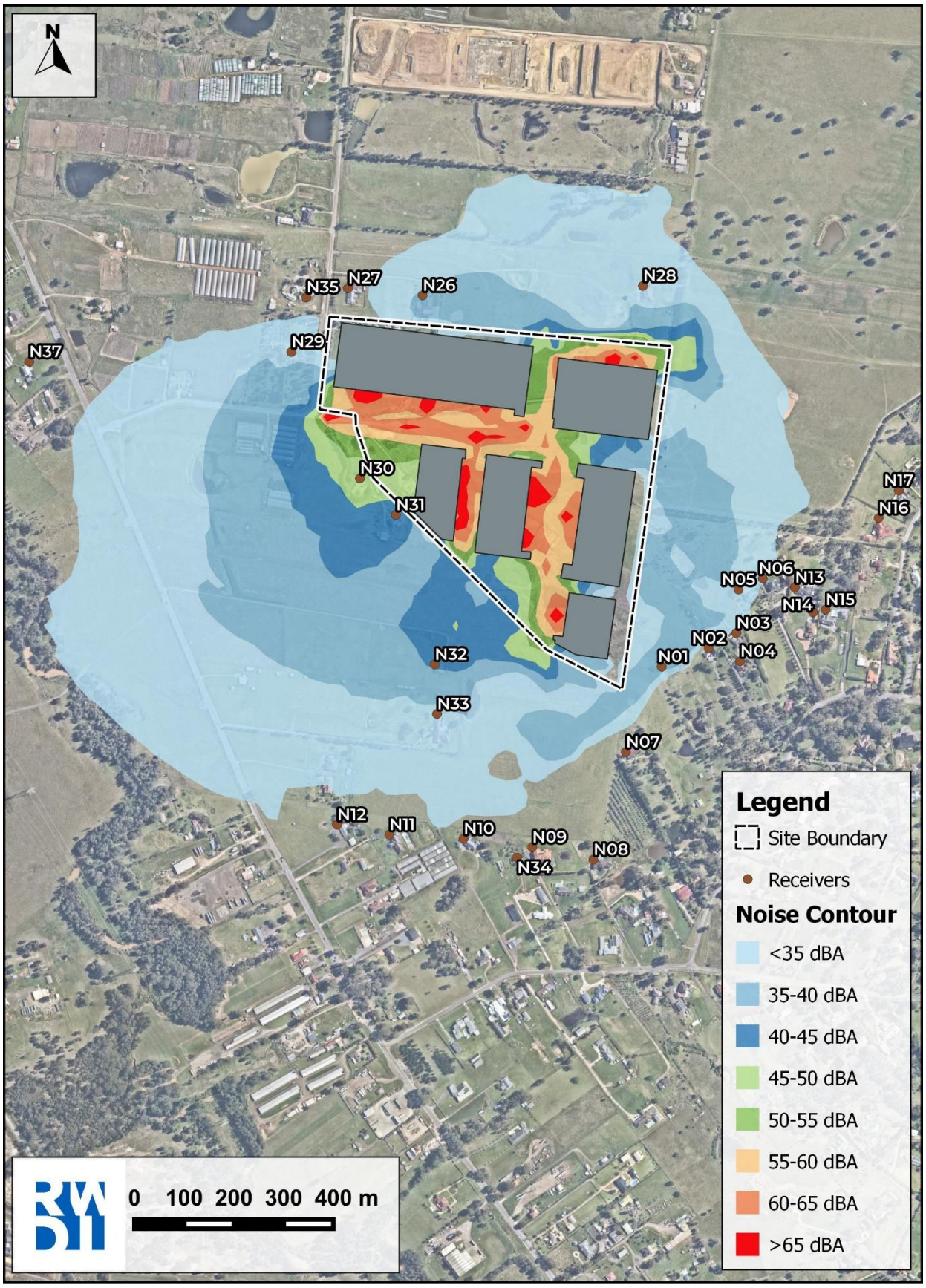


Figure 6-1 Operational Noise Contours – Day Period

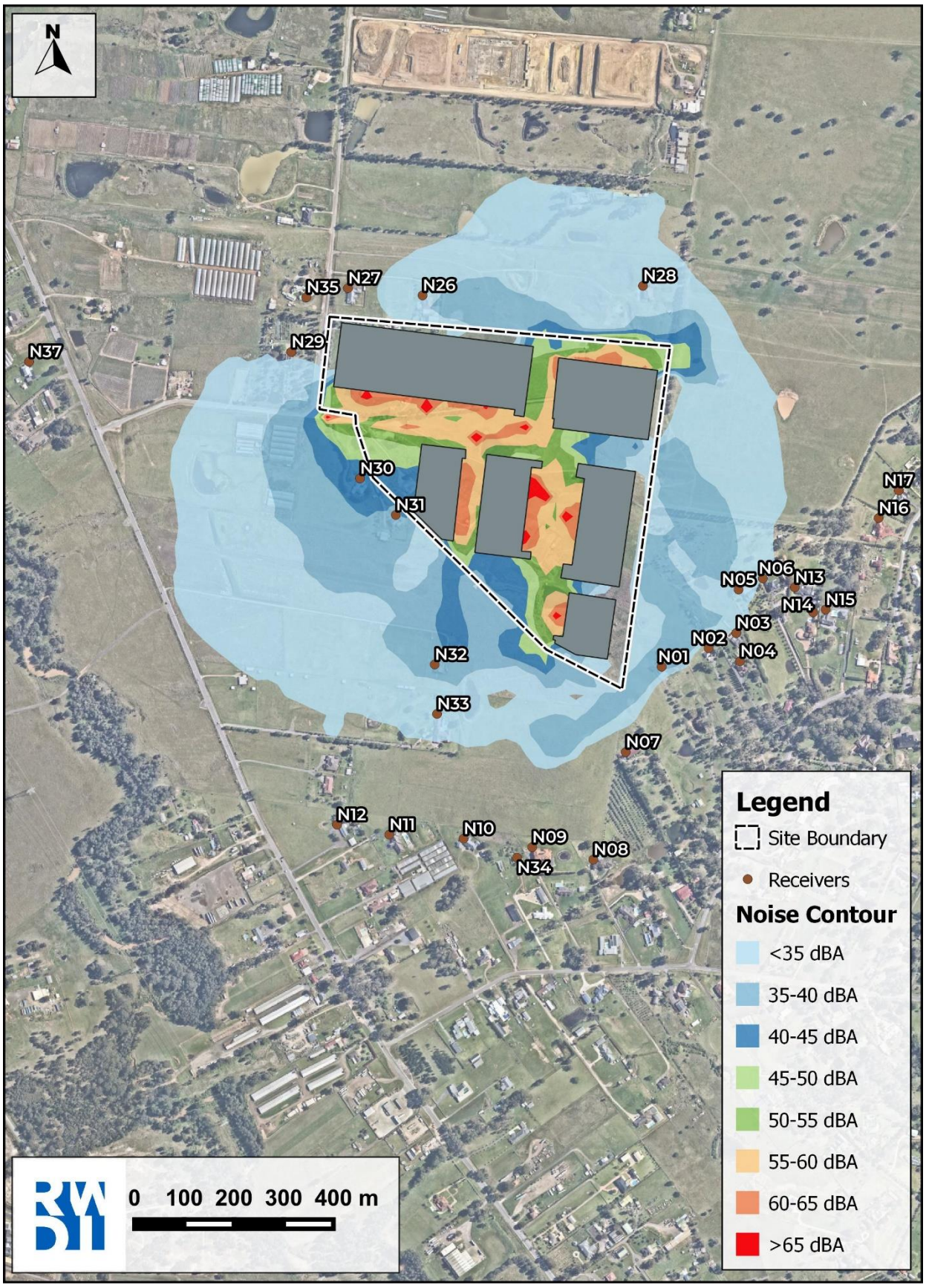


Figure 6-2 Operational Noise Contours – Evening Period

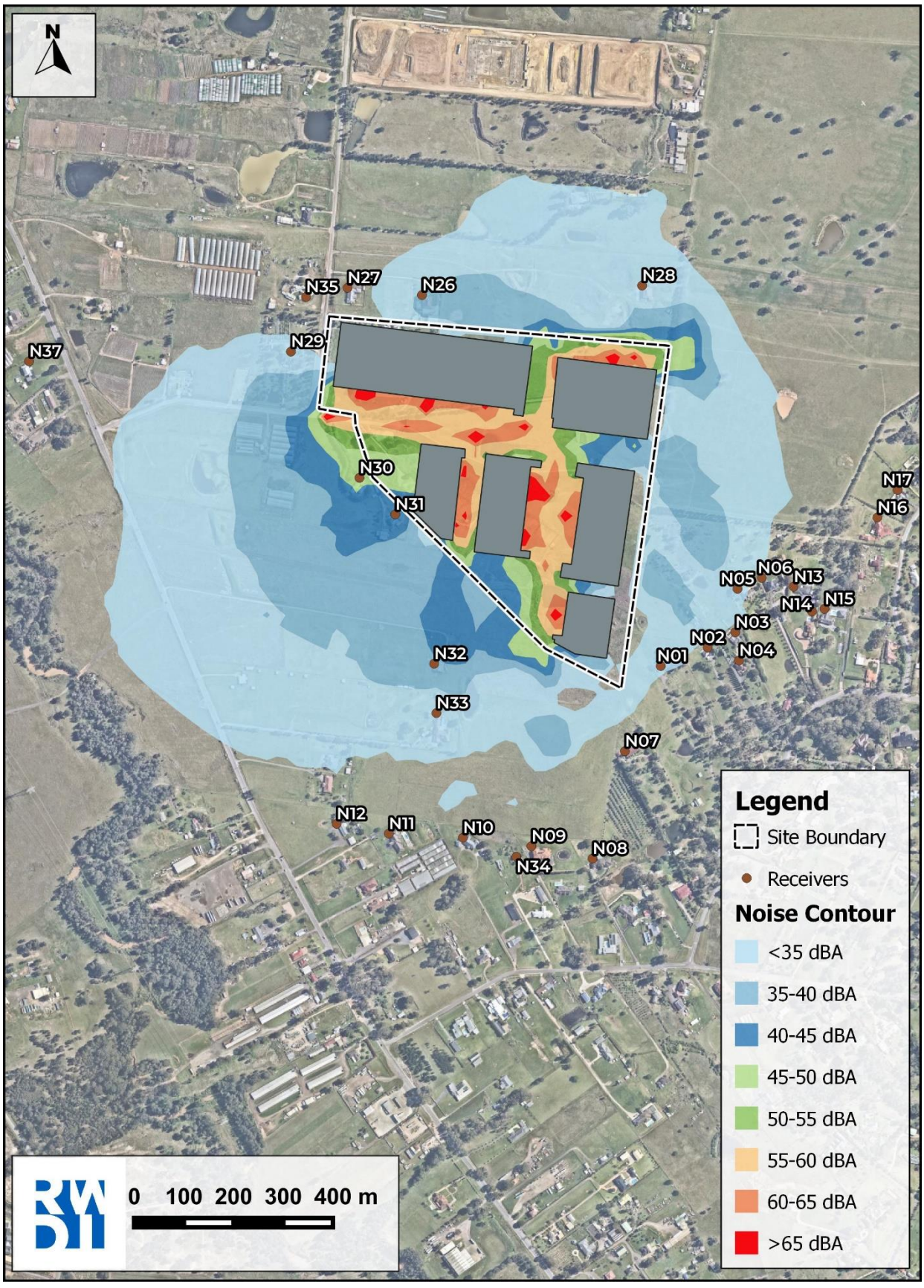


Figure 6-3 Operational Noise Contours – Night

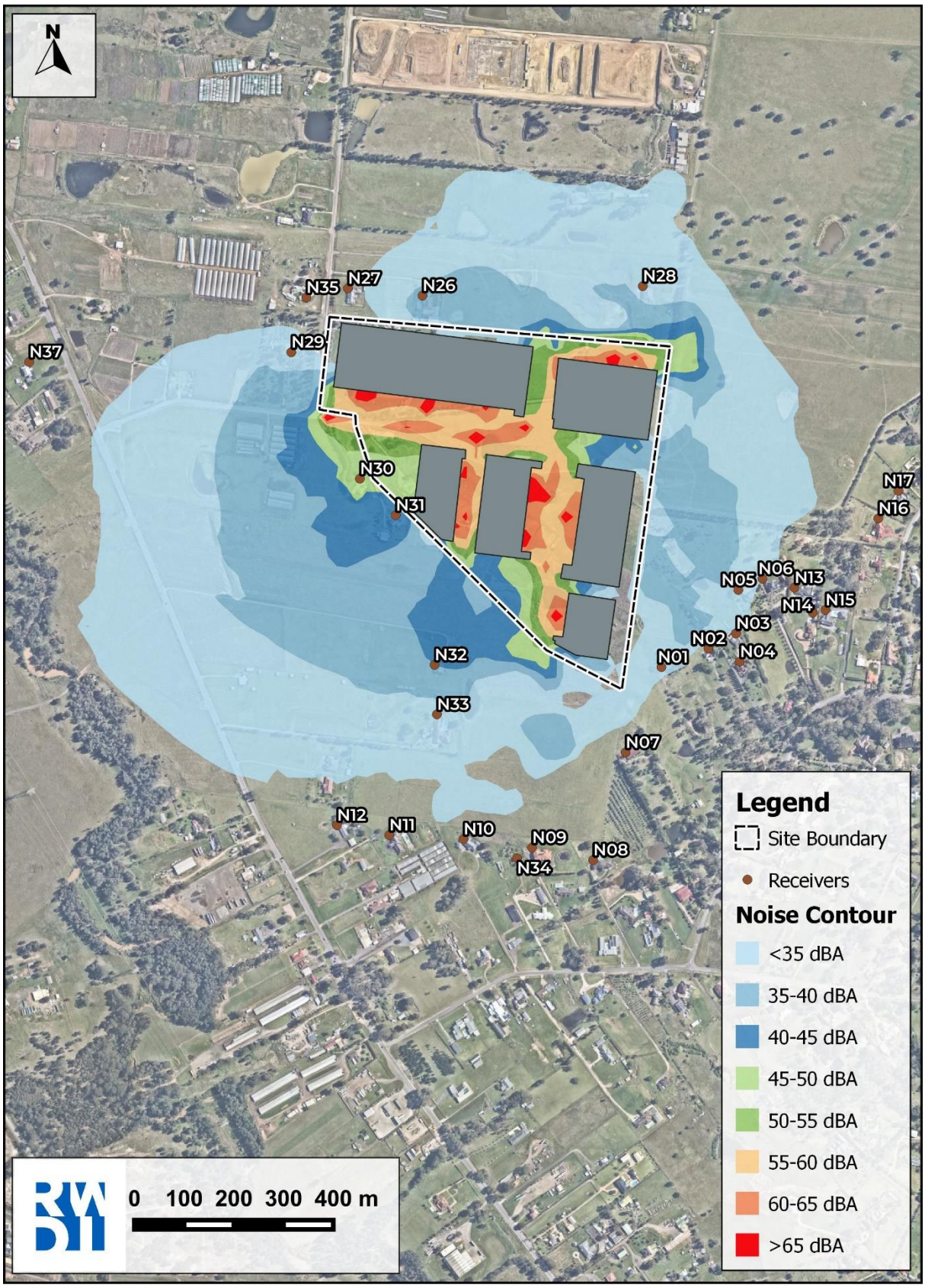


Figure 6-4 Operational Noise Contours – Night (Adverse Met)

6.8 Sleep Disturbance

As the warehouses operate 24 hours per day, noise emissions during the night time period require an assessment for potential sleep disturbance at the nearest noise sensitive receivers. A summary of the L_{Amax} sound power levels of typical activities that may occur at the facility with the potential to cause sleep disturbance is presented in **Table 6-7**.

