NOISE IMPACT ASSESSMENT
FOR
WINTERGREEN FARM
3329 OXLEY HIGHWAY SOMERTON NSW 2340

Prepared for: Wintergreen Farm
Department of Planning, Housing and Infrastructure
Department of Primary Industries and Regional Development
NSW EPA
Tamworth Regional Council

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EXECUTIVE SUMMARY

Benbow Environmental has been engaged by Wintergreen Farm to undertake a Noise Impact Assessment for the proposed poultry farm expansion located at 3329 Oxley Highway Somerton NSW 2340 (legally designated as Lot 10/DP261839).

The nearest receivers and the noise generating activities have been identified. Noise criteria for the project have been formed, with assessment of the proposed site activities conducted against the NSW EPA Noise Policy for Industry (EPA, 2017) and the NSW Road Noise Policy (DECCW, 2011). Modelling of the activities was conducted using the noise modelling software SoundPlan 7.3.

Three (3) operational scenarios have been considered in the noise model. Scenario 1 presents day, evening and night time operations with only and all tunnel fans operating for 100% of the time. Scenario 2 presents day time operations surrounding the periodic feed delivery on site with the feed blower operating for 100% of the time. Scenario 3 presents night time operations surrounding the pickup and loading of birds onto trucks with the forklift operating for 30% of the time.

Operational noise levels in all scenarios are predicted to comply with the Noise Policy for Industry assessment criteria at all receivers for all scenarios for all time periods under all applicable adverse weather conditions.

While additional noise controls are not predicted to be necessary for compliance, the following management practices are recommended as good practice:

- Prohibition of extended periods of on-site revving/idling;
- Minimisation of the use of truck exhaust brakes on site;
- On-site vehicles and machinery to be maintained in accordance with a preventative maintenance program to ensure optimum performance and early detection of wearing or noisy components; and
- Forklifts to use reversing lights as opposed to reverse beepers.

The generation of additional offsite road traffic associated with the site's activities has been assessed and it was predicted to comply with the guidelines set out in the NSW Road Noise Policy.

Noise levels associated with construction are predicted to comply with the noise management level at all receivers and are well below the Interim Construction Noise Guideline's highly noise affected management level of 75 dB(A).

In the Transport for NSW Construction Noise Strategy document and Assessing Vibration – a Technical Guideline, construction equipment that may cause vibration impacts includes hydraulic hammers, vibratory pile drivers, pile boring, jackhammers, 'wacker packers', concrete vibrators, and pavement breakers, amongst other equipment. The construction work proposed would not use this type of equipment and is not expected to cause vibration impacts. The equipment utilised for the sheds will not generate vibration impacts therefore a detailed Vibration Impact Assessment is therefore not considered warranted.

The proposed development will have an acceptable noise impact. No further controls are considered warranted.

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1. INTRODUCTION

Benbow Environmental has been engaged by Wintergreen Farm to undertake a Noise Impact Assessment for the proposed poultry farm expansion located at 3329 Oxley Highway Somerton NSW 2340 (legally designated as Lot 10/DP261839). This document supplements the Environmental Impact Statement for the proposed development. Currently, the site accommodates 240,000 birds. The proposed development is seeking to expand operations accommodate 810,510 birds within a total of 14 sheds.

Noise emissions from the site were predicted by using noise modelling software, SoundPlan (V7.3).

This noise impact assessment has been prepared in accordance with the following guidelines and documents:

- NSW Environmental Protection Authority, Noise Policy for Industry 2017;
- Department of Environment, Climate Change and Water NSW, Road Noise Policy (DECCW, 2011);
- NSW Interim Construction Noise Guideline (DECC, 2009); and
- *Assessing Vibration – A Technical Guideline* (DEC, 2006).

1.1 SCOPE OF WORKS

The Secretary's Environmental Assessment Requirements (SEARs) 1982 was issued on 8th April, 2025. Relevant requirements of noise and vibration are as follows:

Table 1-1: Environmental Assessment Requirement

Key Issues	Response
Noise and vibration – including: • A description of all potential noise and vibration sources during construction and operation, including road traffic noise and any cumulative impacts from existing onsite operations;	• Addressed in Sections 7, 8, 9 and 10.
• A noise and vibration assessment in accordance with the relevant Environmental Protection Authority guidelines; and	• Addressed in Sections 6, 7 and 10.
• A description and appraisal of noise and vibration mitigation and monitoring measures.	• Addressed in Sections 7.4 and 11

This noise impact assessment has been limited to the following scope of works:

- Review of the proposed site operations;
- Establish project noise trigger levels;
- Determine all potential noise sources associated with the proposed development;
- Collect required noise sources data;
- Predict potential noise impacts at the nearest potentially affected receptors to the site;
- Assess potential noise impacts against relevant legislation and guidelines;

- Recommend general ameliorative measures/control solutions (where required); and
- Compile this report with concise statements of potential noise impact.

To aid in the review of this report, supporting documentation has been referenced within this report. A glossary of terminology is included in Attachment 1.

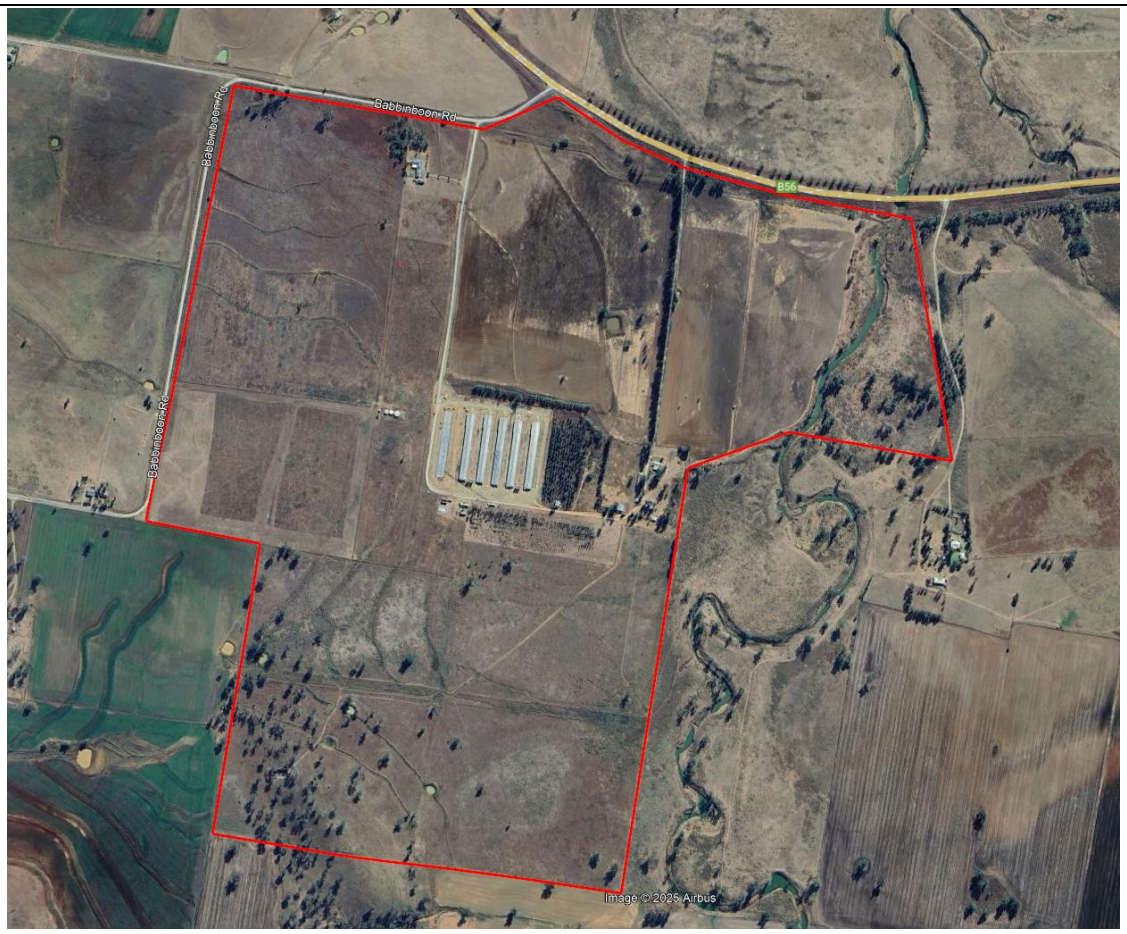
2. SITE DETAILS

2.1 SITE LOCATION

The existing poultry farm is located at located at 3329 Oxley Highway Somerton NSW 2340 (legally designated as 10/DP261839). The land is situated within the local government area of Tamworth Regional Council. The site is surrounded by existing agricultural/rural landscapes, consistent with the primary production land use of the region.

The site is located in a rural area and is located approximately 30 km northwest of Tamworth. The site is accessible via a sealed road, entering from the north-eastern corner, which connects to Oxley Highway (B56) which borders the site at the north. The site location is shown in Figure 2-1.

Figure 2-1: Site Location



Source: Google Earth 2023

↑N Not to scale	LEGEND: Site border	Benbow Environment 27-29 Sherwood Street Northmead NSW 2152

2.2 PROPOSED DEVELOPMENT

The existing site accommodates 240,000 birds. The proposed development is seeking to expand operations to accommodate 810,510 birds within a total of 14 sheds. The existing sheds have an internal floor area of 2,323 m^2 and the proposed sheds will have an internal floor area of 2,970 m^2.

The stocking density of approximately 34 kg per square metre will apply to all 14 sheds. This corresponds to a maximum capacity of 49,945 birds for the existing sheds and 63,855 birds for the proposed sheds.

2.3 OPERATIONAL DETAILS

Each shed would go through a 9 -10 week production cycle, consisting of approximately 7-8 weeks of growing phase and 2 weeks of break in-between growing phases. Typically, birds are collected for harvesting during the 5^{th}, 7^{th} and last (7^{th} or 8^{th}) week in the growth cycle. The RSPCA require a stocking density of no more than 34 kg per sqm and the birds are weighed towards the last weeks of the growing phase to ensure thin-outs occur such that the RSPCA stocking density is not exceeded.

