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Noise Impact Assessment

Pheasants Nest Poultry Farm

Justin and Renee Camilleri C/-Tattersall Lander

6 December, 2017

Rev 0 (Final)

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Report Details

Noise Impact Assessment - Pheasants Nest Poultry Farm

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Endorsements

Function	Signature	Name and Title	Date
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APPENDICES

1. INTRODUCTION

Advitech Pty Limited (T/A Advitech Environmental) was engaged by Tattersall Lander Pty Ltd on behalf of Justin and Renee Camilleri (the proponents) to prepare a Noise Impact Assessment (NIA) for a proposed broiler farm at 180 Mockingbird Road, Pheasants Nest 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 Justin and Renee Camilleri C/-Tattersall Lander ("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 Background and Objectives

Advitech Environmental understands that the proponent is proposing to develop a poultry farm which would consist of seven tunnel ventilated sheds housing a total of 315,000 birds. The proposal location (regional context) of the site is shown in **Figure 1** (overleaf).

The purpose of this report is to identify potential noise impacts associated with the construction and operation of the proposed poultry facility activities on nearby sensitive receivers. The noise impact assessment has been undertaken having regard 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 during day and night periods;
- 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 Wollondilly Shire Council by the client, to support the development application of the proposed project.

2. PROJECT BACKGROUND

2.1 Project Description

Advitech Environmental understands that the proposed facility would include seven poultry sheds located within the boundary of the property and orientated from the north north east to the south south west. The proposal layout is provided in **Figure 2** (overleaf). The site is currently used for livestock grazing and market gardens with associated infrastructure (sheds, dams & access tracks), most of which will be retained. The proposed development site comprises one lot, identified as Lot 264 in DP 625326.

The sheds would house up to 315,000 birds destined for meat production, and would be tunnel ventilated. Once reaching maturity between 32 and 54 days of growth, the birds would be removed during the night and early morning period using approximately 5 to 6 trucks per shed.

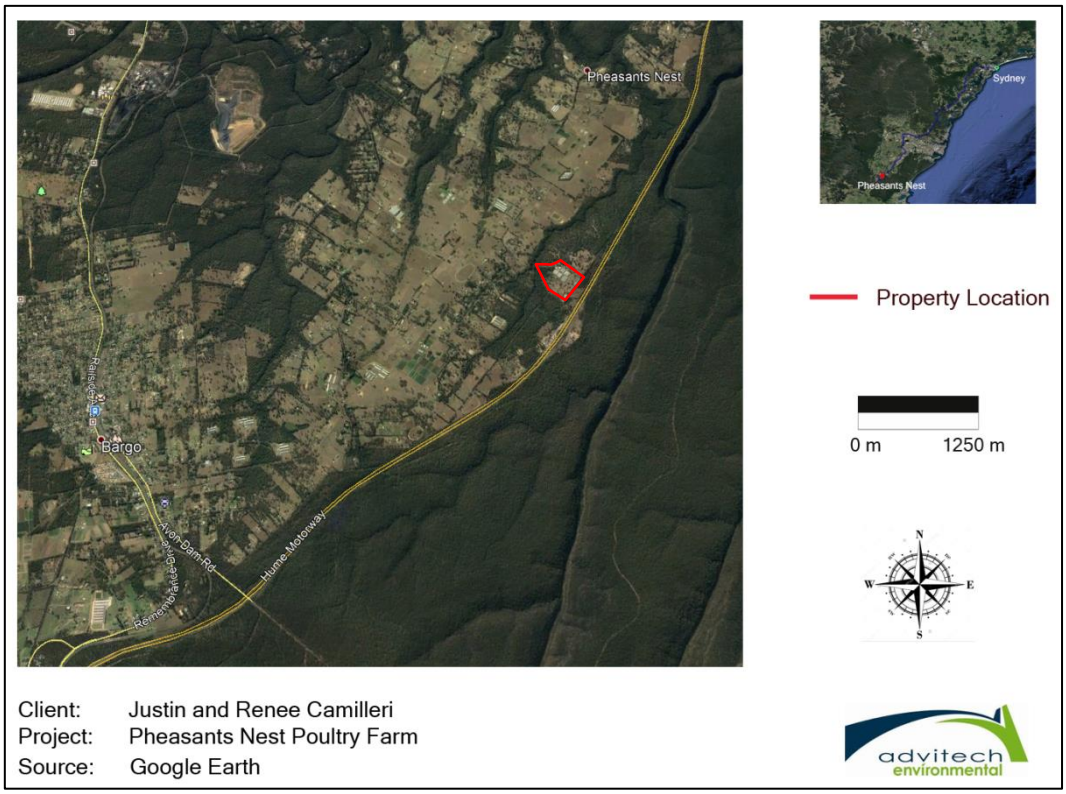

Figure 1: Location Map (Regional context)

Figure 2: Location Map (Local context)

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 up to three feed deliveries per week, during the day or night period, with the grain silos located on site. The access route would enter the site from Mockingbird Road adjacent to the Northern boundary. The proposed layout of the sheds is shown in **Figure 3.**

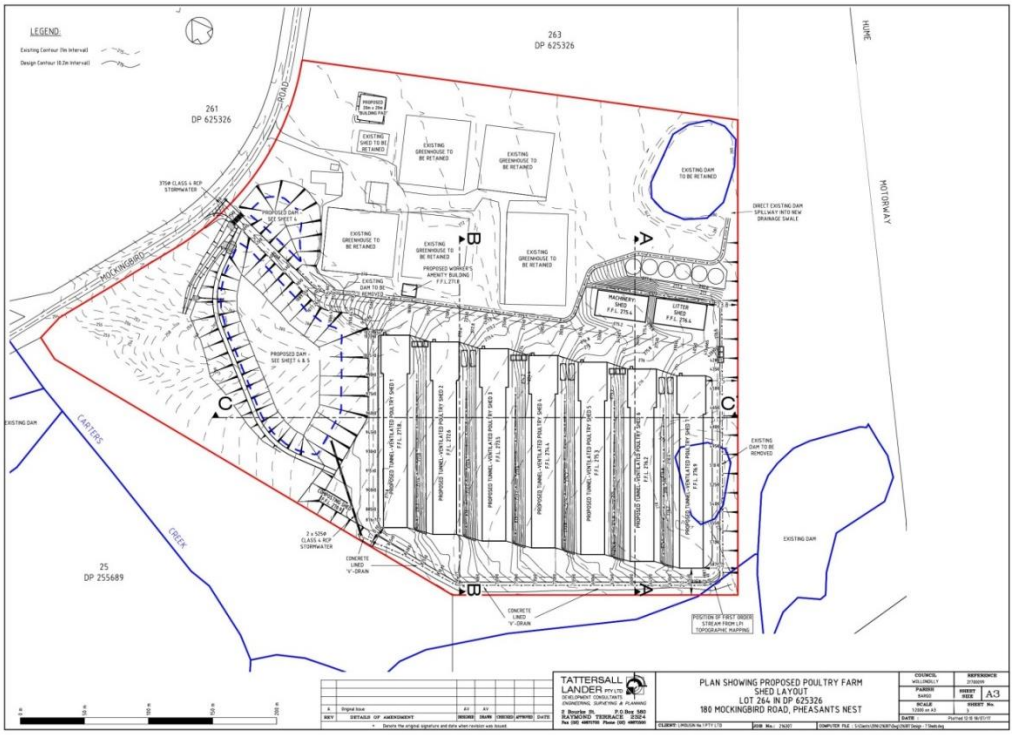

Figure 3: Proposed Shed Plan

2.2 Identification of sensitive receivers

Table 1 provides the details of the nearby identified sensitive receivers that would potentially be impacted by activities associated with the proposed development. The receivers were identified based on their proximity and exposure to the subject site.

Table 1: Nearest Identified Sensitive Receivers

Receiver Identifier (ID)	Receiver Type	Approximate Distance from Facility Noise Source (m)	Easting (UTM) (km)	Northing (UTM) (km)
R1	Residential	315	282.6942	6205.037
R2	Residential	300	282.4975	6205.052
R3	Residential	800	282.9785	6205.427
R4	Residential	590	281.9581	6204.821
R5	Residential	695	281.8468	6204.723
R6	Residential	800	281.7552	6204.61
R7	Residential	950	281.6529	6204.413
R8	Residential	1,035	281.6319	6204.256
R9	Residential	700	282.075	6205.279

Receiver Identifier (ID)	Receiver Type	Approximate Distance from Facility Noise Source (m)	Easting (UTM) (km)	Northing (UTM) (km)
R10	Residential	920	282.0765	6205.541
R11	Residential	970	282.1754	6205.645
R12	Residential	1,085	282.2843	6205.818
R13	Residential	1,170	282.3181	6205.902
R14	Residential	1,220	282.1918	6205.927
R15	Residential	1,150	282.087	6205.807
R16	Residential	1,120	281.9944	6205.737
R17	Residential	1,100	281.9455	6205.681
R18	Residential	1,000	281.8334	6205.451
R19	Residential	980	281.7342	6205.299
R20	Residential	760	281.8564	6205.089
R21	Residential	715	281.8751	6205.017
R22	Residential	665	281.8913	6204.913
R23	Residential	910	281.6569	6204.949
R24	Residential	820	281.7215	6204.735
R25	Residential	905	281.6422	6204.656
R26	Residential	985	281.5702	6204.597
R27	Residential	1,005	281.5625	6204.521
R28	Residential	1,120	281.4506	6204.512
R29	Residential	1,160	281.4453	6204.375
R30	Residential	1,185	281.4386	6204.308
R31	Residential	1,305	281.3563	6204.195
R32	Residential	1,425	282.1404	6206.107
R33	Residential	1,235	282.3566	6205.973
R34	Residential	1,500	282.6698	6206.246
R35	Residential	1,460	283.0833	6206.116
R36	Residential	1,185	281.4869	6204.200
R37	Residential	1,335	281.3952	6204.054
R38	Commercial	845	282.4349	6203.911
R39	Commercial	810	282.7217	6203.969

Of the 39 identified sensitive receivers within a radius of approximately 1.50 kilometres of the proposed site, 37 were residential receivers and two were commercial receivers (service stations). The location of the sensitive receivers is shown in **Figure 4**.

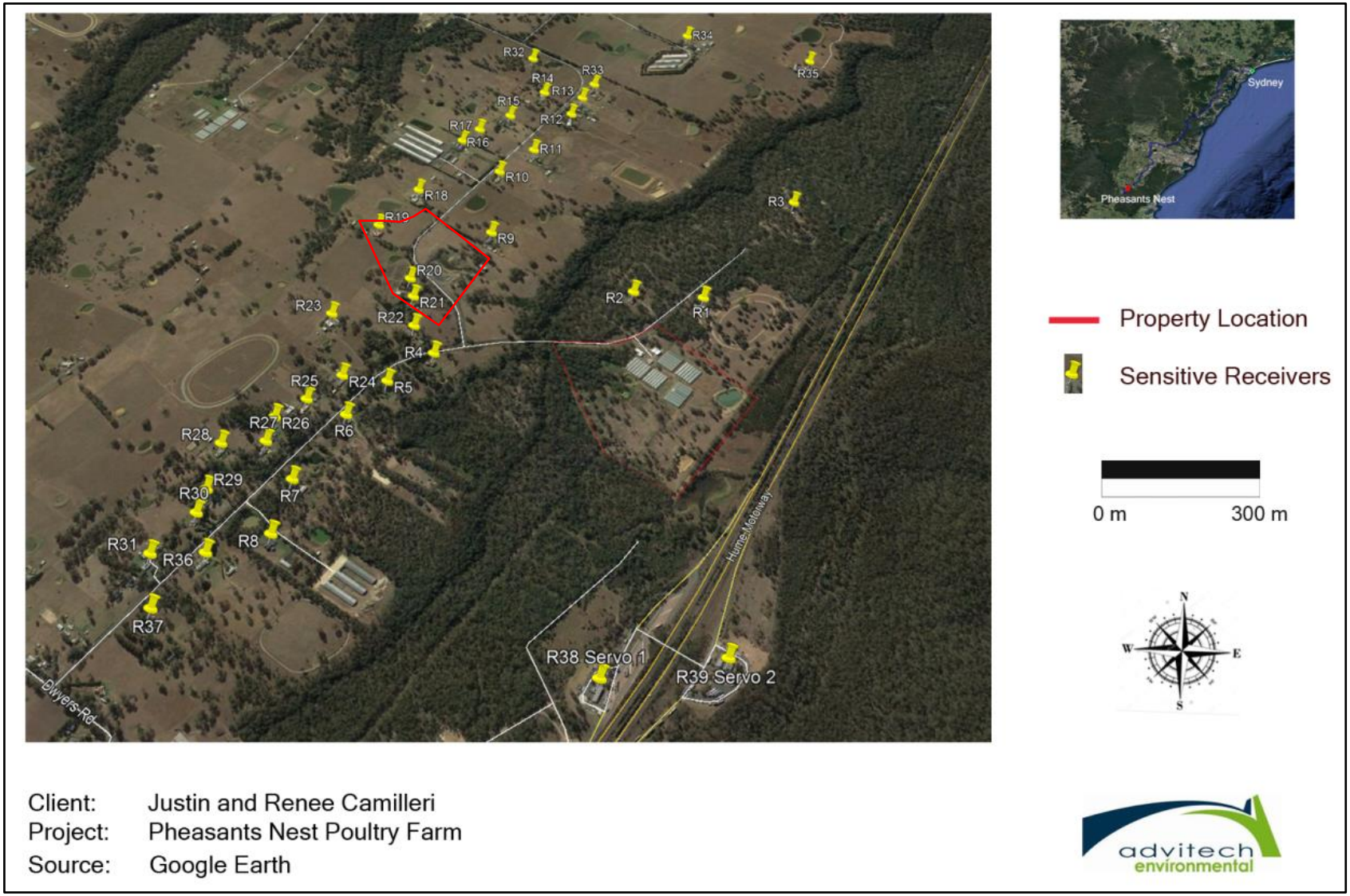

Figure 4: Nearby Sensitive Receivers

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 within the 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 the study area is rural in nature; however, given the close proximity of each of the receivers to local thoroughfares including Mockingbird Road and Nightingale Road, and considering that Hume highway passes upstream of the site, approximately 150 metres from the proposed site, road transport noise may significantly influence the noise environment of the locality. The monitoring locations are shown in **Figure 5.**