Table 6-7 Point Source – L_{Amax} Sound Power Levels

Noise Source	L_{Amax} SWL (dBA)	Source Height
Truck Engine Starting	100	2 m
Airbrake in Truck Parking Area	115	2 m
Reversing Alarm	111	1 m
Roller Door	94	4 m
Forklift loading / unloading	100	2 m

The predicted night time L_{Amax} noise levels at the nearest receivers to the development are presented in **Table 6-8.** Night time period calculations include noise enhancing metrological conditions as described in Section 4.4.

Table 6-8 Summary of Predicted Sleep Disturbance Noise Levels

Receiver ID	Receiver Location	Noise Level (dBA)		
		Criteria L_{AFmax}	Predicted L_{AFmax}	Exceedance
N01	NCA01	52	36	-
N23	NCA02	52	30	-
N11	NCA03	52	39	-
N30	NCA04	52	59	7

The above assessment indicates that predicted night time L_{AFmax} noise levels from the proposal comply with the night time sleep disturbance screening criteria at all receivers with the exception of residential properties located within the General Industrial (IN1) zone surrounding the development boundary.

7 CONSTRUCTION NOISE AND VIBRATION IMPACT ASSESSMENT

People are usually more tolerant to noise and vibration during the construction phase of proposals than during normal operation. This response results from recognition that the construction emissions are of a temporary nature – especially if the most noise-intensive construction impacts occur during the less sensitive daytime period. For these reasons, acceptable noise and vibration levels are normally higher during construction than during operations.

Construction often requires the use of heavy machinery which can generate high noise and vibration levels at nearby buildings and receivers. For some equipment, there is limited opportunity to mitigate the noise and vibration levels in a cost-effective manner and hence the potential impacts should be minimised by using feasible and reasonable management techniques.

At any particular location, the potential impacts can vary greatly depending on factors such as the relative proximity of sensitive receivers, the overall duration of the construction works, the intensity of the noise and vibration levels, the time at which the construction works are undertaken and the character of the noise or vibration emissions.

The following section details the assessment of potential noise and vibration impacts associated with the construction of the Project. Construction noise goals have been determined based on the relevant government guidelines and industry standards. Potential noise levels have been predicted at sensitive receivers for expected activities and where levels are above the goals, feasible and reasonable noise mitigation measures are considered.

It should be noted that the methodology for establishing construction noise and vibration criteria detailed in the following sections is applicable to all stages of the Masterplan.

7.1 Interim Construction Noise Guideline (DECC, 2009)

The NSW EPA *Interim Construction Noise Guideline (ICNG)* requires project-specific Noise Management Levels (NMLs) to be established for noise affected receivers. In the event construction noise levels are predicted to be above the NMLs, all feasible and reasonable work practices are investigated to minimise noise emissions.

Having investigated all feasible and reasonable work practices, if construction noise levels are still predicted to exceed the NMLs then the potential noise impacts would be managed via site specific construction noise management plans, to be prepared in the detailed design phase.

Table 7-1 details the *ICNG* noise management levels for residential receivers.

Table 7-1 Construction Noise Goals at Residences for a Quantitative Assessment

Time	NML	How to Apply
Recommended Standard Hours: Mon to Fri: 7am – 6pm Sat: 8am – 1pm Sun/Public Holidays: No Work	Noise Affected RBL+10dB	The noise affected level represents the point above which there may be some community reaction to noise. • Where the predicted or measure L_{AEQ} is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. • The proponent should also inform all potentially affected residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly Noise Affected 75 dBA	The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours the very noisy activities can occur, taking into account: 1. Times identified by community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning, mid-afternoon for works near residences. 2. If the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.

In addition, the following construction noise management levels $L_{Aeq,15min}$ are recommended for other receivers and areas:

- Industrial premises: external $L_{Aeq,15min}$ 75dBA

Based on the above, **Table 7-2** presents the applicable noise management levels for construction activities at surrounding receivers that have been adopted for all applications.

Table 7-2 Site-specific construction Noise Management Levels

Location	Construction Noise Management Level (NMLs) - $L_{Aeq,15min}$				Highly Noise Affected Noise Level – $L_{Aeq,15min}$
	Day Standard Hours[1]	Day OOH	Evening OOH[2]	Night OOH[3]	
NCA01	45	40	38	38	75
NCA02					
NCA03			39		
NCA04					
Industrial	75 external				-

Note 1: Standard Hours (7am – 6pm Monday to Friday, 8am – 1am Saturday with no work on Sundays or Public Holidays)

Note 2: Evening OOH (6pm – 10pm)

Note 3: Night OOH (10pm – 7am)

7.2 Proposed Construction Activities

7.2.1 Proposed Works

This report provides an assessment of the potential noise and vibration impacts associated with the proposed activities, specifically the construction of all seven warehouse facilities and the supporting road network. The construction noise and vibration assessment has considered the following construction activities:

Lots 1-5

- Site Clearing and Enabling Works
- Excavation
- Building Construction

Roadworks

- Site Clearing and Enabling Works
- Road Widening
- Construction of Access Road

7.2.2 Construction Hours

Where possible, works would be completed during the standard daytime construction hours of Monday to Friday 7.00am to 6.00pm and Saturday 8.00am to 1.00pm. Where Out-of-Hours Works (OOHWs) are required (for emergency works, oversized equipment delivery, etc) it is likely that they would require separate approval.

7.3 Construction Noise Modelling

Noise modelling of the development site was undertaken using the CONCAWE noise prediction algorithm in SoundPLAN V8.2 modelling software.

The noise model was constructed from a combination of aerial photography, existing ground topography, design ground topography and proposed design. The local terrain, receiver buildings and structures have been digitised in the noise model to develop a three-dimensional representation of the construction works and surrounding environment.

Maximum sound power levels (SWLs) for the typical operation of construction equipment applied in the modelling are listed in **Table 7-3**. To assess construction noise levels against the NMLs, the maximum noise levels have been converted to equivalent $L_{Aeq,15min}$ noise emissions. Based on previous experience on large construction proposals, suitable adjustments of between 2 dB to 5 dB have been applied to convert the L_{Amax} noise levels in to L_{Aeq} noise levels for assessment against the NMLs.

Table 7-3 Construction noise sources

Stage	Phase	Equipment	Operating minutes in 15-min period	Number of items in same location	Sound Power Level (dB)		
					Maximum Item (SWL)	L_{Aeq} Activity	L_{Amax} Activity
Lots 1- 6	Site Establishment and Clearing	Chainsaw	5	1	108	**111**	118
		Dozer	15	1	110		
		Dump Truck (15 t)	15	1	98		
	Excavation	Piling (Bored)	7.5	1	108	**117**	123
		Dozer (D10)	15	1	115		
		Dump Truck (15 t)	15	1	100		
		Excavator (40 t)	15	2	109		
	Building Construction	Concrete Truck / Agitator	7.5	2	106	**111**	114
		Forklift	2	2	101		
		Concrete Pump	15	1	106		
		Truck (12-15 tonne)	15	1	103		
Roadworks	Site Establishment and Clearing	Chainsaw	5	1	108	**111**	118
		Dozer	15	1	110		
		Dump Truck (15 t)	15	1	98		
	Road Widening	Scraper	15	2	108	**117**	121
		Grader	15	2	108		
		Compactor	15	2	108		

Stage	Phase	Equipment	Operating minutes in 15-min period	Number of items in same location	Sound Power Level (dB)		
					Maximum Item (SWL)	L_{Aeq} Activity	L_{Amax} Activity
		Asphalt Paver	15	1	111		
		Concrete Truck	15	1	106		
		Vibratory Roller (10-12 t)	15	1	109		
	Construction of Access Road	Scraper	15	2	108	**117**	121
		Grader	15	2	108		
		Compactor	15	2	108		
		Asphalt Paver	15	1	111		
		Concrete Truck	15	1	106		
		Vibratory Roller (10-12 t)	15	1	109		

Consistent with the requirements of the *ICNG*, and to inform the scheduling of construction activity and management of noise during the detailed design phase, the construction noise impacts are based on a worst-case assessment. The *ICNG* recommends that the realistic worst-case or conservative noise levels from the source should be predicted for assessment locations representing the most noise exposed residences or other sensitive land uses. For each receiver area the noise levels are predicted at the most noise-exposed location, which would usually be the closest receiver.

For most construction activities, it is expected that the construction noise levels would frequently be lower than predicted at the most-exposed receiver as the noise levels presented in this report are based on a realistic worst-case assessment.

7.4 Predicted Construction Noise Impacts

In the area surrounding the development site, the noise impacts have been quantitatively assessed for several construction activities. The activities considered are described in **Table 7-3**.

The typical $L_{Aeq,15min}$ noise levels at the surrounding noise sensitive receivers are provided in **Table 7-3** for each of the construction activities and are representative of the 'noisiest' construction periods allowing for the simultaneous operation of noise intensive construction plant in close proximity.

Table 7-4 Predicted construction noise impacts

Works	Stage	NCA	Noise Level – $L_{Aeq,15min}$ – dBA		
			NML Day Standard Hours	Worst-case Predicted	Exceedance
Lots 1- 5	Site Establishment and Clearing	NCA1	45	57	12
		NCA2	45	34	-
		NCA3	45	36	-
		NCA4	45	69	24
	Excavation	NCA1	45	63	18
		NCA2	45	40	-
		NCA3	45	42	-
		NCA4	45	75	30
	Building Construction	NCA1	45	57	12
		NCA2	45	36	-
		NCA3	45	56	11
		NCA4	45	69	24
Roadworks	Site Establishment and Clearing	NCA1	45	48	3
		NCA2	45	24	-
		NCA3	45	37	-
		NCA4	45	65	20
	Road Widening	NCA1	45	37	-
		NCA2	45	31	-
		NCA3	45	37	-
		NCA4	45	60	15
	Construction of Access Road	NCA1	45	54	9
		NCA2	45	33	-
		NCA3	45	43	-
		NCA4	45	75	30

During standard construction hours, exceedances of up to 18 dB are predicted at residential dwellings that are likely to occupied; located in NCA01 and NCA03. The most affected receivers are located in NCA04 and are in close proximity to the site. Exceedances of up to 30 dB are predicted however these sites are unlikely to be inhabited during construction, however this should be assessed at a future date and documented with the CNVMP.

There are no noise sensitive receivers that are considered to be Highly Noise Affected, i.e. with predicted noise levels exceeding 75 dB L_{Aeq}.

The *ICNG* describes strategies for construction noise mitigation and control that are applicable to this proposal. The strategies are designed to minimise, to the fullest extent practicable, noise during construction.

Where reasonable and feasible, preference should be given to scheduling construction works within the standard construction hours of:

- Monday to Friday 7.00am to 6.00pm.
- Saturday 8.00am to 1.00pm

Typically, any OOHWs would be subject to separate approval on a case-by-case basis.

Where construction noise levels are predicted to exceed the NMLs it is recommended that construction noise mitigation measures should be considered, where reasonable and feasible. Typical construction noise mitigation measures include the following:

- Avoiding the coincidence of noisy plant working simultaneously close together would result in reduced noise emissions.
- Equipment which is used intermittently is to be shut down when not in use.
- Where possible, equipment with directional noise emissions should be oriented away from sensitive receivers.
- Regular compliance checks on the noise emissions of all plant and machinery used for the proposal would indicate whether noise emissions from plant items were higher than predicted.

This also identifies defective silencing equipment on the items of plant.

- Where possible, heavy vehicle movements should be limited to standard construction hours.
- Non-tonal reversing alarms should be used on all items of plants and heavy vehicles used for construction.

7.5 Predicted Construction Vibration Impacts

Impacts associated with construction vibration are most likely to occur during Excavation and Roadwork activity.

Table 7-5 sets out the typical ground vibration levels at various distances for safe working distances.

Table 7-5 Ground vibration – minimum working distances from sensitive receivers

Item	Description	Safe Working Distance	
		Cosmetic Damage	Human Response
Vibratory Roller	< 300 kN (Typically 7-13 tonnes)	15m	100m
Small Hydraulic Hammer	(300kg – 5 to 12t Excavator)	2m	7m
Medium Hydraulic Hammer	(900kg – 12 to 18t Excavator)	7m	23m
Large Hydraulic Hammer	(1600kg – 18 to 34t Excavator)	22m	73m
Vibratory Pile Driver	Sheet piles	2m to 20m	20m
Pile Boring	≤ 800mm	2m (nominal)	N/A
Jackhammer	Hand held	1m (nominal)	Avoid contact with structure

Note: Table 2 of RMS *Construction Noise and Vibration Guideline (CNVG).*

7.5.1 Excavation

Proposed construction of Lot 1 includes significant earthworks during the excavation phase. Details of proposed plant items and construction methodology are not available at this design stage. Once a contractor has been nominated a detailed Construction Noise and Vibration Management Plan (CNVMP) should be carried out.

Based on the indicative construction equipment proposed in **Table 7-3,** the minimum working distances for the prevention of cosmetic damage are as follows:

- Large Hydraulic Hammer (1600kg – 18 to 34t Excavator): 22m

It is estimated construction activity will occur as close as 18 meters to the sensitive receiver located within Lot 142 (ref DP1033686) and as close as 33 meters to Lot 141 (ref DP1033686).

Review of the relative elevations indicate pilling activity will occur at RL 59 where Lot 142 is at an elevation of RL 68. At this difference of elevation structural damage from piling is unlikely to cause any structural damage, however this should be assessed at a future date and documented with the CNVMP. Further guidance for vibration mitigation is outlined below in Section 7.6

7.5.2 Roadworks

Vibration intensive items of plant proposed for use during roadworks will likely include vibratory rollers and compactors. Based on the indicative construction equipment proposed in **Table 7-3**, the minimum working distances for the prevention of cosmetic damage are as follows:

- Vibrator Roller < 300 kN (Typically 7-13 tonnes): 15m

Reviewed the proposed work areas and associated vibration generating plant and have confirmed that no receivers buildings fall within the minimum working distances for the proposed vibratory rolling.

7.6 Construction Noise & Vibration Mitigation Measures

Without mitigation, noise levels from construction activities have been predicted to exceed the noise management levels nominated in the guidelines at some surrounding receivers. Therefore, noise control measures are recommended to ensure that noise is reduced where feasible. The following project-specific mitigation measures are recommended.