In the 2 week break period, at the end of every growing phase, a full shed clean out is undertaken, and usually completed in 2 days. The clean out involves the mechanical removal of all spent litter from the sheds and its immediate disposal: the litter is collected by contractors, loaded directly onto trucks and transported off site for further processing elsewhere (usually used as a valuable by-product for other forms of agricultural activities). Shed clean out will be immediately followed by disinfection.

Wood shavings and straw would be most commonly used as litter material. Nipple drinkers fitted with catch-cups are used to supply drinking water to the birds, while pneumatically controlled pipelines deliver chicken feed from hoppers.

2.3.1 Shed Ventilation

The ventilation requirements of any type of poultry shed depends predominantly upon three factors: the ambient temperatures, the age/bodyweight of the birds, and the number of birds housed. For example, as birds grow larger and heat mass increases, the internal temperature in the shed would need to be lowered accordingly by allowing for more air flow and controlling humidity content within the shed. This can be done through either natural ventilation or mechanical ventilation, which is also referred to as tunnel ventilation. All the sheds that are part of the proposed development would operate as tunnel ventilated sheds.

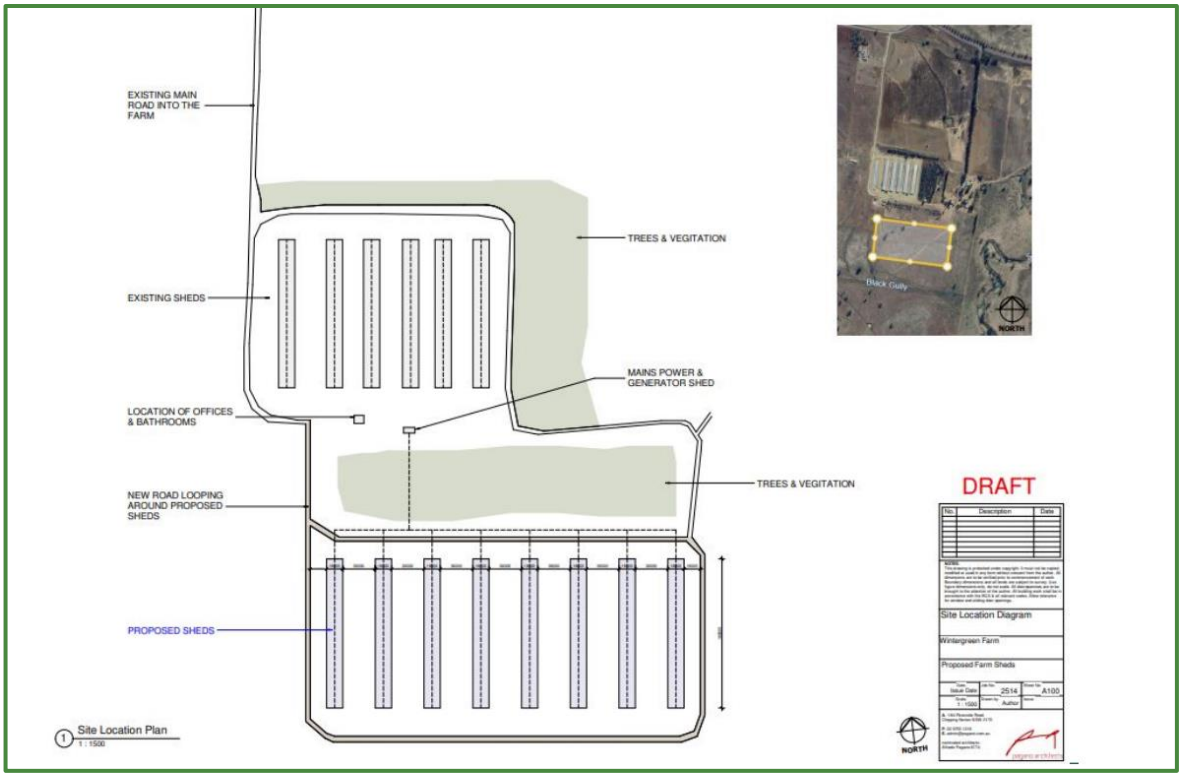
2.4 HOURS OF OPERATION

The existing farm currently operates 24/7. Feed deliveries occur during daytime hours and bird pickup typically occurs during night-time hours for the comfort of the birds. The proposed expansion would retain these hours.

2.5 EMPLOYMENT

The proposal is expected to provide employment for 48 employees during construction, 7 full-time employees during operations, and also to generate employment for trucking contractors (feed delivery, bird pickup, manure merchants, wash and sanitizing crews, bedding providers, bedding spreaders, electricians, plumbers and repairs and maintenance teams).

Figure 2-2: Proposed Site Plan with Shed Layout



3. NEAREST SENSITIVE RECEPTORS

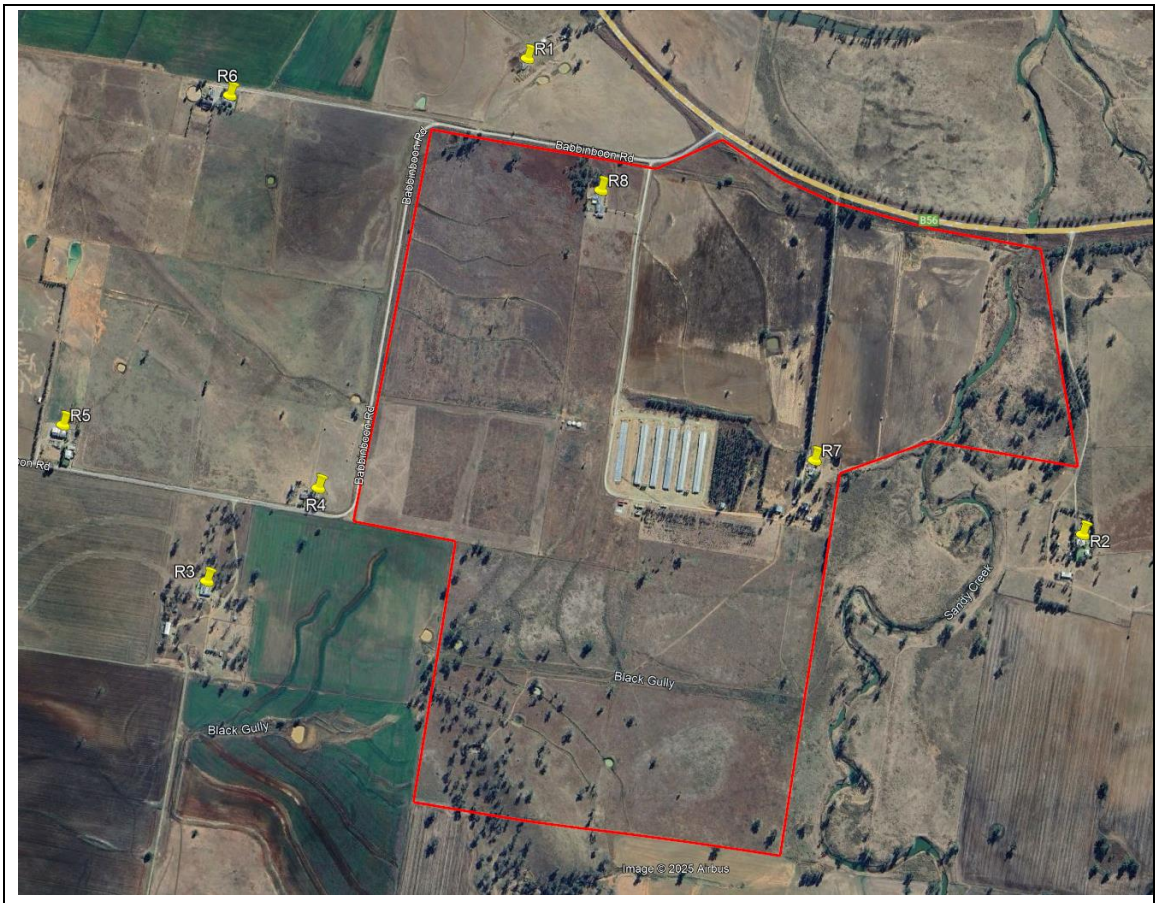
Table 3-1 lists the identifies the nearest sensitive receptors that have the potential to be affected by the proposal that are considered in this assessment. These receptors were selected based on their proximity and directional bearing from the subject site. The locations are shown in Figure 3-1.

Table 3-1: Table of Nearest Receptors

Receptor ID	Address	Lot & DP	Approximate Distance and Direction from Nearest Shed[1)]	Receptor Type
R1	3405 Oxley Highway, Somerton	Lot 173/ DP657385	950 m N	Rural-Residential
R2	3269 Oxley Highway Bective	Lot 11/ DP1002595	970 m E	Rural-Residential
R3	207 Babbinboon Road Somerton	Lot 177/ DP755340	1060 W	Rural-Residential
R4	190 Babbinboon Road Somerton	Lot 4/ DP249697	740 m W	Rural-Residential
R5	250 Babbinboon Road Somerton	Lot 3/ DP249697	1370 m W	Rural-Residential
R6	76 Babbinboon Road Somerton	Lot 5/ DP249697	1320 m W	Rural-Residential
R7*	3329 Oxley Highway Somerton	Lot 10/ DP261839	270 m E	Caretakers Cottage
R8*	3329 Oxley Highway Somerton	Lot 10/ DP261839	540 m NW	Caretakers Cottage

Note: 1) Distance is measured from the nearest proposed or existing shed fan end/corner and nearest residential façade.
2) * On-site receivers – will not be assessed against assessment criteria

Figure 3-1: Map of Nearest Receptors



Source: Google Earth 2023

N	**LEGEND:** Site Location	Benbow Environmental 27-29 Sherwood Road Northmead NSW 2152

4. EXISTING ACOUSTIC ENVIRONMENT

The level of background and ambient noise is assessed separately for the daytime, evening and night time assessment periods. The NSW Noise Policy for Industry (EPA, 2017) defines these periods as follows:

- **Day** is defined as 7.00am to 6.00pm, Monday to Saturday and 8.00am to 6.00pm Sundays and Public Holidays;
- **Evening** is defined as 6.00pm to 10.00pm, Monday to Sunday and Public Holidays; and
- **Night** is defined as 10.00pm to 7.00am, Monday to Saturday and 10.00pm to 8.00am Sundays and Public Holidays.