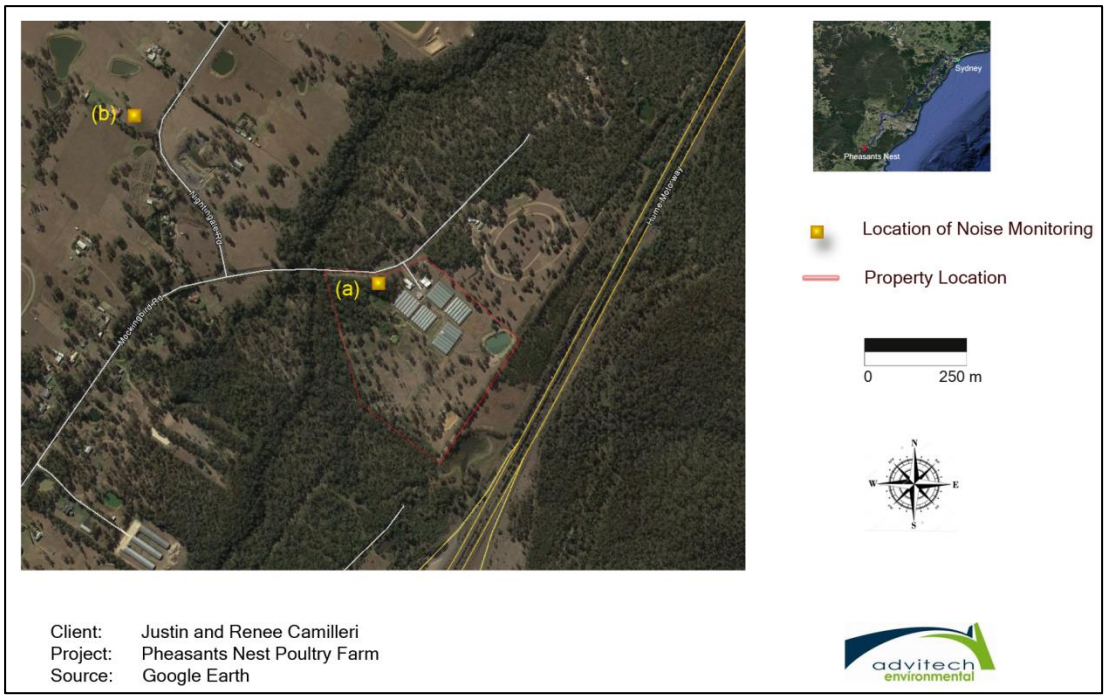

Figure 5: Locations of Noise Monitoring

3.2 Attended Noise Monitoring

Short term attended monitoring was undertaken at monitoring locations A and B on 20 January, 2017 during the day period and on 1 February, 2017, during the night period as a means of characterising the ambient noise sources within the receiving environments. 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_{A10}	L_{Aeq}	L_{A90}	Comments
Location A (180, Mockingbird Road, day time)	20.01.2017	16:20	52	51	40	Insect Noise to ~42 dB(A) Bird Calls to ~58 dB(A) Local Noise[1] to ~71 dB(A)
Location B (55, Nightingale Road, day time)	20.01.2017	15:50	48	47	36	Local Traffic to ~62 dB(A) Bird Calls to ~52 dB(A) Insect Noise to ~46 dB(A)
Location A (180, Mockingbird Road, night time)	1.02.2017	22:20	42	42	41	Road Noise[2] to ~49 dB(A) Local Noise[3] to ~44 dB(A) Bird Calls to ~48 dB(A)
Location B (55, Nightingale Road, night time)	1.02.2017	22:46	41	39	32	Local Traffic to ~45 dB(A) Insect Noise to ~40 dB(A) Local Noise[3] to ~47 dB(A) Barking dogs to ~41 dB(A) Aircraft Noise to ~54 dB(A)

Note1: Noise from machinery on site.

Note 2: Road Noise from Hume Highway.

Note 3: Impact Noise from site.

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 20 January to 1 February, 2017 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	16-203-513	16-299-450
Calibration Expiry Date	22/02/2018	31/08/2018
Measurement Title	Mockingbird Road	Nightingale Road
Run Started	20/01/17 14:45	20/01/17 15:30
Run Stopped	2/02/17 10:30	2/02/17 10:30
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 A.

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)

	Location A (Mockingbird Road)			Location B (Nightingale Road)		
Date	Day	Evening	Night	Day	Evening	Night
20/01/2017	-	-	32.2	-	-	30.4
21/01/2017	33.7	39.1	26.8	30.5	31.2	23.7
22/01/2017	30.4	39.1	29.7	27.2	32.2	26.5
23/01/2017	34.7	36.2	34.8	30.7	32.8	30.1
24/01/2017	-	-	32.1	-	-	28.2
25/01/2017	35.1	36.3	29.0	30.0	30.5	24.9
26/01/2017	33.0	37.1	29.0	26.1	30.4	26.0
27/01/2017	34.6	36.6	28.7	28.8	34.9	26.7
28/01/2017	31.9	34.9	29.4	31.0	32.2	29.6
29/01/2017	32.8	36.7	31.9	29.9	32.7	28.7
30/01/2017	33.6	33.0	35.0	31.0	30.1	30.0
31/01/2017	34.1	37.1	30.7	31.8	33.6	27.4
01/02/2017	32.0	-	31.3	27.1	-	28.7
02/02/2017	42.7	-	-	37.5	-	-
Rating Background Level (RBL)	**34**	**37**[1]	**31**	**30**	**32**[1]	**30**

Note1: Application notes for the INP indicate that in circumstances where the evening and night period RBLs are higher than the day period RBL, the allowable noise levels for the more sensitive periods should not exceed those of the day period. Where this happens, the Intrusiveness Criteria for the more sensitive period should be set to that of the less sensitive period.

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.

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. For commercial premises, the external noise levels at the most-affected occupied point of the premises should not exceed LAeq (15 min) 70 dB(A).

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: Monday to Friday 7 am to 6 pm Saturday 8am to 1 pm No work on Sundays or public holidays	**Noise affected** RBL + 10 dB	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured LAeq (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. The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration as well as contact details.
	Highly Noise affected 75 dB(A)	The highly noise affected level represents the point above which there may be strong community reaction to noise. 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 Saturday : 8am to 1pm	Noise Affected NML (RBL + 10)	40
		Highly Noise Affected NML	75
Commercial Receivers		External NML	70

4.2 Operational Noise Criteria

The *Best Practice Management for Meat Chicken Production in NSW* (Manual 1 & 2) (NSW Department of Primary Industries, 2012) provides 'best management' guidance on the operation of meat chicken farms in NSW. These manuals are intended to promote consistent application of best management and uniform regulation of poultry farming in NSW. While the Manuals provide guidance on best management practices, they do not present assessment criteria against which compliance is demonstrated. Section 3.2.4 of Manual 1 indicates that 'best practice management' requires that the likely noise impacts are assessed in accordance with the *NSW Industrial Noise Policy* (INP) (NSW EPA, 2000).

The INP 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 $L_{Aeq,15minute}$ 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.

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	Rural	Day Evening Night	50 45 40	55 50 45
	Suburban	Day Evening Night	55 45 40	60 50 45
	Urban	Day Evening Night	60 50 45	65 55 50
	Urban/Industrial Interface	Day Evening Night	65 55 50	70 60 55
School – internal	All	Noisiest 1-hr	35	40
Place of worship – internal	All	When in use	40	45
Passive recreation	All	When in use	50	55
Active recreation	All	When in use	55	60
Commercial Premises	All	When in use	65	70
Industrial Premises	All	When in use	70	75

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 *likely to decrease* in the future: Acceptable noise level minus 10. If existing noise level is *unlikely to decrease* 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

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**.

In such cases, the amenity criterion for noise from industrial noise becomes the $L_{Aeq,\ period(traffic)}$ 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. One 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. Furthermore, Advitech Environmental understands that tonal reverse alarms would not be used in mechanical plant on the proposal site. 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** and **Table 11** provide an assessment of the acceptable noise levels, and establish 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	37	35
	Mean L_{Aeq}	48	46	36
	Recommended Acceptable L_{Aeq} Noise Level (ANL-Rural)	50	45	40
	Amenity Criteria	44	38	34
	Project Specific Noise Level (PSNL) $L_{Aeq,15minute}$	**35**	**35**[1]	**35**

Note1: The INP Application Notes suggests that in circumstances where the evening and night period RBLs are higher than the day period RBL, the allowable noise levels for the more sensitive periods should not exceed those of the day period.

Table 11: Recommended Acceptable L_{Aeq} Noise Level (ANL-Commercial Premises)

Receiver Type	Time of Day	Recommended L_{Aeq} Noise Level, dB(A)
Commercial Premises	When in use	65

4.2.5 Sleep Disturbance Criteria

The occurrence of elevated noise levels over short durations, such as reversing beepers and noise from heavy items being dropped, have the potential to cause sleep disturbance to nearby residents. While the INP does not specifically address sleep disturbance from high noise level events, the INP Application Note suggests that the current criterion of an $L_{A1\ (1\ minute)}$ not exceeding the $L_{A90\ (15\ minute)}$ by more than 15 dB(A) should be used as a guide to identify the likelihood of sleep disturbance. This means that where the criterion is met, sleep disturbance is not likely to occur, but where it is not met, a more detailed analysis is required to:

- assess the maximum noise level or $L_{A1\ (1minute)}$;
- 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 12.**

Table 12: Sleep Disturbance Criteria dB(A)

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

Guidance on the potential impacts of short duration, elevated noise levels is contained within the review of research results in the *NSW Road Noise Policy* (RNP). From research on sleep disturbance to date, it can be concluded that:

- maximum internal noise levels below 50 – 55 dB(A) are unlikely to awaken people from sleep; and
- one of two noise events per night, with maximum internal noise levels of 65 – 70 dB(A), are not likely to affect health or wellbeing significantly.

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 13**.

Table 13: 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	35	35	35	45
Commercial Receivers	Construction works	70 (When in use)			
	Operational works	65 (When in use)			

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 few off-site traffic movements including semi-trailer trucks for silo refilling and truck and dogs for bird pickup. These traffic movements would be confined to feed deliveries at a rate of three movements per week, and bird pickup/delivery activities, which would occur approximately every 32 to 54 days. The bird pickup activities would require approximately five to six vehicles per shed, with a maximum of two trucks on site at any one time. These activities would generally be confined to the night period only, as the birds are more easily handled during the cooler night periods.

The proposed development would involve access to the site from Mockingbird Road. The road traffic noise criteria for Mockingbird Road, as a "local Road", are provided in **Table 14**.

Table 14: Road traffic noise criteria

Road Category	Type of Project / Land Use	Assessment Criteria - dB(A) Day 7am - 10pm	Night 10pm - 7am
Local	Existing residences affected by **additional traffic** on existing sub-arterial roads generated by land use developments	$L_{Aeq,\ (15hr)}$ 55 (external)	$L_{Aeq,\ (9hr)}$ 50 (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 15**.

Table 15: 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 with respect 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 16**.

Table 16: 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 potential noise impacts, predictions derived through 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, including SWL measurements of processes at similar poultry operations.

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:

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

The primary earthworks were modelled relative to the natural land surface. Bulldozers and excavators were modelled as point sources, located at the point nearest to the sensitive receivers. 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.

The site levelling works were modelled relative to the final land surface following cut and fill of the site. The graders, bulldozers and rollers were modelled as point sources, located at the point nearest to the sensitive receivers. The water cart was modelled as a moving source, assumed to travel at a speed of 20 km/h, with a maximum of two 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 with the earth mounds/barrier in place. 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 17.**

Table 17: Construction Noise Sources

Activities	Equipment Used	Sound Power Level, dB(A)
Primary Earthworks	Dump Truck	114
	Excavator	105
	Bulldozer	112
Level Pad	Grader	109
	Roller	102
	Bulldozer	112
	Water Cart	107
Construction	Delivery Truck	101
	Concrete Truck	108
	Concrete Pump	103
	Concrete Scree	91
	Franna	103
	Hand Tools	102

5.1.2 Operation Noise

During the operation of the proposed 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 forklift.

Ventilation fans have been identified as the primary continuous noise generating activity at the proposed development. Each broiler shed will have 15 Euroemme EM52 exhaust fans to facilitate tunnel ventilation. Multiple fan configurations were considered throughout this assessment, with the most appropriate configuration involving twelve ventilation fans located at the rear of each shed (south western end), and three fans located on the side of each shed facing the Hume Highway (south east). 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 15 fans, and such conditions would typically occur during the day period only. To account for adverse meteorological conditions however, the modelling scenarios assumed 15 fans per shed during the night time (neutral conditions) and five fans per shed during the night time (temperature inversion conditions) (see Section 5.2 below). These scenarios are considered to be highly conservative, and these operating conditions are likely to occur rarely, if at all.

The proposed development site on Mockingbird Road is close to two naturally ventilated broiler farms on Mockingbird Road and Pheasants Nest Road, and one tunnel ventilated broiler farm on Nightingale Road (**Figure 6**). As such, the cumulative environmental effects that are likely to result from the designated project on Mockingbird Road in combination with the physical activity on the other three broiler farms needs to be considered. The cumulative noise levels due to the operation of the ventilation fans of the proposed sheds were modelled under worst case operating conditions, during the day and night periods.

Due to the topography of the proposed development site, excavation and fill of the site would be required to provide a near level pad upon which to construct the proposed poultry sheds. It is anticipated that the floor level of the nearest shed on the western side of the proposed development would be approximately four metres above the access road entrance. The existing access road, currently being used for market gardens, would be used for the delivery trucks during feed delivery and bird collection.

Feed delivery and mechanical silo refilling scenarios were assessed during the day and night periods. Following advice from the client, it was determined that up to three feed delivery trucks per week were expected on site, with no more than one truck on site during any one day. The feed delivery truck movements were modelled as a moving source, travelling at a speed of 10 km/hr around the designated access route. Mechanical silo refilling was modelled as a point source on the north-eastern side of the proposed sheds near the greenhouses 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.

Figure 6: Locations of nearby broiler farms

During bird collection, a maximum of two transport trucks would be onsite at any one time (four truck movements). It is anticipated that the trucks would typically leave the site approximately one hour apart, and would not travel in convoy. A forklift would operate continuously during the bird collection, alternating between activities inside and outside the buildings. To account for the sheds being partially open at the time of the bird collection activities, the forklift has been modelled as operating for 100% of the time outside the buildings only. The bird collection scenario was modelled for the day, evening and night periods.

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 Forklift. To assess the potential for sleep disturbance, the $L_{A1\ (1\ minute)}$ from forklift operation was modelled. A list of the proposed equipment, as well as their respective SWLs has been provided in **Table 18**.

