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Report

Noise Impact Assessment

Goolgowi Poultry Facility

Tattersall Lander Pty Ltd

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Prepared For

Tattersall Lander Pty Ltd

Bob Lander, Director

Email: bob@tatland.com.au, Telephone: 02 4987 1500, Mobile: 0408 497 657

PO Box 580 Raymond Terrace NSW 2324

Prepared By

Advitech Pty Limited t/a Advitech Environmental

ABN: 29 003 433 458

Dale Redwood, Senior Environmental Scientist

Email: dale.redwood@advitech.com.au, Telephone: 02 4924 5400

Facsimile: 02 4967 3772, Web: www.advitech.com.au, General Email: mail@advitech.com.au

7 Riverside Drive Mayfield West NSW 2304 PO Box 207 Mayfield NSW 2304

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Function	Signature	Name and Title	Date
Prepared by		Dale Redwood Senior Environmental Scientist	16 February, 2017
Checked by	 for	Clayton Sparke Environment Specialist (Acoustics)	16 February, 2017
Authorised for Release by		Dr Rod Bennison Lead Environmental Scientist	16 February, 2017

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1. INTRODUCTION

Advitech Pty Limited (T/A Advitech Environmental) was engaged by Tattersall Lander (TL), on behalf of James and Cathy Muscat, to prepare a Noise Impact Assessment (NIA) for a proposed broiler farm at Goolgowi, NSW. The NIA has been prepared to support the Development Application (DA) for the proposed development.

It should be noted that this report was prepared by Advitech Pty Limited for Tattersall Lander Pty Ltd (“the customer”) in accordance with the scope of work and specific requirements agreed between Advitech and the customer. This report was prepared with background information, terms of reference and assumptions agreed with the customer. The report is not intended for use by any other individual or organisation and as such, Advitech will not accept liability for use of the information contained in this report, other than that which was intended at the time of writing.

1.1 Study Objectives

The purpose of this report is to identify potential noise impacts associated with the operation of the proposed poultry facility activities on nearby sensitive receivers. The noise impact assessment has been undertaken, as per the Secretary’s Environmental Assessment Requirements (SEARs), with regards to the following scope of works:

- Site inspection and review of proposed development;
- Identification of nearby sensitive receivers;
- Long term background monitoring at two locations, supplemented with short term attended monitoring at two locations;
- Establishment of project specific noise levels (PNSL);
- Identification of noise sources associated with the proposed development;
- Prediction of noise levels at nearby sensitive receivers using *Predictor* environmental noise modelling software; and
- Preparation of a Noise Impact Assessment report.

The Noise Impact Assessment is to be submitted to the consent authority by the client, to support the development application of the proposed project.

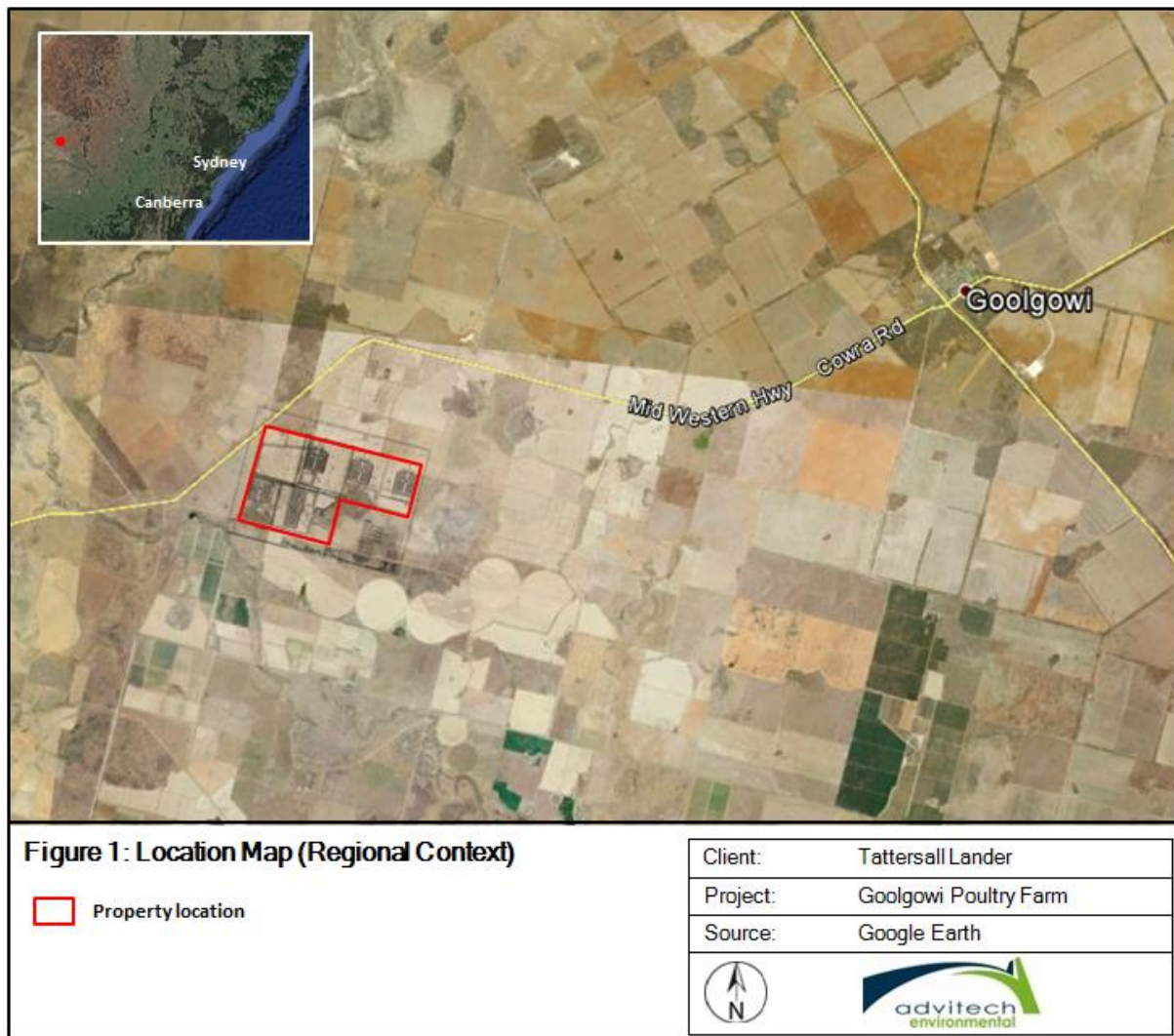
2. PROJECT BACKGROUND

2.1 Project Location

The proposed development would be located adjacent to the Mid-Western Highway at Lots 1 and 2 in DP749831, approximately 17 kilometres west of Goolgowi in western NSW. The Local Government Area is Carrathool Shire Council

The site is located within a rural landscape, surrounded by neighbouring farms. The area is largely flat and devoid of significant topographical features.

The location of the proposed site is shown in **Figure 1** (regional context).



2.2 Adjacent Land Use

The proposal area is rural in nature, and is surrounded by agricultural and farm land. A review of aerial photography identified ten residential properties within five kilometres of the proposed facility. The locations of the sensitive receivers are provided in **Figure 2** and **Table 1**. Additionally, the Jeanella South poultry facility is located approximately 3.6 kilometres east of the proposal site, while the Jeanella poultry facility is located approximately 5.7 kilometres northeast of the proposal site.

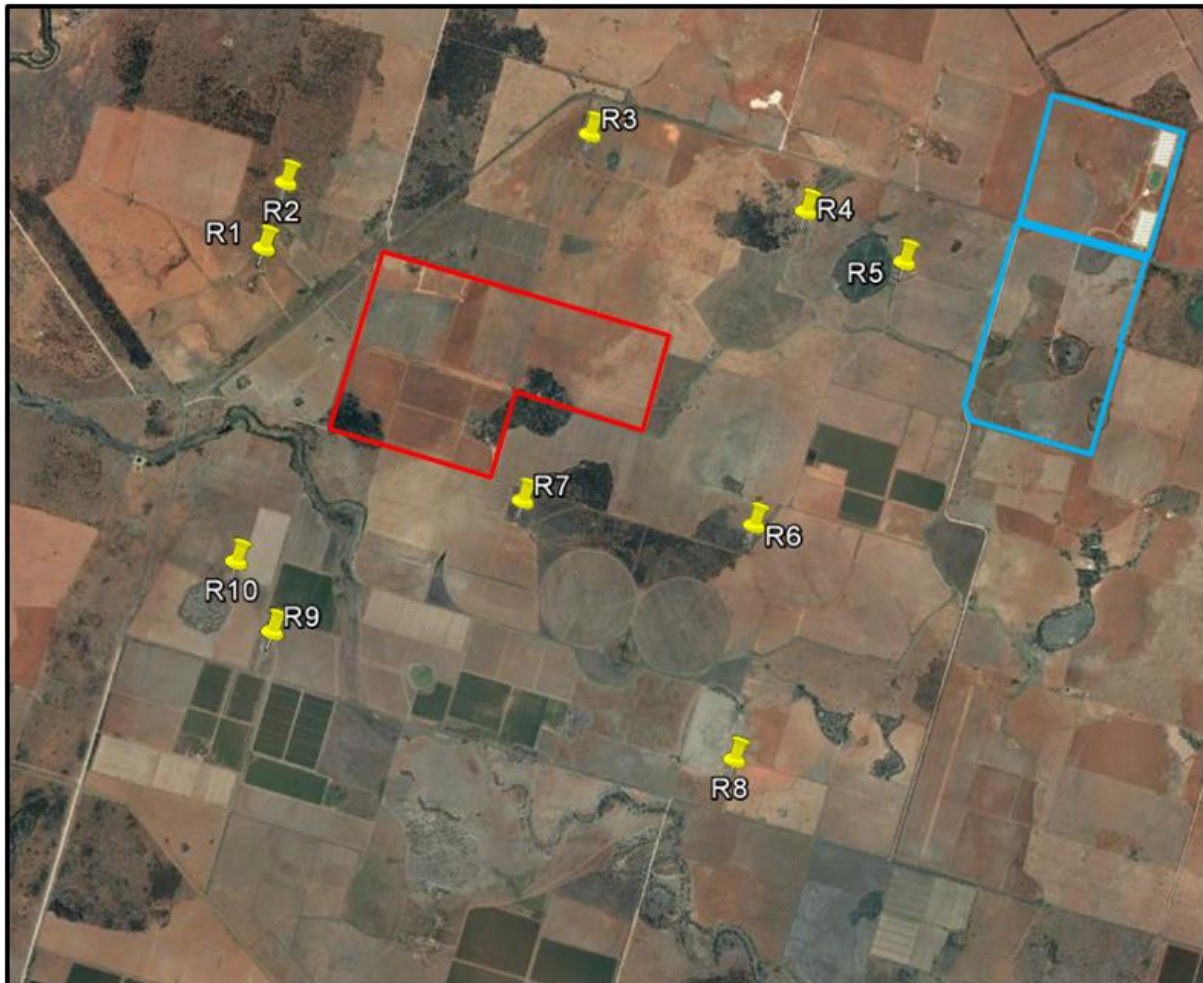


Figure 2: Sensitive Receiver Map

- Property location
- Neighbouring Poultry Facilities
- 📌 Sensitive Receivers

Client:	Tattersall Lander
Project:	Goolgowi Poultry Farm
Source:	Google Earth



Table 1: Nearest Identified Sensitive Receivers

Receiver ID	Receiver Type	Approximate Distance from Facility Noise Source (km)	Bearing
R1	Residential	1.5	W
R2	Residential	1.9	W
R3	Residential	1.8	N
R4	Residential	1.9	NE
R5	Residential	2.7	NE
R6	Residential	1.9	E
R7	Residential	1.0	S
R8	Residential	4.9	SSE
R9	Residential	2.8	S
R10	Residential	2.5	SSW

2.3 Project Description

Advitech Environmental understands that the proponent is proposing to develop a poultry facility consisting of five separately operated farms. Each of the proposed farms would consist of 20 tunnel ventilated sheds measuring approximately 168 metres in length and 18.5 metres in width.

The sheds would house a total of up to 6,000,000 birds, or 60,000 birds per shed, destined for meat production. Advitech Environmental understands that the tunnel ventilation system will discharge vertically through exhaust stacks to allow thorough atmospheric mixing.

The production cycle comprises of a bird occupancy period of between five and eight weeks. Once reaching maturity between 32 and 54 days of growth, the birds would be removed during the night (generally) period using approximately 5 to 6 trucks per shed. Following the removal of the mature birds, each of the sheds would be cleaned, with a new batch of chicks introduced to the sheds after about a week. There would be a total of 5.5 production cycles per year.

Feed delivery to the site would be undertaken during the day period, with the grain siloed on site. The access route would enter the site from Mid-Western Highway, and to minimise travel on site, truck movements would be confined to the northern side of the proposed poultry sheds. The site would operate 24 hours per day, with deliveries and maintenance activities generally confined to the day period (7am to 6 pm).

The site layout in is provided in **Figure 3**.

3. EXISTING NOISE ENVIRONMENT

3.1 Methodology

The existing noise environment is assessed in accordance with the provisions of the NSW EPA *Industrial Noise Policy* (INP).

