Ethos Urban

200 Aldington Road Industrial Estate

Noise and Vibration Impact Assessment

White Noise Acoustics
303, 74 Pitt Street,
Sydney NSW 2000

ABN: 35 632 449 122

Document Control

Project Name	**200 Aldington Road, Kemps Creek**
Project Number	20141
Document Type	Noise Impact Assessment
Reference Number	20141_200819_Noise Impact Assessment_BW_R8.docx
Attention	Gareth Bird

Revision	Date	Reference Number	Drafted By	Approved By
0	19/08/2020	20141_200819_Noise Impact Assessment_BW_R0.docx	BW	BW
1	3/09/2020	20141_200819_Noise Impact Assessment_BW_R1.docx	BW	BW
2	28/09/2020	20141_200819_Noise Impact Assessment_BW_R2.docx	BW	BW
3	9/11/2020	20141_200819_Noise Impact Assessment_BW_R3.docx	BW	BW
4	11/02/2021	20141_200819_Noise Impact Assessment_BW_R4.docx	BW	BW
5	5/8/2021	20141_200819_Noise Impact Assessment_BW_R5.docx	BW	BW
6	8/12/2021	20141_200819_Noise Impact Assessment_BW_R6.docx	BW	BW
7	28/6/2022	20141_200819_Noise Impact Assessment_BW_R7.docx	BW	BW
8	26/08/2022	20141_200819_Noise Impact Assessment_BW_R8.docx	BW	MF

Table of Contents

1 Introduction

White Noise Acoustics (WNA) has been engaged to undertake the Noise and Vibration Impact Assessment (NVIA)of the proposed FKC warehouse development to be located at 200 Aldington Road, Kemps Creek. The proposal seeks approval for the a site wide concept plan and the operation of Lot F.

Specifically, the proposal includes:

1. 13 lots which each contain a warehouse building.
2. Associated on-grade vehicles and parking and truck loading areas.

This assessment includes the acoustic investigation into the potential for noise impacts from the operation of the completed project as well as potential noise impacts from traffic movements on surrounding streets.

Additionally, construction noise management strategies are included in this report.

The proposed development is detailed in the drawings by SBA Architects; a typical floor plan for the development is included below.

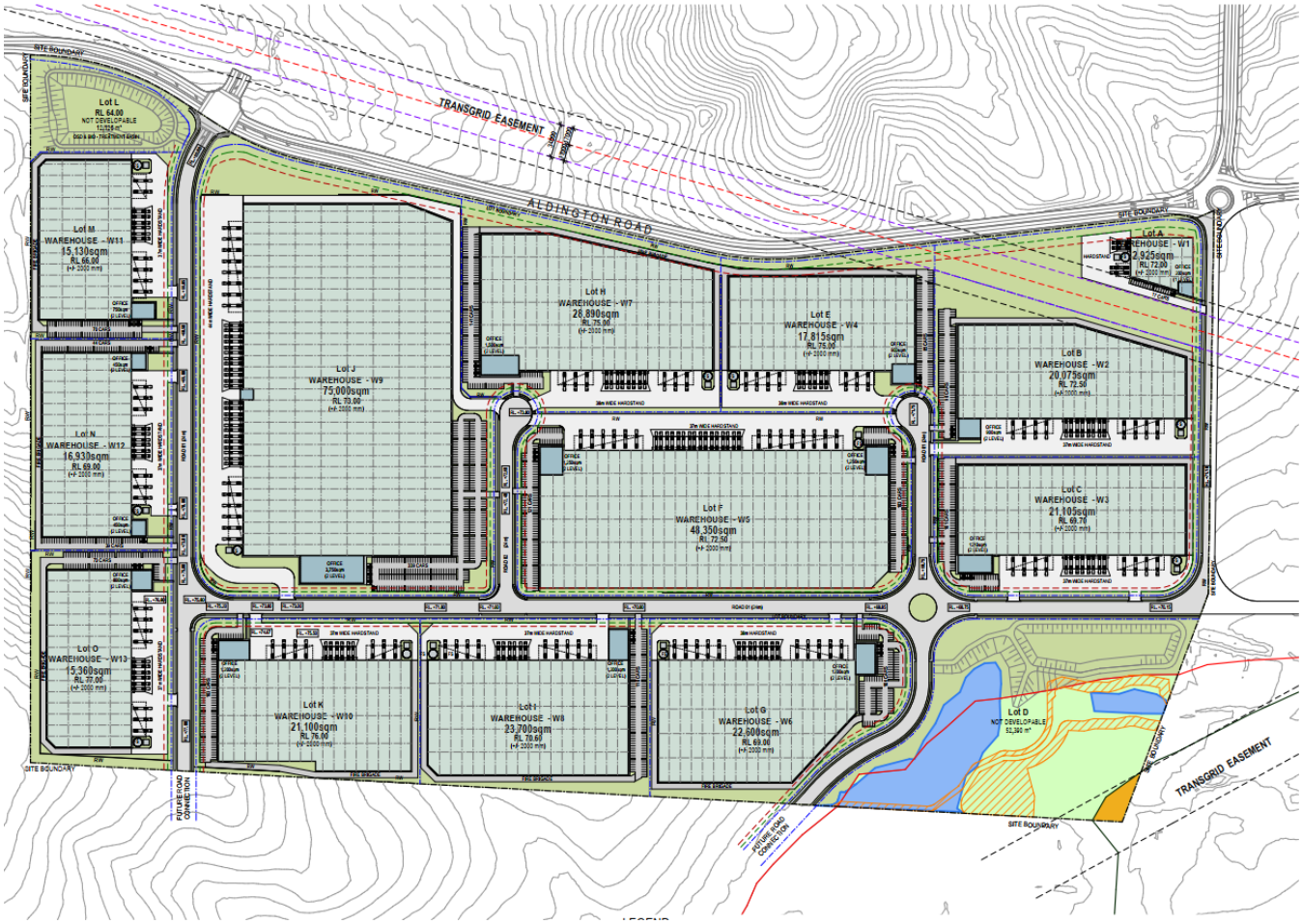


Figure 1 – Proposed development site plan

1.1 Development Description

The site is located on the eastern side of Aldington Road which carries traffic accessing the local residential areas. The surrounding area includes the following:

1. Existing properties located within the Rural area including residential properties surrounding the site. The surrounding land has been rezoned as IN1 including residential use and expected to be progressively redeveloped.
2. The potential future land use to the south of the site which may include a place of worship.

The site location is detailed in Figure 2 below.

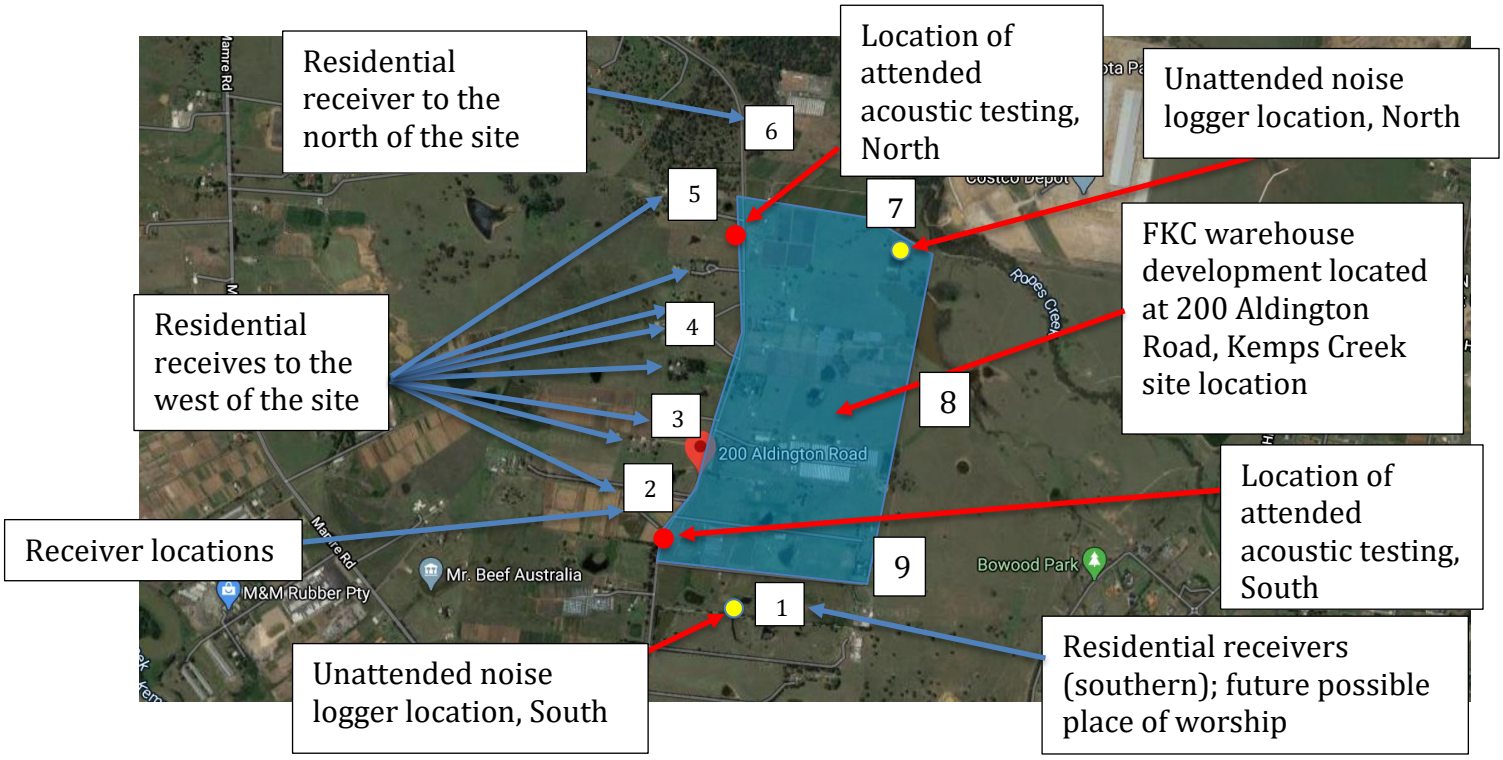


Figure 2 – FKC warehouse development located at 200 Aldington Road, Kemps Creek site location

The surrounding receivers to the site include the following:

1. Receiver 1 - Receiver to the south –Future place of worship including the Hindu Temple. 240-242 Aldington Road, Kemps Creek, currently under construction.
   Distance of 60m from the site.
2. Receiver 2 - Residential receiver to the west of the site across Aldington Road. 201- 217 Aldington Road, Kemps Creek.
   Distance of 150m from the site.
3. Receiver 3 – Formerly a residential receiver to the west of the site opposite on Aldington Road. 169-181 Aldington Road, Kemps Creek. Currently includes a proposed industrial project including a SSD lodgement.
   Distance of 180m from the site.
4. Receiver 4 – Formerly a residential receiver to the west of the site across Aldington Road. 183-197 Aldington Road and 129-139 Aldington Road, Kemps Creek.
   Currently includes a proposed industrial project including a SSD lodgement.
   Distance of 200m from the site.
5. Receiver 5 - Residential receiver to the west of the site across Aldington Road. 99-111 Aldington Road, Kemps Creek.
   Distance of 200m from the site.
6. Receiver 6 - Residential to the north of the site on Aldington Road. 74-88 Aldington Road, Kemps Creek.
   A DA for an industrial subdivision has been lodged for this site.
   Distance of 230m from the site.
7. Receiver 7 – Industrial noise receiver (future) to the north of the site.
8. Receiver 8 - Industrial noise receiver (future) to the east of the site.
9. Receiver 9 - Industrial noise receiver (future) to the south-east of the site.

It is noted that the residential receivers noted in the points above are located within land which is zoned as IN1 (industrial); see the figure below. For the purpose of this assessment, the existing residential receivers have been assessed as residential based on the requirements of the EPA planning policies.

Figure 3 – Project location overlaid on the NSW ePlanning Spatial Viewer Zoning Map

A detailed acoustic assessment for each of the specific individual lots will be required as part of the normal planning process. As such the reports will be required to include investigations of noise emissions from the site-specific activities/operations.

In the event any of the existing residential receivers within the vicinity of the site have been approved or commenced to become industrial type uses at the time of future DA applications, external noise emission criteria at these locations will increase significantly above the requirements detailed in this assessment. As part of the future assessments and applications it is plausible that the recommended acoustic mitigations detailed in this report may not be required.

This section provides a summary of the Project description as lodged (11 November 2020) and publicly exhibited and subsequent amendments to the project to address issues raised by the DPIE and in submissions from agencies, Penrith City Council and the public.

The section concludes with a description of the SSDA for which development consent is now sought.

1. Background / context

This acoustic assessment forms a Request for Additional Information for the proposed Concept State Significant Development Application for a new industrial estate on land at 106 – 228 Aldington Road, Kemps Creek.

The EIS for the project was placed on public exhibition between 18 November 2020 and 15 December 2020. During this period, a total of 18 submissions were received. These submissions were addressed and subsequent amendments to the project were made, as outlined in the Response to Submissions Report (dated 23 March 2021) prepared by Ethos Urban.

In written correspondence dated 28 April 2021, it was requested that FKC provide a further response to additional commentary raised by DPE, as well as additional comments raised by public authorities in their review of the first Response to Submissions Report. This was responded to via a second a Response to Submissions Report outlined by Ethos Urban (dated 22 September 2021).

Additional correspondence was received from DPE dated 15 November 2021 and June 2022 which has necessitated updates and additional information, as contained within this report.

2. Summary of the project for which development consent is now sought

Consent is sought for the following development. It represents minor amendments and does not represent a significant material change to what was previously proposed under the second RTS Report (22 September 2021).

- A concept masterplan to support development for the purposes of warehouse and distribution centre, general industry and ancillary offices. The concept masterplan also seeks consent for:
  - 13 individual development lots supporting:
    - Envelopes for warehouse and distribution and industry with associated hardstand areas, and two lots for water management infrastructure purposes (each including a bio-retention basin); and
    - A total indicative building area of 342,545 sqm.
    - Internal road layouts, which are to be determined and dedicated as public roadways prior to the operation of any facility on the site;
    - Southern road connection to Aldington Road;
    - Northern boundary road (half road corridor) connecting to Aldington Road;
    - Road connections to adjoining landholdings to the north and east;
  - Provision for 1,515 car parking spaces; and
  - Associated concept site landscaping.
- Detailed consent for progressive delivery of site preparation, earthworks and infrastructure works (i.e., Stage 1 works) on the site, including:
  - Demolition and clearing of all existing built form structures;
  - Drainage and infill of existing farm dams and any ground dewatering;
  - Clearing of existing vegetation;
  - Subdivision of the site into 15 individual lots;
  - Construction of a warehouse building with a total of 50,300 sqm of GFA, including:
    - 47,800 sqm of warehouse GFA;
    - 2,500 sqm of ancillary office GFA; and
    - 222 car parking spaces.
  - Bulk earthworks including 'cut and fill' to create level development platforms for the warehouse buildings, and site stabilisation works (if required);
  - Roadworks and access infrastructure, including an interim access road and a temporary junction with Aldington Road;
  - Stormwater works including stormwater basins, diversion of stormwater;
  - Utilities services including sewer and potable water reticulation
  - Road and boundary retaining walls.

1.2 EPA Review

This section of the report details the review and response to the items outlined in the Department of Planning, Industry & Environment's request for additional information listed in their letter *200 Aldington Road Industrial Estate (SSD-10479) Request for additional information* Dated 28 April 2021.

The response from the DPIE included comments regarding the previously prepared *Noise and Vibration Impact Assessment (NVIA)* which was provided as part of the application for proposed development dated 11th February 2021.

Several acoustic items were raised within the DPIE's correspondence which are detailed in the table below, along with the responses which have been addressed in this report.

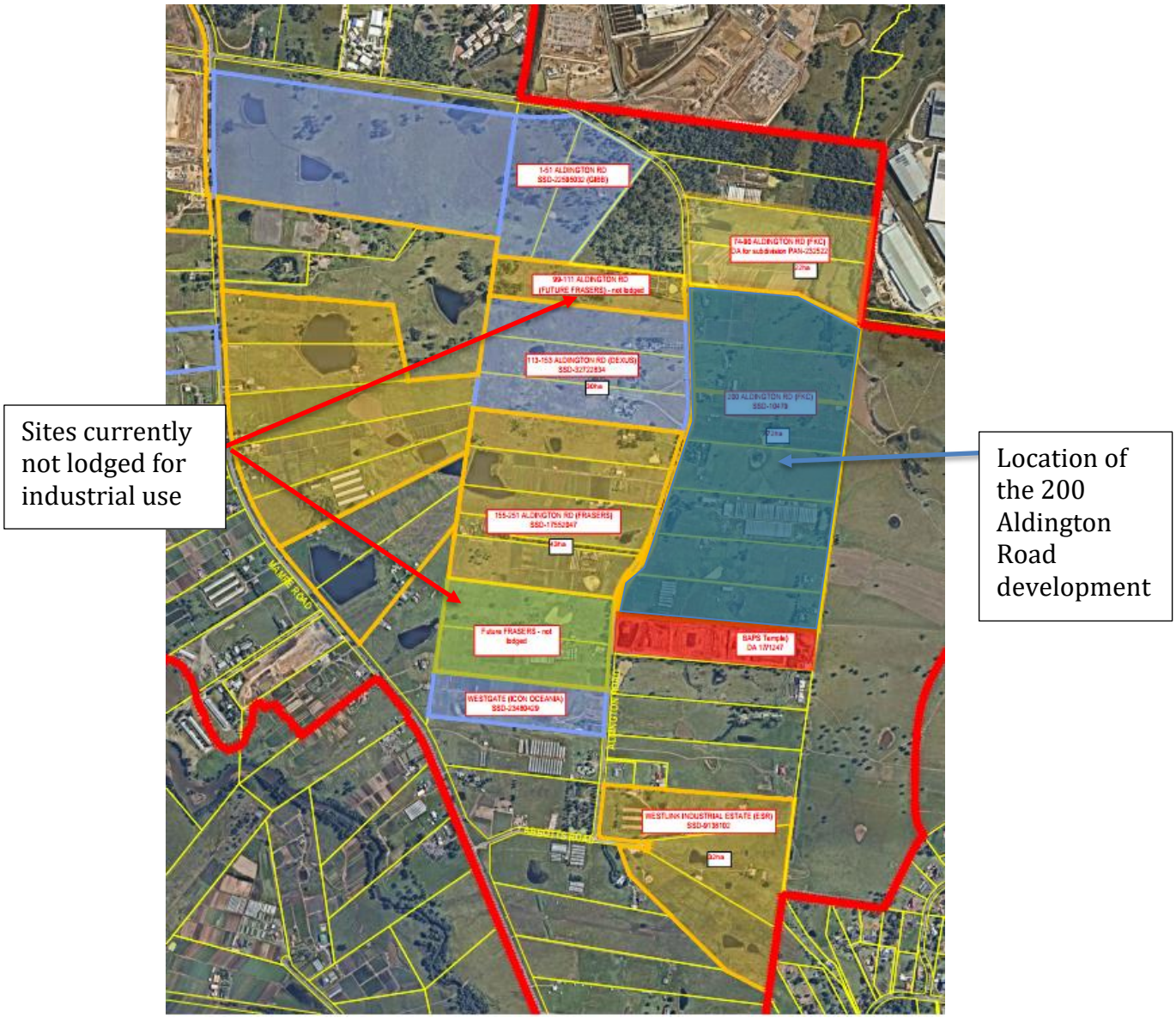
Table 1 – EPA Comments

EPA Comment	Response and Additional information
The DPIE includes comments regarding the noise levels resulting from the proposed trucks to be used on the site including the potential for variations in noise levels from the size of trucks on the site as well as fluctuations in noise levels from the movement of trucks such accelerations and the like.	The noise assessment which is detailed below is undertaken as a worst-case scenario in regard to truck movements on the site. This assumes that all trucks will be a large, reticulated trucks with the maximum possible noise level of 105 dB(A) Sound Power Level over 15 min and 115 dB(A) for maximum noise level. In the event the site has smaller sized trucks then the associated noise levels will be less than the assumed worst-case scenario and therefore compliance with the project trigger noise levels outline in this NVIA would be achieved. Our modelling has included the movement of trucks and forklift which the following assumptions. • Forklifts will generally be used in the external hardstand areas of the warehouses for the purpose of loading and unloading of trucks. • Truck movements will use of the internal access roadways within the proposed development site as well as the movement on external hard stand areas on each warehouse lot. Details of the source noise levels, including the raw onsite measured noise levels on a different previous site are also provided in this report.
Sleep disturbance assessment	This assessment has been undertaken in accordance with the NSW EPA's online *Application notes – NSW industrial noise policy* including screening and maximum noise level assessment. The report has also included a discussion regarding sleep disturbance using other publications such as the WHO guidelines as indicated by the NSW EPA.

Modifying Factors	The assessment noise emissions from the site have included any relevant penalties for modifying factors including tonality and annoying characteristics. The noise modelling results have being predicted in single octave noise levels and the resulting noise levels do not result in any noise levels which are defined as annoying or tonal using the definitions of the EPA's *Noise Policy for Industry.* The assessment of night-time maximum noise levels in the revised *NVIA* include the assessment of night-time *screening criteria* as well as a *sleep awakening* as detailed in Point 2 above.
Consideration of prevailing meteorological conditions	Meteorological conditions experienced during the period when noise monitoring was undertaken at the site have been assessed and details are included in this report. Ref Periods of prevailing conditions which include inclement weather have been excluded from the assessed data, which are identified in the data provided in Appendix B and C of this report.
Cumulative Noise Impact Assessment	The *NVIA* has assessed of both amenity and intrusive noise levels. The resulting project noise trigger levels are formulated based on the more stringent number between the amenity and intrusive levels. The results of the assessment include predicted noise levels which are compliant with the project trigger noise levels, which are less than the amenity noise levels of the EPA's *Noise Policy for Industry.* The resulting predicted noise levels include a buffer for the contribution of noise from possible future surrounding developments. This revised report has conducted additional noise modelling which included movement of trucks, operation of forklifts and cars on the through the site (Details of all movements are also provided) as detailed in Section 6.3 of this report. Section 8 of the *NVIA* includes the assessment of additional noise impact from additional traffic movements on surrounding roadways. The assessment has been conducted based on the requirements and criteria listed within the NSW *Road Noise Policy.*
Potentially Noise Affected Sensitive Receivers	The revised *NVIA* has assessed of noise impact to the surrounding industrial areas which neighbour the site to the east, these include compliance with the requirements for the NPI for industrial type receivers. The revised *NVIA* includes commentary regarding the residential receivers within IN1 zoned land. Compliance has been provided based on the more onerous requirement (being the current residential use) and is a conservative assessment. Should the surrounding residential properties be approved for industrial use the relevant acoustic criteria would be increased and still compliant. As part of the revised *NVIA* an acoustic review of the potential cumulative noise level impacts from the operation/use of the Warragamba pipeline has been included. See section 9.

1.3 Residential Receivers (Current Industrial Applications)

Currently there are a number of applications for the change of use of exiting residential land uses to being industrial type developments. The current applications are identified in the figure below.



Based on the development applications which have been lodged for the surrounding land around the site, a reduced number of surrounding residential receivers is likely. As detailed in Section 1.1 of this report, receiver's locations identified as locations 3, 4 and 6 have since had a development application submitted to be altered to an industrial type of receiver. As such receiver locations 3, 4 and 6 are now assessed as industrial in lieu of residential.

As future development applications may be submitted proposing a similar amendment to permitted land use, should these be approved further amendments to the required project trigger noise levels at each location could occur.

2 Existing Acoustic Environment

The site is located along the eastern portion of Aldington Road Kemps Creek. The roadway currently carries low volume of traffic which is associated with general local traffic.

The site is located within an area which currently is used for *Rural* type activities as defined in the EPA's Noise Policy for Industry. However, review to the NSW land zoning maps via NSW ePlanning indicate the actual land zoning is an industrial type (IN1).

In accordance with the NSW EPA NPI a *Rural* type receiver would have the following acoustic characteristics:

1. An area with an acoustical environment that is dominated by natural sounds, having little or no road traffic noise and generally characterised by low background noise levels. Settlement patterns would be typically sparse.

However, the NPI states a *Rural* type receiver with *Industrial Interface* as defined would have the following acoustic characteristics:

> *The industrial interface assessment provisions recognise that a marginally reduced acoustic amenity is acceptable for existing residences co-located with existing industry, and that the availability of noise mitigation measures might be limited in these circumstances.*
>
> *The industrial interface assessment generally applies only for existing situations (that is, an existing residential receiver near an existing industry that is proposing expansion or modification) and generally only for those residential receivers that are:*
>
> > • *in the immediate area surrounding the existing industry (that is, the region that extends from the boundary of the existing industry to the point where the noise level of the existing industry, measured at its boundary, has fallen by 5 dB or as agreed between the proponent and the relevant authority at the commencement of a noise impact assessment or related study), and*
> > • *where existing industrial noise levels (including noise from the premises under consideration) are above the relevant rural, suburban or urban recommended amenity noise levels.*

As part of this assessment an onsite detailed unattended and attended acoustic survey of the existing noise environment at the site has been undertaken. The survey included attended noise level measurements at the site, during various times of the day on the 17th of August 2020 as well as long term unattended noise logging at two locations which was undertaken between the 11th and 17th of August 2020. Monitoring data recorded during periods of inclement weather has not been included in the assessment.

Noise logging was undertaken using Rion NL-42EX type noise monitors with the following serial numbers and calibration numbers:

1. Logger 1 – Serial number 998079 and calibration number C19678
2. Logger 2 - Serial number 998081 and calibration number C19677

The noise logger locations, as detailed in Figure 2 above, were chosen as representative locations to the north and south of the site,. Both loggers were positioned such that they did not include façade corrections. The noise logging data excluded periods of inclement weather (including periods of rain and high wind), detailed results of the noise monitoring is included in Appendix B and C

Attended noise level testing was conducted using a Bruel and Kjaer 2236C type meter. The meter was calibrated before and after testing and no significant drift was recorded (the drift in calibration did not exceed ±0.5 dB).

2.1 Noise Survey Results

The attended and unattended noise locations were selected to obtain suitable noise levels for the assessment of background noise levels ($L_{90\,(t)}$) as well as the impact from traffic movements ($Leq_{(t)}$). The results of the acoustic survey are detailed in the tables below which have been used as the basis of this assessment.

Table 2 – Results of the Attended Noise Survey at the Site

Measurement Location	Time of Measurement	$L_{Aeq,\ 15min}$ dB(A)	$L_{A90,\ 15min}$ dB(A)	Comments
Attended noise measurement location, Northern Location	9.05am to 9.20am	58	39	Noise level at the site dominated by vehicle movements on Aldington Road, surrounding land uses and natural sources.
Attended noise measurement location, Southern Location	9.25am to 9.40am	56	41	

Table 3 – Results of the Noise Logging at the Site

Measurement Location	Time of Measurement	Maximum Repeatable $L_{Aeq,\ 15min}$ dB(A)	Representative Background noise Level (RBL) $L_{A90,\ 15min}$ dB(A)	Minimum assumed Representative Background Noise Levels $L_{A90,\ 15min}$ dB(A)[1]
Northern noise logger location, see figure 2 above	Day	42	30	35
	Evening	40	29	30
	Night	33	25	30
Southern noise logger location, see figure 2 above	Day	50	32	35
	Evening	35	31	30
	Night	35	30	30

Note 1: Where background noise levels have been recorded below the minimum assumed representative background noise levels , the minimum RBL's have been used for the basis of the assessment as defined in the EPA Noise Policy for Industry

3 Internal Noise Level Criteria

Internal noise levels within the future development have been based on the relevant noise levels as detailed within the Australian Standard AS2107:2016 *Acoustics - Recommended design sound levels and reverberation times for building interiors*.

The recommended levels for various areas of the project are detailed in the following table. The recommended noise levels for packing and delivery areas of industrial developments detailed within AS2107:2016 have been used as the basis of this assessment.

Table 4 - design Recommended design sound levels

Type of Occupancy/Activity	Design sound level maximum ($L_{Aeq,t}$)
Industrial packaging and delivery areas	60
Note: The relevant time period (t) for all areas detailed is 15 minutes.	

4 Environmental Noise Intrusion Assessment

This section of the report details the assessment of environmental noise intrusion into the proposed development and the recommended acoustic treatments to ensure the recommended internal noise levels detailed in the sections above are achieved.

Internal noise levels within the future areas of the development will result from the noise intrusion into the building through the external façade which includes glass, and other façade elements. Typically, the acoustic performance of building elements, including the relatively light-weight elements of the building façade (i.e., glass and/or plasterboard constructions), will be the determining factor in the resulting internal noise levels.

Calculations of internal noise levels have been undertaken based on the measured environmental noise levels at the site and the characteristics of the building, including window openings, buildings constructions and the like.

4.1 External Glass Elements

To ensure the recommended internal noise levels detailed above are achieved, with the façade building openings closed, recommended acoustic constructions for the building's external façade glass elements are detailed in the table below

Table 5 – External Glass Acoustic Requirements

Façade Orientation	Level	Room Type	Recommended Glass Construction	Minimum Façade Acoustic Performance[1]
All Façade Orientation	All Levels	All Areas	4mm Float/Toughened	Rw 28
Note 1: *The acoustic performance of the external façade includes the installed glazing and frame including (but not limited to) the façade systems seals and frame. All external glazing systems are required to be installed using acoustic bulb seals.*				

The recommended glass constructions detailed in the table above include those required to ensure the acoustic requirements of the project are achieved. Thicker glazing may be required to achieve other project requirements such as structural, thermal, safety or other requirements and is to be advised by others.

4.2 External Building Elements

The proposed external building elements including standard light-weight walls constructions which are acoustically acceptable without additional acoustic treatment such as metal sheeting or solid external wall cladding.

If penetrations through any external skin 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.

4.3 External Roof

The proposed standard light weight metal deck roof is acoustically acceptable to ensure internal noise levels are achieved without additional treatments.

If penetrations through any external skin 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 External Noise Emission Assessment

This section of the report details the relevant noise level criteria for general operating noise emissions generated as part of the operation of the site.

It is noted that the assessment of noise emissions from the use of the site include the possible uses of the future warehouse developments, the assessment of vehicles using the access roadways are not assessed as activity noise but rather as public roadways as these roads are defined as and operated as public roads.