4.1 BACKGROUND NOISE LEVELS

As the site is in a rural area with minimal industry and sporadic residences, the minimum RBLs presented in the Noise Policy for Industry 2017 have been assumed as they will provide conservative criterion for the site.

5. METEOROLOGICAL CONDITIONS

Wind and temperature inversions may affect the noise impact at the receptors. Therefore, noise enhancing weather conditions should be assessed when wind and temperature inversions are considered to be a feature of the area.

A site-representative meteorological data file was obtained from the Bureau of Meteorology (BOM) for the Tamworth Airport Automatic Weather Station (AWS ID 055325), which is located approximately 20 km southeast of the site. In this Section, an analysis of the 2024 weather data has been conducted to establish whether significant winds are characteristic of the area.

5.1 WIND EFFECTS

Wind is considered to be a feature where source-to-receiver wind speeds (at 10 m height) of 3 m/s or below occur for 30% or more of the time in any assessment period in any season.

5.1.1 Wind Rose Plots

Wind rose plots show the direction that the wind is coming from, with triangles known as “petals”. The petals of the plots in the figures summarise wind direction data into 8 compass directions i.e. north, north-east, east, south-east, etc. The length of the triangles, or “petals”, indicates the frequency that the wind blows from that direction. Longer petals for a given direction indicate a higher frequency of wind from that direction. Each petal is divided into segments, with each segment representing one of the six wind speed classes.

Thus, the segments of a petal show what proportion of wind for a given direction falls into each class. The proportion of time for which wind speed is less than 0.5 m/s, when speed is negligible, is referred to as calm hours or “calms”. Calms are not shown on a wind rose as they have no direction, but the proportion of time consisting of the period under consideration is noted under each wind rose.

The concentric circles in each wind rose are the axis, which denote frequencies. In comparing the plots, it should be noted that the axis varies between wind roses, although all wind roses are similar in size. The frequencies denoted on the axes are indicated beneath each wind rose.

5.1.2 Local Wind Trends

Seasonal wind rose plots for this site utilising the Tamworth Airport AWS data have been included in Figure 5-1 to Figure 5-3.

Figure 5-1: Wind Rose Plots – BOM Tamworth Airport AWS ID 055325 – 2024 – Day time

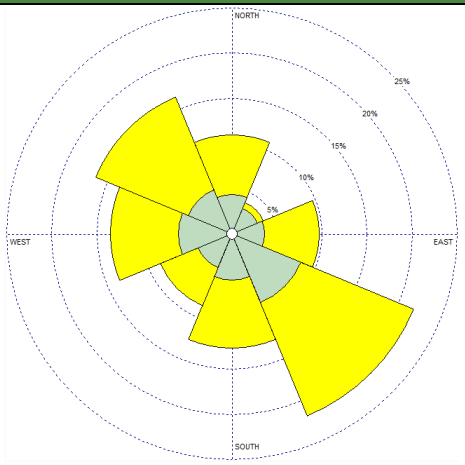
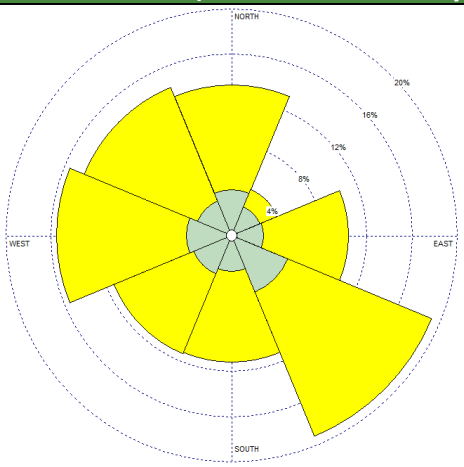
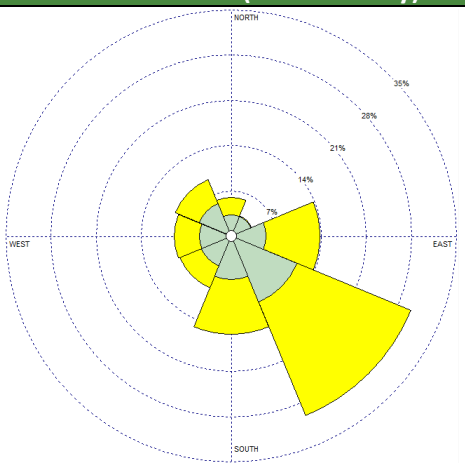
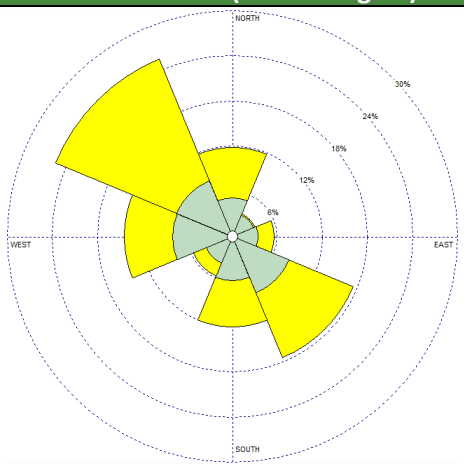
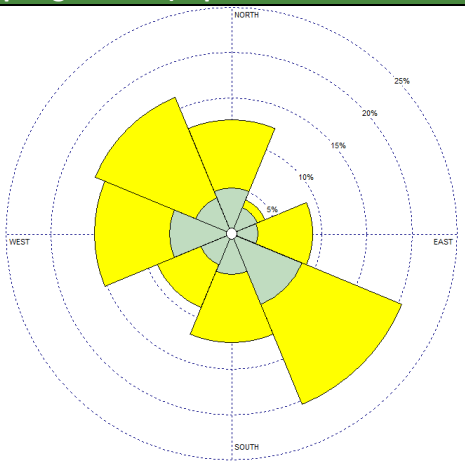
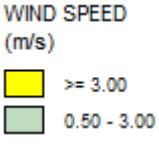
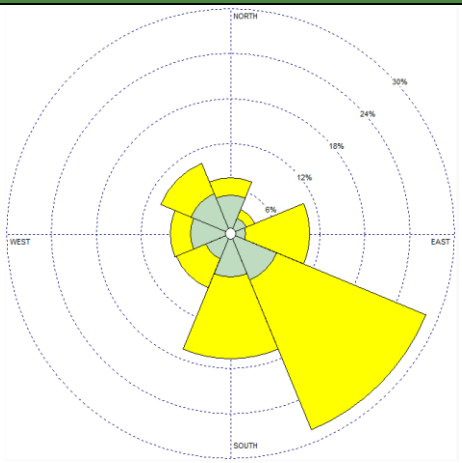
All Seasons	Summer Season (December – February)
	
Average Wind Speed: 3.61 m/s Calms Frequency: 2.78% Axis Frequencies: 5%, 10%, 15%, 20%, 25%	Average Wind Speed: 4.16 m/s Calms Frequency: 0.73% Axis Frequencies: 4%, 8%, 12%, 16%, 20%
Autumn Season (March – May)	**Winter Season (June – August)**
	
Average Wind Speed: 3.16 m/s Calms Frequency: 4.53% Axis Frequencies: 7%, 14%, 21%, 28%, 35%	Average Wind Speed: 3.36 m/s Calms Frequency: 4.08% Axis Frequencies: 5%, 10%, 15%, 20%, 25%
Spring Season (September – November)	**Legend**
	
Average Wind Speed: 3.63 m/s Calms Frequency: 1.74% Axis Frequencies: 5%, 10%, 15%, 20%, 25%	

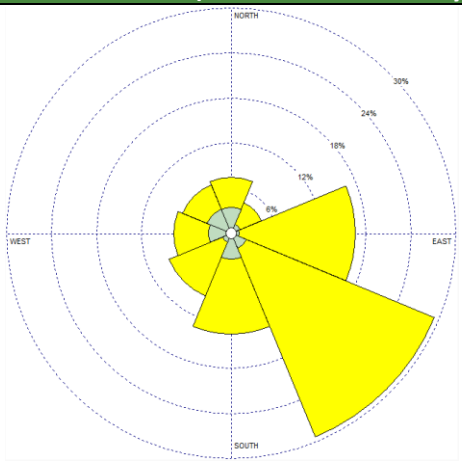
Figure 5-2: Wind Rose Plots – BOM Tamworth Airport AWS ID 055325 – 2024 – Evening time

All Seasons



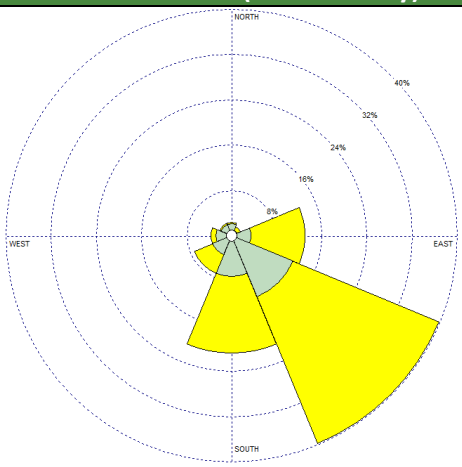
Average Wind Speed: 3.38 m/s
Calms Frequency: 7.49%
Axis Frequencies: 6%, 12%, 18%, 24%, 30%

