Noise Impact Assessment

Abalone Farm

Austasia Leefield c/o
Worley Parsons

Prepared For:

Austasia Leefield c/o Worley Parsons

PO Box 814 Newcastle NSW 2300

Contact:

Jillian Kral

Senior Environmental Planner
Email: jillian.kral@WorleyParsons.com
Telephone: (02) 4985 0023

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Austasia Leefield c/o Worley Parsons

Prepared By:

Advitech Pty Limited

7 Riverside Drive, Mayfield West NSW 2304
PO Box 207, Mayfield NSW 2304
Telephone: 02 4924 5400
Facsimile: 02 4967 3772
Email: mail@advitech.com.au
Web: www.advitech.com.au

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Function	Signature	Name and Title	Date
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Checked By		Rod Bennison Lead Environmental Scientist	11 April 2011
Authorised for Release By		Rod Bennison Lead Environmental Scientist	11 April 2011

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APPENDICES

1. INTRODUCTION

Advitech Pty Limited was engaged by Worley Parsons (on behalf of Austasia Leefield Pty Ltd) to undertake an assessment of potential noise impacts associated with the operation of a proposed commercial Abalone Farm at Pindimar, NSW.

It should be noted that this report was prepared by Advitech Pty Limited for Austasia Leefield 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.

2. BACKGROUND AND OBJECTIVES

2.1 Project Background

The proposal for an Abalone Farm at the site was originally subject to a development application to Great Lakes Council (GLC) under Part 4 of the Environmental Planning and Assessment (EP&A) Act in 2003. Environmental assessment undertaken between 2003 and 2006 shaped amendments to the proposed development, and development approval was issued by GLC in July 2006.

The approval was subject to subsequent challenges in the NSW Land and Environment Court, leading to requirements for additional assessment of potential environmental impacts. It is noted that these appeals did not relate to potential acoustical impacts, and that analysis of noise impacts presented as part of the original environmental assessment (Heggies 2003) are considered to satisfy the requirements of the relevant regulations.

Outstanding aspects of the environmental assessment were finalised in October 2007 and a new application to the NSW Department of Planning (DoP) for project approval was made under Part 3A of the EP&A Act. The DoP issued the Director General's Requirements (DGRs) (MP10_0006) outlining the requirements of the environmental assessment in May 2010. Assessment of potential noise impacts is required by the DoP.

2.2 Assessment Methodology

The NSW Industrial Noise Policy (INP) provides a procedure for the assessment of potential noise impacts associated with industrial activities in NSW. The assessment process includes:

- background monitoring to characterise the ambient (existing) noise environment adjacent to the proposed development;
- establishing a Project Specific Noise Level (PSNL) on the basis of background monitoring, to protect adjacent sensitive receivers from both intrusive noise and impacts on amenity;
- review of regional meteorology to identify prevailing conditions that may enhance the propagation of noise;
- undertake prediction of operational noise impacts at adjacent sensitive receivers under all significant meteorological conditions;
- assess noise impacts by comparing predicted operational noise levels against the PSNL; and
- consider appropriate controls or mitigation options (where required).

A detailed assessment of potential noise impacts was prepared as part of the original NIA for this development in 2003 (Heggies 2003). Review of the current proposal indicates noise generating plant and processes remain unchanged from those assessed as part of the original NIA, and the impact predictions presented in this assessment remain valid.

It is, however, noted that the assessment of background noise and subsequent Project Specific Noise Levels (PSNL) are based on long term monitoring undertaken in November 2000. This presents a risk to the assessment process, as the character of the receiving noise environment may have changed in this time. Furthermore, the DGRs specifically state:

> *"While the Department has no objection to the use of these (previous) studies, the Department does require that you demonstrate that these studies are contemporary at the time the environmental assessment is lodged."*

Despite minimal change to the urban environment at Pindimar since this time, it was considered that additional background monitoring and review of the PSNL would be undertaken in order to characterise the contemporary receiving environment at Pindimar, and validate the findings of the original assessment. The approach applied to this assessment includes:

- attended and unattended monitoring to assess background (L_{A90}) and ambient (L_{Aeq}) noise levels, and identify existing industrial noise contributions in the receiving environment adjacent to the proposed development site;
- determine the PSNL in accordance with the procedures established in Section 2 of the INP;
- present a comparison of the PSNL established in the original assessment with the PSNL from the current monitoring data; and
- provide an assessment of operational impact predictions against the PSNL.

It should be noted that predictive noise modelling was not undertaken as part of this assessment. The original model is considered to be representative of impacts associated with the current proposal, hence all discussion relating to impact predictions will be referenced to the original assessment.

3. REFERENCES

The following information was used in the preparation of this report:

1. AS 2706-1984: *Numerical Values: Rounding and interpretation of limiting values;*
2. NSW Environment Protection Agency (2000). *NSW Industrial Noise Policy*, NSW Environment Protection Agency, Sydney;
3. NSW Department of Environment and Climate Change (2009). *Interim Construction Noise Guideline*, Department of Environment and Climate Change, Sydney*;*
4. Richard Heggie and Associates (2003). *Noise Assessment – Abalone Farm Pindimar (RHA Report 30-1254-R1); and*
5. Worley Parsons (2010). *Proposed Abalone Farm – Pindimar: Preliminary Environmental Assessment.*

4. NOISE ASSESSMENT CRITERIA

4.1 Director General's Requirements

The DoP provides the following DGRs for the assessment of potential noise impacts associated with the proposed Abalone Farm at Pindimar:

- potential construction, operational and traffic noise impacts;
- these impacts should be assessed in accordance with:
  - Interim Construction Noie Guideline (DECC);
  - NSW Industrial Noise Policy (DECC); and
  - Environmental Criteria for Road Traffic Noise (EPA).