The relevant authority which provides the required noise level criteria for noise levels generated from onsite operations is the NSW Environmental Protection Authority's (EPA) Noise Policy for Industry (NPI) 2017 in conjunction with other material from the Word Health Organisation and NSW Road Noise Policy for the assessment of sleeping disturbance/wakening.

5.1 Mamre Road Precinct DCP

Section 4.3.1 of the Mamre Road Precinct (MRP) DCP outlines the following requirements for noise related objectives and controls.

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 from 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.

NSW Department of Planning, Industry and Environment | 65

Mamre Road Precinct –Development Control Plan (November 2021)

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.

Based on the requirements of the DCP listed above, the *NVIA* includes the assessment of the onsite operations in accordance with the requirements of the

EPA NPI and *RNP.* Based on compliance with the NPI and RNP, compliance with the requirements of the MRP DCP would also achieved. Details of the requirements of the relevant standards are included in the following sections of the report.

5.2 NSW Environmental Protection Authority, Noise Policy for Industry (NPI) 2017

The NSW Environmental Protection Authority (EPA) Noise Policy for Industry (NPI) 2017, previously Industrial Noise Policy (INP) 2000, details noise criteria for the control of noise generated from the operation of developments and the potential for impact on surrounding receivers.

The NPI includes both intrusive and amenity criteria which are summarised below.

1. Intrusive noise level criteria, The NPI states the following:

   'The intrusiveness of an industrial noise source may generally be considered acceptable if the level of noise from the source (represented by the LAeq descriptor), measured over a 15minute period, does not exceed the background noise level by more than 5 dB when beyond a minimum threshold. This intrusiveness noise level seeks to limit the degree of change a new noise source introduces to an existing environment.'

2. Amenity noise level criteria, The NPI states the following:

   'To limit continuing increases in noise levels from application of the intrusiveness level alone, the ambient noise level within an area from all industrial noise sources combined should remain below the recommended amenity noise levels specified in Table 2.2 where feasible and reasonable. The recommended amenity noise levels will protect against noise impacts such as speech interference, community annoyance and some sleep disturbance.'

   Project amenity noise level for industrial developments = recommended amenity noise level (Table 2.2) minus 5 dB(A)

   Where the resultant project amenity noise level is 10 dB or more lower than the existing industrial noise level. In this case the project amenity noise levels can be set at 10 dB below existing industrial noise levels if it can be demonstrated that existing industrial noise levels are unlikely to reduce over time.

The LAeq is determined over a 15-minute period for the project intrusiveness noise level and over an assessment period (day, evening and night) for the project amenity noise level. This leads to the situation where, because of the different averaging periods, the same numerical value does not necessarily represent the same amount of noise heard by a person for different time periods. To standardise the time periods for the intrusiveness and amenity noise levels, this policy assumes that the LAeq,15min will be taken to be equal to the LAeq, period + 3 decibels (dB), unless robust evidence is provided for an alternative approach for the particular project being considered.

Project amenity noise level (ANL) is urban ANL (Table 2.1) minus 5 dB(A) plus 3 dB(A) to convert from a period level to a 15-minute level (dB = decibel; dB[A] = decibel [A-weighted]; RBL = rating background noise level).

Noise objectives which are adopted in the assessment below are based on the measured ambient noise levels as outlined in section 2 above as well as any permitted increases (i.e., RBL + 5dBA) where permitted.

5.2.1 Amenity Noise Levels in Areas Near an Existing or Proposed Cluster of Industry

As the project is located within an area which is zoned as industrial however operating under a previous land zoning an additional assessment for the amenity noise level has been undertaken. The assessment has also included the required methodology to be applied for new industrial sites within a newly formed precinct which accounts for cumulative noise impacts to the surrounding receivers.

Section 2.4.2 of the EPA *Noise Policy for Industry* includes the following regarding the assessment of individual project amenity noise levels for cumulative noise levels:

2.4.2 Amenity noise levels in areas near an existing or proposed cluster of industry

The recommended amenity noise level from Table 2.2 represents the **total** industrial noise level from all sources (new and proposed) that is sought to be achieved using feasible and reasonable controls.

The approach of deriving the project amenity noise level resulting from a new development on the basis of the recommended amenity noise level minus 5 dB is based on a receiver not being impacted by more than three to four individual industrial noise sources.

Where an existing cluster of industry, for example, an industrial estate or port area, is undergoing redevelopment and/or expansion and the development constitutes a single premises addition or expansion, with no other redevelopment planned in the foreseeable future, the project amenity noise level approach procedure in Section 2.4 can be applied.

However, where a greenfield or redevelopment of an existing cluster of industry consisting of **multiple new** noise-generating premises is proposed, the approach for determining the project amenity noise level in Section 2.4 is not applicable and the approach below should be applied.

Equation 1: New multiple premises or redevelopment of existing clusters of industry

Individual project amenity noise level = $10\text{Log}\,(10^{(\text{ANL} - 5\,\text{dB}/10)}/\text{N})$

where:

ANL = relevant recommended amenity noise level from Table 2.2

N = number of proposed additional premises.

> Where a greenfield development is proposed and it can be demonstrated that existing levels of industrial noise are more than 5 dB lower than the relevant recommended amenity noise level, equation 1 can be modified to reflect 'amenity noise level' in lieu of 'amenity noise level – 5 dB(A)'.

Based on the application of the NPI for cumulative noise levels from multiple developments (new and existing) the relevant recommended amenity noise level for the site can be modified to reflect 'amenity noise level' in lieu of 'amenity noise level – 5 dB(A)'. As such the relevant calculation for the amenity noise level is:

$$\textit{Individual project amenity noise level} = 10*Log(10^{(ANL/10)}/N$$

Based on the equation above each individual receiver can reasonably be expected to be affected by up to six (6) possible proposed additional premises (future industrial sites).

Based on the application of the equation for the site above the resulting amenity noise levels for the project include the following:

1. Day time = $10*Log(10^{(50/10)}/6 = 42.2\ L_{Aeq,}$ dB(A)
2. Evening = $10*Log(10^{(45/10)}/6 = 37.2\ L_{Aeq,}$ dB(A)
3. Night time = $10*Log(10^{(40/10)}/6 = 32.2\ L_{Aeq,}$ dB(A)

The application for the assessment of cumulative noise levels from multiple industrial sites addresses and considers the requirements as outlined in the *Cumulative Impact Assessment Guidelines for State Significant Projects (July 2021)* which refers the required assessment for cumulative noise levels to the EPA *NPI* 2017.

5.2.2 Project Trigger Noise Levels

Consequently, the resulting project specific noise level criteria are summarised in the table below. The criteria are nominated for the purpose of determining the operational noise limits for the operation of the site at nearby noise sensitive receivers. For each assessment period, the lower (i.e., the more stringent) of the amenity or intrusive criteria are adopted. The calculated *Project Amenity Noise Level* includes either the Recommended Amenity Noise Level (based on the Amenity Noise Levels in Areas Near an Existing or Proposed Cluster of Industry detailed in section 5.1.1 above) plus 3 dB(A) (for a 15minum period) or the measured existing Leq noise level – 10 dB if this is greater as determined by the NPI.

Details of the resulting project trigger noise levels are included in the table below.

Table 6 – External Noise Level Criteria in Accordance with the NSW NPI – Project Trigger Noise Levels

Location	Time of Day	Project Amenity Noise Level, $L_{Aeq, period}$ [1] (dBA)	RBL $L_{A90, 15\ min}$ dBA[2]	Measured $L_{Aeq, period}$ Noise Level (dBA)	Amenity Noise Level, $L_{Aeq, period}$ [1] (dBA)	Intrusive $L_{Aeq, 15\ min}$ Criterion for New Sources (dBA)
Rural residences Northern Locations	Day	42.2	35	42	45.2	**40**
	Evening	37.2	30	40	40.2	**35**
	Night	32.2	30	33	35.2	**35**
Rural residences Western Locations	Day	42.2	35	50	45.2	**40**
	Evening	37.2	30	35	40.2	**35**
	Night[4]	32.2	30	35	35.2	**35**
Rural residences Southern Locations	Day	42.2	35	50	45.2	**40**
	Evening	37.2	30	35	40.2	**35**
	Night	32.2	30	35	35.2	**35**
Industrial receivers	When in use	68	-	-		**-**

Note 1: Project Amenity Noise Levels corresponding methodology detailed in this section of the report.
Note 2: L_{A90} Background Noise or Rating Background Level based on the assumed minimum rating of the EPA NPI.
*Note 3: Project Noise Trigger Levels are shown in **bold***

5.3 Sleep Disturbance

This section of the report details the relevant sleep disturbance noise level criteria for the assessment of noise emissions from the site during night-time hours. The assessment of sleep disturbance includes intermittent noise levels from operations such as deliveries and vehicle movements on the site during night-time periods.

The most recent NSW guidance in relation to sleep disturbance is contained in the NSW EPA's online *Application notes – NSW industrial noise policy*. For the purposes of this assessment a night-time sleep disturbance 'screening criterion' noise goal of RBL +15 dB(A) is applied.

The term 'screening criterion' indicates a noise level that is intended as a guide to identify the likelihood of sleep disturbance. While it is not a firm criterion to be met, where the criterion is met, sleep disturbance is not likely. When the screening criterion is not met, a more detailed analysis is required.

With regard to reaction to potential sleep awakening events, the RNP gives the following guidance:

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

- *maximum internal noise levels below 50–55 dBA 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

The EPA's *Industrial Noise Policy for Industry* (NPI) and the *NSW Road Noise Policy (RNP)* includes suitable criteria for the assessment of potential sleep awakening events, which have been used as the basis of this report.

The NPI includes the following commentary regarding possible sleep awakening events:

> ***2.5 Maximum noise level event assessment***
>
> *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:*
>
> - $L_{Aeq,15min}$ *40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, and/or*
> - L_{AFmax} *52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater,*
>
> *A detailed maximum noise level event assessment should be undertaken. The detailed assessment should cover the maximum noise level, the extent to which the maximum noise level exceeds the rating background noise level, and the number of times this happens during the night-time period. Some guidance on possible impact is contained in the review of research results in the NSW Road Noise Policy.*

The RNP includes the following comments regarding sleep disturbance:

> *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.*

5.3.1 World Health Organisation

In addition to the NSW policies discussed above, there is additional guidance regarding sleep disturbance included by the *World Heath Organisation* (WHO) *Regional office for Europe*.

The WHO *Regional Office for Europe - Environmental Noise Guidelines for the European Region* includes recommendations for maximum noise levels for the following:

- Reduce exposure to noise, while conserving quiet areas.
- Promote interventions to exposure to noise and improve health.
- Coordinate approaches to control noise sources and other environmental health risks.
- Inform and involve communities potentially affected by a change in noise exposure.

The WHO includes research into suitable noise levels for the prevention of adverse impacts from various noise sources including road noise, railway noise, aircraft noise, wind turbines and leisure noise. Based on the proposed development the most relevant noise included in the WHO guideline is traffic noise, which has been summarised in this section of the report.

A summary of the conclusions of the WHO's findings regarding sleep disturbance from traffic noise includes the following:

Next, the GDG assessed the evidence for night noise exposure and its effect on sleep disturbance (Table 7).

Table 7. Night-time exposure levels (L_{night}) for priority health outcomes from road traffic noise

Summary of priority health outcome evidence	Benchmark level	Evidence quality
Sleep disturbance 3% of the participants in studies were highly sleep-disturbed at a noise level of **45.4 dB** L_{night}	3% absolute risk	Moderate quality

Based on the evidence of the adverse effects of road traffic noise on sleep disturbance, the GDG defined a guideline exposure level of 45.4 dB L_{night}. The exact exposure value was rounded to 45 dB L_{night}. As the evidence was rated moderate quality, the GDG made the recommendation strong.

The GDG also considered the evidence for the effectiveness of interventions. The results showed that:

- addressing the source by improving the choice of appropriate tyres, road surface, truck restrictions or by lowering traffic flow can reduce noise exposure;
- path interventions such as insulation and barrier construction reduce noise exposure, annoyance and sleep disturbance;
- changes in infrastructure such as construction of road tunnels lower noise exposure, annoyance and sleep disturbance;
- other physical interventions such as the availability of a quiet side of the residence reduce noise exposure, annoyance and sleep disturbance.

Given that it is possible to reduce noise exposure and that best practices already exist for the management of noise from road traffic, the GDG made a strong recommendation.

There was evidence rated moderate quality for an association between road traffic noise and sleep outcomes measured with polysomnography (probability of additional awakenings) with an OR of 1.36 (95% CI: 1.19–1.55) per 10 dB increase in indoor $L_{AS,max}$ [13] (Basner et al., 2006; Elmenhorst et al., 2012). Further, evidence rated low quality showed an association between road traffic noise and sleep outcomes measured as motility in adults (Frei et al., 2014; Griefahn et al., 2000; Oehrstroem et al., 2006a; Passchier-Vermeer et al., 2007; Pirrera et al., 2014). Finally, there was evidence rated very low quality for an association between road traffic noise and both self-reported and motility-measured sleep disturbance in children (Ising & Ising, 2002; Lercher et al., 2013; Oehrstroem et al., 2006a; Tiesler et al., 2013).

The discussion of the WHO includes recommendations for the effect of average noise levels over a night time period, as determined by the L_{night} level which is defined as:

L_{night}	Equivalent continuous sound pressure level when the reference time interval is the night[1]

The WHO presents recommendations for road traffic noise which include the following:

3.1 Road traffic noise

Recommendations

For average noise exposure, the GDG **strongly** recommends reducing noise levels produced by road traffic below **53 dB** L_{den}, as road traffic noise above this level is associated with adverse health effects.

For night noise exposure, the GDG **strongly** recommends reducing noise levels produced by road traffic during night time below **45 dB** L_{night}, as road traffic noise above this level is associated with adverse effects on sleep.

To reduce health effects, the GDG **strongly** recommends that policy-makers implement suitable measures to reduce noise exposure from road traffic in the population exposed to levels above the guideline values for average and night noise exposure. For specific interventions, the GDG recommends reducing noise both at the source and on the route between the source and the affected population by changes in infrastructure.

Based on the recommendations of the WHO, the guideline presents findings into the potential for adverse outcomes from continuous sound pressure levels over a time period of day, evening and night (L_{den}).

5.3.2 Sleep Disturbance Noise Assessment Levels

Based on consideration of the WHO guideline, it would be considered that an assessment of maximum noise level impacts as included in the NSW *Noise Policy for Industry* and the *Road Noise Policy* is a suitable assessment of intermittent noise impacts to protect the health and wellbeing of residential receivers from intermittent noise levels generated on the site.

Based on the relevant standards detailed above, a summary of the sleep disturbance noise level criteria is detailed in the following table.

Table 7 – Sleep Disturbance Criteria

Type of Receiver	Location	Policy	Description	Background Noise level at 6am	Resulting Maximum Noise Level
Residential Receiver	External Noise levels	Noise Policy for Industry	The potential for sleep disturbance from maximum noise level events	42 dB(A) L $L_{90,15min}$	$L_{Aeq,15min}$ 47 dB(A) Externally
					L_{AFmax} 57 dB(A) Externally
	Within the residential dwelling	Road Noise Policy	1 or 2 events unlikely to awaken people from sleep		65-70 dB(A) Lmax Internally
			Maximum internal noise unlikely to awaken people from sleep		50-55 dB(A) Lmax Internally

Based on the details included within the NPI and the RNP, in the event a noise level of 57 dB(A) L_{max} or 47 $L_{Aeq\ 15\ min}$ does not occur externally at the residential receiver as a result of the use of the operation of the property (internally within the residential receiver) then noise levels are *unlikely to awaken people from sleep,* and compliance with the requirements of the NPI and the RNP regarding sleep disturbance would be achieved.

6 Noise Impact Assessment

An assessment of noise generated on the site has been undertaken in this section of the report. The assessment of noise levels generated on the site are summarised below:

1. **Mechanical Services Equipment** – At this stage of the project, the location of major plant items are generally not known. As such, a detailed assessment of noise associated from mechanical building services cannot be undertaken.

   However, to evaluate the noise levels at surrounding sensitive receivers, a proof-of-concept approach has been considered.

   In our experience, for this type of development the following mechanical systems may be installed, and their associated sound power levels are outlined below.
   - Ventilation fans – 80dB(A) (Lw)
   - Toilet exhaust fans – 45dBA (Lw)
   - Air Conditioning Condensers and cooling equipment – 80dBA (Lw)

   For the proposed ventilation systems, it is anticipated that the physical fans would be installed on a plant area of the roof of each warehouse and mechanical ductwork would move air in/out of the of the warehouses. It is envisaged a dedicated plant deck area will be provided on the roof of each warehouse.

   On the assumption of the Sound Power Level above and the ductwork that is installed is acoustically treated with 50mm internal lining or attenuators (depending on the exact location/selections), compliance would be achieved.

   Toilet exhaust fans for the warehouses will individually discharge from the amenity areas of the future warehouses using in ceiling or roof top mounted fans. It is recommended that 1m with acoustic flexible ducting is used on the intake and discharge side of the fan or a section of internally lined ductwork, on this assumption compliance would be achieved.

   Rooftop plant areas for individual warehouse amenities (office areas) would be provided using condensers located on the roof or ground level. It is expected that each warehouse will include a number of administration areas which will require condenser equipment. Providing this equipment is located on ground level with a line of sight barrier to neighbouring residential properties if located within 25m, or an acoustic screen is included to any condenser equipment located on the roof then the resulting noise emissions will comply with the relevant noise emission criteria.

Details of the required mechanical services equipment and acoustic treatments to ensure the relevant noise level criteria is achieved will be provided as part of the normal approvals process for each individual lot.

Experience with similar projects confirms that the acoustic treatment of mechanical services is both possible and practical to ensure noise emission criteria is achieved.

Expected noise levels from the operation of mechanical plant are detailed in the *Predicted Noise Emissions* section of this report below. All mechanical plant items mentioned above have been reflected in the 3D iNoise modelling.

2. **Use of the Warehouses, internally** – It is envisaged that the future use of the warehouses will include the potential movement of materials and storage. As such the typical type of noise sources associated with these activities are:
    - Noise associated with light industrial activities and material handling equipment (forklifts) for each warehouse.
    - Heavy and light vehicle movements within each warehouse.
    - Noise sources within the warehouses have been distributed across the floor plate to provide a resulting sound pressure level within the space. Refer to assumed noise levels of plant items below.

    Expected noise levels from the internal use of warehouses are detailed below in the *Predicted Noise Emissions* section of this report. All mechanical plant items mentioned above have been reflected in the 3D iNoise modelling.

3. **Use of the Warehouses, Externally -** External hardstand areas within each of the lots are assumed to occur simultaneously, as a worst-case scenario. The location of all assumed hardstand areas within the development are shown in the figure below.

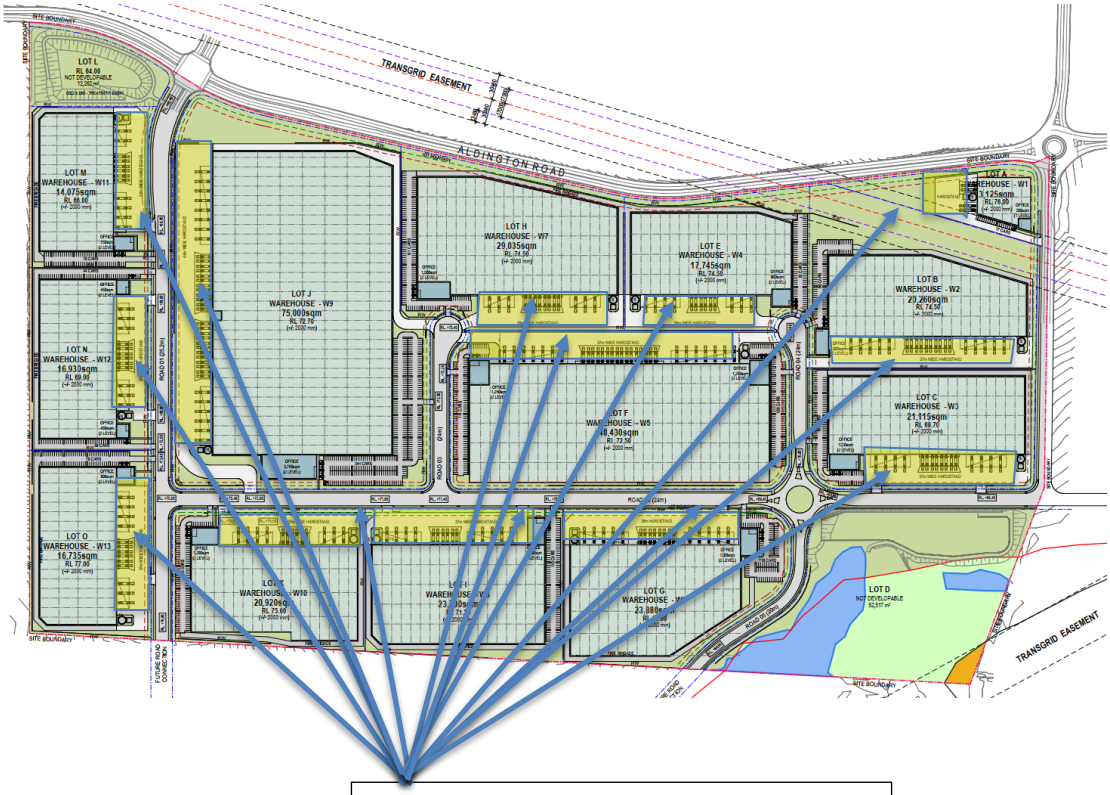


Figure 4 – Proposed Hardstand External Areas

Modelling, which is detailed below, assumes all movements on the lots are possible within a single assessment period of 15 minutes during each of the Day, Evening or Night-time periods.

Table 8 – Assumed use of Hardstand Areas in a 15 min Assessment Period, Smaller Warehouses

Lot Name	Period of the Day	Vehicle Type	Movement Description	Time Period in operation	Source Noise Level SWL (no time corrections)
Lots A, Lot B, Lot C, Lot E, Lot G, Lot H, Lot I, Lot K, Lot M, Lot N, Lot O	Day and evening	All truck assumed to include large, reticulated B-Doubles or equivalent	2 Truck moving in a strait path (arriving or leaving the docks) at a speed of less than 15 km/h	1-minute of movement within a 15-minute period	106 dB(A) L_{Aeq}
			1 Truck revering up to a warehouse	½ -minute period of reversing in a 15min period	110 dB(A) L_{Aeq}
			1 Truck idling on the site hardstand	For 10-minutes in a 15-minute period	103 dB(A) L_{Aeq}
		Forklifts	3 forklifts serving the trucks on the hardstands (no barrier from trucks assumed)	Operational for a full 15-minute period	90 dB(A) L_{Aeq}
	Evening and Night Times	All truck assumed to include large, reticulated B-Doubles or equivalent	1 Truck moving in a strait path (arriving or leaving the docks) at a speed of less than 15 km/h	1 minute of movement within a 15-minute period	106 dB(A) L_{Aeq}
			1 Truck revering up to a warehouse	½ -minute period of reversing in a 15-minute period	110 dB(A) L_{Aeq}
			1 Truck idling on the site hardstand	For 10-minutes in a 15-minute period	103 dB(A) L_{Aeq}
		Forklifts	1 forklift serving the trucks on the hardstands (no barrier from trucks assumed)	Operational for a full 15-minute period	90 dB(A) L_{Aeq}

Table 9 – Assumed use of Hardstand Areas in a 15 min Assessment Period, Large Warehouses

Lot Name	Period of the Day	Vehicle Type	Movement Description	Time Period in operation	Source Noise Level SWL (no time corrections)
Lot F and Lot J	Day and evening	All truck assumed to include large, reticulated B-Doubles or equivalent	4 Truck moving in a strait path (arriving or leaving the docks) at a speed of less than 15 km/h	1-minute of movement within a 15-minute period	106 dB(A) L_{Aeq}
			2 Truck revering up to a warehouse	½ -minute period of reversing in a 15-minute period	110 dB(A) L_{Aeq}
			1 Truck idling on the site hardstand	For 10-minutes in a 15-minute period	103 dB(A) L_{Aeq}
		Forklifts	5 forklifts serving the trucks on the hardstands (no barrier from trucks assumed)	Operational for a full 15-minute period	90 dB(A) L_{Aeq}
	Evening and Night Times	All truck assumed to include large, reticulated B-Doubles or equivalent	2 Truck moving in a strait path (arriving or leaving the docks) at a speed of less than 15 km/h	1-minute of movement within a 15-minute period	106 dB(A) L_{Aeq}
			1 Truck revering up to a warehouse	½ -minute period of reversing in a 15-minute period	110 dB(A) L_{Aeq}
			1 Truck idling on the site hardstand	For 10-minutes in a 15-minute period	103 dB(A) L_{Aeq}
		Forklifts	2 forklift serving the trucks on the hardstands (no barrier from trucks assumed)	Operational for a full 15-minute period	90 dB(A) L_{Aeq}

The modelling of the sources detailed above includes line noise sources for trucks moving on the hardstands, which includes the trucks moving in straight lines and reversing to the warehouses.

4. **Small Car and Van Movements on the Site -** An assessment of the resulting noise levels from traffic movements within the development has been undertaken including noise resulting from the use of the parking on the site from cars and small vans (trucks will not use the parking areas).

   The assessment has included the expected parking numbers for the future development, including parking numbers as detailed in the SSDA Estate Master Plan drawings, included in Appendix E, and summarised in the table below.

Table 10 – Proposed Parking Numbers (cars and small vans only)

Warehouse Number	Proposed Car parking Numbers
Lot A	15
Lot B	90
Lot C	99
Lot D	Not developed
Lot E	81
Lot F	221
Lot G	109
Lot H	133
Lot I	109
Lot J	341
Lot K	98
Lot L	Not Developed
Lot M	65
Lot N	79
Lot O	75
Total	1515

For the purpose of this assessment, the following assumptions regarding the use of the carparking has been included as part of this assessment:

1. During day time periods the maximum use of the carparking areas will include all carparking spaces being used in any 1 hour period.
2. During night time hours 20% of the carparking spaces will be used in any 1 hour period.
3. The assessment includes predicted noise levels resulting from the use of the carparking areas using an FHWA model; results are included below in the *Predicted Noise Emissions* section of this report.

6.1 Source Noise levels

Source noise levels used in this assessment have included, as a minimin, measured noise levels of cars, forklifts and trucks (including both large rigid vehicles and reticulated trucks such as B-doubles) we have previous measured on a similar type of development, known as Hunter Douglas distribution facility.

Whilst it is worth noting that the measured noise levels which are detailed below are slightly lower than the assumed noise levels adopted for this project which are presented in the tables above. Measured noise levels from the previous project (a Hunter Douglas distribution facility) from the basis of the design and allowances for the possibility of louder vehicles have been applied to this project as a conservative assumption due to the exact uses of each lot is not currently known.

The attended noise measurements for the measurements at Hunter Douglas were conducted using two handheld instruments:

- Brüel & Kjær Type 2250 sound level meter (serial number 3006332)
- Svan 971 sound level meter (serial number 39005)

Both instruments were checked prior to and following the measurements using a Brüel & Kjær Type 4231 sound calibrator (serial number 3009148). The calibrator emitted a calibration tone of 94 dB at 1 kHz. The drift in calibration did not exceed ±0.5 dB. All equipment carries appropriate and current NATA (or manufacturer) calibration certificates.

Details of the raw on-site measurements of the testing detailed in this section of the report are included in Appendix F.

Table 11 below summarises the noise measurement results, as well as observations made during the Hunter Douglas measurements.

Table 11 Summary of attended measurements

Measurement Location	Measured Noise Leve dB(A)				Observation
	L_{Amax}	L_{Aeq}	L_{A10}	L_{A90}	
At 2m from forklift pass-by	79	69	72	61	The measurement is done while a forklift is going down the eastern ramp
At 2m from forklift pass-by	82	77	82	69	The measurement is done while a forklift is going up the eastern ramp
At 6m from forklift	82	70	71	65	The recording shows the noise generated by the forklift while unloading goods from the truck
At 15m from forklift	82	69	71	58	Forklift transiting within loading dock
At 5m from truck	82	69	74	50	Strapping of goods onto truck
At 5m from truck	87	76	82	52	Strapping of goods onto truck
At 13.5m from semi-trailer	82	72	72	71	Idle semi-trailer
At 13.5m from semi-trailer	82	74	77	71	Bleeding brake (semi-trailer)
At 6m from truck	69	67	68	67	The recording is done while the truck is idling
At 10m from truck	90	83	89	69	Truck breaking.

It is also noted that in determining the approximate sound power levels of the Hunter Douglas measurements detailed above the following propagation type was assumed:

- For fixed stationary source measurements (i.e., idle measurements, brake bleeding or securing goods) a point/plane source propagation method was adopted in accordance with the relevant ISO standards.
- For measurements which included a vehicle manoeuvring either a line source or plane source propagation method was adopted in accordance with the relevant ISO standards.

Once the future development is completed (all stages) large amounts of screening will be provided for the majority of activities located within the centre of the site to the height of the future warehouse structures. The building structures will result in acoustic screening from the use of the hardstand areas of a number of the lots (including Lots B, C, E, F G, H, I partially to J, K and partially to N and O) to the potentially worst-affected residential receivers within the vicinity of the site.

6.2 Predicted Noise Emissions, Noise Contour Modelling

Noise modelling of the proposed development has been undertaken to assess noise emissions resulting from the use of the proposed development which has been undertaken with the use of an iNoise model.

The model has been configured based on the operational conditions and capacities of the proposed development detailed in this report, including the sections above. The model has been used as an additional method for the assessment of noise impacts from the site in addition to the tabulated calculations conducted in Section 6.2 above.

Operational noise impacts from the use of the external area includes predicted noise levels using the ISO 9613 algorithm within the iNoise modelling software. The iNoise package was specifically used as the 3D computational model of the site and surrounding area allows for building heights, reflections, source locations and multiple receiver locations to be modelled. In addition, buildings and noise sources can be modelled, while the iNoise model also considers ground/air absorption, temperature inversions and receiver characteristics where relevant.

The noise model enables the operational noise impacts of the proposed development to be calculated at the nearest receivers.

The modelling has been undertaken to include the following:

1. Modelling has included an assumption that the proposed development will be operating at maximum capacity simultaneously (i.e. all lots operating as per above), including all other the operational conditions detailed in this report.

   The modelling has included corrections for the potential meteorological conditions, including potential worst case propagation conditions which includes temperature inversions and wind speeds) in line with the Facts Sheet D of the NPI.

   The iNoise modelling has included the requirements of *Fact Sheet D: Accounting for noise-enhancing weather conditions* requirements which includes 2 possible options, as detailed below.