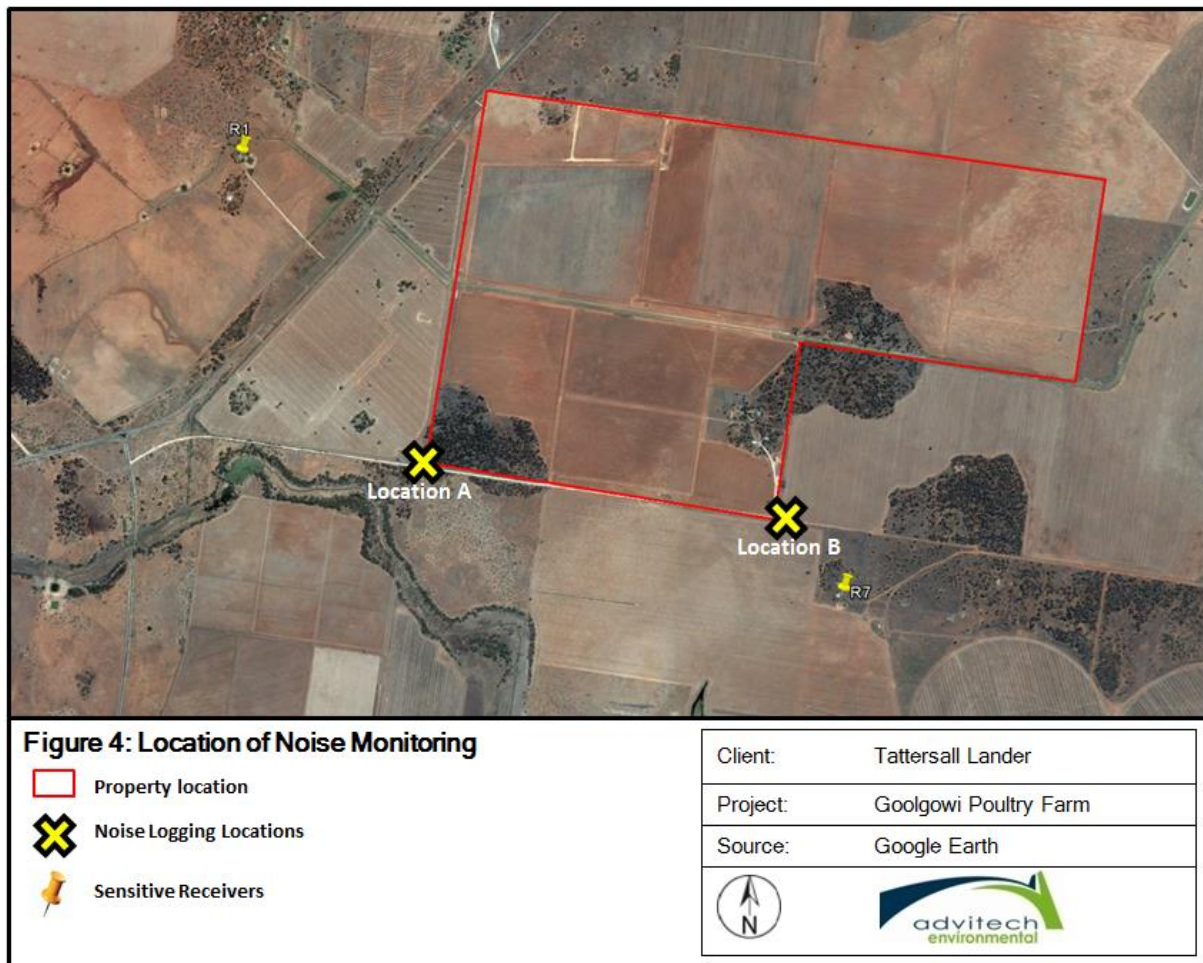
The methodology for assessing the background noise levels within the ambient environment includes:

- long term (unattended) monitoring should be undertaken for a period of not less than 7 days (or until such time as 7 days' worth of valid monitoring data is obtained);
 - local meteorological monitoring should be undertaken in order to identify and exclude noise levels during periods influenced by high wind speeds and/or rainfall that contribute to extraneous noise (not typical to the site);
- monitoring locations selected should be representative of the noise environments at sensitive receivers adjacent to the proposed development;
- monitoring should be undertaken at the time(s) of day that the proposed works would operate; and
- attended monitoring is undertaken to supplement unattended noise logging data, particularly in complex noise environments where existing construction or industrial noise sources may exist.

Ambient noise levels in receiving environments may display significant temporal variation due to the characteristics of the noise generating activities at that locality. To account for the temporal variation of ambient noise levels, the INP indicates that background noise levels are to be measured for the day, evening and night periods. The INP defines these periods as follows:

- Day - the period from 7:00 am to 6:00 pm Monday to Saturday; or 8:00 am to 6:00 pm on Sundays and public holidays;
- Evening - the period from 6:00 pm to 10:00 pm; and
- Night - the period from 10:00 pm to 7:00 am Monday to Saturday, or 10:00 pm to 8:00 am Sundays and public holidays.

Analysis of aerial photography indicates that the study area is rural in nature, with the ambient noise levels of the nearby sensitive receivers likely to be influenced by their proximity to the Mid-Western Highway. Long term, unattended monitoring was undertaken at two locations, with Location A representative of receivers more likely to be influenced by road traffic noise on the Mid-Western Highway, and Location B representative of receivers less affected by road traffic noise. The monitoring locations are shown in **Figure 4**.



3.2 Attended Noise Monitoring

Short term attended monitoring was undertaken at monitoring locations A and B on 15 March, 2016 during the day period as a means of characterising the ambient noise sources within the receiving environment. The attended monitoring was undertaken using a Svantek (SVAN) 958, Type 1 sound level meter (SLM) (S/N:20777), with the results of the monitoring detailed in **Table 2**.

Table 2: Attended Monitoring Results, dB(A)

Location	Date	Time	L _{Aeq}	Comments
Location A	15.03.16	17.00	35	Local Traffic to ~43 dB(A) Bird Calls to ~52 dB(A)
Location B	15.03.16	17:33	59	Insects 30 to 36 dB(A) Bird Calls to ~43 dB(A) Wind Noise to ~46 dB(A)

Existing poultry operations in the locality of the study site were not audible at any time during the attended noise monitoring events.

3.3 Continuous Noise Monitoring

Long-term, unattended noise monitoring was undertaken from 1 March to 17 March, 2016 using two ARL 316 Environmental Noise Loggers to capture the background noise levels within each of the two identified noise environments. The details of the Environmental Noise Logger used for the monitoring are provided in **Table 3**.

Table 3: Continuous noise logging

Location	Location A - Rural Receivers	Location B - Road Receivers
Logger Serial Number	16-299-450	16-203-513
Calibration Date	31/08/2016	22/03/2016
Measurement Title	Goolgowi A	Goolgowi B
Run Started	1/03/16 14:45	1/03/16 15:00
Run Stopped	17/03/16 7:45	16/03/16 15:30
Frequency Weighting	A	A
Time Response	Fast	Fast
Engineering Units	dB SPL	dB SPL

The unattended noise monitoring was undertaken to assess the L_{A90} background noise level, and L_{Aeq} , L_{A10} and L_{A1} noise levels within the receiving area. The L_{A1} , L_{A10} , L_{A90} and L_{Aeq} noise levels for the continuous noise logger are presented graphically in **Appendix I**. Local meteorological conditions, used in the evaluation and validation of noise monitoring data, were measured using a Davis Vantage Vue Precision Weather Station, established at monitoring location B.

The long-term unattended noise monitoring data was analysed to determine the single figure Assessment Background Level (ABL) representing each assessment period, during each day. The ABL is calculated as the lowest tenth percentile of the L_{A90} noise descriptor for each period. The Rating Background Level (RBL), which represents the overall single figure background noise level for each assessment period (day, evening and night) over the duration of the monitoring period, is calculated as the median of all the ABLs for each assessment period. Once the RBLs have been calculated, the most stringent of the RBLs at each of the monitoring locations were used to determine the Project Specific Noise Levels (PSNLs) relevant to the project.

The results for the monitoring location are presented in **Table 4**. Periods for which the ABL are not presented were omitted from the analysis due to the occurrence of meteorological conditions that may contribute to extraneous noise.

Table 4: Noise monitoring results dB(A)

Date	Location A - (G1)			Location B - (G2)		
	Day	Evening	Night	Day	Evening	Night
02/03/2016	n/a	24.3	38.3	n/a	22.7	33.7
03/03/2016	n/a	n/a	n/a	n/a	n/a	n/a
04/03/2016	23.9	23.8	42.2	22.3	22.5	32.8
05/03/2016	n/a	24.3	29.3	n/a	22.4	31.4
06/03/2016	24.2	25.7	35.9	22.2	22.8	30.8
07/03/2016	24.0	23.6	n/a	22.4	22.3	n/a
08/03/2016	23.6	27.0	n/a	22.2	23.3	n/a
09/03/2016	n/a	24.2	n/a	n/a	22.5	n/a
10/03/2016	n/a	n/a	30.4	n/a	n/a	27.3
11/03/2016	n/a	28.6	32.0	n/a	26.8	28.0
12/03/2016	24.4	n/a	30.3	22.3	n/a	27.9
13/03/2016	n/a	n/a	32.1	n/a	n/a	26.6
14/03/2016	25.3	26.6	n/a	22.6	24.1	n/a
15/03/2016	n/a	n/a	n/a	n/a	n/a	n/a
Rating Background Level (RBL)	<30	<30	32	<30	<30	<30
L_{Aeq, period}	40	49	47	40	42	39

Note: n/a denotes data excluded for adverse meteorological conditions as per Section 3.4 of the INP

4. NOISE AND VIBRATION ASSESSMENT CRITERIA

4.1 Construction Noise Criteria

The NSW *Interim Construction Noise Guideline* (ICNG) (2009) provides guidance on managing construction works to minimise noise, with an emphasis on communication with, and cooperation from all stakeholders affected by construction noise. The guideline does not identify a single approach for managing construction noise; rather, it provides a framework for assessing construction noise impacts based on the complexity of the project and condition of the ambient noise environment.

The framework identifies the following steps for managing construction noise impacts:

- identify any sensitive land uses that may be affected;
- identify the operating hours and duration of the proposed construction works;
- determine the noise impacts at sensitive receivers; and
- select and apply the best work practices to minimise noise impacts.

The scale and duration of the construction works, and the number and type of potentially affected sensitive receivers defines the extent to which assessment and management of impacts should be undertaken. The quantitative noise assessment approach is applied to larger construction projects, anticipated to extend for a period greater than three weeks. This approach involves predicting noise levels from construction activities, and comparing them to Noise Management Levels (NML), as per Table 2 of the ICNG, reproduced as **Table 5** below. The NMLs specific to this project, provided in **Table 6**, represents the noise level above which there may be some community reaction to the noise.

Table 5: Noise at Residences (Quantitative Assessment) from ICNG (DECC, 2009)

Time of Day	Management Level, L _{Aeq} (15 min)	How to apply
Recommended standard hours:	Noise affected RBL + 10 dB	The noise affected level represents the point above which there may be some community reaction to noise.
Monday to Friday 7 am to 6 pm		Where the predicted or measured L _{Aeq} (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.
Saturday 8am to 1 pm		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.
No work on Sundays or public holidays	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 for works near schools, or mid-morning or mid-afternoon for works near residences 2. if the community is prepared to accept a longer period of construction in place of restrictions on construction times.

Table 6: Construction Noise Management Levels (L_{Aeq}, (15 min))

Receiver Type	Recommended Standard Hours	Management Level (L _{Aeq} , (15 min))
Residential Receivers	Monday to Friday: 7am to 6pm	Noise Affected NML (RBL + 10) 45
	Saturday : 8am to 1pm	Highly Noise Affected NML 75

It should be noted that the ICNG recognises that the potential long term benefits of some construction works may offset short term amenity losses. On this basis, the NML are not statutory criteria above which impacts are deemed to be non-compliant, but the level at which reasonable and feasible management measures would be required.

4.2 Operational Noise Criteria

The NSW *Industrial Noise Policy* (INP) (2000) presents two criteria for the assessment of industrial noise sources, intrusive noise impacts and amenity noise levels. In assessing the noise impact of industrial sources, both components are considered for sensitive receivers. Typically, the more stringent of these criteria would be applied as the Project Specific Noise Level (PSNL) for the development as a means of managing intrusive noise impacts and preserving the amenity of the receiving environment.

4.2.1 Intrusive Noise Impacts

The intrusiveness of an industrial noise source is generally considered acceptable if the predicted $L_{Aeq,15\text{minute}}$ impact does not exceed the background noise level by more than 5 dB when measured in the absence of the source. The background noise level, or Rating Background Level (RBL), is determined in accordance with Section 3 of the INP and is the median value of the Assessment Background Levels (ABL) determined for the monitoring period. The use of the median accounts for noise level variations over time. The intrusiveness criterion is equal to the RBL + 5dB.

4.2.2 Amenity Noise Level

To limit continuing increases in noise levels, the EPA has identified recommended maximum ambient noise levels for typical receiver areas and land uses. The relevant section of *Table 2.1* of the INP has been reproduced as **Table 7**.

Where the existing noise level from industrial sources is close to the acceptable noise level (ANL), the noise level from any new source(s) must be controlled to preserve the amenity of the area. If the total noise level from industrial sources already exceeds the ANL for the area in question, the L_{Aeq} noise level from any new source should not be greater than 10 dB below the acceptable noise level if there is reasonable expectation that existing levels may be reduced in the future; or 10 dB below the existing level if there is no such reasonable expectation that existing levels will fall. *Table 2.2* of the INP (reproduced as **Table 8**) sets out implications and adjustment requirements for noise from industrial sources.

The level of transportation noise (road traffic noise in particular) may be high enough to result in the noise from an industrial source being effectively inaudible, even though the L_{Aeq} noise level from that industrial noise source may exceed the recommended acceptable noise level as shown in **Table 7**.

Table 7: Recommended L_{Aeq} noise levels from industrial noise sources

Type of Receiver	Indicative Noise Amenity Area	Time of Day	Recommended Acceptable Level dB(A)	Recommended Maximum dB(A)
Residential	Suburban	Day	55	60
		Evening	45	50
		Night	40	45
	Urban	Day	60	65
		Evening	50	55
		Night	45	50
	Urban/Industrial Interface	Day	65	70
		Evening	55	60
		Night	50	55

Source: Environment Protection Authority INP Table 2.1 (2000)

Table 8: Modification to acceptable noise levels (ANL) to account for existing level of industrial noise

Total existing LAeq noise level from industrial sources, dB(A)	Maximum LAeq noise level for noise from new sources alone, dB(A)
Acceptable noise level plus 2	If existing noise level is <i>likely to decrease</i> in the future: Acceptable noise level minus 10. If existing noise level is <i>unlikely to decrease</i> in the future: Existing noise level minus 10
Acceptable noise level plus 1	Acceptable noise level minus 8
Acceptable noise level	Acceptable noise level minus 8
Acceptable noise level minus 1	Acceptable noise level minus 6
Acceptable noise level minus 2	Acceptable noise level minus 4
Acceptable noise level minus 3	Acceptable noise level minus 3
Acceptable noise level minus 4	Acceptable noise level minus 2
Acceptable noise level minus 5	Acceptable noise level minus 2
Acceptable noise level minus 6	Acceptable noise level minus 1
< Acceptable noise level minus 6	Acceptable noise level

In such cases, the amenity criterion for noise from industrial noise becomes the $L_{Aeq, \text{period(traffic)}}$ minus 10 dB. This criterion replaces the amenity criterion in **Table 7**, and is used in the same way the amenity criterion is used, that is, in conjunction with the intrusiveness criterion, to determine the limiting criterion.

This criterion may be applied only if all the following apply:

1. Traffic noise is identified as the dominant source at the site;
2. The existing traffic noise level is 10 dB or more above the Acceptable noise level for the area; and
3. It is highly unlikely that the road traffic noise levels would decrease in the future.

4.2.3 Modifying Factor Adjustments

Where a noise source contains certain characteristics, such as tonality, impulsiveness, intermittency, or dominant low frequency content, the “unusual” noise may cause greater annoyance than other noise at the same level. On the other hand, noise levels from a single event of a short duration, may cause less annoyance to nearby sensitive receivers. In such circumstances, a modifying factor should be applied to the acceptable noise level at the nearby sensitive receivers. These modifying factors are provided in **Table 9**.

Table 9: Modifying factor corrections

Factor	Assessment/ Measurement	When to Apply	Correction
Tonal Noise	One-third octave or narrow band analysis	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 above 400 Hz 8 dB or more if the centre frequency of the band containing the tone is 160 to 400 Hz inclusive 15 dB or more if the centre frequency of the band containing the tone is below 160 Hz	+5 dB
Low Frequency Noise	Measurement of C-wt and A-wt noise level	Measure C-wt and A-wt noise levels over same time period. Correction to be applied if the difference between the two levels is 15 dB or more	+5 dB
Impulsive Noise	A-weighted fast response and impulse response	If difference in A-weighted maximum noise levels between fast response and impulse response is greater than 2 dB	+5 dB
Duration	Single-event noise duration up to 2.5h	One event in any 24-hour period	0 to -20 dB

Source: Environmental Protection Authority INP Table 4.1 (2000)

It is considered that normal operational activities would not generate unusual noise characteristics. Therefore, no modification factors have been applied for tonality, impulsive noise or low frequency noise.