Table 18: Operational Noise Sources

Activities	Equipment Used	Sound Power Level, dB(A)
Ventilation Fan	Multifan 130 Exhaust Fan	88
Feed Delivery	Delivery Truck	101
	Mechanical Refiller	104
Bird Collection	Delivery Truck	101
	Forklift	95
	Forklift ($L_{A1\ (1\ minute)}$)	107

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.

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 52% of night periods during the winter season. As the prevalence of temperature inversions was greater than 30%, the effects of temperature inversions were considered in the modelling of adverse 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.

Table 19: Modelled Meteorological Parameters

Meteorological Parameter	Modelled Meteorological Conditions		
	Day (Neutral)	Evening/Night (Neutral)	Evening/Night (Inversion)
Temperature (deg C)	20	10	10
Humidity (%)	60	50	50
Wind Speed (m/s)	0	0	0
Wind Direction (deg)	N/A	N/A	N/A
Stability Class	D	D	F

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) stations at Camden (068192), 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.

In accordance with the provisions established in Section 5 of the INP, neutral and adverse 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**.

5.3 Noise Model Results

5.3.1 Construction Phase Noise Predictions

The predicted $L_{Aeq,15minute}$ noise levels at the nearest sensitive receivers, for primary earthworks, levelling the pad, and construction of infrastructure activities are shown in **Table 20** to **Table 22**. 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 $L_{Aeq,15minute}$ noise levels at the nearest sensitive receivers, for operational phase activities are shown in **Table 23** to **Table 26.** To assist with the understanding of these results, the predicted noise level contours are provided in **Appendix II**.

Table 20: Predicted $L_{Aeq,15minute}$ noise level – primary earthwork activities, dB(A)

Receiver	Predicted Noise Levels ($L_{Aeq,15\ minute}$) Shed Construction	Criteria dB(A) (Day)	Compliance (Yes or No)
R1	50		No
R2	52		No
R3	40		Yes
R4	52		No
R5	50		No
R6	48		No
R7	46		No
R8	46		No
R9	48		No
R10	45		No
R11	44		No
R12	43		No
R13	40		Yes
R14	42		No
R15	38	40	Yes
R16	43		No
R17	38		Yes
R18	44		No
R19	45		No
R20	48		No
R21	49		No
R22	49		No
R23	45		No
R24	45		No
R25	47		No
R26	43		No
R27	45		No
R28	41		No
R29	43		No
R30	44		No
R31	43		No
R32	36		Yes
R33	40		Yes
R34	34		Yes
R35	34		Yes
R36	43		No
R37	40		Yes
R38[1]	47		No
R39[1]	42		No

Note 1: Service Station (External NML should be below 70 dB(A))

Table 21: Predicted LAeq,15minute noise level – levelling the pad activities, dB(A)

Receiver	Predicted Noise Levels ($L_{Aeq,15\ minute}$) Shed Construction	Criteria dB(A) (Day)	Compliance (Yes or No)
R1	45		No
R2	50		No
R3	36		Yes
R4	50		No
R5	48		No
R6	46		No
R7	44		No
R8	44		No
R9	44		No
R10	42		No
R11	41		No
R12	40		Yes
R13	37		Yes
R14	35		Yes
R15	35	40	Yes
R16	40		Yes
R17	34		Yes
R18	41		No
R19	42		No
R20	45		No
R21	46		No
R22	47		No
R23	42		No
R24	43		No
R25	44		No
R26	41		No
R27	43		No
R28	38		Yes
R29	40		Yes
R30	41		No
R31	40		Yes
R32	33		Yes
R33	36		Yes
R34	31		Yes
R35	30		Yes
R36	39		Yes
R37	37		Yes
R38[1]	45		No
R39[1]	40		Yes

Note 1: Service Station (External NML should be below 70 dB(A))

Table 22: Predicted $L_{Aeq,15minute}$ noise level – construction of infrastructure activities, dB(A)

Receiver	Predicted Noise Levels ($L_{Aeq,15\ minute}$) Shed Construction	Criteria dB(A) (Day)	Compliance (Yes or No)
R1	38		Yes
R2	41		No
R3	29		Yes
R4	38		Yes
R5	36		Yes
R6	35		Yes
R7	32		Yes
R8	31		Yes
R9	33		Yes
R10	30		Yes
R11	29		Yes
R12	28		Yes
R13	26		Yes
R14	27		Yes
R15	27	40	Yes
R16	28		Yes
R17	27		Yes
R18	29		Yes
R19	30		Yes
R20	34		Yes
R21	34		Yes
R22	35		Yes
R23	31		Yes
R24	32		Yes
R25	32		Yes
R26	30		Yes
R27	31		Yes
R28	28		Yes
R29	28		Yes
R30	29		Yes
R31	28		Yes
R32	24		Yes
R33	26		Yes
R34	23		Yes
R35	23		Yes
R36	28		Yes
R37	27		Yes
R38[1]	34		Yes
R39[1]	33		Yes

Note 1: Service Station (External NML should be below 70 dB(A))

Table 23: Predicted $L_{Aeq,15minute}$ noise level - operation of ventilation fans, dB(A)

Receiver	Predicted Noise Levels ($L_{Aeq,15\ minute}$) Day 15 Fans (Neutral)	Evening/Night 15 Fans (Neutral)	Evening/Night 5 Fans (Inversion)	Criteria dB(A) (D/E/N)	Compliance (Yes or No)
R1	31	31	26		Yes
R2	31	29	28		Yes
R3	23	24	19		Yes
R4	32	33	29		Yes
R5	28	28	26		Yes
R6	25	26	24		Yes
R7	23	23	21		Yes
R8	22	22	20		Yes
R9	26	26	25		Yes
R10	24	24	23		Yes
R11	23	24	23		Yes
R12	22	22	22		Yes
R13	21	22	21		Yes
R14	22	22	21		Yes
R15	22	23	22	35/35/35	Yes
R16	22	22	21		Yes
R17	22	22	21		Yes
R18	24	25	23		Yes
R19	30	30	27		Yes
R20	31	31	29		Yes
R21	33	34	31		Yes
R22	32	33	30		Yes
R23	26	26	23		Yes
R24	26	26	24		Yes
R25	24	24	22		Yes
R26	23	23	21		Yes
R27	23	23	20		Yes
R28	22	22	20		Yes
R29	21	22	19		Yes
R30	21	21	19		Yes
R31	20	20	18		Yes
R32	20	20	19		Yes
R33	21	21	20		Yes
R34	19	19	17		Yes
R35	19	20	15		Yes
R36	21	21	19		Yes
R37	19	20	17		Yes
R38[1]	25	25	23		Yes
R39[1]	27	27	23		Yes

Note 1: Service Station (Acceptable L_{Aeq} noise level should be below 65 dB(A))

Table 24: Predicted $L_{Aeq,15minute}$ cumulative noise level - operation of ventilation fans, dB(A)

Receiver	Predicted Noise Levels ($L_{Aeq,15\ minute}$) Day Fans (Mockingbird Road and other broiler farms)	Evening/Night (Inversion) Fans (Mockingbird Road and other broiler farms)	Criteria dB(A) (D/E/N)	Compliance (Yes or No)
R1	31	26		Yes
R2	31	28		Yes
R3	24	19		Yes
R4	32	29		Yes
R5	28	26		Yes
R6	26	24		Yes
R7	24	21		Yes
R8	23	20		Yes
R9	27	25		Yes
R10	25	23		Yes
R11	25	23		Yes
R12	24	22		Yes
R13	24	21		Yes
R14	26	21		Yes
R15	27	22	35/35/35	Yes
R16	26	21		Yes
R17	28	21		Yes
R18	28	23		Yes
R19	31	27		Yes
R20	31	29		Yes
R21	33	31		Yes
R22	33	30		Yes
R23	27	23		Yes
R24	27	24		Yes
R25	25	22		Yes
R26	24	21		Yes
R27	24	20		Yes
R28	23	20		Yes
R29	22	19		Yes
R30	22	19		Yes
R31	21	18		Yes
R32	25	19		Yes
R33	24	20		Yes
R34	21	17		Yes
R35	20	15		Yes
R36	22	19		Yes
R37	20	17		Yes
R38[1]	26	23		Yes
R39[1]	27	23		Yes

Note 1: Service Station (Acceptable L_{Aeq} noise level should be below 65 dB(A))

Table 25: Predicted $L_{Aeq,15minute}$ noise level - feed delivery and silo refilling, dB(A)

Receiver	Predicted Noise Levels ($L_{Aeq,15\ minute}$) Day (Neutral)	Evening/Night (Neutral)	Evening/Night (Inversion)	Criteria dB(A) (D/E/N)	Compliance (Yes or No)
R1	32	31	29		Yes
R2	34	32	33		Yes
R3	24	24	22		Yes
R4	33	33	32		Yes
R5	29	29	28		Yes
R6	27	27	27		Yes
R7	25	25	25		Yes
R8	23	23	22		Yes
R9	27	27	27		Yes
R10	25	25	25		Yes
R11	24	24	25		Yes
R12	23	23	24		Yes
R13	22	22	22		Yes
R14	22	22	23		Yes
R15	23	23	23	35/35/35	Yes
R16	23	23	23		Yes
R17	22	22	22		Yes
R18	25	25	25		Yes
R19	30	30	29		Yes
R20	31	32	30		Yes
R21	33	34	33		Yes
R22	33	33	32		Yes
R23	26	27	25		Yes
R24	27	27	26		Yes
R25	25	25	24		Yes
R26	24	24	24		Yes
R27	24	24	24		Yes
R28	23	23	22		Yes
R29	23	23	23		Yes
R30	22	22	22		Yes
R31	21	21	20		Yes
R32	20	20	20		Yes
R33	21	22	22		Yes
R34	19	19	19		Yes
R35	19	20	17		Yes
R36	22	22	21		Yes
R37	20	21	19		Yes
R38[1]	26	25	24		Yes
R39[1]	27	27	25		Yes

Note 1: Service Station (Acceptable L_{Aeq} noise level should be below 65 dB(A))

Table 26: Predicted $L_{Aeq,15minute}$ and $L_{A1,1minute}$ (sleep disturbance) noise levels - bird collection, dB(A)

Receiver	Predicted Noise Levels ($L_{Aeq,15\ minute}$)			Criteria dB(A) (E/N/Sleep disturbance)	Compliance (Yes or No)
	Day ($L_{Aeq,15minute}$, Neutral)	Evening/Night ($L_{Aeq,15minute}$, Inversion)	Sleep Disturbance ($L_{A1,1minute}$)		
R1	33	33	44		Yes
R2	34	35	45		Yes
R3	22	25	36		Yes
R4	32	31	38		Yes
R5	29	31	39		Yes
R6	27	29	37		Yes
R7	25	26	35		Yes
R8	24	25	34		Yes
R9	29	30	40		Yes
R10	26	27	37		Yes
R11	25	27	37		Yes
R12	23	25	33		Yes
R13	22	23	32		Yes
R14	23	24	34		Yes
R15	23	24	32	35/35/45	Yes
R16	25	26	36		Yes
R17	23	24	32		Yes
R18	26	27	36		Yes
R19	29	28	32		Yes
R20	31	30	35		Yes
R21	33	32	37		Yes
R22	32	32	39		Yes
R23	27	27	35		Yes
R24	27	29	38		Yes
R25	25	28	36		Yes
R26	24	27	34		Yes
R27	24	26	33		Yes
R28	23	25	33		Yes
R29	22	24	32		Yes
R30	22	23	32		Yes
R31	21	22	31		Yes
R32	20	22	30		Yes
R33	22	23	31		Yes
R34	19	20	29		Yes
R35	20	18	29		Yes
R36	22	21	31		Yes
R37	20	19	31		Yes
R38[1]	25	17	27		Yes
R39[1]	27	18	29		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 vegetated surfaces;
- all residential receivers were modelled at 1.5 metres above the ground surface, at the most noise affected location within approximately 1.5 kilometres of the dwelling;
- to reduce the noise levels at the nearby sensitive receivers, the fans on the side of sheds facing the Mockingbird Road were relocated to the rear of the sheds;
- all sources operate at their maximum assumed noise levels for the duration of the assessment period;
- the three metre earth mound/barrier surrounding the proposed site was modelled from south eastern end to north western end, and around the designated access route;
- four metre tall colorbond fencing was modelled at the rear of the sheds to provide attenuation during the operation of fans;
- the $L_{A1\ (1\ minute)}$ for the operation of the forklift was based on a recent measurement of bird collection activities at a similar facility in the Hunter Region; and
- no modifying factors have been applied to noise source sound power levels (SWLs) as tonal influences are 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.

5.4 Road Traffic Noise Assessment Results

The proposed development is not considered a traffic generating development according to Schedule 3 of *Infrastructure SEPP 2007*. According to the proponent, the proposed facility will generate a maximum of four truck movements (two ingressing and two egressing) during any one hour of the night period during bird collection. To enable the assessment of road traffic noise associated with the proposed development, the single event sound power level of 108 dB(A) for a typical truck movement at 80 km/hr was used to predict the $L_{Aeq,1hr,}$ traffic noise level, using the following relationship:

$$L_{Aeq,9hr} = SEL + 10 \log(N) - 10 \log (32400) - 20 \log(r) - 8$$

Where:	SEL	is the sound exposure level from a truck pass-by;
	N	is the number of truck movements during the night period;
	32400	is the number of seconds in 9 hours;
	r	is the distance from road to the receiver; and
	8	is a constant for converting sound power levels to sound pressure levels.

Based on a single event truck pass-by sound power level of 108 dB(A), a distance of approximately 145 metres from the access road to the nearest residential receiver on Mockingbird Road and a maximum of two trucks deliveries each hour (four truck movements) over the course of the night period (9 hours), the predicted $L_{Aeq,1hr}$ traffic noise level at the nearest sensitive receiver is anticipated to be in the order of 27 dB(A). This complies with the daytime and night time criteria established in **Table 14** for local roads and would not increase the traffic noise levels from Mockingbird Road.

5.5 Vibration Assessment Results

A desktop vibration assessment was undertaken having regard to 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 geotechnical 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 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 300 metres. 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 construction phase activities indicated that predicted noise levels would exceed the *noise affected* Noise Management Level (NML) of 40 dB(A), at multiple receiver locations for each phase of construction. The *noise affected* NML is considered to be the point above which there may be some community reaction to the noise being generated by the construction activities. It should be noted that the *highly noise affected* NML of 75 dB(A), considered to be the point above which there is likely to be strong community reaction to the construction noise, was not predicted to be exceeded at any of the nearby receiver locations during the proposed construction phase.