Summer Season (December – February)



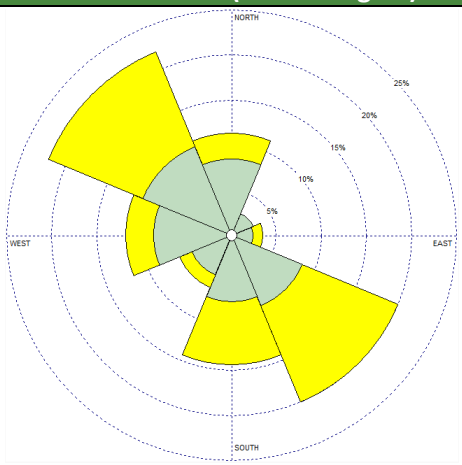
Average Wind Speed: 4.34 m/s
Calms Frequency: 5.27%
Axis Frequencies: 6%, 12%, 18%, 24%, 30%

Autumn Season (March – May)



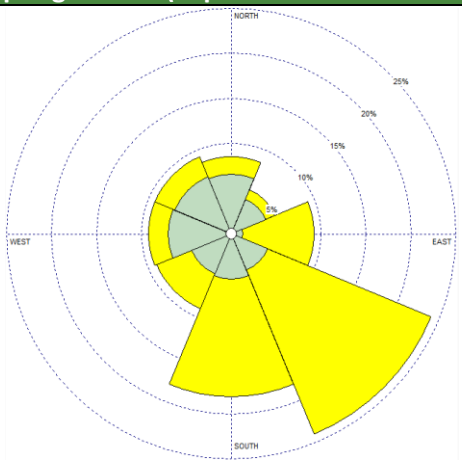
Average Wind Speed: 3.29 m/s
Calms Frequency: 9.35%
Axis Frequencies: 8%, 16%, 24%, 32%, 40%

Winter Season (June – August)



Average Wind Speed: 2.57 m/s
Calms Frequency: 7.83%
Axis Frequencies: 5%, 10%, 15%, 20%, 25%

Spring Season (September – November)



Average Wind Speed: 3.31 m/s
Calms Frequency: 7.47%
Axis Frequencies: 5%, 10%, 15%, 20%, 25%

Legend

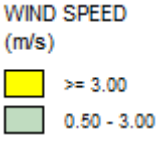
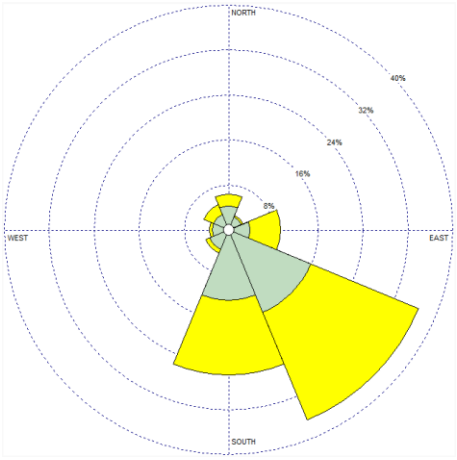
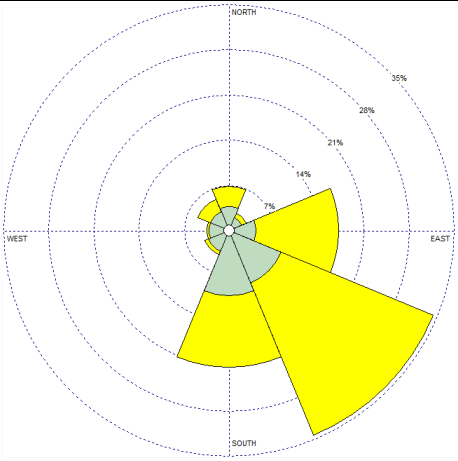
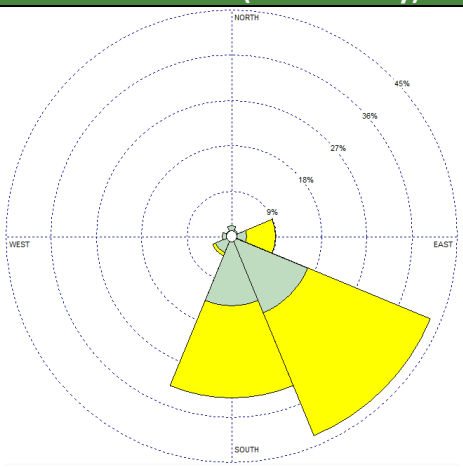
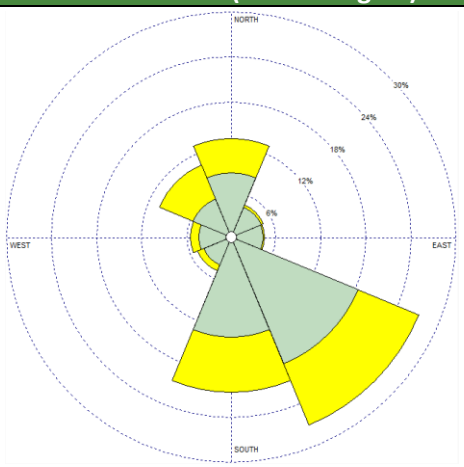
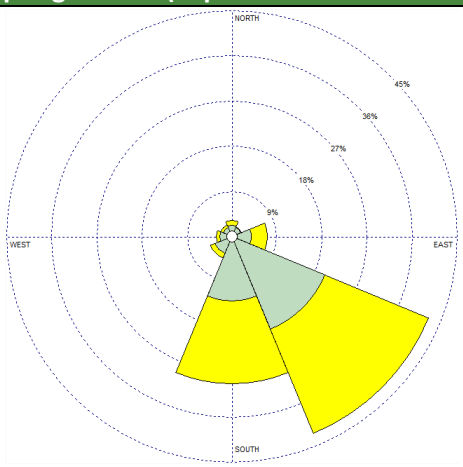
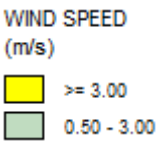


Figure 5-3: Wind Rose Plots – BOM Tamworth Airport AWS ID 055325 – 2024 – Night time

All Seasons	Summer Season (December – February)
	
Average Wind Speed: 2.79 m/s Calms Frequency: 6.29% Axis Frequencies: 8%, 16%, 24%, 32%, 40%	Average Wind Speed: 3.22 m/s Calms Frequency: 4.84% Axis Frequencies: 7%, 14%, 21%, 28%, 35%
Autumn Season (March – May)	**Winter Season (June – August)**
	
Average Wind Speed: 2.89 m/s Calms Frequency: 5.43% Axis Frequencies: 9%, 18%, 27%, 36%, 45%	Average Wind Speed: 2.24 m/s Calms Frequency: 9.24% Axis Frequencies: 6%, 12%, 18%, 24%, 30%
Spring Season (September – November)	**Legend**
	
Average Wind Speed: 2.84 m/s Calms Frequency: 5.60% Axis Frequencies: 9%, 18%, 27%, 36%, 45%	

Appendix D2 of the Noise Policy for Industry (EPA, 2017), refers to utilising the Noise Enhancing Wind Analysis (NEWA) program on the NSW EPA website to determine the significance of source-to-receiver winds.

Table 5-1 below contains the noise wind component analysis from the NEWA software. Wind speeds are taken up to 3 m/s and wind direction is taken from source-to-receiver, plus and minus 45 degrees, as per appendix D2 of the Noise Policy for Industry.

It can be seen from Table 5-1 that there are seven (7) instances, where more than 30% of wind speeds are less than 3 m/s in the plus and minus 45 degree arc from source to receiver. Therefore, worst case 3 m/s source-to-receiver winds have been included in the assessment as the site is proposed to be operational 24/7.

Table 5-1: Noise Wind Component Analysis 2024 Tamworth Airport AWS

Receiver	Day				Evening				Night			
	Summer	Autumn	Winter	Spring	Summer	Autumn	Winter	Spring	Summer	Autumn	Winter	Spring
R1	7	14	11	10	6	19	16	10	19	31	27	33
R2	9	14	17	17	7	5	14	11	6	4	9	5
R3	8	13	7	8	3	10	8	6	11	9	11	11
R4	8	18	10	11	4	17	13	9	18	18	18	22
R5	8	18	11	11	5	17	13	9	18	19	19	23
R6	9	19	14	13	7	23	20	12	25	38	32	38
R7	9	12	12	13	6	7	12	11	9	7	10	8
R8	6	15	10	10	5	20	14	9	19	31	26	32

= Noise enhancing meteorological conditions occur for 30% or more of the period and season

5.2 TEMPERATURE INVERSIONS

Temperature inversion is considered a feature where this occurs more than 30% of the nights in winter.

Temperature inversion conditions would be best associated with F-class stability conditions – generally associated with still/light winds and clear skies during the night time or early morning period (these are referred to as stable atmospheric conditions).

The analysis conducted on the 2024 weather data highlighted that during winter 31.47% of the nights presented temperature inversion conditions. Therefore, temperature inversion effects have been included in the noise impact assessment.

5.2.1 Weather Conditions Considered in the Assessment

The following conditions will be considered in this noise impact assessment considered:

- Neutral Weather Conditions;
- Wind Affected Conditions; and
- Temperature Inversion.

Details of the considered meteorological conditions have been displayed in Table 5-2.

Table 5-2: Meteorological Conditions Assessed in Noise Propagation Modelling

Classification	Ambient Temp.	Ambient Humidity	Wind Speed	Wind Direction (blowing from)	Temperature Inversion	Affected Receiver	Applicability
Neutral	10 °C	70%	-	-	No	All	All periods
Wind Enhancing	10 °C	70%	3 m/s	Source to receiver	No	R1, R6, R8	All periods
Temp. Inversion	10 °C	70%	2 m/s	Source to receiver	Yes	All	Night

6. CURRENT LEGISLATION AND GUIDELINES

6.1 NSW EPA NOISE POLICY FOR INDUSTRY

The NSW Noise Policy for Industry was developed by the NSW EPA primarily for the assessment of noise emissions from industrial sites regulated by the NSW EPA.