The DGRs also make specific reference to the use of previous assessment materials:

> *"While the Department has no objection to the use of these (previous) studies, the Department does require that you demonstrate that these studies are contemporary at the time the environmental assessment is lodged."*

4.2 Criteria for Industrial Noise Sources

The NSW *Industrial Noise Policy* (INP) (2000) presents two criteria for the assessment of industrial noise sources, intrusive noise impacts and noise amenity 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 1**. Where the existing background noise level from industrial noise sources is close to the Acceptable Noise Level (ANL) for that receiver type, Section 2 of the INP (reproduced as **Table 2**) establishes the requirements for applying a modification factor to account for the existing level of industrial noise. The aim of this component of the INP is to protect against cumulative noise impacts associated with rapid development within the receiving noise environment.

Table 1: 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 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
Industrial Premises	All	When in use	70	75

Source: Environment Protection Authority INP Table 2.1 (2000)

Table 2: Modification to Acceptable Noise Level (ANL) to account

Total Existing L_{Aeq} from Industrial Sources	Maximum L_{Aeq} for Noise from New Sources Alone
≥ Acceptable Noise Level plus 2	If existing noise level is likely to decrease in future: ANL minus 10 If existing noise level is unlikely to decrease in future: Existing 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

Source: Environment Protection Authority INP Table 2.2 (2000)

4.2.3 Background Noise Monitoring

Background noise monitoring is undertaken in order to determine the character of the ambient noise environment adjacent to the proposed development. The monitoring locations selected should be representative of the noise environments at sensitive receivers adjacent to the proposed development.

4.2.4 Project Specific Noise Levels

Project specific noise levels for the development are assigned after determining the relevant noise levels from the intrusiveness and amenity criteria. The project specific noise levels typically reflect the most stringent noise level requirement derived from the intrusiveness and amenity criteria. They set the benchmark against which noise impacts and the need for noise mitigation are assessed.

4.3 Road Traffic Noise Guidelines

The *Environmental Criteria for Road Traffic Noise* (ECRTN) (1999) 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. Traffic generated by the proposed development should comply with the ECRTN $L_{Aeq,period}$ day time and night time traffic noise levels (the relevant section is reproduced in **Table 3**) for traffic accessing the site via Clarke and Camage Streets (as provided in **Figure 1**).

Table 3: Road traffic noise criteria

Type of Development	Criteria, dB(A)	Where Criteria is already Exceeded
13. Land use developments with potential to create additional traffic on local roads	Day time $L_{Aeq(1hr)}$ 55 Night time $L_{Aeq(hr)}$ 50	Where feasible, existing noise levels should be mitigated to meet the noise criteria. In all cases, traffic arising from the development should not lead to an increase in existing noise levels of more than 2 dB.

Source: Environmental Criteria for Road Traffic Noise Table 1 (1999)

4.4 NSW Construction Noise Guideline

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. It is noted that the guideline for assessment of construction noise impacts has been revised since the original NIA was prepared; hence review of noise impacts will be undertaken in accordance with provisions of the new (ICNG) guideline.

The ICNG 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 guideline provides both qualitative and quantitative assessment methodologies.

The qualitative approach prioritises the implementation of worksite noise controls over detailed assessment of impacts and is applied in the case of small scale, short duration project such as essential road maintenance or the construction of a residential dwelling.

The quantitative approach is applied to larger projects with potential to affect many sensitive receivers over a longer period of time, or during noise sensitive periods (6pm to 7am) and requires that assessment of potential impacts be undertaken prior to the implementation of management strategies. The quantitative approach establishes management levels for airborne noise incident at typical receiver types as shown in **Table 4.**

Table 4: Construction noise management level

Receiver Type	Management Level, dB(A) ($L_{Aeq,15minute}$)
Residential[1]	
Management level	RBL + 10dB(A)
Highly noise affected	75 dB(A)
Other Sensitive Land Uses[2]	
Classroom at school and other educational institutions	50 dB(A) (internal)
Places of worship	45 dB(A) (internal)
Passive recreation areas	60 dB(A) (external)
Commercial and Industrial Premises[2]	
Industrial Premises	75dB(A) (external)
Commercial (offices, retail outlets)	70dB(A) (external)

1. Management level for residential receivers during standard hours (7am to 6pm). Management level for residential premises outside standard hours is RBL + 5 dB(A).

2. Management level for commercial, industrial and other sensitive land use applies only when in use.

5. ENVIRONMENTAL NOISE ASSESSMENT

5.1 Background Noise Monitoring

An ARL316 environmental noise logger was used to measure ambient noise levels in the receiving environment adjacent to the proposed development site. The monitoring location was selected such as to be representative of typical noise impacts in this receiving environment. Monitoring was undertaken to assess the L_{A90} background noise level, and the L_{Aeq}, L_{A10} and L_{A1} noise levels within the existing noise environment. Details relevant to the background noise monitoring are provided in **Table 5**.