- Selection of quietest feasible construction equipment;
- Use of saw cutting in preference to rock-breakers where feasible; and
- Localised treatment such as barriers, shrouds, and the like around fixed plant, such as pumps, generators, and concrete pumps.
- In addition, the following measures should be included in a Noise & Vibration Management Plan.
- *Plant Noise Audit* – Noise emission levels of all critical items of mobile plant and equipment should be checked for compliance with noise limits appropriate to those items prior to the equipment going into regular service. To this end, testing should be established with the contractor.
- *Operator Instruction* – Operators should be trained in order to raise their awareness of potential noise problems and to increase their use of techniques to minimise noise emission.
- *Equipment Selection* – All fixed plant at the work sites should be appropriately selected, and where necessary, fitted with silencers, acoustical enclosures, and other noise attenuation measures in order to ensure that the total noise emission from each work site complies with EPA guidelines.
- *Site Noise Planning* – Where practical, the layout and positioning of noise-producing plant and activities on each work site should be optimised to minimise noise emission levels.

The adoption of the above measures is aimed at working towards achieving the noise management levels established at surrounding receivers.

7.6.1 Community Liaison and General Approaches to Mitigation

An effective community relations programme should be put in place to keep the community that has been identified as being potentially affected appraised of progress of the works, and to forewarn potentially affected groups (e.g. by letterbox drop, meetings with surrounding owners/tenants, etc) of any anticipated changes in noise and vibration emissions prior to critical stages of the works, and to explain complaint procedures and response mechanisms. This programme should include a *Community and Stakeholder Engagement Strategy* developed specifically for the Project.

Close liaison should be maintained between the communities overlooking work sites and the parties associated with the construction works to provide effective feedback in regard to perceived emissions. In this manner, equipment selections and work activities can be coordinated where necessary to minimise disturbance to neighbouring communities, and to ensure prompt response to complaints, should they occur.

7.6.2 Noise & Vibration Management Plan

A Construction Noise & Vibration Management Plan for the site is recommended which should be prepared by the successful contractor. The plan should reference the findings of this assessment. Areas that should be addressed in plan include:

- Noise and vibration mitigation measures;
- Noise and vibration monitoring;
- Response to complaints**;**
- Responsibilities;
- Monitoring of noise emissions from plant items;
- Reporting and record keeping;
- Non-compliance and corrective action; and
- Community consultation and complaint handling.

8 TRAFFIC NOISE ASSESSMENT

8.1 NSW Road Noise Policy 2008

Additional guidance for the assessment of noise from traffic on public roads are set out in the *RNP* (Department of Environment, Climate Change and Water, 2011).

Table 3 of the *RNP* is reproduced in **Table 8-1** and presents the relevant criteria for road use within the Project.

Table 8-1 Road traffic noise assessment criteria for residential land uses

Type of Development	Assessment Criteria	
	Day (7am–10pm)	Night (10pm–7am)
Existing residences affected by additional traffic on existing freeways / arterial / sub-arterial roads generated by land use developments	$L_{Aeq,15\ hour}$ 60 (external)	$L_{Aeq,9\ hour}$ 55 (external)

As Mamre Road is an arterial road, the following relative increase criterion applies.

Table 8-2 Relative increase criteria for residential land uses

Road Category	Type of Project/Development	Total Traffic Noise Level Increase - dBA	
		Day (7am–10pm)	Night (10pm–7am)
Freeway/arterial/sub-arterial roads and transitways	New road corridor/redevelopment of existing road/land use development with the potential to generate additional traffic on existing road	Existing Traffic $L_{Aeq,15hr}$ + 12 dB (external)	Existing Traffic $L_{Aeq,9hr}$ + 12 dB (external)

8.2 Offsite Traffic Movements

The surrounding road network servicing the proposed development is located within the Mamre Road Precinct Structure Plan (the MRP Structure Plan). Transport for New South Wales (TfNSW) is currently in the process of more detailed investigations into the transport network infrastructure required for the rezoning of the MRP, and specifically road network requirements. The TfNSW investigations include detailed traffic modelling of the MRP and its connectivity to the broader regional road network.

It is expected that the outcomes these key planning policies and strategies will determine the potential for traffic noise impacts at sensitive receiver locations. It is expected that traffic volumes on the surrounding road network would significantly increase due to the increased industrial development in the MRP as well as the Western Sydney Airport Aerotropolis. Assessment of offsite road traffic noise associated with the project is premature at this design stage.

Notwithstanding, estimates of projected traffic volumes associated with the development are taken from the Ason Group *'Transport & Accessibility Management Plan'* dated 12 May 2021. Potential traffic noise impacts for receivers located on Mamre Road are assessed below.

8.2.1 Predicted Traffic Volumes and Assessment

Operational activity associated with the project is expected to generate an additional 4,376 vehicles per day. The existing annual average daily traffic volume for Mamre Road is approximately 18,000 vehicles per day as per RMS report '*Mamre Road upgrade*', dated 2017.

Based on the hourly breakdown of site generated movements, approximately 78% of the traffic volume occurs during the day period of 7.00am to 10.00pm, this results in approximately 14,000 vehicle movements during the day and 4,000 movements during the night period of 10.00pm to7.00am

Table 8-3 below presents the existing traffic volume, additional traffic volume, and the estimated noise level increase.

Table 8-3 Relative Increase in Off-Site Road Noise Levels

Period	Traffic Volume/period		Increase in Road Traffic Noise dB
	Existing	Additional	
Day 7am-10pm	14,000	3,400	1
Night 10pm-7am	4,000	976	1

Based on **Table 8-3**, the predicted increase in road traffic noise levels for receivers near Mamre Road is calculated to be 1 dB for both assessment periods and compliant with the road traffic noise criteria of the RNP. Noise impacts due to traffic generation associated with the proposed development is therefore expected to be negligible.

9 AIRCRAFT NOISE ASSESSMENT

9.1 Site Location

The Project is located across the 20-25 ANEF contour as presented with Western Sydney Airport (WSA) *Airport Plan June 2020*. As a requirement of the Mamre Road Precinct Draft Development Control Plan all developments within this zone are required to be constructed in accordance with Australian Standards AS2021 – Acoustics Noise Intrusion – Building Siting and Construction.

9.2 Site coordinates

The following dimensions have been determined in accordance with AS2021:2015.

Table 9-1 Site Coordinates

Description	Dimension (m)
DS, sideline distance	1200
DL, landing distance	6340
DT, takeoff distance	10100
HS, elevation of site	80
HA, elevation of airport	80

9.3 Aircraft noise levels - AS2021:2015

Using the site coordinates, the noise levels for the various types of aircraft are calculated in **Table 9-2.**

Table 9-2 Aircraft noise levels - AS2021:2015

Model	Representative Aircraft	Noise level, dBA L_{max} (Slow)	
		Departure	Arrival
A319-115	Airbus A319-131	62	55
A320-231	Airbus A320-232	61	56
A321-231	Airbus A321-232	61	56
A330-202	Airbus A330-301	69	60
A330-303	Airbus A330-301	69	60
A340-642	Airbus A340-642	64	61
A380-842 (Short haul)	Airbus A380-841 (Short haul)	65	60
A380-842 (Long haul)	Airbus A380-841 (Long haul)	66	60
737-3YO	Boeing 737-300	67	57

Model	Representative Aircraft	Noise level, dBA L_{max} (Slow)	
		Departure	Arrival
737-476	Boeing 737-400	67	58
737-8FE	Boeing 737-800	67	60
747-438 (Short haul)	747-400 (Short haul)	71	64
747-438 (Long haul)	747-400 (Long haul)	72	64
Max. Noise Level Event		72	64

Table 9-3 provides the AS 2021:2015 recommended indoor design sound levels for buildings relevant to this assessment.

Table 9-3 Indoor design sound levels, dB L_{max}

Building type and activity	Indoor design sound level
Commercial buildings, offices and shops	
Private offices, conference rooms	55
Drafting, open offices	65
Industrial	
Inspection, analysis, precision work	75
Light machinery, assembly, bench work	80

Based on the external noise level of L_{max} 72 dBA, the Aircraft Noise Reduction (ANR) required for each space is detailed in Table 9-3. No further treatment of building envelopes would be required to comply with AS2021:2015 internal assessment requirements.

Table 9-4 Required aircraft noise reduction

Building type and activity	Predicted External Nose Level, L_{max}	Indoor design sound level	Aircraft Noise Reduction (ANR)
Commercial buildings, offices and shops			
Private offices, conference rooms	72	55	17
Drafting, open offices	72	65	7
Industrial			
Inspection, analysis, precision work	72	75	-
Light machinery, assembly, bench work	72	80	-

10 CONCLUSION

RWDI has prepared a noise and vibration impact assessment to form part of a State Significant Development Application (SSDA) for the warehouse development at the corner of Abbotts Road and Aldington Road, Kemps Creek.

The application seeks approval for the Masterplan, as well as the construction for all warehouse (Lots 1 to 6). The assessment concludes the following:

Operational Noise Impact Assessment

- During standard metrological conditions, no exceedances above the PNTLs are predicted for receivers located in NCA01, NCA02 and NCA03. Exceedances are predicted during all time periods for three receivers located in NCA04 (receivers N30, N31, and N32). Exceedances are in the range of 1-9 dB. These existing receivers are located in close proximity the project site on land that is currently being redeveloped for industrial usage. These properties are unlikely to be inhabited during construction or operational stages.
- During night time period under adverse metrological conditions; exceedances of 2-9 dB above the PNTLs are predicted at three receivers located in NCA04 (receivers N30, N31, and N32). Exceedances are predominantly due to heavy vehicle movements entering and exiting the estate on the access road. These existing receivers are in close proximity the project site on land that is currently being redeveloped for industrial usage. These properties are unlikely to be inhabited during construction or operational stages.
- Sleep disturbance assessment deemed the project to comply with the night time sleep disturbance screening criteria at all receivers with the exception of residential properties located within the General Industrial (IN1) zone surrounding the development.

Traffic Noise Assessment

- The predicted relative increase in daytime $L_{Aeq,15hr}$ and night-time $L_{Aeq\ 9hr}$ traffic noise levels for receivers near Mamre Road is calculated to be approximately 1 dB. Noise impacts due to traffic generation associated with the proposed development is therefore expected to be negligible.

Construction Noise and Vibration Impact Assessment

- During standard construction hours, exceedances of up to 18 dB are predicted at residential dwellings that are likely to occupied; located in NCA01 and NCA03. Exceedances of up to 30 dB are predicted with NCA03 however these sites are unlikely to be inhabited during construction. Construction noise impacts for NCA04 receivers should be assessed at a future date and documented with the CNVMP. There are no noise sensitive receivers that are considered to be Highly Noise Affected, i.e. with predicted noise levels exceeding 75 dB L_{Aeq}.

