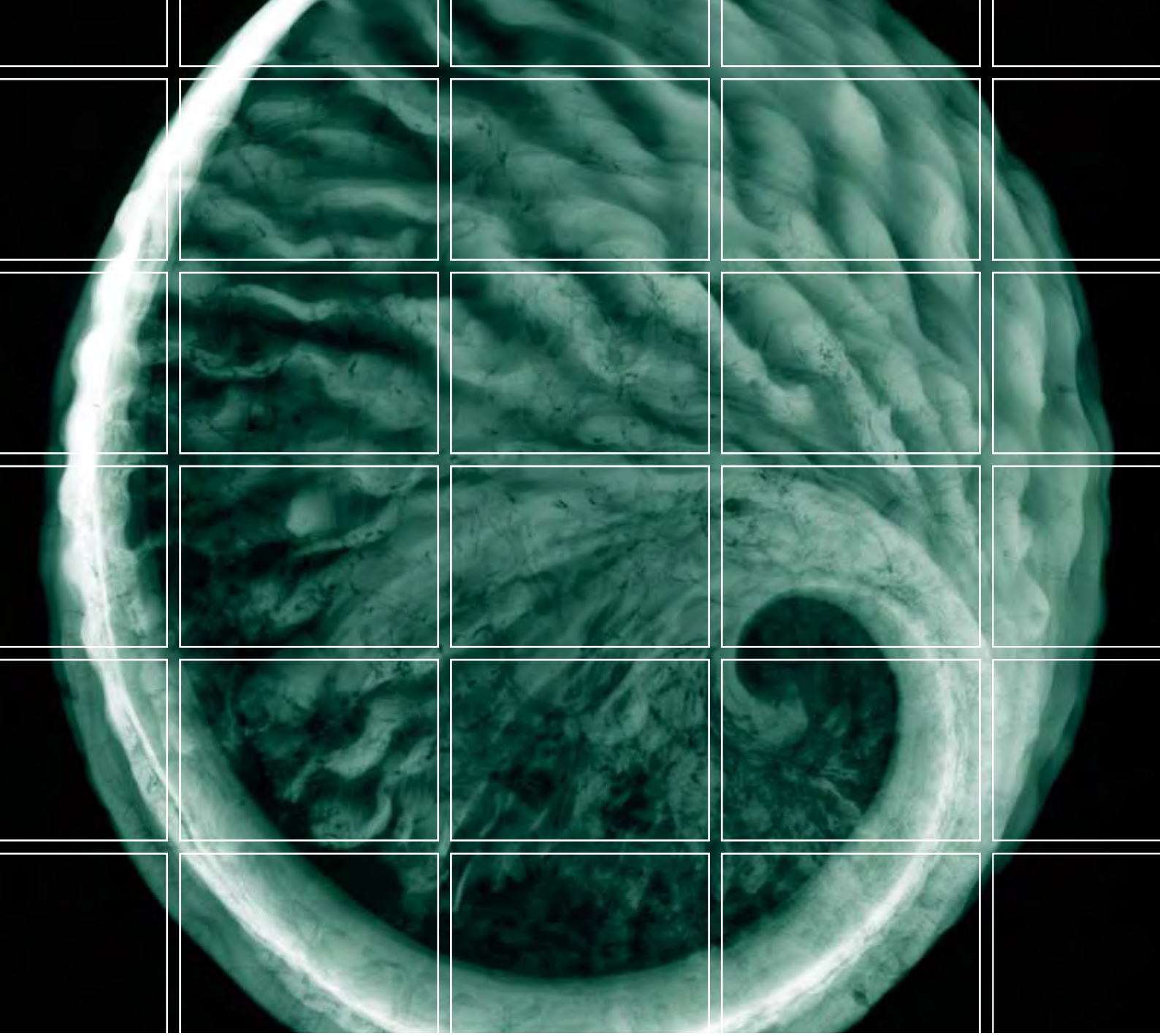

Light Horse Business Centre

Noise Impact Assessment

for ThaQuarry Pty Ltd

August 2008

Reference: 0071234 Noise

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ERM

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Broadway NSW 2007
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19 August, 2008

Jacqueline Ingham
Department of Planning
23-33 Bridge Street
SYDNEY NSW 2000
AUSTRALIA

Our Reference: 0071234LO1DECC.doc

Dear Jacqueline,

RE: ADEQUACY REVIEW RESPONSE TO NOISE ISSUES

This letter provides a response to issues raised by DoP within the Adequacy review with respect to the Noise Impact Assessment (NIA) for the proposed Light Horse Business Centre. This letter is an addendum to the NIA report and should be read in conjunction with the revised report.

1. OPERATIONAL NOISE

DoP stated that: *The operational noise assessment has been based on 700,000 tpa of waste being landfilled and on 354,780 vehicles movements/annum. Please revise the assessment to identify impacts of different scenarios and justify the estimated number of vehicles movements used in the assessment.*

Comment: Traffic noise quantities associated for the development have recently been revised and confirmed as 340,200 movements (maximum). Therefore, the noise impact assessment should be considered a worst case assessment as it adopted 354,780 movements PA.

The NIA for traffic demonstrated compliance when adopting this highly conservative level of vehicle movements. It showed the project would generate noise emissions below the relevant ECRTN criteria at the nearest receivers and would not increase existing traffic noise levels by more than 2 dBA.

Traffic noise levels for 296,000 vehicle movements PA associated with the second proposed operation scenario would therefore also remain below the relevant ECRTN goals.

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2. SCHEDULING OF ACTIVITIES

DoP requested: *the inclusion of details and scheduling of activities to be undertaken after 10pm. Whilst the noise assessment states that activities after 10pm would occur once a week, the traffic assessment indicates that it would occur once every 10 weeks.*

Comment: Scheduling activities (modelled) to occur during the night period include waste handling and waste recovery and items used to assess these activities included:

o	CAT Dozer D8R	o	HITACHI AH 500 Dump Truck
o	Hitachi ZX230 Excavator	o	CAT 320 CL Excavator
o	CAT 320 CL Excavator	o	Hyster Forklift
o	IVECO T2700 Water Cart	o	Hyster Forklift
o	Hyundai 14LC7 Excavator	o	CAT996 Loader

The location of these plant items are shown in Figure 6.1 of the noise impact assessment report.

While there are discrepancies in respect of what activities occur after 10:00 pm the NIA has been conducted in accordance with the Industrial Noise Policy (INP) adopting all plant operating simultaneously over a one-fifteen minute period. Therefore the resultant outputs are a worst case night operating scenario and has been identified to comply with the night operational criteria as well as meeting the relevant Lmax sleep disturbance goals.

3. SENSITIVE RECIEVERS

DoP requested: *a map and table identifying the addresses of each of the sensitive receivers and their distance from the site.*

Comment: ERM figures identify (in particular Figure D) the localities that are potentially impacted by the proposed development; these maps have been amended to include street names and the two neighbouring schools within Erskine Park and Minchinbury.

4. NOISE LEVELS AT THE PRIMARY SCHOOLS

DoP requested: *the noise levels at James Erskine Primary and Minchinbury Primary.*

Comment: With respect to noise impacts at the two primary schools, the NIA provided noise contours for three stages of operation over the life of the development, the noise contours have been reproduced below with inclusion of these schools as receivers for clarification.

As per the INP Table 2.1, the recommended classroom internal noise levels is 35 dBA (acceptable), assuming a partially opened window which is expected to reduce noise levels by 10 dBA, the external target is 45 dB(A). The proposal's noise levels within class rooms of both schools are predicted to be well below the relevant criteria (refer to contours in Figure D of the NIA).

