# 91 Gardiner Street, Rutherford – Diana Pet Foods - Noise Impact Assessment

SPF Diana Australia Pty Ltd
Hawthorne St,
Beresfield NSW 2322

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# 1 INTRODUCTION

Pulse White Noise Acoustics (PWNA) has undertaken an acoustic assessment of the proposed pet food ingredient manufacturing facility at 91 Gardiner Street, Rutherford. This report documents the findings of this assessment.

In terms of the operational noise assessment of the development, proposed activities have been assessed against the requirements of the Noise Policy for Industry (NPfI). A 3D noise model was created in the noise modelling software iNoise (2022.01) to assess on-site truck movements and associated loading / unloading activities, passenger car movements, major items of mechanical equipment and other operational noise sources associated with the development.

This report provides a noise and vibration impact assessment and responds to the Industry Specific Secretary's Environmental Assessment Requirements (SEARs) issued by the Department of Planning and Environment (DPE) on 18 January 2022. An outline of the SEARs relevant to this acoustic assessment, and how they have been responded to, is summarised below.

**Noise and Vibration – including:**

- *a description of all potential noise and vibration sources during construction and operation, including road traffic noise*
- *a noise and vibration assessment in accordance with the relevant Environment Protection Authority guidelines*
- *a description and appraisal of noise and vibration mitigation and monitoring measures.*

This document provides high level acoustic advice for the proposed facility, including an assessment of noise emissions to external receivers.

This report included includes identification of noise sensitive receiver locations, the results of unattended noise monitoring, establishment of applicable criteria, conceptual noise control measures and recommendations for the facility to manage potential noise and vibration impacts.

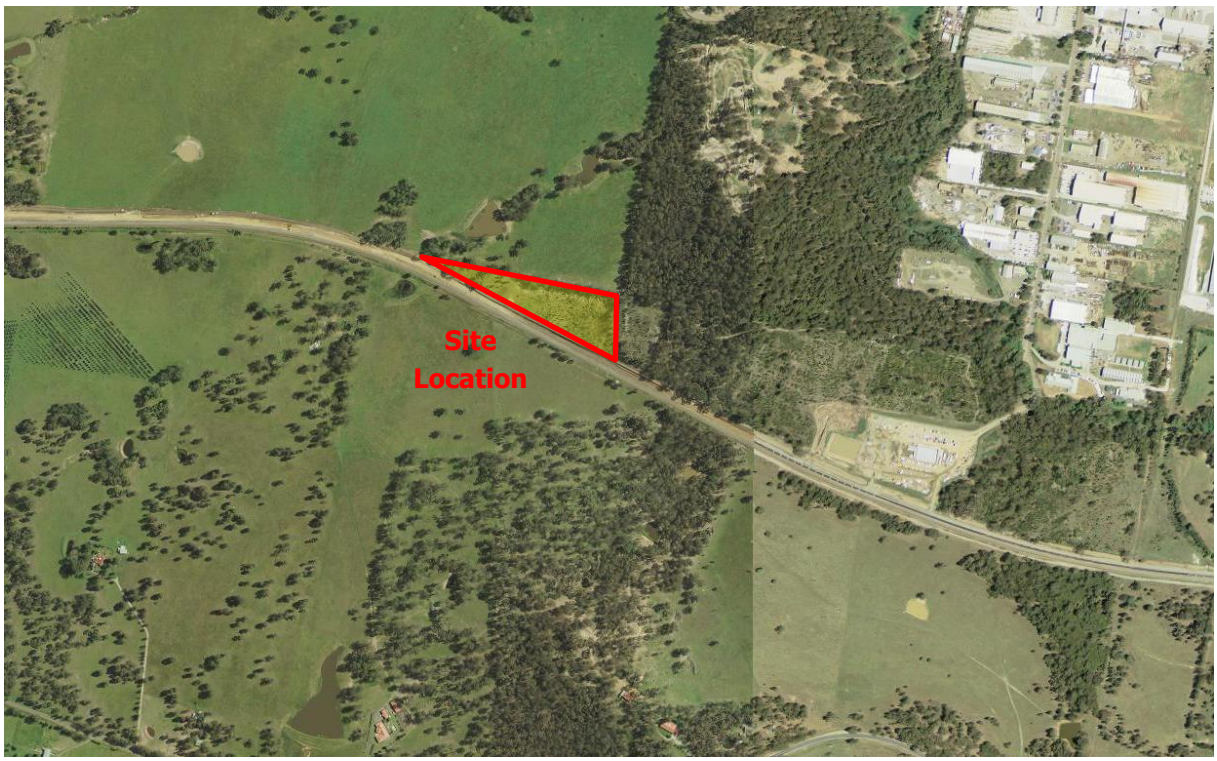
## 1.1 Site Location

The site is located at 91 Gardiner Street, Rutherford within close proximity of the Hunter Line which is located to the south. Existing industrial developments are located to the north-east of the site and include "Jurox" at 85 Gardiner St and "Industrial Maintenance & Fabrications Pty Ltd" at 73 Gardiner St.

Residential receivers are situated approximately 700m further to the south of the site, with the nearest receptor located at 398 Wollombi Rd Farley, 2320. Other surrounding residences located further away have also been considered in the noise impact assessment.

Figure 1 below highlights the site location, as well as adjacent industrial developments to the north-east.

**Figure 1 Site Location - 91 Gardiner Street, Rutherford**




## 1.2 Proposed Development

The proposed pet food ingredient manufacturing facility is to be developed at 91 Gardiner Street, Rutherford, known as Lot 2, DP1197299.

Primary noise generating sources from the site are expected to include truck movements, car movements, mechanical equipment and plant items associated with the SPF Diana Australia Pty Ltd development.

Construction noise criteria are also established in this report. Potential increases in road traffic noise from increased vehicle movements along Gardiner Street will also be assessed against the NSW Environment Protection Authority's (EPA) Road Noise Policy (RNP) criteria.

Traffic data for the Rutherford site has been based off a survey of the existing Diana Pet Foods development at Hawthorne Street which has been documented within '*Traffic and Parking Assessment Report*' (Report No: PT21101r01_V2, dated February 2022).

The proposed layouts of the development are shown in the below figures.

**Figure 2 Proposed Site Plan Drawing 1**

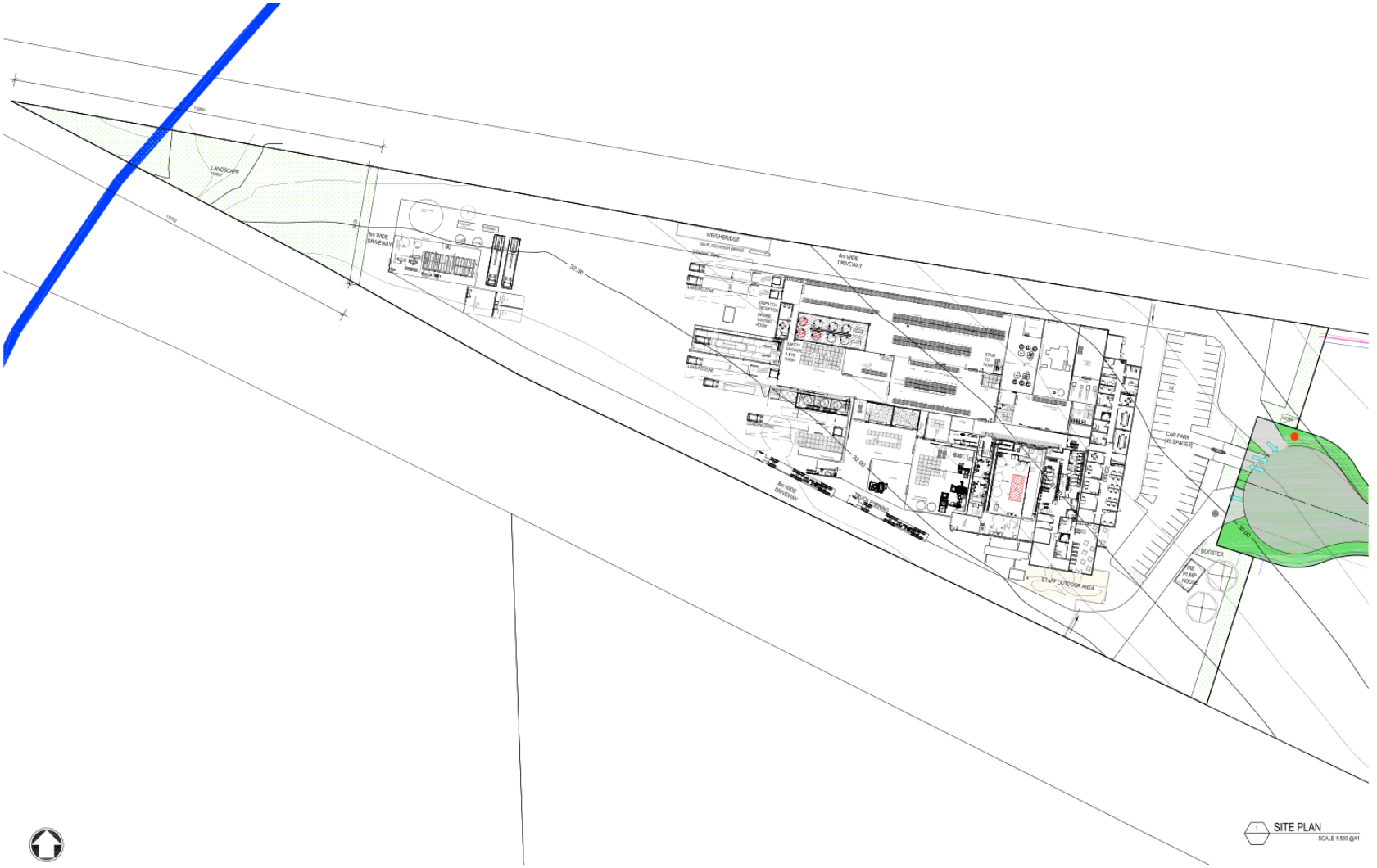


**Figure 3 Proposed Site Plan Drawing 2**

# 2 NEAREST SENSITIVE RECEPTORS

The site location is classified as 'IN1 - General Industrial' according to the NSW Planning ePlanning Spatial Viewer Zoning Maps. Residential receivers located to the south of the site and identified in Table 2-1 are zoned as 'RU2: Rural Landscape'.

A total of 16 receiver locations have also been highlighted in Figure 4. Note that residential properties at located at these rural addresses and these receiver locations have therefore been assessed as "residential receivers".

No receivers have been placed in the industrial lots situated North-East of the site location, as the noise intrusion from the site at these locations is predicted to be well within compliance of the industrial noise criteria.