The policy sets out two components that are used to assess potential site-related noise impacts. The intrusiveness noise level aims at controlling intrusive noise impacts in the short-term for residences. The amenity noise level aims at maintaining a suitable amenity for particular land uses including residences in the long-term. The more stringent of the intrusiveness or amenity level becomes the project noise trigger levels for the project.

6.1.1 Project Intrusiveness Noise Level

The project intrusiveness noise level is determined as follows:

$L_{Aeq,\ 15\text{-}minute}$ = rating background noise level + 5 dB

Where the $L_{Aeq,(15minute)}$ is the predicted or measured L_{Aeq} from noise generated within the project site over a fifteen minute interval at the receptor.

This is to be assessed at the most affected point on or within the residential property boundary or if that is more than 30 m from the residence, at the most affected point within 30 m of the residential dwelling.

6.1.2 Amenity Noise Level

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 Noise Policy for Industry 2017. The relevant recommended noise levels applicable are reproduced in Table 6-1.

Table 6-1: Amenity noise levels.

Receiver	Noise Amenity Area	Time of Day	L_{Aeq} dB(A) Recommended amenity noise level
Residential	Rural	Day	50
		Evening	45
		Night	40
Active Recreation	All	When in use	55
School Classroom	All	Noisiest 1-hour period when in use	Internal: 40[1]
			External: 50[2]
Industrial Premises	All	When in use	70

Note: 1) In the case where existing schools are affected by noise from existing sources, the acceptable L_{Aeq} noise level may be increased to L_{Aeq} 1 hour.
2) Where internal amenity noise levels are specified, they refer to the noise level at the centre of the habitable room that is most exposed to the noise and apply with windows opened sufficiently to provide adequate ventilation, except where alternative means of ventilation complying with the Building Code of Australia are provided. In cases where gaining internal access for monitoring is difficult, then external noise levels 10 dB(A) above the internal levels apply.

Source: Table 2.2 and Section 2.6, NSW Noise Policy for Industry

The project amenity noise level for industrial developments = recommended amenity noise level minus 5 dB(A)

The following exceptions to the above method to derive the project amenity noise levels apply:

1. *In areas with high traffic noise levels*
2. *In proposed developments in major industrial clusters*
3. *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.*
4. *Where cumulative industrial noise is not a necessary consideration because no other industries are present in the area, or likely to be introduced into the area in the future. In such cases the relevant amenity noise level is assigned as the project amenity noise level for development.*

This development is not considered to be captured by the above exceptions.

6.1.3 Sleep Disturbance Criteria

In accordance with the NSW EPA Noise Policy for Industry, 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:

- **$L_{Aeq,\ 15\text{-}minute}$ 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 assessment should be undertaken. A maximum noise level assessment has not been undertaken as the site will not be operating during the night time period.

6.1.4 Project Noise Trigger Levels

The project noise trigger levels for the site have been established in accordance with the principles and methodologies of the NSW Noise Policy for Industry (EPA, 2017).

Table 6-2 below presents the minimum rating background levels, project intrusive noise level, recommended amenity noise level, and project amenity noise level. The project noise trigger level is the lowest value of intrusiveness or project amenity noise level after conversion to $L_{Aeq\ 15\text{-}minute}$, dB(A) equivalent level.

Different time periods apply for the noise criteria as the intrusive criterion considers a 15-minute assessment period while the amenity criterion requires assessment over the total length of time that a site is operational within each day, evening or night period. In order to ensure compliance under all circumstances, a 15-minute period assessment has been considered for all receptors.

Table 6-2: Project Noise Trigger Levels (PNTL) for Operational Activities, dB(A)

Receiver	Type of Receptor	Time of day	Minimum rating background noise level	Project intrusiveness noise level ($L_{eq(15\text{-}minute)}$)	Recommended amenity noise level $L_{Aeq\ period}$	Project amenity noise level $L_{Aeq\ 15\text{-}minute}$ [1]	PNTL $L_{Aeq\ 15\text{-}minute}$	Sleep Disturbance L_{Amax}
R1-R8	Residential - Rural	Day	35	**40**	50	48	**40**	-
		Evening	30	**35**	45	43	**35**	-
		Night	30	**35**	40	38	**35**	**52**

Notes:

1) These levels have been converted to $L_{Aeq\ 15\text{-}minute}$ using the following: $L_{Aeq\ 15\text{-}minute} = L_{Aeq\ period}$ **+ 3 dB** (NSW Noise Policy for Industry Section 2.2).

6.1.5 Annoying Noise Characteristics

In section 3.3.1 of the Noise Policy for Industry is a list of important parameters for predicting noise. Included in that list is the following:

- Annoying characteristics of the noise sources that may be experienced at receiver locations (for example, tonality, low frequency, and intermittency).

Further details to assess annoying characteristics are described in Fact Sheet C of the Noise Policy for Industry, summarised below.

Table 6-3: Excerpt from Table C1: Modifying factor corrections

Factor	Assessment/ measurement	When to apply	Correction[1]	Comments
Tonal noise	One-third octave band analysis using the objective method for assessing the audibility of tones in noise – simplified method (ISO1996.2-2007 – Annex D).	Level of one-third octave band exceeds the level of the adjacent bands on both sides by: • 5 dB or more if the centre frequency of the band containing the tone is in the range 500-10,000 Hz • 8 dB or more if the centre frequency of the band containing the tone is in the range 160-400 Hz • 15 dB or more if the centre frequency of the band containing the tone is in the range 25-125 Hz.	5 dB[2,3]	Third octave measurements should be undertaken using unweighted or Z-weighted measurements. Note: Narrow-band analysis using the reference method in *ISO1996-2:2007*, *Annex C* may be required by the consent/regulatory authority where it appears that a tone is not being adequately identified, e.g. where it appears that the tonal energy is at or close to the third octave band limits of contiguous bands.

Table 6-3: Excerpt from Table C1: Modifying factor corrections

Factor	Assessment/ measurement	When to apply	Correction[1]	Comments
Low-frequency noise	Measurement of source contribution C-weighted and A-weighted level and one-third octave measurements in the range 10-160 Hz	Measure/assess source contribution C- and A-weighted $L_{eq.T}$ levels over the same time period. Correction to be applied where the C minus A level is 15 dB or more and: • Where any of the one-third octave noise levels in Table C2 are exceeded by up to and including 5 dB and cannot be mitigated, a 2-dB(A) positive adjustment to measured/predicted A-weighted levels applies for the evening/night period • Where any of the one-third octave noise levels in Table c2 are exceeded by more than 5 dB and cannot be mitigated, a 5-dB(A) positive adjustment to measured/predicted A-weighted levels applies for the evening/night period and a 2-dB(A) positive adjustment applies for the daytime period.	2 or 5 dB[2]	A difference of 15 dB or more between C- and A-weighted measurements identifies the potential for an unbalance spectrum and potential increased annoyance. The values in Table C2 are derived from Moorhouse (2011) for DEFRA fluctuating low-frequency noise criteria with corrections to reflect external assessment locations.
Intermittent noise	Subjectively assessed but should be assisted with measurement to gauge the extent of change in noise level.	The source noise heard at the receiver varies by more than 5 dB(A) and the intermittent nature of the noise is clearly audible.	5 dB	Adjustment to be applied for **night time only**.

Table 6-3: Excerpt from Table C1: Modifying factor corrections

Factor	Assessment/ measurement	When to apply	Correction[1]	Comments
Duration	Single-event noise duration may range from 1.5 min to 2.5 h.	One event in any assessment period.	0 to 20 dB(A)	The project noise trigger level may be increased by an adjustment depending on duration of noise (see Table C3).
Maximum adjustment	Refer to individual modifying factors.	Where two or more modifying factors are indicated.	Maximum correction of 10 dB(A)[2] (excluding duration correction).	

Note 1. Corrections to be added to the measured or predicted levels, except in the case of duration where the adjustment is to be made to the criterion.

2. Where a source emits tonal and low-frequency noise, only one 5-dB correction should be applied if the tone is in the low-frequency range, that is, at or below 160 Hz.

3. Where narrow-band analysis using the reference method is required, as outlined in column 5, the correction will be determined by the *ISO1996-2:2007* standard.

6.2 NSW EPA Road Noise Policy

The NSW Road Noise Policy (RNP) has been adopted to establish the noise criteria for the potential noise impact associated with additional traffic generated by the proposal. The RNP was developed by the NSW EPA primarily to identify the strategies that address the issue of road traffic noise from:

- Existing roads;
- New road projects;
- Road redevelopment projects; and
- New traffic-generating developments.

6.2.1 Road Category

Vehicles are proposed to access the site from Oxley Highway, categorised as an arterial road.

6.2.2 Noise Assessment Criteria

Section 2.3 of the RNP outlines the criteria for assessing road traffic noise. The relevant Section of Table 3 of the RNP is shown in Table 6-4.

Table 6-4: Road Traffic Noise Assessment Criteria For Residential Land Uses, dB(A)

Road Category	Type of Project/Land Use	Assessment Criteria, dB(A)*	
		Day (7am-10pm)	Night (10pm-7am)
Arterial roads	3. Existing residences affected by **additional traffic** on existing arterial roads generated by land use developments	$L_{Aeq\ (15\ hour)}$ 60 dB (external)	$L_{Aeq\ (9\ hour)}$ 55 dB (external)

* measured at 1 m from a building façade.

6.2.3 Relative Increase Criteria

In addition to the assessment criteria outlined above, any increase in the total traffic noise level at a location due to a proposed project or traffic-generating development, must be considered. Residences experiencing increases in total traffic noise levels above the relative criteria should also be considered for mitigation as described in Section 3.4 of the RNP. For road projects where the main subject road is a local road, the relative increase criterion does not apply.