5. NOISE REPRESENTATIONS

DoP requested: *clarification as to why R2 located to the west of the site has been used to represent noise levels at R3-R5 north of the site.*

Comment: The existing noise environment at R3-R5 is considered to be conservatively represented by the long term measurement at R2. The R2 logger is further from the M4 motorway than the logger placed at Minchinbury, and therefore considered to be in a quieter location.

It is likely that the existing traffic noise contribution to residences along Wallgrove Road is slightly higher than the levels adopted, although potentially not as high as those for Minchinbury due to the monitoring locations angle of exposure to the M4 Motorway. Notwithstanding this, the noise impacts associated from traffic noise remain below the ECRTN criteria for day and night.

ERM has responded to the additional information requested within the Adequacy Review. Should any further information or clarification be required please contact ERM Project Manager - Chris Jack on (02) 8584 8888.

Yours sincerely,
for Environmental Resources Management Australia Pty Ltd

Oliver Muller
Senior Acoustic Scientist (MAAS)

FINAL REPORT

ThaQuarry Pty Ltd

Light Horse Business Centre

Noise Impact Assessment

August 2008

Reference: 0071234 Noise

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1 INTRODUCTION

1.1 BACKGROUND

ThaQuarry Pty Ltd and ACN 114 843 453 Pty Ltd seek project approval for the construction and operation of a resource recovery facility (including a materials processing centre (MPC) and waste transfer station (WTS)), and a class 2 inert and solid waste landfill at Eastern Creek, New South Wales (NSW). Project approval is sought under Part 3A of the *Environmental Planning and Assessment Act, 1979*. The application process is to be managed on behalf of both parties by ThaQuarry Pty Ltd under the project name Light Horse Business Centre.

Environmental Resources Management Australia Pty Ltd (ERM) was engaged to undertake a noise impact assessment for the proposed resource recovery facility (RRF) and landfill facility (The 'Facility'), as part of the overall Environmental Assessment. The noise impact assessment was conducted to identify potential acoustic impacts associated with operational, construction and traffic generation activities associated with the 'Facility'.

The assessment has been conducted with reference to the Department of Environment and Climate Change (DECC) (2000) *Industrial Noise Policy* (INP), DECC (1999) *Environmental Criteria for Road Traffic Noise (ECRTN)* and DECC's constitution guidelines, formerly Chapter 171 of the (1994) *Environmental Noise Control Manual* (ENCM).

Blasting has not been included in this assessment, as there are no blasting activities associated with the Facility.

1.2 PROJECT DESCRIPTION

The facility will have the capacity to accept up to two million tones (t) of waste per annum. An estimated 50% to 80% of this material will be recovered by sorting and processing, and stored on site in stockpiles and material bays until sold. The remaining 20% to 50% will constitute "unsalvageable" material and will go to landfill in the adjoining landfill facility or be transferred off site as appropriate. A description of Project activities relevant to this assessment is provided below.

1.2.1 Waste Handling

The Project will include several noise generating activities associated with receival, sorting, processing, storage and on-site transportation of waste materials, focussed at the following areas (refer *Figure 1.1* for proposed site layout plan):

- inwards/ outwards weighbridge for vehicles entering the facility and one way dump truck weighbridge for loads entering the land filling area;
- raised Material Processing Centre (MPC) and Waste Transfer Station (WTS) structure; and
- drop off zone and processing/ stockpiling area.

1.2.2 Landfill Operations

The landfill operations associated with this facility will occur within the existing quarry void adjacent to the proposed resource recovery facility (RRF). Initial filling will take place from the south eastern corner of the quarry base at the deepest point and proceed towards the north eastern corner. Once the north eastern corner is reached, filling will proceed towards the west and continue in a north-south / south-north filling pattern. This process will be repeated until filling reaches the western end of the quarry at which time the total lift throughout the site is expected to be approximately ten metres. Filling will then occur in the same manner in the opposite direction.

To model the range of noise impacts as landfilling operations progress closer to the surface, ERM adopted three modelling scenarios being:

- Year 5 – representing the initial stage of pit filling where plant are operating deep within the pit;
- Year 13 – representing the middle stages of landfilling, with plant operating approximately half way up the pit; and
- Year 20 – representing the final stages of pit filling, with plant operating at the surface.

1.2.3 Operating Hours

Operations at the facility will generally be conducted seven days a week during daytime hours. Some site activity will occur during the evening period between 6:00 pm and 10:00 pm, however plant activity will be reduced slightly during this time with all plant operating except the mobile crusher and associated loader.

On occasion the RRF may receive materials after 10:00 pm, from essential works, such as millings and asphalt from road works.

For operations after 10:00 pm, only waste receival will occur, with no sorting or processing of materials to take place. For a worst case scenario, plant utilised during this time, and adopted in the assessment of night time noise, is expected to include dump trucks, watercarts, excavators, loaders (x 2) and forklifts. For the Year 20 scenario, the noise assessment has adopted loaders with a sound power level of 111 dBA to mitigate potential impacts from plant during this stage. To manage this, an acoustic audit of plant equipment should be conducted to verify the overall sound power level of plant items working on the site.

1.2.4 Plant and Equipment

Various mobile and stationary plant items will be used on site throughout the stages of the project, as identified below. One third octave data for all equipment modeled in this assessment is presented in *Annex A*.

Maintenance and repair activities are expected to occur within the workshop of the facility between the hours of 6:00 and 10:00 pm. However, noise sources at the workshop including hand tools, are expected to remain acoustically insignificant and have not been included in modeling for this assessment.

Waste Handling

Acoustically significant plant associated with the receival, sorting, processing, storage and transportation of waste at the site will include the following:

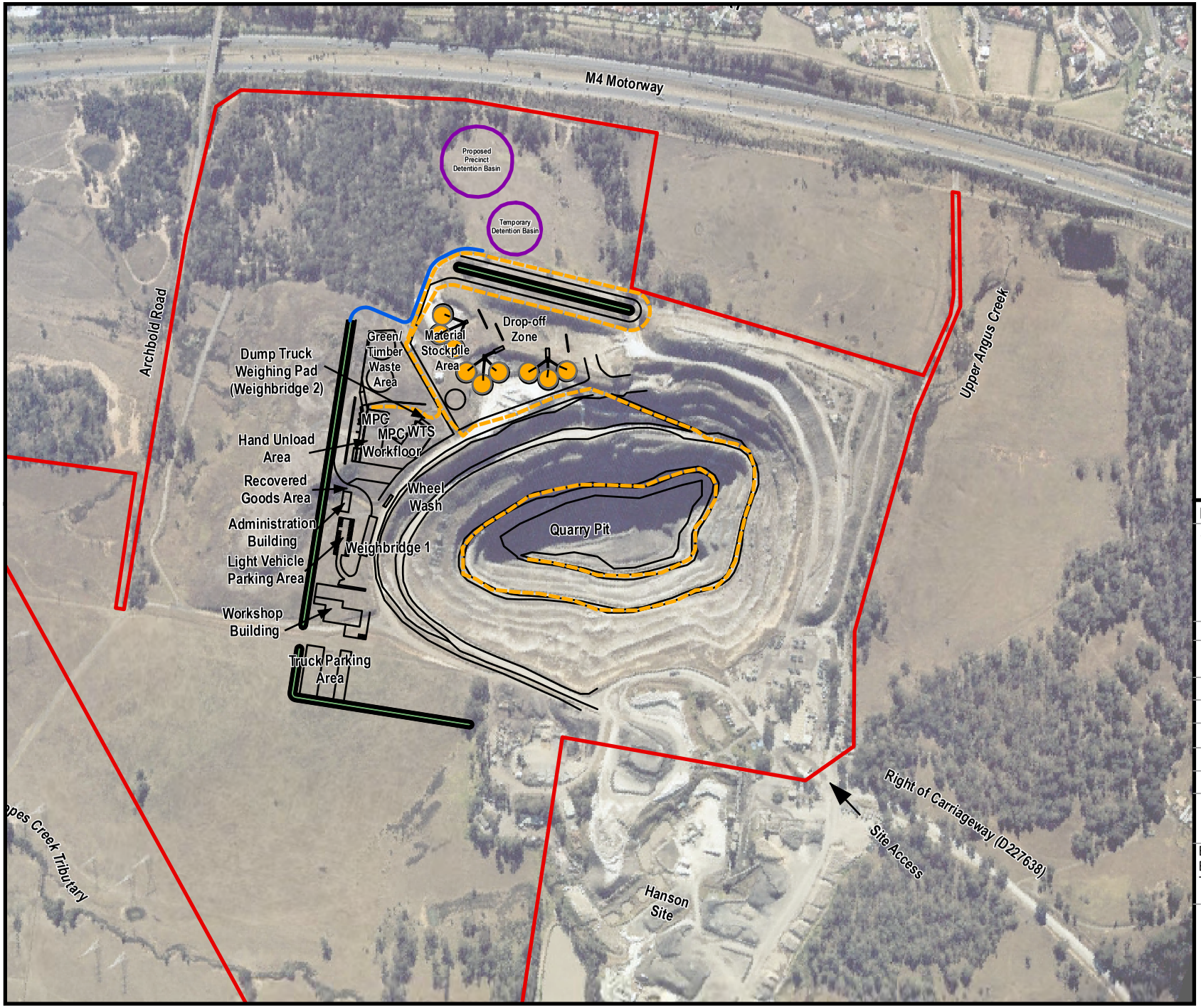
- dump trucks (3);
- water cart;
- multi purpose Hooklift Truck;
- excavators (6);
- loaders (5);
- mobile screens (3);
- mobile crusher;
- stationary crusher; and
- forklifts (2).