4.2.4 Project Specific Noise Levels

Project specific noise levels (PSNLs) for the development are assigned after determining the relevant noise levels from the intrusiveness and amenity criteria, and set the benchmark against which noise impacts and the need for noise mitigation are assessed. **Table 10** provides an assessment of the acceptable noise levels, and establishes the PSNLs relevant to the project.

Table 10: Assessment of project specific noise levels (Residential Receivers)

Location	Time Period	Day (7:00 to 18:00)	Evening (18:00 to 7:00)	Night (22:00 to 7:00)
All receivers	Intrusiveness Criteria			
	L_{Aeq, 15min} (RBL +5)	35	35	35
	Mean L_{Aeq}	42	42	39
	Amenity Criteria	50	45	40
	Project Specific Noise Level (PSNL) L _{Aeq, 15minute}	35	35	35

4.2.5 Sleep Disturbance Criteria

The occurrence of elevated noise levels over short durations has the potential to cause sleep disturbance to nearby residents. While the INP does not provide guidance for determining sleep disturbance criteria, the NSW *Road Noise Policy* (RNP) and the NSW EPA *Noise Guide for Local Government* (NGLG) suggest that the L_{A1, 1minute} noise level should not exceed the L_{A90} background noise levels (RBL) by more than 15 dB.

It is noted that this criterion is considered to be a “screening criterion”, above which there is the potential for sleep disturbance. It is not a firm criterion to be met, however where the criterion is met, sleep disturbance is considered unlikely. When the screening criterion is not met, a more detailed analysis should be undertaken to assess the maximum noise level or LA1 (1minute), the extent that the maximum noise level exceeds the background noise level and the number of times any exceedance occurs during the night period.

The proposed Sleep Disturbance criterion for the receiving environment adjacent to the proposed works area is presented in **Table 11**.

Table 11: Sleep Disturbance Criteria dB(A)

Location	RBL (night)	Sleep Disturbance Criteria
All receivers	30	45

4.3 Summary of Noise Criteria

Background noise levels were determined for the receiving environment adjacent to the proposed works area, in accordance with provisions established in Section 2 and 3 of the INP, to establish the project specific noise levels (PSNLs), which represent the criteria relevant to the construction and operational phases of the proposed development. Where predicted noise levels exceed the PSNLs, reasonable and feasible noise control methods would be required to be implemented to manage the potential adverse impacts. The relevant noise criteria for the proposed development are summarised in **Table 12**.

Table 12: Summary of Noise Criteria - Construction and Operational Phases

Receiver Type	Work Activity	L _{Aeq,15minute}			L _{A1,1minute}
		Day	Evening	Night	Sleep Disturbance
Residential Receivers	Construction works	40	N/A	N/A	N/A
	Operation of Fans	35	35	35	N/A
	Feed Delivery Silo Refilling	35	35	35	N/A
	Bird Collection	N/A	35	35	45

Note 1: Modifying factor of +2 dB applied for duration for feed delivery and silo refilling activities as per *Table 4.2* of the INP

4.4 Road Traffic Noise Guidelines

The *NSW Road Noise Policy* (RNP) (2011) provides a framework for the management of traffic noise issues associated with new developments near existing or new roads, and new or upgraded road developments adjacent to new or planned building developments. The primary aim of the RNP is to provide assessment criteria for road traffic noise based on protecting amenity and wellbeing.

The proposed development would require several off-site traffic movements. These traffic movements would be confined to the following activity rates:

- feed deliveries at a rate of up to 50 movements per week (25 inbound and 25 outbound), or 3 to 4 trucks per day, during the day period only;
- poultry pickup at a rate of up to 100 movements per day (50 inbound and 50 outbound), assuming an all-in all-out production cycle involving all five farms. As the five individual farms are anticipated to operate on a staggered production cycle, the vehicle movements

would occur over a period of up to eight weeks. Poultry pickup would typically occur overnight or early in the morning.

- waste removal following cleanout of each shed would occur at a rate of approximately 100 vehicle movements (50 inbound and 50 outbound) per cycle, on a similar schedule to the poultry pickup;
- restocking at a rate of four trucks per cycle (eight vehicle movements); and
- litter delivery at a rate of 60 trucks per cycle (60 inbound and 60 outbound), during the day period only.

Advitech Environmental understands that the peak number of vehicle movements generated by the proposed poultry facility would be 112 movements (56 inbound and 56 outbound). It is noted, that this figure assumes that all farms are operating concurrently. Advitech Environmental understands that the individual farms would operate on a staggered production cycle to reduce the intensity of operations at any one time.

The proposed development would involve access to the site from Mid-Western Highway. The road traffic noise criteria for Mid-Western highway, as an “Arterial Road”, are provided in **Table 13**.

Table 13: Road traffic noise criteria

Road Category	Type of Project / Land Use	Assessment Criteria - dB(A)	
		Day 7am - 10pm	Night 10pm - 7am
Arterial	Existing residences affected by additional traffic on existing sub-arterial roads generated by land use developments	L _{Aeq} , (15hr) 60 (external)	L _{Aeq} , (9hr) 55 (external)
		Limit increases to < existing level + 2dB	

Source: NSW Road Noise Policy (2011) Table 3

4.5 Ground Vibration Guidelines

The NSW Department of Environment and Conservation (DEC) (2006) document *Assessing Vibration: a technical guideline* provides guidance on the assessment of human response to vibration, including the maximum vibration values and recommendations for measurement and evaluation techniques.

The DEC guideline considers the following sources of vibration that may result in undue impacts to nearby receivers:

- Continuous vibration - from uninterrupted sources.
- Impulsive vibration - up to three instances of sudden impact (i.e. dropping heavy items).
- Intermittent vibration - such as from drilling, compacting or other activities that would result in continuous vibration if operated continuously.

The preferred and maximum vibration levels for continuous, impulsive and intermittent vibration are provided in **Table 14**.

Table 14: Daytime Preferred and Maximum Vibration Levels for Human Exposure

Vibration Source (Residential Receivers)	Preferred Vibration Level RMS Acceleration	Maximum Vibration Level RMS Acceleration
Continuous	0.010 m/s ²	0.020 m/s ²
Impulsive	0.30 m/s ²	0.60 m/s ²
Intermittent	0.20 m/s ^{1.75}	0.40 m/s ^{1.75}

While the guideline provides preferred and maximum values for human responses to vibration, it does not address vibration-induced change to buildings or structures. At present, building damage from construction-induced vibration is commonly assessed in regards to the British Standard 7385 Part 2-1993 *Evaluation and measurement for vibration in buildings*. The recommended limits (guide values) for transient vibration to ensure minimal risk of cosmetic damage to residential buildings are shown in Table 15.

Table 15: Transient Vibration Guide values - Minimal Risk of Cosmetic Damage

Type of Building	Peak Component Particle Velocity in Frequency Range of Predominant Pulse	
	4 Hz to 15 Hz	15 Hz and above
Unreinforced or light framed structures. Residential of light commercial type buildings	15 mm/s at 4 Hz to 20 mm/s at 15 Hz	20 mm/s at 15 Hz to 50 mm/s at 40 Hz and above

5. PREDICTED NOISE LEVELS

A model of the proposed construction and operation phase activities, and adjacent sensitive receivers was constructed using the ISO9613 calculation methodology in the *Predictor* environmental noise modelling software, with consideration to the CONCAWE sub-method to evaluate meteorological influences. Predictor is an environmental noise mapping package that facilitates calculation of noise impacts, accounting for source receiver relationships, terrain and meteorological affects. To assess the noise impacts, impact predictions provided by the noise modelling are presented against the relevant noise criteria.

5.1 Noise Generating Activities

The modelled impact of the proposed activities is based on the Sound Power Level (SWL) and location of noise sources within the proposed works area. Third-octave (1/3 octave) SWL data representative of the proposed works were used as model inputs. These data were sourced from:

- SWLs of processes supplied by the client;
- the UK Department of Environment, Food and Rural Affairs (DEFRA, 2005);
- AS 2436-2010: Guide to noise and vibration control on construction, demolition and maintenance sites; and
- the Advitech Environmental noise source library.

As the proposed works comprise a number of phases of work, noise prediction models were constructed to evaluate noise impacts from specific activities, during each work phase. These work phases relate to both construction activities and operational activities.

5.1.1 Construction Noise

During the construction works, the specific work phases or activities would include:

- Bulk earthworks, including formation of access road, excavation of the site, and levelling the pad to provide a finished ground surface;
- Construction of infrastructure, including concrete works and building of the poultry sheds.

The bulk earthworks were modelled relative to the natural land surface. Bulldozers, excavators and rollers were modelled as point source, located at the point nearest to the sensitive receivers. The site levelling works were modelled relative to the final land surface following cut and fill of the site. The water cart was modelled as a moving source, assumed to travel at a speed of 20 km/h, with a maximum of four vehicle movements in any one hour. The dump truck was modelled as a moving source, assumed to travel at an average speed of 20 km/h, with a maximum of eight vehicle movements in any one hour.

Construction of the poultry sheds was assumed to involve the formation of concrete structures, and the building of the poultry sheds. During this phase, delivery trucks and concrete trucks were modelled as moving sources, assumed to travel at an average speed of 10 km/h, with four vehicle movements per hour. All other sources, including concrete pumps, concrete screes, franna crane and hand tools were modelled as point sources at the location most exposed to the nearby sensitive receivers. A list of the proposed equipment, as well as their respective SWLs has been provided in **Table 16**.

Table 16: Construction Noise Sources

Activities	Equipment Used	Sound Power Level, dB(A)
Bulk Earthworks	Roller	102
	Bulldozer	112
	Excavator	105
	Dump Truck	114
	Water Cart	107
Construction	Delivery Truck	107
	Concrete Truck	108
	Concrete Pump	103
	Concrete Scree	91
	Franna	103
	Hand Tools	102

5.1.2 Operation Noise

During the operation of the propose poultry facility, the specific work phases or activities include:

- Operation of the extraction fans for tunnel ventilation;
- Feed delivery and mechanical silo refilling; and
- Bird delivery and collection using transport truck and Telescopic Handler.

Ventilation fans have been identified as the primary continuous noise generating activity at the proposed development. Each broiler shed will have 18 Multifan 130 fans discharging through vertical exhaust stacks. Twelve ventilation fans would be located at the rear of the shed to facilitate tunnel ventilation, and three fans located on each side of the shed to be operated during extreme conditions. The fans operate automatically on an as-required basis, with a greater number of fans operating during

warmer or more humid conditions. It is considered that only extreme meteorological conditions, late in the production cycle, would warrant the operation of all 18 fans, and such conditions would occur during the day period only. During the cooler evening and night periods, a reduced number of fans would be required.

Feed delivery and mechanical silo refilling scenarios were assessed during the day and night period. Following advice from the client, it was determined that up to four feed delivery trucks per day were expected on site, but with no more than one truck per farm at the site during any one time. The feed delivery truck movements were modelled as a moving source, travelling at a speed of 40 km/hr around the designated access route. Mechanical silo refilling was modelled as a point source at the front of the proposed sheds, at one location representing the most exposed location to the nearest sensitive receivers. It was assumed that the mechanical silo refilling would occur for approximately 20% of the time during each one hour period.

During bird collection, transport trucks would arrive and depart site, with a maximum of two trucks per farm on site at any one time. A Manitou Telescopic Handler would operate continuously while trucks were stationary, with 50% of their operation within the buildings, and 50% outside the buildings. The bird collection scenario was modelled for the evening and night periods only.

During the night period, it was determined that the activity most likely to cause peak levels that may disrupt the sleep of nearby residents, was the operation of the Telescopic Handler. To assess the potential for sleep disturbance, the $L_{A\text{Max}}$ from Telescopic Handler operation was modelled. A list of the proposed equipment, as well as their respective SWLs has been provided in **Table 17**.

Table 17: Operational Noise Sources

Activities	Equipment Used	Sound Power Level, dB(A)
Ventilation Fan	Multifan 130 Exhaust Fan	88
Feed Delivery	Delivery Truck	106
	Mechanical Refiller	104
Bird Collection	Semi-Trailer (Idling)	97
	Semi-Trailer (Pass by)	108
	Telescopic Handler	94
	Telescopic Handler ($L_{A\text{Max}}$)	118

It is noted that the proposed development site is located approximately 3.6 kilometres to the west of the existing Jeanella and Jeanella South poultry facilities. Although the separation distance is likely to be sufficient to avoid cumulative environmental affects, an assessment of cumulative noise levels is presented in **Section 5.3.4**.

5.1.3 Road Traffic Noise

Advitech understands that during 'typical' operating conditions, the proposed broiler farm will receive heavy vehicles transporting chickens, grains or waste materials. These vehicles will reach the site via mid-western Highway, and it is anticipated that 112 movements (56 inbound and 56 outbound trucks) would be generated each day.

A road traffic noise model was constructed using the Predictor (Type7810) calculation software and the Calculation of Road Traffic Noise (CoRTN) methodology. In lieu of traffic noise monitoring data, two modelling scenarios were constructed to evaluate road traffic noise impacts at receivers along Mid-Western Highway associated with:

- existing traffic flows; and
- existing traffic flows plus HV movements created by the proposed development.

Information obtained from the NIA report for a nearby poultry farm (ProTen Jenella Sourh Polutry) prepared by Global Acoustics indicates that the Average Annual Daily Traffic (AADT) for Mid-Western Highway is approximately 561 vehicles with 207 of heavy vehicle movements.

Mid-Western Highway was modelled as two separate sections of road to account for two distinct speed zones along the access route. Traffic was assumed to travel at the sign posted speed limits of:

- 110km/hr for approximately the first 19 km of the route, heading northeast along Mid-Western Highway; and
- 70km/hr for the remaining route along the Cowra Road, heading to the town nearby, Goolgowi

The road surface was assumed to be constructed of bitumen, and traffic was conservatively modelled with heavy vehicles source heights (1.5m) given the relatively high proportion of heavy vehicle movements in the Mid-Western Highway. All impact predictions were modelled at a height of RL+1.5m.

5.2 Meteorological Conditions

The INP states that meteorological conditions such as gradients winds and temperature inversions can enhance or inhibit noise propagation. As per Section 5 of the INP, in circumstances where wind or temperature inversions are determined to be a feature of the area, these conditions are required to be considered when assessing the potential impacts from the proposed development.

A review of historical climate at Griffith has been undertaken to determine the most representative 12 month calendar period to model air emissions from the proposed poultry facility at Goolgowi. The closest representative climate data to the Goolgowi facility was sourced from the Bureau of Meteorology (BOM) station at Griffith Airport.