The locations at which noise monitoring were undertaken in November 2000 and March 2011 are provided in **Figure 1**. The March 2011 monitoring location was established:

- such that it was exposed to noise sources (industrial, transportation or environmental) representative of the ambient noise environment;
- to replicate (as near as practicable) monitoring reported in the original NIA; and
- in such a way as to facilitate secure and safe access to the monitoring equipment.

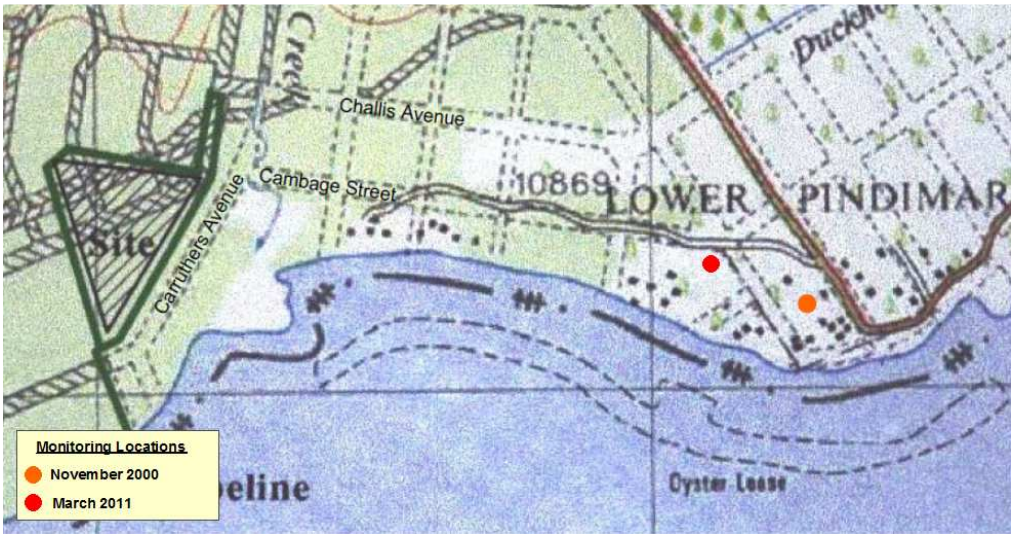


Figure 1: Background monitoring locations

Source: Reproduced from Heggies, 2003.

Table 5: Continuous noise logging, Pindimar

Location	Cambage St
Logger Serial Number	16-203-513
Measurement Title	Pindimar
Run Started	2/3/2011 11:06
Run Stopped	17/3/2011 15:53
Frequency Weighting	A
Time Response	Fast
Engineering Units	dB SPL

The continuous noise data logger recorded the following data over 15-minute intervals:

- date, time and temperature;
- maximum and minimum noise levels measured during the interval;
- the equivalent continuous noise level (L_{Aeq}) for the interval; and
- statistical noise levels representative of the noise environment.

The L_{A1}, L_{A10}, L_{A90} and L_{Aeq} noise levels for the continuous noise loggers are presented graphically in **Appendix I**. A meteorological monitoring station was also established at the monitoring location, in order to evaluate potential meteorological impacts in accordance with the requirements of Section 3 of the INP.

5.2 Noise Monitoring Results

The Rating Background Level (RBL) and Intrusiveness Criteria were determined for the receiving environment adjacent to the proposed development in accordance with provisions established in Section 2 and 3 of the INP. The results of this analysis are presented in **Table 6**. Periods for which the ABL is not presented were omitted from the analysis based on the data exclusion rules outlined in Appendix B of the INP.

Table 6: Monitoring results (Cambage St, Pindimar), dB(A)

Time Period	Day (0700 to 1800)	Evening (1800 to 2200)	Night (2200 to 0500)
5/03/2011	-	36.0	33.9
6/03/2011	33.6	33.0	30.1
7/03/2011	32.5	32.5	31.0
8/03/2011	36.6	34.4	29.4
9/03/2011	35.8	31.0	31.6
10/03/2011	34.8	30.2	31.6
11/03/2011	31.9	30.0	31.2
12/03/2011	35.7	33.2	33.5
13/03/2011	38.1	34.0	33.2
14/03/2011	33.9	43.9	38.7
15/03/2011	33.9	30.8	31.2
Rating Background Level (RBL)	34	33	32
Mean L_{Aeq}	53	46	41

The mean L_{Aeq} has also been derived for the purposes of establishing an amenity criteria specific to existing industrial noise impacts. Analysis of operator attended and unattended background monitoring presented in **Appendix I** and **Appendix II**, indicates the receiving environment adjacent to the proposed development is characterised by the *Rural* receiver type as defined in the INP:

> **Rural** – an area with an acoustical environment that is dominated by natural sounds, having little or no road traffic. Such areas may include:
>
> - an agricultural area, except those used for intensive agricultural activities;
> - a rural recreational areas such as resort areas;
> - a wilderness area or national park; or
> - an area generally characterised by low background noise levels (except in the immediate vicinity of industrial noise sources).
>
> This area may be located in either a rural, rural-residential, environment protection zone or scenic protection zone, as defined on a council zoning map (LEP) or other planning instrument.

6. NOISE CRITERIA

6.1 Operational Stage Criteria

6.1.1 Project Specific Noise Levels

Table 7 provides an analysis of background monitoring data for the purposes of establishing a PSNL for the proposed development. This analysis assumes the receiving environment is representative of the Rural receiver type, based on results of attended monitoring.