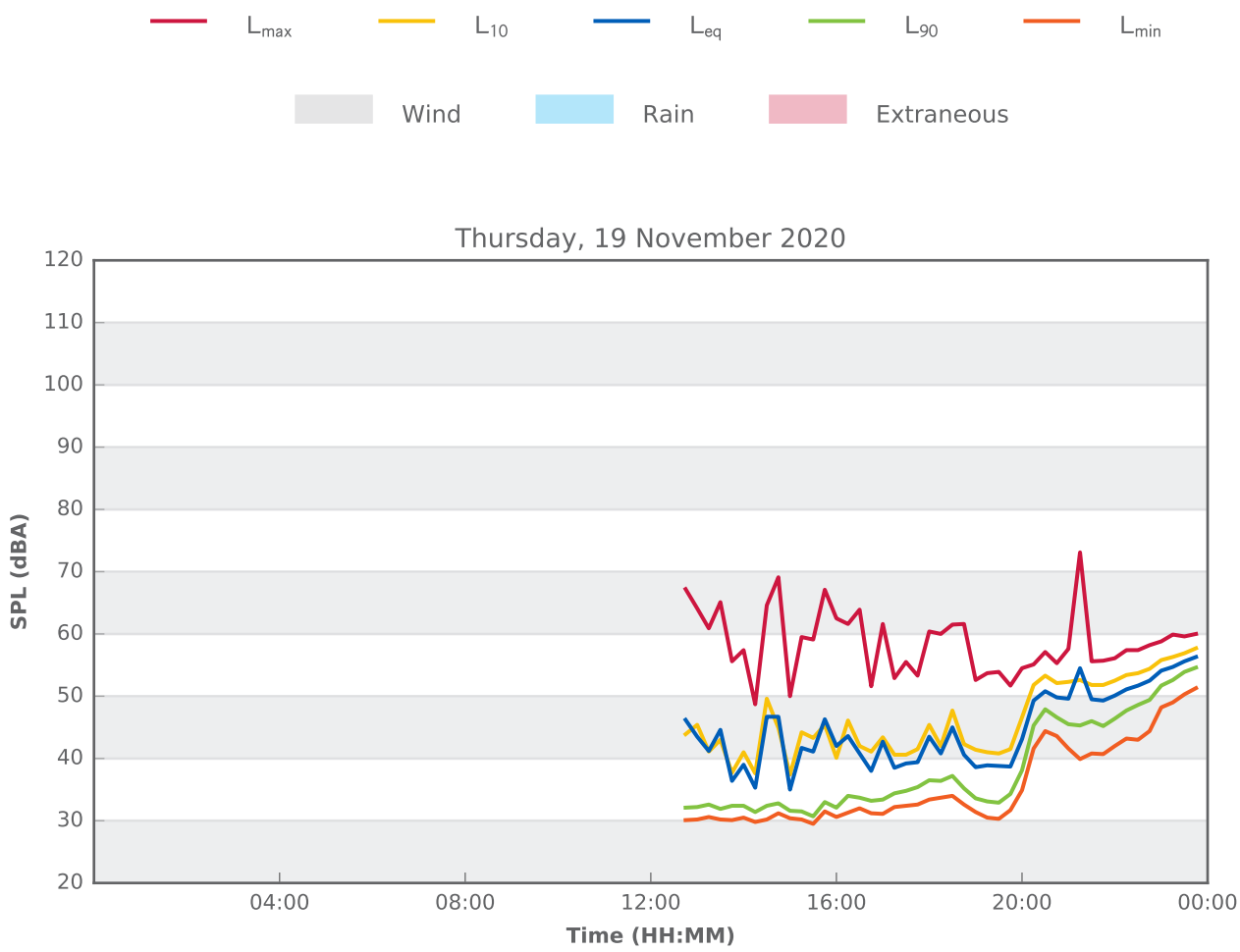
Aircraft Noise Assessment

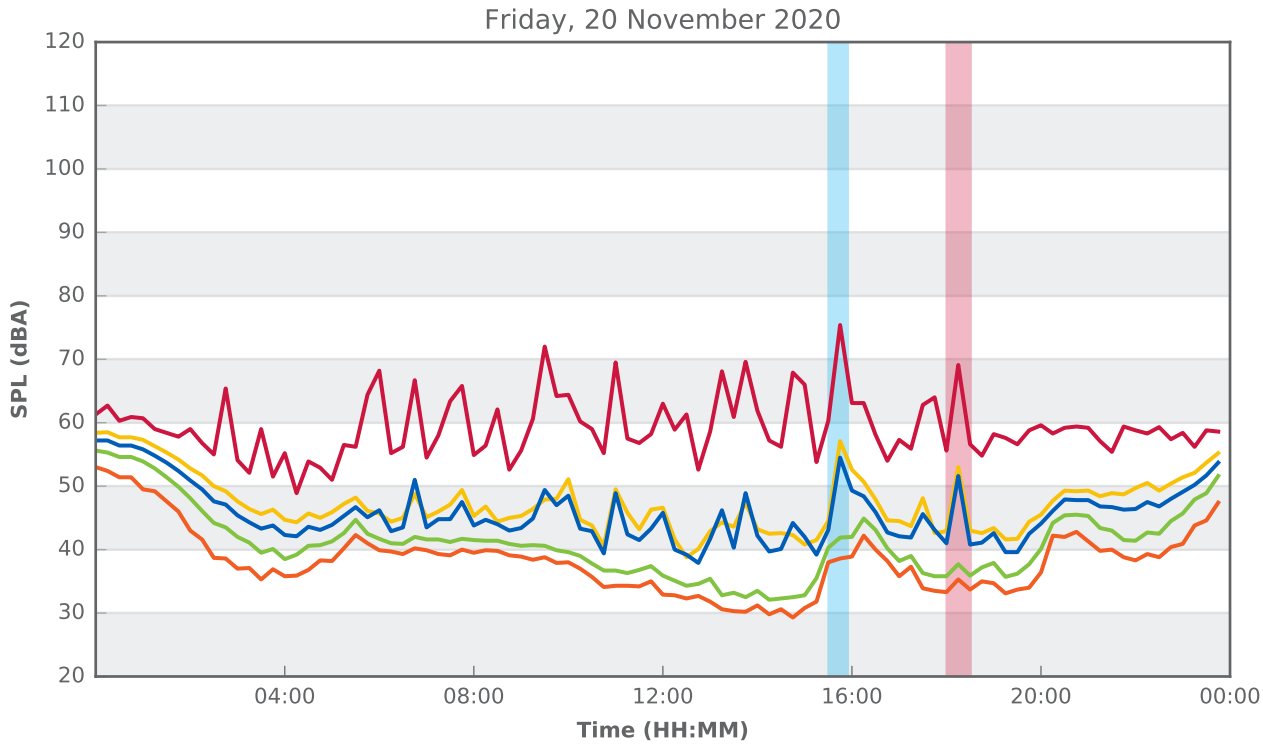
- No further treatment of building envelopes would be required to comply with AS2021:2015 internal assessment requirements.