> Two options are available to a proponent to consider meteorological effects:
>
> 1. Adopt the **noise-enhancing meteorological conditions** for all assessment periods for noise impact assessment purposes without an assessment of how often these conditions occur – a conservative approach that considers source-to-receiver wind vectors for all receivers and F class temperature inversions with wind speeds up to 2 m/s at night.
>
> **Or**
>
> 2. Determine the **significance** of noise-enhancing conditions. This involves assessing the significance of temperature inversions (F and G class stability categories) for the night-time period and the significance of light winds up to and including 3 m/s for all assessment periods during stability categories other than E, F or G. Significance is based on a threshold of occurrence of 30% determined in accordance with the provisions in this policy. Where **noise-enhancing meteorological conditions** occur for less than 30% of the time, **standard meteorological conditions** may be adopted for the assessment.

Option 1 has been used in the noise modelling of the development and has adopted the noise-enhancing meteorological conditions for all periods as required in option 1 above.

Noise modelling has included the requirements, including those included in Option 1 above including F class *Stability category* temperature inversions and wind speed of up to 2 m/s, which includes the relevant C0 parameters.

2. Source noise levels which are adopted in the assessment for engine noise are based on a line source. This ensures that the highest noise level across the vehicle path is assumed and therefore is a worst-case scenario as opposed to a vehicle moving at a reduced noise level due to idle or coasting (unless specifically designed as an idle location).

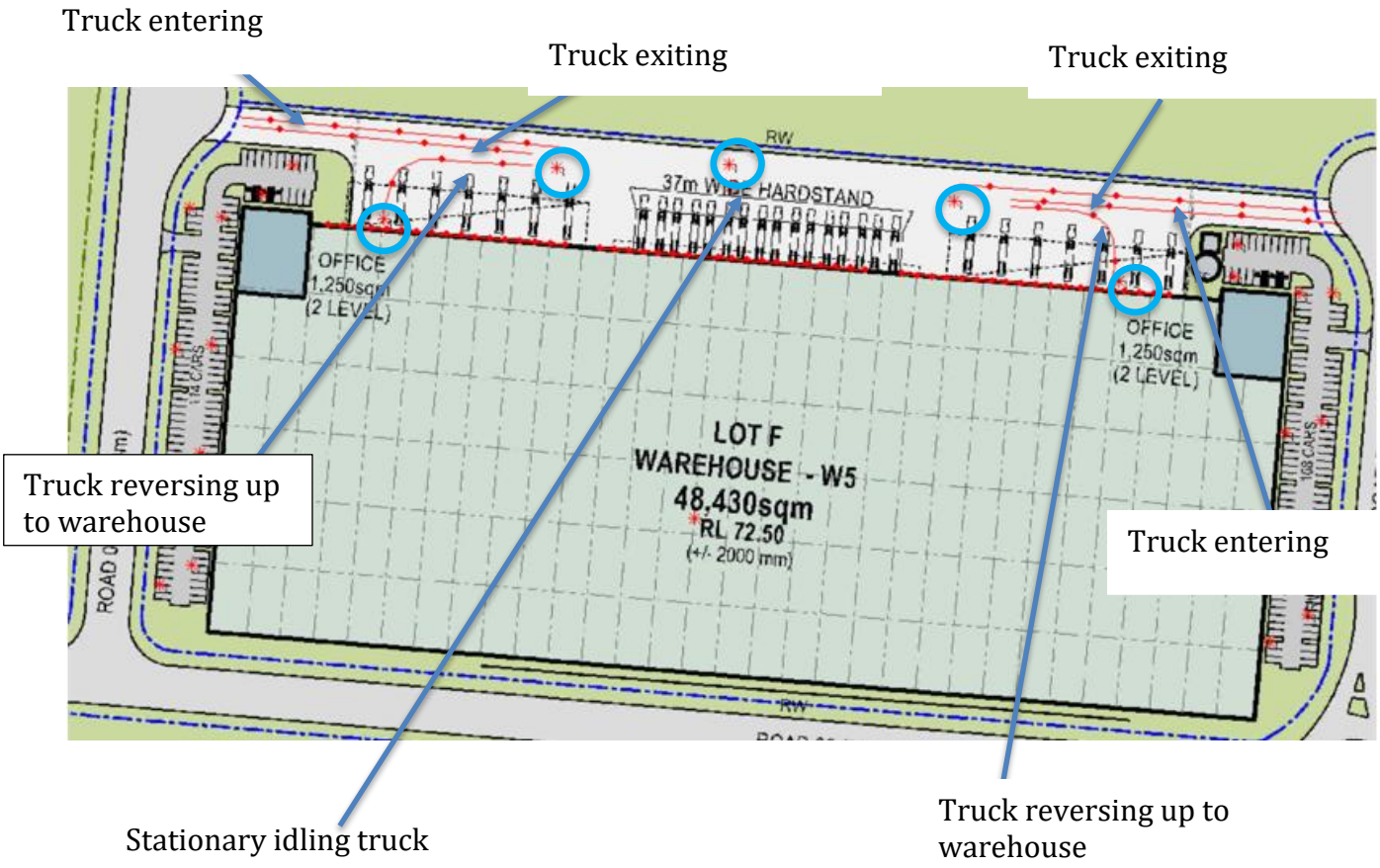
3. All other noise sources (such as plant location, brake bleeding, idling, door closing, vehicle starting etc) are modelled based on being either a point/plane source as relevant.

4. The modelling has assumed the following would be operational during any of the assessed 15-minute periods:
    a. Internal use as detailed above, within the warehouses.
    b. Movement of cars within the proposed development based on the parking numbers detailed in the sections above.
    c. Movement of trucks within the development and the use of the hardstand areas as detailed in the sections above.
    d. Operation of the potential building services plant and equipment servicing the development as detailed above.

5. The resulting noise emission levels from the operation of the site have been calculated to the surrounding receivers as detailed in the above sections. It has been assumed that the assessment height of the surrounding locations are either 1.5m above the ground level or an elevated height above ground as required by the NPI and Australian Standards.

6. Provided below are example figures of how each type of noise source has been applied in the model (i.e., location of roof plant, location of hard stand areas etc.) The figures below include details of the source noise levels for a typical smaller warehouse as well as a large warehouse.

7. Examples below include line sources (red lines in the figures below) for the vehicle movements on the site.



Forklifts servicing trucks (Note that no barrier effect of the trucks has been included in modelling)

Figure 5 – Noise Source Generation, Large Warehouse F – Daytime

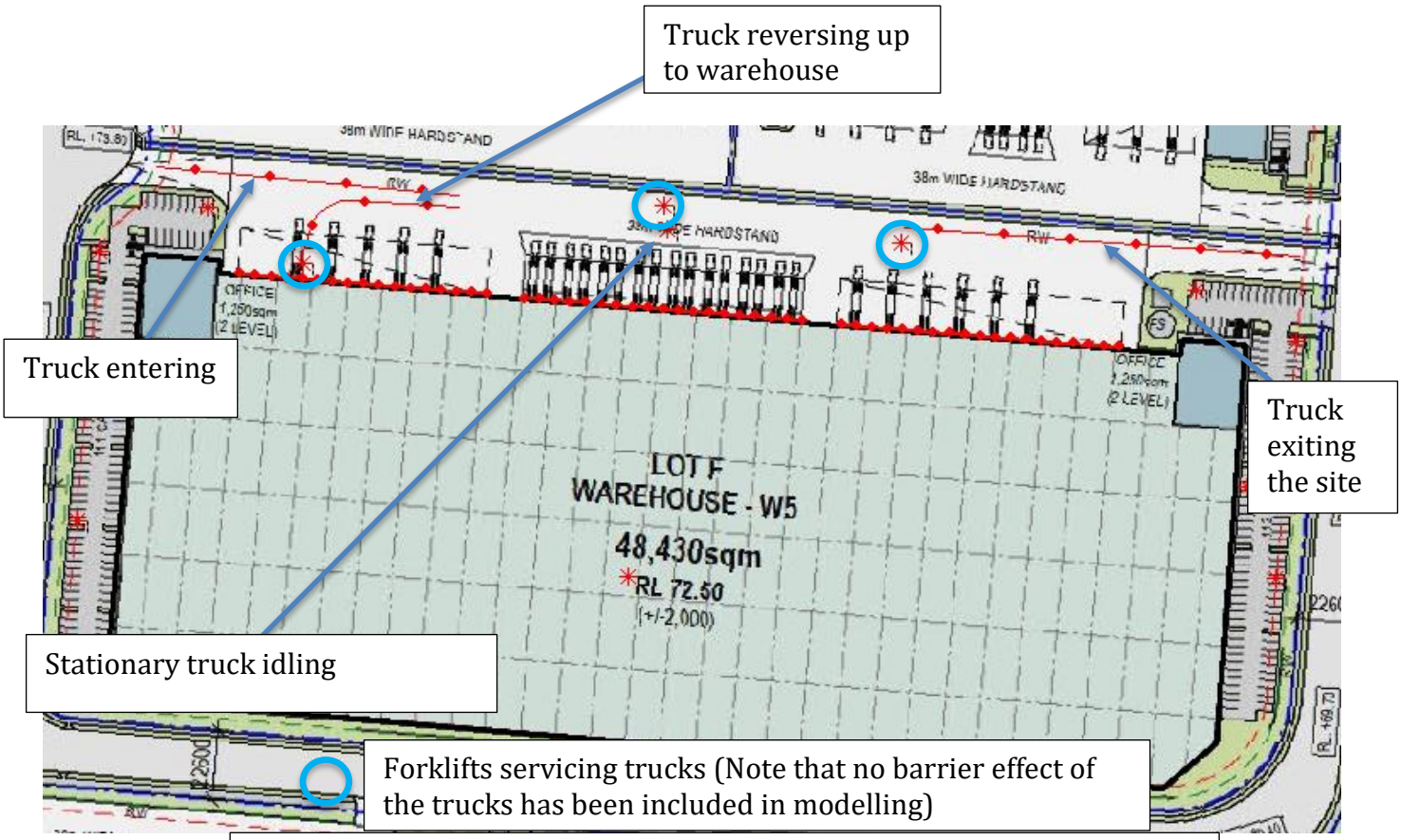


Figure 6 – Noise Source Generation, Large Warehouse F – Night

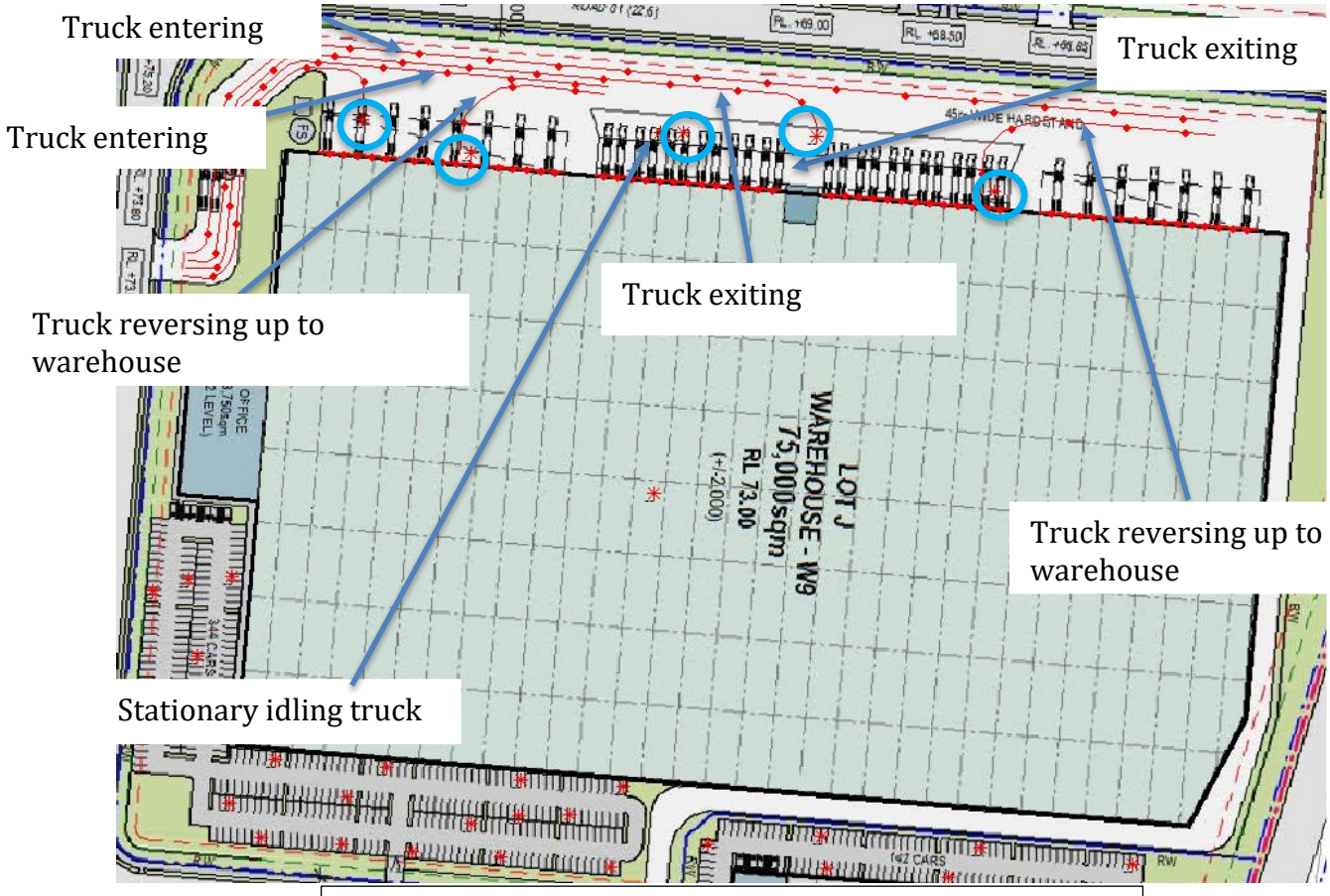


Figure 7 – Noise Source Generation, Large Warehouse J – Daytime

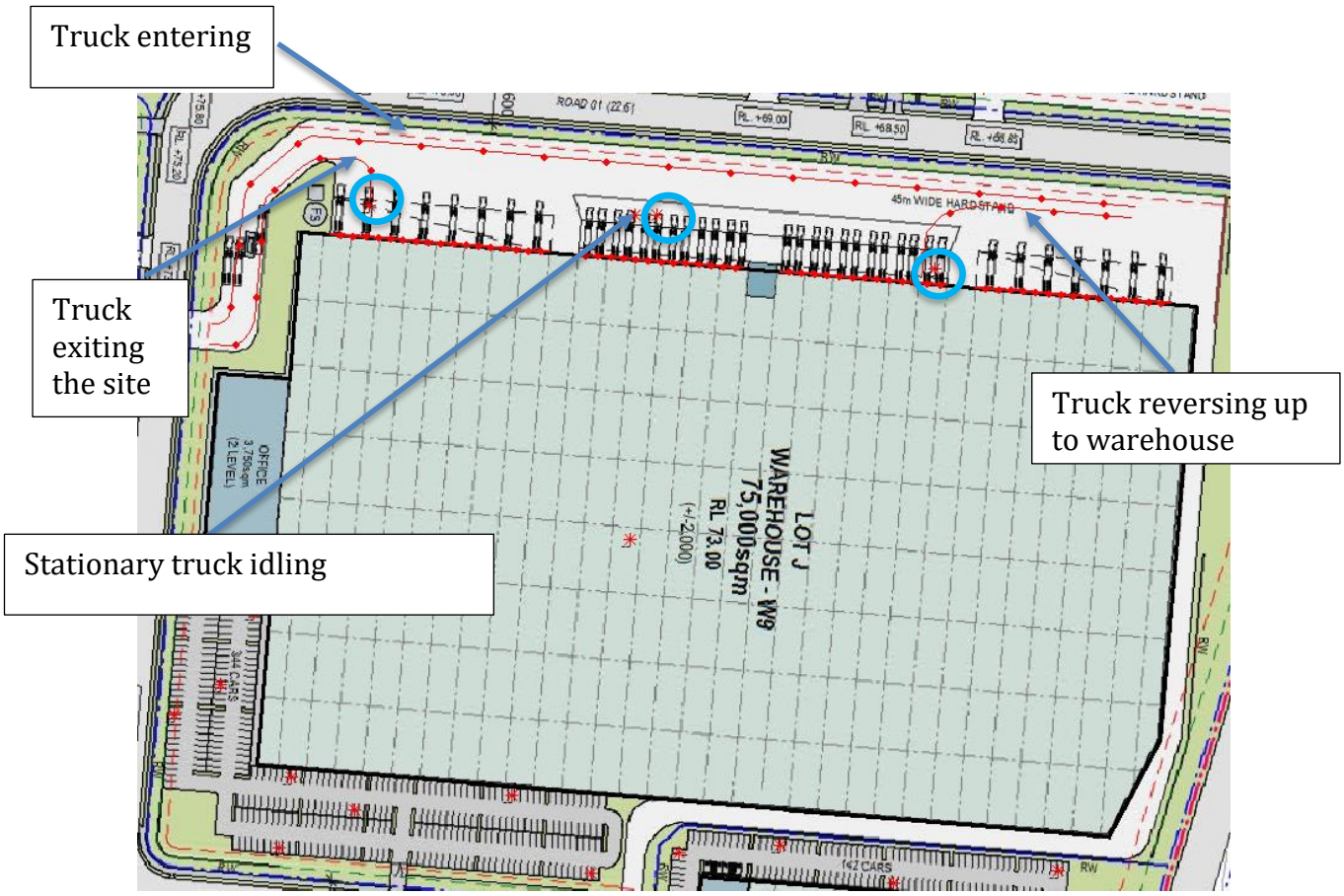


Figure 8 – Noise Source Generation, Large Warehouse J – Night

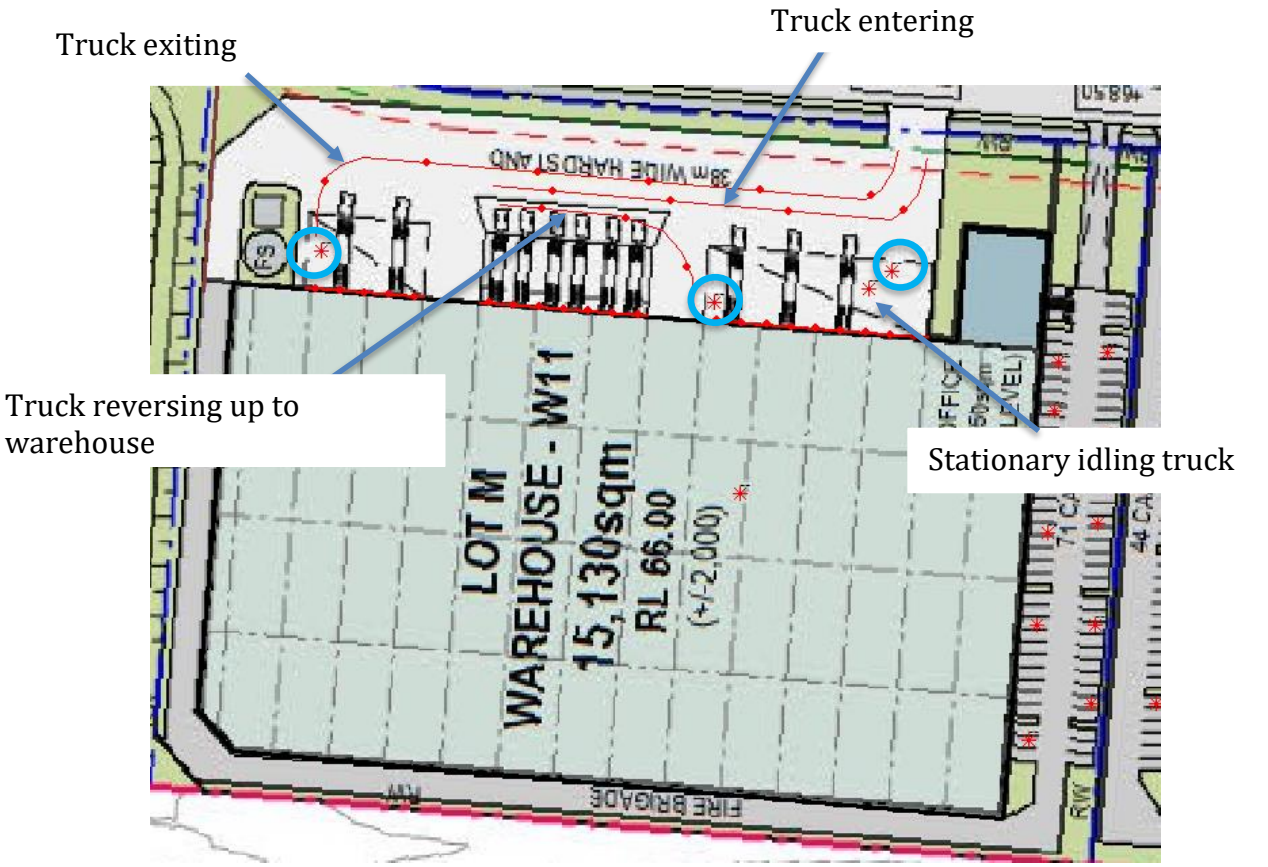


Figure 9 – Noise Source Generation, Smaller Warehouse M – Daytime (similar for Lots A, B, C, E, G, H, I, K, M, N and O)

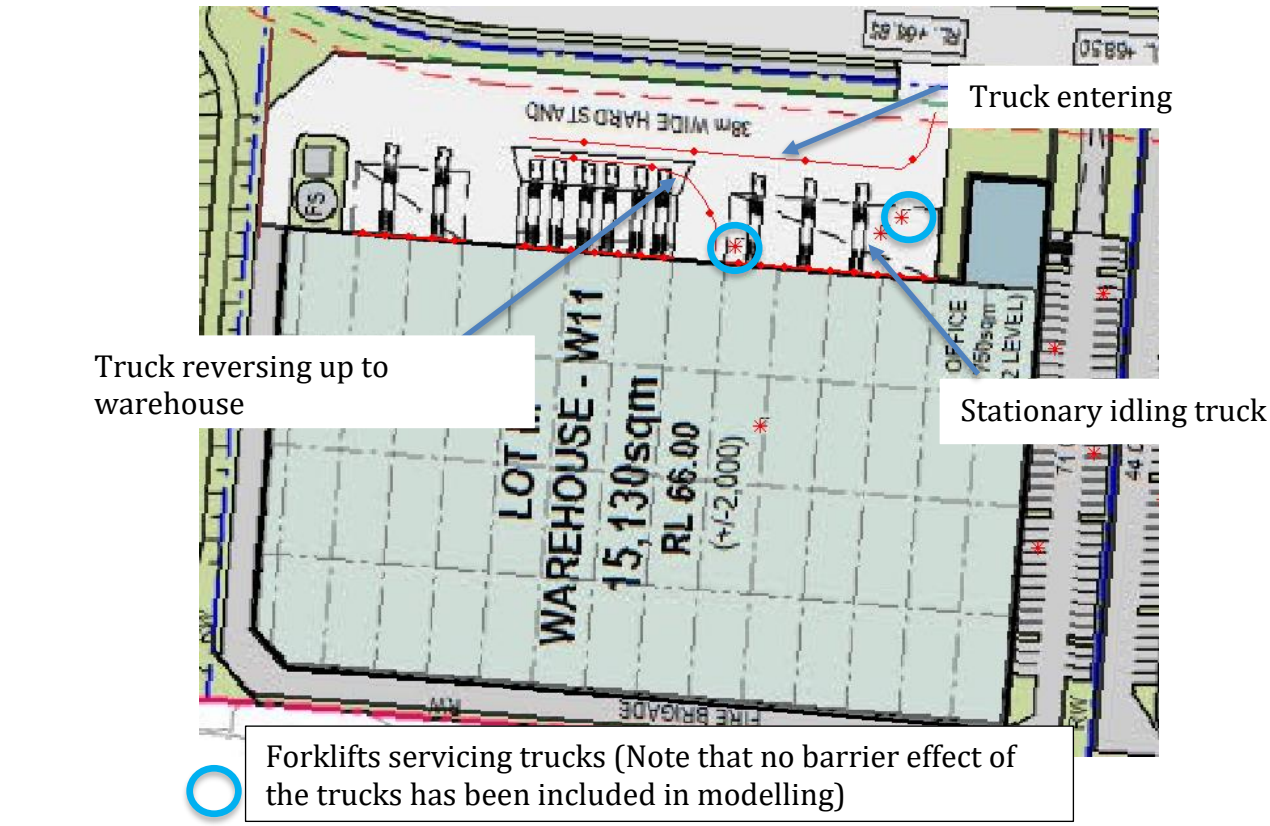


Figure 10 – Noise Source Generation, Smaller Warehouse M – Night-time (similar for Lots A, B, C, E, G, H, I, K, M, N and O)

The results of the of the iNoise modelling are included in Appendix D and summarised in the table below.

Note: Predicted noise levels shown in the table below are for development within the Mamre Road Precinct. Refer to section 7 for the assessment of noise to receivers outside the Mamre Road Precinct.

Table 12 – Summary of Noise Modelling

Receiver Location	Time of Day	Calculated External Noise level	Project Noise Emissions Criteria $L_{Aeq,\ 15\ min}$ (dBA)	Comments
1	Day	34	40	Results of the iNoise modelling indicate noise emissions which are compliant with the projects noise emission criteria providing recommended mitigations included in this report are included in the design and operation of the project
	Evening	32	35	
	Night	32	35	
2	Day	37	40	
	Evening	35	35	
	Night	35	35	
3 - No longer residential	When in use	34	68	
4 - No longer residential	When in use	37	68	
5	Day	34	40	
	Evening	32	35	
	Night	32	35	
6	Day	33	40	
	Evening	31	35	
	Night	31	35	
7 – Industrial to the east	When in use	47	68	
8 – Industrial to the east	When in use	35	68	
9 – Industrial to the east	When in use	37	68	

The assessment of noise emissions from the site have included an assessment of modifying factors including tonality and annoying characteristics. The noise modelling has been undertaken using single octave levels as required to determine the requirement for modifying factors. However, in accordance with the NPI, broadband levels are provided above.

From our assessment and review, we can confirm the characteristics of the predicted noise levels do not require any additional penalties to be applied.

Based on the results of this assessment, the cumulative noise emissions from the proposed development will comply with the relevant noise emissions criteria providing the recommended acoustic treatments detailed in this report, are implemented.

6.2.1 Maximum Noise Level Assessment

Based on the proposed use of the site, an assessment of the potential for maximum noise level events has been conducted. The assessment includes the potential for maximum noise level events on the site within the closest residential neighbours surrounding the site.

The assessment of maximum noise levels occurring on the proposed development included noise generated as part of warehouse 'Lot M' hardstand which represents the closest proximity to the residential receivers (including those to the west of the site).

The assessment of the screening criteria has been undertaken for external noise levels, which is provided below.

Table 13 – Maximum Noise level events Screening Criteria to Residential Receiver (externally)

	Source Noise Type		
Noise Source	Large truck vehicle movement (including acceleration)	Truck Horn	Truck Air Brake
Noise Source level	106 dB(A) L_{Max}	115 dB(A) L_{Max}	108 dB(A) L_{Max}
Distance Correction (120m)	-49.6 dB	-49.6 dB	-49.6 dB
Resulting External Noise Level	56 dB(A) L_{Max}	65 dB(A) L_{Max}	58 dB(A) L_{Max}
Screening Noise Level –	52 dB(A) L_{Max}	52 dB(A) L_{Max}	52 dB(A) L_{Max}

Based on the predicted noise levels above, there are possible noise events which may exceed the maximum noise level '*screening test*' and, as a result, a future assessment of the possible *sleep awakenings* has been undertaken.

The assessment of possible sleep awakenings included the potential for maximum internal noise within residential receivers within proximity to the proposed development including noise sources resulting from the use of the Lot M hardstand.

Table 14 – Sleep Awakenings Noise Calculation to Residential Receiver (internally)

	Source Noise Type		
Noise Source	Large truck vehicle movement (including acceleration)	Truck Horn	Truck Air Brake
Noise Source level	106 dB(A) L_{Max}	115 dB(A) L_{Max}	108 dB(A) L_{Max}
Distance Correction (120m)	-49.6 dB	-49.6 dB	-49.6 dB
Correction for open window of neighbours building	-6 dB	-6 dB	-6 dB
Resulting Noise Level within bedroom	50 dB(A) L_{Max}	59 dB(A) L_{Max}	52 dB(A) L_{Max}
unlikely to awaken people from sleep Noise Level	50 dB(A) L_{max} – repetitive events 65-70 L_{max} – 1-2 events	50 dB(A) L_{max} – repetitive events 65-70 L_{max} – 1-2 events	50 dB(A) L_{max} – repetitive events 65-70 L_{max} – 1-2 events

Based on the results of the assessment detailed above, the resulting maximum noise level from the operation of the site will comply with the relevant criteria for sleep disturbance based on the normal continuously occurring events on the site involving truck movements.

Noise from the intermittent use of truck horns and air brakes may intermittently be above the continuously occurring levels which are *unlikely to awaken people from sleep,* however, the resulting noise levels are below the maximum noise level for intermittent events during a night-time period (in the event they do not occur continuously during a night time period).

To mitigate the possible events as a result of truck horns or air brakes, the following should be undertaken:

1. Truck drivers and forklift operators to be notified for the requirement to operate with the intention of minimising noise levels. The use of horns and air brakes should not be used, if at all possible, except in emergency situations during night-time hours.

2. Signs should be installed at the entry to the site reminding truck drivers that horns and air brakes should not be used during night-time hours if at all possible.

The assessment includes the assumption that the is no line-of-sight barrier from building and the activity is being used at the closest location from the site, including the hardstand of 'Lot M'.

In the event there is an additional distance or a line-of-sight barrier (such as from the proposed warehouse buildings for other warehouse lots on the site) from noise sources, then the resulting maximum noise levels will be less than that detailed in the table above.