For the purpose of this assessment, three construction phases were considered. These include primary earthworks; levelling and compacting the site; and the construction of the poultry sheds. The primary earthworks were considered to be activities for the purpose of 'cutting' the site. All noise sources were modelled relative to the existing ground level. The site levelling and compacting works were considered to be the activities for the purpose of redistributing excavated material (filling) the site, and compacting the site. All noise sources during this phase were modelled relative to final ground surface. The shed construction works were considered to include all activities relating to shed construction including concrete works and shed building. Advitech Environmental understands that the ground works, including the site excavation and compacting would be undertaken over a period of approximately four weeks. It is also recommended that the earth berms/barriers proposed to reduce the impacts associated with noise and air quality should be constructed during the site excavation and levelling pad works.

The results of the modelling indicate that the highest predicted noise levels at each of the sensitive receiver locations would generally occur during primary earthworks. The predicted noise levels were observed to exceed the noise affected NML at 30 of the 39 identified nearby residential receivers, with the highest noise levels predicted at receiver locations R2 and R4 (52 dB(A)).

During the site levelling and compacting works, the results of the noise modelling indicate that the predicted noise levels would exceed the noise affected NML at 22 of the 39 identified nearby residential receivers. The highest noise levels were predicted to occur at receiver locations R2 and R4 (50 dB(A)).

During the shed construction works, the results of the noise modelling indicate that the predicted noise levels would exceed the noise affected NML only at one of the 39 identified nearby residential receivers. The highest noise levels were predicted to occur at receiver location R2 (41 dB(A)).

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. It is therefore considered that the modelled predictions represent the upper limit of the expect 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 to Table 22.

To reduce the impact on potentially affected residential receivers, it is recommended that a construction phase noise management plan (NMP) should be prepared prior to start of construction. Specifically, the NMP should ensure 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 mounds/barrier;
- 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 ventilation fans during the day, evening and night periods, modelled under neutral and adverse meteorological conditions, indicates that the noise levels would comply with the $L_{Aeq,15minute}$ criteria at all receiver locations. Cumulative noise impact assessment for the fans of the existing tunnel ventilated sheds at Nightingale Road and the fans of the proposed sheds at Mockingbird Road showed that the noise levels would comply with the $L_{Aeq,15minute}$ criteria of 35 dB(A) during day and night periods at all receiver locations.

Noise levels generated during feed delivery and silo refilling activities are predicted to comply with the day, evening and night time $L_{Aeq,15minute}$ criterion of 35 dB(A) under neutral and adverse meteorological conditions at all receiver locations.

Bird collection activities would generally occur during the night periods over a period of approximately one week, for each five to eight week production cycle. However, the potential noise impacts associated with bird pickup were undertaken for both day and night periods in case any bird pick up would occur during day period also. It should be noted that peak noise levels during night time were modelled based on adverse 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 day, evening and night periods would comply with the associated $L_{Aeq,15minute}$ criteria for all receiver locations.

In addition to general bird collection activities, the $L_{A1\ (1minute)}$ for the operation of the forklift, to be used during bird loading, was modelled to predict whether $L_{A1\ (1minute)}$ noise levels would exceed the sleep disturbance $L_{A1,1minute}$ criterion of 45 dB(A). The results of the analysis indicates that the $L_{A1\ (1minute)}$ noise levels would not exceed the sleep disturbance $L_{A1,1minute}$ criterion at any receiver.

Although the results of the predictive modelling indicated that no exceedences of the day, evening or night criteria are anticipated, it is advised that universal work practices to minimise noise impacts should be implemented. Some of the work practices that may be considered for the operation of the proposed facility include:

- training workers on ways to minimise noise outside the sheds. This includes avoiding the use of radios, loud talking and the slamming of vehicle doors;
- 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; and
- 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 on behalf of Justin and Renee Camilleri (the proponents) to prepare a Noise Impact Assessment (NIA) for a proposed poultry facility at 180 Mockingbird Road, Pheasants Nest, New South Wales. The proposed poultry facility would include seven tunnel ventilated sheds located on the southern boundary of the property, and orientated with the ventilation from the north north east to the south south west.

Noise modelling was undertaken using the *Predictor* environmental noise modelling software, considering several operational scenarios with consideration to topographical and meteorological conditions. Strategic earth mounds are included in the modelled scenarios to provide attenuation measures.

Modelling of the construction activities indicate that predicted $L_{Aeq,15minute}$ noise levels would exceed noise affected NML of 40 dB(A) at multiple receiver locations during each construction phase over day period; however, this modelling scenario was predicted to comply with the highly noise affected NML of 75 dB(A), above which there is likely to be strong community reaction to the noise.

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.

To reduce the noise impacts, it is recommended that the operating fans are all located either at the rear of the sheds or side of sheds facing the Hume Highway. On this basis, fans are not operating on the side of shed facing the Mockingbird Road. Modelling of the fans operating indicate that predicted $L_{Aeq,15minute}$ noise levels would comply with the nominated PSNL criteria at all receiver locations under neutral and adverse meteorological conditions. Cumulative noise impact assessment for the fans operating also showed that the noise levels would comply with nominated PSNL criteria at all receiver locations.

Modelling of the feed delivery and silo refilling activities indicated that the predicted $L_{Aeq,15minute}$ noise levels would not exceed nominated criteria any receiver location during day, evening and night time operations, under neutral and worst case operating conditions.

Modelling of the bird collection activities indicate that predicted $L_{Aeq,15minute}$ noise levels would be below the nominated PSNL criteria at all receiver locations during various site activities. Modelled sleep disturbance ($L_{A1,\ 1\ minute}$) impacts due to forklift operation resulting from the proposed development operating during the night period, are also predicted to comply with the sleep disturbance criterion of 45 dB(A) at all receiver locations during bird collection activities under temperature inversion conditions.

8. REFERENCES

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AS 2706-1984: Numerical Values: Rounding and interpretation of limiting values.

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NSW Department of Planning (2007). *State Environmental Planning Policy (Infrastructure)*, DoP, Sydney.

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Roads and Traffic Authority of NSW (RTA Environment and Community Policy Branch) (2001). RTA Environmental Noise Management Manual. Roads and Traffic Authority of NSW Environment and Community Policy Branch, Surry Hills.

Appendix I

Background and Attended Monitoring Results

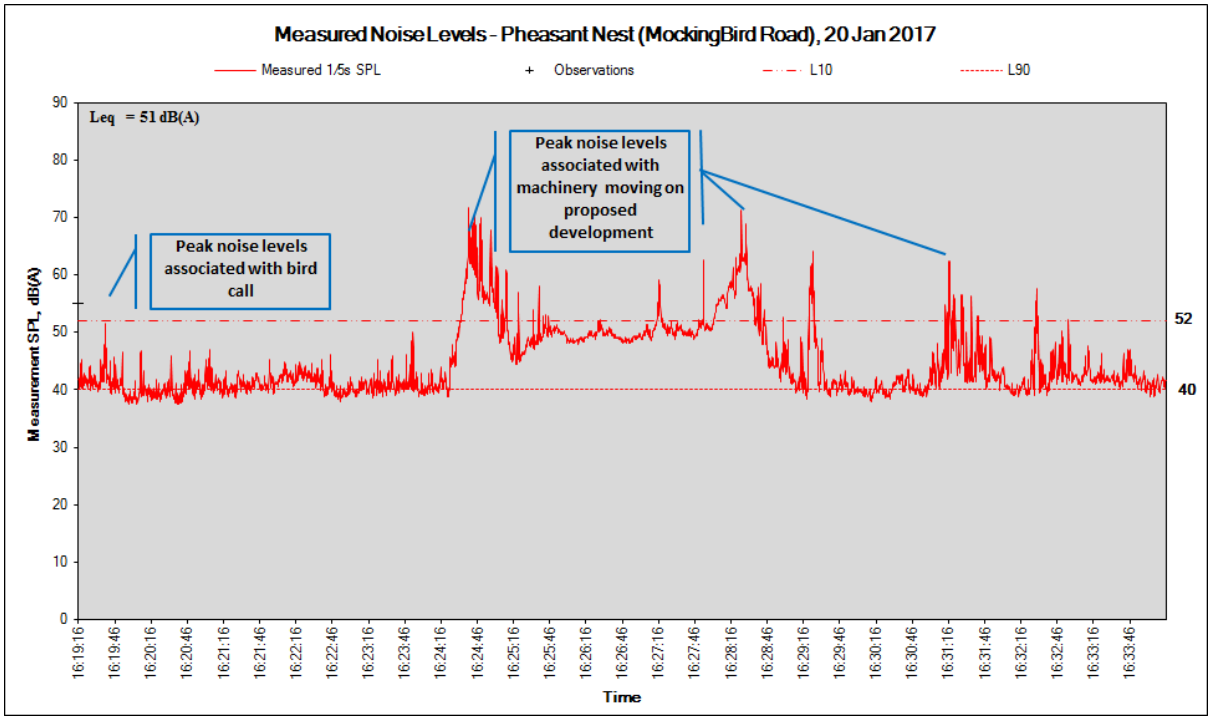

Figure AI – 1: Attended monitoring during day period, Mockingbird Road, 20 January 2017

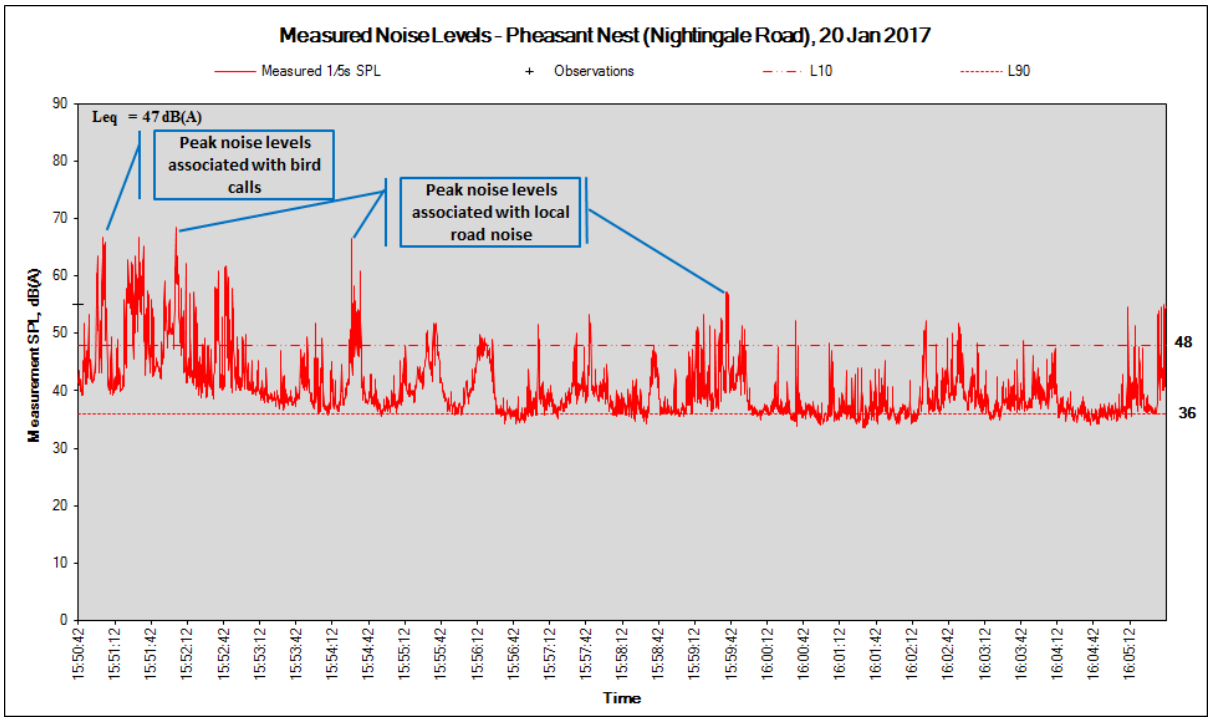

Figure AI – 2: Attended monitoring during day period, Nightingale Road, 20 January 2017

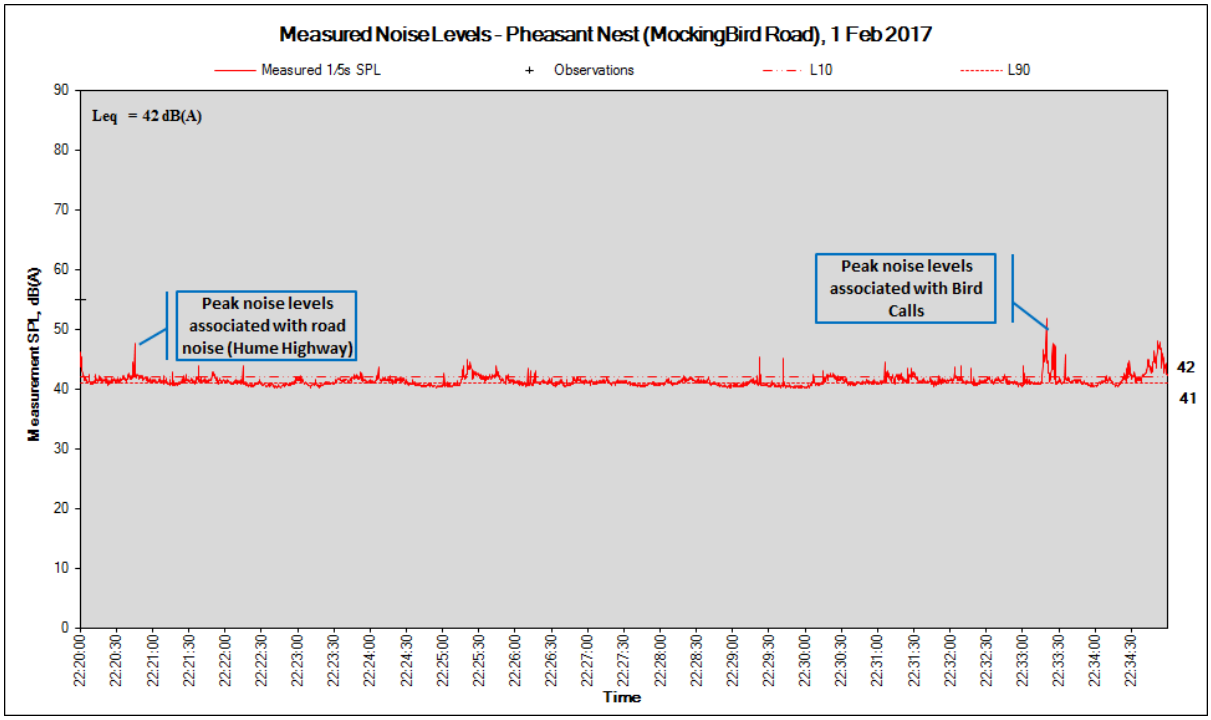

Figure AI – 3: Attended monitoring during night period, Mockingbird Road, 1 February 2017