Table 7: Assessment of PSNL in adjacent receiving environment

Assessment Period	Day	Evening	Night
Intrusiveness Criteria $L_{Aeq,15minute}$ (RBL+5)	**39**	**38**	**37**
Mean L_{Aeq} (Measured)	53	46	41
Mean L_{Aeq} (Ambient Industrial Contribution)	43	36	32
Recommended Acceptable L_{Aeq} Rural	50	45	40
Amenity Criteria	**50**[1]	**45**[1]	**40**[1]
Project Specific Noise Level (March 2011)	**39**	**38**	**37**
Project Specific Noise Level (November 2000)	**38**	**37**	**35**

1. Existing noise level >6dB below ANL. Amenity criteria equal to ANL;

Review of attended monitoring data presented in **Appendix II** indicates no contribution was observed from industrial noise sources in this receiving environment. For the purposes of determining the amenity criteria, any contribution from industrial sources was assumed to be 10dB below that of the measured $L_{Aeq,period}$ noise level.

6.1.2 Assessment of Historical PSNL

Monitoring results presented in **Table 7** indicate RBLs from March 2011 are generally consistent with those observed in the November 2000 monitoring data. In both instances the intrusiveness criteria is the limiting noise criterion in assigning the PSNL.

6.2 Construction Stage Criteria

6.2.1 Construction Noise Management Levels

It is understood that all construction activities would be carried out during standard working hours (7am to 6pm Monday to Friday, and 8am to 1pm Saturdays). **Table 8** presents the construction noise management levels at sensitive receivers adjacent to the development site. These are the limits above which construction noise impacts would require significant management.

Table 8: Construction noise management levels

Receiver	Receiver Type	Management Level, $L_{Aeq,15minute}$	Construction Noise Criteria, dB(A)
Adjacent Residential	Rural	RBL + 10	44

7. ASSESSMENT OF NOISE IMPACTS

7.1 Operational Noise Impacts

7.1.1 Noise Sources and Hours of Operation

A review of analysis presented in the original NIA (Heggies 2003) indicates acoustically significant plant within the project site would typically include pumping stations, generators, air conditioning units and a small number of heavy vehicle movements associated with deliveries to and from site. It is assumed that water pumps would be required to operate continuously (24 hours per day), however other acoustically significant plant would be restricted to day period (7am to 6pm) operations.

7.1.2 Meteorological Conditions

An analysis of prevailing meteorology at the Williamtown AWS is presented as part of the original assessment. This analysis indicates the development site is not subject to gradient wind conditions that may significantly enhance the propagation of noise to adjacent sensitive receivers. The assessment does not present analysis of potential temperature inversion impacts, but instead, conservatively assumes they may occur during the winter night period, and provides an assessment of potential impacts under these conditions.

7.1.3 Impact Predictions

A review of the proposed site layouts and activity descriptions indicates there are no acoustically significant differences between the current proposal and that subject to detailed assessment in 2003. Consequently, it is assumed the impact predictions presented as part of the original NIA remain representative of potential operational stage noise impacts, and these predictions may be used to assess potential impacts against the revised PSNL. Impact predictions from the original NIA are reproduced in **Table 9**.

Table 9: Impact predictions at nearest sensitive receiver[1], dB(A)

	Meteorological Scenario		PSNL	
Period	**Neutral**	**Temp. Inversion**	**Original**	**Revised**
Day	37	n/a[2]	38	39
Evening	<20	n/a[2]	37	38
Night	<20	20	35	37

1. Reproduced from original assessment (Heggies 2003);
2. Not assessed as these conditions are not considered to present during these periods.

A review of impact predictions indicates the noise emissions from the proposed operations would comply with the PSNL established on the basis of either November 2000 or March 2011 monitoring data. This assessment indicates the noise emissions from the site would meet the requirements of the NSW Industrial Noise Policy.

7.2 Construction Stage Noise Impacts

7.2.1 Noise Sources and Hours of Operation

Review of analysis presented in the original NIA (Heggies 2003) indicates acoustically significant plant during the construction stage of the development may include an excavator, bobcat and delivery of materials via heavy vehicles. Construction activities would occur only during standard work hours, 7am to 6pm Monday to Friday and 8am to 1pm Saturdays.

7.2.2 Meteorological Conditions

Analysis of monitoring data presented in Section 5 of the original assessment indicates meteorological scenarios with significant potential to enhance noise propagation do not present during the day period. Consequently, impact predictions for construction noise assume propagation under only neutral conditions.

7.2.3 Impact Predictions

Review of construction stage noise impact predictions prepared as part of the original assessment (Heggies, 2003) are reproduced in **Table 9**.

Table 10: Impact predictions at nearest sensitive receiver[1], dB(A)

Source	Contribution at receiver (L_{A10})	Construction Criteria (L_{Aeq})
Excavator	40	-
Bobcat	39	-
Deliveries	21	-
Total	42	44

1. Reproduced from original assessment (Heggies 2003);

It should be noted that the NSW Department of Environment, Climate Change and Water (DECCW) revised guidelines on the assessment of construction noise in 2009. The *Interim Construction Noise Guideline* (2009) replaces earlier guidance published in the NSW Environmental Noise Control Manual (ENCM), 1994. The ICNG cites the $L_{Aeq,15minute}$ indicator as the appropriate means of assessing construction noise impacts, superseding the previously applied L_{A10} indicator.