Table 18: Bureau of Meteorology (BOM) Climate Data History for Griffith Airport

Year	Temperature (degrees Celsius)				Rainfall (mm)	
	Maximum year average	Difference from long term average	Minimum year average	Difference from long term average	Yearly total	Percentage of long term average
2008	24.2	+0.2	10.7	+0.5	282.4	71%
2009	25.4	+1.4	11.5	+1.3	309.4	78%
2010	23.4	-0.6	10.9	+0.7	605.4	153%
2011	24.2	+0.2	10.5	+0.3	489.8	124%
2012	23.7	-0.3	9.5	-0.7	556.8	140%
2013	25.1	+1.1	10.6	+0.4	276.6	70%
2014	25.1	+1.1	10.9	+0.7	345.6	87%
2015	24.3	+0.3	10.9	+0.7	435.2	110%

A review of Bureau of Meteorology (BOM) climate data suggests that there is significant annual variation in climate parameters in the locality of the study area. However, it was observed that greater deviations in either the average rainfall or temperatures occurred for the years 2009, 2010, 2013, 2014 and 2015. The years with the least deviation from long term average climate statistics were 2008,

2011, and 2012. The 2011 data was selected for the derivation of the worst case meteorological conditions to be included in the noise modelling scenarios for the proposed Goolgowi facility. The analysis of the prevailing conditions, including wind speed and direction, and atmospheric stability are provided in **Table 19**.

Wind is considered to be a feature of a site where source-to-receiver winds of up to 3 m/s occur for 30% of the time, for all time periods. Long term meteorological data from the Bureau of Meteorology (BOM) station at Griffith Airport (075041), indicates that source-to-receiver winds of up to 3 m/s at the study site do not occur for 30% of the time during any season. Therefore, gradient winds are not considered to be a feature of the site, and have not been considered in the prediction of noise impacts. An analysis of prevailing meteorological conditions is provided in **Appendix III**.

Temperature inversions are considered to be a feature of a site when the percentage occurrence of the total night time, winter temperature inversions exceeds 30%. The night time period for determining the frequency of temperature inversions is one hour before sunset, to one hour after sunrise (taken to be 6:00 pm to 7:00 am). The analysis of prevailing conditions indicated that 'moderate' to 'high' temperature inversions (F and G Class) were present for approximately 26% of night periods during the winter season. As the prevalence of temperature inversions approached 30%, the effects of temperature inversions were considered in the modelling of worst case meteorological conditions. Due to the absence of significant topographical features in the locality of the proposed site, drainage-flow wind, associated with temperature inversion conditions, has not been considered in the modelling of potential noise impacts.

In accordance with the provisions established in Section 5 of the INP, neutral and worst case meteorological conditions have been assumed in the prediction of potential noise impacts associated with the proposed poultry facility. The modelled meteorological scenarios are shown in **Table 19**.

Table 19: Meteorological Parameters

Meteorological Parameter	Modelled Meteorological Conditions		
	Day (Neutral)	Evening/Night (Neutral)	Evening/Night (Inversion)
Temperature (deg C)	35	25	5
Humidity (%)	30	30	30
Wind Speed (m/s)	0	0	0
Wind Direction (deg)	N/A	N/A	N/A
Stability Class	D	D	F

It should be noted that conditions during the evening and night period, where up to 75 percent of ventilation fans would be required, are expected to occur during the warmer seasons only, and have therefore been modelled during neutral meteorological conditions. Under temperature inversion conditions, which may occur at the study location during winter, modelling of ventilation fans assumed a maximum of five ventilation fans operating at any one time.

5.3 Noise Model Results

5.3.1 Construction Phase Noise Predictions

The predicted $L_{Aeq,15\text{minute}}$ noise levels at the nearest sensitive receivers, for bulk earthworks and construction phase activities are shown in **Table 20** and **Table 21**.

Table 20: Predicted $L_{Aeq,15\text{minute}}$ noise level - bulk earthworks

Receiver	Predicted Noise Levels ($L_{Aeq,15\text{minute}}$)	Criteria dB(A) (Day)	Compliance (Yes or No)
R1	41	40	No
R2	41		No
R3	40		Yes
R4	36		Yes
R5	34		Yes
R6	37		Yes
R7	41		No
R8	32		Yes
R9	34		Yes
R10	36		Yes

Table 21: Predicted $L_{Aeq,15\text{minute}}$ noise level - shed construction

Receiver	Predicted Noise Levels ($L_{Aeq,15\text{minute}}$)	Criteria dB(A) (Day)	Compliance (Yes or No)
R1	<25	40	Yes
R2	<25		Yes
R3	25		Yes
R4	<25		Yes
R5	<25		Yes
R6	<25		Yes
R7	25		Yes
R8	<25		Yes
R9	<25		Yes
R10	<25		Yes

To assist with the understanding of these results, the predicted noise level contours are provided in **Appendix II**. The predicted noise levels represent conservative assumptions, based on all plant operating at maximum capacity at locations most exposed to the nearby sensitive receivers. It is therefore considered that these modelled predictions represent the upper limit of expected noise levels.

It should be noted that many of the items of plant proposed for the construction phase activities have the potential to generate tonal influences, particularly in the case of reverse alarms. Where tonal reverse alarms are used in lieu of broadband reverse alarms, the predicted noise levels are expected to be up to 5 dB higher than those modelled.

5.3.2 Operational Phase Noise Predictions

The predicted $L_{Aeq,15\text{minute}}$ noise levels at the nearest sensitive receivers, for operational phase activities are shown in **Table 22** to **Table 24**. To assist with the understanding of these results, the predicted noise level contours are provided in **Appendix II**.

Table 22: Predicted $L_{Aeq,15\text{minute}}$ noise level - operation of ventilation fans, dB(A)

Receiver	Predicted Noise Levels ($L_{Aeq,15\text{ minute}}$)			Criteria dB(A) (D/E/N)	Compliance (Yes or No)
	Day 18 Fans (Neutral)	Evening/Night 10 Fans (Neutral)	Evening/Night 5 Fans (Inversion)		
R1	<25	<25	<25	35/35/35	Yes
R2	<25	<25	<25		Yes
R3	<25	<25	<25		Yes
R4	<25	<25	<25		Yes
R5	<25	<25	<25		Yes
R6	<25	<25	<25		Yes
R7	<25	<25	<25		Yes
R8	<25	<25	<25		Yes
R9	<25	<25	<25		Yes
R10	<25	<25	<25		Yes

Table 23: Predicted $L_{Aeq,15\text{minute}}$ noise level - feed delivery and silo refilling, dB(A)

Receiver	Predicted Noise Levels ($L_{Aeq,15\text{ minute}}$)		Criteria dB(A) (D/E/N)	Compliance (Yes or No)
	Day (Neutral)	Evening/Night (Inversion)		
R1	<25	<25	35/35/35	Yes
R2	<25	<25		Yes
R3	<25	<25		Yes
R4	<25	<25		Yes
R5	<25	<25		Yes
R6	<25	<25		Yes
R7	25	<25		Yes
R8	<25	<25		Yes
R9	<25	<25		Yes
R10	<25	<25		Yes

Table 24: Predicted $L_{Aeq,15\text{minute}}$ and $L_{A1,1\text{minute}}$ (sleep disturbance) noise levels - bird collection, dB(A)

Receiver	Predicted Noise Levels ($L_{Aeq,15\text{minute}}$)		Criteria dB(A) (E/N/Sleep disturbance)	Compliance (Yes or No)
	Evening/Night ($L_{Aeq,15\text{minute}}$)	Sleep Disturbance ($L_{A1,1\text{minute}}$)		
R1	28	35	35/35/45	Yes
R2	27	34		Yes
R3	27	36		Yes
R4	<25	31		Yes
R5	<25	28		Yes
R6	<25	33		Yes
R7	30	42		Yes
R8	<25	27		Yes
R9	<25	31		Yes
R10	<25	31		Yes

5.3.3 Assumptions of the Model

Key assumptions of the model include:

- topographical information was obtained from the 1 second SRTM Derived Digital Elevation Models produced by Geoscience Australia;
- all cleared areas were modelled considering a conservative ground factor of 0.5 to account for a mixture of hard and grassed ground;
- all residential receivers were modelled at 1.5 metres above the ground surface, at the most noise affected location within approximately 5 kilometres of the dwelling;
- all sources operate at their maximum assumed noise levels for the duration of the assessment period;
- the $L_{A\text{Max}}$ for the operation of the Telescopic Handler was based on a recent measurement from the operation of a Telescopic Handler at an industrial complex. Observations made at the time of the measurement indicated that metal on metal contact noise was the source of the peak noise levels. It is noted that the crates used for the transportation of birds are plastic, and contact noise from the loading of the plastic crates would typically be lower than noise levels from metal on metal contact; and
- no modifying factors have been applied to noise source SWLs as tonal influences not considered to be a feature of the operational noise environment.

It must be noted that these represent conservative assumptions, and the modelling results represent the upper limit of expected noise levels.

5.3.4 Cumulative Impacts

A review of land uses in the study area indicated that there are two additional poultry facilities located nearby the proposal site. These were identified as the Jeanella South poultry facility, located approximately 3.6 kilometres east of the proposal site, and the Jeanella poultry facility, located approximately 5.7 kilometres northeast of the proposal site. Located between the proposal site and the neighbouring poultry facilities are receivers R4, R5 and R6.

A review of modelled noise levels, based on the NIA undertaken by Global Acoustics (2015) reference: 15207_R01, was undertaken for the nearest neighbouring poultry facility, identified as Jeanella South, to determine the potential for cumulative noise impacts. The results of the Jeanella South NIA indicated that the highest noise levels for any receiver location, under adverse weather conditions, were predicted to be 33 dB(A), 2 dB lower than the PSNL.

The modelled noise levels at receiver locations R4, R5 and R6, for the proposed poultry facility, were observed to be more than 10 dB lower than those predicted for the Jeanella South poultry facility. As two noise sources with a difference of more than 10 dB do not result in an overall noise level increase, cumulative impacts are unlikely to occur.

5.4 Traffic Noise Levels

Modelling was conducted for an 18-hour period scenario for the existing and proposed increase in vehicle. To understand the potential sensitivity of the assessment, analysis of impact predictions at 10 receiver locations adjacent to Mid-Western Highway is presented. Summary of the impact predictions for each receiver is provided in **Table 25**.

Table 25: Impact predictions at road noise affected receivers ($L_{Aeq,18hour}$)

Receiver	Predicted Noise Levels ($L_{Aeq,18\text{ hours}}$)		Road Noise Criteria	Compliance (Yes or No)
	Existing Traffic, dB(A)	Existing Traffic + Additional Traffic, dB(A)		
R1	46	47	60	Yes
R2	44	45		Yes
R3	49	50		Yes
R4	46	48		Yes
R5	45	46		Yes
R6	<30	<30		Yes
R7	33	35		Yes
R8	<30	<30		Yes
R9	33	34		Yes
R10	35	37		Yes

The results of this analysis indicate that existing levels of road noise (based on modelling assessment and historical traffic count data) were evaluated to be below guidance exposure levels for receivers adjacent to this type of road. Assessment of worst case impact predictions against the road noise criteria is provided in **Table 26**.

Table 26: Calculated road traffic noise levels, $L_{Aeq,18hour}$ dB(A)

Scenario	Result	Existing Traffic, dB(A)	Existing Traffic + Additional Traffic, dB(A)	Increase on Existing Case
Predicted Noise Levels ($L_{Aeq,18hour}$)	Maximum	48.6	50	1.4
	90 th %ile	46.4	47.8	1.4
	50 th %ile	39.3	40.8	1.5
Road Noise Criteria		60	60	<+2

This analysis indicates that:

- the maximum $L_{Aeq,18\text{hour}(\text{Day})}$ road traffic noise impact prediction was in the order of 50dB(A);
- 90% of receivers are predicted to experience road traffic noise levels less than 48dB(A);
- the median impact prediction was in the order of 41dB(A).

Modelling suggests that while noise levels may be expected to increase when the traffic generated by the proposed farm is added to the existing traffic flows, this increase is less than 2dB(A) at most receiver locations. Note that an increase of up to 2 dB is recognised as a minor impact and is barely perceptible by an average person.

5.5 Vibration Assessment Results

A desktop vibration assessment was undertaken with regards to the site construction activities, the types of vibration events, and the distance between the vibration source and the nearest receiver locations. The typical ground vibration levels from construction activities, provided in **Table 27** have been sourced from the South Australian Department of Planning, Transport and Infrastructure document *Management of Noise and Vibration: Construction and Maintenance Activities* (2015), and the Transport for NSW (TfNSW) (2012) *Construction Noise Strategy*. It should be noted that vibration levels are influenced by the actual operating condition of the items of plant and the local site and geographical conditions. **Table 27** provides indicative vibration levels and associated safe working distances, however, where there is the potential for ground vibrations to occur; vibration level monitoring should be undertaken at the site to quantify the potential impacts.

Table 27: Typical Vibration Levels from Construction Activities

Activity	Typical Levels of Ground Vibration	Safe Working Distance	
		Cosmetic Damage	Human Comfort
Truck traffic over irregular surfaces	2mm/s at 10m	<10m	40m
Bulldozer	2mm/s at 5m	<10m	20m
Roller/Compactor	2mm/s at 15m	<15m	50m
Excavator	0.2mm/s at 40m	<15m	40m
Excavator (with rock breaker)	1.3mm/s at 10m	<10m	40m

The vibration intensive works most likely to cause any impact have been completed under a separate development application of the proposed project. The majority of the proposed construction activities are considered to occur intermittently, in that they occur for relatively short periods during any one cycle of the construction activity. Nevertheless, due to the potential for plant to operate for extended periods of time, all items of plant are considered to operate in a continuous fashion throughout the construction period.

A review of aerial photographs indicated that the closest point between the proposed construction site and the nearest sensitive receiver is approximately 1.4 kilometres. Based on the typical vibration levels from the proposed construction activities, vibration impacts from the proposed works, associated with cosmetic damage to buildings and human response to vibration, are unlikely to occur. It is important to note that the safe working distances are indicative and depend on site specific conditions including items of plant and geotechnical conditions.

6. ASSESSMENT OF POTENTIAL IMPACTS

6.1 Construction Phase

Modelling of potential impacts associated with bulk earthworks indicated that predicted noise levels would marginally exceed (1 dB) the *noise affected* Noise Management Level (NML) of 40 dB(A) at receiver locations R1, R2 and R7, where activities were being undertaken on each of the five farms concurrently. Where bulk earthworks are being undertaken at few locations, with a large separation distance between the locations, the noise levels are predicted to be below the *noise affected* NML. Additionally, modelling of potential impacts associated with the construction of the poultry sheds indicated that the predicted noise levels would be below the *noise affected* NML.

It is noted that the predicted noise levels represent conservative assumptions, based on all plant operating at their maximum capacity at the locations that present the highest potential exposure to the nearby sensitive receivers for each of the five individual poultry farms. It is therefore considered that the modelled predictions represent the upper limit of the expected noise levels. During 'normal' operating conditions, it is likely that items of plant would operate below their maximum capacity, and items of plant would likely be dispersed throughout the construction site. It is therefore anticipated that construction noise levels would typically be lower than those presented in **Table 20** and **Table 21**.

To reduce the impact on potentially affected residential receivers, it is recommended that early and ongoing consultation with potentially affected receivers adjacent to the works area is undertaken, and site work practices to minimise noise are implemented. Some practical methods for managing the potential impacts may include:

- designing of the site to avoid the use of reverse alarms or employ the use of broadband alarms to reduce the occurrence of any annoying characteristics;
- place as much distance between plant or equipment and other sensitive land uses;
- place fixed equipment in cuttings or behind earth berms;
- regularly inspect and maintain equipment to ensure it is good working order; and
- train workers to minimise noise by avoiding shouting; minimising slamming vehicle doors; avoiding the use of radios or stereos outdoors where neighbours can be affected; and preventing the dropping of materials from height or unnecessary metal to metal contact on equipment.