APPENDIX A

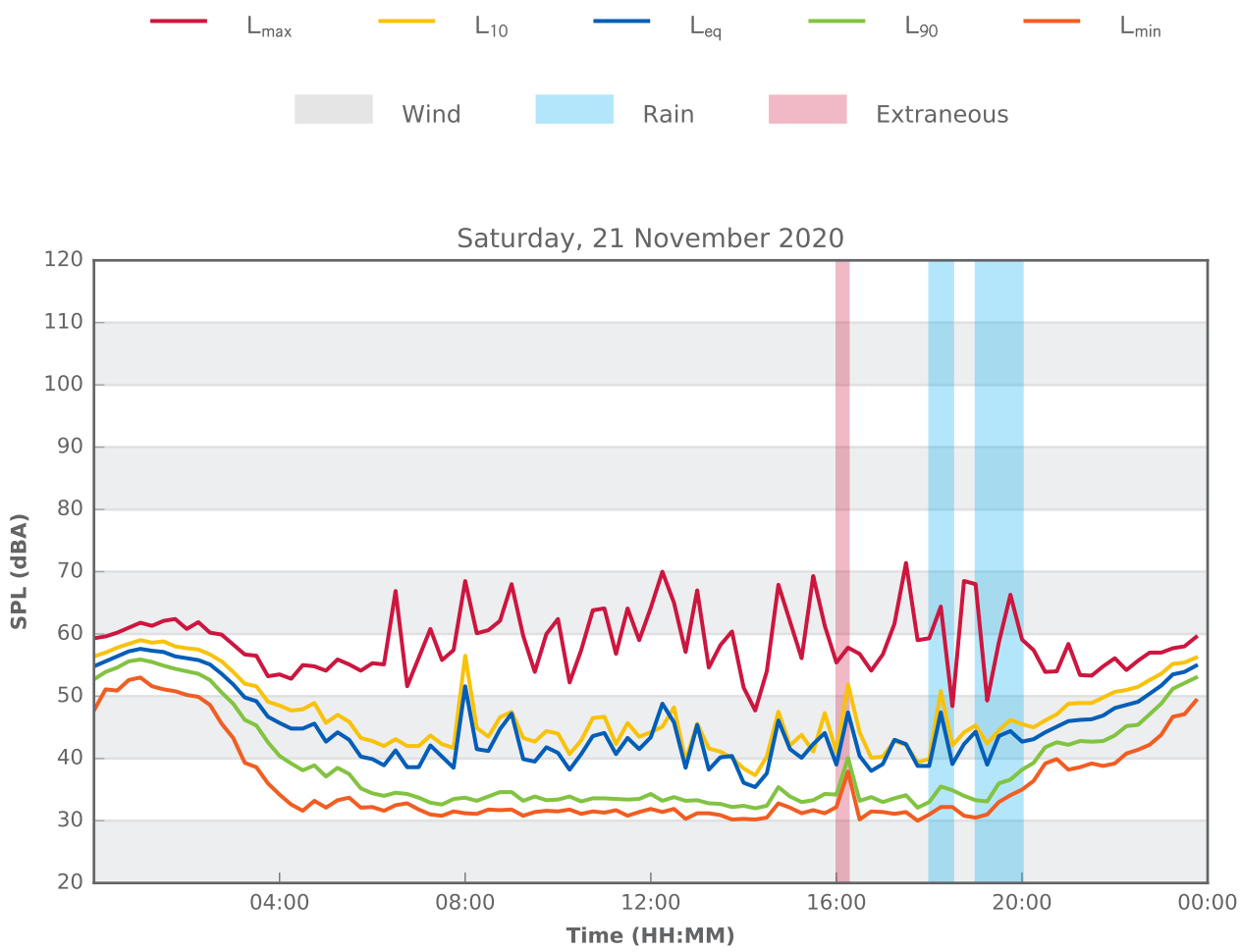
UNATTENDED NOISE MEASUREMENT GRAPHS

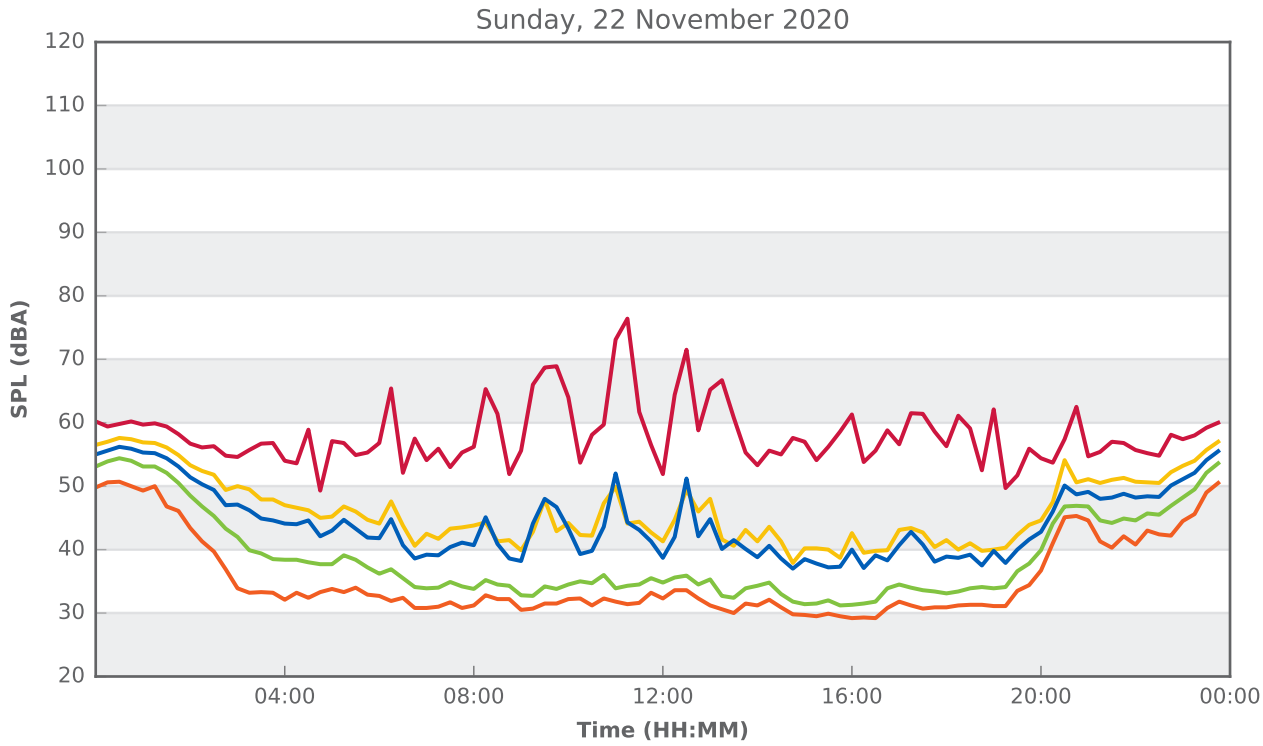
L01 - 30-38 Mount Vernon Rd



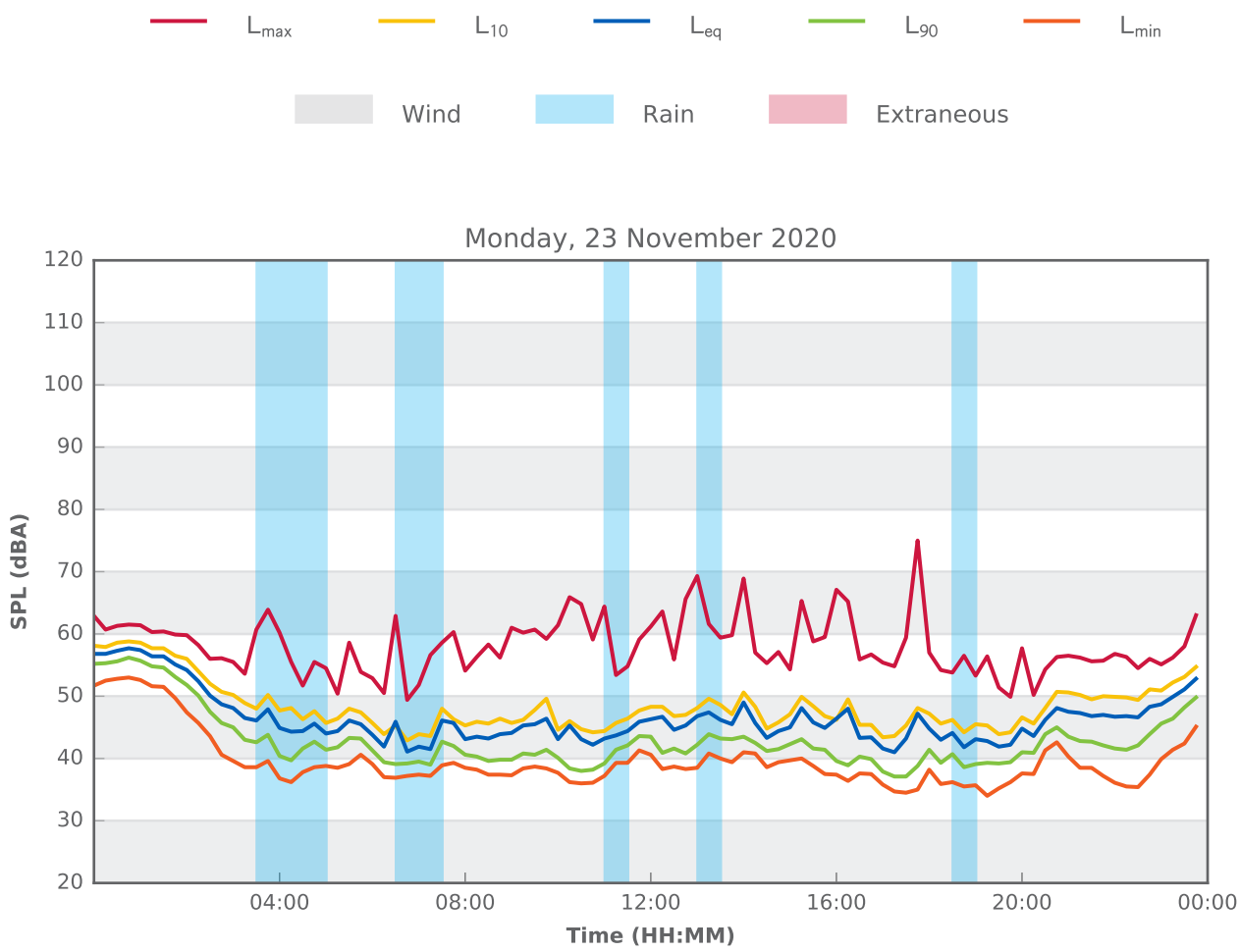


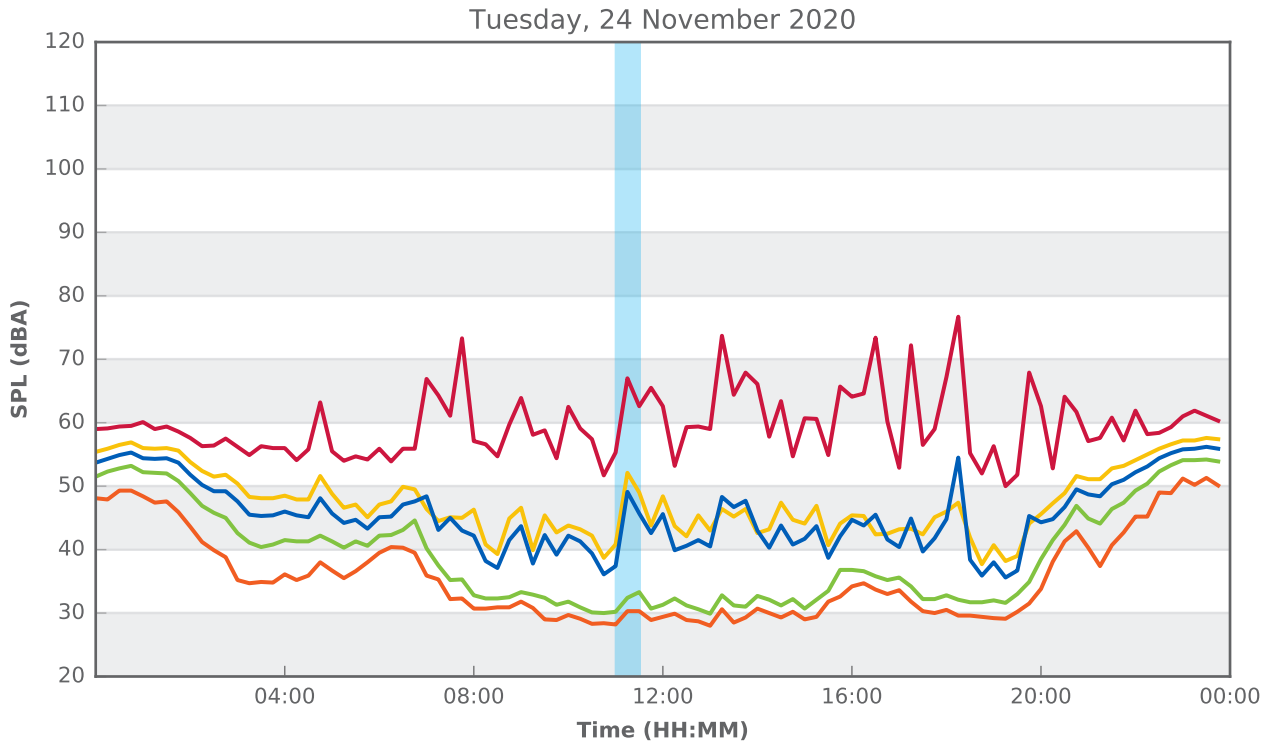
L01 - 30-38 Mount Vernon Rd



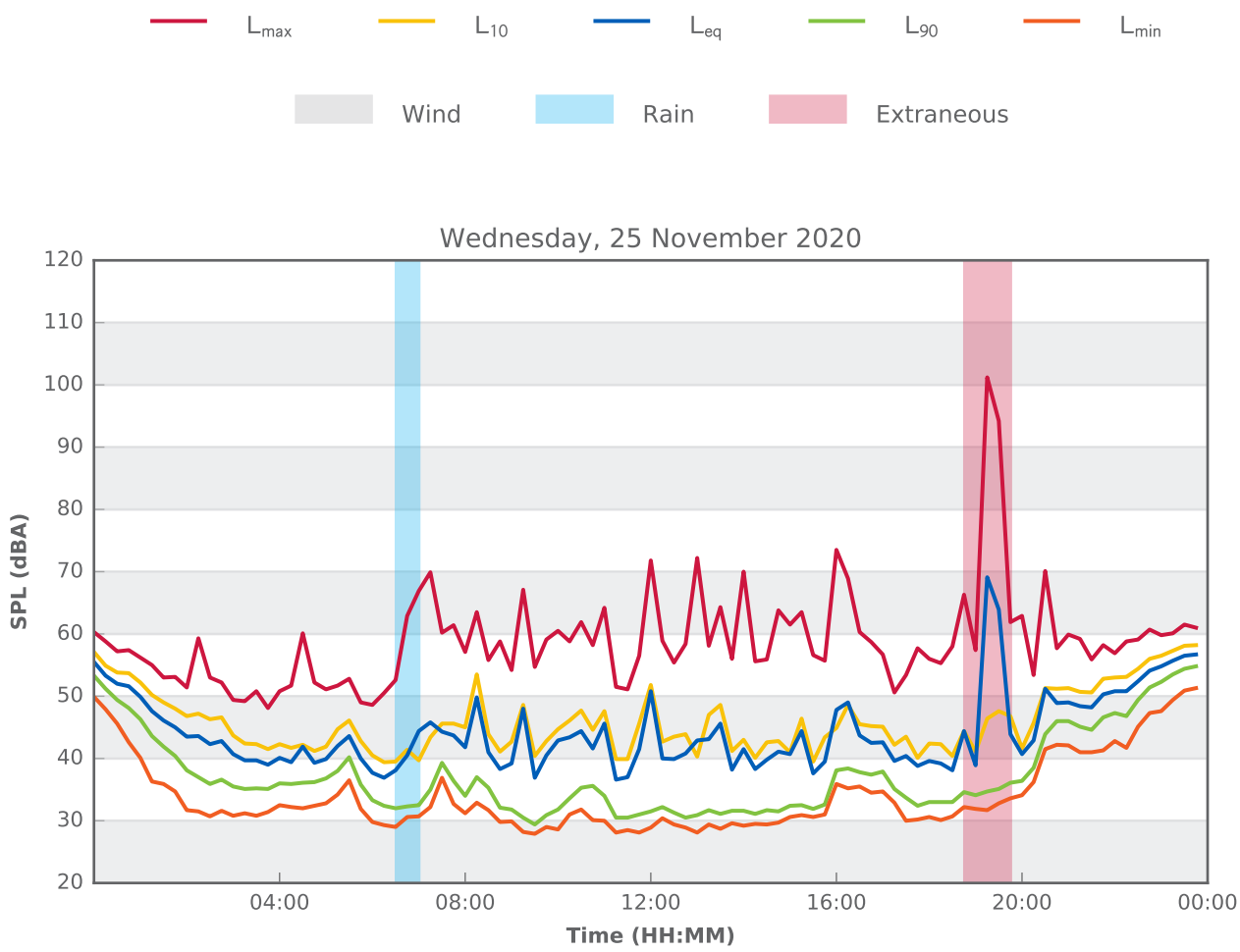


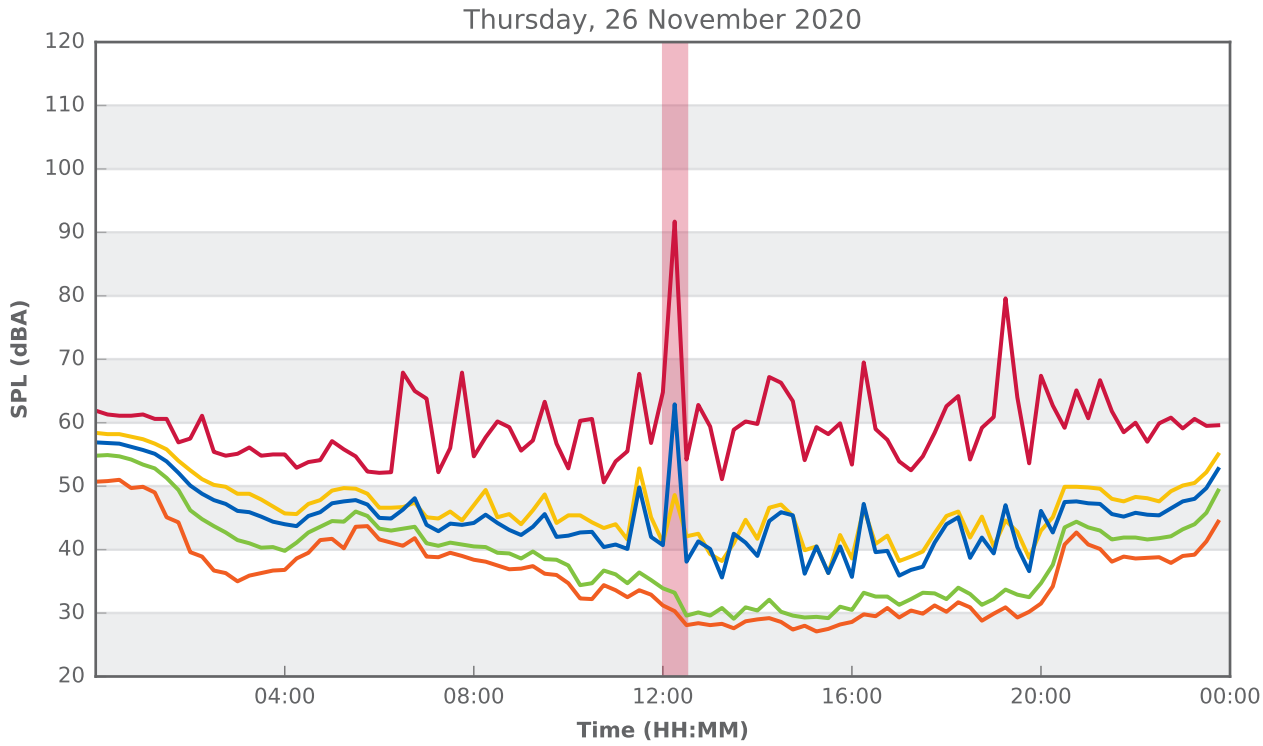
L01 - 30-38 Mount Vernon Rd