Landfill Operations

Acoustically significant plant associated with landfill operations for the Project will include the following:

- dump trucks (3 as above);

- water cart (as above);
- multi purpose Hooklift Truck (as above);
- excavators (as above);
- bulldozer ; and
- compactors (2).



Legend

- Visual Barrier Wall
- Dump Truck and Water Cart Route
- Site Design
- Detention Basins
- Site Boundary
- Berm

Suffix	*Revisions*	*Date*	*Init*
R0	From EA-09_R1	08-05-08	JS
R1	Site layout edits	19-05-08	JS
R2	Addition of Basins	18-08-08	JF

Figure 1.1

Site Layout

Client:	ThaQuarry Pty. Ltd.		
Project:	Light Horse Buisiness Centre		
Drawing No:	0071234_GIS23	Suffix No:	R2
Date:	18/08/2008	Drawing size:	A4
Drawn by:	JF	Reviewed by:	JK
Source:	VGT Environmental Compliance Solutions		
Scale:	Refer Scale Bar		

N

0 50 100 200 300 Metres

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Site Access

The existing site access via the two lane registered right of carriage way off Old Wallgrove Road will be used throughout construction and operations for the Project.

1.3 GLOSSARY

A number of technical terms have been used in this report and are explained in *Table 1.1*.

Table 1.1 Glossary of Terms

Term	Description
ABL	Assessment Background Level (ABL) is defined in the INP as a single figure background level for each assessment period (day, evening and night). It is the tenth percentile of the measured L_{90} statistical noise levels.
dB(A)	Noise is measured in units called decibels (dB). There are several scales for describing noise, the most common being the 'A-weighted' scale. This attempts to closely approximate the frequency response of the human ear.
dB(LinPeak)	The peak sound pressure level (not root mean squared (rms)) expressed as decibels with no frequency weighting.
L1	The noise level exceeded for 1 % of a measurement period.
L10	A noise level which is exceeded 10 % of the time. It is approximately equivalent to the average of maximum noise levels.
L90	Commonly referred to as the background noise, this is the level exceeded 90 % of the time.
Leq	The summation of noise over a selected period of time. It is the energy average noise from a source, and is the equivalent continuous sound pressure level over a given period.
Lmax	The maximum root mean squared (rms) sound pressure level received at the microphone during a measuring interval.
RBL	The Rating Background Level (RBL) is an overall single figure background level representing each assessment period over the whole monitoring period. The RBL is used to determine the intrusiveness criteria for noise assessment purposes and is the median of the ABL's.
Sound power level	This is a measure of the total power radiated by a source. The sound power of a source is a fundamental location of the source and is independent of the surrounding environment.

2 NOISE IMPACT ASSESSMENT CRITERIA

2.1 GENERAL CRITERIA

The DECC (2000), in its INP, gives guidelines for assessing industrial facilities. Assessment criteria depend on the existing amenity of areas potentially affected by a proposed development as outlined below.

Assessment criteria for sensitive receivers near industry are based on the following objectives:

- protection of the community from excessive intrusive noise; and
- preservation of amenity for specific land uses.

To meet these objectives, two separate criteria are prescribed by the DECC, namely the intrusiveness criteria and the amenity criteria. A fundamental difference between the intrusiveness and the amenity criteria is that the former is applicable over 15 minutes in any period, while the latter covers the entire assessment period (day, evening and night).

2.1.1 *Assessing for Intrusiveness*

The intrusiveness criterion requires that $L_{Aeq,15min}$ noise levels from a newly introduced source during the day, evening and night do not exceed the existing Rating Background Levels (RBL) by more than 5dB. This is expressed as:

$$L_{Aeq,15min} \leq RBL + 5 - K$$

where $L_{Aeq,15min}$ is the L_{eq} noise level from the source, measured over a 15 minute period and K is a series of adjustments for various noise characteristics. Where the RBL is less than 30 dB(A), a value of 30 dB(A) is used. For typical noise from the Facility, no adjustment factors are considered applicable.

2.1.2 *Assessing for Amenity*

The DECC's amenity criterion requires industrial noise to be within an acceptable level for the particular locality and land use. Where ambient noise is already high, the acoustic environment should not be deteriorated significantly. The strategy behind the amenity criterion is a holistic approach to noise, where all industrial noise (existing and future) received at a given receptor does not exceed the recommended goals.

Private residences and other potentially sensitive receivers potentially affected by the Project are covered by the DECC's varying amenity categories as presented in Table 2.1 of the INP and are reproduced below

Table 2.1 ***Amenity Criteria - Recommended L_{Aeq} Noise Levels from Industrial Noise Sources***

Type of Receiver	Indicative Noise Amenity Area	Time of Day	Recommended LAeq(Period) Noise Level (dBA)	
			Acceptable	Recommended Maximum
Residence	Rural	Day	50	55
		Evening	45	50
		Night	40	45
	Suburban	Day	55	60
		Evening	45	50
		Night	40	45
	Urban	Day	60	65
		Evening	50	55
		Night	45	50
	Urban/Industrial Interface (for existing situations only)	Day	65	70
		Evening	55	60
		Night	50	55
School classrooms - internal	All	Noisiest 1 hour period when in use	35	40
Hospital wards - internal - external	All	Noisiest 1 hour period	35 50	40 55
Place of worship - internal	All	When in use	40	45
Area specifically reserved for passive recreation (eg National Park)	All	When in use	50	55
Active recreation area (eg school playground, golf course)	All	When in use	55	60
Commercial premises	All	When in use	65	70
Industrial premises	All	When in use	70	75

Note: Monday – Saturday Daytime 7.00 am to 6.00 pm; Evening 6.00 pm to 10.00 pm; Night-time 10.00 pm to 7.00 am. On Sundays and Public Holidays, Daytime 8.00 am - 6.00 pm; Evening 6.00 pm - 10.00 pm; Night-time 10.00 pm - 8.00 am.