Assessment of the potential vibration impacts associated with construction works indicates that the proposed construction activities would occur at a distance greater than the minimum safe working distances for each of the items of plant proposed for the works. It is therefore considered that the construction works would not result in any undue vibration impacts, on either cosmetic damage to buildings or human comfort.

6.2 Operation Phase

Modelling of potential impacts for the operation of the extraction fans during the day, evening and night periods, modelled under neutral and worst case temperature inversion conditions, indicates that the noise levels would comply with the LAeq,15minute criteria at all receiver locations. Cumulative noise levels associated with the concurrent operation of the proposed poultry facility, and the existing Jeanella and Jeanella South poultry facilities are predicted to comply with the day, evening and night LAeq,15minute criterion of 35 dB(A) at all receiver locations. Noise levels generated during feed

delivery and silo refilling activities are predicted to comply with the $L_{Aeq,15minute}$ criterion at all receiver locations also.

It is anticipated that bird collection activities would occur during the night periods over a period of approximately one week, for each five to eight week production cycle. It should be noted that peak noise levels were modelled based on the worst case meteorological conditions involving the occurrence of a temperature inversion. The results of the modelling indicate that the predicted noise levels for bird pickup activities during the evening and night periods would comply with the associated $L_{Aeq,15minute}$ criteria for all receiver locations. Additionally, the L_{Amax} for the operation of the Telescopic Handler, to be used during bird loading, was predicted to comply with the sleep disturbance $L_{A1,1minute}$ criterion of 45 dB(A) at all receiver locations.

Some of the work practices that may be considered to ensure operating the equipment in a quieter or more efficient manner include low truck speeds travelling on site, minimising time that equipment is left idling, reducing heavy acceleration / engine revving, and ensuring that heavy vehicles avoid using air breaking on site. Furthermore, equipment should be regularly checked and maintained to ensure that it is in good mechanical condition so that unwanted annoying characteristics are not produced.

7. CONCLUSIONS

Advitech Environmental was engaged by Tattersall Lander Pty Ltd to prepare a Noise Impact Assessment (NIA) for a proposed poultry facility, approximately 17 kilometres west of Goolgowi NSW, New South Wales. The proposed poultry facility would include 5 farms with 20 tunnel ventilated sheds for each farm.

Noise modelling was undertaken using the *Predictor* environmental noise modelling software, considering several operational scenarios with consideration to topographical and meteorological conditions. Advitech Environmental notes that plans provided by the client indicate that four metres strategic earth mounds are to be constructed around each of the five farms. These features have been included in the modelled scenarios.

Modelling of the construction activities indicate that predicted $L_{Aeq,15minute}$ noise levels would marginally exceed the *noise affected* NML of 40 dB(A) by 1 dB at receivers R1, R2 and R7 during bulk earthworks. The modelling of the bulk earthworks scenario assumed that earthworks would be undertaken concurrently at each of the five farms, as well as the formation of the new access road and intersection with the Mid-Western Highway. Where earthworks are undertaken at fewer locations with larger separation distances, the noise levels are predicted to be lower than the *noise affected* NML. Modelling of shed construction activities indicate that the predicted $L_{Aeq,15minute}$ noise levels would be below the *noise affected* NML of 40 dB(A).

A review of the items of plant and separation distances between the proposed construction works and the nearby sensitive receivers suggested that all of the proposed construction activities would be undertaken at safe distances to prevent any vibration impacts. It is therefore considered that the construction works would not result in any undue vibration impacts, on either cosmetic damage to buildings, or human comfort.

Modelling of the fans operating indicated that the predicted $L_{Aeq,15minute}$ noise levels would be lower than the nominated PSNL criteria at all receiver locations under neutral and worst case operating conditions.

Modelling of the feed delivery, silo refilling and bird collection activities indicated that the predicted $L_{Aeq,15\text{minute}}$ noise levels would comply with the nominated criteria at all receiver locations, under neutral and worst case operating conditions. The $L_{A\text{Max}}$ for the operation of the Telescopic Handler modelling for bird loading activities indicate that noise levels wouldn't exceed the sleep disturbance $L_{A1,1\text{minute}}$ criterion at any receiver location.

An assessment of cumulative noise levels, from the proposed development and the adjacent existing poultry facilities of Jeanella and Jeanella South, indicated that the noise levels associated with the proposed development would not result in an increase in the noise levels above the criteria at any of the receiver locations, as modelled under neutral or worst case operating conditions.

The analysis of the predicted noise levels associated with additional traffic movements along the Mid-Western Highway, indicated that noise increases of up to 1.5 dB(A) would be experienced; however, the modelled noise levels were predicted to be below the criteria for arterial roads / freeways. Furthermore, the predicted increase was shown to be below the 2 dB level recognised as barely perceptible by an average person

8. REFERENCES

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Appendix I

Background Monitoring Results

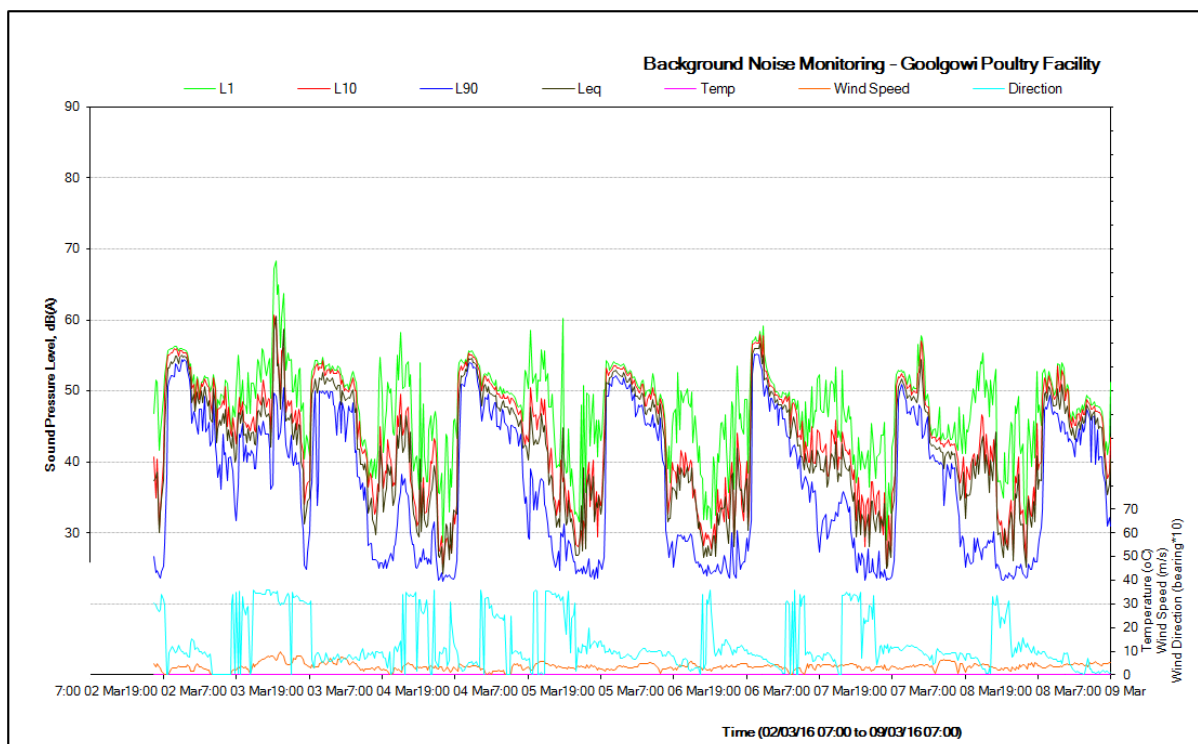


Figure I-1: Unattended Monitoring Site G1 - 2 March - 9 March, 2016

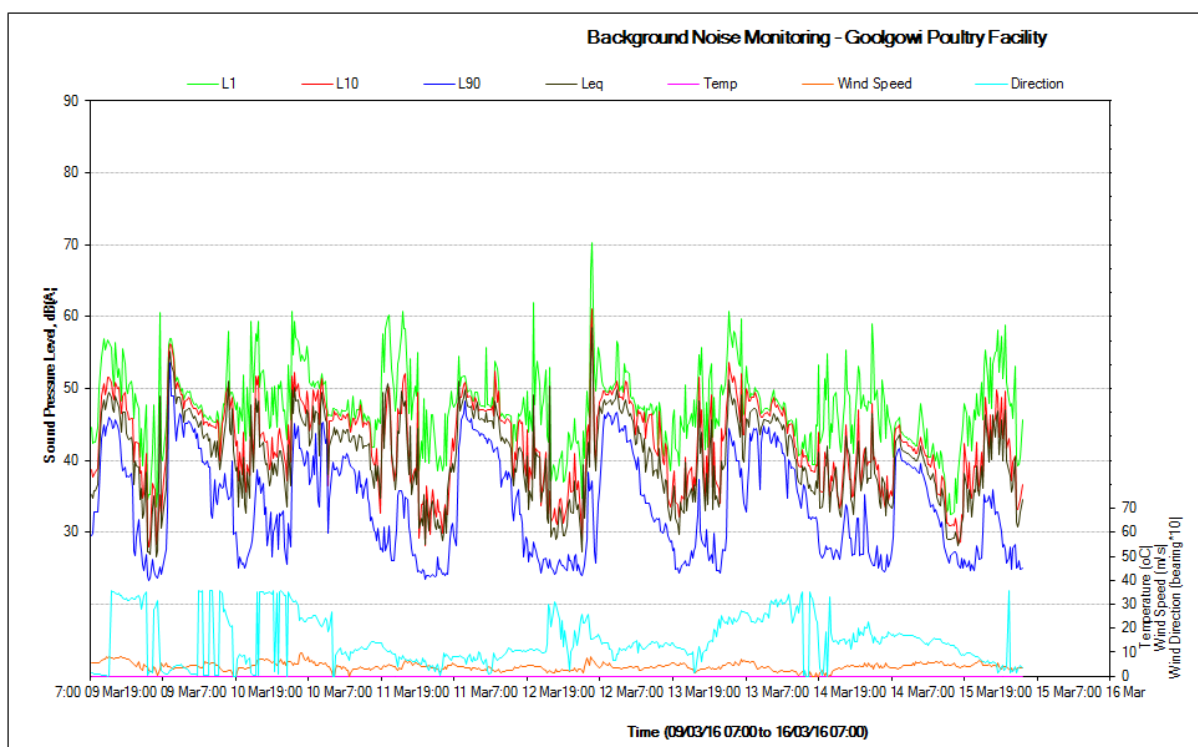


Figure I-2: Unattended Monitoring Site G1 - 9 March - 14 March, 2016

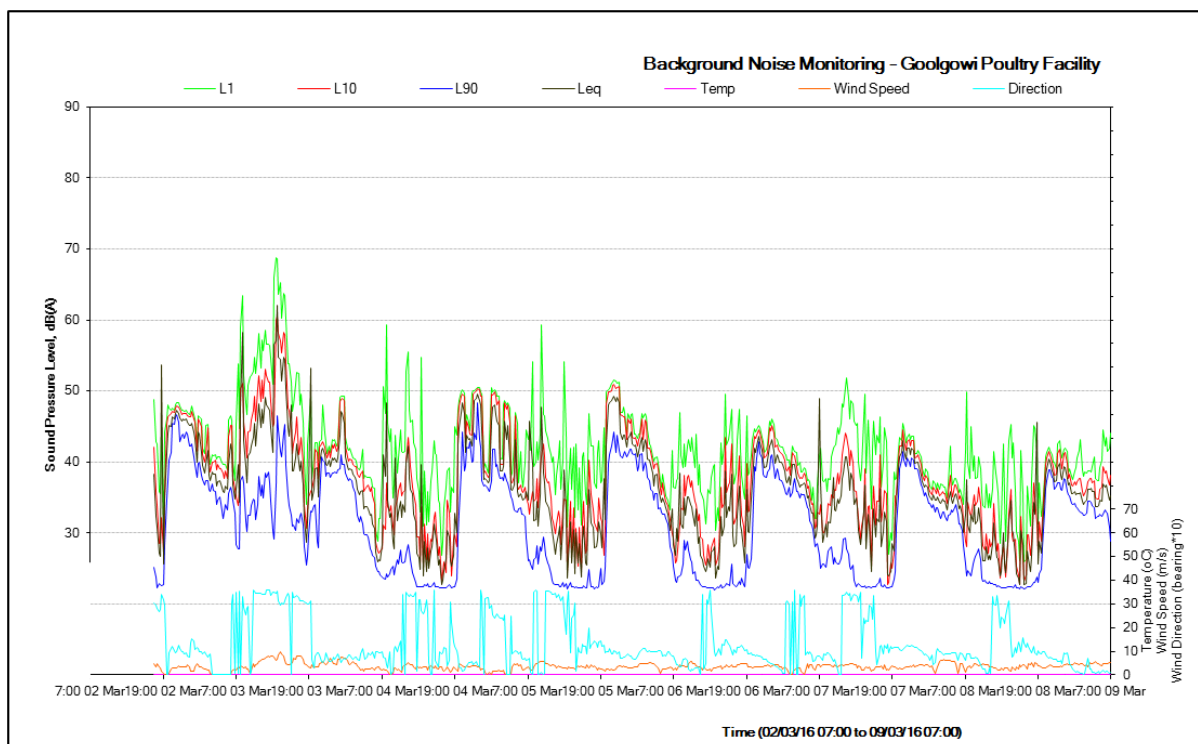


Figure I-3: Unattended Monitoring Site G2 - 2 March - 9 March, 2016

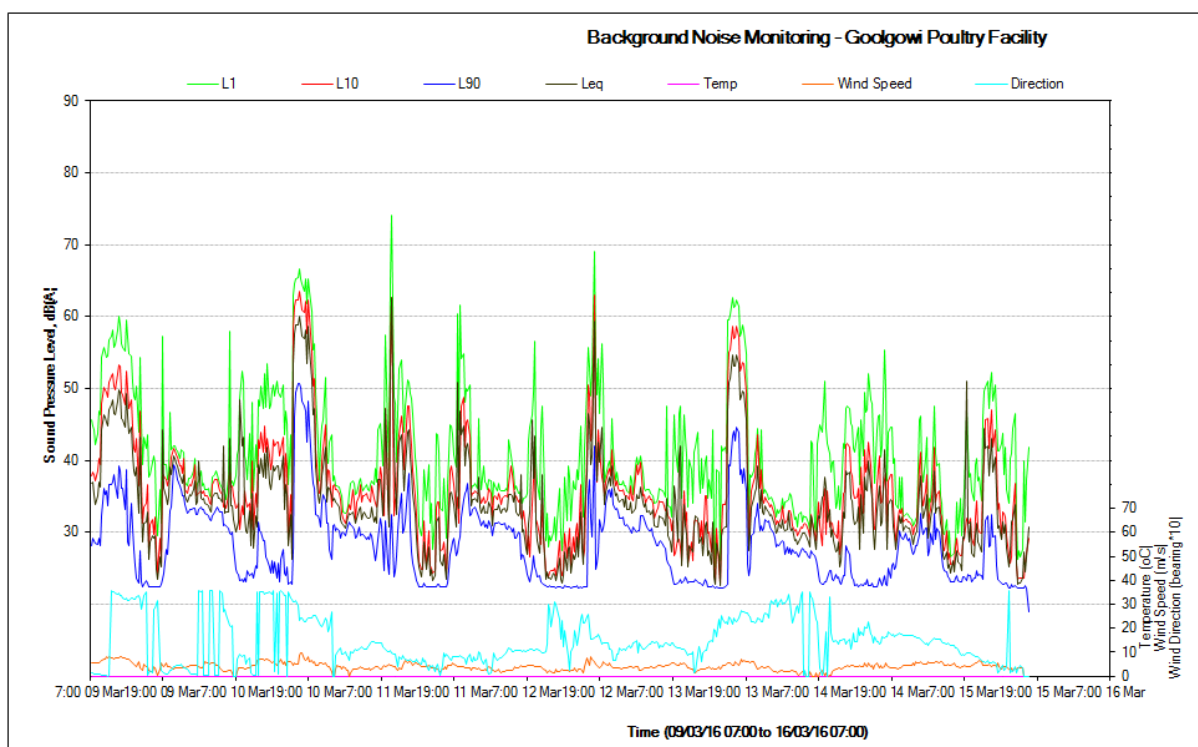


Figure I-4: Unattended Monitoring Site G2 - 9 March - 14 March, 2016



Appendix II

Predicted Noise Level Contours (Construction and Operational)