**Figure 4 Location of Considered Receivers**

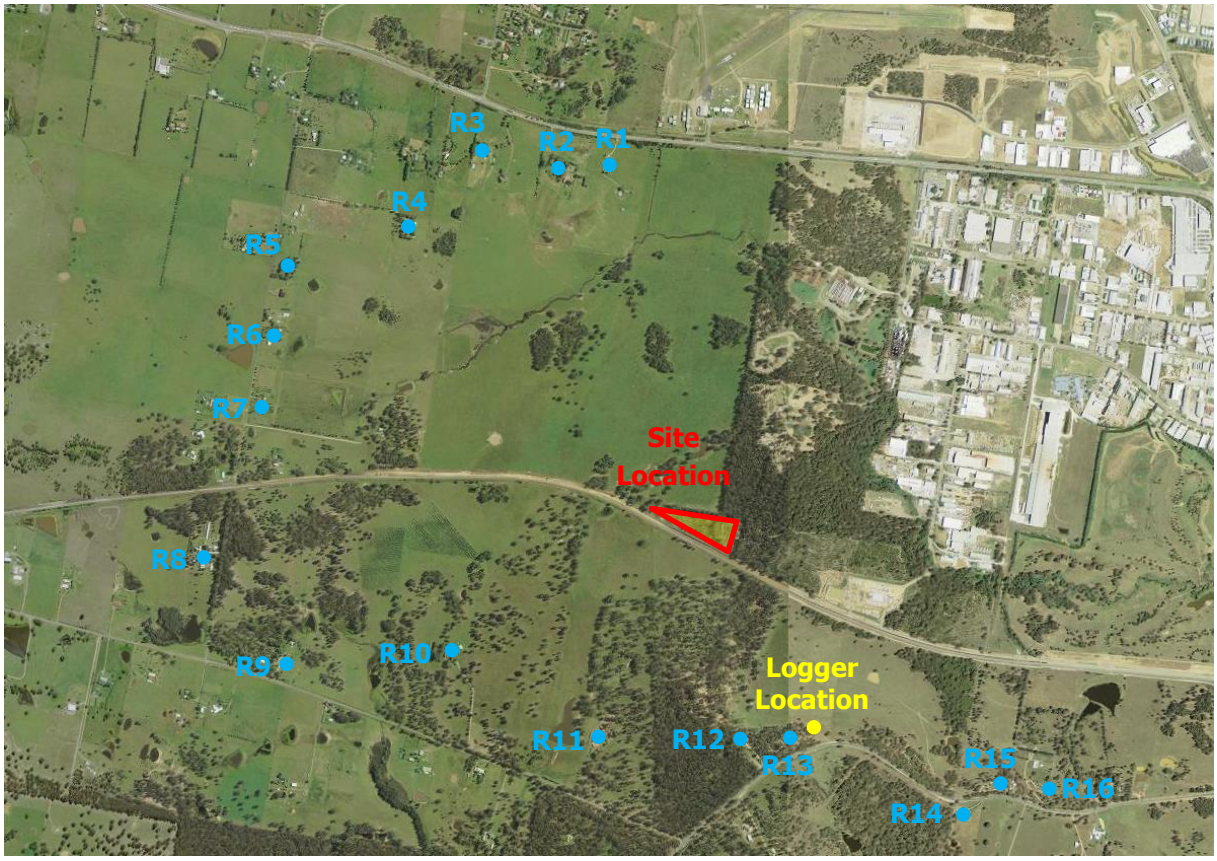


**Table 2-1 Nearest Potentially Affected Receivers**

| Receptor ID | Address | Lot and DP | Type of Receiver |
|---|---|---|---|
| **R1** | 643 New England Highway, Lochinvar 2321 | Lot 6 DP846960 | Residential |
| **R2** | 669 New England Highway, Lochinvar 2321 | Lot 5 DP846960 | Residential |
| **R3** | 687 New England Highway, Lochinvar 2321 | Lot 6871 DP1121957 | Residential |
| **R4** | 59 Winders Lane, Lochinvar 2321 | Lot 6 DP239754 | Residential |
| **R5** | 93 Winders Lane, Lochinvar 2321 | Lot 22 DP859518 | Residential |
| **R6** | 115 Winders Lane, Lochinvar 2321 | Lot 310 DP863302 | Residential |
| **R7** | 141 Winders Lane, Lochinvar 2321 | Lot 4 DP239754 | Residential |
| **R8** | 206 Old North Road, Lochinvar 2321 | Lot 1311 DP1141533 | Residential |
| **R9** | 176 Old North Road, Farley 2320 | Lot 1 DP634522 | Residential |
| **R10** | 94 Old North Road, Farley 2320 | Lot 1 DP634522 | Residential |
| **R11** | 48 Old North Road, Farley 2320 | Lot 4 DP 634525 | Residential |
| **R12** | 412 Wollombi Road, Farley 2320 | Lot 5 DP 634525 | Residential |
| **R13** | 398 Wollombi Road, Farley 2320 | Lot 4 DP234367 | Residential |
| **R14** | 319 Wollombi Road, Farley 2320 | Lot 3 DP810894 | Residential |
| **R15** | 312 Wollombi Road, Farley 2320 | Lot 8 DP585160 | Residential |
| **R16** | 292 Wollombi Road, Farley 2320 | Lot 90 DP774537 | Residential |

# 3 EXISTING ACOUSTIC ENVIRONMENT

## 3.1 Noise Descriptors and Terminology

Environmental noise constantly varies in level with time. Therefore, it is necessary to measure noise in terms of quantifiable time periods with statistical descriptors. Typically, environmental noise is measured over 15-minute periods and relevant statistical descriptors of the fluctuating noise are determined to quantify the measured level.

Noise (or sound) consists of minute fluctuations in atmospheric pressure capable of detection by human hearing. Noise levels are expressed in terms of decibels, abbreviated as dB or dBA, the "A" indicating that the noise levels have been frequency weighted to approximate the characteristics of normal human hearing. Because noise is measured using a logarithmic scale, 'normal' linear arithmetic does not apply, e.g., adding two sound sources of equal values result in an increase of 3 dB (i.e., 60 dBA plus 60 dBA results in 63 dBA). A change of 1 dB or 2 dB in the sound level is difficult for most people to detect, whilst a 3 dB – 5 dB change corresponds to a small but noticeable change in loudness. A 10 dB change roughly corresponds to a doubling or halving in loudness.

The most relevant environmental noise descriptors are the $L_{Aeq}$, $L_{A1}$, $L_{A10}$ and $L_{A90}$ noise levels. The $L_{Aeq}$ noise level represents the "equivalent energy average noise level". This parameter is derived by integrating the noise level measured over the measurement period. It represents the level that the fluctuating noise with the same acoustic energy would be if it were constant over the measured time period.

The $L_{A1}$, $L_{A10}$ and $L_{A90}$ levels are the levels exceeded for 1%, 10% and 90% of the sample period. These levels can be considered as the maximum noise level, the average repeatable maximum and average repeatable minimum noise levels, respectively.

Specific acoustic terminology is used in this assessment report. An explanation of common acoustic terms is included in Appendix A.

## 3.2 Unattended Noise Monitoring

### 3.2.1 Monitoring Details

To determine the background noise levels at nearby receivers, long term unattended noise monitoring was conducted at the boundary of the subject site and the nearest residential receiver. As per Table A1 of the Noise Policy for Industry, the noise logger was placed in the vicinity of the potentially most affected residence. The location of the noise monitor is shown in Figure 4.

### 3.2.2 Monitoring Instrumentation

Instrumentation used for the noise survey comprised of one SVAN 971 type sound level meter (serial number 103360) fitted with a microphone windshield. Calibration of the logger was checked prior to and following the measurements. Drift in calibration did not exceed ±0.5 dBA. All equipment carried appropriate and current NATA (or manufacturer) calibration certificates.

Charts presenting summaries of the measured daily noise data are attached in Appendix B. These charts, representing each 24 hour period, show the $L_{A1}$, $L_{A10}$, $L_{Aeq}$ and $L_{A90}$ noise levels measured over 15 minute time periods.

Logging was conducted from Sunday November 14th 2021 to Saturday November 27th 2021. The measurement results have been filtered to remove data affected by adverse weather conditions, such as excessively windy or rainy time periods, as recorded by the nearest Bureau of Meteorology weather station at Maitland Airport AWS, NSW. Detailed noise logging results are shown in Appendix B.

The measured background noise data of the logger was assessed in accordance with the recommendations contained in the NSW Environment Protection Authority's (EPA) *Noise Policy for Industry* (NPI).

The Rating Background Noise Level (RBL) is the background noise level used for assessment purposes at the nearest potentially affected receiver. It is the 90th percentile of the daily background noise levels during each assessment period, being day, evening and the night. The RBL $L_{A90\ (15minute)}$ and $L_{Aeq}$ noise levels are presented in Table 3-1 for the unattended logging. The measured noise levels are considered to be representative of the levels to be expected at the nearest and most affected residence to the proposed development.

**Table 3-1 Measured ambient noise levels in accordance with the NSW NPI**

| Measurement Location | Daytime[1] 7:00 am to 6:00 pm | | Evening[1] 6:00 pm to 10:00 pm | | Night-time[1] 10:00 pm to 7:00 am | |
|---|---|---|---|---|---|---|
| | $L_{A90}$[2] | $L_{Aeq}$[3] | $L_{A90}$[2] | $L_{Aeq}$[3] | $L_{A90}$[2] | $L_{Aeq}$[3] |
| **Logger Location (398 Wollombi Road, Farley) – see Figure 4** | 40 | 58 | 40 | 57 | 38 | 56 |

*Note 1: For Monday to Saturday, Daytime 7:00 am – 6:00 pm; Evening 6:00 pm – 10:00 pm; Night-time 10:00 pm – 7:00 am. On Sundays and Public Holidays, Daytime 8:00 am – 6:00 pm; Evening 6:00 pm – 10:00 pm; Night-time 10:00 pm – 8:00 am*

*Note 2: The $L_{A90}$ noise level is representative of the "average minimum background sound level" (in the absence of the source under consideration), or simply the background level.*

*Note 3: The $L_{Aeq}$ is the energy average sound level. It is defined as the steady sound level that contains the same amount of acoustical energy as a given time-varying sound.*

# 4 APPLICABLE GUIDELINES AND RECOMMENDED CRITERIA

This section contains noise criteria on the operational criteria, construction criteria and vibration criteria.

The following criteria are relevant for the assessment of noise and vibration emissions from the proposed facility:

- For the assessment of the predicted operational noise emissions from the development: The criteria have been derived in accordance with the *Noise Policy for Industry* (EPA, 2017). Refer to Section 4.1.
- The assessment of the noise impacts of the construction noise on the sensitive receivers: The criteria have been derived in accordance with the *Interim Construction Noise Guideline* (DECC, 2009). See Section 4.2.
- For the assessment of vibration impacts from the development: The criteria have been derived in accordance with *Assessing Vibration: A Technical Guideline* (DEC, 2006), BS 7385-2: 1993 and BS 6472: 1992. Refer to Section 4.4.

## 4.1 NSW Noise Policy for Industry

In NSW, the control of noise emissions is the responsibility of Local Government and the NSW Environment Protection Authority (NSW EPA). In October 2017, the NSW EPA released the *Noise Policy for Industry* (NSW NPI). The purpose of the policy is to ensure that noise impacts associated with particular industrial developments are evaluated and managed in a consistent and transparent manner. The policy aims to ensure that noise is kept to acceptable levels in balance with the social and economic value of industry in NSW.

The NSW NPI criteria for industrial noise sources have two components:

- Controlling the intrusive noise impacts for residential receivers in the short-term; and
- Maintaining noise level amenity of particular land uses for residents and sensitive receivers in other land uses.

The project noise trigger level is derived from the more stringent value out of the project intrusiveness noise level and the project amenity noise level.

### 4.1.1 Intrusive Noise Impacts (Residential Receivers)

The NSW NPI states that the noise from any single source should not intrude greatly above the prevailing background noise level. Industrial noises are generally considered acceptable if the equivalent continuous (energy-average) A-weighted level of noise from the source ($L_{Aeq}$), measured over a 15-minute period, does not exceed the background noise level measured in the absence of the source by more than 5 dB(A). This is often termed the Intrusiveness Criterion.