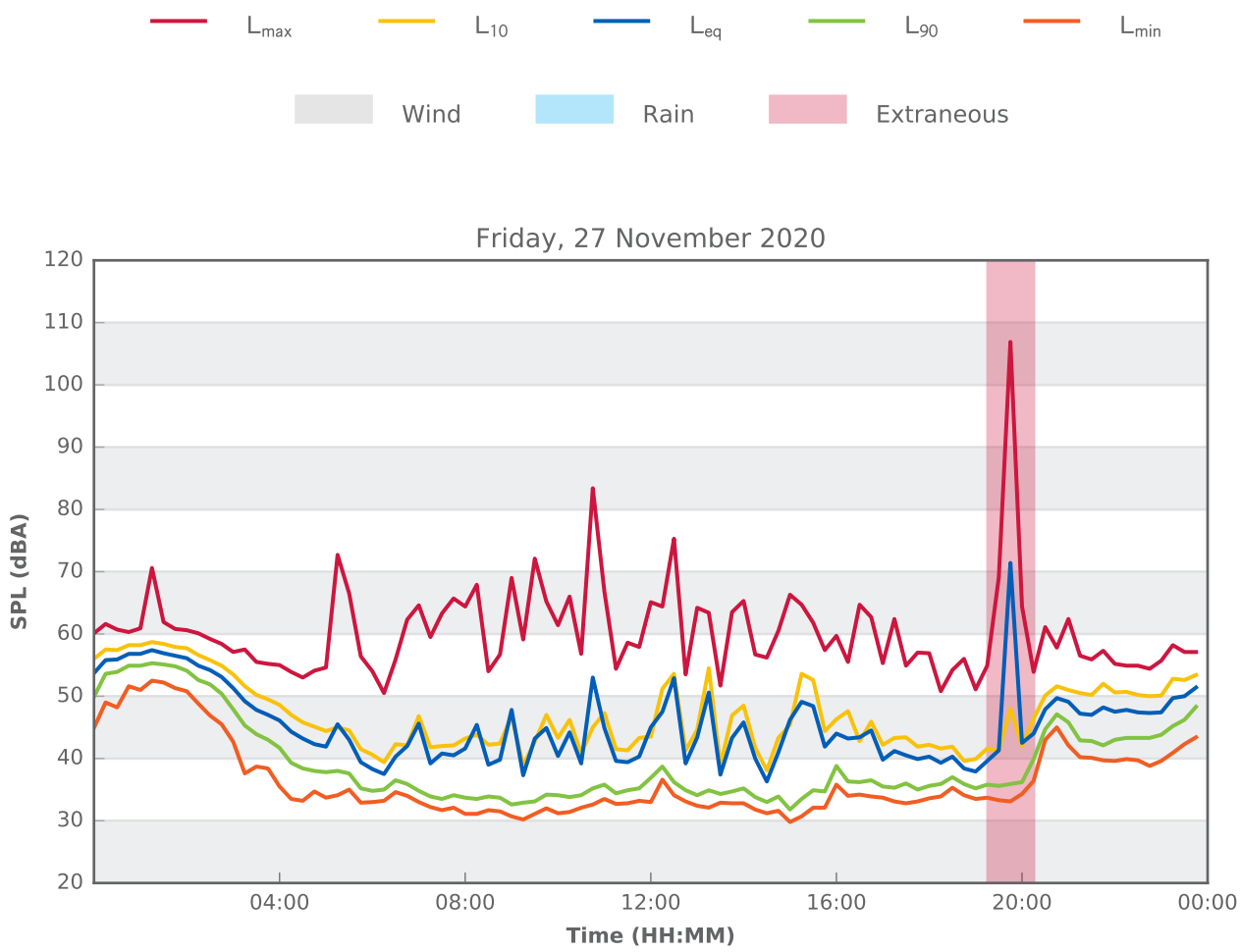


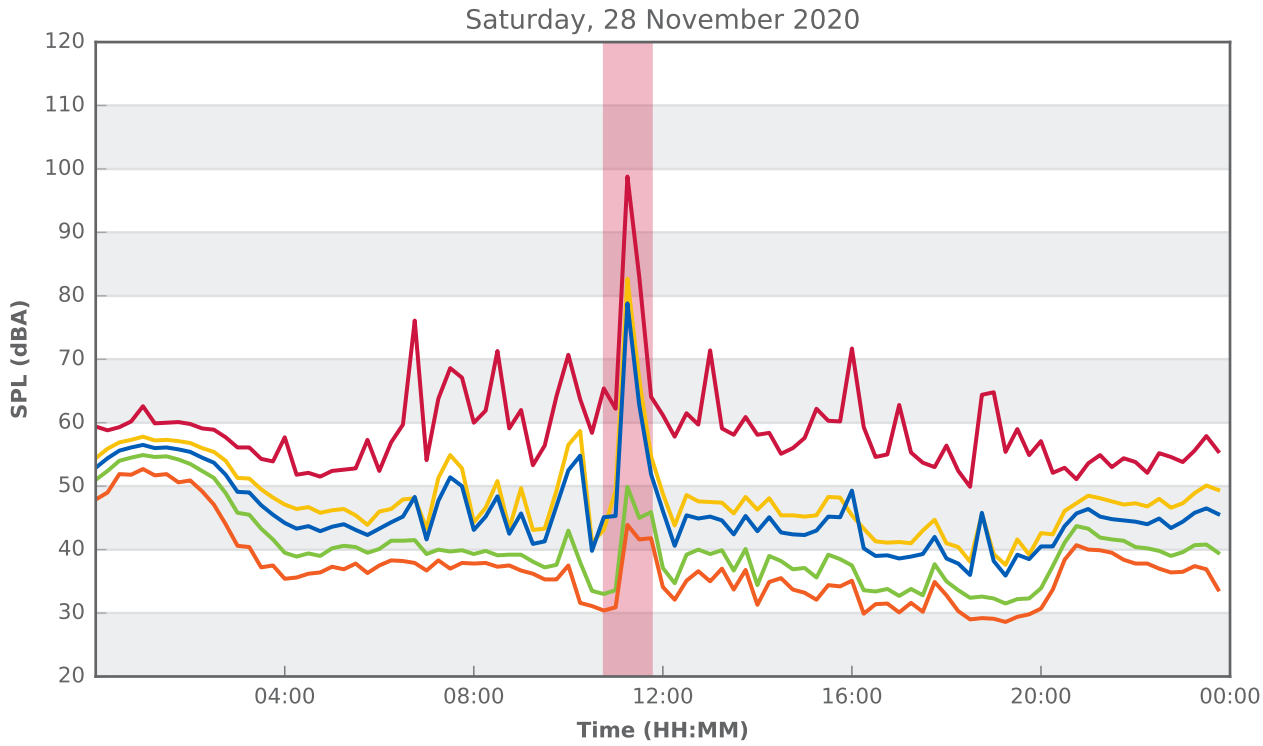
L01 - 30-38 Mount Vernon Rd



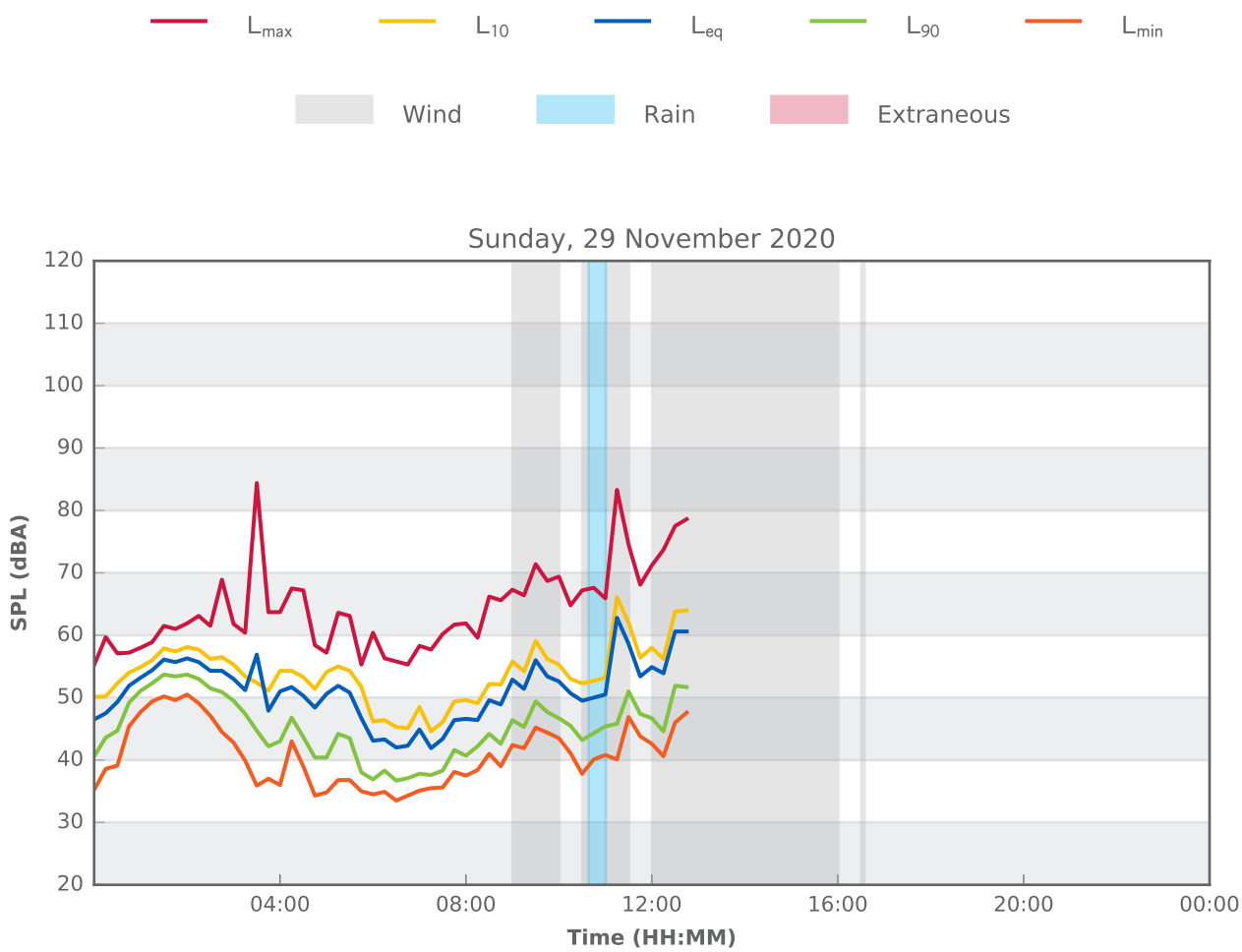


L01 - 30-38 Mount Vernon Rd

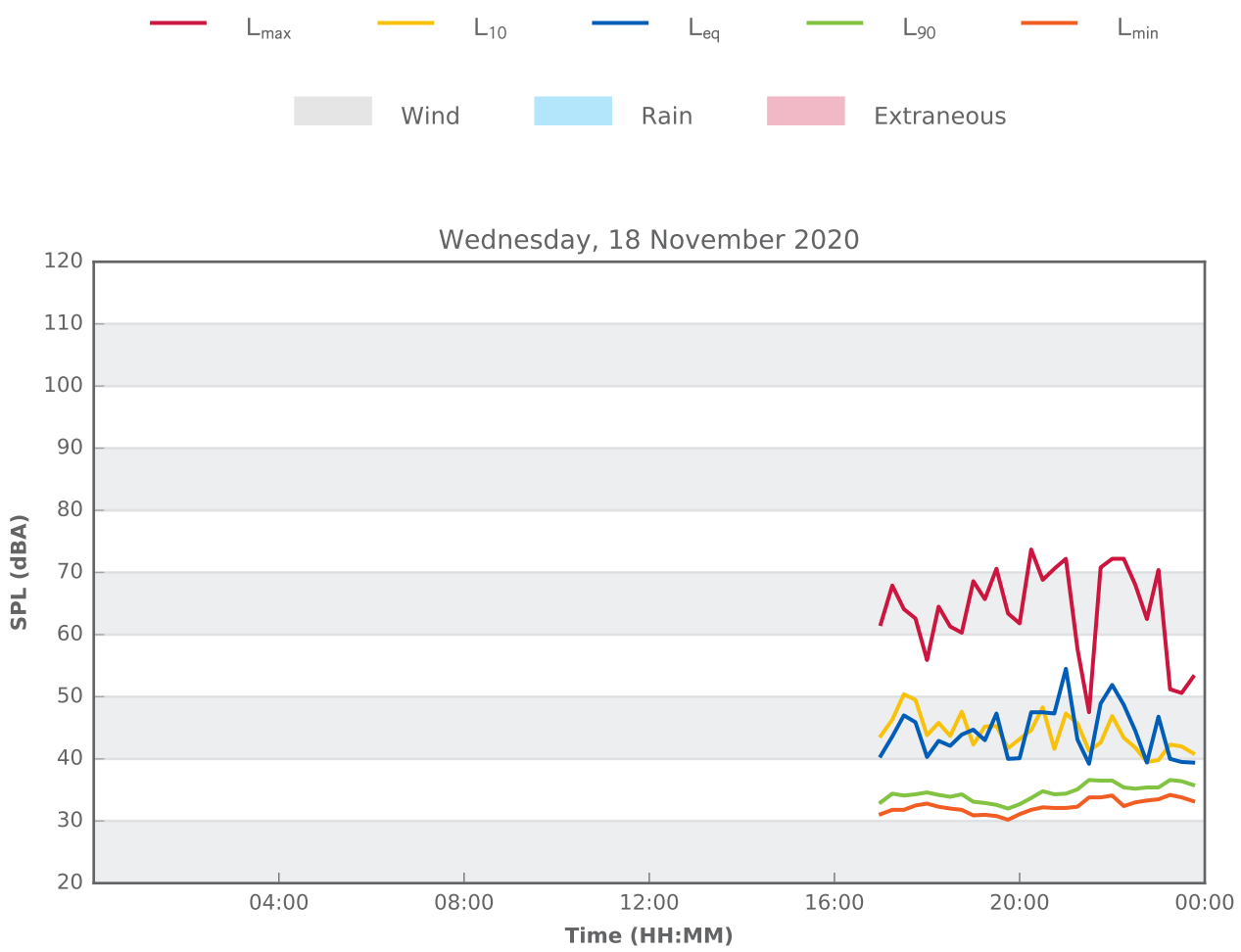


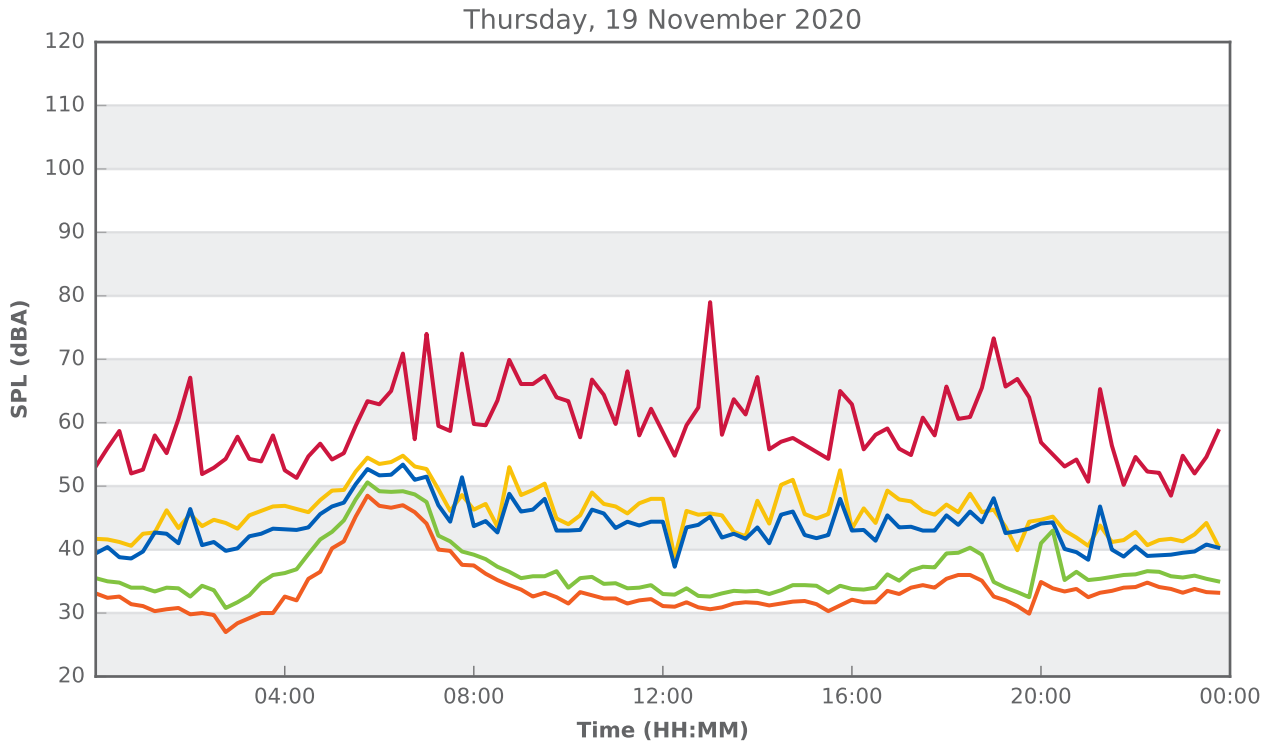


L01 - 30-38 Mount Vernon Rd

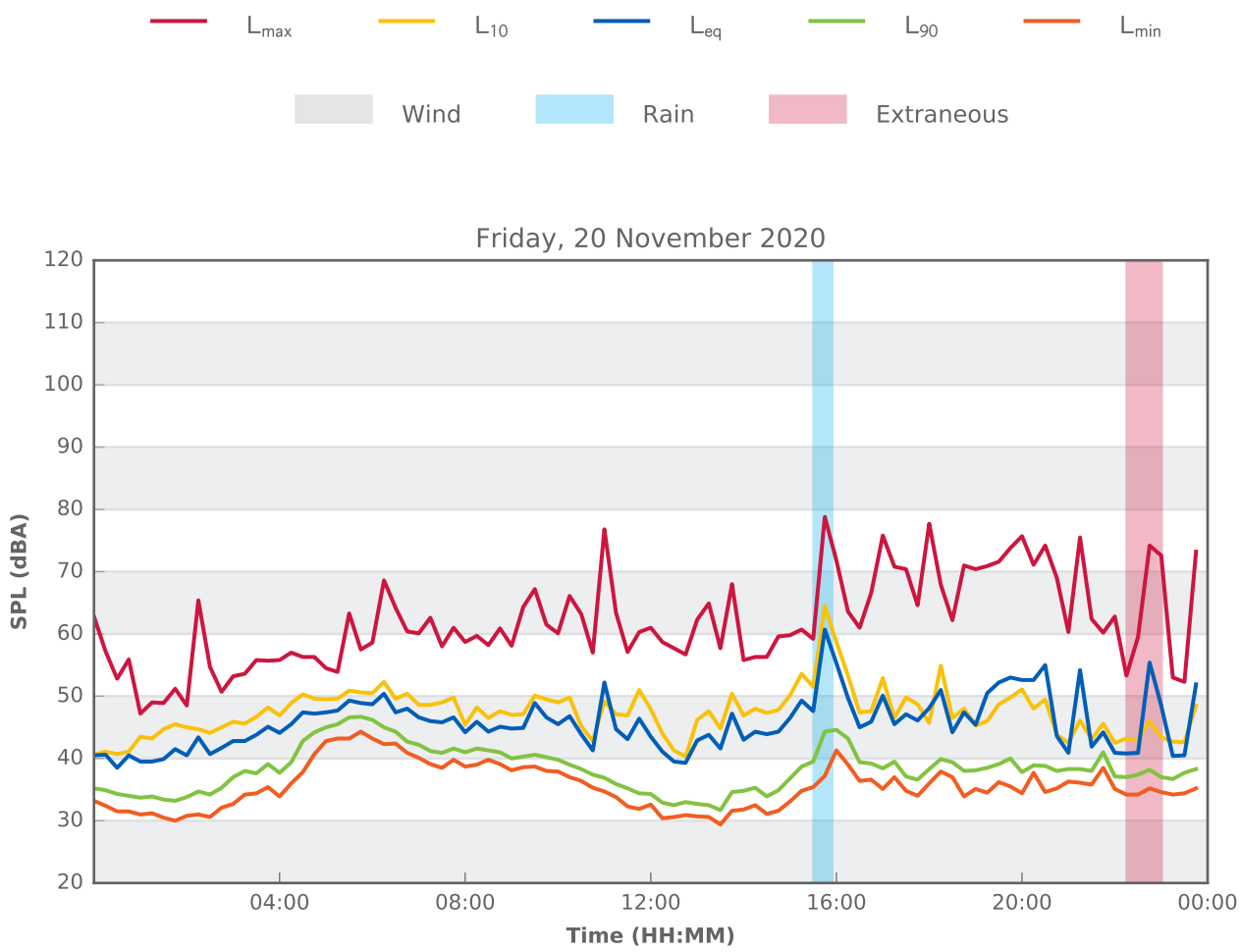


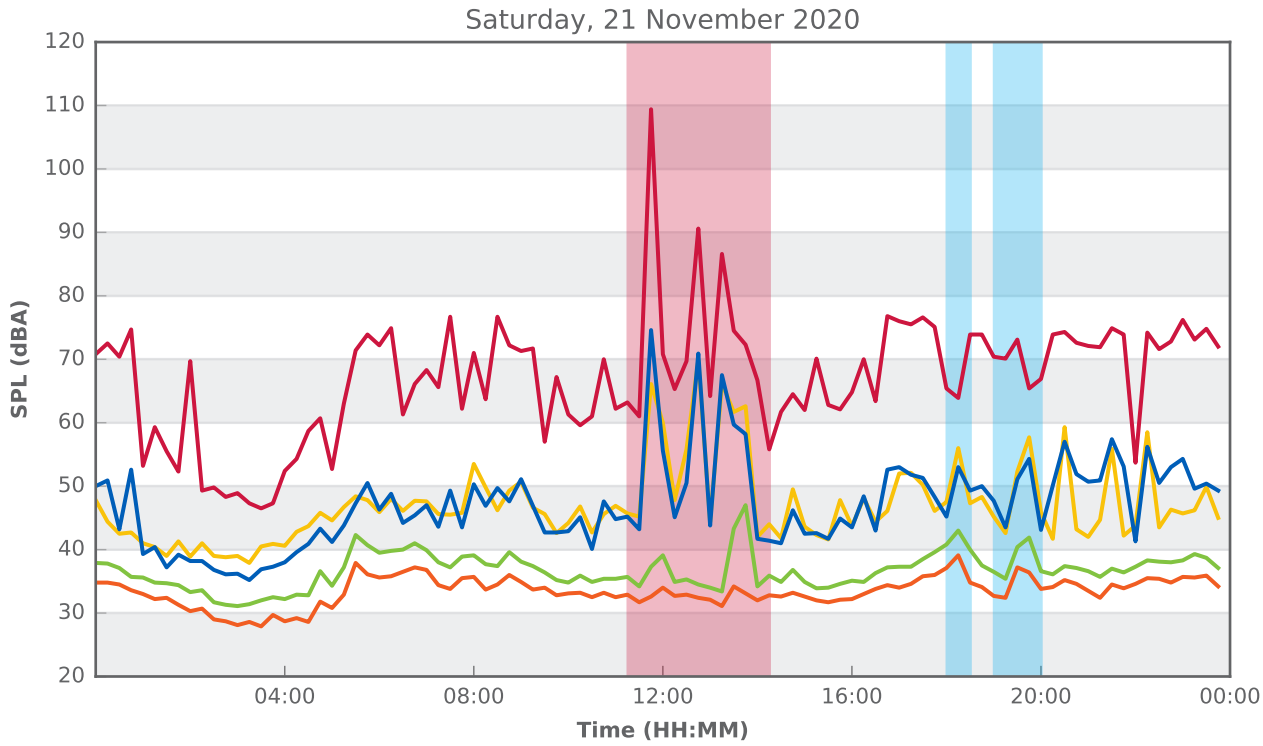
L02 - 284 Aldington Road, Kemps Creek