2.2 *CONSTRUCTION NOISE*

Chapter 171 of the ENCM sets out methods for determining construction criteria associated with proposed developments. *Table 2.2* reproduces the acceptable construction noise levels. These take into account the rating background noise level (RBL) and are based on duration of the construction period that applies to nearest sensitive receivers.

Table 2.2 Construction Noise Goals

Construction Period	Acceptable LA10 Noise Level[1]
4 weeks and under	Background LA90 plus 20 dBA
4 weeks to 26 weeks	Background LA90 plus 10 dBA
Greater than 26 weeks	Background LA90 plus 5 dBA

1. Applicable between the hours of 7.00 am and 6.00 pm Monday to Friday, and 8.00 am to 1.00 pm Saturdays. For all other times construction noise must be inaudible at the receiver. No construction work is to take place on Sundays or Public Holidays.

2.3 *ROAD TRAFFIC NOISE CRITERIA*

The Environment Protection Authority released the ECRTN in May 1999. The policy sets out noise criteria applicable to different road classifications for the purpose of defining traffic noise impacts.

2.4 *SLEEP DISTURBANCE*

While the INP does not specify a criterion for assessing sleep disturbance, the ENCM (1994) recommends that $L_{1,1minute}$ noise from a source should not exceed the existing background noise by more than 15 dB. Depending on the measured background noise, the sleep disturbance criteria for the quietest location could be as low as 45 dB(A)L_1.

3 EXISTING ACOUSTICAL ENVIRONMENT

3.1 SENSITIVE RECEIVERS

Sensitive receivers surrounding the proposed facility are generally to the west in Erskine Park and to the north in Minchinbury, located in the general areas identified in *Table 3.1*. The locality map presented in *Figure 3.1* identifies the nearest residential areas and sensitive receivers adjacent to the proposed facility.

Representative monitoring and modelling assessment points were selected to represent the worst case general receivers for each area. *Table 3.1* presents the modelled receiver positions and associated representative street/roads. The monitoring locations are identified in *Section 3.2* and shown on *Figure 3.1*.

Table 3.1 Assessed Representative Receivers

Area	Representative of Receivers Situated in and around:
South West Receivers Erskine Park	Residential :Weaver Street, Pollux Close, Ohio Place and Fantail Crescent Schools : Erskine Park High and James Erskine Primary Churches / Places of Worship : N/A
Western Receivers Erskine Park	Residential: Swamphen Street and Roper Road. Schools : N/A Churches/Places of Worship : N/A.
North Receivers Minchinbury	Residential : Cobbler Crescent, McFarlane Drive, Grazier Place, Tod Place, Eber Place and Bergin Place. Schools : N/A Churches/Places of Worship : N/A.
North East Receivers Minchinbury	Residential: Barrossa Drive, Minchin Drive, Swamphen Street and Roper Road. Schools : Minchinbury Public School Churches/Places of Worship : N/A.
East North East Receivers Minchinbury	Residential: Rutherglen place Agrafe Place, Tirage Place and Farrington Street.. Schools : N/A Churches/Places of Worship : N/A.

Legend

- Visiual Barrier Wall
- Site Design
- Detention Basins
- School
- Site Boundary
- Receiver Location

Suffix	*Revisions*	*Date*	*Init*
R0	Preliminary Issue	10-01-08	JS
R1	Label rotation	11-01-08	JS
R2	Vis Boundry + Sern Change	08-05-08	JS
R3	School Locations Added	04-08-08	JF

Figure 3.1

Sensitive Receiver and Noise Monitoring Locations

Client:	ThaQuarry Pty Ltd		
Project:	Light Horse Buisiness Centre EA		
Drawing No:	0071234_GIS14	Suffix No:	R3
Date:	04/08/2008	Drawing size:	A4
Drawn by:	JF	Reviewed by:	JK
Source:	© 2007 Google TM		
Scale:	Refer Scale Bar		

N

0 95 190 380 570 Meters

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3.2 BACKGROUND NOISE ASSESSMENT

3.2.1 Introduction

Acoustic instrumentation utilised during the monitoring and assessment process for this assessment complies with the requirements of AS IEC 6167, 2004 *'Electroacoustics - Sound level meters – Specifications'*. Additionally, all equipment used have current NATA or manufacturer calibration certificates. All instrumentation was calibrated before and after each measurement survey and the tolerance of each unit did not vary by more than ±0.5 dBA.

3.2.2 Unattended Noise Monitoring

Unattended continuous monitoring was conducted from 16 August 2007 to 5 September 2007 inclusive, at two residential locations using ARL Type EL315 environmental noise loggers. The monitoring locations were at 12 Swamphen Street, Erskine Park, NSW and 166 McFarlane Drive, Minchinbury, NSW. Atypical or anomalous data apparent in charts was also removed prior to analysis. This typically resulted in adopting the largest grouped ABL values to conservatively calculate the RBL.

A summary of the results of the background surveys, within each of the proposed operating periods of the development, are given in *Table 3.2*. The noise logging data set is presented in *Annex B*.

Table 3.2 Summary of Background and Ambient Noise Levels

Location	Rating Background Level, dB(A)				Ambient Noise Level, dB(A)L_{eq} period		
	Morning Shoulder[2]	Day[1]	Evening[1]	Night[1]	Day[1]	Evening[1]	Night[1]
West – Swamphen Street	38	39	39[4]	37	54	59	49
North – McFarlane Drive	44	47	47	41	55	53	51

1. Day is from 7am to 6pm; Evening is from 6pm to 10pm; and Night is from 10pm to 7am (INP).

2. The morning shoulder (6am-7am) has been adopted as the midpoint between day and night periods, in accordance with Section 3.3 of the INP to account for steadily rising background noise levels due to traffic.

3. Noise data during periods of any rainfall and/or wind speeds above 5m/s were discarded.

4. Ambient noise levels were controlled by traffic noise. An assessment of noise for high traffic areas (in accordance with Section 2.2.3 of the INP) has been undertaken and no corrections are applied, as levels are not more than 10 dB above the recommended acceptable amenity levels.

5. Adjustments are to be made to the Project Specific Noise Criteria to account for evening noise levels being 1 dBA higher than daytime, in accordance with the DECC's Application Notes for the INP.

3.2.3 Attended Noise Monitoring

To gain a better understanding of the existing noise environment, ERM conducted attended noise monitoring at the unattended noise monitoring locations during calm clear weather conditions, to ascertain dominate ambient noise sources and to quantify existing industrial noise contributions. For the northern receivers, due to a localised residential extraneous noise source at the time of the measurement, the attended survey location was relocated from McFarlane Drive to nearby Cobbler Crescent (representative of the area). The findings of the survey are presented in *Table 3.3*.

Table 3.3 Summary of Attended Noise Measurements

Location	Time/Date	Duration (min)	Total Measured Noise Levels, dB(A)		Industrial Noise Contribution dB(A)	Noise Sources
			L_{eq}	L_{90}		
West – Swamphen Street	09:16 16/08/07	15:00	48	44	< 44	Traffic M4 No industrial noise contribution
North – Cobbler Crescent adjacent to McFarlane Drive	15:11 16/08/07	15:00	50	47	< 47	Birds 48-55 Dogs 48 – 60 Traffic M4 48 -50 Hanson Asphalt Batching Plant noise just audible, not measurable. Minimal industrial noise contribution

Attended measurements verify that the locality surrounding the proposed facility is typical of an urban environment, as defined in Section 2.2.1 of the INP. In particular, identified noise sources that dominated measured levels included 'urban hum' that was largely traffic-related sources.