The 'Rating Background Level' (RBL) is the background noise level to be used for assessment purposes and is determined by the methods given in the NSW NPI. Using the rating background noise level approach results in the intrusiveness criterion being met for 90% of the time. Adjustments are to be applied to the level of noise produced by the source that is received at the assessment point where the noise source contains annoying characteristics such as tonality or impulsiveness.

### 4.1.2 Protecting Noise Amenity (All Receivers)

To limit continuing increases in noise levels, the maximum ambient noise level within an area from industrial noise sources should not normally exceed the acceptable noise levels specified in Table 2.2 of the NSW NPI. That is, the ambient $L_{Aeq}$ noise level should not exceed the level appropriate for the particular locality and land use. This is often termed the 'Background Creep' or Amenity Criterion.

The amenity assessment is based on noise criteria specified for a particular land use and corresponding sensitivity to noise. The cumulative effect of noise from industrial sources needs to be considered in assessing the impact. These criteria relate only to other continuous industrial-type noise and do not include road, rail or community noise. If the existing (measured) industrial-type noise level approaches the criterion value, then the NSW NPI sets maximum noise emission levels from new sources with the objective of ensuring that the cumulative levels do not significantly exceed the criterion.

Project amenity noise level for industrial developments is specified as the recommended amenity noise level (Table 2.2 of the NPI) minus 5 dB(A). To standardise the time periods for the intrusiveness and amenity noise levels, this policy assumes that the $L_{Aeq,15min}$ will be taken to be equal to the $L_{Aeq,period}$ + 3 decibels (dB).

### 4.1.3 Area Classification

The NSW NPI characterises the "Rural residential" noise environment as an area that has the following characteristics:

> *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.*

For the considered receptors in the suburban area, the recommended amenity noise level is shown in Table 4-1 below. When the existing noise level from industrial noise sources is close to the recommended "Amenity Noise Level" (ANL) given below, noise from the new source must be controlled to preserve the amenity of the area in line with the requirements of the NSW NPI.

**Table 4-1 NSW NPI – Recommended $L_{Aeq}$ Noise Levels from Industrial Noise Sources**

| Type of Receiver | Indicative Noise Amenity Area | Time of Day[1] | Recommended Amenity Noise Level ($L_{Aeq, period}$)[2] (dBA) |
|---|---|---|---|
| Residence | Rural | Day | 50 |
| | | Evening | 45 |
| | | Night | 40 |
| Commercial | | When in use | 65 |
| Industrial | | When in use | 70 |

*Note 1: For Monday to Saturday, Daytime 7:00 am – 6:00 pm; Evening 6:00 pm – 10:00 pm; Night-time 10:00 pm – 7:00 am. On Sundays and Public Holidays, Daytime 8:00 am – 6:00 pm; Evening 6:00 pm – 10:00 pm; Night-time 10:00 pm – 8:00 am.*

*Note 2: The $L_{Aeq}$ is the energy average sound level. It is defined as the steady sound level that contains the same amount of acoustical energy as a given time-varying sound.*

Where existing road traffic noise is high enough to render stationary noise sources effectively inaudible, the ANL can be modified so that the amenity criteria is not unduly stringent in an environment where road traffic noise is the dominant source of environmental noise. If all the conditions below are satisfied, the ANL becomes $L_{Aeq, traffic}$ minus 15 dBA. The conditions are:

- The road traffic noise is the dominant noise source.
- The existing noise is 10dBA or more above the recommended ANL for the area.
- It is highly unlikely the road traffic noise levels would reduce in the near future.

### 4.1.4 Project Trigger Noise Levels

The intrusive and amenity criteria for industrial noise emissions derived from the measured data are presented in Table 4-2. The amenity and intrusive criterion are nominated for the purpose of determining the operational noise limits for noise sources associated with the development which can potentially affect noise sensitive receivers.

For each assessment period, the project trigger noise levels are the lower (i.e., the more stringent) of the amenity or intrusive criteria. The project trigger noise levels are shown in bold text in Table 4-2.

**Table 4-2 External noise level criteria in accordance with the NSW NPI**

| Location | Time of Day | Project Amenity Noise Level, $L_{Aeq, period}$ [1] (dBA) | Measured $L_{A90, 15\ min}$ (RBL) [2] (dBA) | Measured $L_{Aeq, period}$ Noise Level (dBA) | Intrusive $L_{Aeq, 15\ min}$ Criterion for New Sources (dBA) [4] | Amenity $L_{Aeq, 15\ min}$ Criterion for New Sources (dBA) [5, 6, 7] |
|---|---|---|---|---|---|---|
| **Residential Receiver** | Day | 45 | 40 | 58 | **45** | 51 |
| | Evening | 40 | 40 | 57 | **45** | 50 |
| | Night | 35 | 38 | 56 | **43** | 49 |
| **Industrial Receiver** | When in use | 65 | - | - | - | **68** |

*Note 1: Project Amenity Noise Levels corresponding to "rural" areas, equivalent to the Recommended Amenity Noise Levels minus 5 dBA*

*Note 2: $L_{A90}$ Background Noise or Rating Background Level*

*Note 3: As per section 2.3 of the Noise Policy for Industry, the evening RBL is set to no greater than the daytime RBL*

*Note 4: Intrusive criterion is equal to the RBL + 5 dB*

*Note 5: Amenity Criterion corresponding to "Rural" areas, equivalent to the Recommended Amenity Noise Levels minus 5 dBA + 3 dB to convert from the measurement "period" to a 15 minute criteria.*

*Note 6: Where the measured $L_{Aeq}$ noise levels are more than 10 dB higher than the Project Amenity Criterion, then the 15 minute Amenity Noise Criteria is equal to the measured $L_{Aeq,period}$ noise levels minus 10 dBA + 3 dB to convert from the measurement "period" to a 15 minute criteria.*

*Note 7: The lower of the amenity and the intrusiveness level is typically used as the applicable overall noise criterion for the day, evening and night periods. The overall noise criteria is shown in bold above.*

### 4.1.5 Sleep Disturbance

An accurate representation of sleep disturbance impacts on a community from a noise source is particularly difficult to quantify mainly due to differing responses of individuals to sleep disturbance – this is found even within a single subject monitored at different stages of a single night's sleep or during different periods of sleep.

In addition, the differing grades of sleep state make a definitive definition difficult, and even where sleep disturbance is not noted by the subject, factors such as heart rate, mood and performance can still be negatively affected.

An assessment of sleep disturbance should consider the maximum noise level or $L_{A1(1\ minute)}$, and the extent to which the maximum noise level exceeds the background level and the number of times this may happen during the night-time period. Factors that may be important in assessing the extent of impacts on sleep include:

- How often high noise events will occur;
- Time of day (normally between 10.00pm and 7.00am); and
- Whether there are times of day when there is a clear change in the existing noise environment (such as during night periods).

Section 2.5 of the EPA NPI provides the following criteria:

- $L_{Aeq,15min}$ 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.

As outlined in Table 4-2 above, the measured rating background noise level during the night hours (10:00pm to 7:00am) is 35 dBA $L_{A90}$. Therefore, the resultant RBL +15dB is 53dBA, which is above the minimum 52 dBA $L_{AFmax}$.

As such, **53dBA** will be adopted for this assessment at all surrounding receivers.

## 4.2 Road Traffic Noise Criteria

In March 2011, the Department of Environment Climate Change and Water NSW (now the EPA) released the NSW 'Road Noise Policy' (RNP) (DECCW, 2011). The NSW RNP aims to identify the strategies that address the issue of road traffic noise from:

- existing roads
- new road projects
- road redevelopment projects
- new traffic generating developments

The NSW RNP defines the criteria to be used in assessing the impact of such noise. Although it is not mandatory to achieve the noise assessment criteria in this NSW RNP, proponents will need to provide justification if it is not considered feasible or reasonable to achieve them.

### 4.2.1 Road classification

Gardiner Road can be classified as a local road. The proposed pet food ingredient manufacturing facility is best described as a new traffic generating development.

### 4.2.2 Noise assessment criteria

Table 3 of the NSW RNP outlines the road traffic noise assessment criteria for residential land uses. The applicable section is reproduced in Table 4-3.

**Table 4-3 Road Traffic Noise Assessment Criteria for Residential Land Uses**

| Road category | Type of project/land use | Assessment Criteria – dB(A) | |
|---|---|---|---|
| | | Day (7am to 10pm) | Night (10pm to 7am) |
| **Local roads – residential receivers** | 4. Existing residences affected by noise from new local road corridors<br>5. Existing residences affected by noise from redevelopment of existing local roads<br>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) |

## 4.3 Interim Construction Noise Guideline

The DECC *Interim Construction Noise Guideline* (ICNG, July 2009) provides guidelines for the assessment and management of construction noise. The NSW EPAs Road Noise Policy (RNP) refers to the use of the ICNG for the assessment of construction noise impacts.

The ICNG focuses on applying a range of work practices and management strategies to minimise construction noise impacts rather than focusing on achieving numeric noise levels which is not always practical on large infrastructure projects.

The main objectives of the ICNG are to:

- Identify and minimise noise from construction works
- Focus on applying all 'feasible' and 'reasonable' work practices to minimise construction noise impacts
- Encourage construction during the recommended standard hours only, unless approval is given for works that cannot be undertaken during these hours
- Reduce time spent dealing with complaints at the project implementation stage
- Provide flexibility in selecting site-specific feasible and reasonable work practices to minimise noise impacts

### 4.3.1 Quantitative Noise Assessment Criteria

Construction noise assessment goals presented in the ICNG are referenced to Noise Management Levels (NMLs) for residential, sensitive land uses and commercial/industrial premises.

***Residential premises***

Table 4-4 sets out NMLs for noise at residences and how they are to be applied.

In Table 4-4 the rating background level (RBL) is used when determining the management level. 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 *Noise Policy for Industry* (EPA, 2017).

As a guide, the difference between the internal noise level and the external noise level is typically 10 dB with windows open for adequate ventilation.

**Table 4-4 Noise at Residents Using Quantitative Assessment**

| Time of day | Management Level $L_{Aeq\ (15\ min)}$[1] | How to apply |
|---|---|---|
| **Recommended standard hours:**<br>**Monday to Friday 7am to 6pm**<br>**Saturday 8am to 1pm**<br>**No work on Sundays or public holidays** | Noise affected<br>RBL + 10 dB | The noise affected level represents the point above which there may be some community reaction to noise.<br>- Where the predicted or measured LAeq (15 min) is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level.<br>- 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 dB(A) | The highly noise affected level represents the point above which there may be strong community reaction to noise.<br>- 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:<br>▪ 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<br>▪ if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times. |

| Time of day | Management Level $L_{Aeq\ (15\ min)}$[1] | How to apply |
|---|---|---|
| **Outside recommended standard hours** | Noise affected<br>RBL + 5 dB | - A strong justification would typically be required for works outside the recommended standard hours.<br>- The proponent should apply all feasible and reasonable work practices to meet the noise affected level.<br>- Where all feasible and reasonable practices have been applied and noise is more than 5 dB(A) above the noise affected level, the proponent should negotiate with the community. |

*Note 1: Noise levels apply at the property boundary that is most exposed to construction noise, and at a height of 1.5m above ground level. If the property boundary is more than 30m 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.*

Pulse White Noise Acoustics are of the understanding that construction hours for the proposed development will only fall under the recommended standard hours outlined in the ICNG.

**Table 4-5 NMLs as basis for the acoustic assessment**

| Receiver Types | Noise management level ($L_{Aeq,15min}$) dB(A)<br>Standard Hours<br>Monday to Friday: 7 am to 6 pm<br>Saturday: 8 am to 1 pm |
|---|---|
| **Residential Receivers** | 50 |

As no construction is expected to occur outside of standard hours, a sleep disturbance assessment for construction noise is not required.