Table 6 of the RNP outlines the relative increase criteria for residential land uses, with the details applicable to this project shown in Table 6-5.

Table 6-5: Relative Increase Criteria For Residential Land Uses, dB(A)

Road Category	Type of Project/Land Use	Total Traffic Noise Level Increase, dB(A)	
		Day (7am-10pm)	Night (10pm-7am)
Arterial roads	Land use development with potential to generate additional traffic on existing road	Existing traffic $L_{Aeq\ (15\ hour)}$ + 12 dB (external)	Existing traffic $L_{Aeq\ (9\ hour)}$ + 12 dB (external)

The assessment criteria provided in Table 6-4 and the relative increase criteria provided in Table 6-5 should both be considered when designing project specific noise levels. When existing traffic levels are below the criteria in Table 6-4, the lower of the relative increase criteria and the assessment criteria in Table 6-5 should be adopted. For example, if the assessment criteria is 60 dB(A) and the relative increase criteria is 42 dB(A), then a project specific noise level of 42 dB(A) should be adopted. Similarly, if the assessment criteria is 60 dB(A) and the relative increase criteria is 65 dB(A), a project specific noise level of 60 dB(A) should be adopted.

6.2.4 Exceedance of Criteria

If the criteria shown in both Table 6-4 and Table 6-5 cannot be achieved, justification should be provided that all feasible and reasonable mitigation measures have been applied.

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'.

6.2.5 Assessment Locations for Existing Land Uses

Table 6-6: Assessment Locations for Existing Land Uses

Assessment Type	Assessment Location
External noise levels at residences	The noise level should be assessed at 1 metre from the façade and at a height of 1.5 metres from the floor. Separate noise criteria should be set and assessment carried out for each façade of a residence, except in straightforward situations where the residential façade most affected by road traffic noise can be readily identified. The residential noise level criterion includes an allowance for noise reflected from the façade ('façade correction'). Therefore, when taking a measurement in the free field where reflection during measurement is unlikely (as, for instance, when measuring open land before a residence is built), an appropriate correction – generally 2.5 dB – should be added to the measured value. The 'façade correction' should not be added to measurements taken 1 metre from the façade of an existing building. Free measurements should be taken at least 15 metres from any wall, building or other reflecting pavement surface on the opposite side of the roadway, and at least 3.5 metres from any wall, building or other pavement surface, behind or at the sides of the measurement point which would reflect the sound.
Noise levels at multi-level residential buildings	The external points of reference for measurement are the two floors of the building that are most exposed to traffic noise. On other floors, the internal noise level should be at least 10 dB less than the relevant external noise level on the basis of openable windows being opened sufficiently to provide adequate ventilation. (Refer to the Building Code of Australia (Australian Building Codes Board 2010) for additional information.)
Internal noise levels	Internal noise levels refer to the noise level at the centre of the habitable room that is most exposed to the traffic noise with openable windows being opened sufficiently to provide adequate ventilation. (Refer to the Building Code of Australia (Australian Building Codes Board 2010) for additional information.)
Open space – passive or active use	The noise level is to be assessed at the time(s) and location(s) regularly attended by people using the space. In this regard, 'regular' attendance at a location means at least once a week.

6.2.6 Road Traffic Project Specific Noise Levels

The selected project specific noise levels associated with road traffic noise are presented in Table 6-7.

Table 6-7: Project Specific Noise Levels Associated with Road Traffic, dB(A)

Receptor along	Period	Assessment Criteria
Oxley Highway (Arterial Road)	Day	60 $L_{Aeq, 15\ hour}$
	Night	55 $L_{Aeq, 9\ hour}$

6.3 CONSTRUCTION NOISE AND VIBRATION CRITERIA

Criteria for construction and demolition noise has been obtained from the NSW Interim Construction Noise Guideline (DECC, 2009). Guidance for construction vibration has been taken from British Standard BS7385-Part 2: 1993 '*Evaluation and measurement for vibration in buildings*' and other standards.

6.3.1 NSW Interim Construction Noise Guideline

Residential Criteria

Table 2 of the Interim Construction Noise Guideline (DECC, 2009) sets out construction noise management levels for noise at residences and how they are to be applied. The management noise levels are reproduced in Table 6-8 below. Restrictions to the hours of construction may apply to activities that generate noise at residences above the 'highly noise affected' noise management level.

Table 6-8: Management Levels at Residences Using Quantitative Assessment

Time of Day	Management Level $L_{Aeq(15\text{-minute})}$	How to Apply
Recommended standard hours: Monday to Friday 7am – 6pm Saturday 8am – 1pm 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 $L_{Aeq(15\text{-minute})}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practises to meet the noise affected level. • The proponent should also inform all potentially affected residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly Noise Affected 75 dB(A)	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, or mid-morning or mid-afternoon for works near residents. 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(A) above the noise affected level, the proponent should negotiate with the community. • For guidance on negotiating agreements see Section 7.2.2 (RNP)

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 from the residence.

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 from the residence.

Noise Criterion

The noise criterion for construction noise is presented in Table 6-9.

Table 6-9: Construction Noise Criterion dB(A)

Receiver	Land Use	Period	RBL L_{A90}	Management Level $L_{Aeq(15\ minute)}$
R1-R6	Residential	Standard Hours	35	45

6.3.2 Vibration Criteria

Vibration criteria from construction works are outlined in this section, including guidelines to avoid cosmetic damage, structural damage or human discomfort. There is no specific vibration standard in NSW to assess cosmetic or structural damage to buildings. Usually the British Standard BS 7385–Part 2: 1993 '*Evaluation and measurement for vibration in buildings*' or the German standard DIN4150–Part 3: 1999 '*Structural Vibration Part 3 – effects of vibration on structures*' is referenced. The *Assessing Vibration – A Technical Guideline* (DEC, 2006) provides guidance on preferred levels for human exposure.

6.3.3 BS 7385-2:1993

The British Standard BS 7385–Part 2:1993 '*Evaluation and measurement for vibration in buildings*' provides vibration limits to avoid cosmetic damage on surrounding structures. Limits are set at the lowest limits where cosmetic damage has previously been shown.

Table 6-10: Vibration criteria for cosmetic damage (BS 7385:2 1993)

Type of building	Peak component particle velocity in frequency range of predominant pulse		
	4 Hz to 15 Hz	15 Hz to 40 Hz	40 Hz and above
Reinforced or framed structures. Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above		
Unreinforced or light framed structures. Residential or light commercial type buildings	15 to 20 mm/s	20 to 50 mm/s	50 mm/s

6.3.4 DIN4150-3:1999

The German standard DIN4150-Part 3:1999 'Structural Vibration Part 3 – effects of vibration on structures' has also been considered. The German standard is considered more onerous than the British standard, and specifically includes more stringent limits to avoid structural damage to surrounding heritage buildings.

Table 6-11: Structural damage criteria heritage structures (DIN4150-3 1999)

Type of building	Peak component particle velocity (PPV) mm/s			
	Vibration at the foundation at a frequency of:			Vibration of horizontal plane of highest floor at all frequencies
	1 to 10 Hz	10 to 50 Hz	50 to 100 Hz	
Buildings used for commercial purposes, industrial buildings or buildings of similar design	20	20 to 40	40 to 50	40
Residential dwellings and similar	5	5 to 15	15 to 20	15
Structures that, because of their particular sensitivity to vibration, cannot be classified as the two categories above, and are of intrinsic value (for example heritage listed buildings).	3	3 to 8	8 to 10	8

6.3.5 Human Exposure

The guideline *Assessing Vibration – A Technical Guideline* (DEC, 2006) describes preferred criteria for human exposure. The limits describe values where occupants of buildings would be impacted by construction work.

Table 6-12: Preferred and maximum weighted rms z-axis values, 1-80 Hz

Location	Daytime		Night time	
	Preferred	Maximum	Preferred	Maximum
Continuous Vibration (weighted root mean square (rms) vibration levels for continuous acceleration (m/s^2) in the vertical direction)				
Residences	0.01	0.02	0.007	0.014
Offices, schools, educational institutions and places of worship	0.02	0.04	0.02	0.04
Workshops	0.04	0.08	0.04	0.08
Impulsive Vibration (weighted root mean square (rms) vibration levels for impulsive acceleration (m/s^2) in the vertical direction)				

Table 6-12: Preferred and maximum weighted rms z-axis values, 1-80 Hz

Location	Daytime		Night time	
	Preferred	Maximum	Preferred	Maximum
Residences	0.3	0.6	0.1	0.2
Offices, schools, educational institutions and places of worship	0.64	1.28	0.64	1.28
Workshops	0.64	1.28	0.64	1.28
Intermittent Vibration (m/s)				
Residences	0.2	0.4	0.13	0.26
Offices, schools, educational institutions and places of worship	0.4	0.8	0.4	0.8
Workshops	0.8	1.6	0.8	1.6

7. OPERATIONAL NOISE IMPACT ASSESSMENT

7.1 MODELLING METHODOLOGY

7.1.1 Noise Model

Noise propagation modelling was carried out using the Concawe algorithm within SoundPLAN v7.3. This model has been extensively utilised by Benbow Environmental for assessing noise emissions for existing and proposed developments and is recognised by regulatory authorities throughout Australia. The model allows for the prediction of noise from a site at the specified receptor, by calculating the contribution of each noise source.

Concawe was also used to determine the effects due to wind and temperature inversion. The model allows for the prediction of noise from a site at the specified receptor, by calculating the contribution of each noise source. Other model inputs included the noise sources, topographical features of the subject area, surrounding buildings and receiver locations. Other model inputs included the noise sources, topographical features of the subject area, surrounding buildings and receiver locations.

The modelling stages have been carried out using both $L_{Aeq,\ 15\ minutes}$ and L_{Amax} descriptors. Using these descriptors, noise emission levels were predicted at the nearest potentially affected sensitive receptors to determine the noise impact against the relevant noise criteria in accordance with the NSW EPA Noise Policy for Industry (EPA, 2017).