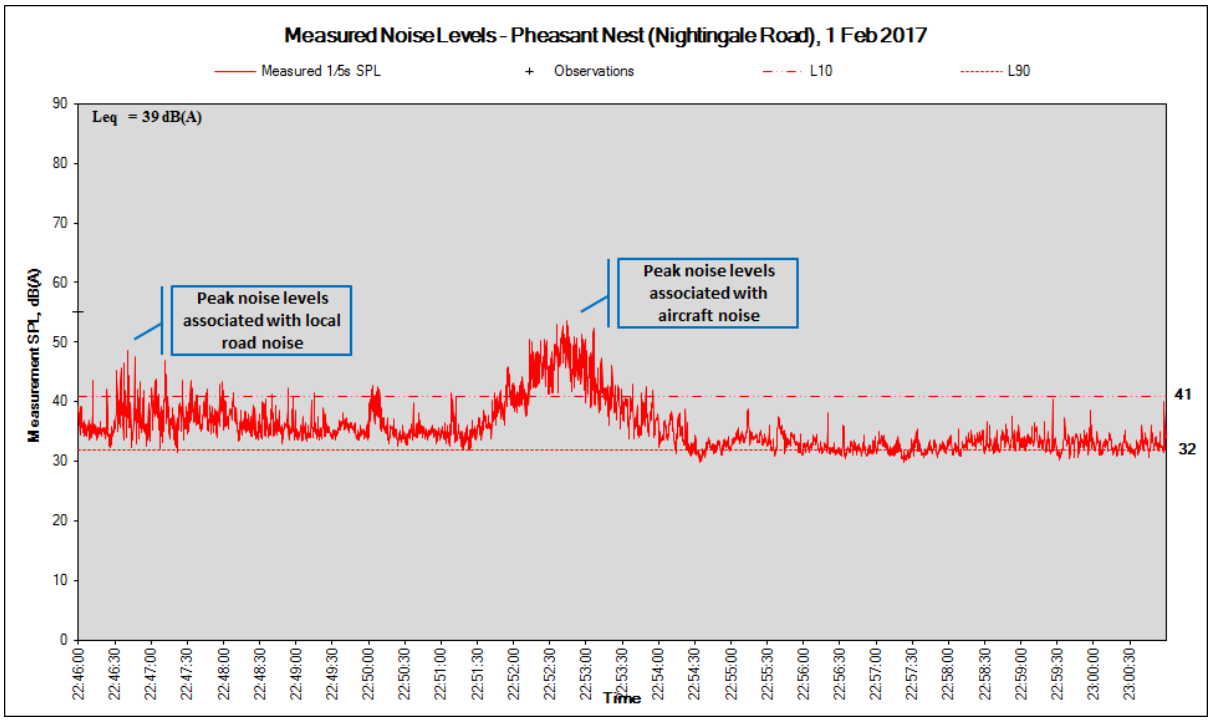

Figure AI – 4: Attended monitoring during night period, Nightingale Road, 1 February 2017

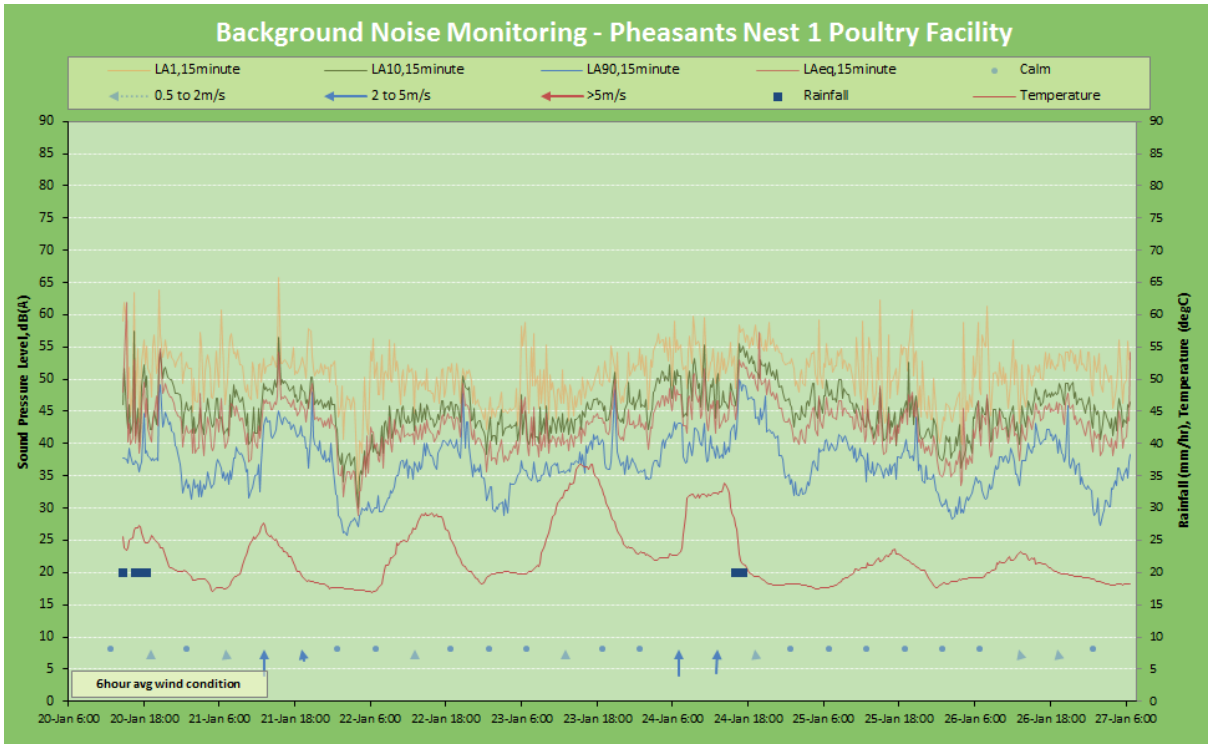

Figure A1 – 5: Background Monitoring Mockingbird Road (20 January to 27 January)

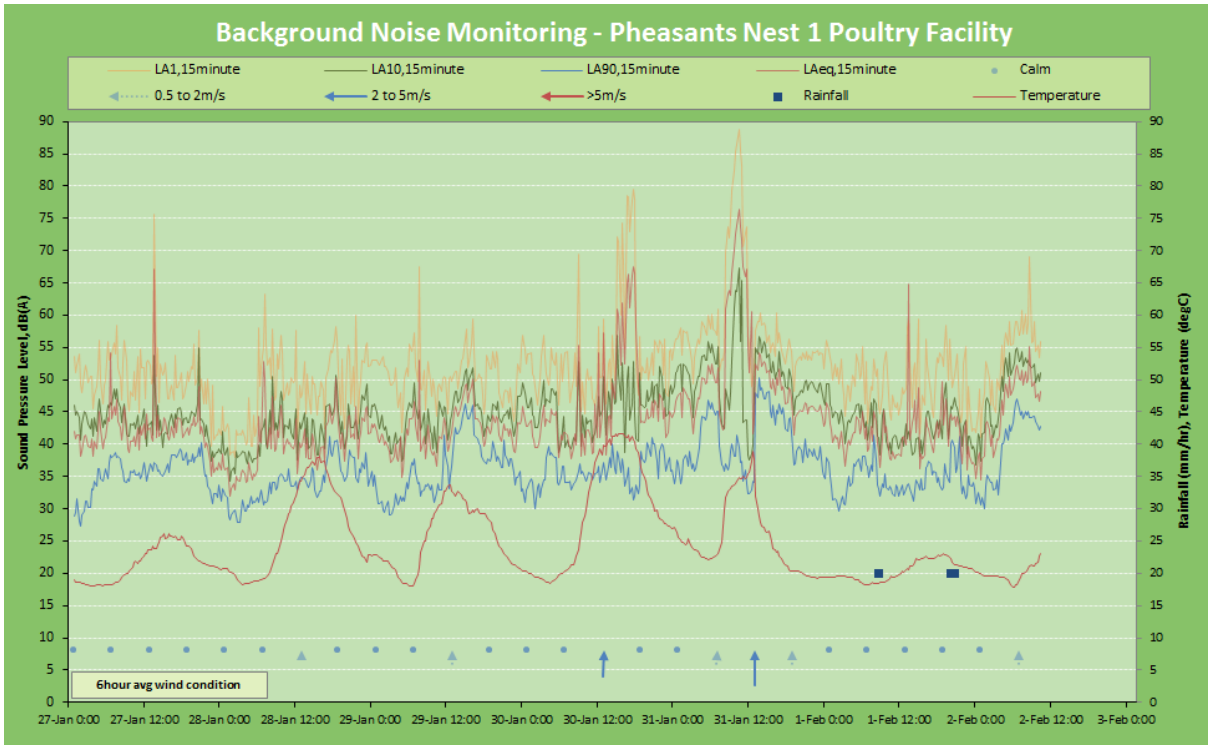

Figure A1 – 6: Background Monitoring Mockingbird Road (27 January to 2 February)

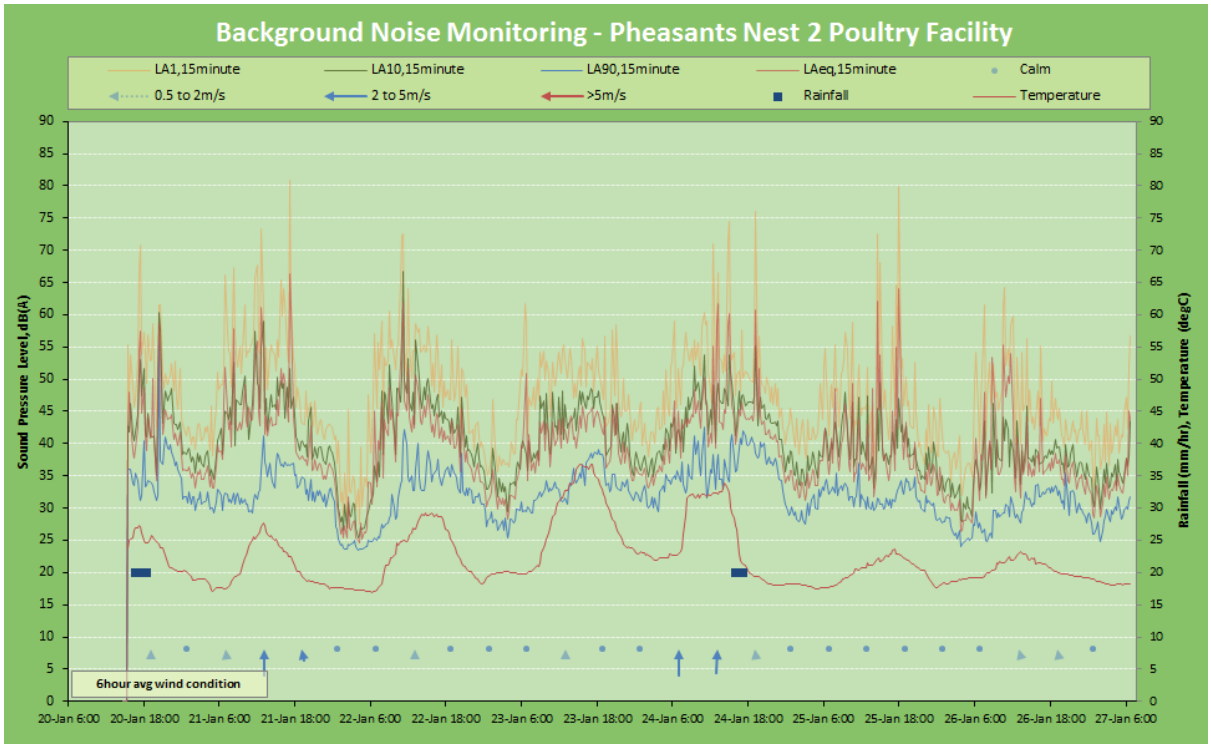

Figure A1 – 7: Background Monitoring Nightingale Road (20 January to 27 January)

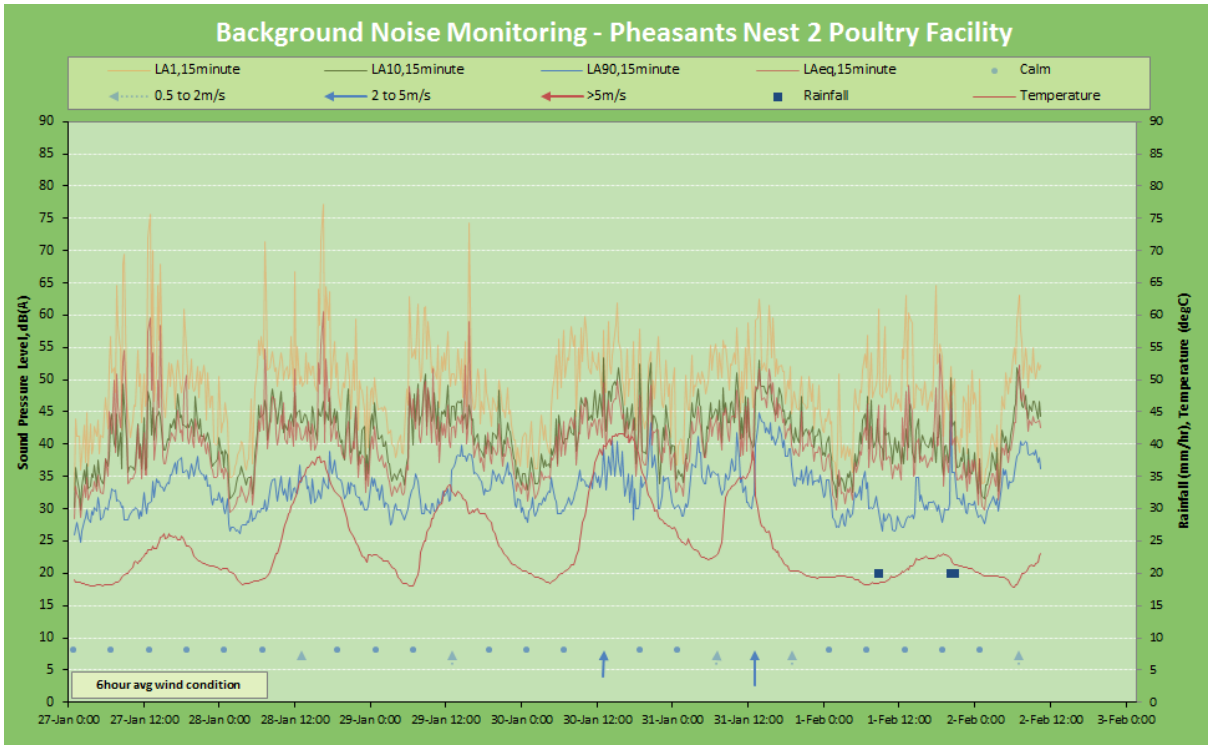

Figure A1 – 8: Background Monitoring Nightingale Road (27 January to 2 February)