6.3 Recommended Acoustic Mitigations

The following recommended mitigations and management controls should be included in the design, construction and operation of the site (in addition to those included in the sections above) to ensure suitable on-going operation of the site:

1. All external hardstand, driveways and the like should be considered as part of development applications for the respective buildings to include a surface which does not include speed humps or the like.
2. Any grates or metal drainage points should be securely fixed to prevent movement as vehicles pass over.
3. The speed limit of trucks moving on the hardstands should include a limit of 15km/h. Signs should be included in the site at the entry points as well as hardstand areas indicating this requirement.
4. All external concrete hardstand surfaces being used by trucks and forklifts should not include pained or polished concrete surfaces (for the prevention of tyre squeal).
5. Any expansion joints should include flush finishes including cover plates where vehicles pass over as identified by the acoustic engineer during the detailed design of the building.
6. No use of any amplified speaker systems for the purpose of notifications/instructions to drivers in the external areas of the project are to be used.
7. A site contact should be provided to residents where complaints can be registered.
8. Based on the current site conditions which includes residential receivers surrounding the site, acoustic screens are recommended which include the following:
    a. Acoustic screening should include a solid barrier such as Hebel, Masonry, FC Sheet or the like.
    b. Screens should be a minimum height of 9m from ground level.
    c. The recommended locations of the screens are included in the figures below.

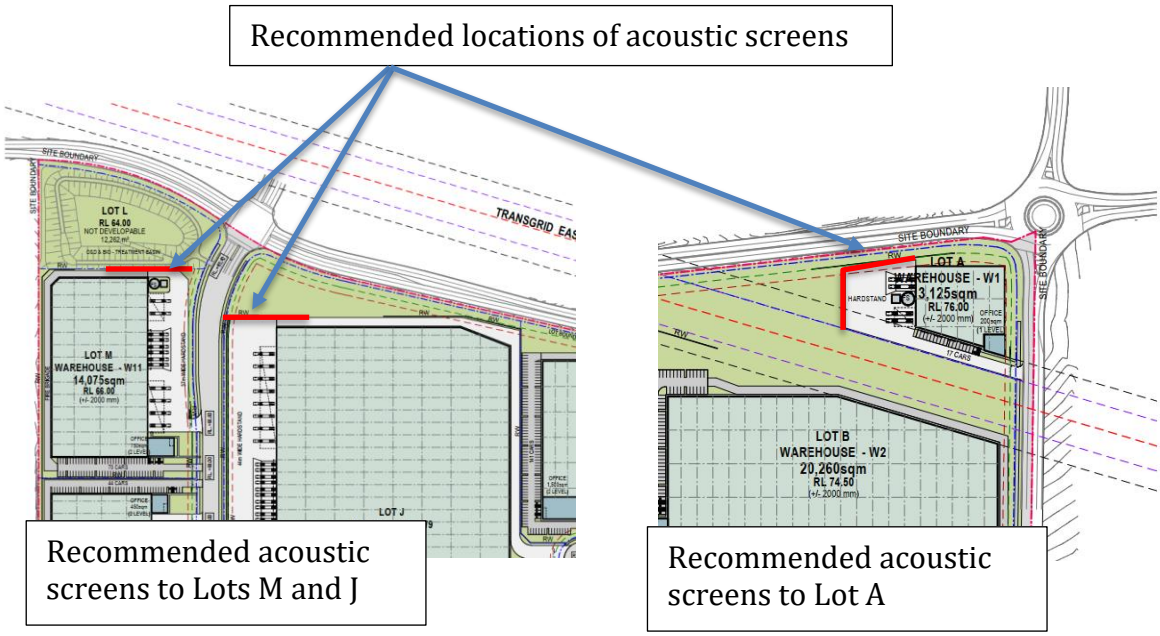


Figure 11 – Recommended Acoustic Screens

The site is located within an area which is designated as IN1 which permits light industrial activity. See figure 3 above.

However, notwithstanding above, this assessment has been conducted on the basis that the current use of the surrounding land in some cases is residential.

As each lot will require further detailed acoustic assessment as part of the typical planning pathways should a future surrounding location be approved for industrial activities relevant acoustic criteria could change. This may result in some of the recommended treatments outlined above (including the acoustic screens) not be required.

6.4 Noise Impact Assessment of Warehouse F

This section of the report details the assessment of noise modelling resulting from the operation of warehouse F only. As the submission is for not only the concept masterplan but also the operation of warehouse F, a detailed assessment of the use of warehouse F only is provided below.

The assessment of the noise associated with the operation of warehouse F, is based on the operational parameters outlined throughout Section 6 of this report, however, does not consider the construction of any other lot.

The assumed source noise levels of the warehouse includes the details provided in the table below, which facilitate the assessment over a 15-minute period.

Table 15 – Noise Sources for Warehouse F

Lot Name	Period of the Day	Vehicle Type	Movement Description	Time Period in operation	Source Noise Level SWL (no time corrections)
Lot F	Day and evening	All truck assumed to include large, reticulated B-Doubles or equivalent	4 Truck moving in a strait path (arriving or leaving the docks) at a speed of less than 15 km/h	1-minute of movement within a 15-minute period	106 dB(A) L_{Aeq}
			2 Truck revering up to a warehouse	½ -minute period of reversing in a 15-minute period	110 dB(A) L_{Aeq}
			1 Truck idling on the site hardstand	For 10-minutes in a 15-minute period	103 dB(A) L_{Aeq}
		Forklifts	5 forklifts serving the trucks on the hardstands (no barrier from trucks assumed)	Operational for a full 15-minute period	90 dB(A) L_{Aeq}
	Evening and Night Times	All truck assumed to include large, reticulated B-Doubles or equivalent	2 Truck moving in a strait path (arriving or leaving the docks) at a speed of less than 15 km/h	1-minute of movement within a 15-minute period	106 dB(A) L_{Aeq}
			1 Truck revering up to a warehouse	½ -minute period of reversing in a 15-minute period	110 dB(A) L_{Aeq}
			1 Truck idling on the site hardstand	For 10-minutes in a 15-minute period	103 dB(A) L_{Aeq}
		Forklifts	2 forklift serving the trucks on the hardstands (no barrier from trucks assumed)	Operational for a full 15-minute period	90 dB(A) L_{Aeq}

Information regarding the modelling of warehouse f is provided above in section 6.3. Refer to section 6.3 for all modelling information.

Table 16 – Summary of Noise Modelling, Warehouse F only

Receiver Location	Time of Day	Calculated External Noise level	Project Noise Trigger Level Criteria $L_{Aeq,\ 15\ min}$ (dBA)	Comments
1	Day	24	40	Results of the iNoise modelling indicate noise emissions which are compliant with the projects noise emission criteria providing recommended mitigations included in this report are included in the design and operation of the project
	Evening	22	35	
	Night	22	35	
2	Day	27	40	
	Evening	25	35	
	Night	25	35	
3- no longer residential	When in use	31	68	
4- no longer residential	When in use	36	68	
5	Day	28	40	
	Evening	25	35	
	Night	25	35	
6	Day	24	40	
	Evening	21	35	
	Night	21	35	
7 – Industrial to the east	When in use	43	68	
8 – Industrial to the east	When in use	33	68	
9 – Industrial to the east	When in use	33	68	

The assessment of noise emissions from the operation of warehouse f has included an assessment of modifying factors including tonality and annoying characteristics. The noise modelling has been undertaken using single octave levels as required to determine the requirement for modifying factors. However, in accordance with the NPI, broadband levels are provided above.

From our assessment and review, we can confirm the characteristics of the predicted noise levels do not require any additional penalties to be applied.

Based on the results of this assessment, the noise emissions from the operation of warehouse F comply with the relevant noise emissions criteria providing the recommended acoustic treatments detailed in this report, are implemented (see above).

6.5 Cumulative Noise Level from Surrounding Sites

The assessment of noise emissions from the operation of the proposed development includes the cumulative noise impacts from all sources within the site (Lots of A to M) to the exiting surrounding residential receivers within proximity of the site.

The assessment provided above includes a noise emission assessment using both the amenity and intrusive noise requirements as determine in accordance with the NPI.

As detailed in Section 5 of this report the resulting noise emission criteria is based on the more conservative intrusive noise levels (i.e. a BG + 5dBA assessment) as the existing background noise levels are below the determine amenity criteria for the site.

Based on the project trigger noise level being below the amenity criteria for the area, this will result in protection from background noise creep which may result from the approval of additional industrial developments within the area.

In addition to the above, in the event the surrounding land uses become future industrial/commercial development as opposed to residential the resultant project trigger noise levels will also increase. The revised project trigger noise levels will increase to 68 dB(A) (when in use) based on the EPA NPI. As this is a significant increase, the transition to an industrial type of receiver would therefore be acoustically acceptable.

In relation to the approvals of each individual site (i.e., other land outside the 200 Aldington Road Industrial Estate) a detailed assessment of each proposal will be required, this will include a similar type of assessment to that shown above in accordance with the EPA' NPI. A similar philosophy should be adopted which will result in a conservative criterion which is responsive to the protection of background noise level creep.

7 Noise Emissions to Areas Outside of the Mamre Road Precinct

This section of the report details the assessment of noise emissions from the use of the proposed development to surrounding receivers located outside of the Mamre Road Precinct.

The Mamre Road Precinct includes the land identified within the *State Environmental Planning Policy (Western Sydney Employment Area) 2009* and detailed in Figure 1 of the *NSW Government Western Sydney Employment Area – Mamre Road Precinct, Development Control Plan 2021,* which is shown below.

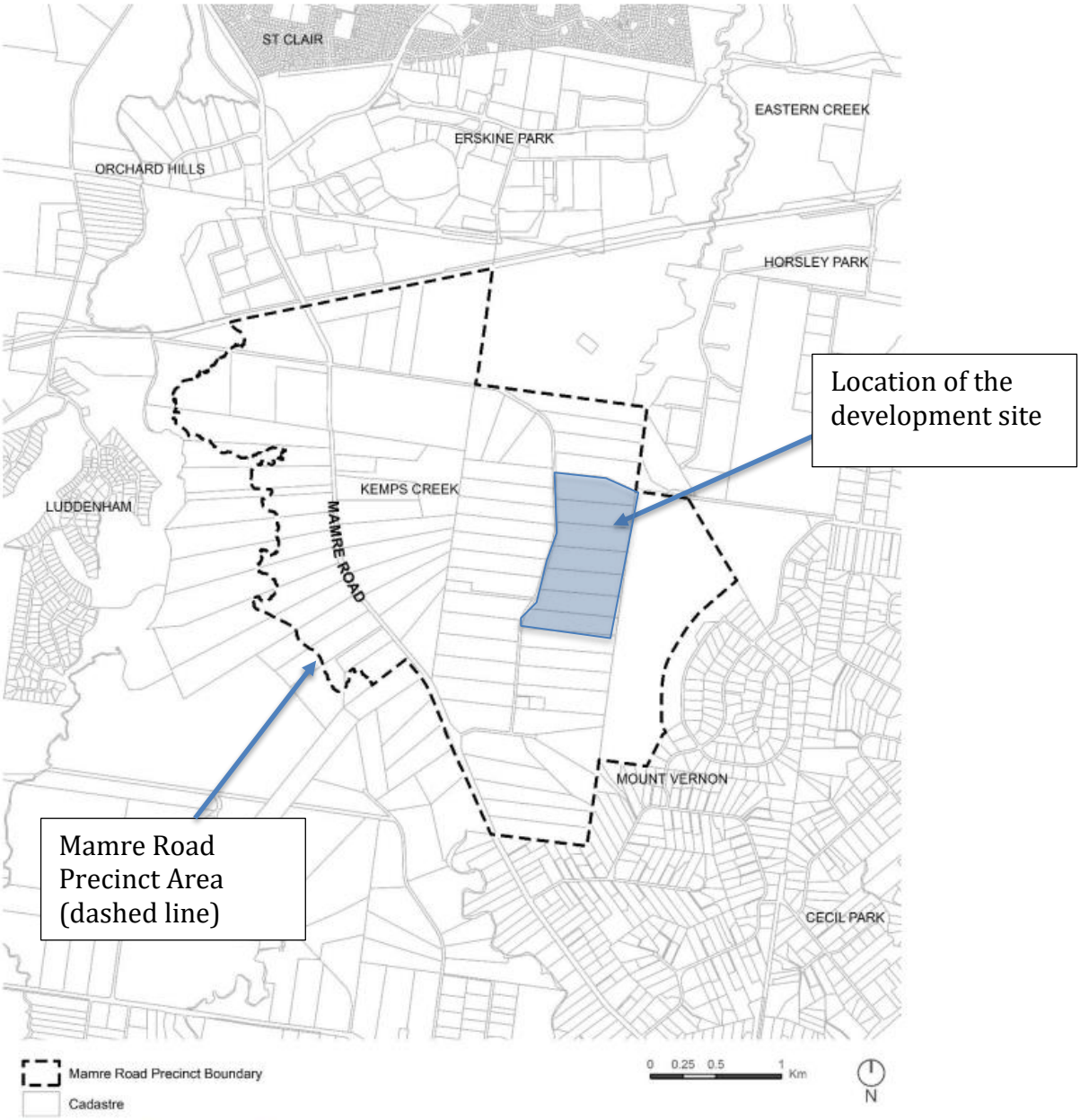


Figure 12 - Mamre Road Precinct area based on the *NSW Government Western Sydney Employment Area – Mamre Road Precinct, Development Control Plan 2021*

7.1 Surrounding Land Uses

An assessment of the proximity of residential receivers within Mount Vernon, Horsley Park, Kemps Creek and Luddenham to the site has been undertaken, including the locations detailed in the figure below.

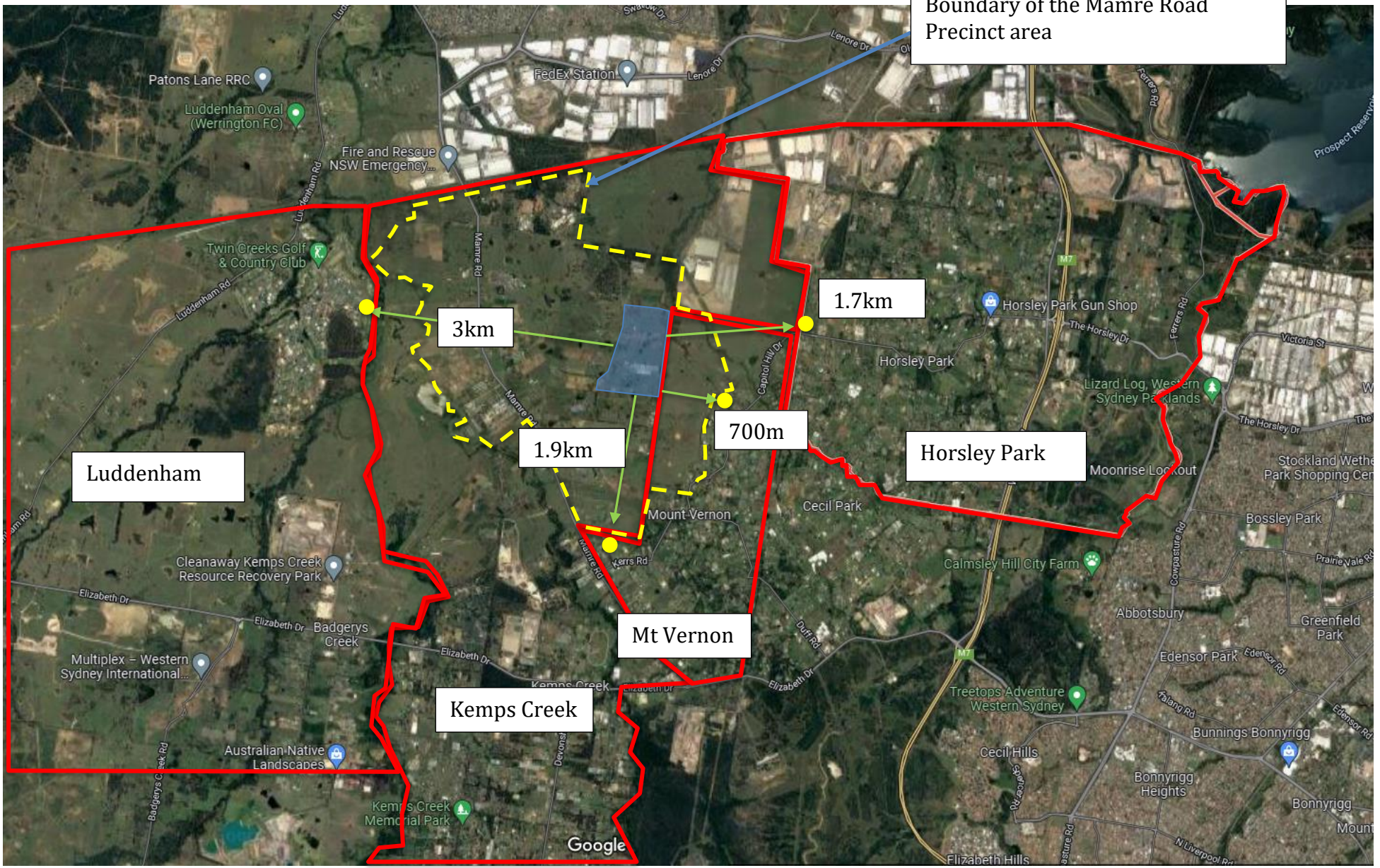


Figure 13 – Identification of residential receivers outside of the Mamre Road Precinct

As detailed in the figure above the distance separation of the proposed site to the residential receivers within proximity of the site which are outside of the Mamre Road Precinct are summaries below:

1. Residential receivers to the west of the site in Luddenham – 3km
2. Residential receivers to the north east in Horsley Park – 1.7km
3. Residential receivers to the east in Mt Vernon – 700m
4. Residential receivers to the south in Mt Vernon – 1.9km

Based on the advice received from the DPE the required noise emissions criteria for the assessment of night time noise emissions from the operation of sitewide Mamre Road Precinct (including the propsoed development) at the residential receivers identified above is 27 dB(A) $L_{Aeq\ (15\ min)}$, see comments provide from the DPE below.

- Clause 4.3.1(5) Noise and Vibration of MRP DCP states: '*Acoustic Reports for individual developments must assess cumulative noise impacts, including likely future noise emissions from 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*.' In response to Clause 4.3.1(5) of the MRP DCP, the Department requires that all developable industrial zoned land within the Mamre Road Precinct and any existing / approved industrial sites near the precinct must be considered when using section 2.4.2 of the *Noise Policy for Industry* to derive project amenity noise levels. The night-time project amenity noise level for rural-residential areas ~~outside the Precinct in~~ Mount Vernon, Horsley Park, Kemps Creek and Luddenham should be no more than 27 dBA.

7.2 Cumulative Noise Level Modelling

An assessment of cumulative noise emissions from the operation of the site during night-time period (based on the identified parameters above in section 6) has been undertaken. This includes internal areas of the warehouses, hardstand areas and building services. Resulting of the modelling are provided below and are also done in accordance with the modelling methodologies identified above.

Table 17 – Summary of Noise Modelling – Receivers Outside Mamre Road Precinct

Receiver Location	Time of Day	Calculated External Noise level	Project Noise Emissions Criteria $L_{Aeq,\ 15\ min}$ (dBA)	Comments
Residential Receiver to the west in Luddenham	Nigh time	<20	27	Results of the iNoise modelling indicate noise emissions which are compliant with the projects noise emission criteria providing recommended mitigations including the night-time noise level of 27 dB(A) to residential receivers outside of the Mamre Road Precinct
Residential Receiver to the north east in Horsley Park	Nigh time	16	27	
Residential Receiver to the east within Mt Vernon	Nigh time	25	27	
Residential Receiver to the South in Horsley Park	Nigh time	<20	27	

Detailed graphical results of the noise modelling are provided in the figure below.

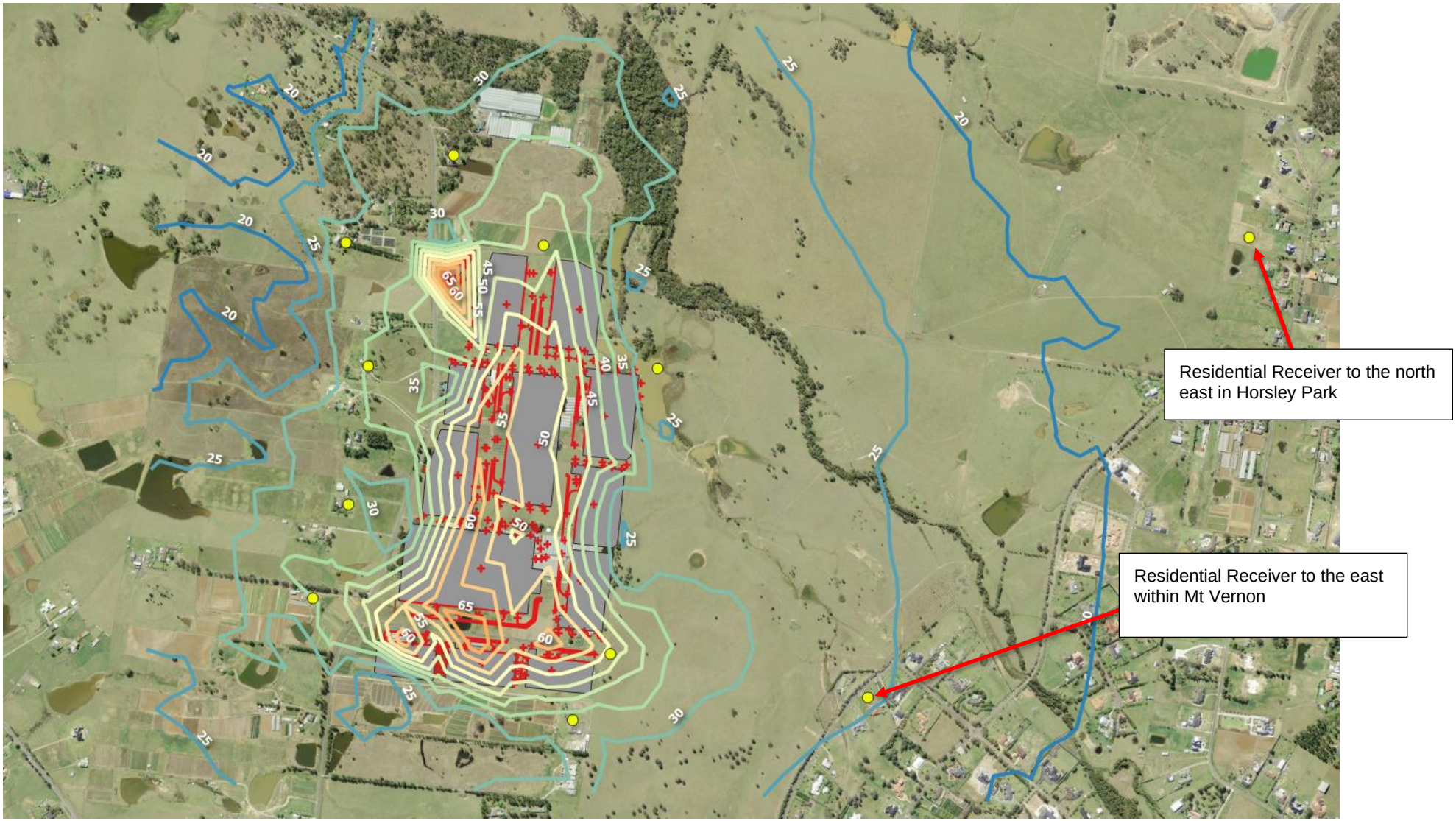


Figure 14 – Cumulative Noise Modeling for residential receivers outside of the Mamre Road Precinct

7.3 Warehouse F, Noise Level Modelling

Additionally, similar to the assessment done above, a specific assessment of warehouse f only has being provided to ensure compliance with the relevant precinct noise level of 27dBA.

As mentioned above, the modelling shown below is based on the parameters and modelling methodologies identified and discussed above.

Table 18 – Summary of Noise Modelling, Warehouse F – Receivers Outside Mamre Road Precinct

Receiver Location	Time of Day	Calculated External Noise level	Project Noise Emissions Criteria $L_{Aeq,\ 15\ min}$ (dBA)	Comments
Residential Receiver to the west in Luddenham	Nigh time	<10	27	Results of the iNoise modelling indicate noise emissions which are compliant with the projects noise emission criteria providing recommended mitigations including the night time noise level of 27 dB(A) to residential receivers outside of the Mamre Road Precinct for Warehouse F only
Residential Receiver to the north east in Horsley Park	Nigh time	<10	27	
Residential Receiver to the east within Mt Vernon	Nigh time	10	27	
Residential Receiver to the South in Horsley Park	Nigh time	<10	27	

Det Detailed graphical results of the noise modelling are provided in the figure below.

Based on the results of the noise modelling of warehouse F only, the resulting noise emissions to receivers outside of the Mamre Road Precinct area will comply with the relevant precinct noise level of 27dBA.

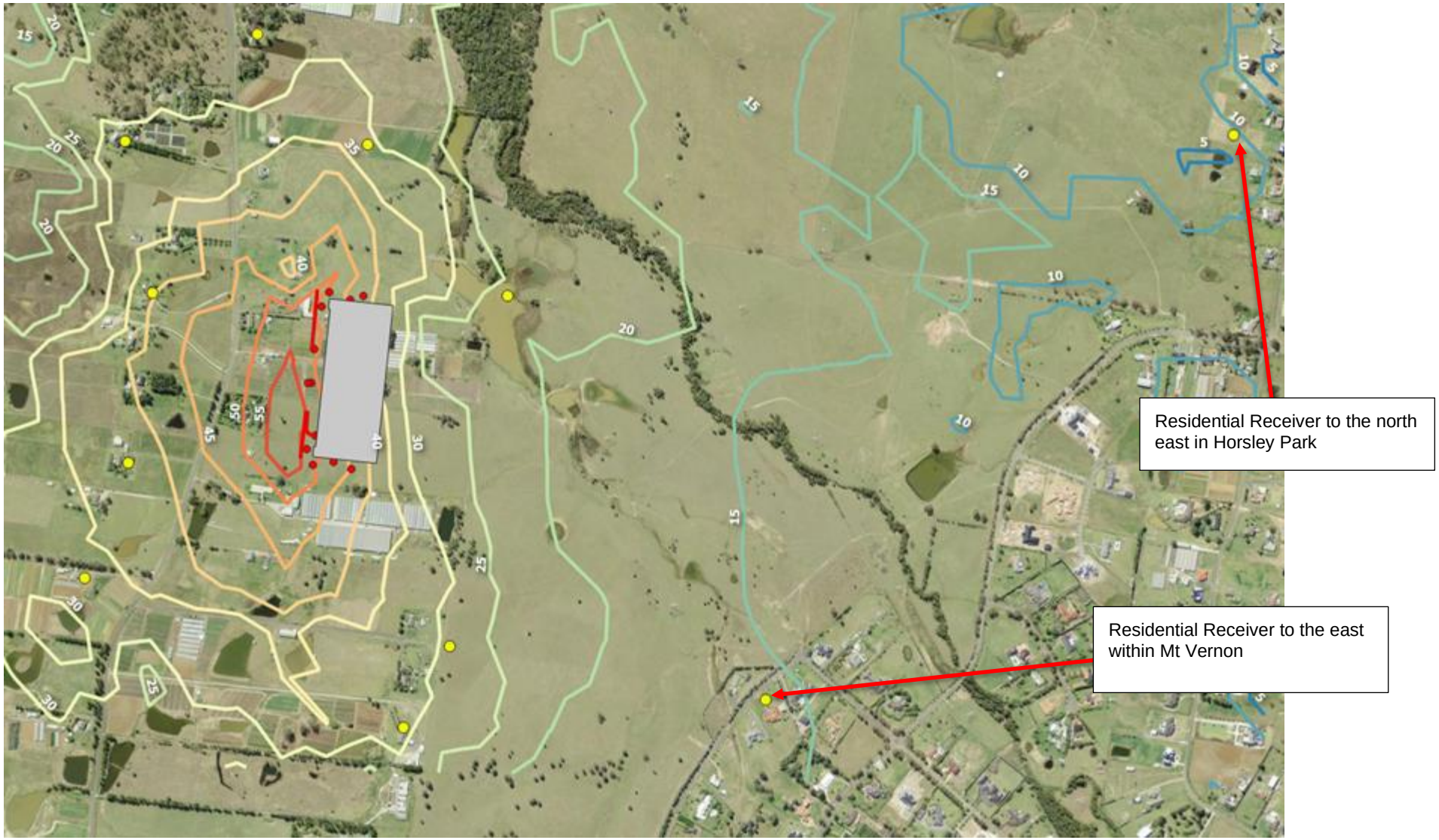


Figure 15 – Warehouse F, Noise Modeling for residential receivers out side of the Mamre Road

8 Additional Traffic Noise on Surrounding Roadways

This section of the report details the assessment of future traffic noise on surrounding public streets as a result of vehicles using the site.

The suitable noise criteria for the assessment of road traffic noise generated by vehicles using the site are set out in the NSW Government's NSW Road Noise Policy (RNP). Table 3 of the standard details the assessment criteria to be applied at residences potentially impacted by additional traffic volumes based on the road category and land use. The relevant noise criteria is detailed in the table below.

Table 3 Road traffic noise assessment criteria for residential land uses

Road category	Type of project/land use	Assessment criteria – dB(A)	
		Day (7 a.m.–10 p.m.)	Night (10 p.m.–7 a.m.)
Freeway/ arterial/ sub-arterial roads	1. Existing residences affected by noise from **new** freeway/arterial/sub-arterial road corridors	$L_{Aeq,\ (15\ hour)}$ 55 (external)	$L_{Aeq,\ (9\ hour)}$ 50 (external)
	2. Existing residences affected by noise from **redevelopment** of existing freeway/arterial/sub-arterial roads 3. 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)
Local roads	4. Existing residences affected by noise from **new** local road corridors 5. Existing residences affected by noise from **redevelopment** of existing local roads 6. Existing residences affected by **additional traffic** on existing local roads generated by land use developments	$L_{Aeq,\ (1\ hour)}$ 55 (external)	$L_{Aeq,\ (1\ hour)}$ 50 (external)

Note: Land use developers must meet internal noise goals in the Infrastructure SEPP (Department of Planning NSW 2007) for sensitive developments near busy roads (see **Appendix C10**).

In addition to the table above the RNP includes criteria for sites where existing noise levels exceed those levels detailed in the table above. Section 3.4.1 *Process of applying the criteria* includes the following:

> *For existing residences and other sensitive land uses affected by additional traffic on existing roads generated by land use developments, any increase in the total traffic noise level should be limited to 2 dB above that of the corresponding 'no build option'.*

Aldington Road will be upgraded to a Distributor road with access restricted to vehicles only travelling south via Abbotts Road/Mamre Road, and not using Bakers Lane

Aldington Road may connect to a future arterial road way and until this is known there would be limited value in estimating existing traffic numbers as future traffic numbers using the roadway could include an Annual Average Daily Traffic (AADT) of 2,000 to 20,000 AADT. This assessment includes the current conditions of traffic noise at the site.