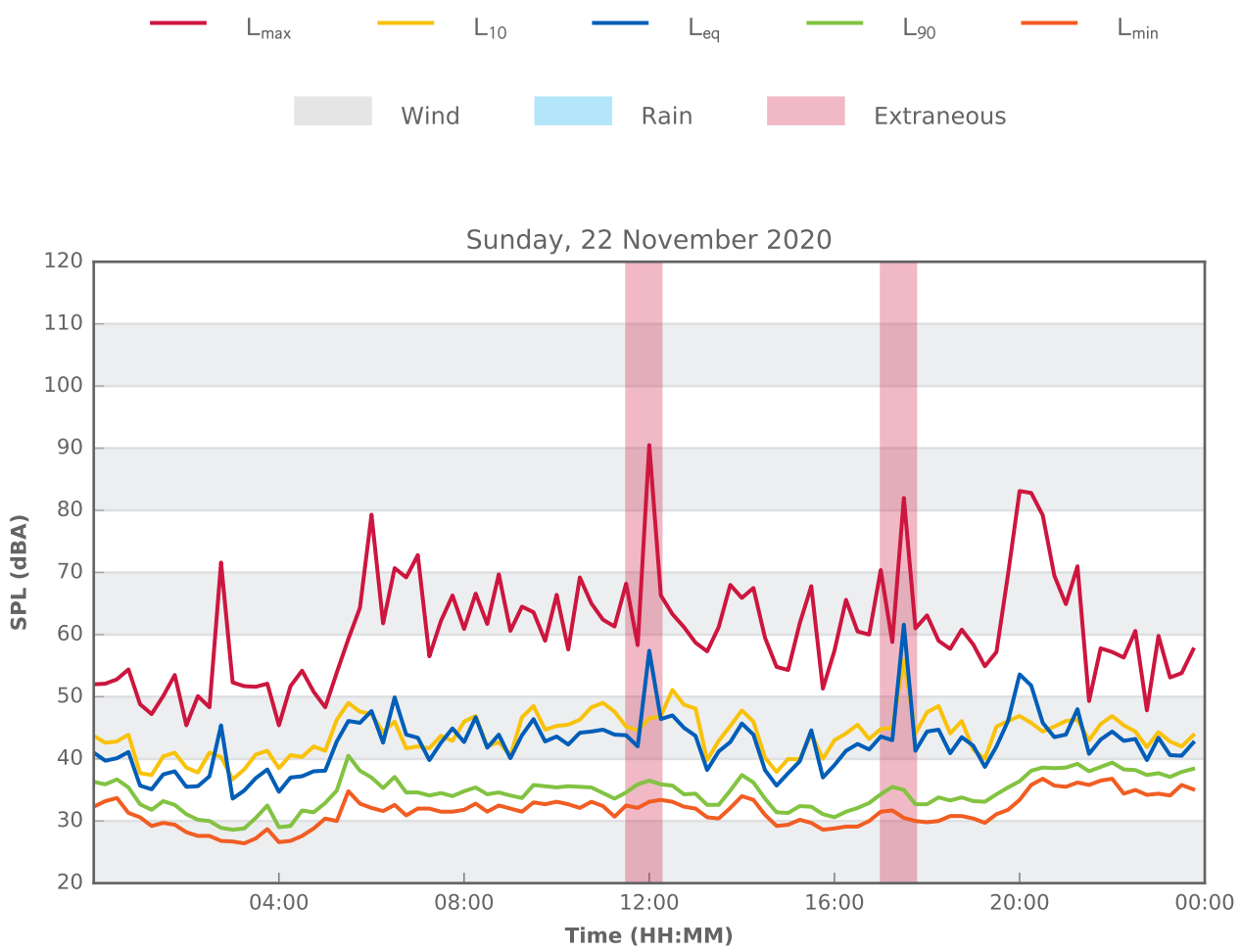


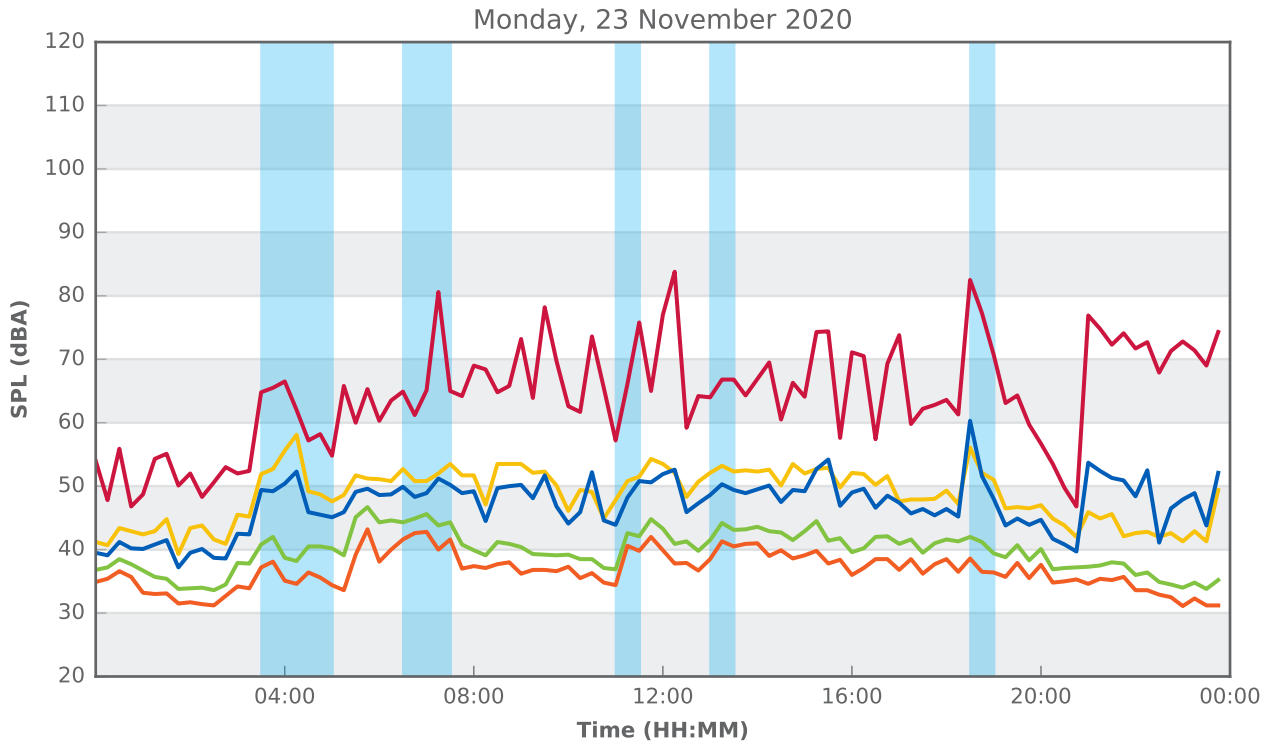
L02 - 284 Aldington Road, Kemps Creek



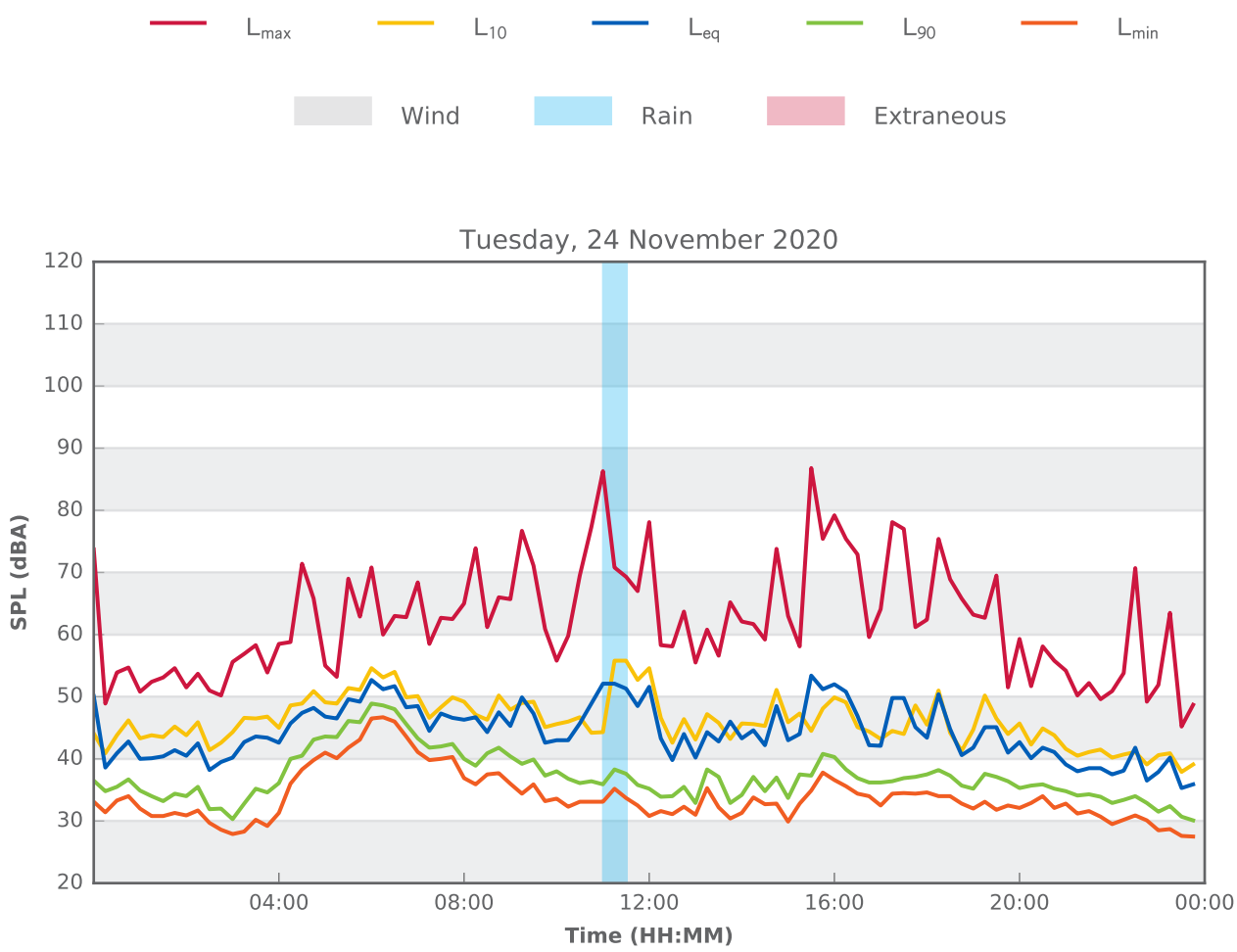


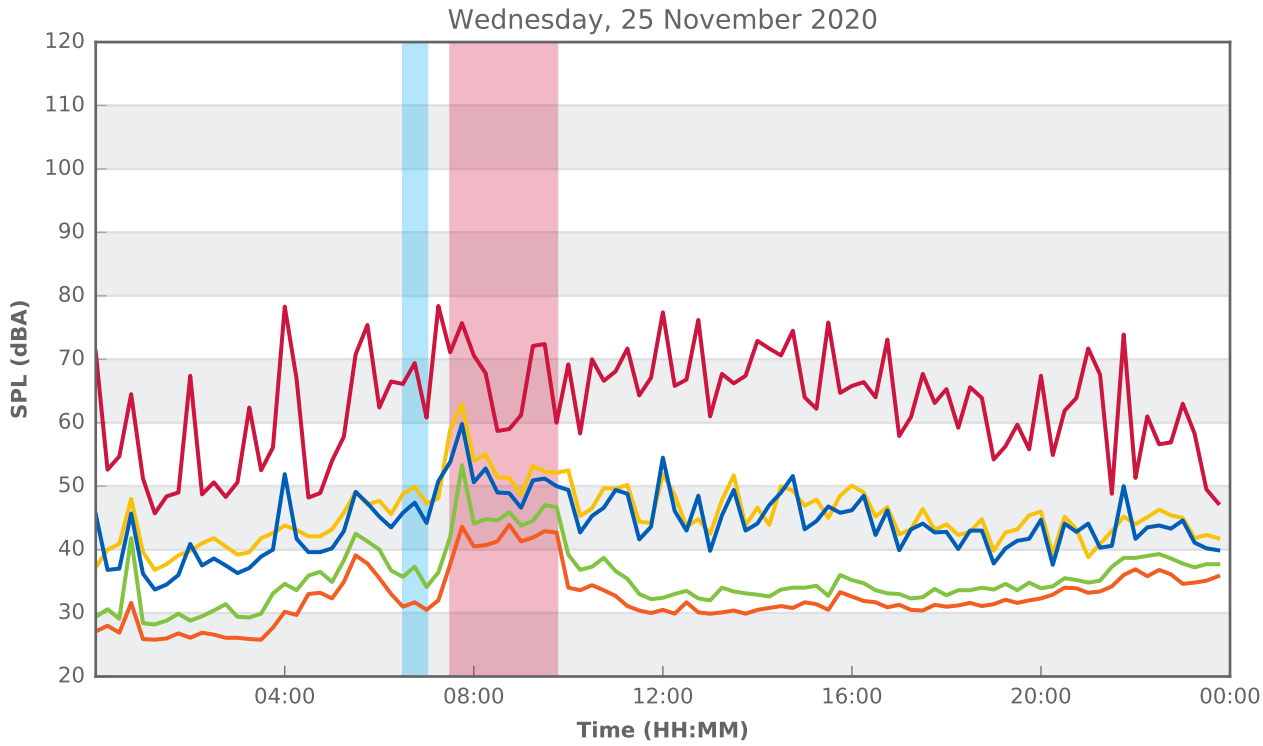
L02 - 284 Aldington Road, Kemps Creek



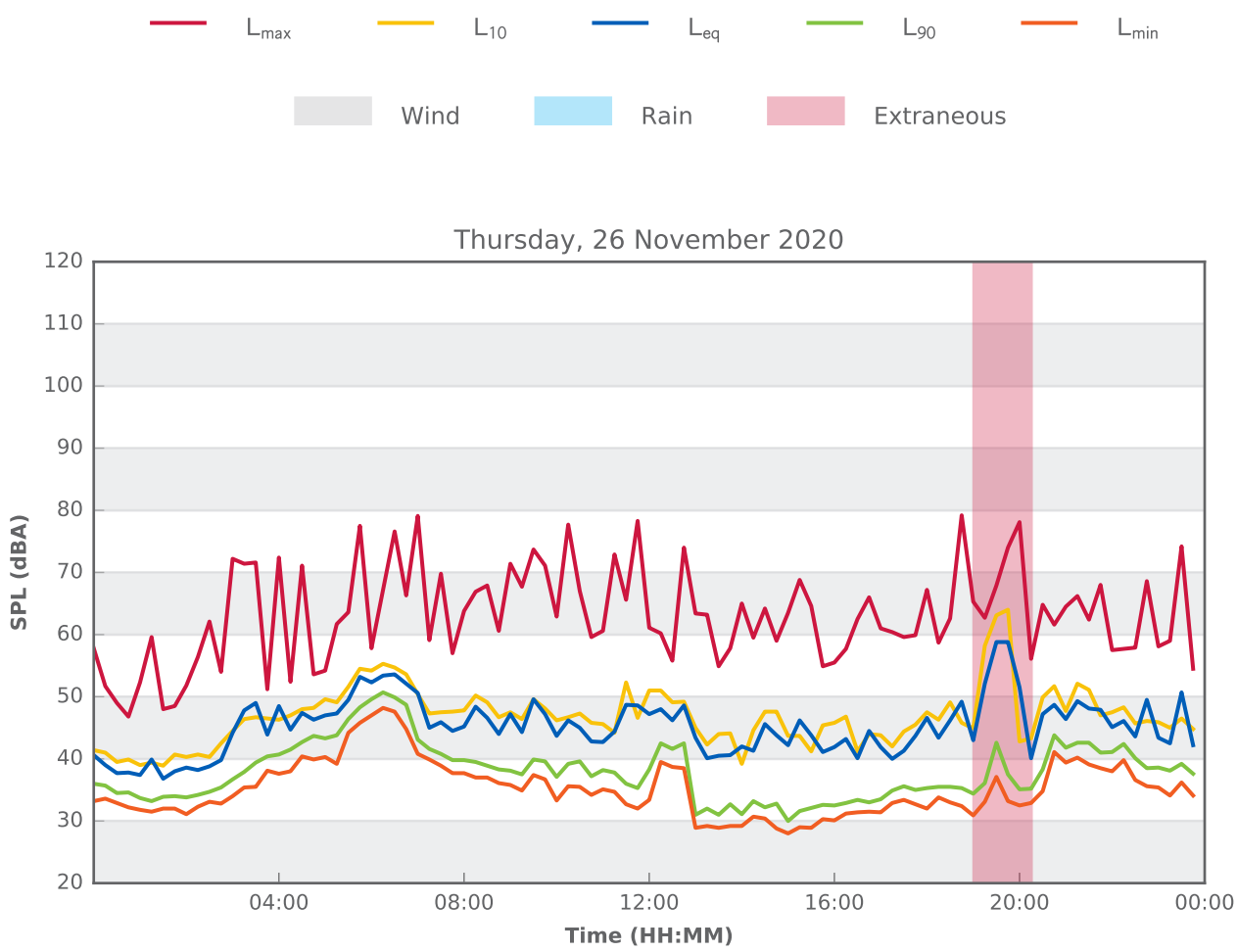


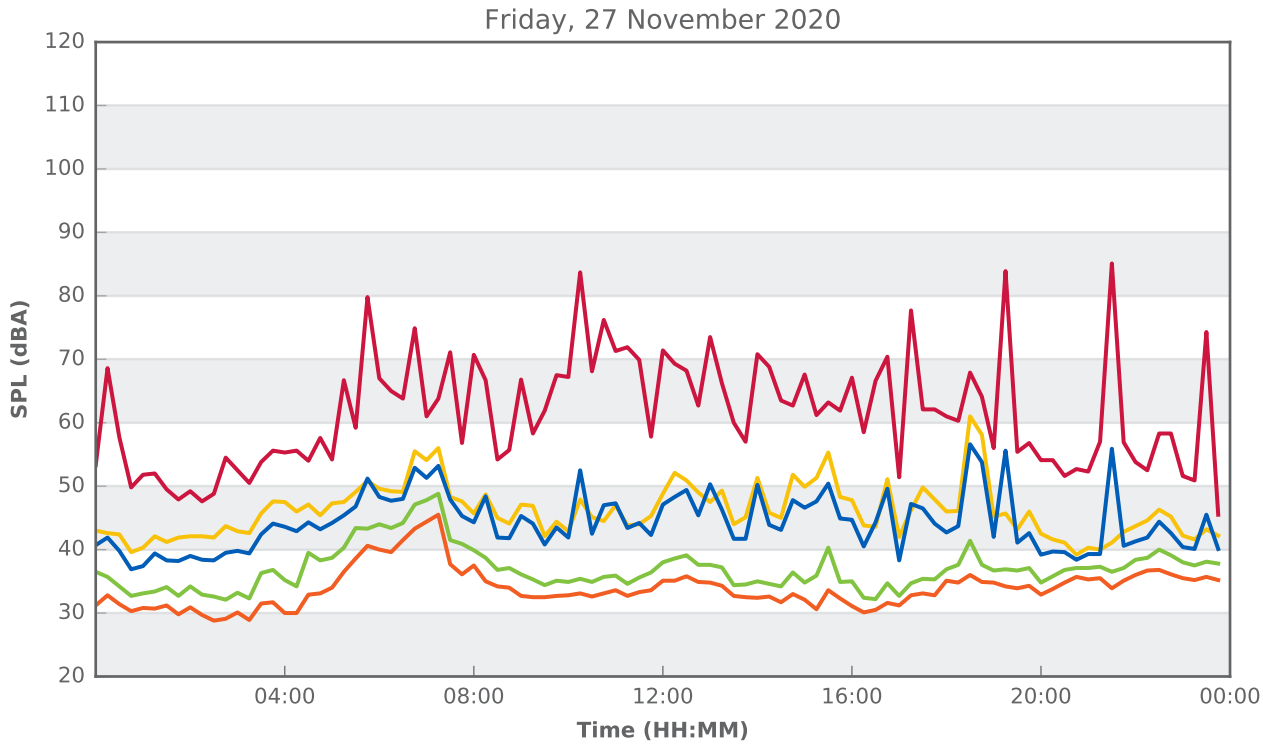
L02 - 284 Aldington Road, Kemps Creek



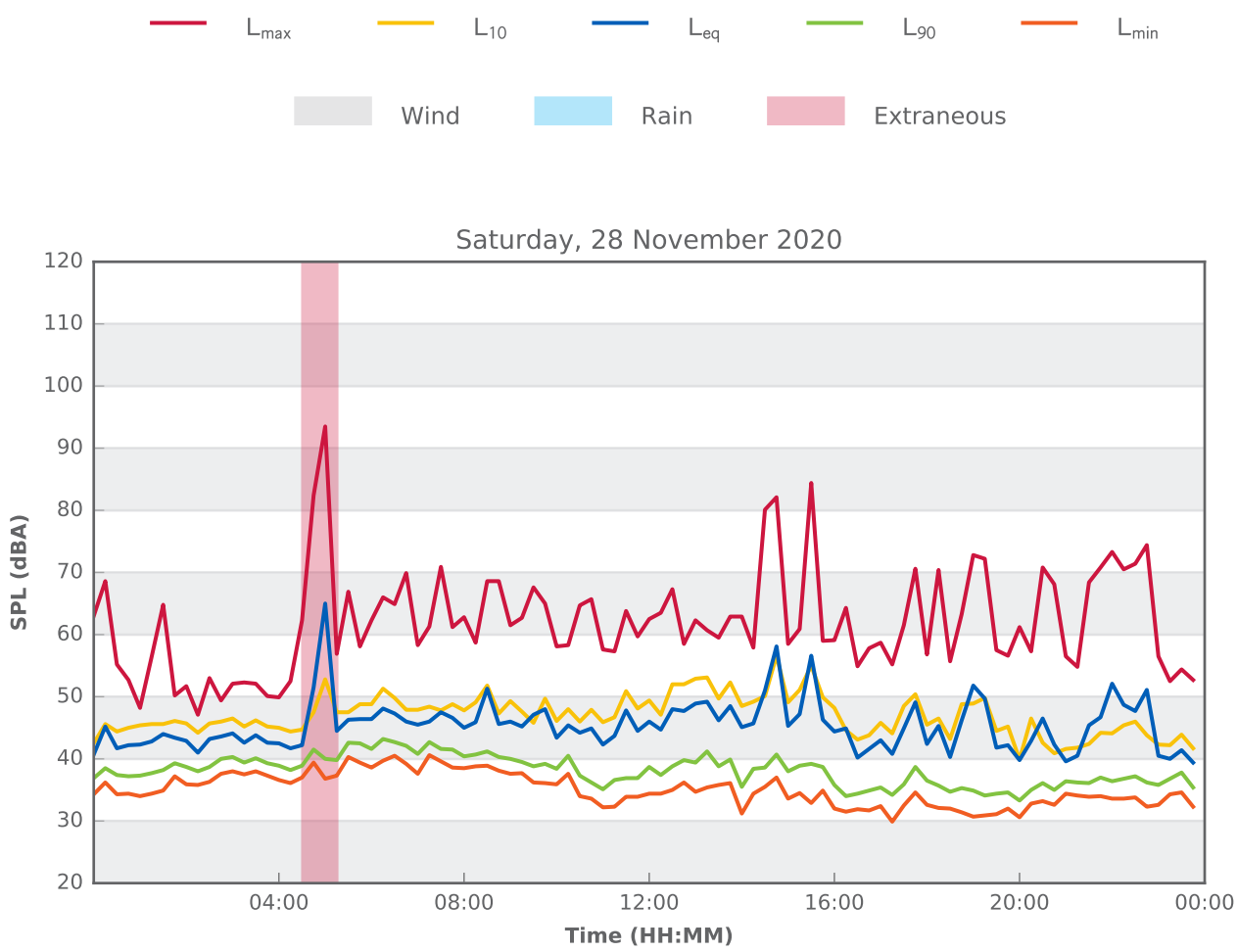