Appendix II

Predicted Noise Level Contours (Construction and Operational)

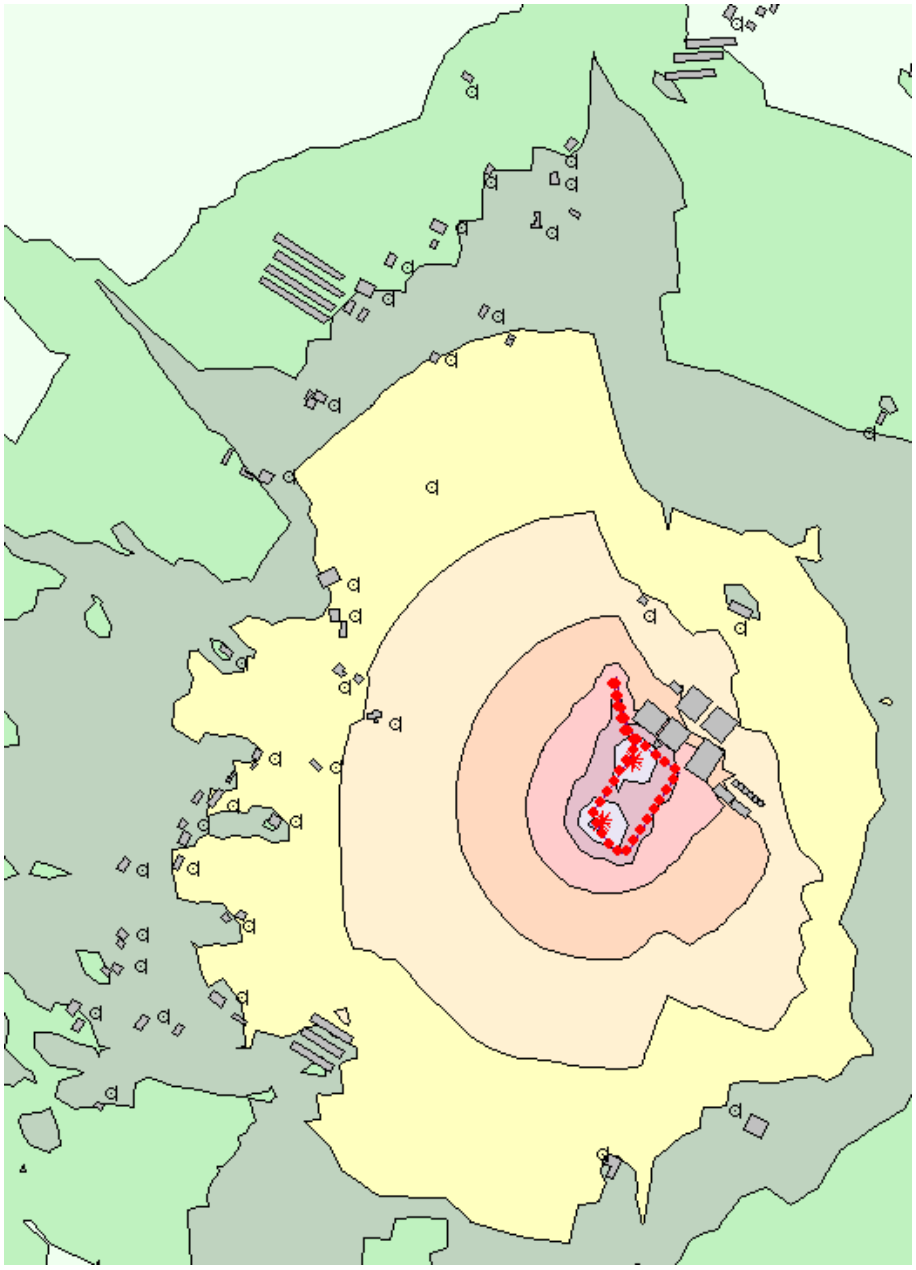

Figure AII – 1: Predicted $L_{Aeq,\ 15\ minute}$ noise levels (dB(A)) – Primary Earthworks

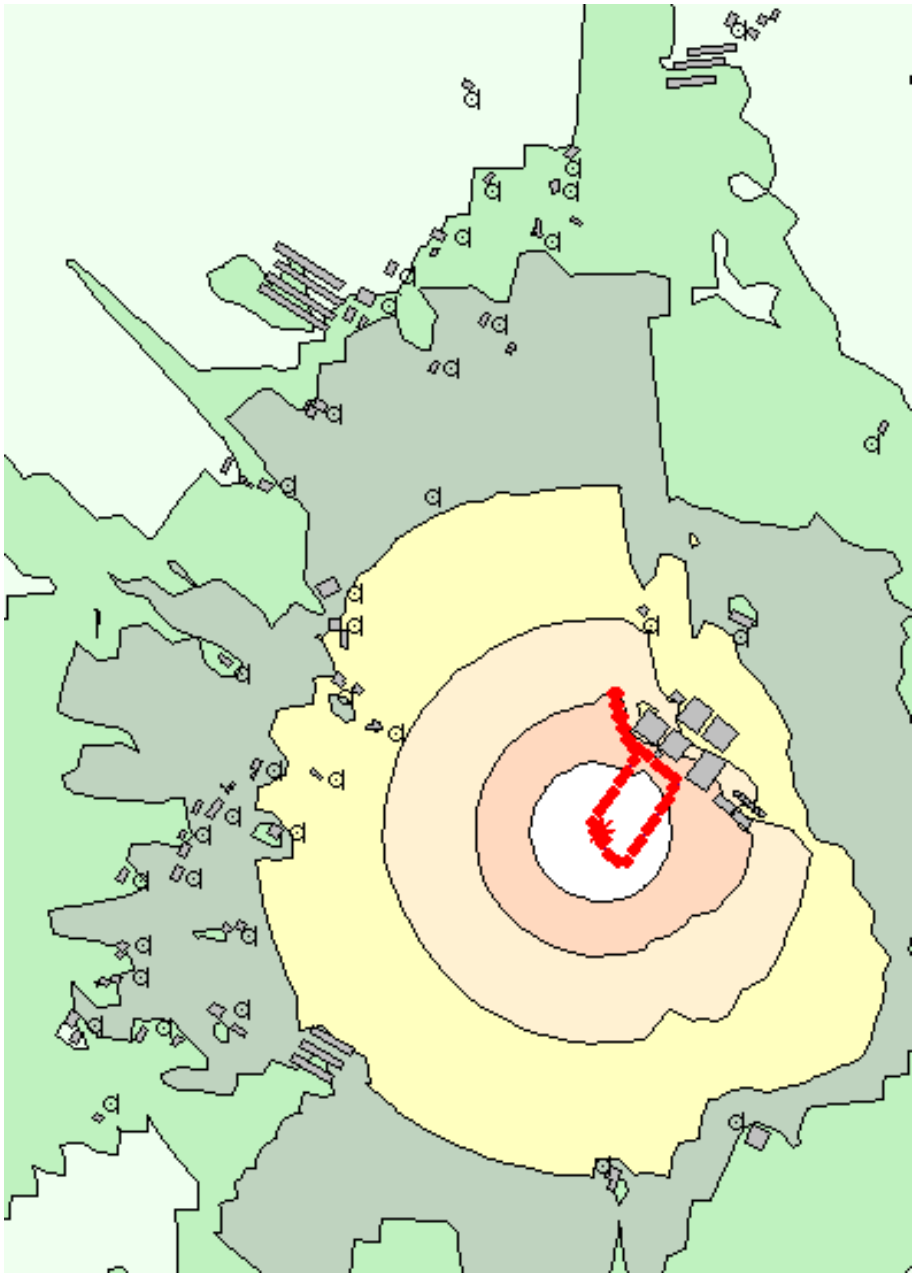

Figure AII – 2: Predicted $L_{Aeq,\ 15\ minute}$ noise levels (dB(A)) – Levelling Pad

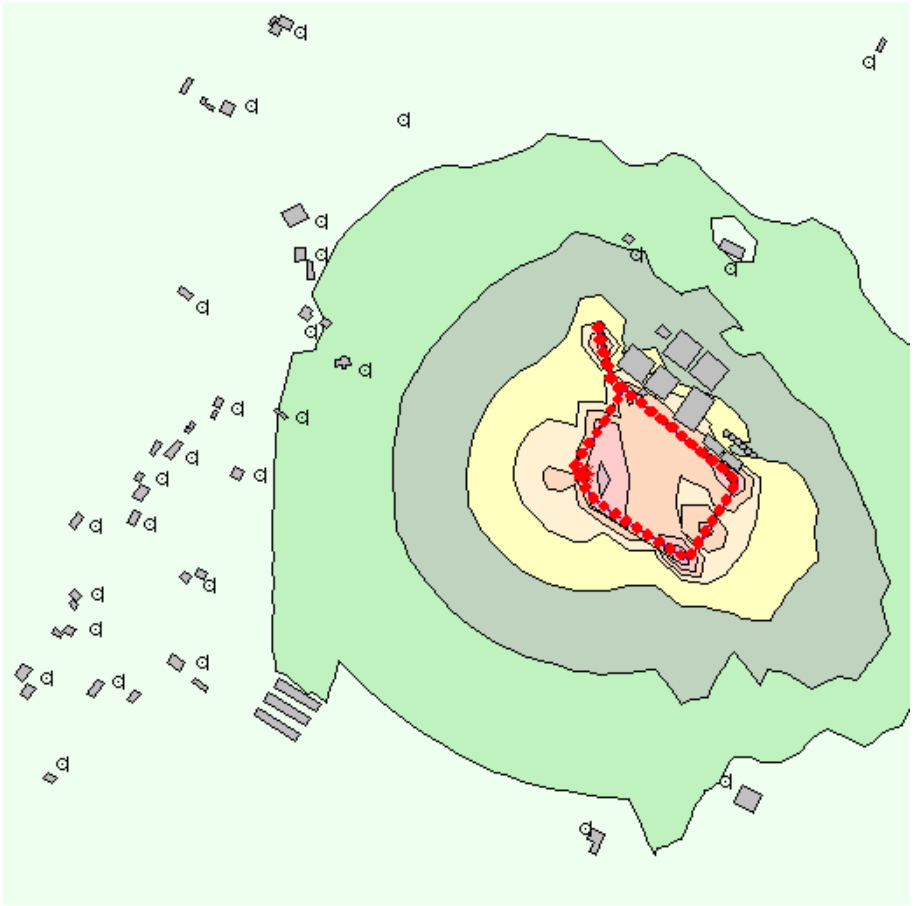

Figure AII – 3: Predicted $L_{Aeq,\ 15\ minute}$ noise levels (dB(A)) – Shed Construction

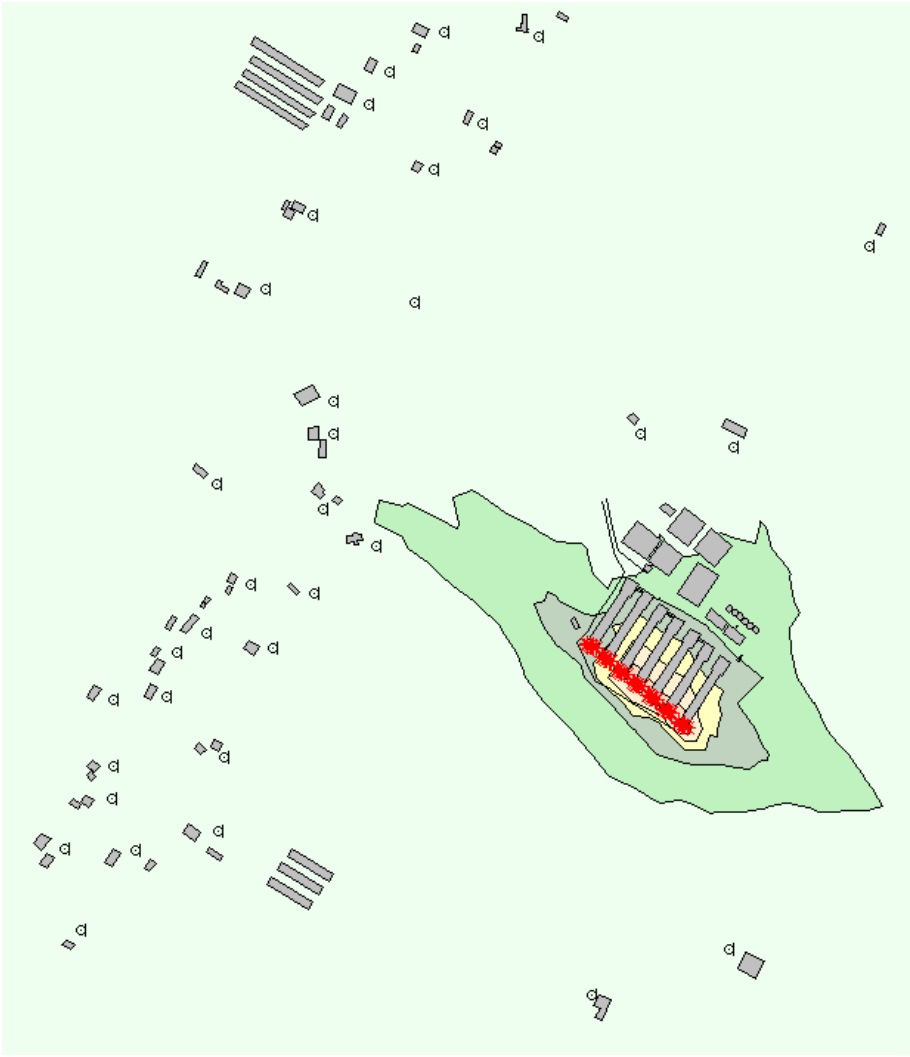

Figure AII – 4: Predicted $L_{Aeq,\ 15\ minute}$ noise levels (dB(A)) – 15 fans operating (day period)