7.1.2 Noise Sources

An outline of the predictive noise modelling methodology and operational noise modelling scenarios has been provided below.

Day Time Noise Sources

The main noise sources during the day time period are associated with the periodic delivery of feed to the site. These include a truck accessing or leaving the site and the truck mounted blower utilised to fill the silos.

All of the proposed sheds include tunnel fans and their operations vary depending on the air circulation needed. For the purpose of assessing the worst case noise impact, all fans present on each shed have been considered to be continuously operating.

Evening/Night Time Noise Sources

The primary noise impact generated by the poultry farm throughout the night time periods occur during the loading of birds onto trucks. The loading occurs at night times as the birds are more subdued allowing for the human handling and loading of the birds into transport cages. Cooler conditions also prevail at evening and night allowing for the birds to experience greater comfort.

There will be two distinct noise generating phases during the loading period. The first would be the truck driving onto the property, whilst the second phase would involve the use of a forklift to load the birds' cages. It is generally very unlikely a truck would be manoeuvring on-site while the forklift is operational.

Road Traffic Noise Sources

Traffic generating activities, such as feed deliveries and bird pickup operations are proposed to occur at the site.

Feed delivery currently occurs once or twice a week depending on the age of the birds; therefore, one or two trucks are accessing the site, for feed delivery purposes weekly.

Operational Noise Sources

The sound power levels for the identified noise sources associated with the operational activities are shown in Table 7-1 below. The sound power levels have been calculated from measurements of sound pressure levels undertaken by BE at similar sites and sourced from BE's extensive noise source database.

Table 7-1: A-weighted Sound Power Levels , dB(A)

Source	Source Type	Height	L_{max}	Overall	Third Octave Band Centre Frequency (Hz)									
					25	31	40	50	63	80	100	125	160	200
					250	315	400	500	630	800	1000	1250	1600	2000
					2500	3150	4000	5000	6300	8000	10000	12500	16000	20000
Bulk Feed Delivery (Feed Blower)	Point	2 m	**109**	**106**	41	41	51	51	51	69	65	69	79	76
					79	92	85	92	92	93	95	97	99	97
					96	96	94	93	90	87	84	80	73	69
Truck Engine	Line	1.5 m	**106**	**103**	44	48	57	65	70	73	78	78	80	82
					83	85	94	98	94	96	89	88	82	87
					85	84	82	83	83	82	78	-	-	-
Truck Exhaust	Line	3 m	**104**	**101**	42	46	55	63	68	71	76	76	78	80
					81	83	92	96	92	94	87	86	80	85
					83	82	80	81	81	80	76	-	-	-
Forklift Manoeuvring	Point	1 m	**95**	**90**	-	57	-	-	81	-	-	82	-	-
					78	-	-	85	-	-	84	-	-	81
					-	-	75	-	-	67	-	-	-	-
Single Tunnel Fan	Point	1 m	**87**	**85**	43	47	48	50	52	62	58	59	63	72
					74	75	72	73	76	78	77	75	74	72
					67	66	62	58	55	51	46	42	41	40

7.1.3 Modelling Scenarios

Three (3) operational scenarios have been considered in the noise model.

Scenario 1 presents day, evening and night time operations with only and all tunnel fans operating for 100% of the time.

Scenario 2 presents day time operations surrounding the periodic feed delivery on site with the feed blower operating for 100% of the time.

Scenario 3 presents night time operations surrounding the pickup and loading of birds onto trucks with the forklift operating for 30% of the time.

Table 7-2: Modelling Scenarios

Scenario	Time of day	Description and Noise Sources
Scenario 1 Proposed operations – Fans only *Weather conditions: neutral and wind-affected, temperature inversion*	Day, Evening and Night	**Sources:** • Single tunnel fans x 84
Scenario 2 Proposed operations – Feed delivery *Weather conditions: neutral and wind-affected*	Day	**Sources:** • Feed blower • Truck engine • Truck exhaust
Scenario 3 Proposed operations – Bird pickup *Weather conditions: neutral and wind-affected, temperature inversion*	Night	**Sources:** • Forklift • Truck engine • Truck exhaust

Figure 7-1: Scenario 1 Proposed operations – Fans only

Figure 7-2: Scenario 2 Proposed operations – Feed delivery

Figure 7-3: Scenario 3 Proposed operations – Bird pickup

7.1.4 Modelling Assumptions

It should be noted that the relevant assessment period for operational noise emissions has been considered to be 15-minutes. Therefore, noise source durations detailed in the following assumptions should be considered per 15-minute period in view of potential noise impacts under worst-case scenarios. Each assessment-specific assumption has been detailed below:

- Topographical information was obtained from Google Earth;
- Heights of the on-site buildings have been taken from the site plans;
- The new building has been modelled on site to the specifications provided in the site plan;
- All receptors were modelled at 1.5 m above ground level;
- All ground areas have been modelled considering different ground factors ranging from 0 to 1 (Hard to Soft ground). The modelled rural area has been modelled with a ground absorption factor of 0.9;
- Trucks are modelled in sound plan as two (2) line sources, utilising a moving point source definition, with one source representing the truck engine at a height of 1.5 m, and the other representing the exhaust at a height of 3 m. Trucks have been assumed to travel on the site at 30 km/h;
- Bird pickup activities were modelled for the night time as they would occur only during this period;
- Feed delivery activities were modelled for the day time as they would occur only during this period;
- Eighty-four (84) point sources representing the tunnel fans were modelled to operate for 100% of the time. Six (6) Tunnel fans were modelled on one end of each shed;
- One (1) truck per 15-minutes has been considered for the feed blowing scenario providing a worst case assessment;
- One (1) point source representing the feed blower was modelled for the feed delivery process. The feed blower was modelled to operate for 100% of the time.
- Two (2) trucks per 15-minutes has been considered for the bird pickup scenario providing a worst case assessment. No more than ten (10) bird pickup trucks are expected per shed under the worst case scenario as several sheds can be ready for bird pickup at one time;
- One (1) point source representing the forklift was modelled for the bird pickup process. The forklift was modelled to operate for 30% of the time due to the fact that for 70% (or more) of the time the forklift would be operating inside the shed;
- All night-time noise sources were additionally modelled with the L_{Amax} descriptor to assess sleep disturbance; and

An outline of the noise sources and operational noise modelling stages has been provided below.

7.2 OPERATIONAL PREDICTED NOISE LEVELS

Results of the predictive noise modelling of the operational activities are shown in Table 7-3 for all scenarios. Note that the wind-affected receivers have been assessed based on the results of Table 5-2.

During operations, noise levels are predicted to comply with the NSW EPA Noise Policy for Industry criteria at all receivers during all periods. Therefore, the noise levels are acceptable for the proposed development. Noise control measures are recommended in Section 7.4.

Table 7-3: Scenario 1-3 Noise Modelling Results – Operational Predicted Noise Levels dB(A)

Receiver	Predicted Noise Level									Noise Criteria $L_{Aeq\ (15\ minute)}$			Night Sleep Disturbance L_{Amax}
	Scenario 1 – Day, Evening & Night $L_{Aeq\ (15\ minute)}$				Scenario 2 – Day $L_{Aeq\ (15\ minute)}$	Scenario 3 – Night $L_{Aeq\ (15\ minute)}$				Day	Evening	Night	
	Neutral	Wind	Temperature Inversion $L_{Aeq\ (15\ minute)}$	Sleep Disturbance L_{Amax}	Neutral	Neutral	Wind	Temperature Inversion $L_{Aeq\ (15\ minute)}$	Sleep Disturbance L_{Amax}				
R1	21✓	26✓	31✓	25✓	22✓	21✓	21✓	27✓	30✓	40	35	35	52
R2	25✓	-	29✓	29✓	30✓	24✓	-	29✓	32✓	40	35	35	52
R3	21✓	-	22✓	25✓	22✓	20✓	-	26✓	27✓	40	35	35	52
R4	26✓	-	29✓	30✓	25✓	24✓	-	29✓	30✓	40	35	35	52
R5	19✓	-	22✓	23✓	17✓	17✓	-	23✓	23✓	40	35	35	52
R6	18✓	22✓	27✓	22✓	17✓	17✓	17✓	23✓	24✓	40	35	35	52
R7*	38	-	42	42	46	38	-	41	51	-	-	-	-
R8*	26	32	38	30	28	28	28	32	40				

Note: ✓Complies × Non-compliance;

* On-site receivers – exempt from assessment criteria

7.3 ANNOYING CHARACTERISTICS

Annoying characteristics are discussed in the following section. It is noted, however, that due to the large margin of compliance, if any penalty were to be applied the predicted levels would still comply with the PNTLs at all receivers for all scenarios for all time periods.

7.3.1.1 Low Frequency

Low frequency noise for fans only, feed delivery and bird pickup result in C-weighted minus A-weighted levels greater than 15 dB indicative of a low frequency component. However, due to the very low predicted levels the 1/3 octave band would not exceed the thresholds in table C2 of Fact sheet C of the Noise Policy for Industry. Therefore, no low frequency penalty applies.

7.3.2 Tonality

The noise sources do not contain tonal elements, and third octave band analysis has revealed no tonal elements in the results at the worst case receiver.

It is recommended that reverse beepers will not be used on forklifts, reversing lights will be used instead.

7.3.3 Intermittent Noise

There will be no intermittent noise from the site. It is recommended that reverse lights will be used instead of beepers on forklifts.

7.3.4 Duration and Maximum Adjustment

Duration and maximum adjustment is not relevant to noise generated by the site.

7.4 RECOMMENDED OPERATIONAL MITIGATION MEASURES

Operational noise levels are predicted to comply with the assessment criteria at all receivers.