4 PROJECT SPECIFIC NOISE CRITERIA

4.1 OPERATIONAL NOISE CRITERIA

The noise emission criteria for the Project have been set in accordance with Section 4.0 of the INP. The intrusiveness and amenity design criteria have been set, based on logging measurements conducted at the nearest representative receivers to the site. Noise monitoring data from the Swamphen Street location was considered representative of the noise environment at the South West, West and South East receivers. Noise monitoring data from the McFarlane Drive location was considered representative of the North, North East and East North East receivers.

The background noise levels for setting the intrusiveness criterion have been determined in the absence of any noise from the proposed development.

The existing LAeq in the area surrounding the site is dominated by traffic and residential noise sources. Some industrial noise was just perceptible from the Hanson site (to the south east of the Project site), however no acoustic contribution was measured above the overall background noise at this location, even during breaks in traffic. Therefore this industrial contribution is estimated to be 10 dBA or greater below the measured (LA90) background noise level. The acoustical environment surrounding the site is typical of an urban environment, as it is dominated by through traffic from the M4 motorway and Great Western Highway, in particular during peak times including the evenings, where noise levels are elevated from traffic.

An assessment of transport noise in accordance with Section 2.2.3 of the INP identified that corrections to the amenity criteria to account for high traffic noise is not applicable, as levels are not more than 10 dB above the recommended acceptable amenity levels. Additionally, as there is no existing industrial noise contribution at representative receivers, no adjustment to the amenity criteria is necessary and the recommended acceptable amenity levels from Table 2.1 of the INP has been adopted as the amenity criteria.

The design goals for operational noise are given in *Table 4.1.*

Table 4.1 Project Specific Noise Criteria

Location	Period	Intrusiveness Criteria LAeq(15minute)	Amenity Criteria LAeq(Period)
South West Receivers	Morning Shoulder	**43 dBA**	53 dBA
	Day	**44 dBA**	60 dBA
	Evening	**44 dBA**	50 dBA
	Night	**42 dBA**	45 dBA
West Receivers	Morning Shoulder	**43 dBA**	53 dBA
	Day	**44 dBA**	60 dBA
	Evening	**44 dBA**	50 dBA
	Night	**42 dBA**	45 dBA
North Receivers	Morning Shoulder	**49 dBA**	53 dBA
	Day	**52 dBA**	60 dBA
	Evening	52 dBA	**50 dBA**
	Night	46 dBA	**45 dBA**
North East Receivers	Morning Shoulder	**49 dBA**	53 dBA
	Day	**52 dBA**	60 dBA
	Evening	52 dBA	**50 dBA**
	Night	46 dBA	**45 dBA**
East North East Receivers	Morning Shoulder	**49 dBA**	53 dBA
	Day	**52 dBA**	60 dBA
	Evening	52 dBA	**50 dBA**
	Night	46 dBA	**45 dBA**
School Receivers	When in use	45 dBA (external level -10dBA for transmission loss)	

1. Weekdays and Saturdays - Daytime 7:00 am – 6:00 pm; Evening 6:00 pm – 10:00 pm; Night 10:00 pm - 07:00 am. Sundays -Daytime 8am - 6pm; Evening 6:00pm - 8:00am; Night 10:00pm - 8:00am.
2. The INP states that these criteria have been selected to protect at least 90% of the population living in the vicinity of industrial noise sources from the adverse effects of noise for at least 90% of the time. Provided the criteria in the INP are achieved, it is unlikely that most people would consider the resultant noise levels excessive.
3. Applicable project specific design criteria are in bold and are the lower of the intrusiveness and amenity criteria in each instance. Adjustments have been made to the Project Specific Noise Criteria to account for daytime noise levels being quieter than evening periods in accordance with the DECC's Application Notes for the INP.
4. The Amenity Criteria for the morning shoulder (6am-7am) is based on the 'mid-point' between the originally derived day and night recommended acceptable noise levels to account for steadily rising background noise levels due to traffic.

4.2 CONSTRUCTION NOISE CRITERIA

The construction phase of this project is expected to occur for a period of greater than 26 weeks in duration. Therefore, in accordance with the ENCM, the construction noise goals are set to background plus 5 dBA (LA90 + 5dBA). The Project specific construction noise criteria for receivers are presented in *Table 4.2*.

Table 4.2 Construction Noise Goals (>26 week construction period)

Location	Project Specific Noise Criteria LA10(15minute)
West and South West Receivers	44 dBA
North, North East and East North East Receivers	52 dBA

1. Noise generating construction activities may only occur between the hours of 7.00 am and 6.00 pm Monday to Friday, and 8.00 am to 1.00 pm Saturdays. For all other times construction noise must be inaudible at the receiver.

4.3 ROAD TRAFFIC NOISE CRITERIA

The NSW DECC ECRTN recommends external and internal traffic noise goals. The proposed facility will be near to several major roadways including the M4 Motorway and M7 Motorway and to a lesser extent the Great Western Highway. Traffic noise impacts have been assessed for receivers located off Wallgrove Road (which is anticipated to be used by all vehicles accessing the site) and the M4 Motorway. Therefore the traffic noise impact assessment has adopted noise goals for *'land use developments with the potential to create additional traffic on arterial roads or freeways'*, in accordance with the ECRTN and reproduced in *Table 4.3*.

Table 4.3 Traffic Noise Design Goals

Location	Road Classification	Traffic Noise Goal	
		Daytime LAeq(15hour)	Night **LAeq(9hour)**
West and South West Receivers	Freeway/Arterial	60dBA	55dBA
North, North East and East North East Receivers			

1. Daytime: 07:00 am – 10:00 pm, Night : 10:00 pm to 07:00 am.

Further, the ECRTN identifies that traffic arising from the development should not lead to an increase in existing noise levels of more than 2 dBA.

4.4 SLEEP DISTURBANCE

Table 4.4 presents the sleep disturbance noise emission goals for this project. As outlined in *Section 2.4* of this report, these goals have been established with reference to the ENCM and are based RBL noise level recorded during the night time period at each receiver area.

Table 4.4 Sleep Disturbance Design Goals

Location	Period	Sleep Disturbance Goal (LA1(1minute))
West and & South West Receivers	Night	52 dBA
North, North East and East North East Receivers	Night	56 dBA

5 METEOROLOGICAL ANALYSIS

Noise propagation over long distances can be significantly affected by the prevailing weather conditions. Of most interest are source to receiver winds and the presence of temperature inversions, as both these conditions can enhance received noise levels. To account for these phenomena, the DECC's INP, specifies weather analysis procedures to be employed to determine the prevalent weather conditions that enhance noise propagation in a particular area, with a view to determining whether they can be described as a feature of the project area.

The prevailing wind directions in the area have been determined in accordance with the INP. The INP requires that winds below 3m/s with an occurrence greater than 30 per cent of the time be assessed. Wind roses created from 1 September 2005 to 10 September 2007 for the Horsley Park area have been analysed. The results of this analysis are presented in more detail and form the wind roses presented in *Annex C* of this report. Based on the results of this analysis, the relevant meteorological conditions modelled are summarised in *Table 5.1.*

Table 5.1 Relevant Site Specific Meteorological Parameters

Assessment Condition	Temperature	Wind Speed/ Direction	Relative Humidity	Temperature Gradient
Daytime - Calm	20°C	n/a	65%	n/a
Evening - Calm	15°C	n/a	80%	n/a
- Prevailing Winds	15°C	3m/s /SW±45°	80%	n/a
Night time - Calm	10°C	n/a	80%	n/a
– Prevailing Winds at:				
W & SW Receivers	10°C	3m/s/ SE±45°	80%	n/a
N, NE and ENE Receivers	10°C	3m/s/ S±45°	80%	n/a
- Temperature Inversion	10°C	n/a	80%	3°C/100 m

The potential for drainage flows to occur around the site have been analysed and are not relevant as Project noise sources are at a lower elevation than nearby receivers, or there is intervening topography present between the identified Project noise sources and nearby receivers.