## 4.4 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

### 4.4.1 Vibration Criteria – Human Comfort

The first of these vibration effects relating specifically to the human comfort aspects of the project are taken from the *Assessing Vibration – A Technical Guideline*. This type of impact can be further categorised and assessed using the appropriate criterion as follows:

- Continuous vibration – from uninterrupted sources (see Table 4-6)
- Impulsive vibration – up to three instances of sudden impact e.g. dropping heavy items, per monitoring period (see Table 4-7)
- Intermittent vibration – such as from drilling, compacting or activities that would result in continuous vibration if operated continuously (see Table 4-8)

**Table 4-6 Continuous Vibration Acceleration Criteria (m/s$^2$) 1-80Hz**

| 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 |
| *Note 1: From Assessing Vibration – A Technical Guideline DEC (2006)* | | | | | |

**Table 4-7 Impulsive Vibration Acceleration Criteria (m/s$^2$) 1-80Hz**

| 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 |
| *Note 1: From Assessing Vibration – A Technical Guideline DEC (2006)* | | | | | |

**Table 4-8 Intermittent Vibration Impacts Criteria (m/s$^{1.75}$) 1-80Hz**

| 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 |
| *Note 1: From Assessing Vibration – A Technical Guideline DEC (2006)* | | | | |

### 4.4.2 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).

#### 4.4.2.1 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 Figure 5 and illustrated in Figure 5.

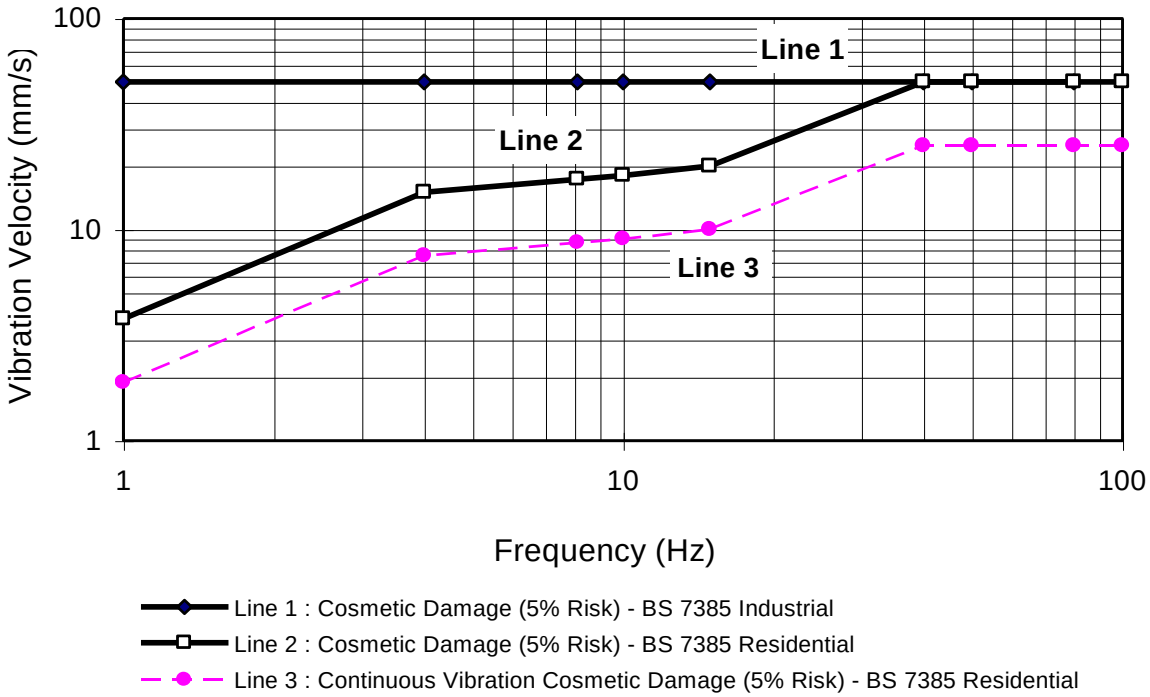
**Table 4-9 Transient vibration criteria as per standard BS 7385 Part 2 - 1993**

| Line in Figure 9 | 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 4-9 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 4-9 need to be reduced by up to 50% (refer to Line 3 in Figure 5).

**Figure 5 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 4-9. 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 4-9 should not be reduced for fatigue considerations.

# 5 OPERATIONAL ACOUSTIC ASSESSMENT

Predictive noise modelling was carried out using the ISO 9613 algorithm within iNoise 2022.01. The iNoise software package allows a 3D computational model of the site and surrounding area to be created. Inputs into the noise model included terrain, ground absorption, buildings, fences, receiver locations and noise sources.

## 5.1 Noise Generating Scenarios (Noise Inventory)

This Noise Assessment includes assessment of the potential uses within the buildings and exterior noise sources. Noise in the development would be generated by

- Noise breakout from the facility;
- Noise from mechanical units;
- Noise from trucks and cars travelling to or from site.

Three noise generating scenarios are presented with the internal noise from the factory, exterior condenser units, car and truck movements all considered.

The amount of truck and light vehicle movements have been based on the '*Traffic and Parking Assessment Report*' generated by Positive Traffic (Report No: PT21101r01_V2, dated February 2022), and taken from the worst-case hour in the day, evening and night periods, divided by four to adjust for a 15-minute scenario. The following mechanical units have been modelled as operational for 24 hours a day.

- 2 x Baltimore Aircoil Company cooling towers (Model: PCT1116-P3-P, total Sound Power Level (Lw) of 103dBA each)
- 2 x Flues
- 2 x Air Handling Units
- 3 x Condenser Units
- 4 x Electric forklifts operating

Vehicle movements for each period have been modelled as follows:

- Day Scenario (7am – 7pm):
    - 7 Trucks: 4 manoeuvring, 2 idling, 1 reversing
    - 16 light vehicle movements
- Evening Scenario (7pm – 11pm):
    - 4 Trucks: 1 manoeuvring, 2 idling, 1 reversing
    - 8 light vehicle movements
- Night Scenario (11pm – 7am):
    - 6 Trucks: 3 manoeuvring, 2 idling, 1 reversing
    - 9 light vehicle movements

## 5.2 Noise Sources

Details on the noise sources used in this assessment, factory breakout, mechanical plant and vehicles are contained in this section.

### 5.2.1 Internal Noise Level Within the Facility

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 5-1 Recommended design sound levels**

| Type of Occupancy/Activity | Design sound level maximum, $L_{Aeq,15\ min}$ |
|---|---|
| **Industrial packaging and delivery areas** | 60 |

### 5.2.2 Mechanical Plant

At this stage of the project, the location of major plant items and the exact selection to be installed are not known. As such, a detailed assessment of noise associated from engineering services cannot be undertaken.

To ensure that future selections of plant items meet external noise levels at neighbouring properties, 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.

- Flues – 92 dBA (Lw)
- Air Conditioning Condensers – 80 dBA (Lw)
- Air Handling Units – 92 dBA (Lw)

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

### 5.2.3 Assumed Vehicle Noise Levels and Time Durations

This noise assessment includes assessment of the potential uses within the development. The following noise levels include the expected source noise events from activities likely to occur on the site:

1. 10 Tonne truck start $L_{Aeq}$ of 96 dB(A), for a duration of 2 seconds.
2. 10 Tonne truck door close $L_{Aeq}$ of 90 dB(A), for a duration of 1 second.
3. 10 Tonne truck manoeuvring at <15 km/h $L_{Aeq}$ = 92 dB(A), for a duration of 2 minutes.
4. Car start $L_{Aeq}$ of 89 dB(A), for a duration of 2 seconds.
5. Car door close $L_{Aeq}$ of 87 dB(A), for a duration of 1 second.
6. Car manoeuvring at <15 km/h $L_{Aeq}$ of 85 dB(A), for a duration of 2 minutes.

7. Semi truck start $L_{Aeq}$ of 101 dB(A), for a duration of 2 seconds.
8. Semi truck door close $L_{Aeq}$ of 93 dB(A), for a duration of 1 second.
9. Semi truck manoeuvring at <15 km/h $L_{Aeq}$ of 97 dB(A), for a duration of 2 minutes.
10. Forklift operations $L_{Aeq}$ of 90 dB(A), for a duration of 5 minutes.

The utilised sound power levels of potential activities to be conducted on the site are summarised in the table below.

**Table 5-2 Summary of Assumed Activity Sound Power Levels**

| Activity Type | Height (m) | $L_{Aeq,15\ min}$ Sound Power Level, dBA | $L_{Amax}$ Sound Power Level, dBA |
|---|---|---|---|
| Car engine start | 1 | 63 | 94 |
| Car door close | 1 | 58 | 91 |
| Car manoeuvring | 1 | 76 | 89 |
| Semi Truck engine start | 2 | 75 | 105 |
| Semi Truck door close | 2 | 64 | 97 |
| Semi Truck manoeuvring (including acceleration) | 3 | 88 | 101 |
| Reversing Alarms | 2 | 62 | 105 – including 5 dB penalty of tonality |
| Semi-trailer arrival to warehouse | 2 | 86 | 103 |
| Semi-trailer reversing to park in warehouse | 3 | 90 | 107 |
| Semi-trailer departure from warehouse | 3 | 86 | 103 |
| Semi-trailer passing-by loading dock | 3 | 86 | 103 |
| Medium rigid truck passing-by loading dock | 3 | 65 | 96 |
| Van or pick-up truck passing-by loading dock | 2 | 61 | 92 |
| Idle semi-trailer | 3 | 85 | 102 |
| Idle medium rigid truck | 3 | 61 | 92 |
| Forklift operations | 1 | 90 | - |

Assumed noise levels have been based on detailed noise measurements of cars and various sized trucks and vans.

Truck reversing alarms are often tonal in nature, and therefore a 5 dB penalty has been applied to these noise sources. No other noise source characteristic penalties such as low frequency, impulsive etc. have been applied to noise sources in our assessment.

## 5.3 Modelling Assumptions

The following modelling assumptions are utilised in this noise impact assessment:

- The noise generating scenario is modelled for a worst case 15 minute period;
- Terrain has been sourced from the NSW Land and Property Information database Six Maps;
- Ground Absorption has been included in the model with the surrounding grass areas having an absorption factor of 1.0 and the site itself having a ground absorption factor of 0;
- All receptors are modelled 1.5 m above the ground;
- Buildings and fences have been included in the model where relevant.
- The noise sources and sound power levels have been modelled with respect to the information presented in Table 5-2;
- The internal noise level within factories is assumed to be 60 dBA. This matches the recommended noise level for packing and delivery areas of industrial developments detailed within AS2107:2016;
- At this stage of the project, the location of major mechanical plant items have not been selected. As such, a detailed assessment of noise associated from engineering services cannot be undertaken. To ensure that future selections of plant items meet external noise levels at neighbouring properties, a proof-of-concept approach has been considered;
- It is assumed that truck movements occur per 15 minute period as per the details listed in section 5.1;
- The site is assumed to be operational 24 hours a day; and
- The conditions considered within the ISO 9613-2:1996 algorithm hold equivalently, for average propagation under a well-developed moderate ground-based temperature inversion, such as commonly occurs on clear, calm nights.

## 5.4 Predicted $L_{Aeq, 15\ min}$ Noise Levels

The predicted $L_{Aeq, 15\ min}$ results of the modelled night operational scenario are presented below in Table 5-3. Noise contours of the modelled $L_{Aeq, 15\ min}$ operational scenario are shown in the below figure. It is shown that, if the modelling assumptions in Section 5.3 are carried out then the resulting noise levels are predicted to comply with the criteria at the considered residential receivers.