Review of impact predictions indicates the $L_{A10,15minute}$ impact prediction would comply with the contemporary construction noise criteria of 44 dB(A) during the day period. It should be noted this provides a conservative assessment of impacts, as the L_{A10} noise level would typically exceed that of the LAeq level for the same source. Consequently, L_{Aeq} noise levels from construction activities would likely be lower than the 42 dB(A) impact prediction at the nearest sensitive receiver.

7.3 Road Traffic Noise Impacts

Assessment presented in the original NIA indicates potential road traffic noise impacts would comply with the ECRTN goal level for traffic on local roads during both construction and operational phases of the proposed development. The ECRTN prescribes noise goals based on functional types of roads, rather than characteristics of the receiving environment. Consequently, the criteria presented in the original assessment remain valid in the context of the current proposal. As access arrangements under the current proposal remain unchanged from that originally subject to assessment, it is considered traffic noise impacts would be consistent with the objectives of the ECRTN.

8. RECOMMENDATIONS AND CONCLUSIONS

Austasia Leefield Pty Ltd propose to construct and operate a commercial Abalone Farm at Pindimar, NSW. The development was originally proposed in 2003, however the project design was subject to review and amendment following feedback on environmental assessment undertaken prior to 2006. Design improvements were incorporated into the proposal, and an application was made to have the project assessed under Part 3A of the EP&A Act in 2007. It is noted that amendments to the design of the proposal were not driven by acoustical constraints.

The NSW DoP issued DGRs for the project in May 2010, requiring that potential noise impacts associated with the development be assessed in accordance with the current regulations. In issuing these requirements, the Department did, however, acknowledge the significant assessment that had been previously completed:

> *"While the Department has no objection to the use of these (previous) studies, the Department does require that you demonstrate that these studies are contemporary at the time the environmental assessment is lodged."*

The current proposal was reviewed in the context of the existing assessment, and noise generating plant and processes were found to be typically consistent with the original proposal. In order to ensure the DGRs were satisfied with regard to preparation of a contemporary assessment, the following amendments were incorporated:

- background monitoring was undertaken to assess the character of the contemporary noise environment, and ensure the PSNL were determined in accordance with this character; and
- review of potential construction stage noise impacts was undertaken in accordance with current guidelines for construction noise assessment.

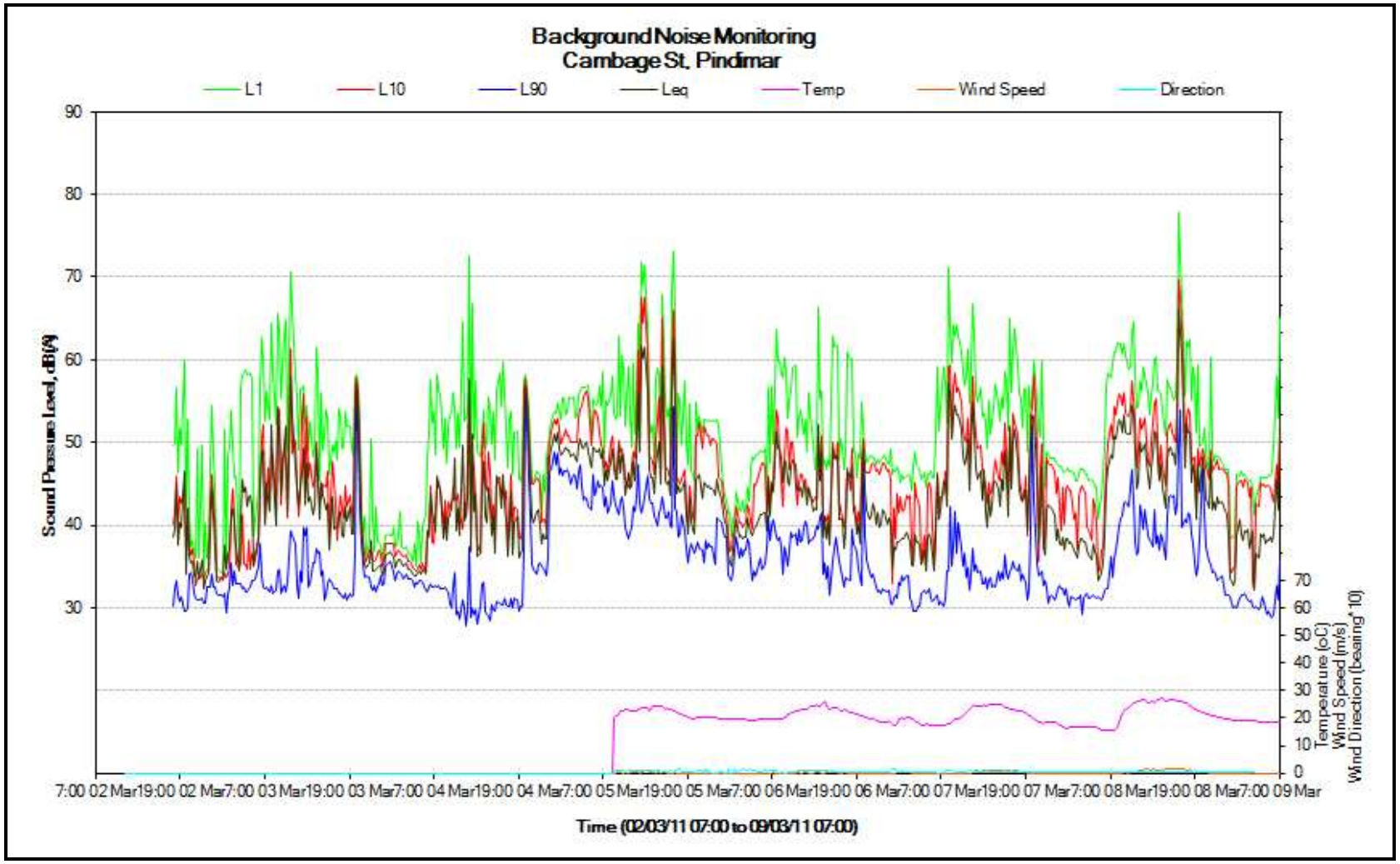
Analysis of background monitoring data provides PSNL slightly higher than those presented in the original assessment. The variation is considered minor (<2dB(A)), and the intrusiveness criteria remains the limiting criterion in establishing the PSNL. It is considered these monitoring results demonstrate the contemporary noise environment remains consistent with that presented in the original assessment, and on this basis, operational stage noise impacts would be consistent with the objectives of the INP.