Based on the existing noise levels measured at the site and detailed in this report, the relevant criteria for additional traffic noise are detailed in the table below.

Table 19 – Additional Traffic Noise Criteria

Measurement Location	Time of Measurement	Maximum Repeatable $L_{Aeq, 1\ hr}$ dB(A)	Sub arterial Road Criteria $L_{Aeq, 1\ hr}$ dB(A)	Resulting Additional Traffic Noise Criteria $L_{Aeq, 1\ hr}$ dB(A)
Residence Opposite on Addington Road, Locations 2 detailed in Figure 2 of this report	Day	50	60	60
	Night	35	55	55

The potential traffic generated by use of the proposed site have been based on the Ason Group *Transport Management and Accessibility Plan, State Significant Development Application - 200 Aldington Road, Industrial Estate* reference 1294r05 and dated 30/06/2022.

Section 7 *Traffic Generation & Distribution Assessment* includes details of the expected *Concept Master Plan Site Daily Traffic Profile*, which is included in Appendix A of the traffic report. The relevant additional volume data is included below:

TABLE 19 CONCEPT MASTER PLAN SITE DAILY TRAFFIC PROFILE

Start Time	Light Vehicle	Rigid	Semi-trailer	B-double	Total
0:00	58	16	2	0	76
1:00	48	16	2	0	67
2:00	54	17	2	0	73
3:00	68	14	1	0	84
4:00	233	32	3	1	269
5:00	431	71	7	2	511
6:00	577	100	10	3	690
7:00	542	119	12	3	676
8:00	461	136	14	3	615
9:00	354	150	15	4	522
10:00	325	144	15	4	488
11:00	346	147	15	4	512
12:00	420	133	14	3	570
13:00	542	135	14	3	694
14:00	632	120	12	3	767
15:00	535	106	11	3	655
16:00	449	85	9	2	545
17:00	369	71	7	2	450
18:00	209	50	5	1	265
19:00	123	31	3	1	158
20:00	89	24	2	1	116
21:00	135	18	2	0	156
22:00	175	22	2	1	199
23:00	118	19	2	0	139
Total	**7,294**	**1,776**	**182**	**45**	**9,297**

Based on the details included in the *Traffic Generation & Distribution Assessment*, the assessment of worst case additional traffic numbers in a 1 hour period have included the following:

1. Day time: Worst 1-hour periods may include the following possible movements, including the following:
    a. 11am to midday, including the following:
        i. Additional cars and small vans using the site - Up to 346
        ii. Heavy viceless including ridged -147, semi-trailers - 15 and B-doubles - 4
    b. 2pm to 3pm, including the following:
        i. Additional cars and small vans using the site - Up to 632
        ii. Heavy viceless including ridged -120, semi-trailers - 12 and B-doubles - 3

2. Night-time: Worst 1-hour periods may include the following possible movements, based on the time period of 6am to 7am, including the following:
    a. Additional cars and small vans using the site – 577
    b. Heavy viceless including ridged -100, semi-trailers - 10 and B-doubles - 3

Based on the expected use of the site, the calculated future traffic noise levels are detailed in the table below.

Table 20 – Calculated Future Additional Traffic Noise Levels

Location	Time of Measurement	Additional Traffic Noise Criteria $L_{Aeq,\ 1\ hr}$ dB(A)	Calculated Traffic Noise Levels $L_{Aeq,\ 1\ hr}$ dB(A)
Residence opposite the site on Aldington Road	Day	60	54
	Night	55	52

Based on the results of the additional traffic assessment, the proposed development will be compliant with the relevant RNP criteria.

The table below details the sample calculation of the CoRTN calculation undertaken for the day time and night-time periods for the potentially impacted receivers west of the site across Aldington Road (see figure 2 above).

The use of the CoRTN model includes the acceptable method of assessment, as detailed in the NSW *Road Noise Policy* which includes the use of the CoRTN model is in Section B4 *Noise modelling methods* of the standard.

Table 21 – CoRTN Calculations – Residence to the West on Aldington Road (Location 2)

Descriptor	Day Time Period	Night-Time Period
Number of Vehicle Movements[1]	768	690
Percentage of Heavy Vehicles	40%	40%
Expected Speed	70 km/h	70 km/h
Receiver Height above ground	1.5m	1.5m
Angle of View	180º	180º
Gradient of Road	Flat	Flat
Façade Corrections	Non	Non
Barrier Corrections	Non	Non
Distance to building façade of the residence	100m	100m
Predicted Noise Level	**52.3 dB(A)** $L_{Aeq\ (1\ hour)}$	**51.8 dB(A)** $L_{Aeq\ (1\ hour)}$
Project Criteria	60 dB(A) $L_{Aeq\ (1\ hour)}$	55 dB(A) $L_{Aeq\ (1\ hour)}$
Note 1 – Including both existing and future traffic numbers in addition to existing traffic movements.		

Based on the assessment of additional traffic numbers on Aldington Road, the resulting noise levels from additional traffic numbers associated with the site will comply with the requirements of the RNP criteria.

It is noted that, in the event the existing residential receivers to the west of the site are developed to include industrial receivers, then an assessment of additional traffic noise generation would not be required to be completed.

8.1 Future use of Estate Roads

The potential for noise resulting from the estate roads and the resulting noise levels at surrounding receivers has been undertaken. As details of traffic numbers for internal roadways are not know at this stage of the Master Planning of the development the assessment has assumed the maximum entire site traffic movements presented in the *Traffic Generation & Distribution Assessment* includes details of the expected *Concept Master Plan Site Daily Traffic Profile* may use the internal road as a conservative assessment. Details of the calculation is included in the table below.

Table 22 – CoRTN Calculations – Closest Sensitive Residence to the West on Aldington Road

Descriptor	Day Time Period	Night-Time Period
Number of Vehicle Movements[1]	694	690
Percentage of Heavy Vehicles	40%	40%
Expected Speed	30 km/h	30 km/h
Receiver Height above ground	1.5m	1.5m
Angle of View	180°	180°
Gradient of Road	Flat	Flat
Façade Corrections	Non	Non
Barrier Corrections	Non	Non
Distance to building façade of the residence	400m	400m
Predicted Noise Level	**44.8 dB(A)** $L_{Aeq\ (1\ hour)}$	**44.8 dB(A)** $L_{Aeq\ (1\ hour)}$
Project Criteria	60 dB(A) $L_{Aeq\ (1\ hour)}$	55 dB(A) $L_{Aeq\ (1\ hour)}$

Note 1 – Including future traffic using the internal roadway based on maximum traffic number potentially by the development and detailed in the Ason Group Transport Management and Accessibility Plan, State Significant Development Application - 200 Aldington Road, Industrial Estate reference 1294r05 and dated 30/06/2022.

Based on the assessment of traffic numbers using the future internal public roadways within the site (and to include designated public roads), the resulting noise levels from additional traffic numbers associated with the site will comply with the requirements of the RNP criteria.

8.2 Future Traffic Restrictions

As part of the traffic management plan for the project, traffic flows from the site are required to use the a southern travel paths from the site on Aldington Road.

Details of the required future use of the road network is detailed the following:

12. Infrastructure Staging

12.1. Staging

The Estate wide civil infrastructure works will be undertaken within Stage 1 of the development, prior to OC of the first building. The infrastructure includes Internal Estate Roads, intersections with Aldington Road, associated footpaths and verge, earthworks, retaining walls, stormwater drainage systems, Stormwater Basins, and services infrastructure to provide service to the allotments.

Fife Kemps Creek is working with Council and TfNSW and the LOG-E (Landowner Group - East) to design and construct the external road upgrades (Aldington Road, Abbotts Road, and the intersection with Mamre Road) to provide access that will appropriately provide for the estates. The timing of this upgrade is dependent on approvals independent but expected to be linked to development of this site.

12.2. Funding arrangements

The assumed funding arrangement for infrastructure are as follows:

- **Abbotts / Mamre Road Intersection:** Proposed to be delivered as Works in Kind for TfNSW and offset against SIC Levy. This work is proposed to be delivered in partnership with other landowners, known as the Landowners Group – East (LOG-E).
- **Aldington Road Upgrades:** Proposed to be delivered as Works in Kind for Penrith City Council and offset against Section 7.11 contributions. This work will be delivered in partnership with other landowners, known as the Landowners Group – East (LOG-E).
- **Lead-in services:** Developer funded with potential reimbursements subject to relevant authority approvals and procurement processes.
- **Internal Estate works:** Developer funded.

All funding arrangements are subject to authority approvals.

Road Network

3) The Precinct shall be developed generally in accordance with the desired road network structure and hierarchy (Figure 12). The road network will comprise the arterial roads of Mamre Road and the future Southern Link Road (Movement Corridors), Aldington Road/ Abbotts Road (distributor road) and an indicative internal industrial local and collector road network.
4) Until the delivery of the connection of Aldington Road to the future Southern Link Road, all development accessed from Aldington Road and Abbotts Road is to be accessed via the

southern end of Aldington Road/ Abbotts Road and Mamre Road. Access to the north via Bakers Lane is not permitted.

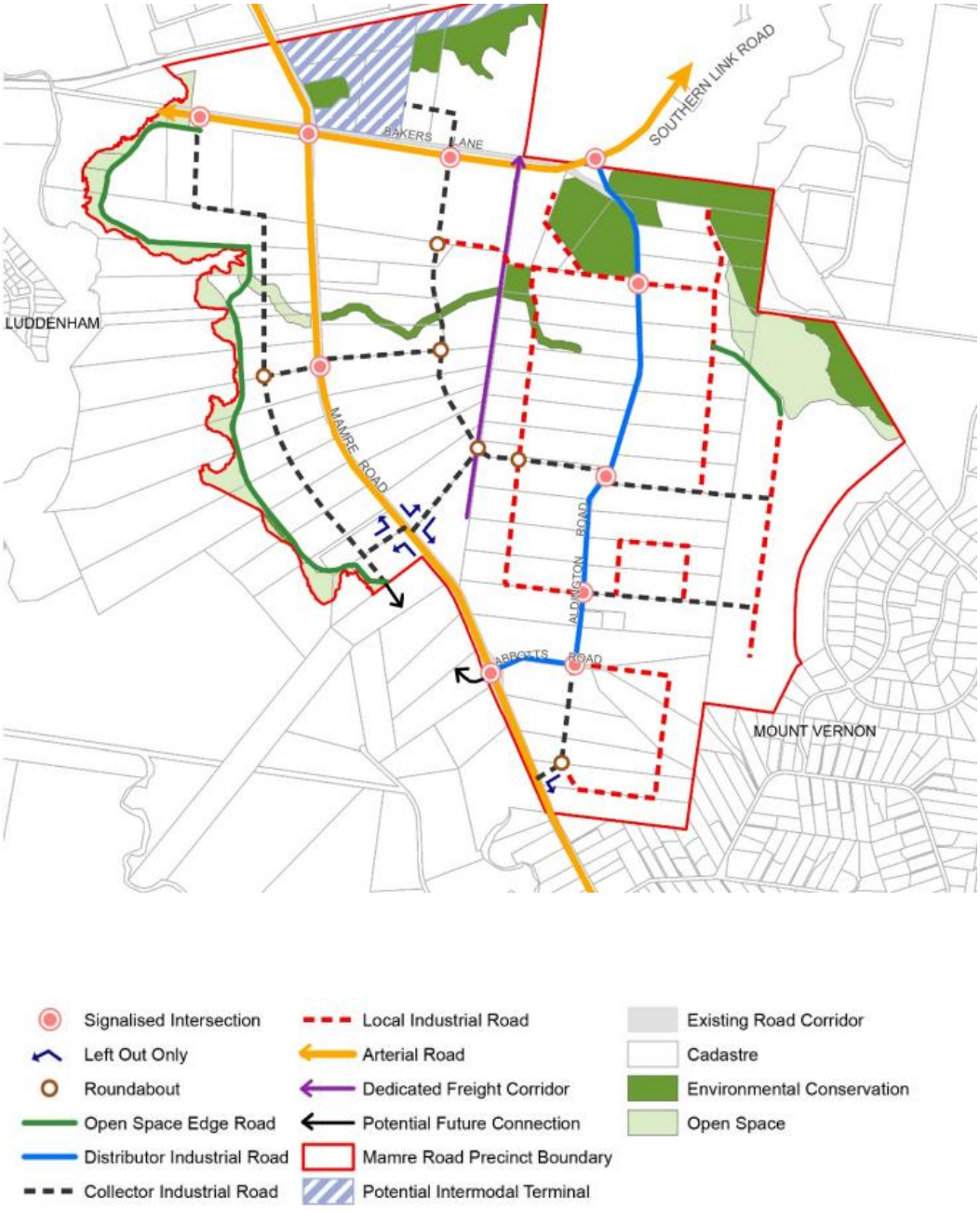


Figure 12. Road network hierarchy in the Mamre Road Precinct.

The assessment of future traffic volumes resulting from the use of the site has included the future use of the road network detailed above.

9 Warragamba Pipeline

As part of this assessment an acoustic review of the potential for cumulative noise levels from the operation of the Warragamba pipeline has been considered.

The Warragamba pipeline is located over 1.6km to the north of the site as shown in the figure below.

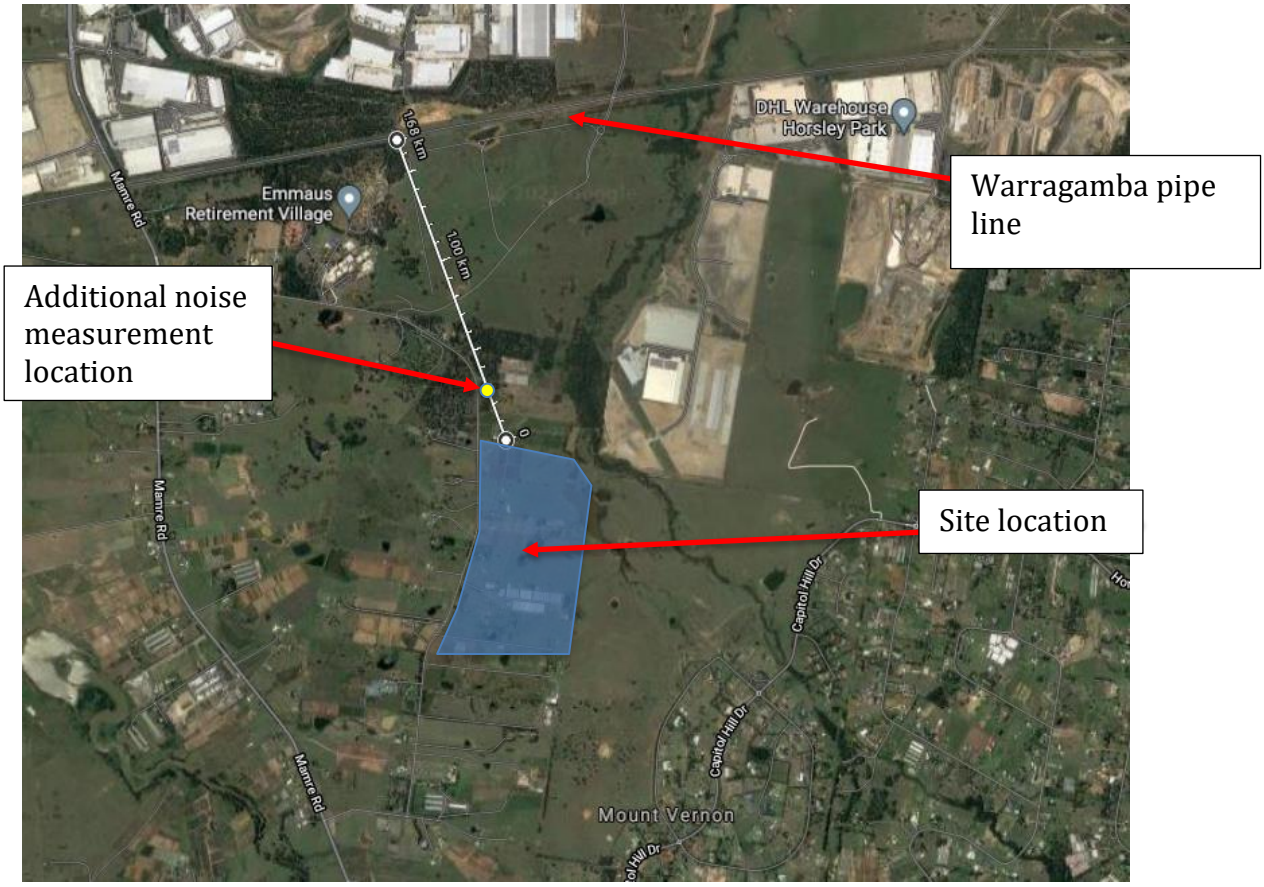


Figure 16 - Warragamba pipeline proximity to the site

Based on the proximity of the site from the Warragamba pipeline, cumulative noise impacts resulting from the pipeline will not result in an increase in noise ambient noise levels in the area as detailed above in this report.

Based on the assessment of noise impacts detailed in this report, the cumulative noise impacts to the surrounding receivers within proximity of the pipeline will not experience unacceptable noise contributions resulting from the operation of the proposed site.

An additional site inspection was conducted to assess noise from the operation of the pipeline. The site visit was undertaken on the 30th November 2021 during the evening/night time period of 9pm to 10pm. The purpose of the measurement was to determine any additional noise impacts from the operation of the pipeline to the residential receiver located to the north of the site.

Attended noise level testing was conducted using a Bruel and Kjaer 2236C type meter. The meter was calibrated before and after testing and no significant drift was recorded (the drift in calibration did not exceed ±0.5 dB).

The results of the potential impacts from the pipeline to the north of the site are included in the table below.

Table 23 – Results of the Pipeline Noise Level Attended Noise Survey

Measurement Location	Time of Measurement	$L_{Aeq, 15min}$ dB(A)	$L_{A90, 15min}$ dB(A)	Comments
Attended noise measurement location North of the site	9.00pm to 9.15pm	54	43	Noise level at the site dominated by vehicle movements on surrounding areas and natural sources. **Noise from the Pipeline was not audible at the test location.**
	9.15pm to 9.30pm	52	44	

Based on the results of the testing undertaken noise levels from the pipeline were inaudible at the measurement location. As a result, there will not be a cumulative increase in noise at the receiver location to the north of the site which are required to be applied to the operational noise levels detailed in this report.

In addition to the above, in the event there are noise levels which impact the receivers to the north of the site, which are 1.6km away from the pipeline, the resulting noise level generated from the pipeline would be in excess of relevant noise emission criteria at the residential receivers within close proximity to the pipeline (i.e. Emmaus Retirement Village) including magnitude of noise of approximately 65 dB(A) or greater which would currently be unacceptable.

10 Construction Noise and Vibration Management Plan

This section of the report details the assessment of noise associated with the proposed demolition, excavation and construction activities associated with the development.

The proposed construction (and associated works) activities to be undertaken on the site include the removal of the existing buildings, bulk ground works and construction of the new structures and lots. The development will then be constructed using normal construction processes.

The EPA's Interim Construction Noise Guideline defines normal day time hours as the following:

2.2 Recommended standard hours

The recommended standard hours for construction work are shown in Table 1; however, they are not mandatory. There are some situations, as described below, where construction work may need to be undertaken outside of these hours. The likely noise impacts and the ability to undertake works during the recommended standard hours should be considered when scheduling work.

Table 1: Recommended standard hours for construction work

Work type	Recommended standard hours of work*
Normal construction	Monday to Friday 7 am to 6 pm Saturday 8 am to 1 pm No work on Sundays or public holidays
Blasting	Monday to Friday 9 am to 5 pm Saturday 9 am to 1 pm No blasting on Sundays or public holidays

* The relevant authority (consent, determining or regulatory) may impose more or less stringent construction hours.

It is noted that alternative construction hours may be approved for the site and include the project's *Conditions of Consent.*

10.1 Proposed Appliances

The proposed appliances which will be used as part of the works required as part of the development are detailed in the table below:

Table 24 – Noise Level from Expected Construction Appliances

Tasks	Equipment	Sound Power Levels per task dB(A) $L_{Aeq\ (15\text{-}min)}$	Aggregate Sound Power Level per Task dB(A) $L_{Aeq(15\text{-}min)}$
Site Demolition and Earth works	Jack hammer mounted on skid steer	118	123
	Hand held jack hammer	111	
	Concrete saw	119	
	Skid steer	110	
	Power hand tools	109	
	Excavators	115	
	Trucks	110	
	Earth Rollers	112	
Construction Works	Piling	115	121
	Welder	101	
	Saw cutter	109	
	Dump truck	109	
	Concrete saw	119	
	Power hand tools	109	
	Cranes	110	

Notes: Noise levels of proposed equipment to be used on the site based on the Australian Standard AS2436-2010 and noise level measurements previously undertaken of similar equipment on construction sites.

10.2 Construction Noise Criteria

This section of the report details the relevant construction noise criteria which is applicable to the site.

10.2.1 Interim Construction Noise Guideline

Noise criteria for construction and demolition activities are discussed in the *Interim Construction Noise Guideline* (ICNG). The ICNG also recommends procedures to address potential impacts of construction noise on residences and other sensitive land uses. The main objectives of the ICNG are summarised as follows:

- Promote a clear understanding of ways to identify and minimise noise from construction works;
- Focus on applying all "feasible" and "reasonable" work practices to minimise construction noise impacts;
- Encourage construction to be undertaken only during the recommended standard hours unless approval is given for works that cannot be undertaken during these hours;
- Streamline the assessment and approval stages and reduce time spent dealing with complaints at the project implementation stage; and
- Provide flexibility in selecting site-specific feasible and reasonable work practices in order to minimise noise impacts.

The ICNG contains a quantitative assessment method which is applicable to this project. Guidance levels are given for airborne noise at residences and other sensitive land uses.

The quantitative assessment method involves predicting noise levels at sensitive receivers and comparing them with the Noise Management Levels (NMLs). The NML affectation categories for receivers have been reproduced from the guideline and are listed in the table below.

Table 25 – Noise Management Levels from Construction – Quantitative Assessment

Receiver Type	Time of Day	Noise Management Level $L_{Aeq(15minute)}$[1,2]	How to Apply
Residential	Recommended standard hours: Monday to Friday 7 am to 6 pm Saturday 8 am to 1 pm No work on Sundays or public holidays	Noise affected RBL + 10 dB	The noise affected level represents the point above which there may be some community reaction to noise. • Where the predicted or measured LAeq(15minute) 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 impacted 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 that the very noisy activities can occur, taking into account: 1. Times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or 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.
	Outside recommended standard hours	Noise affected RBL + 5 dB	• A strong justification would typically be required for works outside the recommended standard hours. • The proponent should apply all feasible and reasonable work practices to meet the noise affected level. • Where all feasible and reasonable practices have been applied and noise is more than 5 dB above the noise affected level, the proponent should negotiate with the community.

Table 25 – Continued

Receiver Type	Time of Day	Noise Management Level $L_{Aeq(15minute)}$[1,2]	How to Apply
Industrial Receivers	When is use	LAeq (15 min) 75 dB(A)	During construction, the proponent should regularly update the occupants of the commercial and industrial premises regarding noise levels and hours of work.

Note 1 *Noise levels apply at the property boundary that is most exposed to construction noise, and at a height of 1.5 m above ground level. If the property boundary is more than 30 m from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30 m of the residence. Noise levels may be higher at upper floors of the noise affected residence.*

Note 2 *The RBL is the overall single-figure background noise level measured in each relevant assessment period (during or outside the recommended standard hours). The term RBL is described in detail in the NSW Industrial Noise Policy (EPA 2000).*

Based on the table above, the resulting construction noise management levels for this project are detailed in the table below.

Table 26 – Site Construction Noise Management Levels

Noise Source	Time Period	Receiver Type	Construction Noise Management Level	'High Noise Affected' Level
Construction Noise	Recommended standard hours: Monday to Friday 7 am to 6 pm Saturday 8 am to 1 pm No work on Sundays or public holidays	Residential	63 dB(A) $L_{Aeq\ (15min)}$	75 dB(A) $L_{Aeq\ (15min)}$
	When in Use	Industrial Receivers	75 dB(A) $L_{Aeq\ (15min)}$	

Note 1: Construction noise management levels based on the Interim Construction Noise Guideline

10.3 Construction Vibration Criteria

Effects of ground borne vibration on buildings may be segregated into the following three categories:

- Human comfort – vibration in which the occupants or users of the building are inconvenienced or possibly disturbed.
- Effects on building contents – where vibration can cause damage to fixtures, fittings and other non-building related objects.
- Effects on building structures – where vibration can compromise the integrity of the building or structure itself.

10.3.1 Vibration Criteria – Human Comfort

Vibration effects relating specifically to the human comfort aspects of the project are taken from the guideline titled *"Assessing Vibration – A Technical Guideline"*. (AVTG) This type of impact can be further categorised and assessed using the appropriate criterion as follows:

- Continuous vibration – from uninterrupted sources (refer to Table 27).
- Impulsive vibration – up to three instances of sudden impact e.g., dropping heavy items, per monitoring period (refer to Table 31).
- Intermittent vibration – such as from drilling, compacting or activities that would result in continuous vibration if operated continuously (refer to Table 29).

Table 27 Continuous vibration acceleration criteria (m/s2) 1 Hz-80 Hz

Location	Assessment period	Preferred Values		Maximum Values	
		z-axis	x- and y-axis	z-axis	x- and y-axis
Residences	Daytime	0.010	0.0071	0.020	0.014
	Night-time	0.007	0.005	0.014	0.010
Offices, schools, educational institutions and places of worship	Day or night-time	0.020	0.014	0.040	0.028
		0.04	0.029	0.080	0.058
Workshops	Day or night-time	0.04	0.029	0.080	0.058

Table 28 Impulsive vibration acceleration criteria (m/s2) 1 Hz-80 Hz

Location	Assessment period	Preferred Values		Maximum Values	
		z-axis	x- and y-axis	z-axis	x- and y-axis
Residences	Daytime	0.30	0.21	0.60	0.42
	Night-time	0.10	0.071	0.20	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

Table 29 Intermittent vibration impacts criteria (m/s1.75) 1 Hz-80 Hz

Location	Daytime		Night-time	
	Preferred Values	Maximum Values	Preferred Values	Maximum Values
Residences	0.20	0.40	0.13	0.26
Offices, schools, educational institutions and places of worship	0.40	0.80	0.40	0.80
Workshops	0.80	1.60	0.80	1.60

10.3.2 Vibration Criteria – Building Contents and Structure

The vibration effects on the building itself are assessed against international standards as follows:

- For transient vibration: British Standard BS 7385: Part 2-1993 "Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration" (BSI 1993); and
- For continuous or repetitive vibration: German DIN 4150: Part 3 – 1999 "Effects of Vibration on Structure" (DIN 1999).

10.3.3 Standard BS 7385 Part 2 - 1993

For transient vibration, as discussed in standard BS 7385 Part 2-1993, the criteria are based on peak particle velocity (mm/s) which is to be measured at the base of the building. These are summarised in Table 30 and illustrated in the figure below.

Table 30 Transient vibration criteria as per standard BS 7385 Part 2 - 1993

Line in Figure below	Type of Building	Peak Component Particle Velocity in Frequency Range of Predominant Pulse	
		4 Hz to 15 Hz	15 Hz and Above
1	Reinforced or framed structures Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	
2	Unreinforced or light framed structures Residential or light commercial type buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

Standard BS 7385 Part 2 – 1993 states that the values in Table 30 relate to transient vibration which does not cause resonant responses in buildings. Where the dynamic loading caused by continuous vibration events is such as that results in dynamic magnification due to resonance (especially at the lower frequencies where lower guide values apply), then the values in Table 30 may need to be reduced by up to 50% (refer to Line 3 in the Figure below).

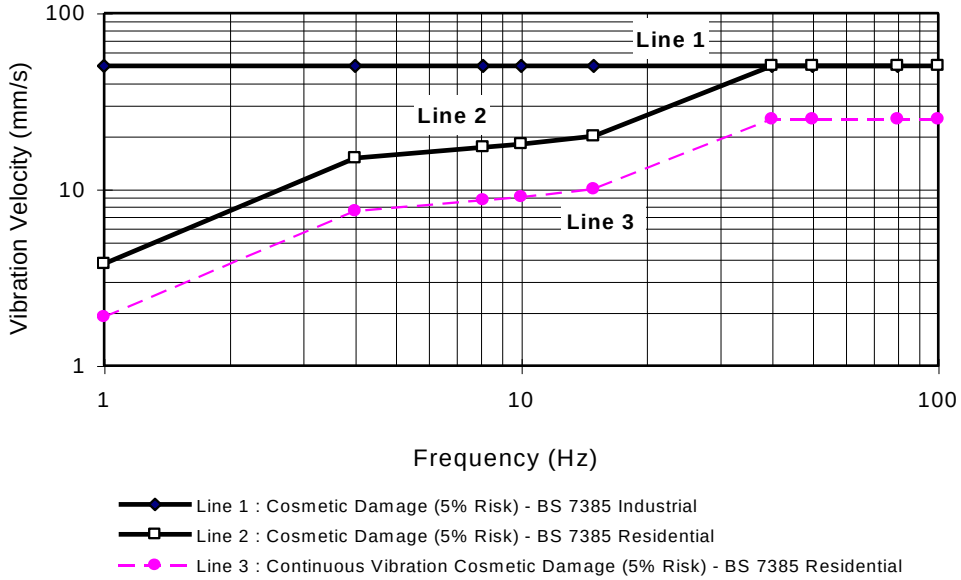


Figure 17 - BS 7385 Part 2 – 1993, graph of transient vibration values for cosmetic damage

In the lower frequency region where strains associated with a given vibration velocity magnitude are higher, the recommended values corresponding to Line 2 are reduced. Below a frequency of 4 Hz where a high displacement is associated with the relatively low peak component particle velocity value, a maximum displacement of 0.6 mm (zero to peak) is recommended. This displacement is equivalent to a vibration velocity of 3.7 mm/s at 1 Hz.

The standard also states that minor damage is possible at vibration magnitudes which are greater than twice those given in Table 30, and major damage to a building structure may occur at values greater than four times the tabulated values.

Fatigue considerations are also addressed in the standard and it is concluded that unless calculation indicates that the magnitude and number of load reversals is significant (in respect of the fatigue life of building materials) then the values in Table 30 should not be reduced for fatigue considerations.