6 NOISE MODELLING

Site operations are predicted to commence in 2008, with landfilling anticipated to continue for a period of approximately 20 years and resource recovery activities to continue indefinitely.

6.1 MODELLING SCENARIOS

As discussed in *Section 1.2.2*, three modelling scenarios were adopted, representative of Years 5, 13 and 20 of operations, to represent the potential range of impacts as landfilling operations and associated in pit equipment progresses closer to the surface.

6.2 PLANT NOISE LEVELS

Mobile plant noise emission data used in modelling for this assessment were obtained from the ERM noise emission database for relevant noise sources. Noise data for stationary plant items such as the screens and crushers were provided by the proponent. The noise emission levels used in modelling are summarised in *Table 6.1.*

Table 6.1 Equipment Sound Power Levels

Typical Item	Representative $L_{eq,15minute}$ Sound Power Level, dB(A)
CAT 740 Dump Truck	103
HITACHI AH 500 Dump Truck	106
IVECO T2700 Water Cart	105
IVECO T2700 Hooklift Truck	101
CAT 320 CL Excavator	106
Hitachi ZX230 Excavator	104
Hyundai 14LC7 Excavator	105
CAT980 Loader	115
CAT996 Loader	110
CAT Dozer D8R	113
Mobile Screens EXTEC	101

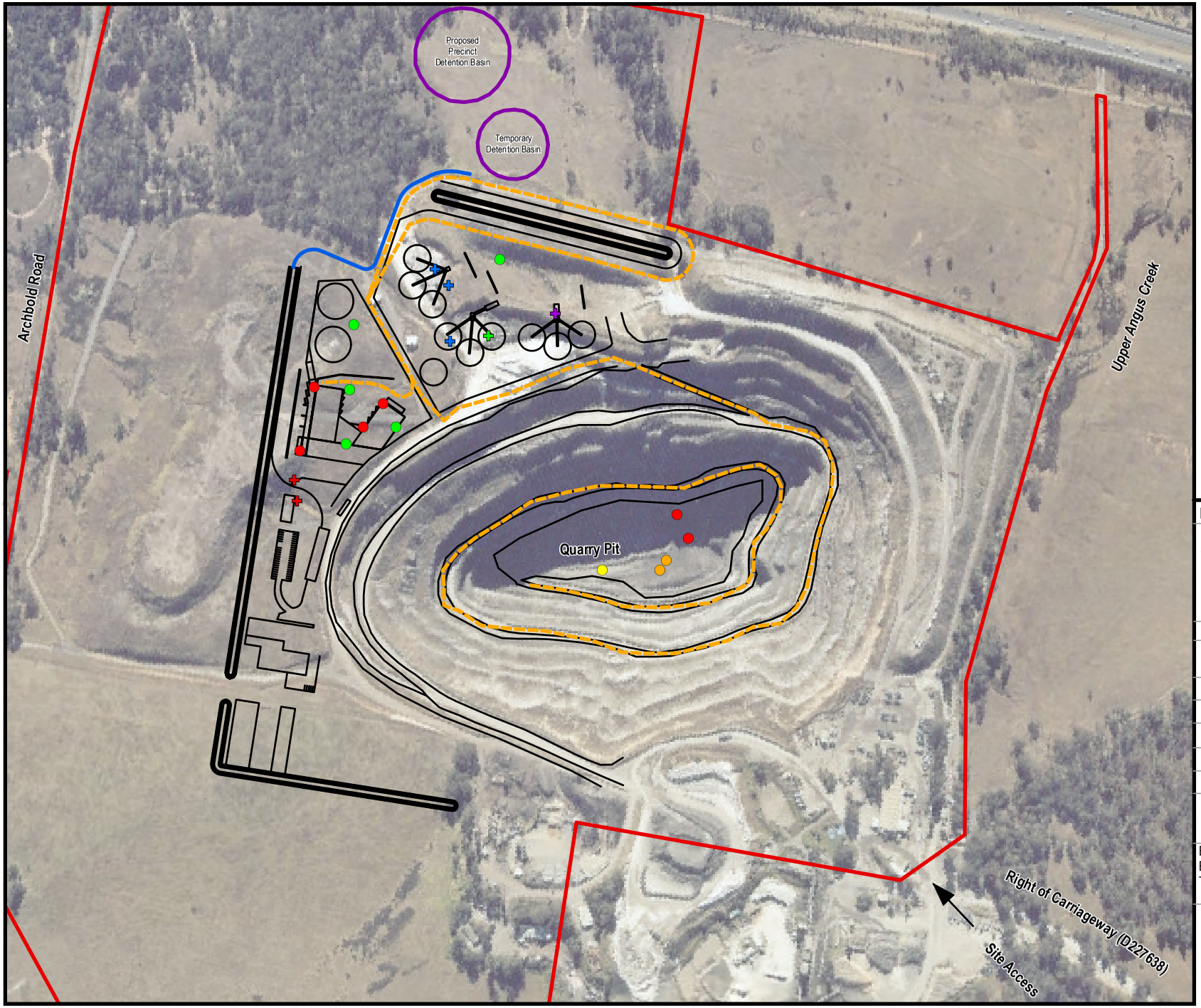
Typical Item	Representative $L_{eq,15minute}$ Sound Power Level, dB(A)
Mobile Screens KEYSTRAC	101
Mobile Crusher EXTECC12	114
Stationary Crusher	114
Hyster Forklift	103
CAT 826 Compactor	113
IVECO T2700 Water Cart2	105
Road Truck	102
Notes: Refer to *Annex D* for 1/3 octave data used for noise modelling	

6.3 CALCULATION PROCEDURES

ENM noise modelling software was used to assess potential noise impacts associated with the Project. ENM is a DECC accepted software package and takes into account distance, ground effect, atmospheric absorption and topographic detail.

The model incorporated three-dimensional digitised ground contours for the facility, as derived from proposed site plans (inclusive of barriers) and barriers and the surrounding land base topography, superimposed on each other. Plant and equipment was modelled at various locations and heights, representative of realistic operating conditions for the three representative scenarios, as indicated on *Figure 6.1*. For each scenario, noise sources were modelled in the same (x,y) positions with elevations of in pit equipment changed to represent the change in height of the landfill operations.

The noise model predicts L_{eq} noise levels, although it should be noted that this assessment has assumed that all plant and equipment operate simultaneously. In practice, such an operating scenario would be unlikely to occur and the results should therefore be considered conservatively high. Where relevant, modifying factors in accordance with Section 4 of the INP have been applied to calculations.



Legend

- Excavator
- Compactor
- Bulldozer
- Loader
- Forklift
- Mobile Crusher
- Mobile Screens
- Stationary Crusher
- Visual Barrier Wall
- Dump Truck and Water Cart Route
- Site Design
- Detention Basins
- Site Boundary

Suffix	*Revisions*	*Date*	*Init*
R0	Preliminary Issue	10-01-08	JS
R1	Equip location source change	11-01-08	JS
R2	Visual Bound+DT Route Change	08-05-08	JS

Figure 6.1

Indicative Plant and Equipment Operating Locations

Client:	ThaQuarry Pty. Ltd.		
Project:	Light Horse Buisiness Centre		
Drawing No:	0071234_GIS24_R2	Suffix No:	R2
Date:	08/05/2008	Drawing size:	A4
Drawn by:	JS	Reviewed by:	JK
Source:	VGT Environmental Compliance Solutions		
Scale:	Refer Scale Bar		

N

0 25 50 100 150 Meters

Environmental Resources Management Australia Pty Ltd
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ERM

7 NOISE IMPACT ASSESSMENT - RESULTS AND DISCUSSION

7.1 OPERATIONAL NOISE

Three operational scenarios were modelled to determine the potential acoustic impact of the Project on the surrounding community at various stages of the development. Noise from all sources that contribute to the total noise from the proposed site operations has been assessed.