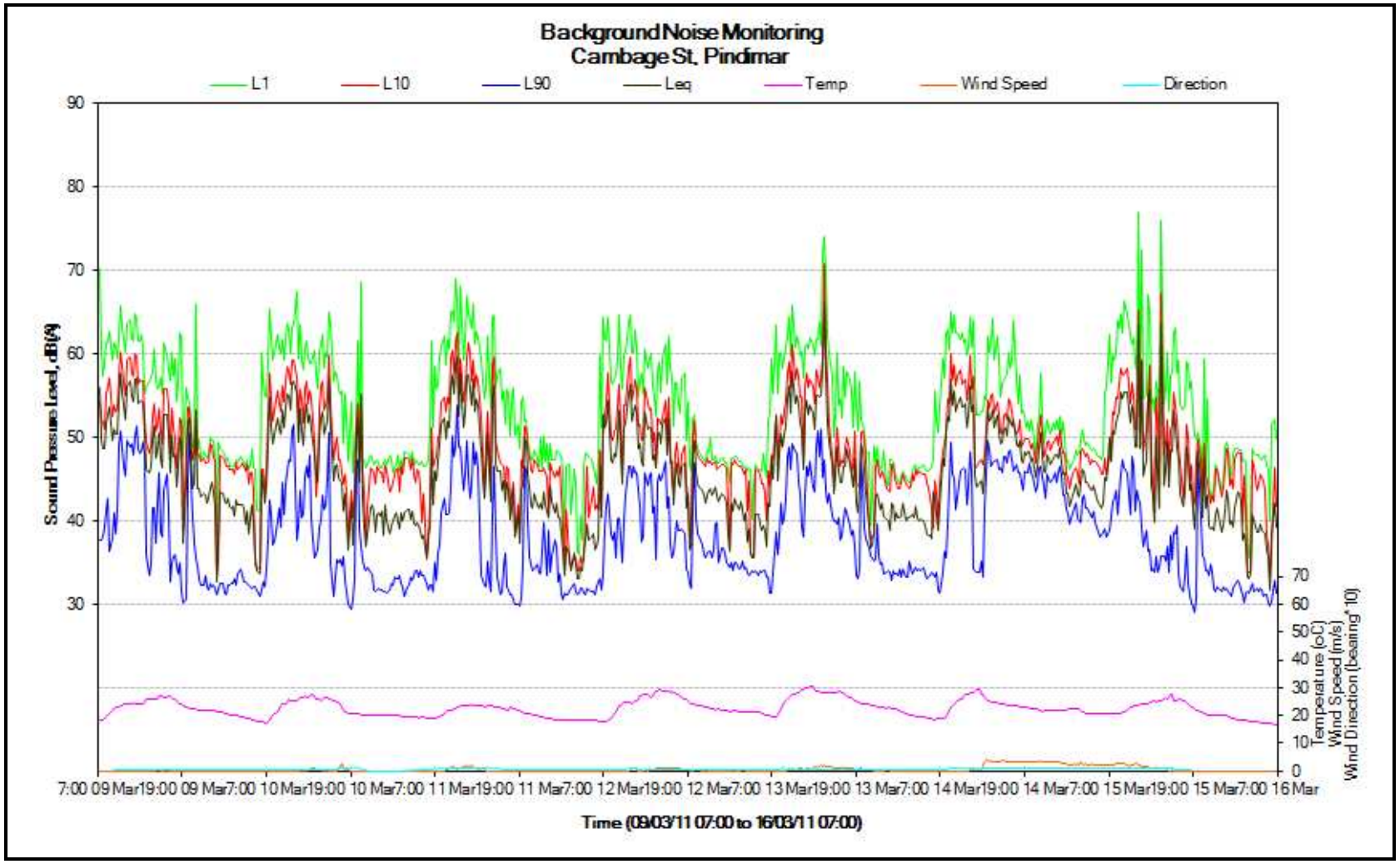
The revised guideline for construction noise management (*Interim Construction Noise Guideline*) presents an alternative indicator (L_{Aeq}) for the assessment of construction noise impacts. Review of impact predictions in the context of the revised guideline, indicates that noise emissions would satisfy the requirements of the ICNG during the proposed construction hours.

On the basis of analysis presented in this assessment, it is considered noise impacts associated with the construction and operation of the proposed Abalone Farm would satisfy the objectives of the relevant noise regulations.