**Table 5-3 Predicted Noise Levels, Worst-Case Operational Scenario, $L_{Aeq}$ (15 minute)**

| Receiver | Criteria | | | Predicted Noise Levels | | |
|---|---|---|---|---|---|---|
| | Day | Evening | Night | Day Scenario | Evening Scenario | Night Scenario |
| **R1** | 45 | 45 | 43 | 21 | <20 | <20 |
| **R2** | 45 | 45 | 43 | 21 | <20 | <20 |
| **R3** | 45 | 45 | 43 | 20 | <20 | <20 |
| **R4** | 45 | 45 | 43 | 20 | <20 | <20 |
| **R5** | 45 | 45 | 43 | <20 | <20 | <20 |
| **R6** | 45 | 45 | 43 | <20 | <20 | <20 |
| **R7** | 45 | 45 | 43 | <20 | <20 | <20 |
| **R8** | 45 | 45 | 43 | <20 | <20 | <20 |
| **R9** | 45 | 45 | 43 | <20 | <20 | <20 |
| **R10** | 45 | 45 | 43 | 25 | <20 | <20 |
| **R11** | 45 | 45 | 43 | 27 | 20 | 21 |
| **R12** | 45 | 45 | 43 | 32 | 26 | 26 |
| **R13** | 45 | 45 | 43 | 31 | 25 | 25 |
| **R14** | 45 | 45 | 43 | 22 | <20 | <20 |
| **R15** | 45 | 45 | 43 | 22 | <20 | <20 |
| **R16** | 45 | 45 | 43 | 20 | <20 | <20 |

**Figure 6 Predicted Noise Contours – Operational Scenario Day, $L_{Aeq}$ (15 minute)**

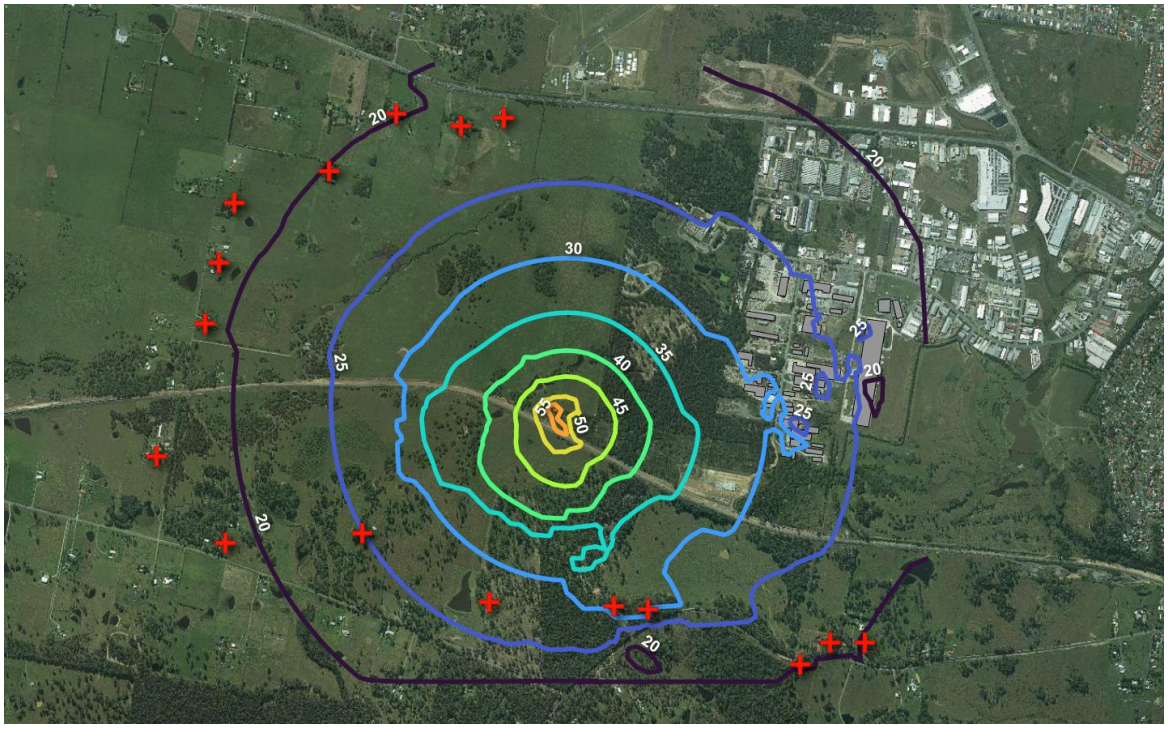



**Figure 7 Predicted Noise Contours – Operational Scenario Evening, $L_{Aeq}$ (15 minute)**

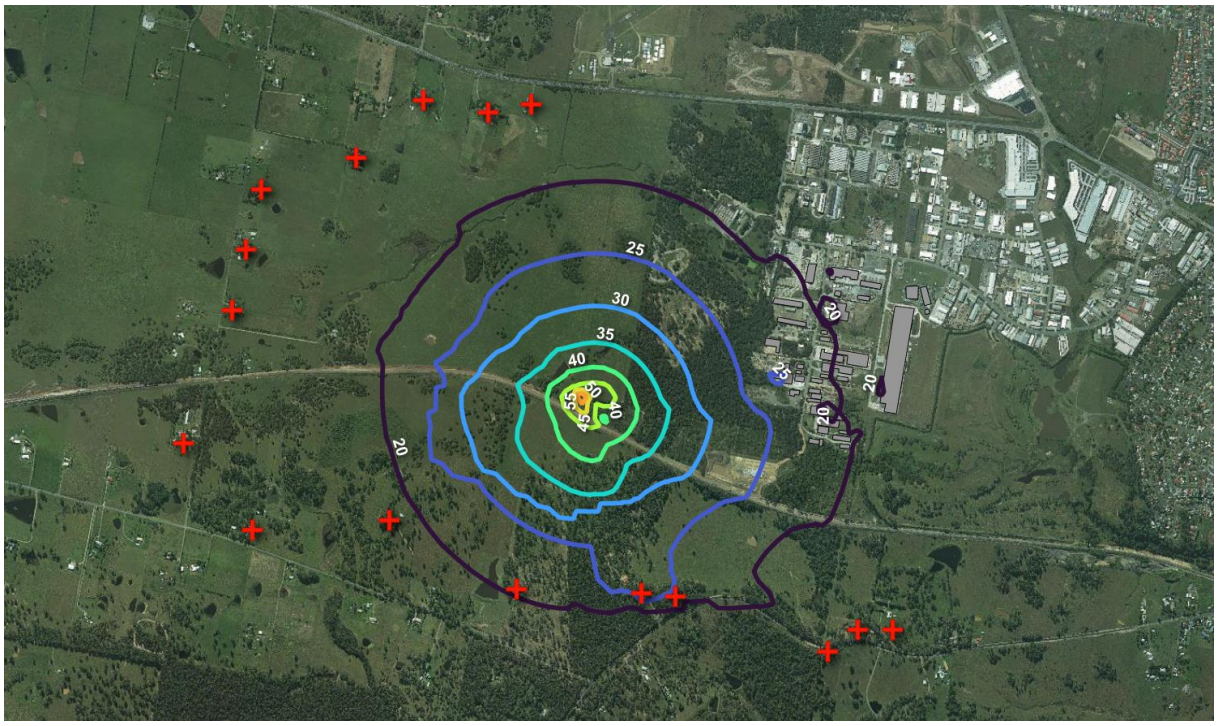
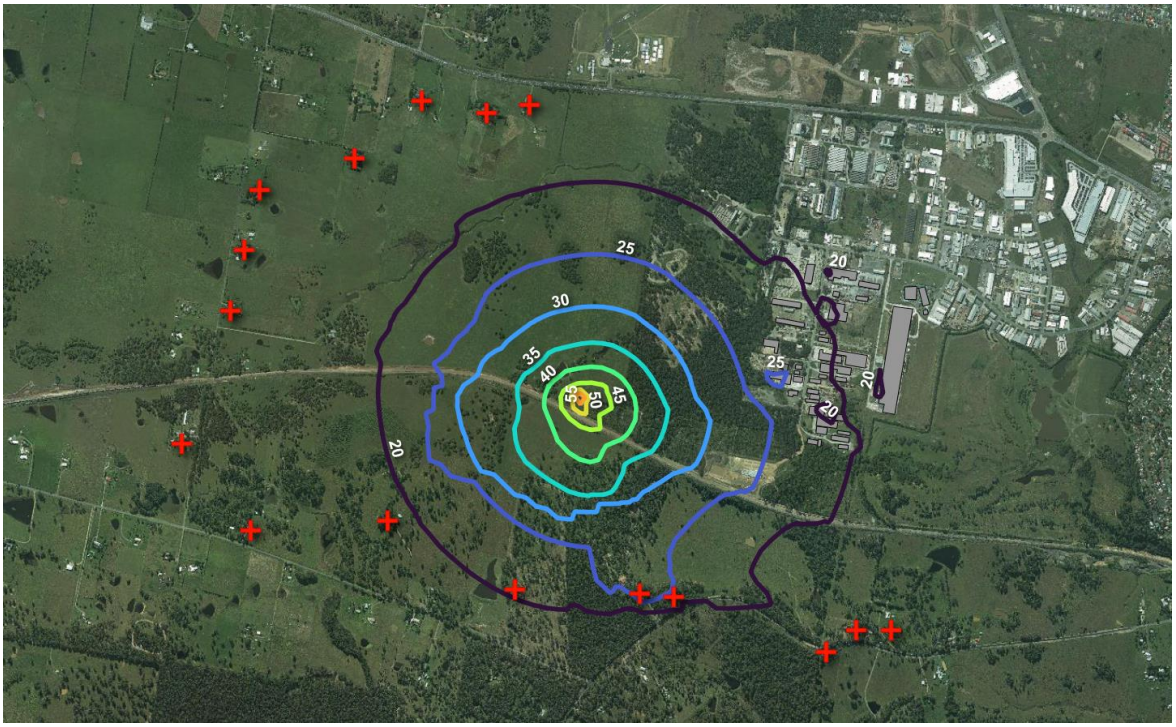


**Figure 8 Predicted Noise Contours – Operational Scenario Night, $L_{Aeq}$ (15 minute)**



# 6 ROAD TRAFFIC NOISE ASSESSMENT

As part of the total industrial development at 91 Gardiner Street, Rutherford, additional vehicle movements are expected on Gardiner Street. Gardiner Street has been selected for this road noise assessment as it is the road that will have the highest proportion of site traffic travelling to/from the site. For other surrounding roadways, the proportion of traffic from the development will be lower, and, therefore, road traffic noise is not proposed to be assessed.

Under section 3.4.1 of the Road Noise Policy "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'".

A 2 dB increase equates to approximately a 60% increase in total traffic along the subject road. Any proportional traffic increase along Gardiner Street from the development is predicted to be far smaller than this amount. Therefore, it is predicted that road traffic noise levels will not increase by 2 dB or more. The proposed road movements are thus predicted to comply with the Road Noise Policy and no further noise mitigation measures are recommended.

# 7 CONSTRUCTION NOISE AND VIBRATION

Predictive noise modelling of the construction noise activities was carried out using the ISO 9613 algorithm within iNoise 2021. Construction activities are assumed to include the following:

- Site establishment;
- Concreting works;
- Structure works

## 7.1 Noise Generating Scenarios

Major plant equipment to be used in the construction works is likely to include excavators, dozers, trucks, hand tools and a franna. The sound power levels for the construction equipment likely to be used for each of the listed tasks are provided in the table below. Indicative locations of the noise sources are shown in Figure 9 to Figure 11.