Figure II-1: Predicted Day period $L_{Aeq, 15\text{minute}}$ noise levels - Bulk Earthworks

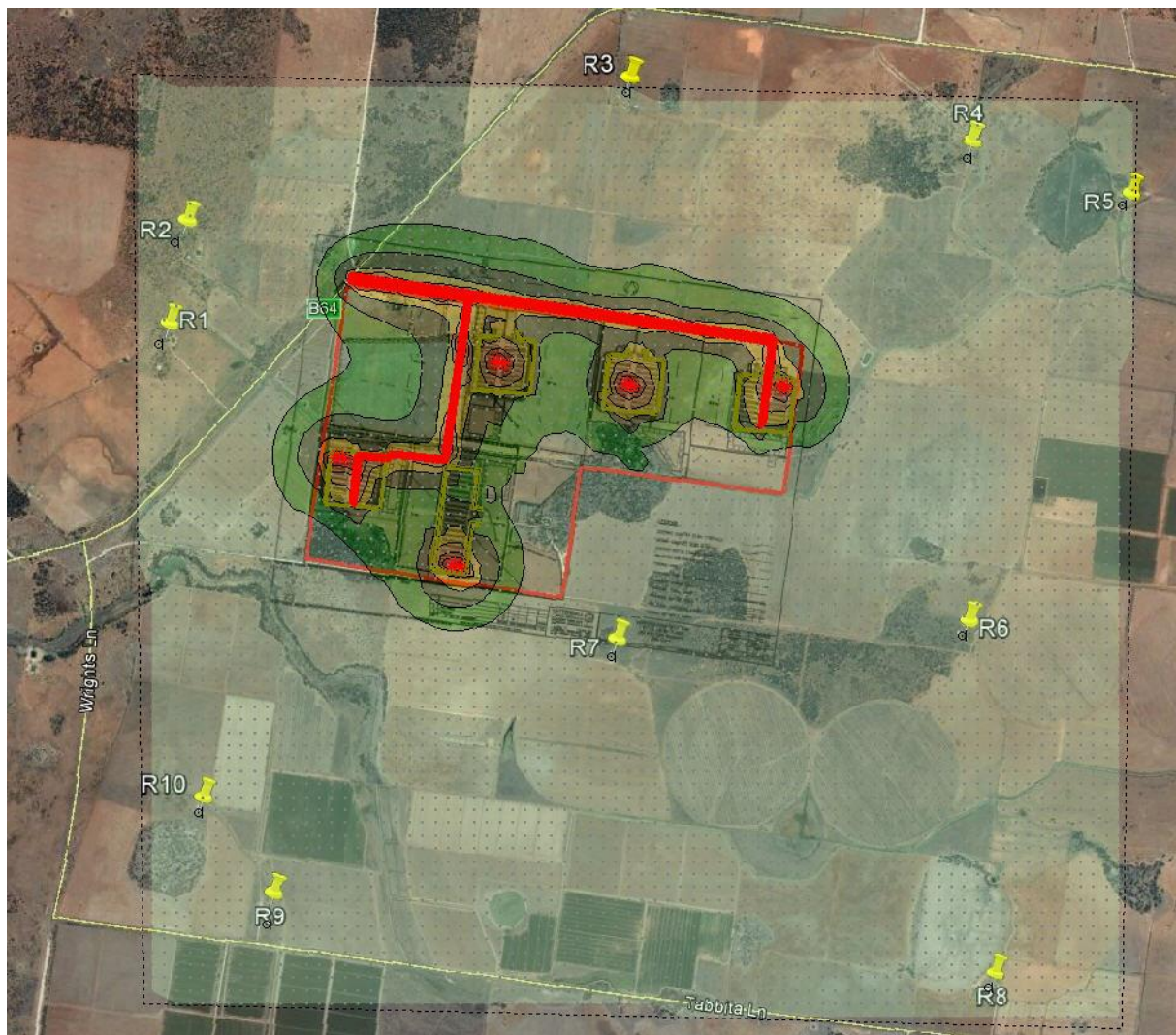


Figure II-2: Predicted Day period $L_{Aeq, 15\text{minute}}$ noise levels - Shed Construction



Figure II-3: Predicted Day period $L_{Aeq, 15\text{minute}}$ noise levels - Operation of Fans. Neutral Conditions



Figure II-4: Predicted E/N period $L_{Aeq, 15\text{minute}}$ noise levels - Operation of Fans. Neutral Conditions



Figure II-5: Predicted E/N period $L_{Aeq, 15\text{minute}}$ noise levels - Operation of Fans. Adverse Conditions



Figure II-6: Predicted day period $L_{Aeq, 15\text{minute}}$ noise level - Feed Delivery and Silo Refilling. Neutral Conditions



Figure II-7: Predicted night period $L_{Aeq, 15\text{minute}}$ noise level - Feed Delivery and Silo Refilling. Adverse Conditions



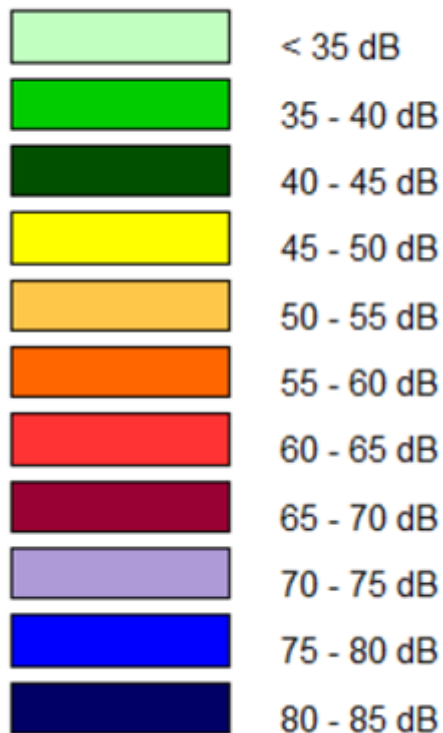
Figure II-8: Predicted night period $L_{Aeq, 15\text{minute}}$ noise levels - Bird Collection, Adverse Conditions



Figure II-9: Predicted night period L_{Amax} noise levels - Bird Collection, Adverse Conditions



Figure II-10: Predicted $L_{Aeq, period}$ noise levels - Additional Traffic Movements



Key II-1: Predicted Noise Level Contours dB(A)



Appendix III

Analysis of Prevailing Meteorological Conditions

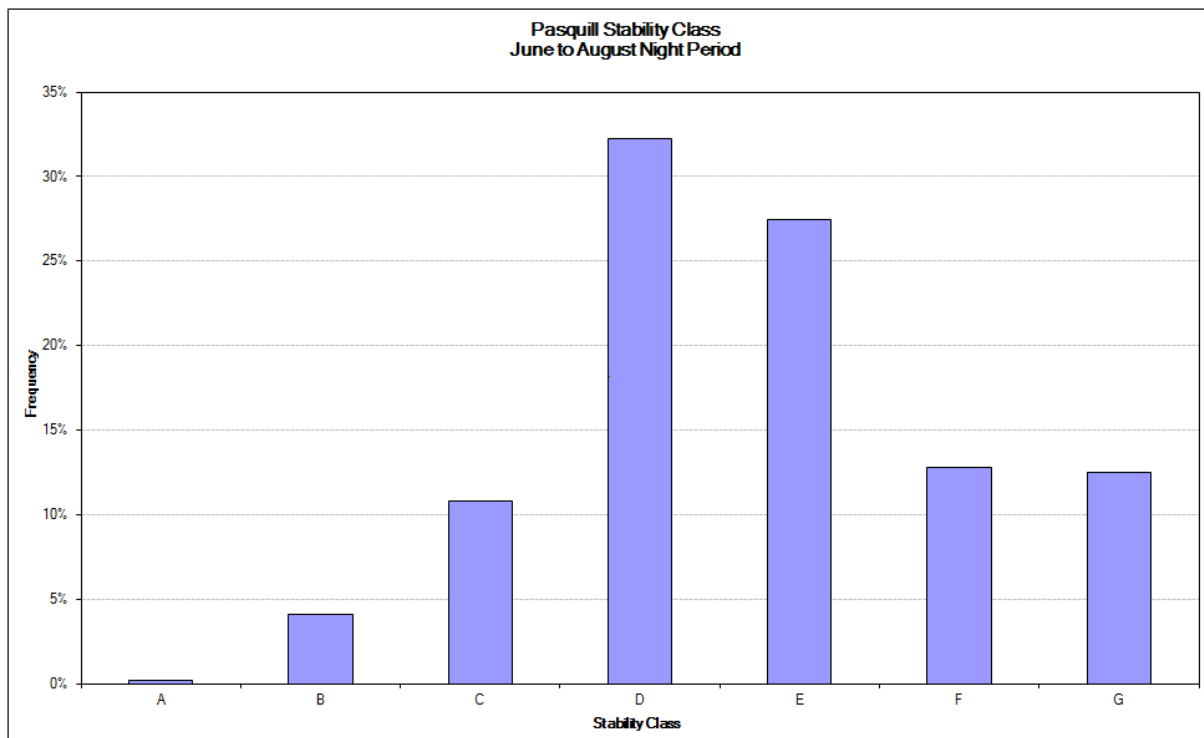


Figure III-1: Stability Class - Winter Period.

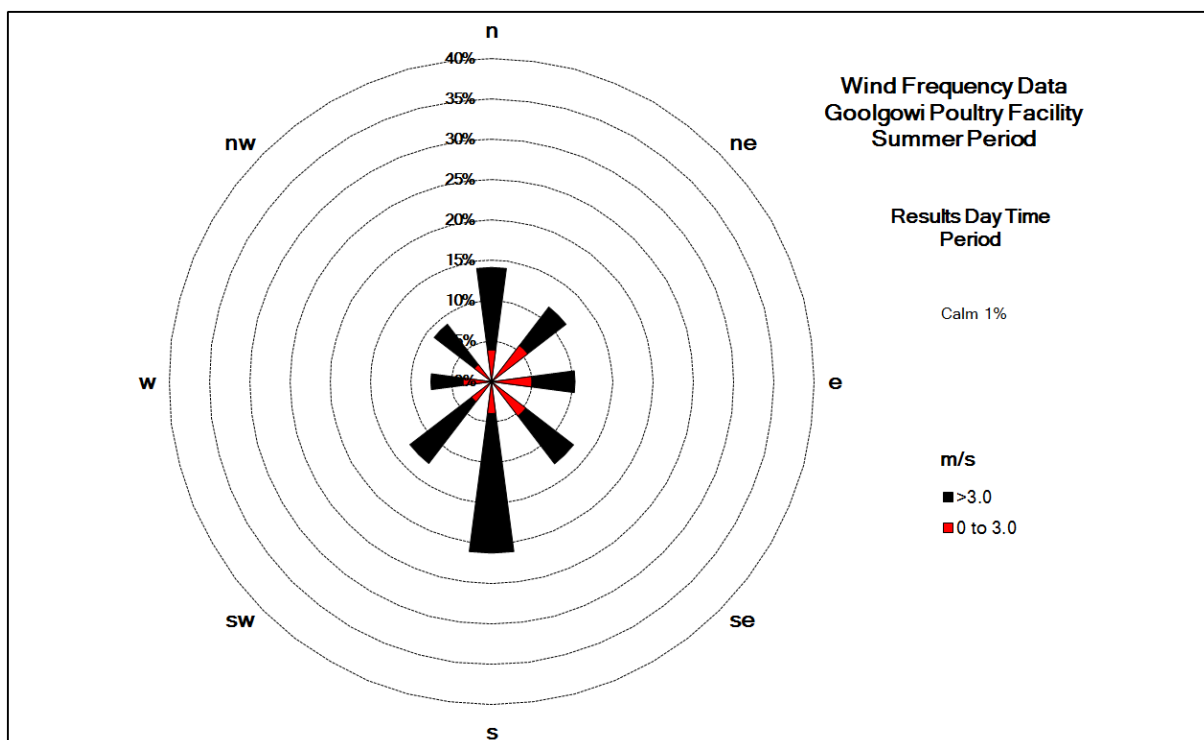


Figure III-2: Wind Rose Data - Summer (Day Period)

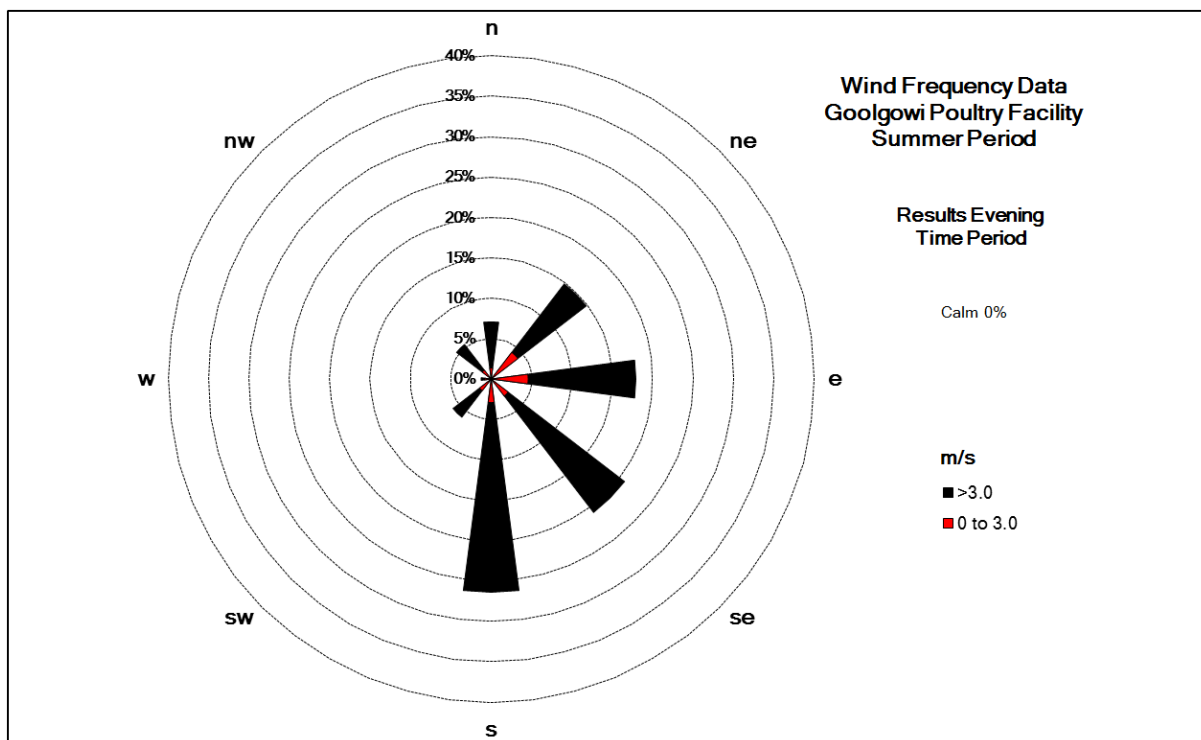


Figure III-3: Wind Rose Data - Summer (Evening Period)