Appendix I

Background Monitoring
Run Charts


Background Noise Monitoring
Cambage St, Pindimar
L1
L10
L90
Leq
Temp
Wind Speed
Direction
Sound Pressure Level, dB(A)
90
80
70
60
50
40
30
70
60
50
40
30
20
10
0
Temperature (oC)
Wind Speed (m/s)
Wind Direction (bearing *10)
7:00 02 Mar 19:00 02 Mar 7:00 03 Mar 19:00 03 Mar 7:00 04 Mar 19:00 04 Mar 7:00 05 Mar 19:00 05 Mar 7:00 06 Mar 19:00 06 Mar 7:00 07 Mar 19:00 07 Mar 7:00 08 Mar 19:00 08 Mar 7:00 09 Mar
Time (02/03/11 07:00 to 09/03/11 07:00)

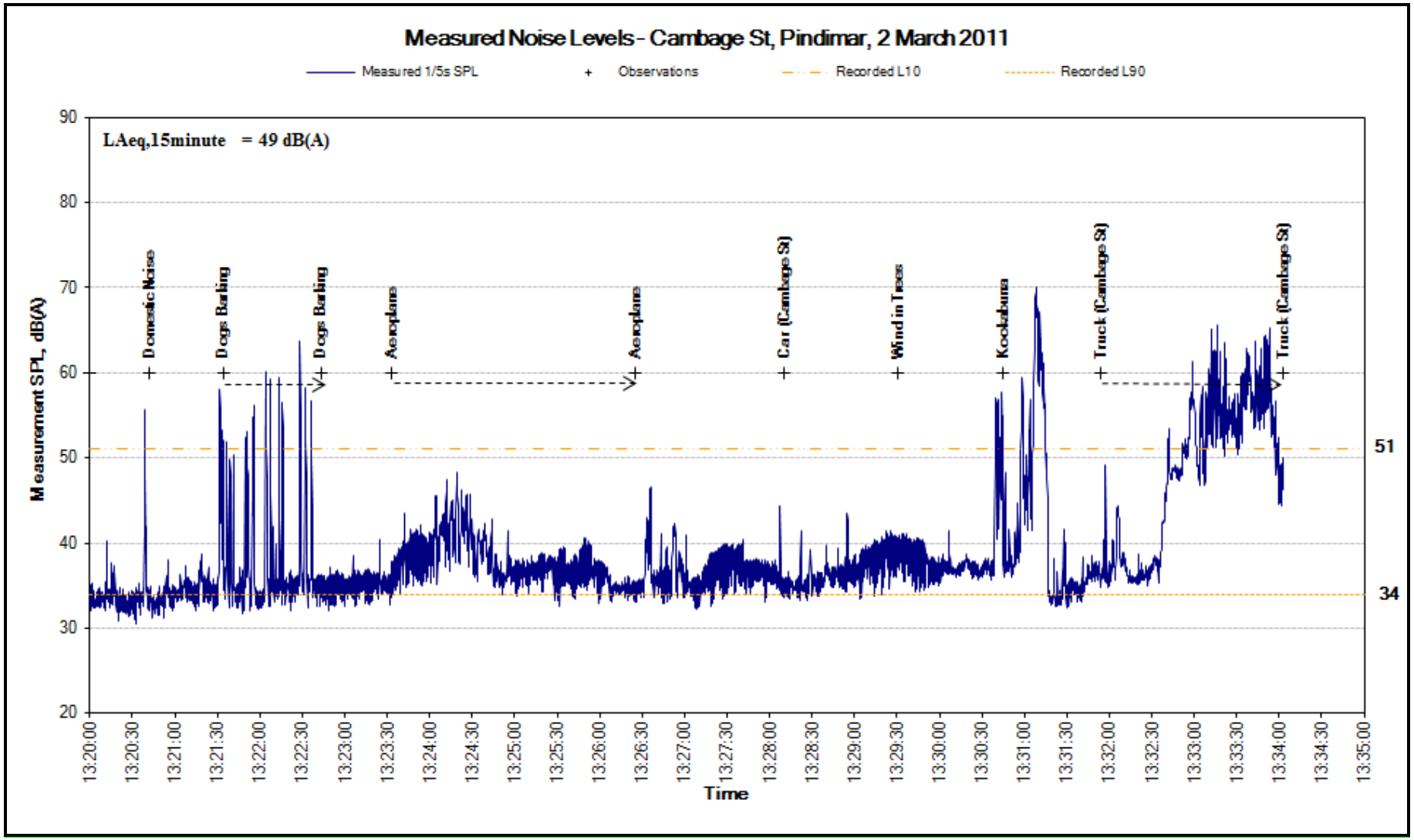

Background Noise Monitoring
Cambage St, Pindimar
L1
L10
L90
Leq
Temp
Wind Speed
Direction
Sound Pressure Level, dB(A)
90
80
70
60
50
40
30
70
60
50
40
30
20
10
0
Temperature (oC)
Wind Speed (m/s)
Wind Direction (bearing *10)
7:00 09 Mar 19:00 09 Mar 7:00 10 Mar 19:00 10 Mar 7:00 11 Mar 19:00 11 Mar 7:00 12 Mar 19:00 12 Mar 7:00 13 Mar 19:00 13 Mar 7:00 14 Mar 19:00 14 Mar 7:00 15 Mar 19:00 15 Mar 7:00 16 Mar
Time (09/03/11 07:00 to 16/03/11 07:00)