10.3.4 Standard DIN 4150 Part 3 - 1999

For continuous or repetitive vibration, standard DIN 4150 Part 3-1999 provides criteria based on values for peak particle velocity (mm/s) measured at the foundation of the building; these are summarised in Table 31. The criteria are frequency dependent and specific to particular categories of structures.

Table 31 Structural damage criteria as per standard DIN 4150 Part 3 - 1999

Type of Structure	Peak Component Particle Velocity, mm/s			
	Vibration at the foundation at a frequency of			Vibration of horizontal plane of highest floor at all frequencies
	1 Hz to 10 Hz	10 Hz to 50 Hz	50 Hz to 100 Hz[1]	
Buildings used for commercial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40
Dwellings and buildings of similar design and/or use	5	5 to 15	15 to 20	15
Structures that, because of their sensitivity to vibration, do not correspond to those listed in lines 1 and 2 and are of great intrinsic value (e.g. buildings that are under a preservation order)	3	3 to 8	8 to 10	8

Note 1: For frequencies above 100Hz, at least the values specified in this column shall be applied.

10.4 Construction Noise Management – Qualitative Assessment

Based on the assessment of the expected construction noise levels generated from the construction of the project, noise levels are generally expected to require the building contractor to engage in management of activities on the site.

The following management controls are recommended to mitigate construction noise levels on the site:

1. All plant and equipment are to be maintained such that they are in good working order.
2. A register of complaints is to be recorded in the event of complaints being received, including location, time of complaint, nature of the complaint and actions resulting from the complaint.
3. If required, a noise level measurement of the offending plant item generating complaints is to be conducted and noise mitigations undertaken to reduce noise levels to within Noise Management levels in the event magnitude of noise levels is found to be above suitable levels.
4. The use of high noise generating equipment including hydraulic hammers, rock cutters or the like should be minimised prior to 8am Monday to Friday or 8.30am Saturdays.
5. The loading of trucks should be conducted such that there is not a requirement to stack trucks on the roadways adjacent to the residential receivers.

In addition to the recommended mitigations above, details of the proposed construction (including demolition) works to be conducted on the site, including type of activities to be conducted as well as the expected duration of activities should be provided to the neighbouring receivers.

A detailed construction noise and vibration management plan is to be provided by the building contractor as part of the construction certificate.

10.5 Construction Noise Assessment – Quantitative Assessment

A quantitative assessment of the construction noise levels resulting from the proposed works has been undertaken, including first principal noise calculations.

The assessment has been based on the expected noise levels to be generated on the site including those detailed in section above. Calculations of the resulting construction noise levels at the residential receivers within proximity to the site are detailed in the table below.

Table 32 Quantitative Assessment of Construction Noise to Neighboring Residence

Source Noise	Equipment	Sound Power Levels dB(A) $L_{eq\ 15min}$	Aggregate Sound Power Level dB(A) $L_{eq\ 15min}$	Calculated Construction Noise Levels
Site Demolition works	Jack hammer mounted on skid steer	118	123	50-68 dB(A) when items used externally
	Hand held jack hammer	111		
	Concrete saw	119		
	Skid steer	110		
	Power hand tools	109		
	Excavators	115		
	Trucks	110		
	Earth Rollers	112		
Construction Works	Piling	115	121	48-66 dB(A) when items used externally
	Welder	101		
	Saw cutter	109		
	Dump truck	109		
	Concrete saw	119		
	Power hand tools	109		
	Cranes	110		

Based on the qualitative assessment of construction noise, suitable management controls and community notifications are required to be conducted. All predicted noise levels are proposed to be lower the High Noise Affected Level (HNAL) of 75dBA.

The required management of construction noise impacts are included in section above.

Subject to the implementation of these management measures, acoustic impacts during construction of the proposal will be acceptable.

10.6 Construction Vibration

Construction vibration levels may be exceeded in the event of hard rock was encountered during the earthworks. Safe working distances for building damage will be complied with at all times and vibration monitoring could be required if acceptable levels of vibration levels cannot be achieved.

Based on the location of the site, there is significant separation of areas where construction activities will be conducted from surrounding building. Based on the location of works that will be conducted there will be safe working distances relating to continuous vibration from construction equipment. Most construction activities will have intermittent vibration emissions and, therefore, higher vibration levels occurring over shorter periods are acceptable for intermittent events.

Construction vibration is not expected to generate magnitudes of vibration with the potential to exceed the criteria applicable for human comfort and, therefore, the nearest residential receivers are not likely to experience adverse vibration impacts. In order to maintain compliance with construction noise criteria, it is recommended that the indicative safe distances listed in table below should be maintained.

Table 33 Recommended indicative safe working distances for vibration intensive plant

Plant	Rating / Description	Safe Working Distances (m)	
		Cosmetic Damage (BS 7385: Part 2 DIN 4150: Part 3)	Human Comfort (AVTG)
Vibratory roller	< 50 kN (Typically 1 – 2 tonnes)	5	15 – 20
	< 100 kN (Typically 2 – 4 tonnes)	6	20
	< 200 kN (Typically 4 – 6 tonnes)	12	40
	< 300 kN (Typically 7 – 13 tonnes)	15	100
	> 300 kN (Typically more than 13 tonnes)	20	100
Small hydraulic hammer	300 kg, typically 5 – 12 tonnes excavator	2	7
Medium hydraulic hammer	900 kg, typically 12 – 18 tonnes excavator	7	23
Large hydraulic hammer	1600 kg, typically 18 – 34 tonnes excavator	22	73
Vibratory pile driver	Sheet piles	2 – 20	20
Jackhammer	Hand held	1	Avoid contact with structure and steel reinforcements

Based on the required construction activities to be undertaken as part of the project as well as the proximity of the surrounding receivers to the site the resulting construction vibration is unlikely to negatively impact on any of the surrounding receivers.

11 Conclusion

This report details the Noise and Vibration Impact Assessment (NVIA) of the proposed FKC warehouse development located at 200 Aldington Road, Kemps Creek.

This report details the required acoustic constructions of the building's façade, including external windows, to ensure that the future internal noise levels comply with the relevant noise levels of the Australian Standard AS2107:2016. Providing the recommended constructions detailed in this report are included in the construction of the project, then the required internal noise levels will be achieved.

External noise emissions from the site have been assessed and detailed in accordance with the NSW Environmental Protection Authorities Noise Policy for Industry (previously the Industrial Noise Policy). The future design and treatment of all building services associated with the project can be acoustically treated to ensure all noise emissions from the site comply with the EPA NPI criteria. Details of the equipment and associated acoustic treatments will be provided as part of the CC submission of the project.

An assessment of additional traffic noise generated by vehicles using the site has been undertaken. Calculated noise levels comply with the requirements of the EPA's *Road Noise Policy.*

A construction noise and vibration assessment of the expected construction activities required to be used to complete the project has been undertaken. Mitigation measures to be applied during the construction stage of the project have been documented. Subject to the undertaking these management measures, the project will have acceptable noise levels during the construction period.

For any additional information please do not hesitate to contact the person below.

Regards

Ben White
Director
White Noise Acoustics

12 Appendix A – Glossary of Terms

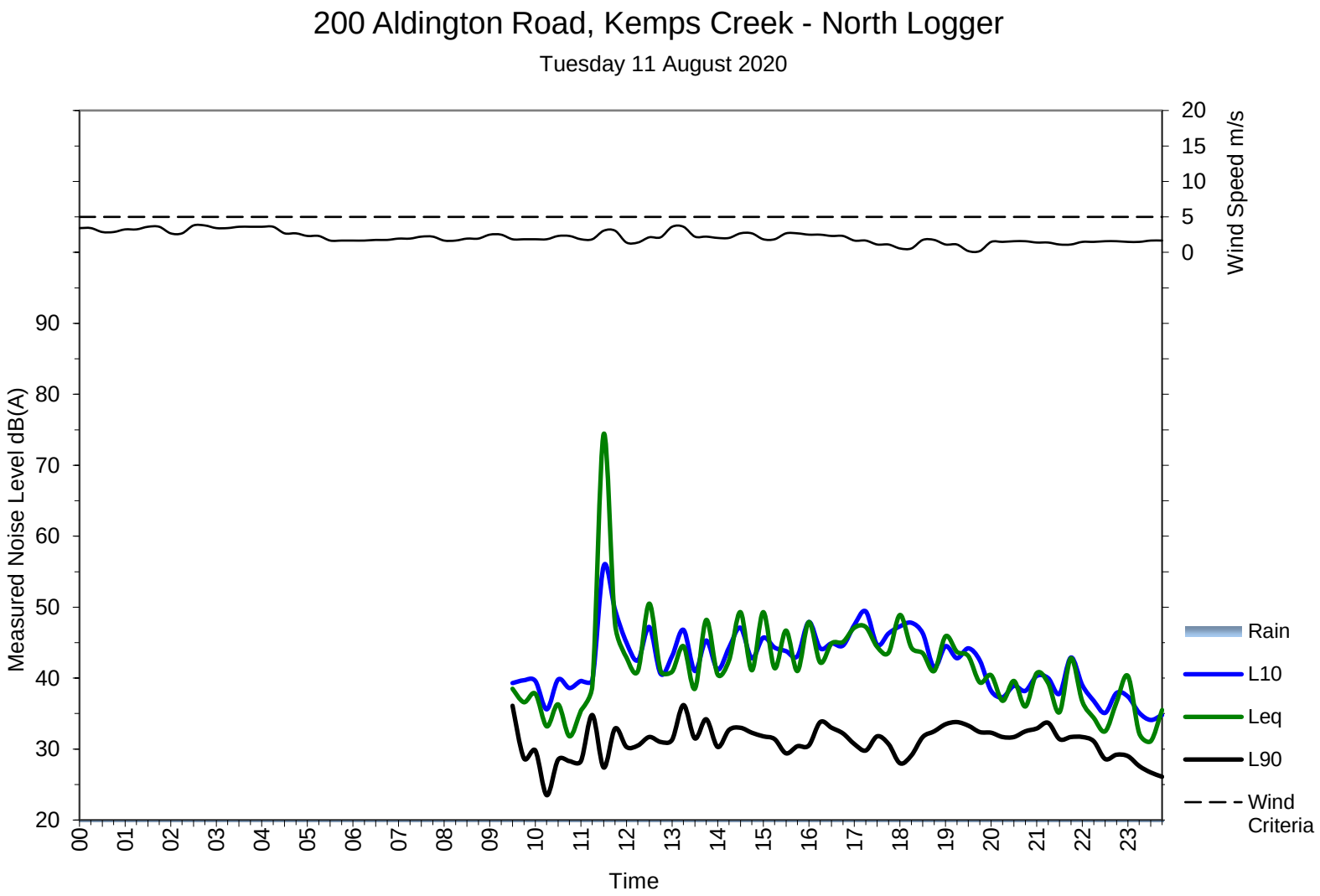
Ambient Sound	The totally encompassing sound in a given situation at a given time, usually composed of sound from all sources near and far.
Audible Range	The limits of frequency which are audible or heard as sound. The normal ear in young adults detects sound having frequencies in the region 20 Hz to 20 kHz, although it is possible for some people to detect frequencies outside these limits.
Character, acoustic	The total of the qualities making up the individuality of the noise. The pitch or shape of a sound's frequency content (spectrum) dictate a sound's character.
Decibel [dB]	The level of noise is measured objectively using a Sound Level Meter. The following are examples of the decibel readings of every day sounds;

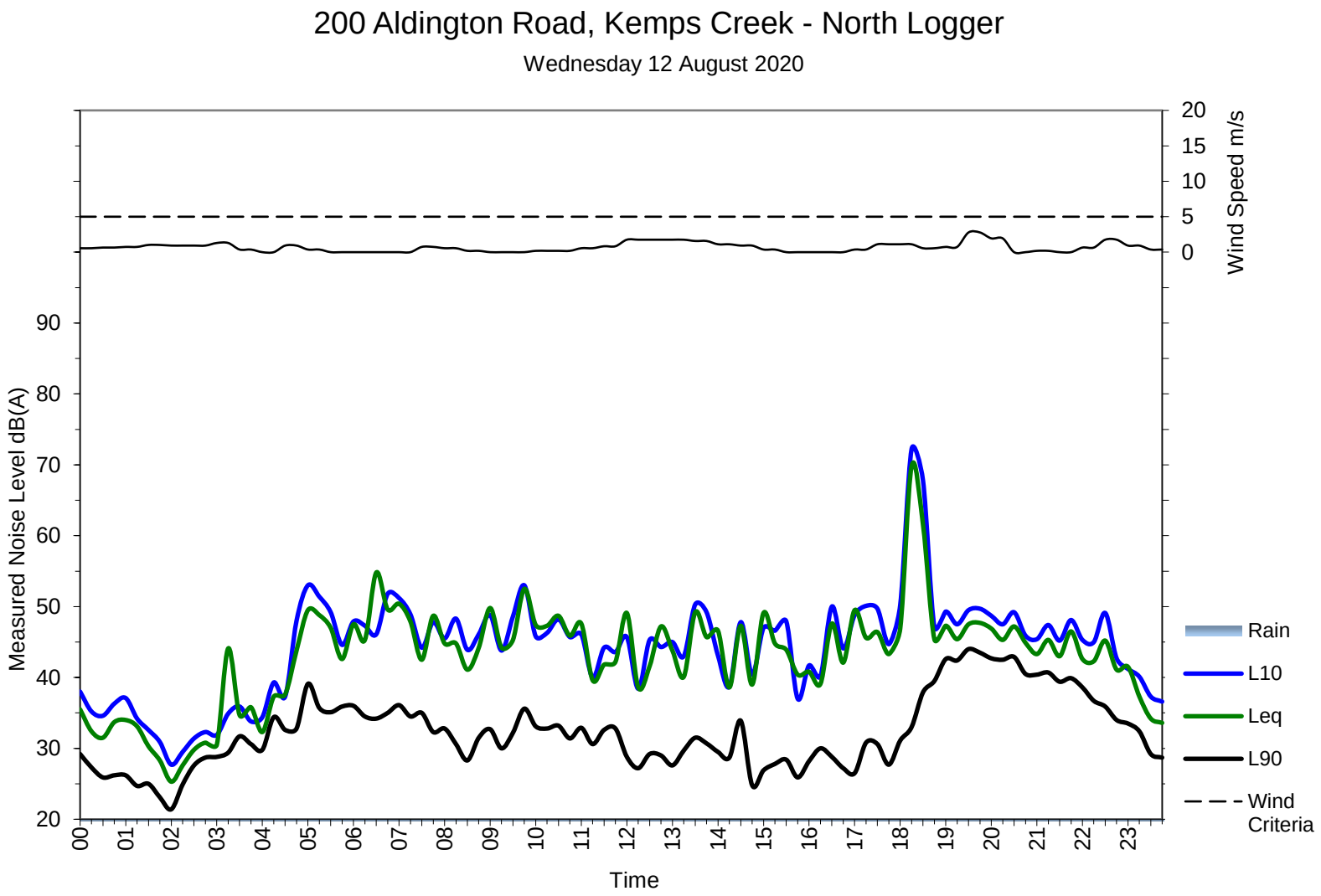
0dB	the faintest sound we can hear
30dB	a quiet library or in a quiet location in the country
45dB	typical office space. Ambience in the city at night
60dB	Martin Place at lunch time
70dB	the sound of a car passing on the street
80dB	loud music played at home
90dB	the sound of a truck passing on the street
100dB	the sound of a rock band
115dB	limit of sound permitted in industry
120dB	deafening

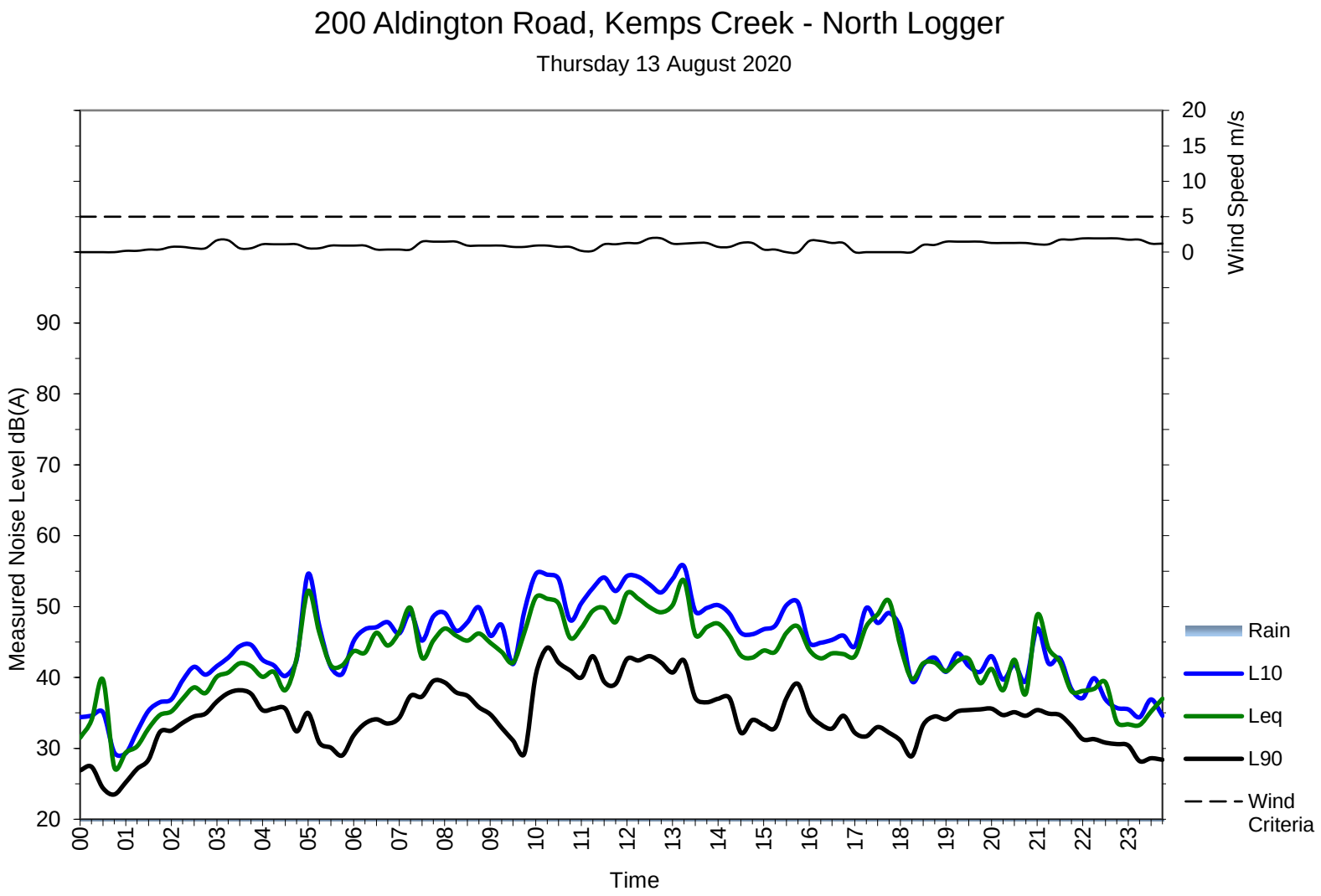
dB(A)	*A-weighted decibels* The ear is not as effective in hearing low frequency sounds as it is hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the "A" filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is measured using the A filter. The sound pressure level in dB(A) gives a close indication of the subjective loudness of the noise.
Frequency	Frequency is synonymous to *pitch*. Sounds have a pitch which is peculiar to the nature of the sound generator. For example, the sound of a tiny bell has a high pitch and the sound of a bass drum has a low pitch. Frequency or pitch can be measured on a scale in units of Hertz or Hz.
Loudness	A rise of 10 dB in sound level corresponds approximately to a doubling of subjective loudness. That is, a sound of 85 dB is twice as loud as a sound of 75 dB which is twice as loud as a sound of 65 dB and so on
L_{Max}	The maximum sound pressure level measured over a given period.
L_{Min}	The minimum sound pressure level measured over a given period.
L_1	The sound pressure level that is exceeded for 1% of the time for which the given sound is measured.
L_{10}	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
L_{90}	The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L_{90} noise level expressed in units of dB(A).
L_{eq}	The "equivalent noise level" is the summation of noise events and integrated over a selected period of time.
Background Sound Low	The average of the lowest levels of the sound levels measured in an affected area in the absence of noise from occupants and from unwanted, external ambient noise sources. Usually taken to mean the L_{A90} value
Ctr	A frequency adaptation term applied in accordance with the procedures described in ISO 717.
dB (A)	'A' Weighted overall sound pressure level

Noise Reduction	The difference in sound pressure level between any two areas. The term “noise reduction” does not specify any grade or performance quality unless accompanied by a specification of the units and conditions under which the units shall apply
NR Noise Rating	Single number evaluation of the background noise level. The NR level is normally around 5 to 6 dB below the “A” weighted noise level. The NR curve describes a spectrum of noise levels and is categorised by the level at 1000 Hz ie the NR 50 curve has a value of 50 dB at 1000 Hz. The NR rating is a tangential system where a noise spectrum is classified by the NR curve that just encompasses the entire noise spectrum consideration.
R_w	Weighted Sound Reduction Index - Laboratory test measurement procedure that provides a single number indication of the acoustic performance of a partition or single element. Calculation procedures for Rw are defined in ISO 140-2:1991 “Measurement of Sound Insulation in Buildings and of Building Elements Part 2: Determination, verification and application of precision data”.
R'_w	Field obtained Weighted Sound Reduction Index - this figure is generally up to 3-5 lower than the laboratory test determined level data due to flanked sound transmission and imperfect site construction.
Sound Isolation	A reference to the degree of acoustical separation between any two areas. Sound isolation may refer to sound transmission loss of a partition or to noise reduction from any unwanted noise source. The term “sound isolation” does not specify any grade or performance quality and requires the units to be specified for any contractual condition
Sound Pressure Level, L_P dB	A measurement obtained directly using a microphone and sound level meter. Sound pressure level varies with distance from a source and with changes to the measuring environment. Sound pressure level equals 20 times the logarithm to the base 10 of the ratio of the rms sound pressure to the reference sound pressure of 20 micro Pascals.
Sound Power Level, L_W dB	Sound power level is a measure of the sound energy emitted by a source, does not change with distance, and cannot be directly measured. Sound power level of a machine may vary depending on the actual operating load and is calculated from sound pressure level measurements with appropriate corrections for distance and/or environmental conditions. Sound power levels is equal to 10 times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power of 1 picoWatt
Speech Privacy	A non-technical term but one of common usage. Speech privacy and speech intelligibility are opposites and a high level of speech privacy means a low level of speech intelligibility. It should be recognised that acceptable levels of speech privacy do not require that speech from an adjacent room is inaudible.
Transmission Loss	Equivalent to Sound Transmission Loss and to Sound Reduction Index in terminology used in countries other than Australia. A formal test rating of sound transmission properties of any construction, by usually a wall, floor, roof etc. The transmission loss of all materials varies with frequency and may be determined by either laboratory or field tests. Australian Standards apply to test methods for both situations.

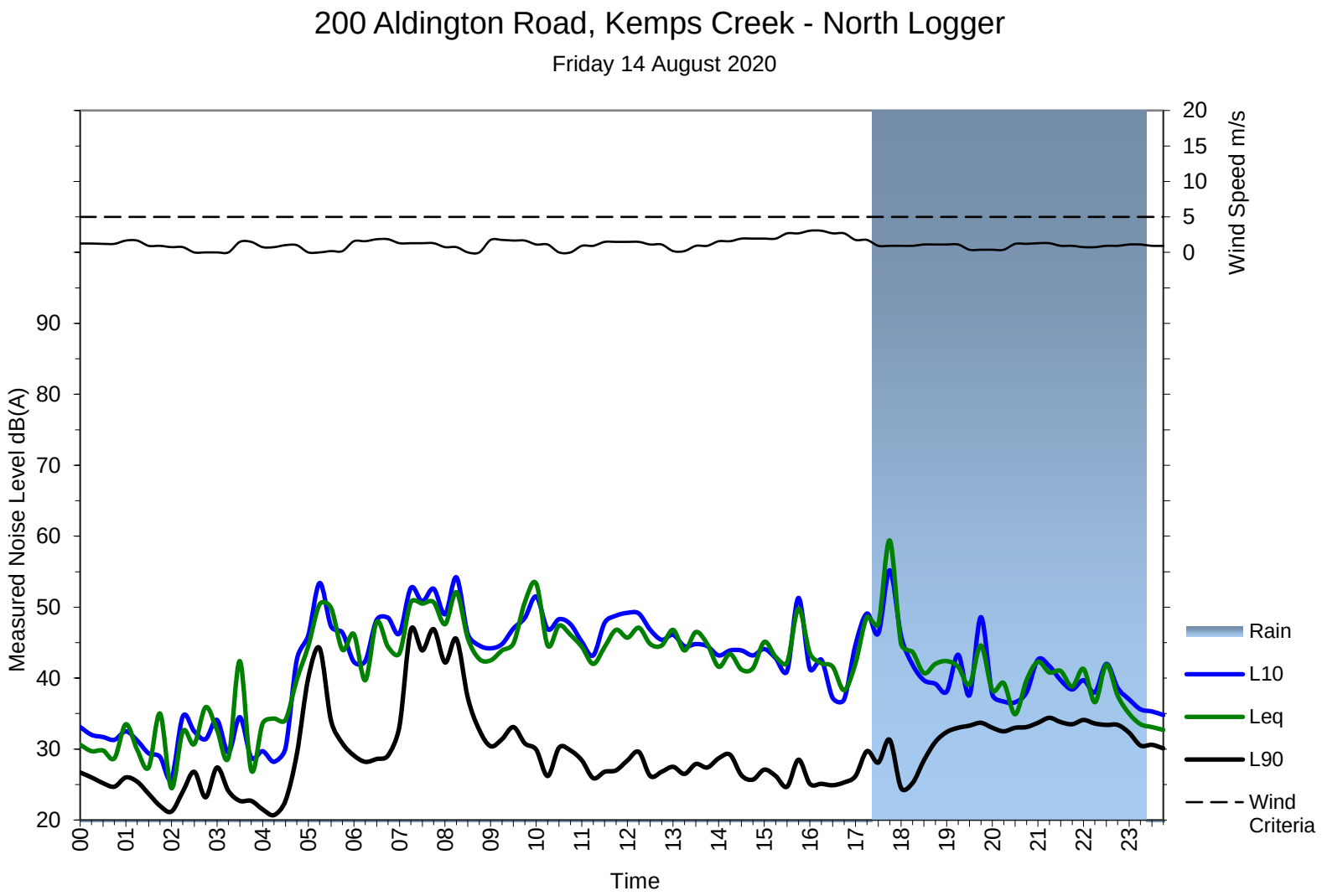
13 Appendix B – Noise Logging Results, Northern Logger

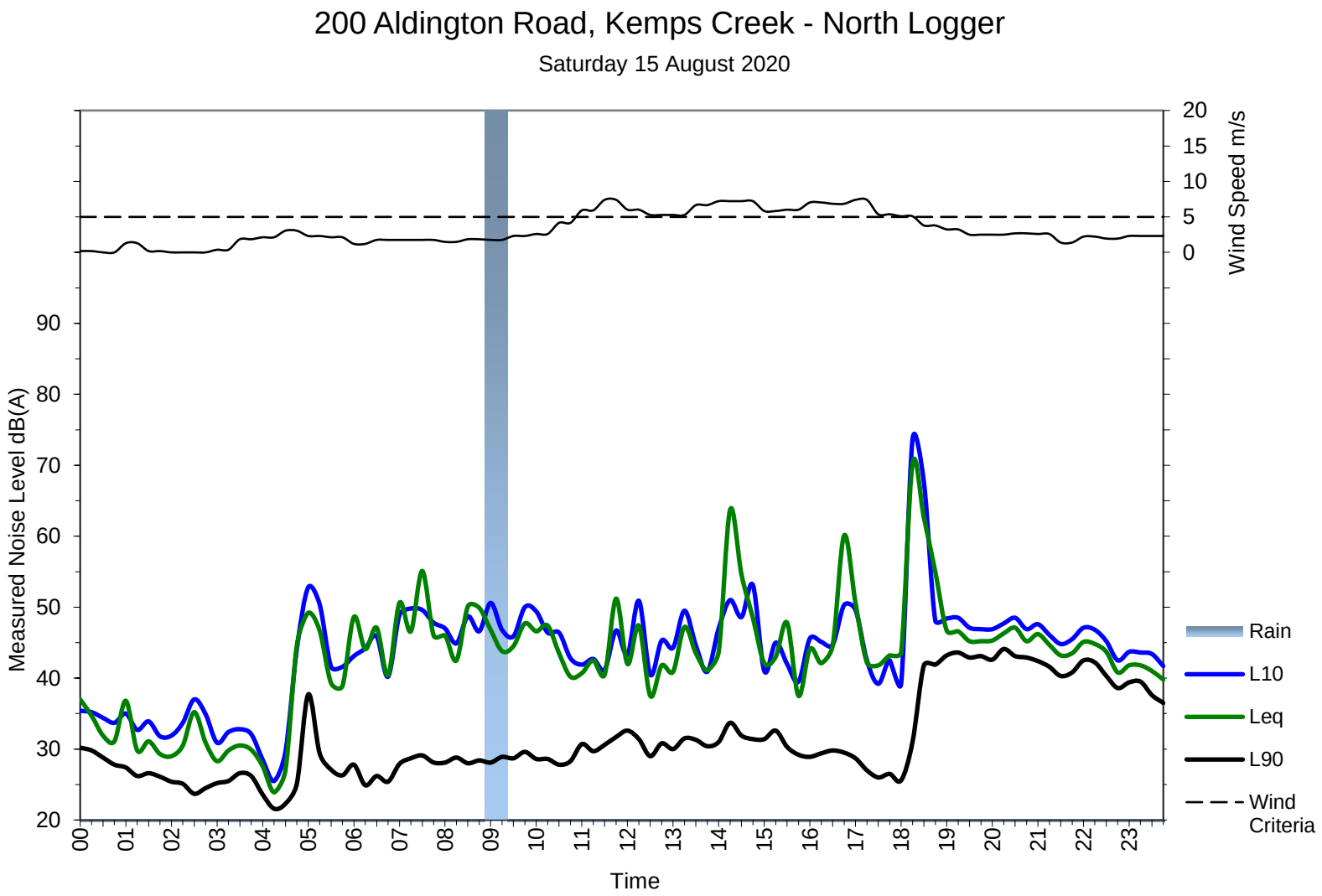

200 Aldington Road, Kemps Creek - North Logger
Tuesday 11 August 2020
Measured Noise Level dB(A)
Wind Speed m/s
Time
Rain
L10
Leq
L90
Wind Criteria