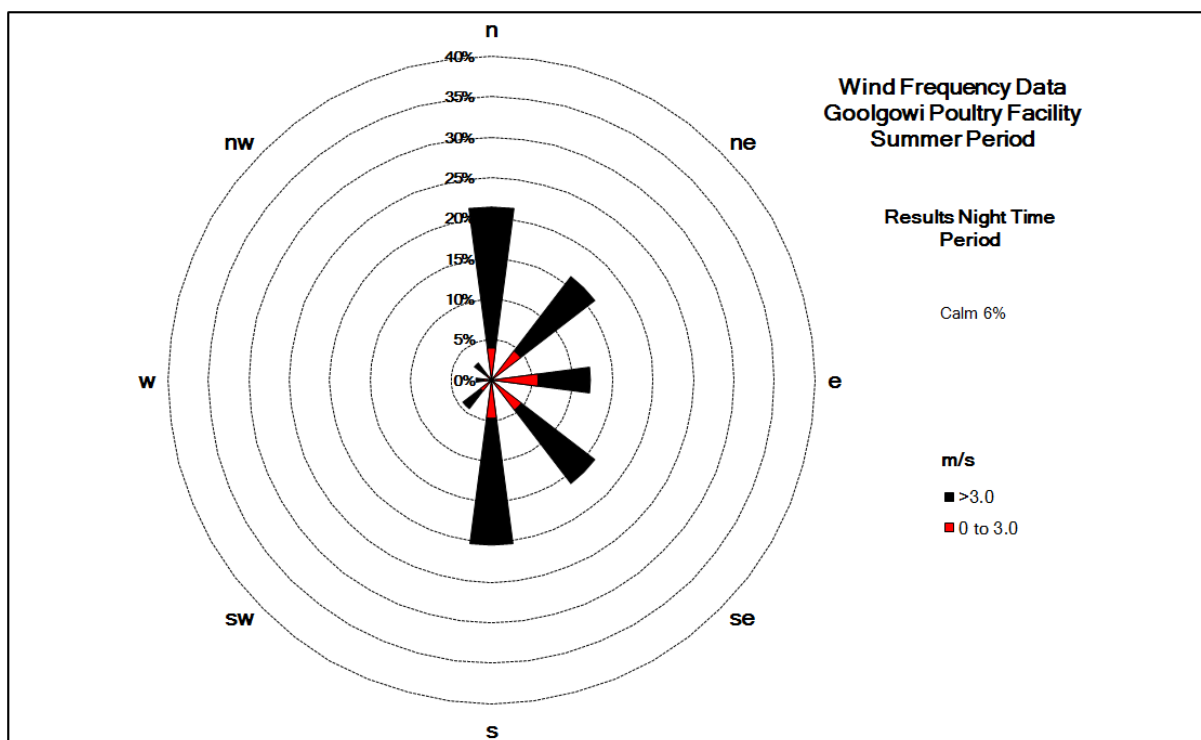


Figure III-4: Wind Rose Data - Summer (Night Period)

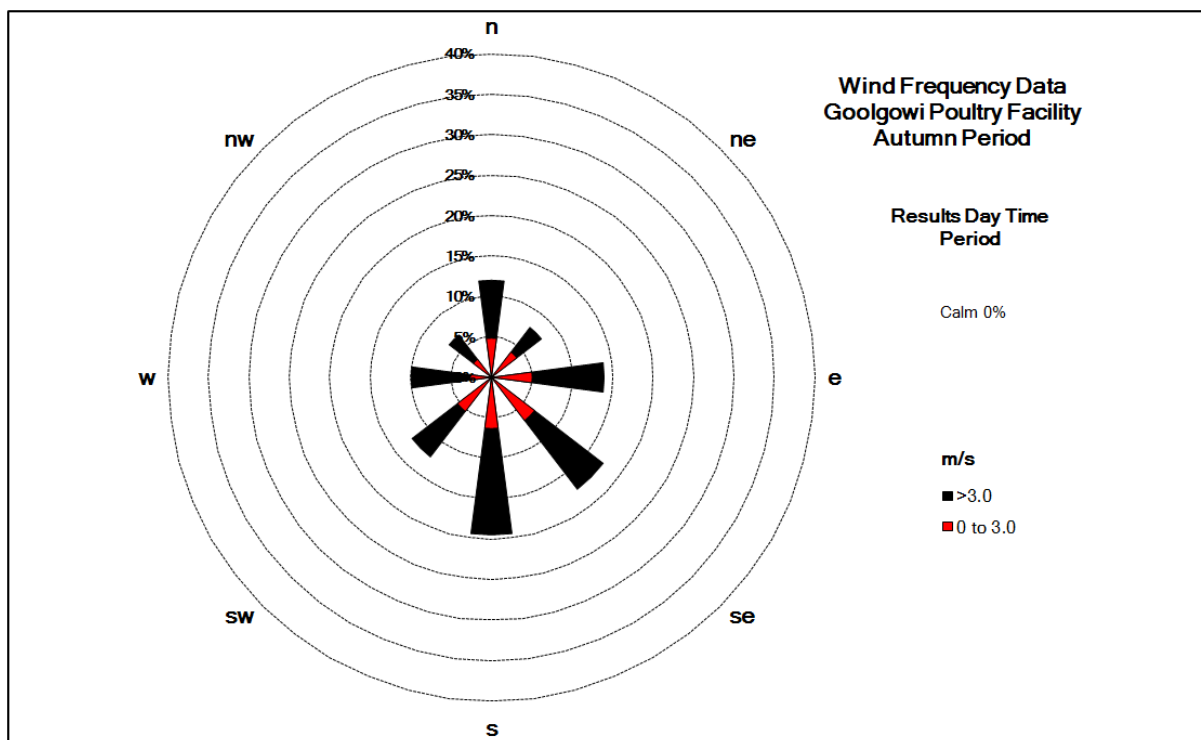


Figure III-5: Wind Rose Data - Autumn (Day Period)

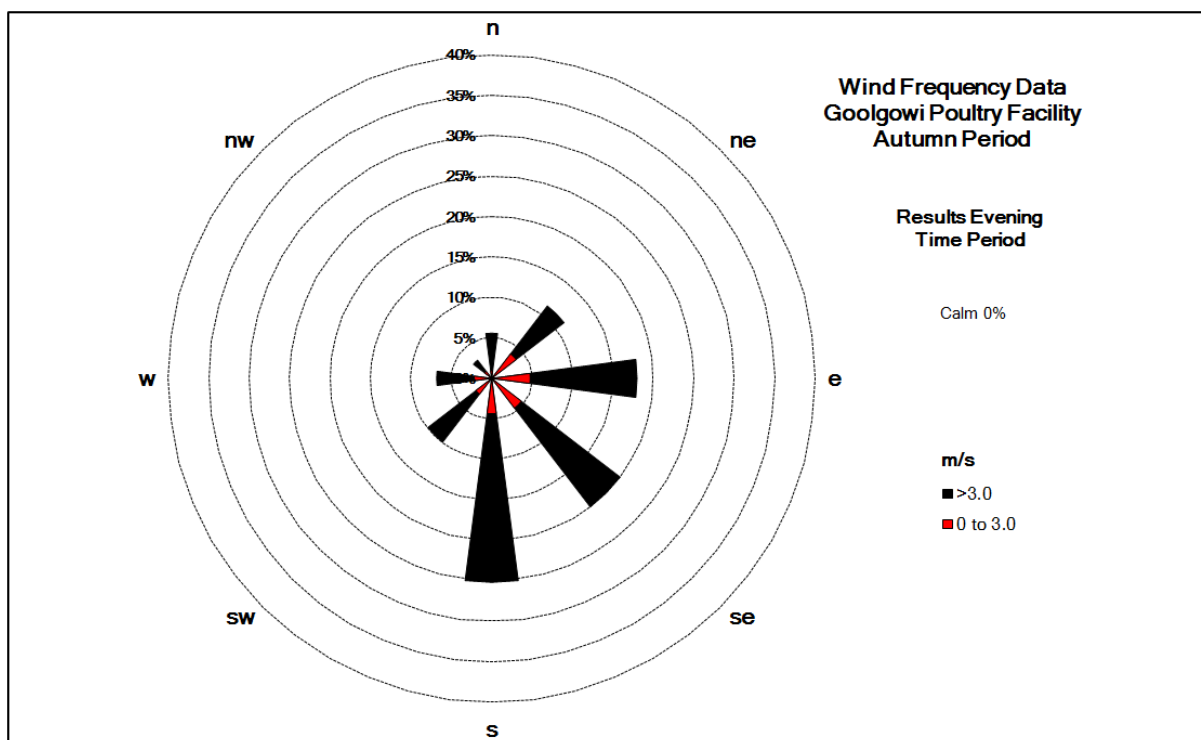


Figure III-6: Wind Rose Data - Autumn (Evening Period)

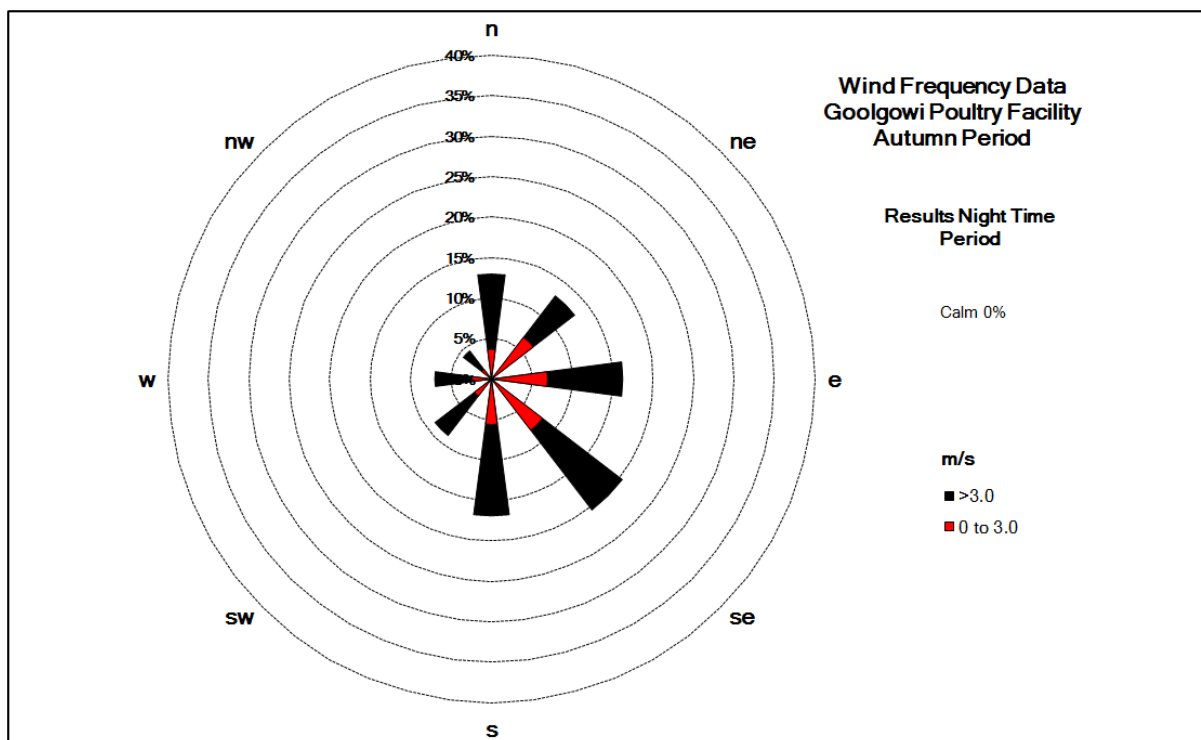


Figure III-7: Wind Rose Data - Autumn (Night Period)

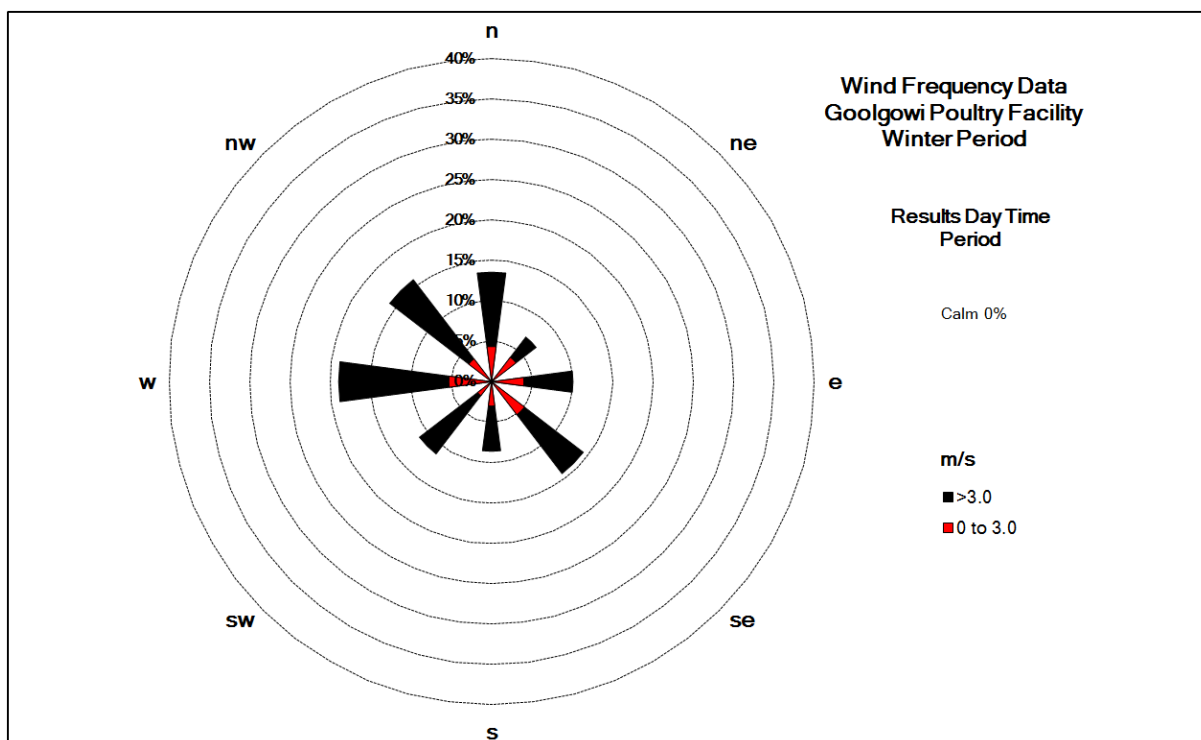


Figure III-8: Wind Rose Data - Winter (Day Period)