While additional noise controls are not predicted to be necessary to comply with the operational noise criteria, the following management practices are recommended as good practice:

- Prohibition of extended periods of on-site revving/idling;
- Minimisation of the use of truck exhaust brakes on site;
- On-site vehicles and machinery to be maintained in accordance with a preventative maintenance program to ensure optimum performance and early detection of wearing or noisy components; and
- Forklifts to use reversing lights as opposed to reverse beepers.

8. ROAD TRAFFIC NOISE IMPACT ASSESSMENT

A description of the calculation methodology and the noise predictions associated with road traffic has been provided below. The most likely route to the site travels along Oxley Highway coming from Tamworth, then onto Babbinboon Road before entering the Wintergreen Farm unsealed road.

Calculation of road traffic noise contribution has been undertaken using SoundPLAN 7.3. A worst case scenario of two trucks per 15-minutes, 8 per hour has been considered during both the day and night time period. The trucks are also assumed to travel along Oxley Highway at a speed of 100 km/h. Trucks have been modelled considering two moving point sources at heights of 1.5 m and 3 m above ground level.

The $L_{Aeq,\ 15\ hour\text{-}day}$ and $L_{Aeq,\ 9\ hour\text{-}night}$ noise descriptors have been calculated at the most affected residential receptor on Oxley Highway itself. The receiver has been selected as it is the closest residential receiver along the road route to the site. The predicted noise levels are displayed in Table 8-1. The highest noise levels would be predicted at this location, therefore, 3086 Oxley Highway is the only location considered.

Table 8-1: Predicted Levels for Road Traffic Noise

Receptor	Criteria		Predicted noise level	
	Day $L_{Aeq,\ 15\ hour}$	Night $L_{Aeq,\ 9\ hour}$	Day $L_{Aeq,\ 15\ hour}$	Night $L_{Aeq,\ 9\ hour}$
3086 Oxley Highway, Bective 2340	60	55	32 ✓	32 ✓

✓Complies × Non-compliance

From Table 8-1, the predicted daytime $L_{Aeq,\ 15\ hour}$ and night-time $L_{Aeq,\ 9\ hour}$ road traffic noise levels comply with the noise criteria, as established in the NSW EPA Road Noise Policy. Therefore, no additional road noise mitigation strategies are recommended.

9. CONSTRUCTION NOISE IMPACT ASSESSMENT

An outline of the predictive noise methodology and construction noise modelling scenarios have been provided below.

9.1 CONSTRUCTION ACTIVITIES AND MODELLED SCENARIO

Two worst-case scenarios have been considered, one for earthworks and one for building works. In each scenario, the equipment would be running for 100% of the time over the 15 minute assessment period. The equipment list for each stage is detailed in Table 9-1 with equipment location diagrams in Figure 9-1 and Figure 9-2.

Table 9-1: Modelled Noise Source Scenarios for Proposed Construction Works

Scenario	Time of Day	Noise Sources for Worst 15 Minute Period
1 - Earthworks	Standard hours and outside standard hours	Excavator Backhoe Truck manoeuvring Hand tools
2 - Building works	Standard hours and outside standard hours	Concrete mixer truck Concrete pump Truck manoeuvring Hand tools

Noise propagation modelling was carried out using the ISO 9613 algorithm within SoundPLAN. The two construction scenarios were modelled using the $L_{Aeq,15\ minutes}$ descriptor.

Figure 9-1: Construction Scenario 1 - Earthworks

Figure 9-2: Construction Scenario 2 - Building works

9.1.1 Noise Sources

A-weighted octave band centre frequency sound power levels are presented shown in Table 9-2 below. The sound power levels for the relevant noise sources have been calculated from measurements of sound pressure levels undertaken by an acoustic engineer from Benbow Environmental at similar sites and sourced from Benbow Environmental's noise source database, as well as taken from AS 2436: 2010 and the UK Department for Environmental Food and Rural Affairs (DEFRA) database, *Update of noise database for prediction of noise on construction and open sites*.

Table 9-2: A-weighted Sound Power Levels Associated with Construction Activities, dB(A):

Noise Source	Overall	Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Excavator	**105**	75	77	81	87	91	92	89	81
Truck	**105**	76	84	89	104	95	93	88	88
Hand tools	**100**	71	81	91	96	94	90	87	81
Backhoe	**104**	102	94	92	92	91	88	87	78
Concrete truck	**108**	85	86	85	94	98	107	89	82
Concrete pump truck	**105**	77	92	97	99	100	95	95	89

9.1.2 Modelling Assumptions

- The relevant assessment period for operational noise emissions has been considered to be 15 minutes. Construction scenarios assume all equipment is running 100% of the time during the 15 minute assessment period, to provide a worst-case scenario;
- All noise sources associated with the construction works have been modelled as point sources.

9.1.3 Construction Predicted Noise Levels

Results of the predictive noise modelling of the construction activities are shown in Table 9-3 below. Noise levels associated with construction are predicted to comply with the noise management level at all receivers and are well below the highly noise affected management level of 75 dB(A).

Table 9-3: Noise Modelling Results Associated with Construction for Leq, dB(A)

Receiver	Noise Management Levels ($L_{eq,15\ minute}$ dB(A))	Scenario (Standard Hours) (L_{eq}, dB(A))	
	Standard Hours	Scenario 1	Scenario 2
R1	45	29✓	28✓
R2	45	33✓	31✓
R3	45	30✓	28✓
R4	45	33✓	32✓
R5	45	27✓	24✓
R6	45	27✓	25✓
R7*	-	45	45
R8*	-	32	34

✓Complies × Non-compliance

* On-site receivers – exempt from assessment criteria

9.2 Construction Noise Controls

The construction noise scenario represents a worst case scenario that may not occur in practice, and expected impacts on the surrounding receivers are predicted to be lower than the results presented. None of the predicted noise levels exceed the noise management levels discussed in section 6.3.1 and the highly noise affected management level of 75 dB(A).

Construction activities should only take place during standard **construction** hours as follows:

Monday to Friday:	8am to 6pm
Saturday:	8am to 1pm
Sunday and Public Holidays:	No works permitted

10. VIBRATION IMPACT ASSESSMENT

In the NSW TfNSW Construction Noise Strategy document and Assessing Vibration – A Technical Guideline, construction equipment that may cause vibration impacts includes hydraulic hammers, vibratory pile drivers, pile boring, jackhammers, wacker packers, concrete vibrators and pavement breakers, amongst other equipment. The construction work proposed would not use this type of equipment and is not expected to cause vibration impacts. The equipment utilised for the sheds will not generate vibration impacts therefore a detailed Vibration Impact Assessment is therefore not considered warranted.

11. STATEMENT OF POTENTIAL NOISE IMPACT

Benbow Environmental has been engaged by Wintergreen Farm to undertake a Noise Impact Assessment for the proposed Wintergreen Farm poultry development in Somerton, NSW.

The noise impact assessment was undertaken in accordance with the following guidelines:

- NSW Environmental Protection Authority, Noise Policy for Industry 2017;
- Department of Environment, Climate Change and Water NSW, Road Noise Policy (DECCW, 2011);
- NSW Interim Construction Noise Guideline (DECC, 2009); and
- *Assessing Vibration – A Technical Guideline* (DEC, 2006).

The nearest receivers and the noise generating activities have been identified. Noise criteria for the project have been formed, with assessment of the proposed site activities conducted against the NSW EPA Noise Policy for Industry (EPA, 2017) and the NSW Road Noise Policy (DECCW, 2011). Modelling of the activities was conducted using the noise modelling software SoundPlan 7.3.

The activities proposed by the proponent were found to be within the framework of the NSW EPA Noise Policy for Industry.

Operational noise levels in all scenarios are predicted to comply with the Noise Policy for Industry assessment criteria at all receivers.

While additional noise controls are not predicted to be necessary for compliance, the following management practices are recommended as good practice:

- Prohibition of extended periods of on-site revving/idling;
- Minimisation of the use of truck exhaust brakes on site;
- On-site vehicles and machinery to be maintained in accordance with a preventative maintenance program to ensure optimum performance and early detection of wearing or noisy components; and
- Forklifts to use reversing lights as opposed to reverse beepers.

The generation of additional road traffic associated with the site's activities has been assessed and it was predicted to comply with the guidelines set out in the NSW Road Noise Policy.

Noise levels associated with construction are predicted to comply with the noise management level at all receivers and are well below the Interim Construction Noise Guideline's highly noise affected management level of 75 dB(A).

Operational vibration impacts on the similar industrial facilities have been assessed and shown to be negligible and well below the relevant Assessing Vibration – A Technical Guideline (DEC, 2006) criteria.

In the Transport for NSW Construction Noise Strategy document and Assessing Vibration – a Technical Guideline, construction equipment that may cause vibration impacts includes hydraulic hammers, vibratory pile drivers, pile boring, jackhammers, 'wacker packers', concrete vibrators, and pavement breakers, amongst other equipment. The construction work proposed would not use this type of equipment and is not expected to cause vibration impacts. The equipment utilised

for the sheds will not generate vibration impacts therefore a detailed Vibration Impact Assessment is therefore not considered warranted.

This concludes the report.

Graduate Environmental Scientist

Environmental Scientist

Principal Consultant

12. IMITATIONS

Our services for this project are carried out in accordance with our current professional standards for site assessment investigations. No guarantees are either expressed or implied.

This report has been prepared solely for the use of Wintergreen Farm, as per our agreement for providing environmental services. Only Wintergreen Farm is entitled to rely upon the findings in the report within the scope of work described in this report. Otherwise, no responsibility is accepted for the use of any part of the report by another in any other context or for any other purpose.

Although all due care has been taken in the preparation of this study, no warranty is given, nor liability accepted (except that otherwise required by law) in relation to any of the information contained within this document. We accept no responsibility for the accuracy of any data or information provided to us by Wintergreen Farm for the purposes of preparing this report.

Any opinions and judgements expressed herein, which are based on our understanding and interpretation of current regulatory standards, should not be construed as legal advice.