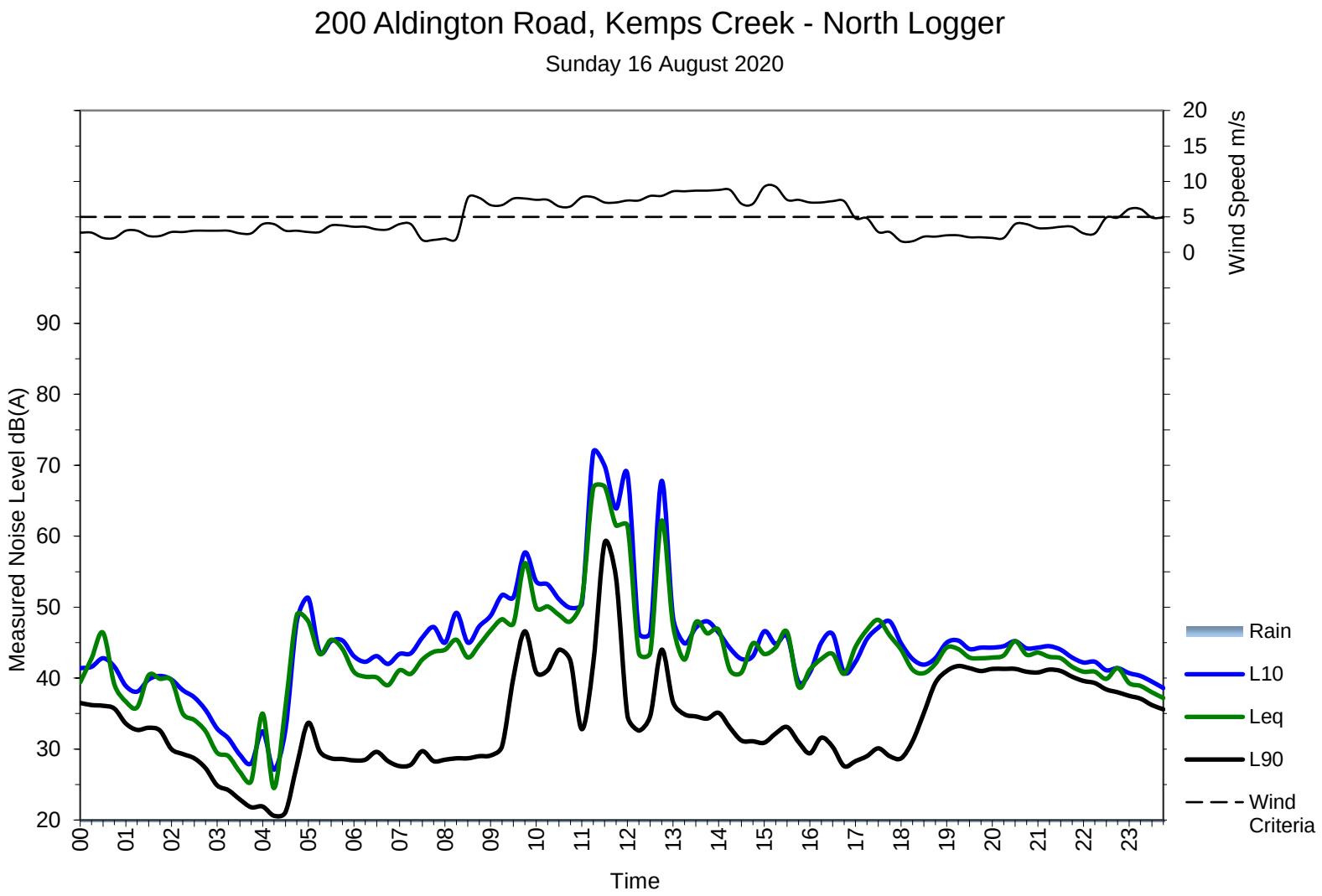

200 Aldington Road, Kemps Creek - North Logger
Wednesday 12 August 2020
Measured Noise Level dB(A)
Wind Speed m/s
Time
Rain
L10
Leq
L90
Wind Criteria

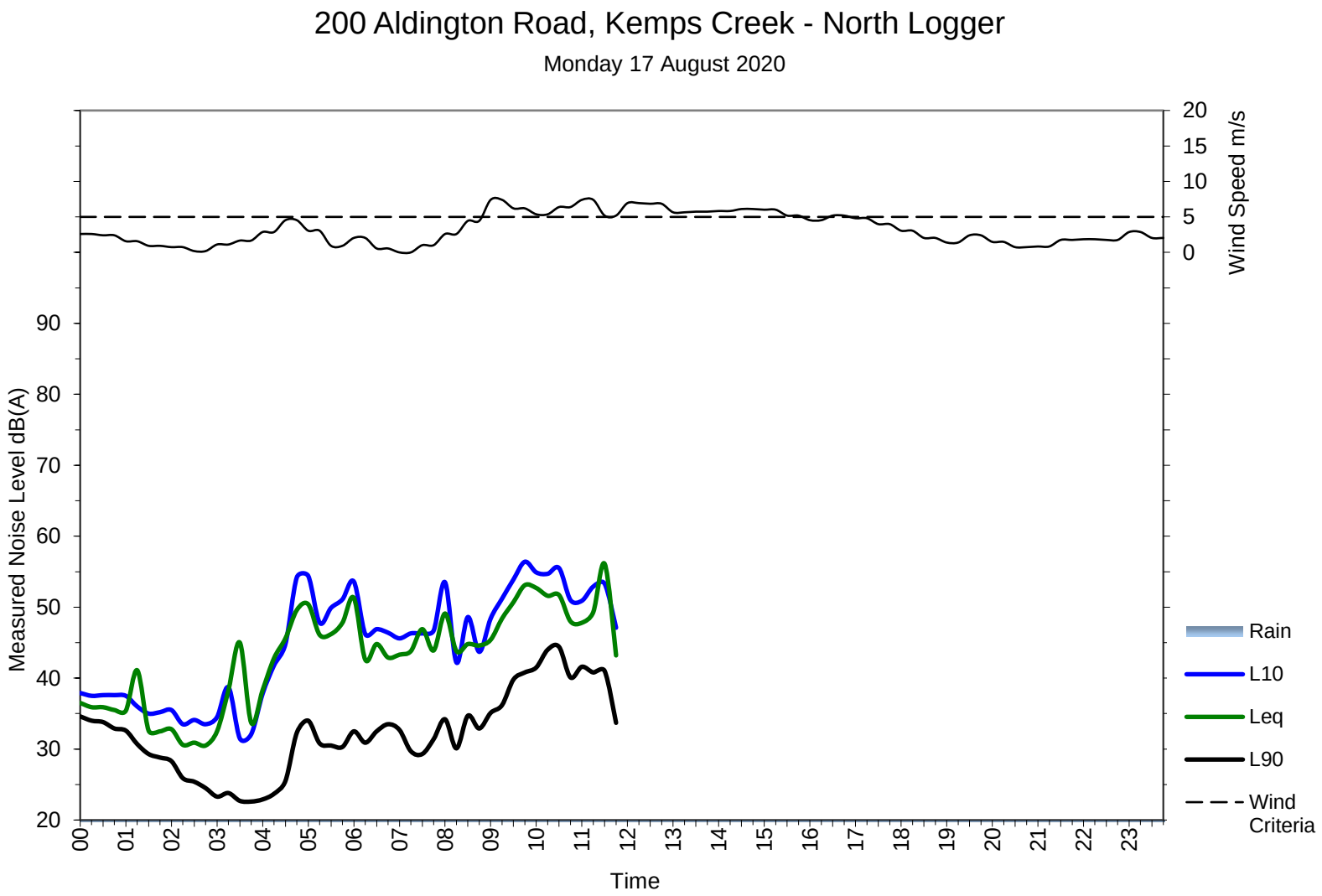

200 Aldington Road, Kemps Creek - North Logger
Thursday 13 August 2020
Measured Noise Level dB(A)
Wind Speed m/s
Time
Rain
L10
Leq
L90
Wind Criteria

v

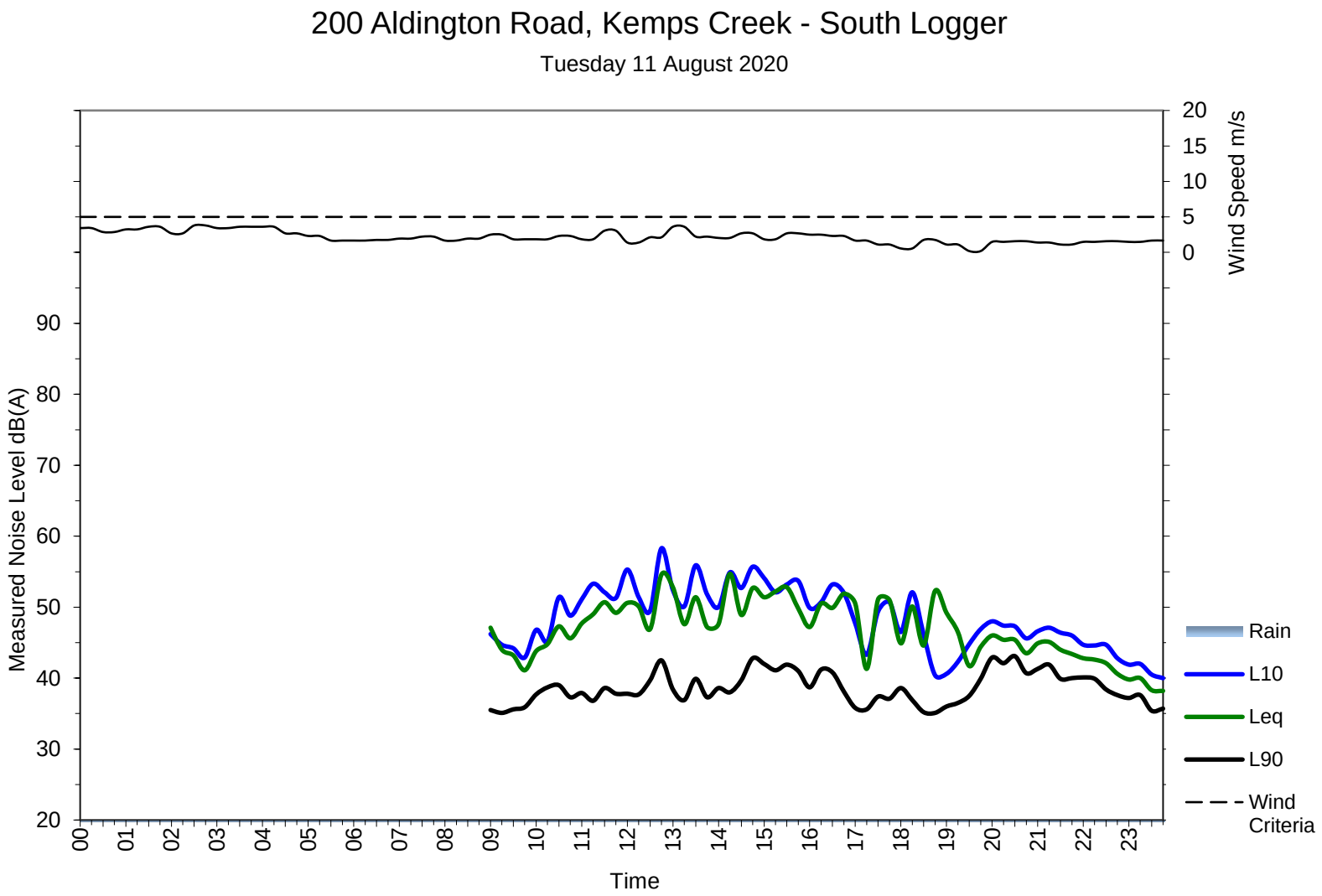

200 Aldington Road, Kemps Creek - North Logger
Friday 14 August 2020
Measured Noise Level dB(A)
Wind Speed m/s
Time
Rain
L10
Leq
L90
Wind Criteria

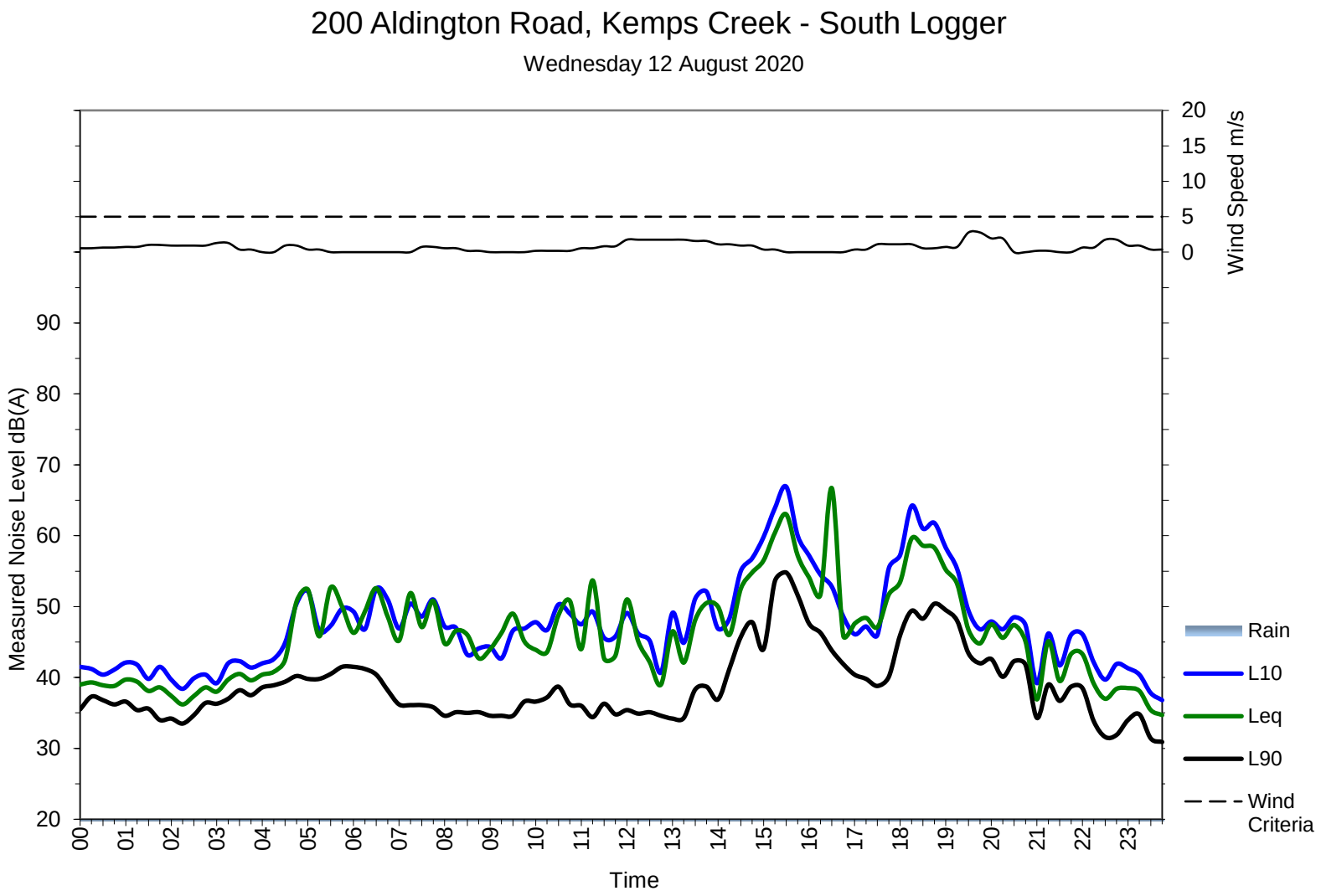

200 Aldington Road, Kemps Creek - North Logger
Saturday 15 August 2020
Measured Noise Level dB(A)
Wind Speed m/s
Time
Rain
L10
Leq
L90
Wind Criteria

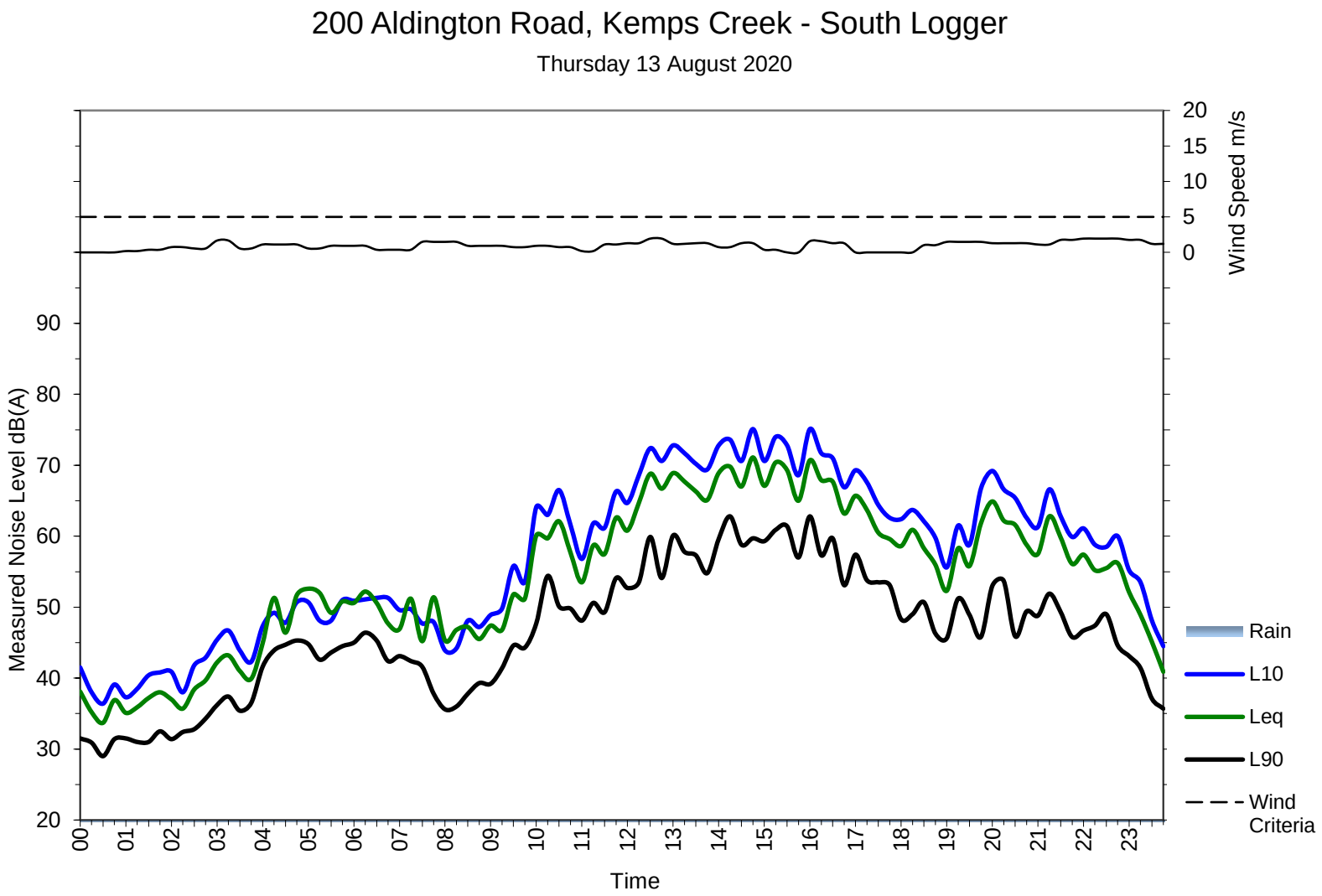

200 Aldington Road, Kemps Creek - North Logger
Sunday 16 August 2020
Measured Noise Level dB(A)
Wind Speed m/s
Time
Rain
L10
Leq
L90
Wind Criteria

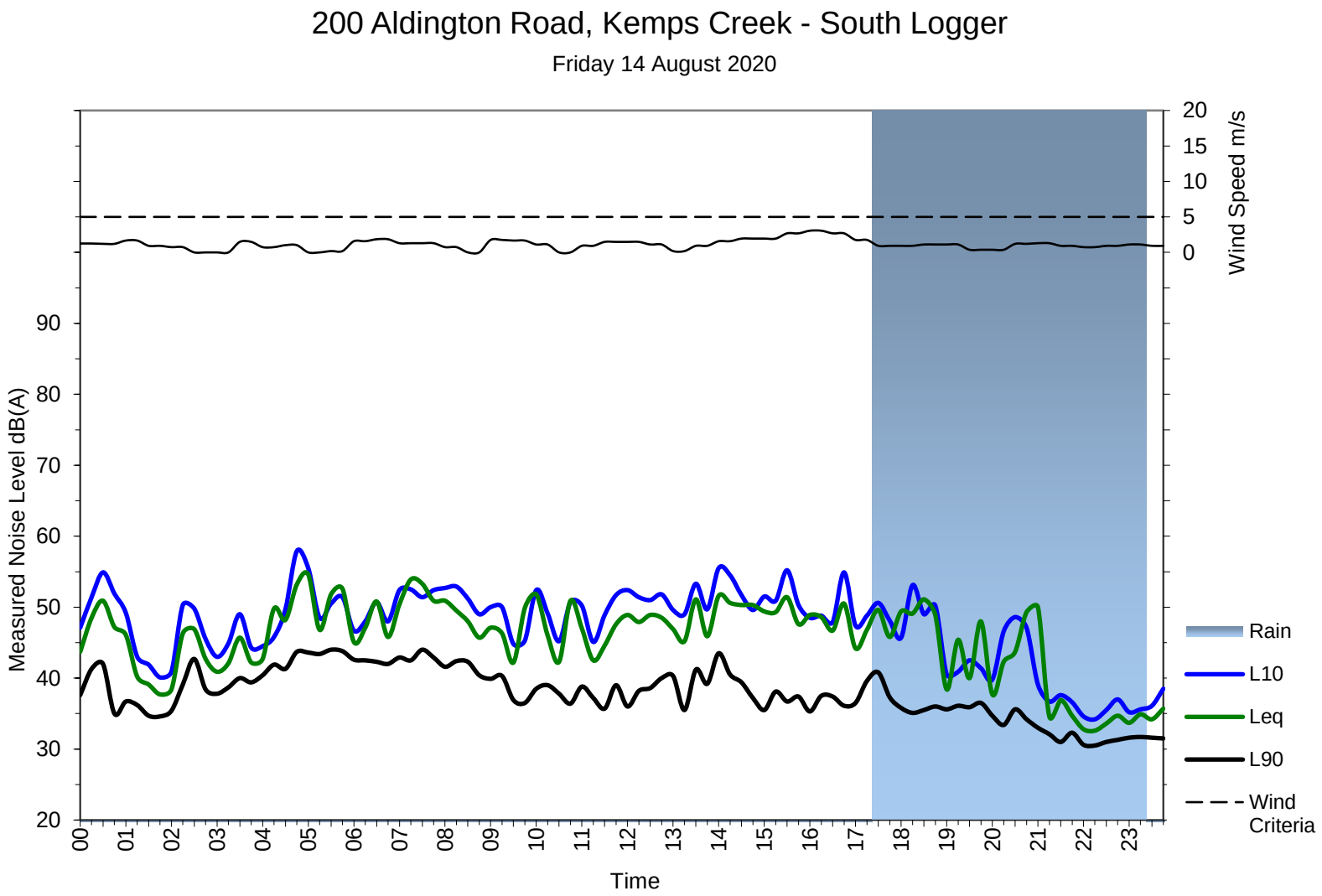

200 Aldington Road, Kemps Creek - North Logger
Monday 17 August 2020
Measured Noise Level dB(A)
Wind Speed m/s
Time
Rain
L10
Leq
L90
Wind Criteria

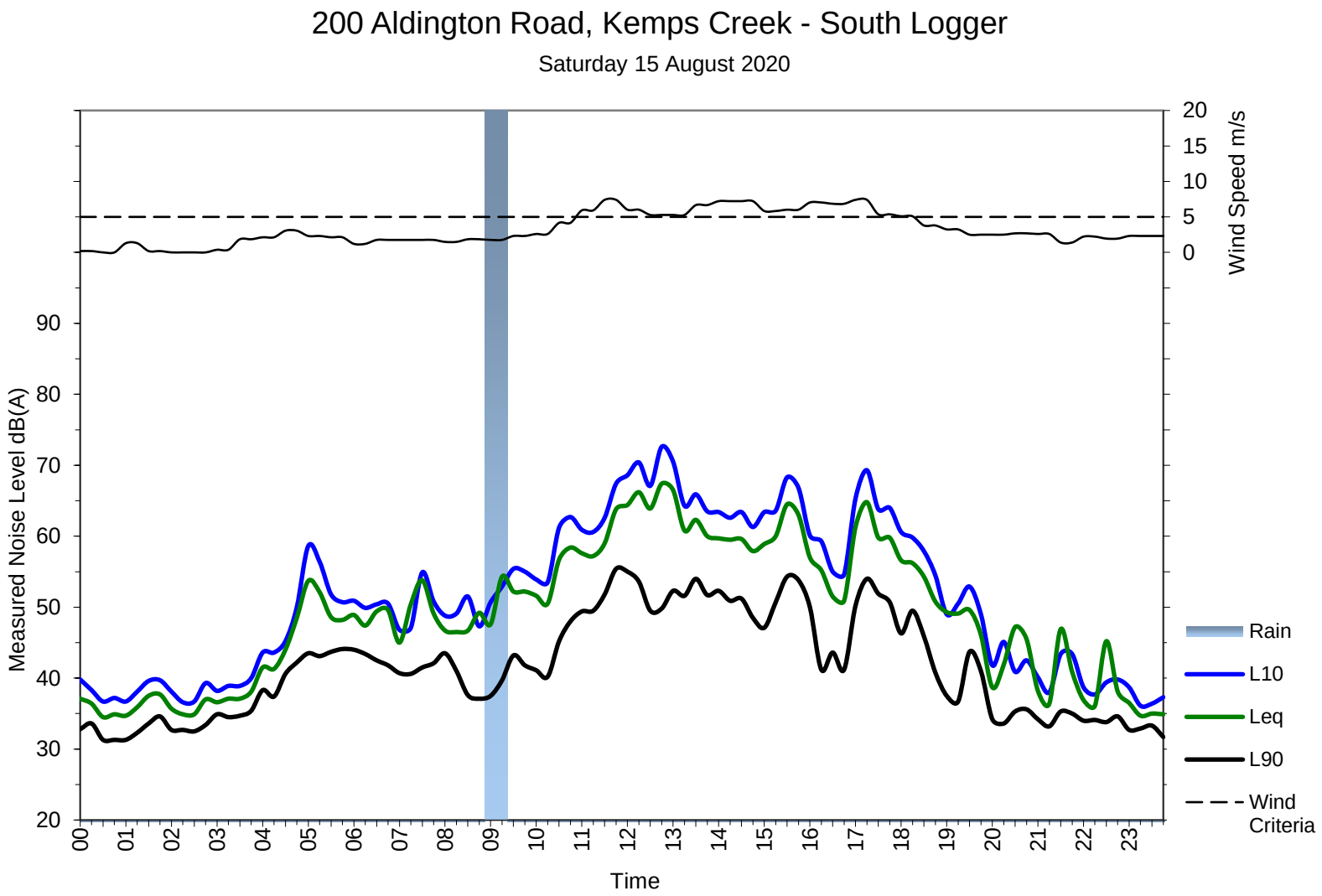
14 Appendix C – Noise Logging Results, Southern Logger

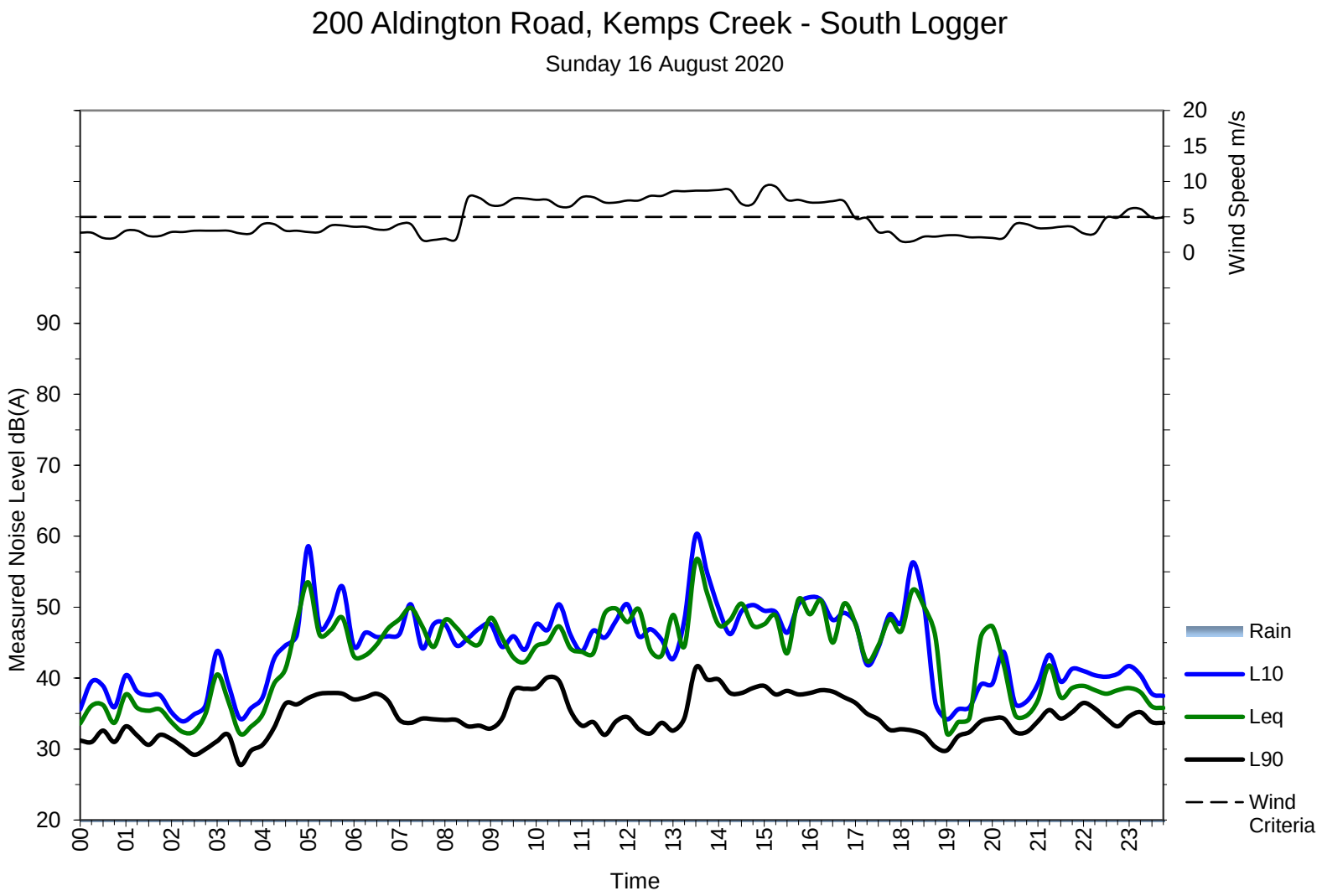

200 Aldington Road, Kemps Creek - South Logger
Tuesday 11 August 2020
Measured Noise Level dB(A)
Wind Speed m/s
Time
Rain
L10
Leq
L90
Wind Criteria