A summary of predicted noise levels at assessed representative areas adjacent to the site are provided in *Table 7.1* to *7.3*, for calm and prevailing weather conditions. ENM, noise contour maps for the worst case daytime and evening operations for Years 5, 13 and 20 of operations are provided in *Annex D*.

Table 7.1 Noise Modelling Summary – Year 5

Location	Modelled Period	Project Specific Noise Criteria LAeq	Calm LAeq	Prevailing Wind LAeq	Inversion LAeq
South West Receivers	Morning Shoulder	43 dBA	<35 dBA	N/A	36 dBA
	Day[1]	44 dBA	<35 dBA	N/A	N/A
	Evening[1]	44 dBA*	<35 dBA	<35 dBA	N/A
	Night[1]	42 dBA	<35 dBA	<35 dBA	<35 dBA
Western Receivers	Morning Shoulder	43 dBA	<35 dBA	N/A	<35 dBA
	Day[1]	44 dBA	<35 dBA	N/A	N/A
	Evening[1]	44 dBA*	<35 dBA	<35 dBA	N/A
	Night[1]	42 dBA	<35 dBA	<35 dBA	<35 dBA
North Receivers	Morning Shoulder	49 dBA	42 dBA	N/A	44 dBA
	Day[1]	52 dBA	42 dBA	N/A	N/A
	Evening[1]	50 dBA	43 dBA	45 dBA	N/A
	Night[1]	45 dBA	35 dBA	42 dBA	43 dBA
North East Receivers	Morning Shoulder	49 dBA	42 dBA	N/A	45 dBA
	Day[1]	52 dBA	41 dBA	N/A	N/A
	Evening[1]	50 dBA	42 dBA	49 dBA	N/A
	Night[1]	45 dBA	<35 dBA	44 dBA	43 dBA
East North East Receivers	Morning Shoulder	49 dBA	36 dBA	N/A	40 dBA
	Day[1]	52 dBA	37 dBA	N/A	N/A
	Evening[1]	50 dBA	37 dBA	43 dBA	N/A
	Night[1]	45 dBA	35 dBA	40 dBA	39 dBA
James Erskine Primary	When in use	45 dBA	<35 dBA	N/A	N/A
Minchinbury Primary			<45 dBA	N/A	N/A

1. Intrusive Criteria Applicable - LAeq(15minute);
2. Amenity Criteria Applicable - LAeq(Period);

* Where the PSNC for evening is greater than that of day, the day criteria has been adopted.

Table 7.2 Noise Modelling Summary – Year 13

Location	Modelled Period	Project Specific Noise Criteria LAeq	Calm LAeq	Prevailing Wind LAeq	Inversion LAeq
South West Receivers	Morning Shoulder	43 dBA	<35 dBA	N/A	37 dBA
	Day[1]	44 dBA	<35 dBA	N/A	N/A
	Evening[1]	44 dBA*	<35 dBA	<35 dBA	N/A
	Night[1]	42 dBA	<35 dBA	<35 dBA	<35 dBA
Western Receivers	Morning Shoulder	43 dBA	<35 dBA	N/A	<35 dBA
	Day[1]	44 dBA	<35 dBA	N/A	N/A
	Evening[1]	44 dBA*	<35 dBA	<35 dBA	N/A
	Night[1]	42 dBA	<35 dBA	<35 dBA	<35 dBA
North Receivers	Morning Shoulder	49 dBA	43 dBA	N/A	44 dBA
	Day[1]	52 dBA	43 dBA	N/A	N/A
	Evening[1]	50 dBA	43 dBA	45 dBA	N/A
	Night[1]	45 dBA	39 dBA	40 dBA	41 dBA
North East Receivers	Morning Shoulder	49 dBA	42 dBA	N/A	45 dBA
	Day[1]	52 dBA	42 dBA	N/A	N/A
	Evening[1]	50 dBA	42 dBA	50 dBA	N/A
	Night[1]	45 dBA	38 dBA	45 dBA	42 dBA
East North East Receivers	Morning Shoulder	49 dBA	36 dBA	N/A	40 dBA
	Day[1]	52 dBA	36 dBA	N/A	N/A
	Evening[1]	50 dBA	36 dBA	43 dBA	N/A
	Night[1]	45 dBA	36 dBA	39 dBA	39 dBA
James Erskine Primary	When in use	45 dBA	<35 dBA	N/A	N/A
Minchinbury Primary			<45 dBA	N/A	N/A

1. Intrusive Criteria Applicable - LAeq(15minute);
2. Amenity Criteria Applicable - LAeq(Period);

* Where the PSNC for evening is greater than that of day, the day criteria has been adopted.

Criteria exceedences are in bold

Table 7.3 Noise Modelling Summary – Year 20

Location	Modelled Period	Project Specific Noise Criteria LAeq	Calm LAeq	Prevailing Wind LAeq	Inversion LAeq
South West Receivers	Morning Shoulder	43 dBA	<35 dBA	N/A	40 dBA
	Day[1]	44 dBA	<35 dBA	N/A	N/A
	Evening[1]	44 dBA*	<35 dBA	<35 dBA	N/A
	Night[1]	42 dBA	<35 dBA	<35 dBA	<35 dBA
Western Receivers	Morning Shoulder	43 dBA	<35 dBA	N/A	37 dBA
	Day[1]	44 dBA	<35 dBA	N/A	N/A
	Evening[1]	44 dBA*	<35 dBA	<35 dBA	N/A
	Night[1]	42 dBA	<35 dBA	<35 dBA	<35 dBA
North Receivers	Morning Shoulder	49 dBA	44 dBA	N/A	46 dBA
	Day[1]	52 dBA	44 dBA	N/A	N/A
	Evening[1]	50 dBA	44 dBA	47 dBA	N/A
	Night[1]	45 dBA	43 dBA	45 dBA	45 dBA
North East Receivers	Morning Shoulder	49 dBA	42 dBA	N/A	45 dBA
	Day[1]	52 dBA	42 dBA	N/A	N/A
	Evening[1]	50 dBA	42 dBA	49 dBA	N/A
	Night[1]	45 dBA	42 dBA	45 dBA	45 dBA
East North East Receivers	Morning Shoulder	49 dBA	37 dBA	N/A	41 dBA
	Day[1]	52 dBA	37 dBA	N/A	N/A
	Evening[1]	50 dBA	<35 dBA	44 dBA	N/A
	Night[1]	45 dBA	37 dBA	42 dBA	40 dBA
James Erskine Primary	When in use	45 dBA	<35 dBA	N/A	N/A
Minchinbury Primary			<45 dBA	N/A	N/A

1. Intrusive Criteria Applicable - LAeq(15minute);
2. Amenity Criteria Applicable - LAeq(Period);
   Includes loader sound power level of 111 dBA for this stage

* Where the PSNC for evening is greater than that of day, the day criteria has been adopted.
Criteria exceedences are in bold

Tables 7.1 to *7.3* show that modelled noise levels for all stages of the Project operations are predicted to meet the relevant Project Specific Noise Criteria at most sensitive receivers during all meteorological conditions.

7.1.1 Construction Noise

Construction Equipment

Construction works for the Facility are expected to last for approximately six months. The construction noise impact assessment has adopted the items of equipment presented in *Table 7.4*, and associated noise emission data, as obtained from the ERM noise database. Modelling conservatively assumed that construction equipment is operating at the proposed location of the crushing and screening facilities, as this is the construction area located closest to potentially sensitive receivers.