**Table 7-1 Summary of utilised construction sound power levels**

| Tasks | Equipment | Sound Power Levels (dBA re 1pW) | Operational Time per 15 minute period |
|---|---|---|---|
| **1. Site establishment works** | Truck | 106 | 5 minutes |
| | Power hand tools | 100 | 15 minutes |
| **2. Concreting works** | Concrete truck | 106 | 15 minutes |
| | Concrete pump | 106 | 15 minutes |
| | Truck | 106 | 5 minutes |
| **3. Façade construction** | Franna | 106 | 15 minutes |
| | Truck | 106 | 5 minutes |
| | Power hand tools | 100 | 5 minutes |

**Figure 9 Construction Scenario 1 – Site Establishment Works**

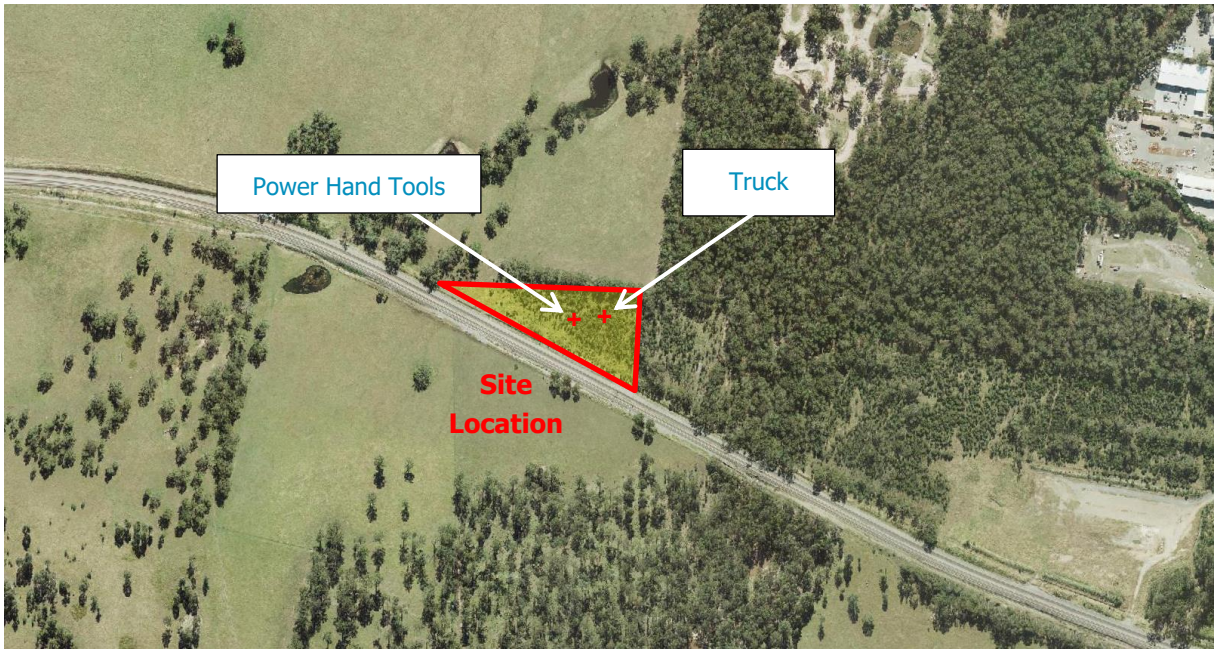



**Figure 10 Construction Scenario 4 – Concreting Works**

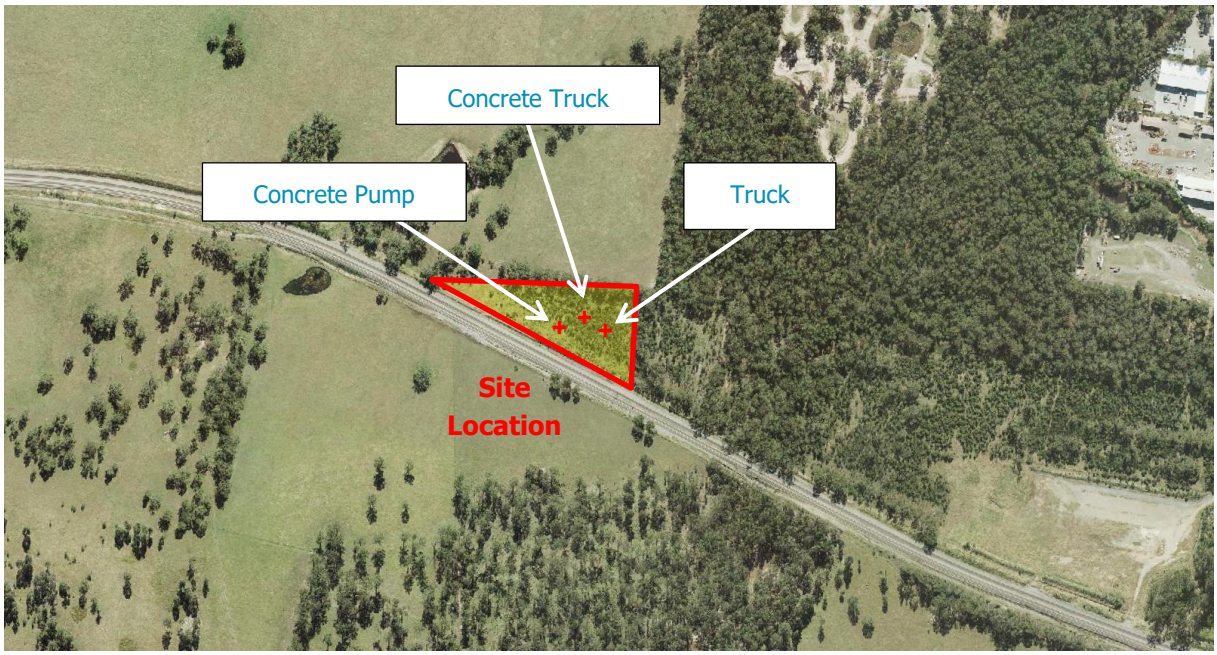
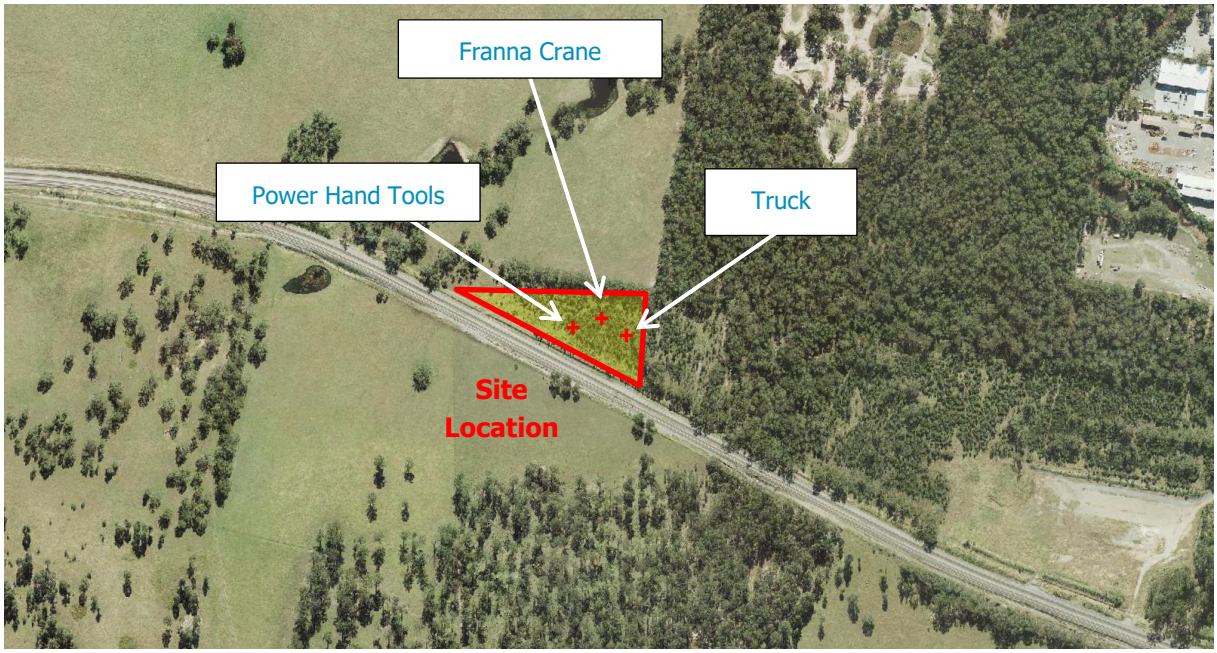


**Figure 11 Construction Scenario 5 – Façade Construction**




## 7.2 Modelling Assumptions

The following modelling assumptions are utilised for the construction noise assessment:

- The noise generating scenario is modelled for a worst case 15 minute period;
- Terrain has been sourced from the NSW Land and Property Information database Six Maps;
- Ground Absorption has been included in the model with the surrounding grass areas having an absorption factor of 1.0 and the site itself having a ground absorption factor of 0;
- All receptors are modelled 1.5m above the ground;
- The noise sources and sound power levels have been modelled with respect to the information presented in Table 7-1, and;
- Construction noise is assumed to take place during standard construction hours, that is
  - Monday to Friday 7 am to 6 pm
  - Saturday 8 am to 1 pm
  - No work on Sundays or public holidays
- Truck and light vehicle movements have been based off 'Traffic and Parking Assessment Report' (Report No: PT21101r01_V2)

## 7.3 Predicted $L_{Aeq\ (15\ minute)}$ Noise Levels

The predicted $L_{Aeq,\ 15\ min}$ results of the modelled construction scenarios are presented below in Table 7-2. Noise contours of the modelled $L_{Aeq,\ 15\ min}$ construction scenarios are shown in Figure 12 to Figure 14.