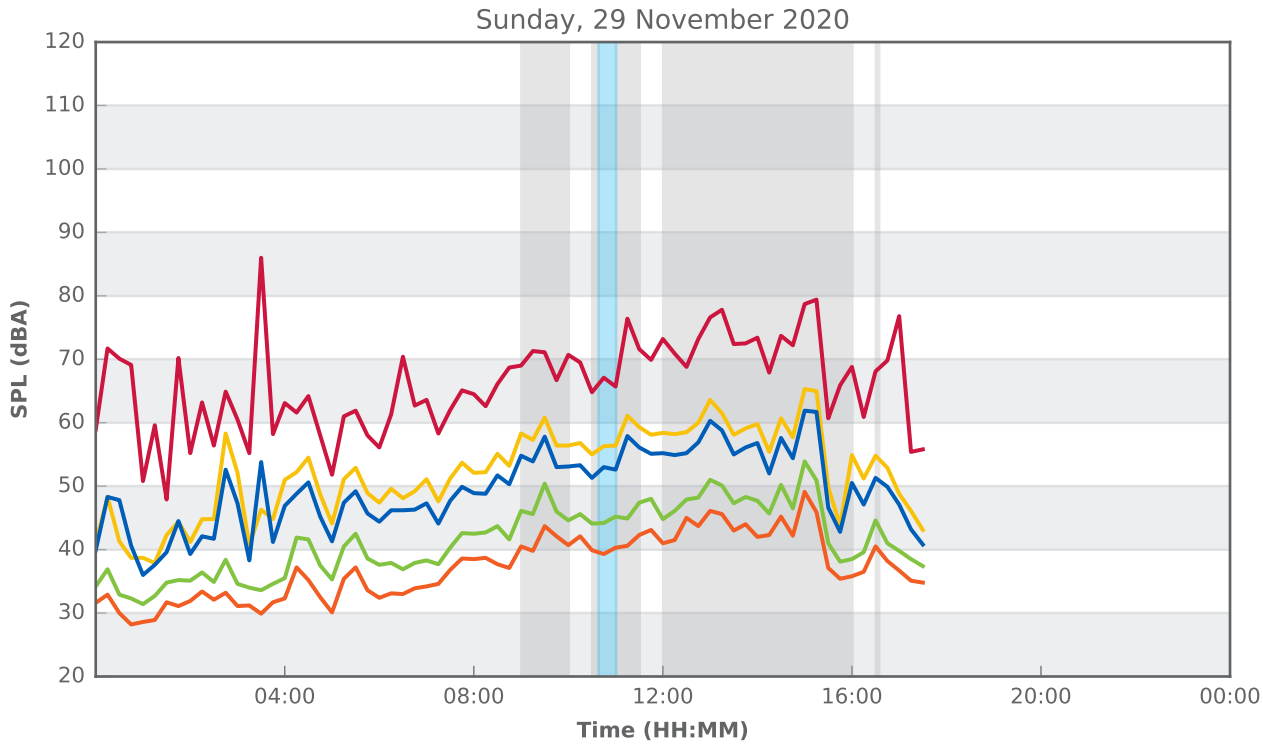
L02 - 284 Aldington Road, Kemps Creek





L02 - 284 Aldington Road, Kemps Creek





APPENDIX B

MODELLED NOISE SOURCE LOCATIONS


N
Lot 1
Lot 1a
Lot 3
Lot 4
Lot 1b
Lot 5
Legend
Site Boundary
Line Sources
Light Vehicle
Heavy Vehicle - Access Road
Heavy Vehicle - Hardstand
Heavy Vehicle - Ramp
Heavy Vehicle - Reverse
Point Sources
Forklift
Mech Plant
0 50 100 150 200 m