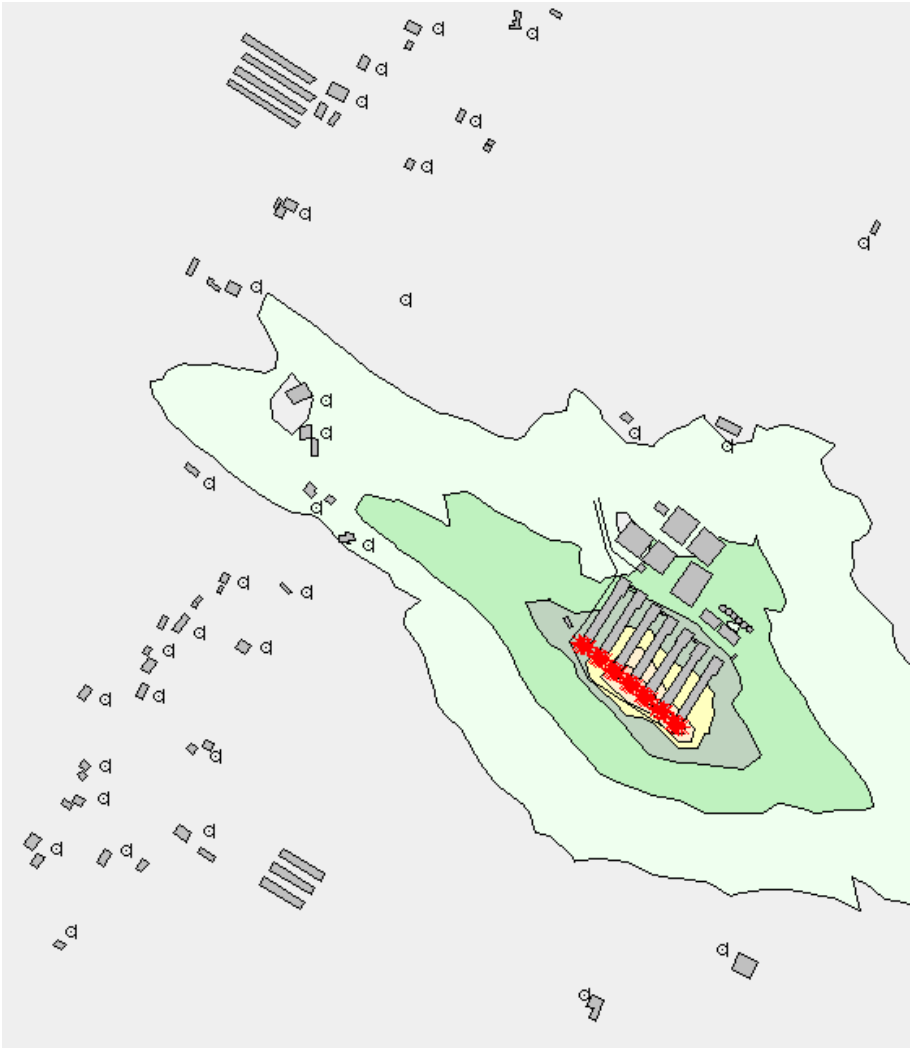

Figure A1 – 5: Predicted $L_{Aeq,\ 15\ minute}$ noise levels (dB(A)) – 15 fans operating (night period)

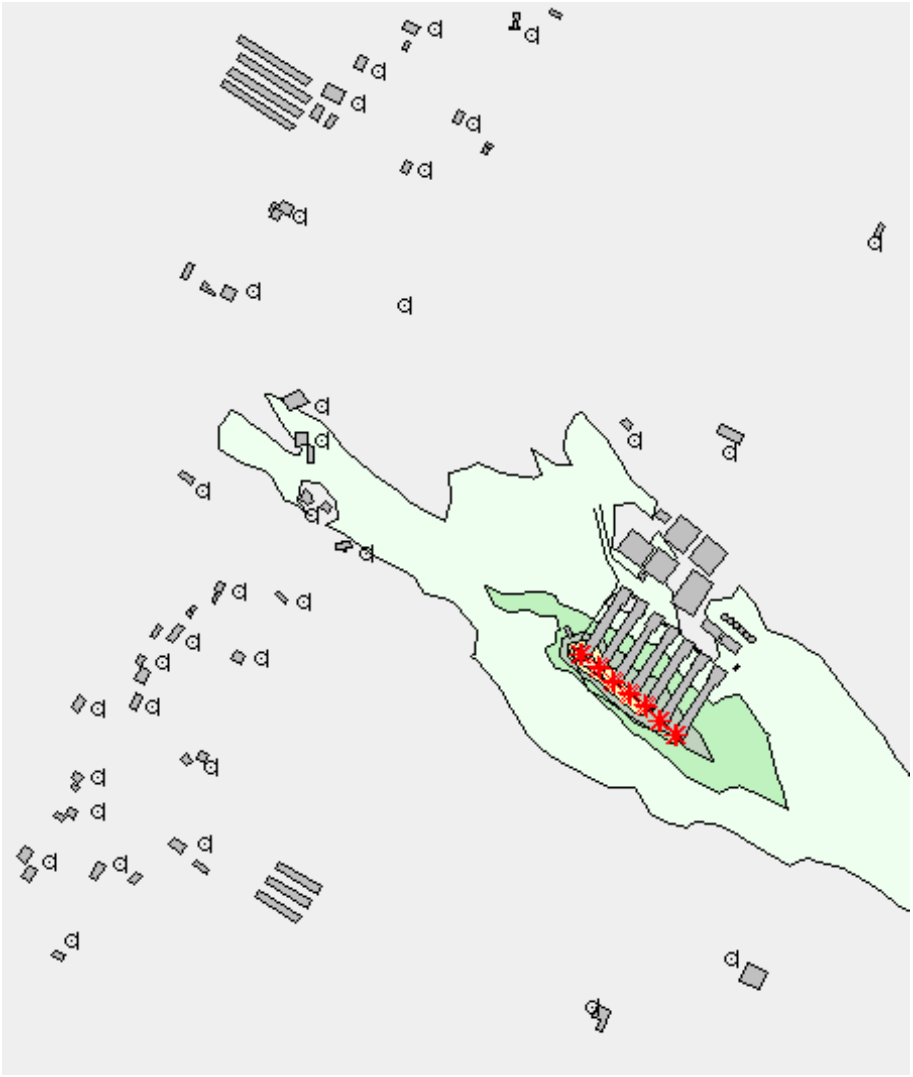

Figure A1 – 6: Predicted $L_{Aeq,\ 15\ minute}$ noise levels (dB(A)) – 5 fans (night period – inversion conditions)

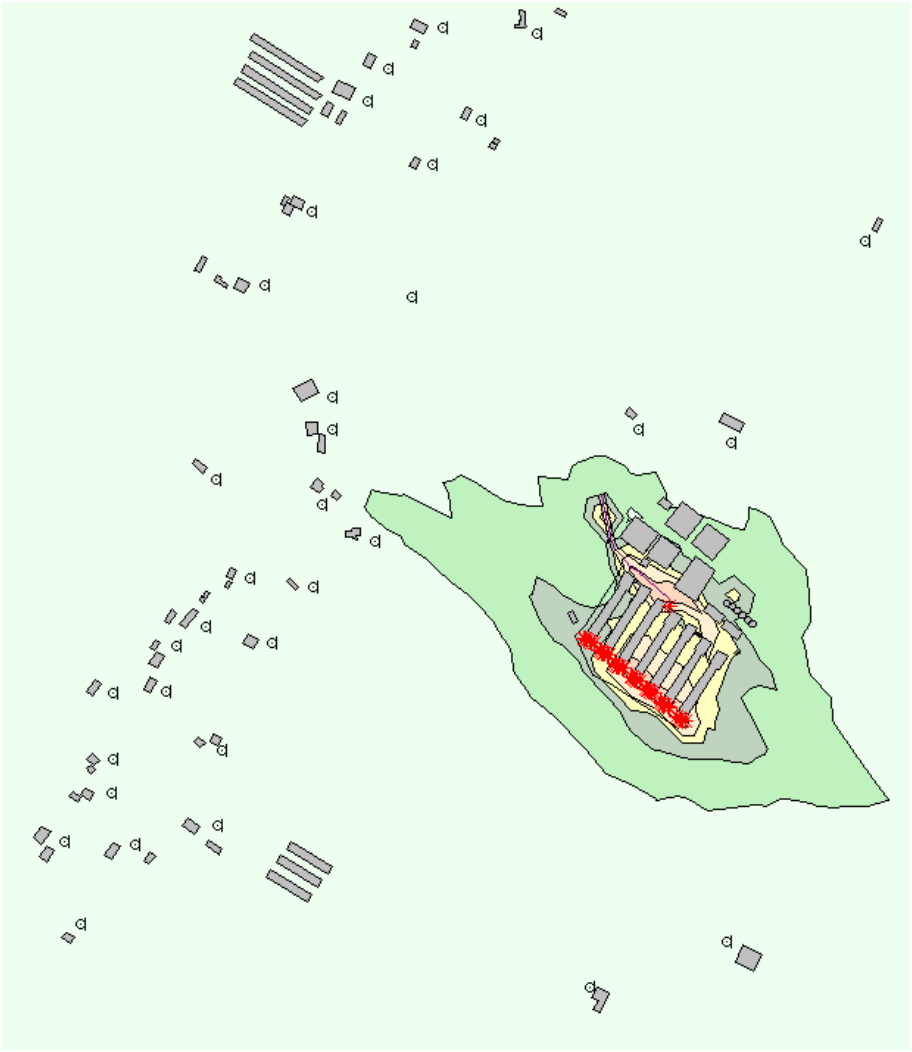

Figure A1 – 7: Predicted $L_{Aeq,\ 15\ minute}$ noise levels (dB(A)) – feed delivery (day period)

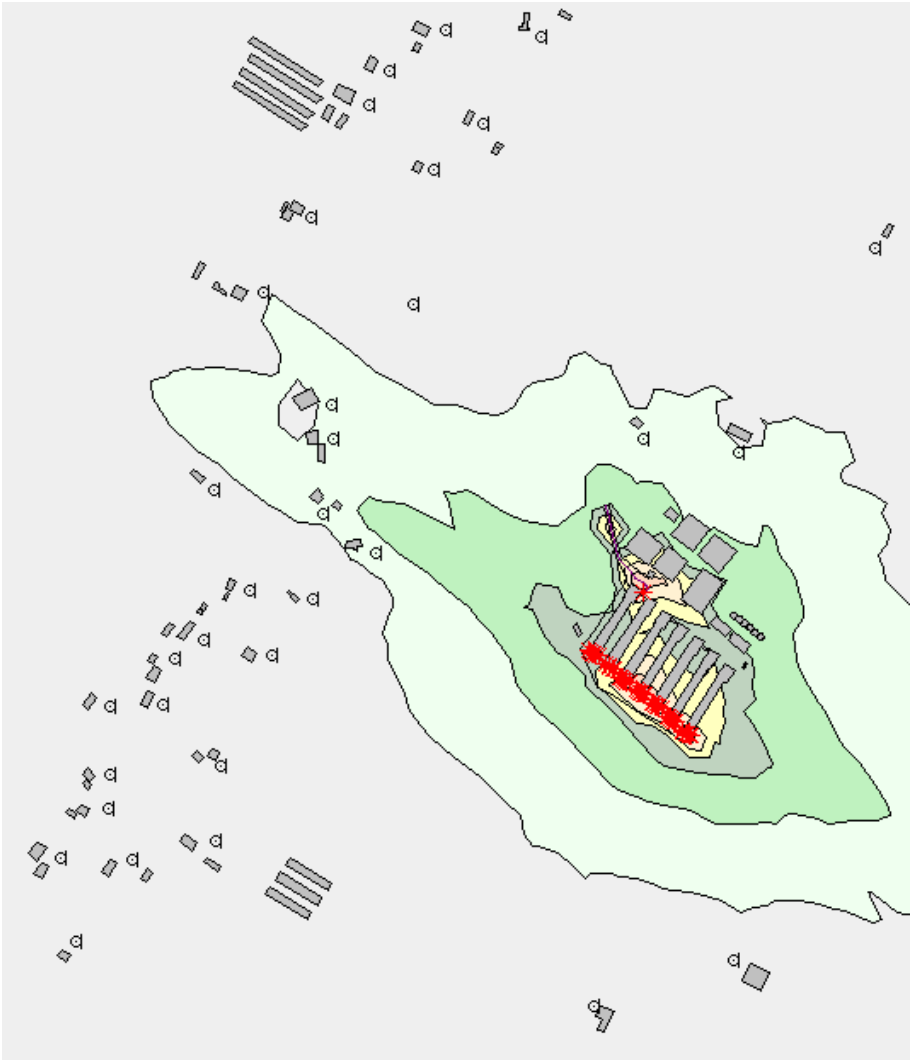

Figure A1 – 8: Predicted $L_{Aeq,\ 15\ minute}$ noise levels (dB(A)) – feed delivery (night period) - neutral

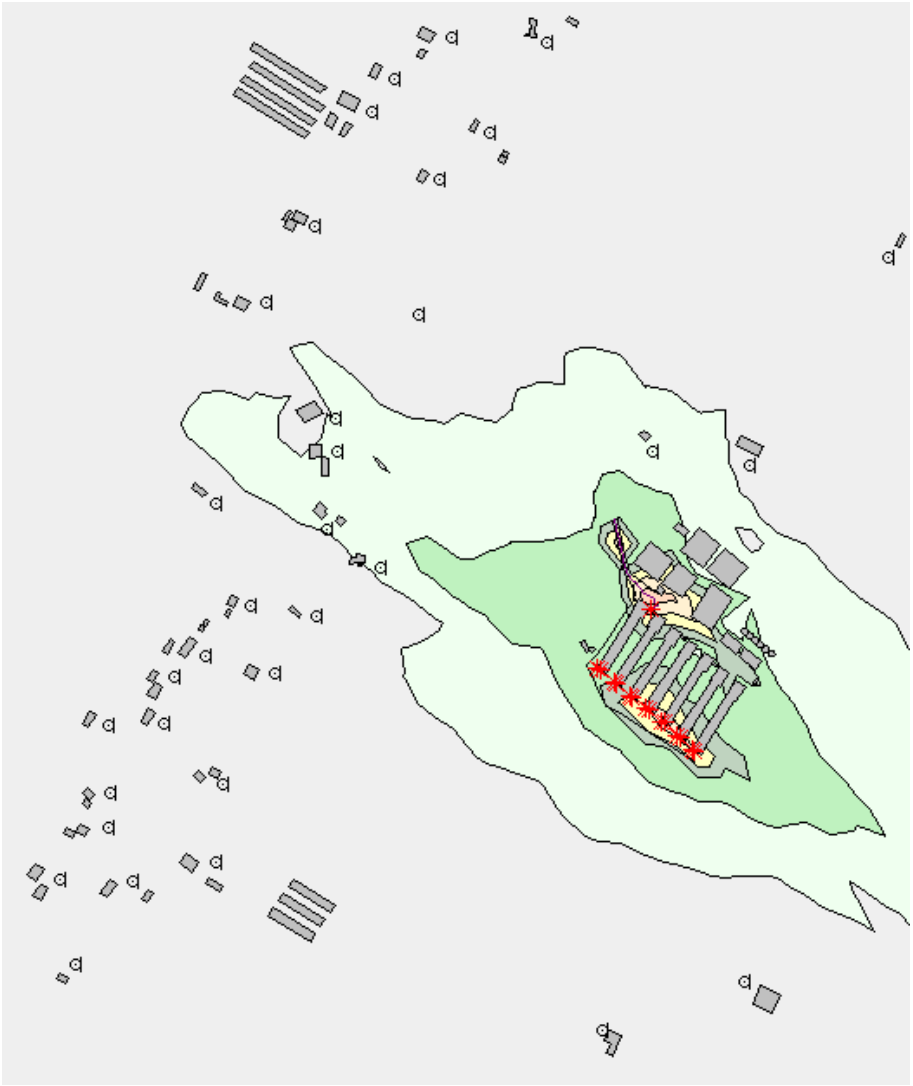

Figure A1 – 9: Predicted $L_{Aeq,\ 15\ minute}$ noise levels (dB(A)) – feed delivery (night period) – inversion conditions