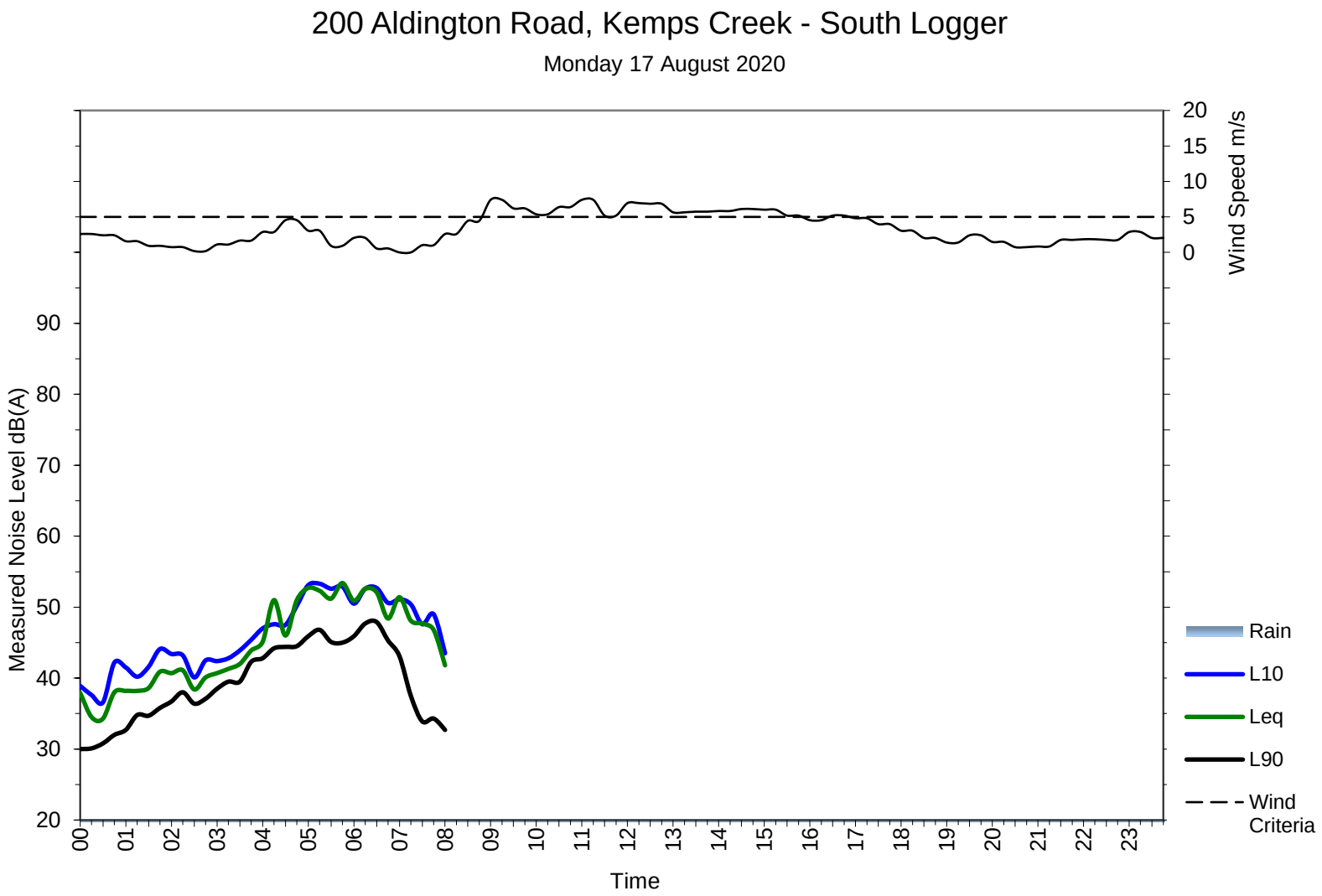

200 Aldington Road, Kemps Creek - South Logger
Wednesday 12 August 2020
Measured Noise Level dB(A)
Wind Speed m/s
Time
Rain
L10
Leq
L90
Wind Criteria


200 Aldington Road, Kemps Creek - South Logger
Thursday 13 August 2020
Measured Noise Level dB(A)
Wind Speed m/s
Time
Rain
L10
Leq
L90
Wind Criteria


200 Aldington Road, Kemps Creek - South Logger
Friday 14 August 2020
Measured Noise Level dB(A)
Wind Speed m/s
Time
Rain
L10
Leq
L90
Wind Criteria

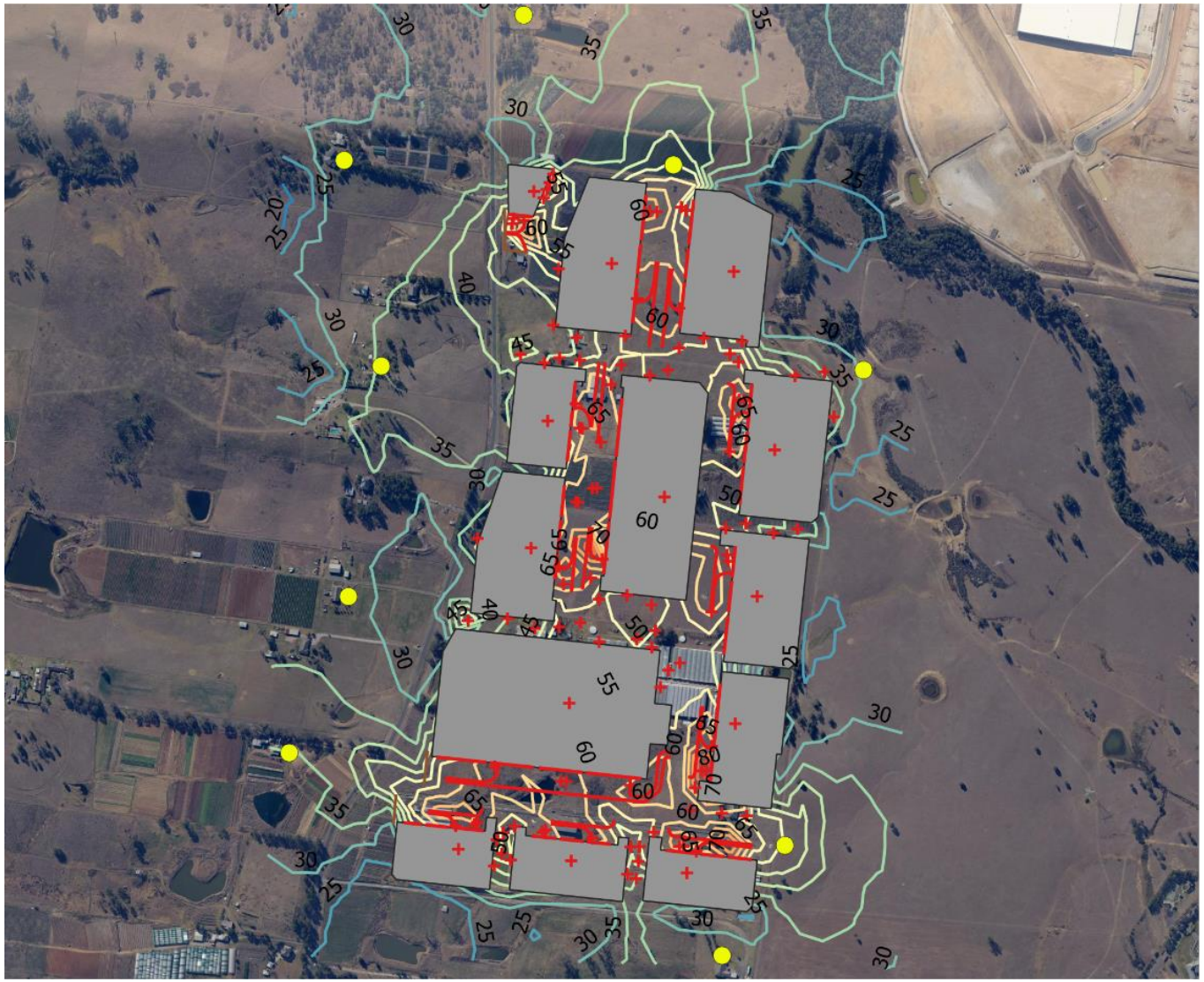

200 Aldington Road, Kemps Creek - South Logger
Saturday 15 August 2020
Measured Noise Level dB(A)
Wind Speed m/s
Time
Rain
L10
Leq
L90
Wind Criteria


200 Aldington Road, Kemps Creek - South Logger
Sunday 16 August 2020
Measured Noise Level dB(A)
Wind Speed m/s
Time
Rain
L10
Leq
L90
Wind Criteria

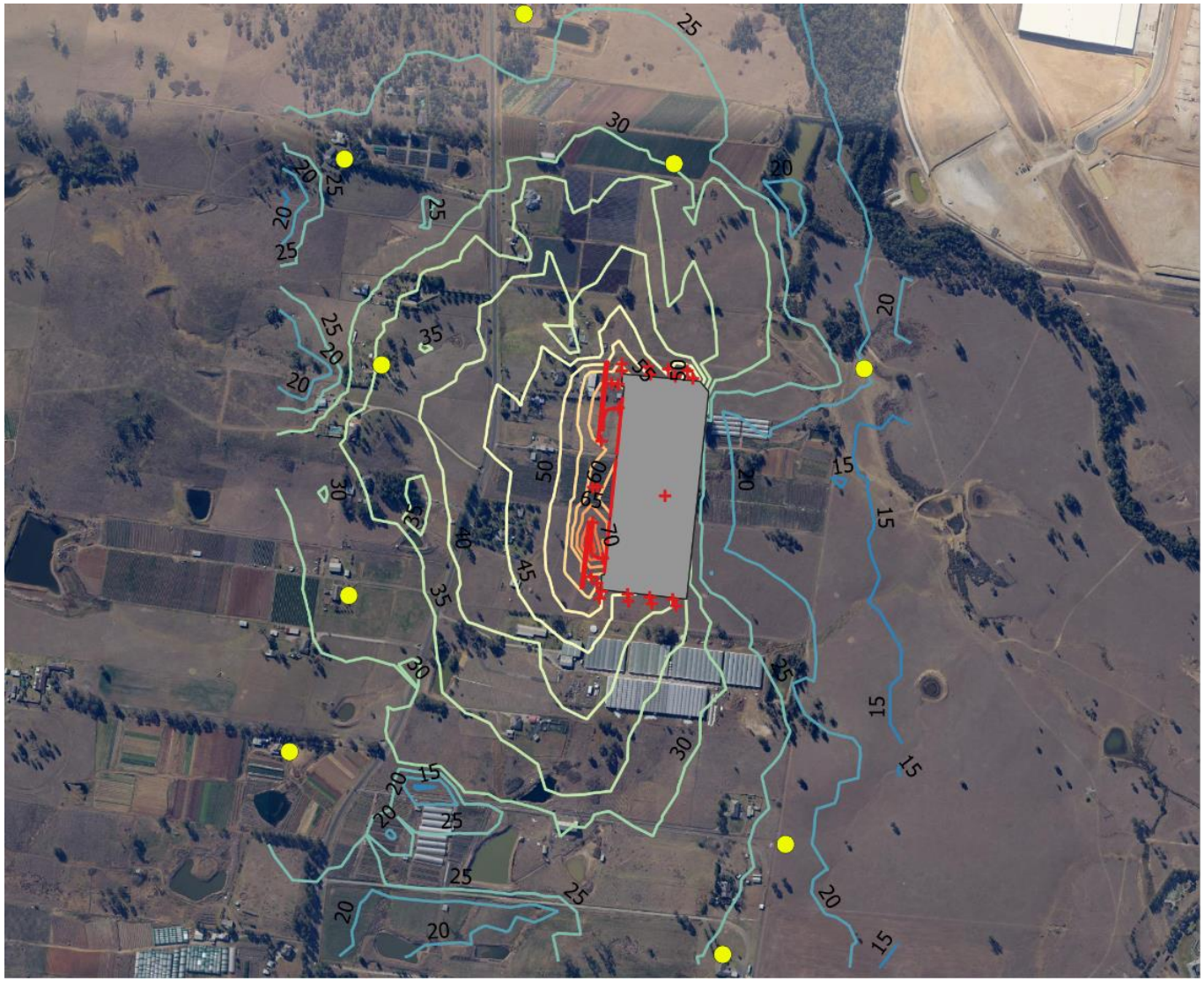

200 Aldington Road, Kemps Creek - South Logger
Monday 17 August 2020
Measured Noise Level dB(A)
Wind Speed m/s
Time
Rain
L10
Leq
L90
Wind Criteria

15 Appendix D – Results of iNoise Modelling

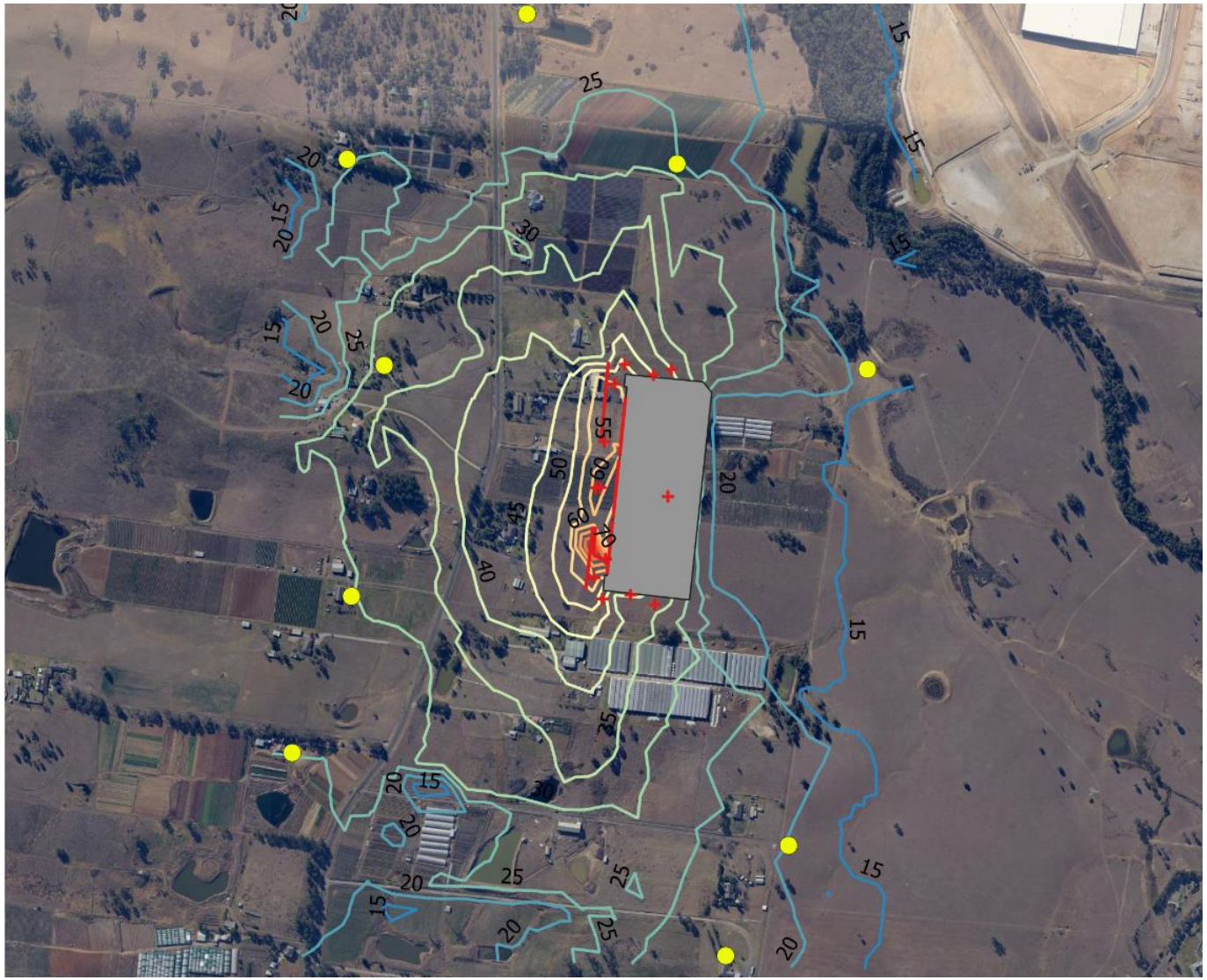
Cumulative Day Time iNoise Modelling Results – All Warehouses



Cumulative Evening and Night Time iNoise Modelling Results – All Warehouses

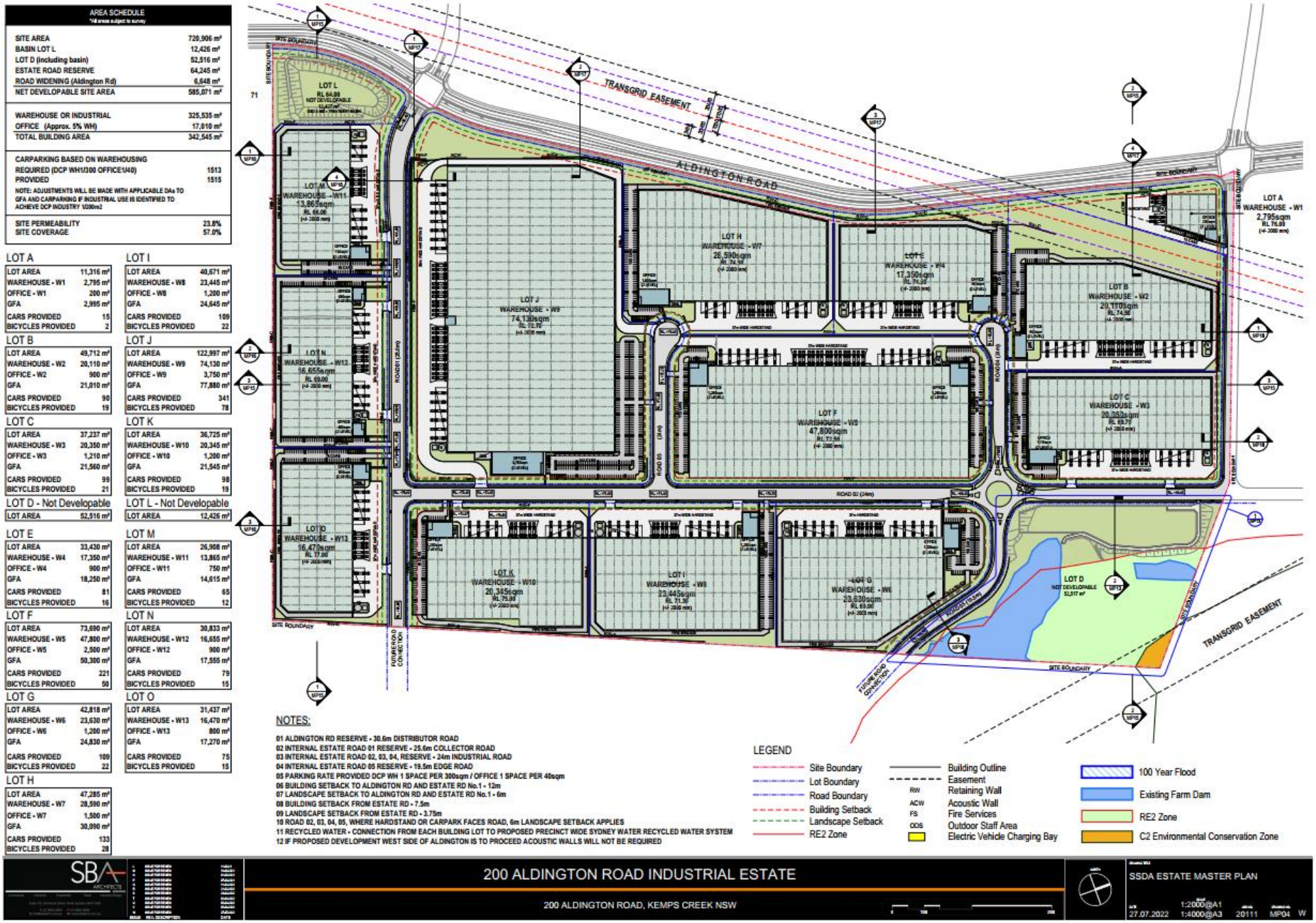


Cumulative Day Time iNoise Modelling Results – Warehouse F only



Cumulative Evening and Night Time iNoise Modelling Results – Warehouse F only

16 Appendix E – Proposed Car Parking


AREA SCHEDULE
*All areas subject to survey
SITE AREA 726,906 m²
BASIN LOT L 12,426 m²
LOT D (including basin) 52,516 m²
ESTATE ROAD RESERVE 64,245 m²
ROAD WIDENING (Aldington Rd) 6,648 m²
NET DEVELOPABLE SITE AREA 585,071 m²
WAREHOUSE OR INDUSTRIAL 325,535 m²
OFFICE (Approx. 5% WH) 17,010 m²
TOTAL BUILDING AREA 342,545 m²
CARPARKING BASED ON WAREHOUSING
REQUIRED (DCP WH1/300 OFFICE1/40) 1513
PROVIDED 1515
NOTE: ADJUSTMENTS WILL BE MADE WITH APPLICABLE DAs TO GFA AND CARPARKING IF INDUSTRIAL USE IS IDENTIFIED TO ACHIEVE DCP INDUSTRY 1/300m2
SITE PERMEABILITY 23.8%
SITE COVERAGE 57.0%
LOT A
LOT AREA 11,316 m²
WAREHOUSE - W1 2,795 m²
OFFICE - W1 200 m²
GFA 2,995 m²
CARS PROVIDED 15
BICYCLES PROVIDED 2
LOT B
LOT AREA 49,712 m²
WAREHOUSE - W2 20,110 m²
OFFICE - W2 900 m²
GFA 21,010 m²
CARS PROVIDED 90
BICYCLES PROVIDED 19
LOT C
LOT AREA 37,237 m²
WAREHOUSE - W3 20,350 m²
OFFICE - W3 1,210 m²
GFA 21,560 m²
CARS PROVIDED 99
BICYCLES PROVIDED 21
LOT D - Not Developable
LOT AREA 52,516 m²
LOT E
LOT AREA 33,430 m²
WAREHOUSE - W4 17,350 m²
OFFICE - W4 900 m²
GFA 18,250 m²
CARS PROVIDED 81
BICYCLES PROVIDED 16
LOT F
LOT AREA 73,690 m²
WAREHOUSE - W5 47,800 m²
OFFICE - W5 2,500 m²
GFA 50,300 m²
CARS PROVIDED 221
BICYCLES PROVIDED 50
LOT G
LOT AREA 42,818 m²
WAREHOUSE - W6 23,630 m²
OFFICE - W6 1,200 m²
GFA 24,830 m²
CARS PROVIDED 109
BICYCLES PROVIDED 22
LOT H
LOT AREA 47,285 m²
WAREHOUSE - W7 28,590 m²
OFFICE - W7 1,500 m²
GFA 30,090 m²
CARS PROVIDED 133
BICYCLES PROVIDED 28
LOT I
LOT AREA 40,671 m²
WAREHOUSE - W8 23,445 m²
OFFICE - W8 1,200 m²
GFA 24,645 m²
CARS PROVIDED 109
BICYCLES PROVIDED 22
LOT J
LOT AREA 122,997 m²
WAREHOUSE - W9 74,130 m²
OFFICE - W9 3,750 m²
GFA 77,880 m²
CARS PROVIDED 341
BICYCLES PROVIDED 78
LOT K
LOT AREA 36,725 m²
WAREHOUSE - W10 20,345 m²
OFFICE - W10 1,200 m²
GFA 21,545 m²
CARS PROVIDED 98
BICYCLES PROVIDED 19
LOT L - Not Developable
LOT AREA 12,426 m²
LOT M
LOT AREA 26,968 m²
WAREHOUSE - W11 13,865 m²
OFFICE - W11 750 m²
GFA 14,615 m²
CARS PROVIDED 65
BICYCLES PROVIDED 12
LOT N
LOT AREA 30,833 m²
WAREHOUSE - W12 16,655 m²
OFFICE - W12 900 m²
GFA 17,555 m²
CARS PROVIDED 79
BICYCLES PROVIDED 15
LOT O
LOT AREA 31,437 m²
WAREHOUSE - W13 16,470 m²
OFFICE - W13 800 m²
GFA 17,270 m²
CARS PROVIDED 75
BICYCLES PROVIDED 15
TRANSGRID EASEMENT
ALDINGTON ROAD
LOT A WAREHOUSE - W1 2,795sqm
LOT B WAREHOUSE - W2 20,110sqm
LOT C WAREHOUSE - W3 20,350sqm
LOT D NOT DEVELOPABLE 52,517 m²
LOT E WAREHOUSE - W4 17,350sqm
LOT F WAREHOUSE - W5 47,800sqm
LOT G WAREHOUSE - W6 23,630sqm
LOT H WAREHOUSE - W7 28,590sqm
LOT I WAREHOUSE - W8 23,445sqm
LOT J WAREHOUSE - W9 74,130sqm
LOT K WAREHOUSE - W10 20,345sqm
LOT L RL 64.00 NOT DEVELOPABLE
LOT M WAREHOUSE - W11 13,865sqm
LOT N WAREHOUSE - W12 16,655sqm
LOT O WAREHOUSE - W13 16,470sqm
ROAD 01 (25m)
ROAD 02 (24m)
ROAD 03 (24m)
ROAD 04 (24m)
ROAD 05 (19.5m)
SITE BOUNDARY
FUTURE ROAD CONNECTION
NOTES:
01 ALDINGTON RD RESERVE - 30.6m DISTRIBUTOR ROAD
02 INTERNAL ESTATE ROAD 01 RESERVE - 25.6m COLLECTOR ROAD
03 INTERNAL ESTATE ROAD 02, 03, 04, RESERVE - 24m INDUSTRIAL ROAD
04 INTERNAL ESTATE ROAD 05 RESERVE - 19.5m EDGE ROAD
05 PARKING RATE PROVIDED DCP WH 1 SPACE PER 300sqm / OFFICE 1 SPACE PER 40sqm
06 BUILDING SETBACK TO ALDINGTON RD AND ESTATE RD No.1 - 12m
07 LANDSCAPE SETBACK TO ALDINGTON RD AND ESTATE RD No.1 - 6m
08 BUILDING SETBACK FROM ESTATE RD - 7.5m
09 LANDSCAPE SETBACK FROM ESTATE RD - 3.75m
10 ROAD 02, 03, 04, 05, WHERE HARDSTAND OR CARPARK FACES ROAD, 6m LANDSCAPE SETBACK APPLIES
11 RECYCLED WATER - CONNECTION FROM EACH BUILDING LOT TO PROPOSED PRECINCT WIDE SYDNEY WATER RECYCLED WATER SYSTEM
12 IF PROPOSED DEVELOPMENT WEST SIDE OF ALDINGTON IS TO PROCEED ACOUSTIC WALLS WILL NOT BE REQUIRED
LEGEND
Site Boundary
Lot Boundary
Road Boundary
Building Setback
Landscape Setback
RE2 Zone
Building Outline
Easement
RW Retaining Wall
ACW Acoustic Wall
FS Fire Services
ODS Outdoor Staff Area
Electric Vehicle Charging Bay
100 Year Flood
Existing Farm Dam
RE2 Zone
C2 Environmental Conservation Zone
SBA ARCHITECTS
200 ALDINGTON ROAD INDUSTRIAL ESTATE
200 ALDINGTON ROAD, KEMPS CREEK NSW
SSDA ESTATE MASTER PLAN
27.07.2022
1:2000@A1
1:4000@A3
20111
MP04
W

17 Appendix F – Raw Data and Notes of on site Truck and Forklift Measurements

Echohush panels → Pyrotek
↳ several colours
↳ subcontractors to install.
↳ adhesive fixing
↳ need specs, casting...

Viterolite R/B
→ More durability
→ Less sound absorption
→ More suitable for mech fixing
→ 600x600

BAC – PCT0808 – 2-K

2.59 x 2.59 x 3.33

Project #	Location	Leq	L90	Lmax
2	Noise logger			
3	Lift fork ramp down	68.9	60.5	72
4	Lift fork up ramp	77.4	69	82
5	Lift Loading Part 2			
6	Lift Loading Part 2			
7	Forklift Idling (5~7m)			
8	Actual Loading (7~m)			
9	Unloading Cylender (~7.7m)			
10	Lift P1 (~3-6m)			
11	Lift Loading v2 P2 (7m)			
12	Lift moving 5th Part 1 (~4m)			
13	Lift loading 3rd Part # (~ 6m)			
14	Strapping on goods 1st Part 1 (5m)			
15	Strapping on goods 1st Part 2 (5m)			
16	Strapping on goods 3rd (5m)			
17	Truck moving P1 (13.5)			
18	Truck Idle P2 (13.5m)			
19	Truck Idle P3 (13.4m)	72	71	72
20	Truck brakes (17m)			
21	Truck Idle (weird noise) (7m)			
22	" " (" ") (7m)			
23	" " (no noise) 7m	76	76	77
24	Truck moving (4m)			
25	Truck reversing (3m)			
26	" " (3m)			
27	" " (3m)			
28	" " (Brakes Bleeding) (3m)			
29	Roller Compactor - rolling (8m)			
30	" " - Idle (4m)			
31	" " - moving alongside (4m)			
32	Putting stuff in container (4m)			
33	Roller Compactor - rolling (5m)			
34	" " (5m)	54	55	68
35	Forklift (3m)			
36	Forklift on road with bump (2m) (25m empty)