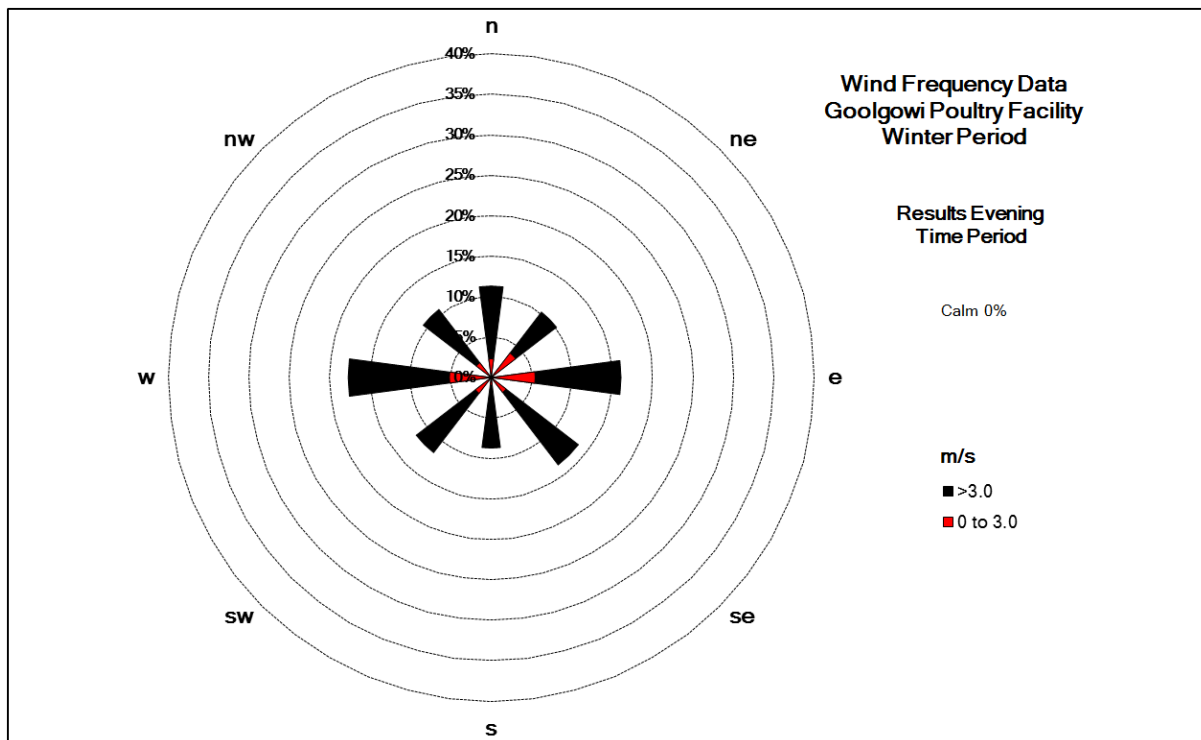


Figure III-9: Wind Rose Data - Winter (Evening Period)

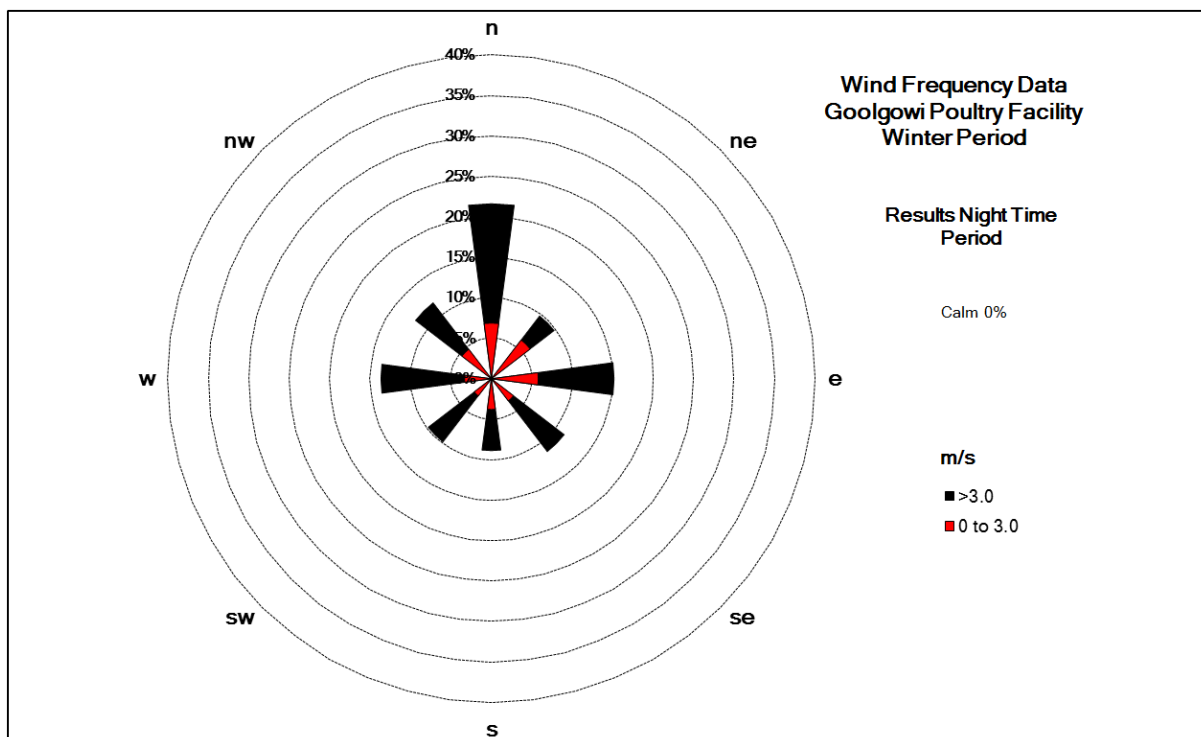


Figure III-10: Wind Rose Data - Winter (Night Period)

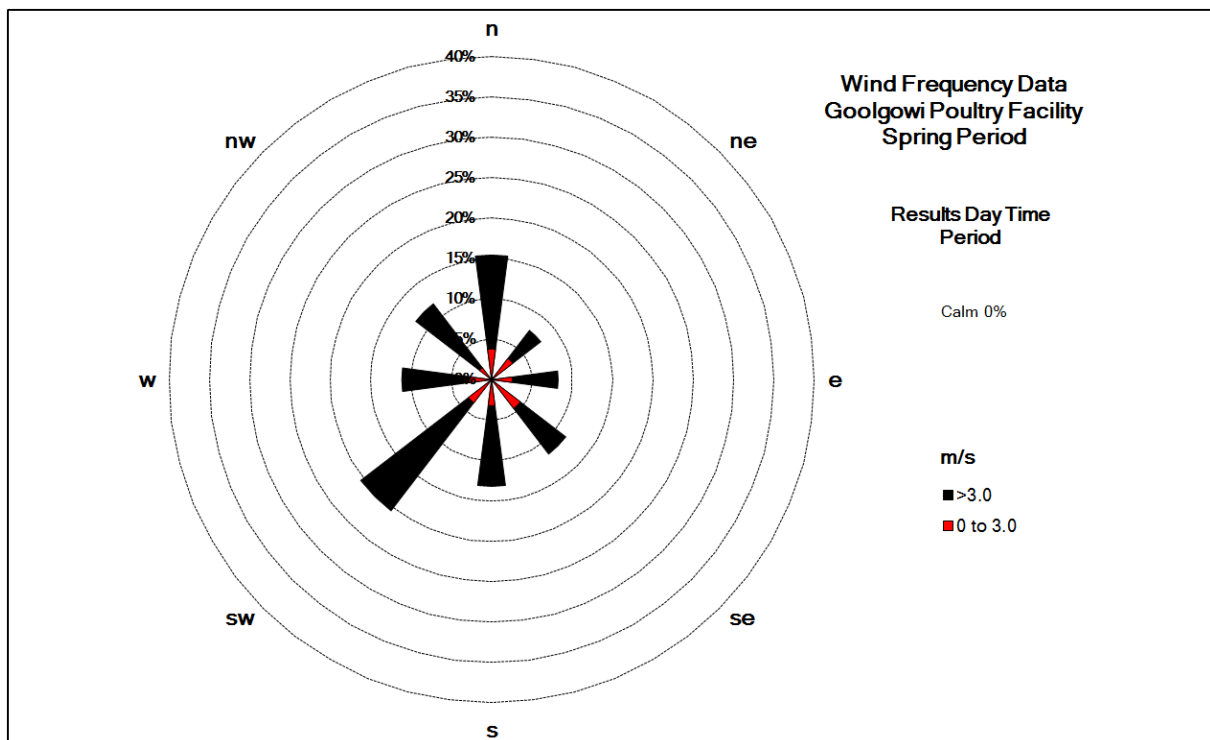


Figure III-11: Wind Rose Data - Spring (Day Period)

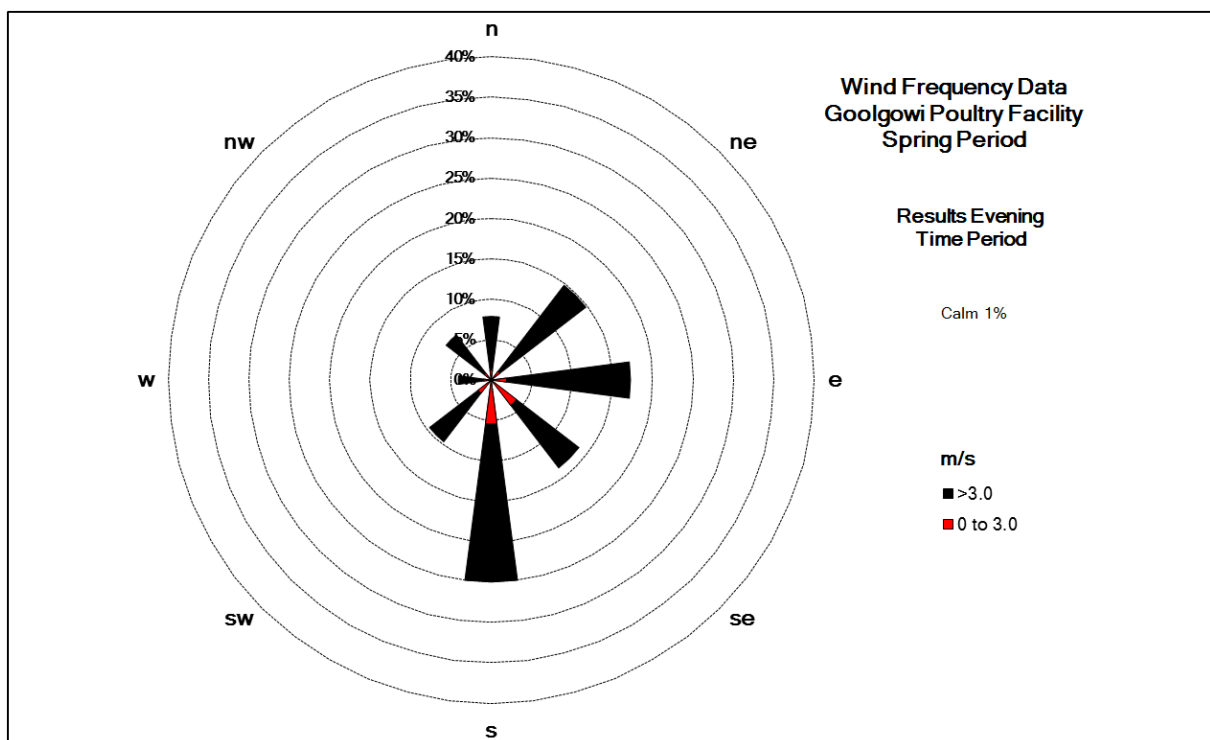


Figure III-12: Wind Rose Data - Spring (Evening Period)

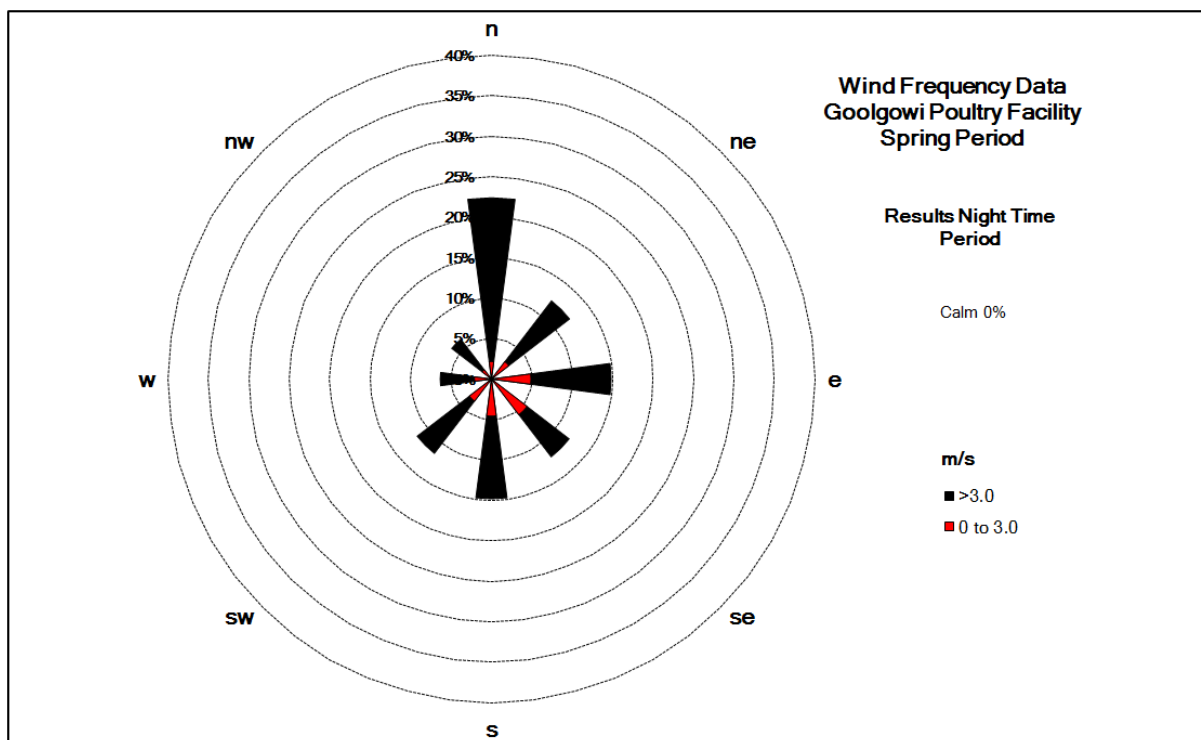


Figure III-13: Wind Rose Data - Spring (Night Period)