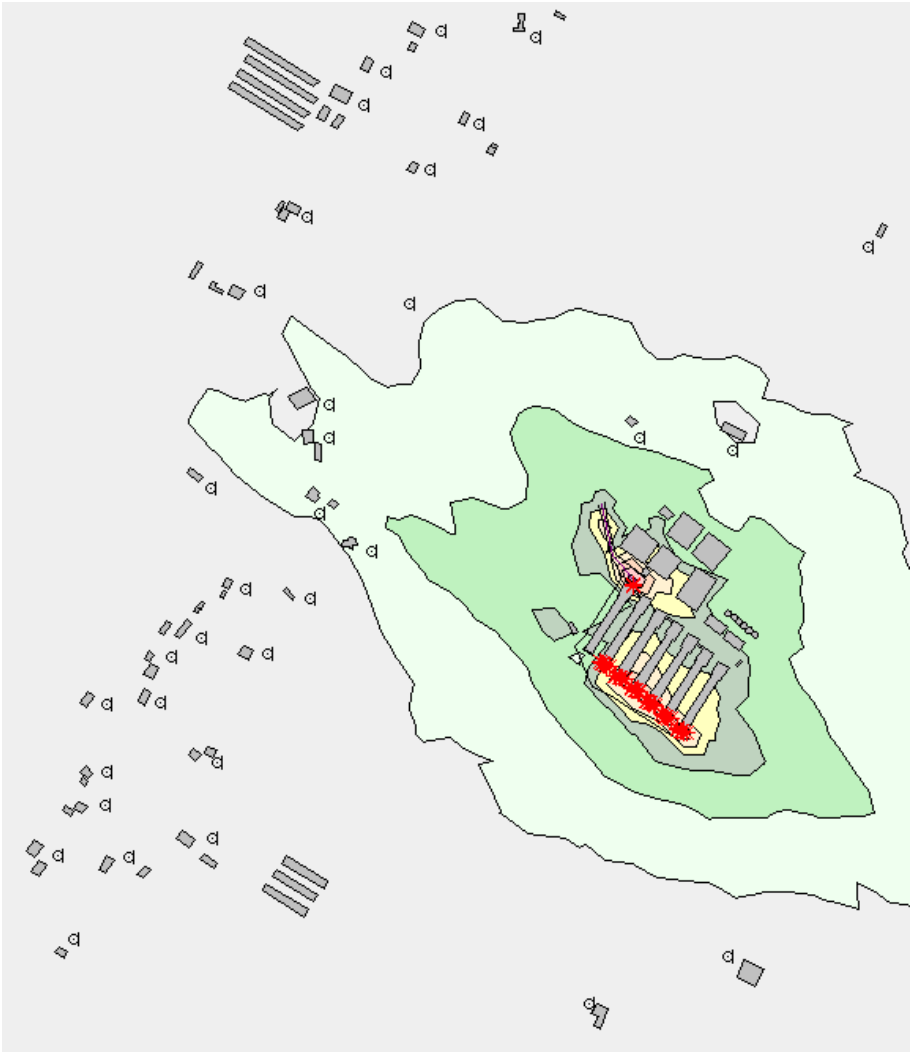

Figure A1 – 9: Predicted $L_{Aeq,\ 15\ minute}$ noise levels (dB(A)) – bird collection (day period)

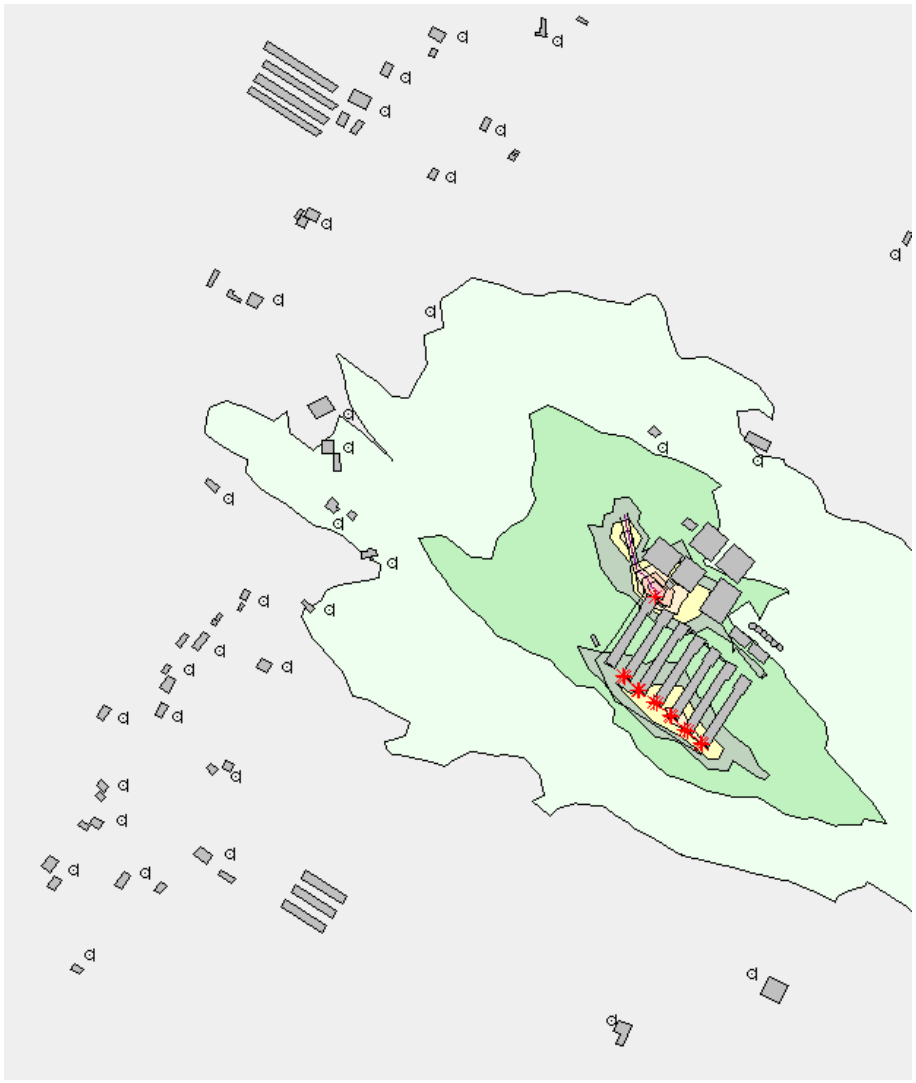

Figure A1 – 10: Predicted $L_{Aeq,\ 15\ minute}$ noise levels (dB(A)) – bird collection (night period)

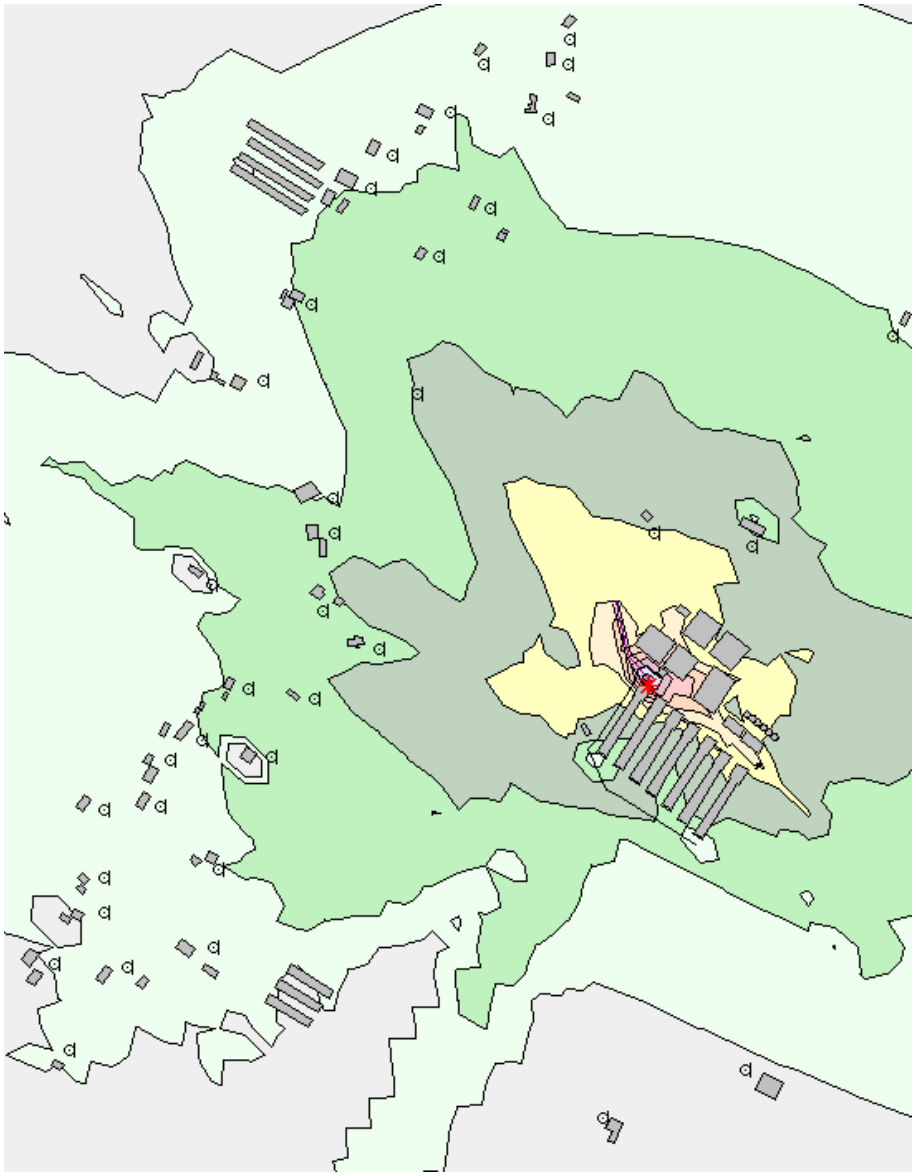

Figure A1 – 10: Predicted $L_{A1,\ 1\ minute}$ noise levels (dB(A)) – bird collection

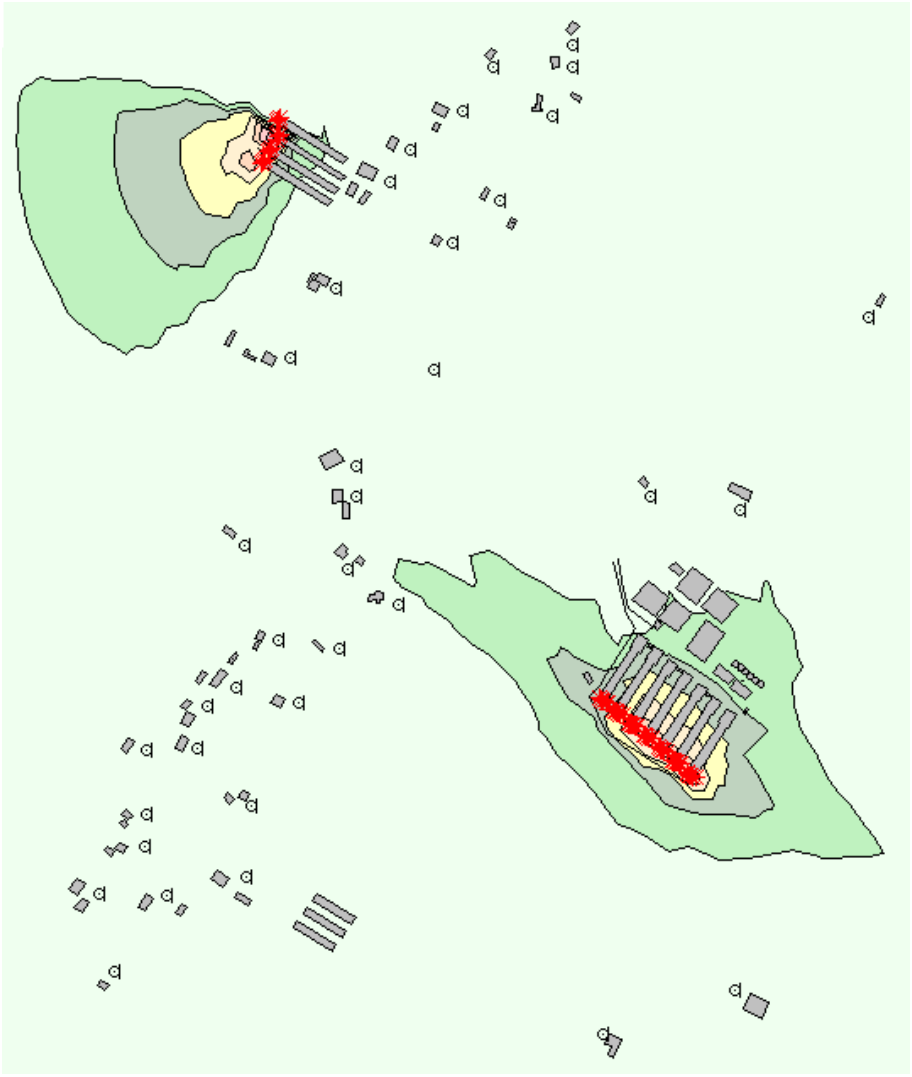

Figure A1 – 11: Predicted $L_{Aeq,\ 15\ minute}$ noise levels (dB(A)) – Cumulative Impacts (Day)