**Table 7-2 Predicted Noise Levels, Operational Scenario, $L_{Aeq}$ (15 minute)**

| Receiver | Criteria | Predicted Noise Levels – Construction Scenario | | |
|---|---|---|---|---|
| | Standard Hours | 1 | 2 | 3 |
| R1 | 50 | 23 | 29 | 27 |
| R2 | 50 | 22 | 29 | 27 |
| R3 | 50 | 21 | 27 | 25 |
| R4 | 50 | 21 | 27 | 25 |
| R5 | 50 | <20 | 25 | 23 |
| R6 | 50 | <20 | 20 | <20 |
| R7 | 50 | <20 | 21 | 20 |
| R8 | 50 | <20 | 20 | <20 |
| R9 | 50 | <20 | 22 | 20 |
| R10 | 50 | 22 | 29 | 27 |
| R11 | 50 | 25 | 32 | 30 |
| R12 | 50 | 30 | 37 | 35 |
| R13 | 50 | 29 | 36 | 34 |
| R14 | 50 | 21 | 27 | 26 |
| R15 | 50 | 22 | 28 | 26 |
| R16 | 50 | 20 | 27 | 25 |

**Figure 12 Predicted Noise Contours – Construction Scenario 1, $L_{Aeq}$ (15 minute)**

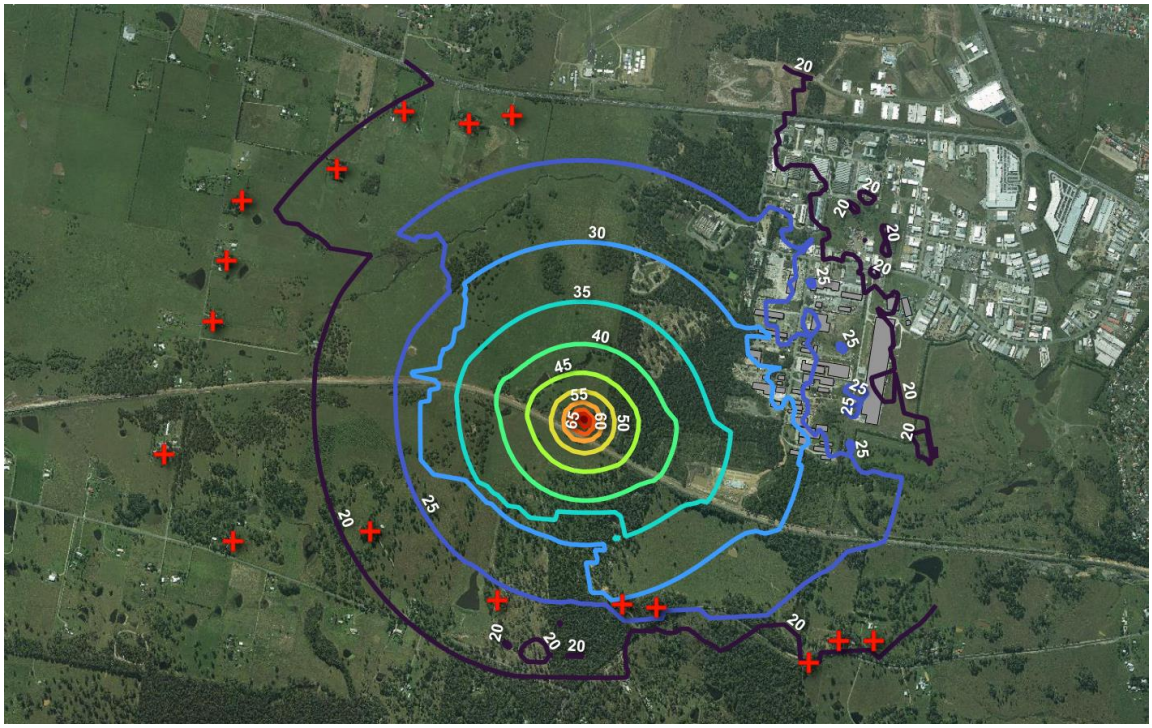


**Figure 13 Predicted Noise Contours – Construction Scenario 2, $L_{Aeq}$ (15 minute)**

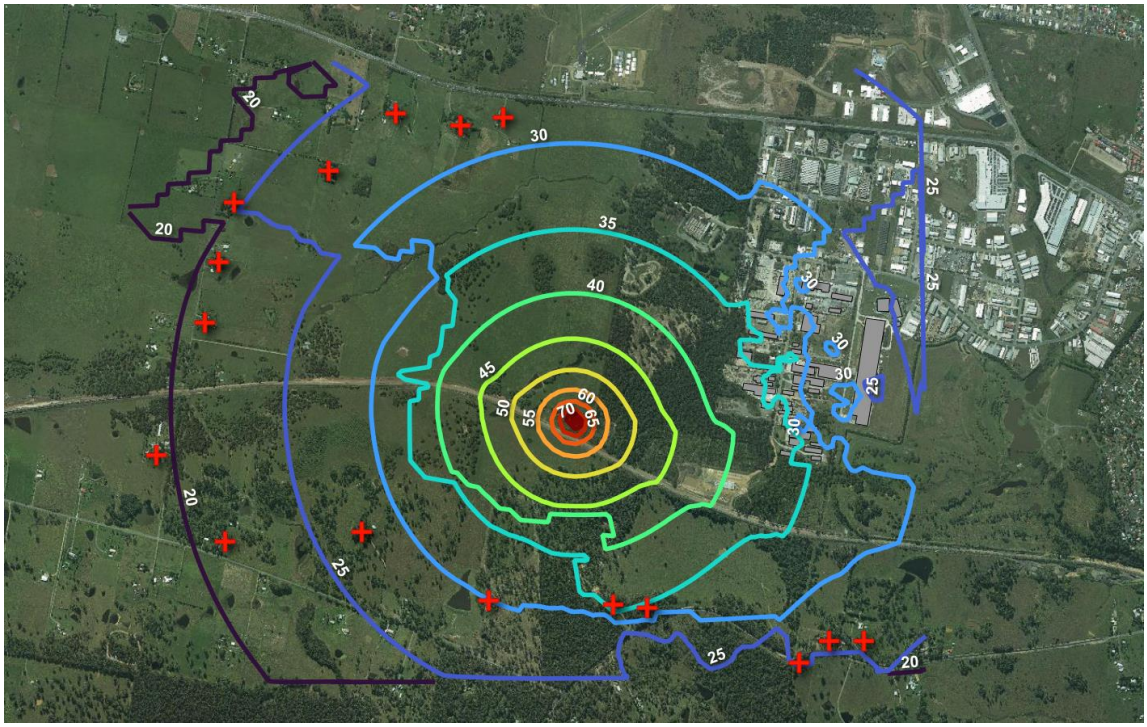
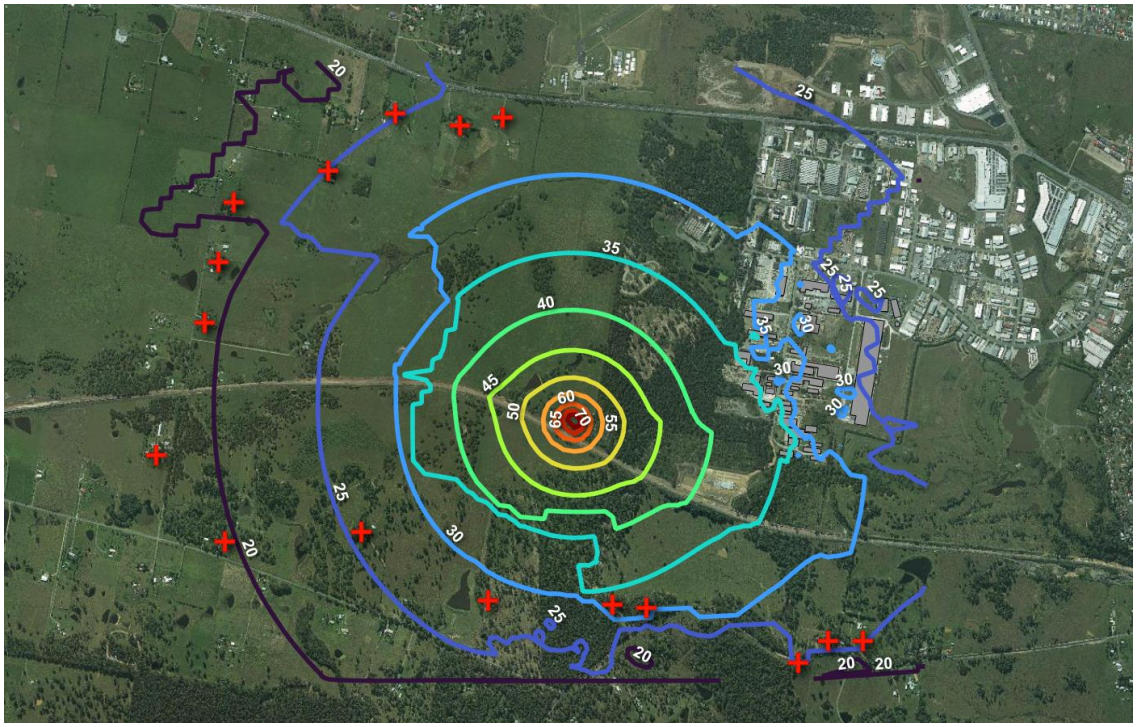



**Figure 14 Predicted Noise Contours – Construction Scenario 3, $L_{Aeq}$ (15 minute)**




## 7.4 Construction Vibration Assessment

The distance between the site and the nearest surrounding receivers is substantial. Therefore, vibration impacts are predicted to be well below the criteria for cosmetic damage and human comfort at the neighbouring receivers.

# 8 CONCLUSIONS

A Noise Impact assessment was conducted for the proposed pet food ingredient manufacturing facility at 91 Gardiner Street, Rutherford.

This document assesses the potential operational noise impacts of the proposed facility on the neighbouring receptors and responds to the Industry Specific Secretary's Environmental Assessment Requirements (SEARs) issued by DPE on 18 January 2022.

In particular, operational impacts of the mechanical equipment, factory use, truck movements, forklift operations, and light vehicle movements are assessed at the nearest neighbouring receptors. Traffic data has been sourced from the '*Traffic and Parking Assessment Report*' generated by Positive Traffic (Report No: PT21101r01_V2, dated February 2022). Noise impact assessments of the initial construction works have also been carried out.

Based on the findings from this Noise and Vibration Impact Assessment, the pet food ingredient manufacturing facility is predicted to comply with the recommended noise criteria at the surrounding receivers without the need for additional acoustic treatment.

Only the receivers located within the vicinity of 91 Gardiner Street, Rutherford at the date of this Development Application environmental assessment have been considered. If additional neighbouring residences and/or industrial properties are erected in the future within close proximity to the SPF Diana Australia Pty Ltd facility, an additional acoustic assessment may be required.

Regards

**Brendan Ngo**

Acoustic Engineer

PULSE WHITE NOISE ACOUSTICS PTY LTD

# APPENDIX A: ACOUSTIC TERMINOLOGY

The following is a brief description of the acoustic terminology used in this report.

| | |
|---|---|
| *Sound power level* | The total sound emitted by a source |
| *Sound pressure level* | The amount of sound at a specified point |
| *Decibel [dB]* | The measurement unit of sound |
| *A Weighted decibels [dB(A])* | The A weighting is a frequency filter applied to measured noise levels to represent how humans hear sounds. The A-weighting filter emphasises frequencies in the speech range (between 1kHz and 4 kHz) which the human ear is most sensitive to, and places less emphasis on low frequencies at which the human ear is not so sensitive. When an overall sound level is A-weighted it is expressed in units of dB(A). |
| *Decibel scale* | The decibel scale is logarithmic in order to produce a better representation of the response of the human ear. A 3 dB increase in the sound pressure level corresponds to a doubling in the sound energy. A 10 dB increase in the sound pressure level corresponds to a perceived doubling in volume. Examples of decibel levels of common sounds are as follows: |

| | |
|---|---|
| 0dB(A) | Threshold of human hearing |
| 30dB(A) | A quiet country park |
| 40dB(A) | Whisper in a library |
| 50dB(A) | Open office space |
| 70dB(A) | Inside a car on a freeway |
| 80dB(A) | Outboard motor |
| 90dB(A) | Heavy truck pass-by |
| 100dB(A) | Jackhammer/Subway train |
| 110 dB(A) | Rock Concert |
| 115dB(A) | Limit of sound permitted in industry |
| 120dB(A) | 747 take off at 250 metres |