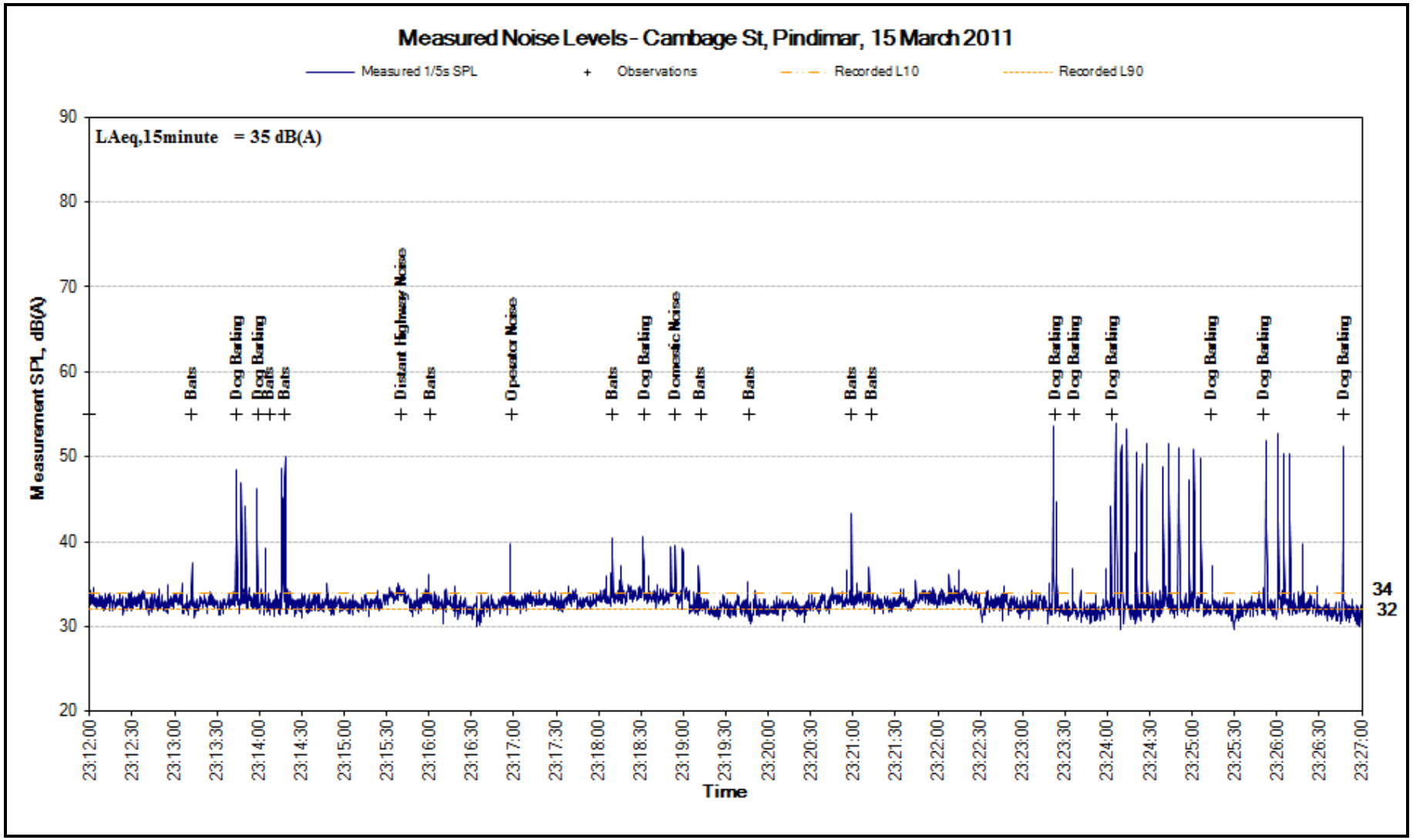
Appendix II

Attended Monitoring
Run Charts

Table A1: Attended monitoring results, March 2010

		Measured SPL, dB(A)			
Location	**Time**	**L_{A1}**	**L_{A90}**	**L_{Aeq}**	**Description of noise environment**
Cambage St, Pindimar	2/3/2011 12:16	62	34	49	Noise environment dominated by environmental noise sources including birds and barking dogs. No industrial noise sources observed. Monitoring stopped after 14 minutes due to light rainfall.
	15/3/2011 23:12	45	32	35	Noise environment dominated by environmental noise sources including bats and barking dogs. No industrial noise sources noted, however minor contribution from distant highway noise was observed.


Measured Noise Levels - Cambage St, Pindimar, 2 March 2011
Measured 1/5s SPL
Observations
Recorded L10
Recorded L90
LAeq,15minute = 49 dB(A)
Measurement SPL, dB(A)
Time
Domestic Noise
Dogs Barking
Dogs Barking
Aeroplane
Aeroplane
Car (Cambage St)
Wind in Trees
Kookaburra
Truck (Cambage St)
Truck (Cambage St)
51
34


Measured Noise Levels - Cambage St, Pindimar, 15 March 2011
Measured 1/5s SPL
Observations
Recorded L10
Recorded L90
LAeq,15minute = 35 dB(A)
Measurement SPL, dB(A)
Time
Bats
Dog Barking
Distant Highway Noise
Operator Noise
Domestic Noise
34
32