| | |
|---|---|
| *Frequency [f]* | The repetition rate of the cycle measured in Hertz (Hz). The frequency corresponds to the pitch of the sound. A high frequency corresponds to a high pitched sound and a low frequency to a low pitched sound. |
| *Ambient sound* | The all-encompassing sound at a point composed of sound from all sources near and far. |
| *Equivalent continuous sound level [$L_{eq}$]* | The constant sound level which, when occurring over the same period of time, would result in the receiver experiencing the same amount of sound energy. |
| *Reverberation* | The persistence of sound in a space after the source of that sound has been stopped (the reverberation time is the time taken for a reverberant sound field to decrease by 60 dB) |
| *Air-borne sound* | The sound emitted directly from a source into the surrounding air, such as speech, television or music |
| *Impact sound* | The sound emitted from force of one object hitting another such as footfalls and slamming cupboards. |
| *Air-borne sound isolation* | The reduction of airborne sound between two rooms. |
| *Sound Reduction Index [R] (Sound Transmission Loss)* | The ratio the sound incident on a partition to the sound transmitted by the partition. |

| | |
|---|---|
| *Weighted sound reduction index [$R_w$]* | A single figure representation of the air-borne sound insulation of a partition based upon the R values for each frequency measured in a laboratory environment. |
| *Level difference [D]* | The difference in sound pressure level between two rooms. |
| *Normalised level difference [$D_n$]* | The difference in sound pressure level between two rooms normalised for the absorption area of the receiving room. |
| *Standardised level difference [$D_{nT}$]* | The difference in sound pressure level between two rooms normalised for the reverberation time of the receiving room. |
| *Weighted standardised level difference [$D_{nT,w}$]* | A single figure representation of the air-borne sound insulation of a partition based upon the level difference. Generally used to present the performance of a partition when measured in situ on site. |
| *$C_{tr}$* | A value added to an $R_w$ or $D_{nT,w}$ value to account for variations in the spectrum. |
| *Impact sound isolation* | The resistance of a floor or wall to transmit impact sound. |
| *Impact sound pressure level [$L_i$]* | The sound pressure level in the receiving room produced by impacts subjected to the adjacent floor or wall by a tapping machine. |
| *Normalised impact sound pressure level [$L_n$]* | The impact sound pressure level normalised for the absorption area of the receiving room. |
| *Weighted normalised impact sound pressure level [$L_{n,w}$]* | A single figure representation of the impact sound insulation of a floor or wall based upon the impact sound pressure level measured in a laboratory. |
| *Weighted standardised impact sound pressure level [$L'_{nT,w}$]* | A single figure representation of the impact sound insulation of a floor or wall based upon the impact sound pressure level measured in situ on site. |
| *$C_I$* | A value added to an $L_{nW}$ or $L'_{nT,w}$ value to account for variations in the spectrum. |
| *Energy Equivalent Sound Pressure Level [$L_{A,eq,T}$ ]* | 'A' weighted, energy averaged sound pressure level over the measurement period T. |
| *Percentile Sound Pressure Level [$L_{Ax,T}$ ]* | 'A' weighted, sound pressure that is exceeded for percentile x of the measurement period T. |

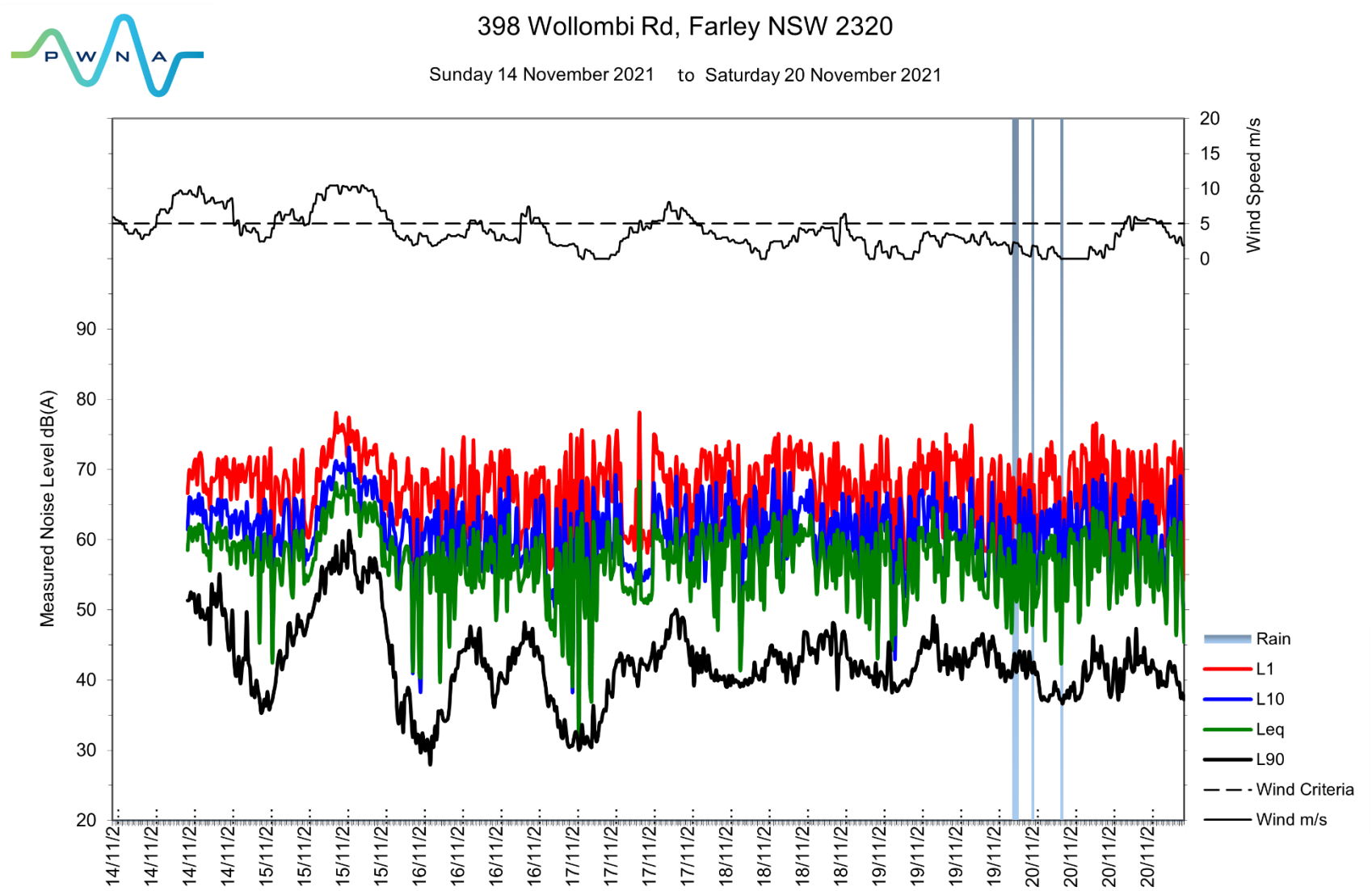
*Definitions of a number of terms have been adapted from Australian Standard AS1633:1985 *"Acoustics – Glossary of terms and related symbols"*

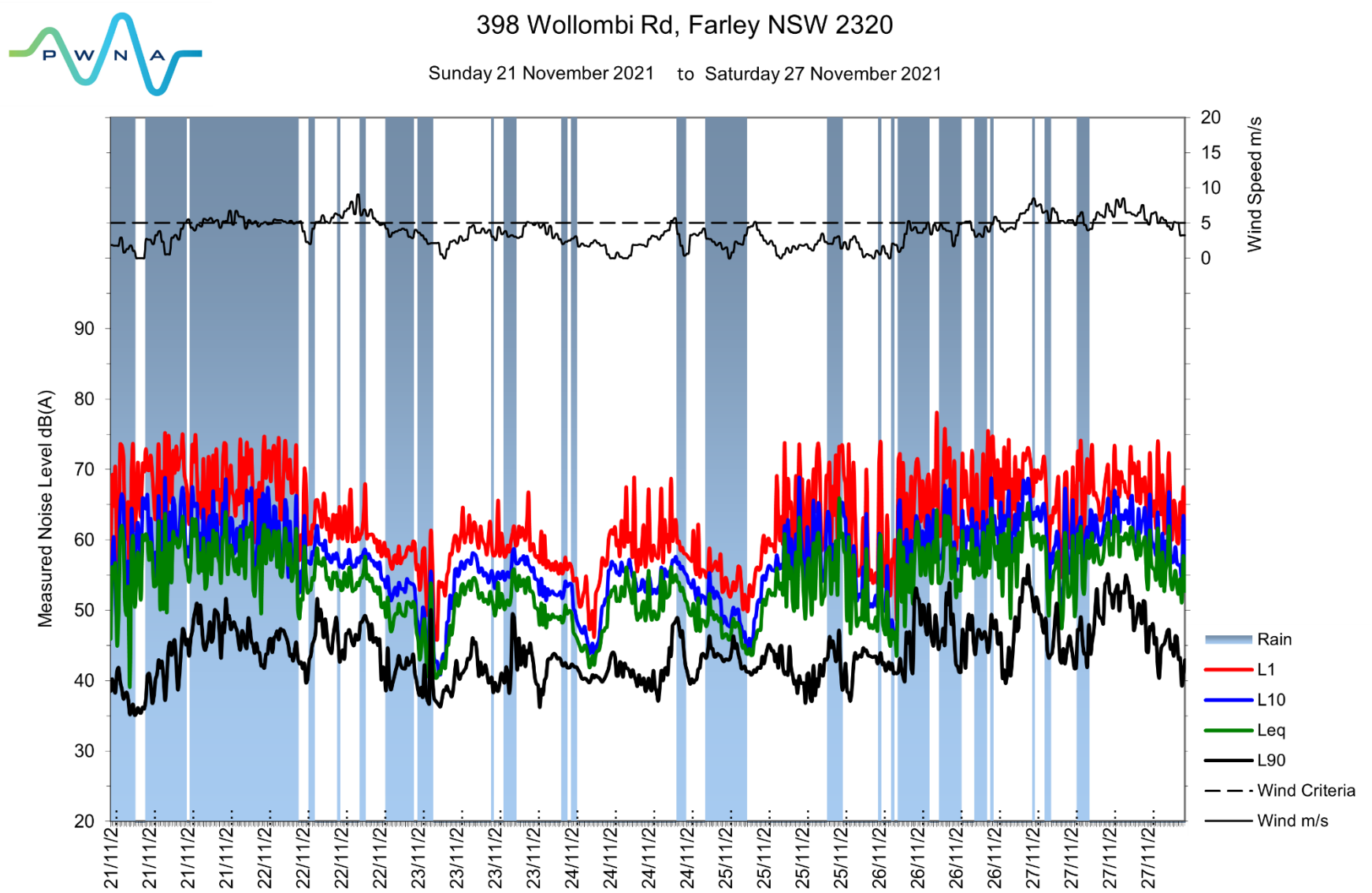
# APPENDIX B: UNATTENDED NOISE LOGGING

**Weather Station:** MAITLAND AIRPORT AWS, NSW

**Weather Station ID:** SITE 61428

**Coordinates:** -32.7023°S 151.4881°E, Height: 28m


398 Wollombi Rd, Farley NSW 2320
Sunday 14 November 2021 to Saturday 20 November 2021
Measured Noise Level dB(A)
Wind Speed m/s
20
15
10
5
0
90
80
70
60
50
40
30
20
14/11/2
15/11/2
16/11/2
17/11/2
18/11/2
19/11/2
20/11/2
Rain
L1
L10
Leq
L90
Wind Criteria
Wind m/s


398 Wollombi Rd, Farley NSW 2320
Sunday 21 November 2021 to Saturday 27 November 2021
Measured Noise Level dB(A)
Wind Speed m/s
20
15
10
5
0
90
80
70
60
50
40
30
20
21/11/2...
22/11/2...
23/11/2...
24/11/2...
25/11/2...
26/11/2...
27/11/2...
Rain
L1
L10
Leq
L90
Wind Criteria
Wind m/s