Table 7.4 Construction Plant

Plant and Equipment	Sound Power Level (LA10)
Compressor	94 dBA
Transit Mixer	114 dBA
Excavator	114 dBA
Crane	108 dBA
Hand tools (including grinding, hammering etc.)	108 dBA

Construction Modelling Results

The ENM model results for construction works are presented in *Table 7.5*. It can be seen that construction noise is not expected to exceed the relevant criteria at any of the assessed receivers.

Table 7.5 Construction Emissions Summary

Location	Project Specific Noise Criteria LA10	Calculated LA10 (Calm)
South West Receivers	Day – 44 dBA	<30 dBA
Western Receivers	Day – 44 dBA	<30 dBA
North Receivers	Day - 52 dBA	38 dBA
North East Receivers	Day - 52 dBA	37 dBA
East North East Receivers	Day - 52 dBA	30 dBA

7.2 *ROAD TRAFFIC NOISE*

The US Environment Protection Agency's method was used to predict the LAeq noise levels from traffic travelling along Wallgrove Road and the M4 Motorway, at residences adjacent to these routes. It is an internationally accepted theoretical traffic noise prediction model which takes into account the vehicle noise levels (light and heavy), receiver offset distance, passby duration, vehicle speed, ground absorption (based on the ratio of soft ground and average height of propagation), number of vehicle movements, receiver height, truck exhaust height and the height and location of any intervening barriers.

To predict road traffic noise from the Project, it was necessary to take into account the volume of vehicles predicted to travel to and from the site. Traffic generation predictions supplied by the proponent for a worst case traffic generation scenario, whereby 80% of incoming waste is recycled and transported back off site are presented in *Table 7.6* and were used for this assessment. This scenario would result in approximately 972 vehicle movements per day from the Project.

For assessment of road traffic noise during the daytime, it was conservatively assumed that all daily movements (refer *Table 7.6*) would occur during the daytime period between 7:00am and 10:00pm. To assess worst-case impacts during the night-time, a conservative scenario was modelled, whereby one quarter of medium and heavy vehicle daily waste deliveries (approximately 120 movements) occur during the night period between 10:00pm and 7:00am. This would include deliveries during standard operating hours between 6:00am and 7:00am, as well as movements associated with the occasional delivery of waste after 10:00pm (anticipated to occur once per week).

Table 7.6 Vehicle Movement Distribution

	Daily Movements		
Activity	**Light**	**Medium**	**Heavy**
Staff Movements	76	-	-
Subcontractors	8	-	-
Site Visitors	8	-	-
Waste Deliveries	62	166	314
Product Dispatch	62	86	182
General Deliveries (fuel, workshop and administrative supplies, service and maintenance activities etc)	4	2	2
TOTAL	**220**	**254**	**498**

For this assessment, it has been conservatively assumed that all site traffic travel along both Wallgrove Road and the M4 Motorway, in one direction to and from site. Results of the intermittent traffic noise assessment are presented in *Table 7.7*. These results show that the predicted traffic noise from existing traffic (determined from noise logger data) plus additional vehicle movements from the Project would remain below the relevant ECRTN criteria at the nearest receivers to Wallgrove Road and the M4 Motorway. Additionally it can be seen that Project traffic will not increase existing noise levels by more than 2 dBA.

Table 7.7 Road Traffic Noise Impacts

Location	Existing Traffic Noise	Calculated Maximum Traffic Noise Contribution of Project	Calculated Existing + Project Traffic Noise	Noise Design Criteria
Parameter		LAeq(15hour) Day		
Wallgrove Road at 35 metres	53 dBA	51 dBA	55 dBA	60 dBA
M4 Motorway at 75 metres	54 dBA	47 dBA	55 dBA	60 dBA
Parameter		LAeq(9hour) Night		
Wallgrove Road at 35 metres	48 dBA	44 dBA	50 dBA	55 dBA
M4 Motorway at 75 metres	50 dBA	42 dBA	51 dBA	55 dBA

1. Analysis of LAeq logging data for each location was used to establish the existing traffic noise contribution for the day and night period. Logger data from McFarlane Crescent was used for the M4 traffic noise contribution, while data from the Swamphen Street logger was taken as a conservative traffic noise contribution for Wallgrove Road.

Recent information has been provided by the proponent regarding traffic volumes. Revised traffic movements are identified to be 340,200 movements PA rather than the assessed worst case of 354,780 movements PA. Therefore, noise levels presented in *Table 7.7* should be considered highly conservative. It should also be noted that traffic noise emissions comply with the ECRTN even when adopting higher traffic volumes for the site.

7.3 *SLEEP DISTURBANCE*

Although site operations will generally not occur in the night time period, approximately once per week waste may be received into the site after 10.00 pm. To assess sleep disturbance typical of night time waste receival activities, noise for the following LAmax noise sources have been calculated:

- truck start up Lmax
- truck - brake release Lmax

- heavy door slam Lmax

ENM modelling results during prevailing weather conditions are presented in *Table 7.8* for representative receivers. The modelling results indicate that maximum noise emissions during night time operations are predicted to remain below the sleep disturbance noise criteria.

Table 7.8 Sleep Disturbance Noise Impacts

Locality	Sleep Disturbance Noise Criteria (LA1(1minute))	Predicted Noise Level	
		Inversion LA10	Prevailing Winds LA10 (source to receiver)
South West Receivers	55 dBA	<35 dBA	35 dBA
Western Receivers	55 dBA	<35 dBA	<35 dBA
North Receivers	56 dBA	41 dBA	38 dBA
North East Receivers	56 dBA	44 dBA	45 dBA
East North East Receivers	56 dBA	<35 dBA	36 dBA

7.4 CUMULATIVE NOISE

The existing Hanson operations to the south east of the site are the main source of existing industrial noise in the area. Noise emissions from the proposed facility may contribute to existing industrial noise levels and potentially increase cumulative noise.

However, attended and unattended measurements identify that the existing industrial noise emissions at receivers west and the north of the proposed facility are minimal. The acoustical environment of the surrounding community is dominated by traffic from the M4 Motorway. Therefore, a cumulative impact assessment has been undertaken adopting the background noise level from the unattended loggers minus 10 dBA for the conservatively estimated industrial noise contribution from the daytime attended measurements. The cumulative impact assessment is for the worst case noise generating stage of the development, i.e. Year 20. Cumulative industrial noise levels from the facility's emissions and the existing measured industrial noise emissions are presented in *Table 7.9* for calm and noise enhancing weather conditions.

Table 7.9 Cumulative Impacts

Location	Amentiy Noise Criteria LAeq	Calm LAeq	Prevailing Wind LAeq	Inversion LAeq
South West Receivers	Day - 60 dBA	36 dBA	N/A	N/A
	Evening[1] - 50 dBA*	36 dBA	36 dBA	N/A
	Night[1] - 45 dBA	36 dBA	36 dBA	36 dBA
Western Receivers	Day - 60 dBA	36 dBA	N/A	N/A
	Evening[1] - 50 dBA*	36 dBA	36 dBA	N/A
	Night[1] - 45 dBA	36 dBA	36 dBA	36 dBA
North Receivers	Day - 60 dBA	45 dBA	37 dBA	N/A
	Evening[1] - 50 dBA*	45 dBA	47 dBA	N/A
	Night[1] - 45 dBA	43 dBA	45 dBA	45 dBA
North East Receivers	Day - 60 dBA	43 dBA	N/A	N/A
	Evening[1] - 50 dBA*	43 dBA	49 dBA	N/A
	Night[1] - 45 dBA	42 dBA	45 dBA	45 dBA
East North East Receivers	Day - 60 dBA	40 dBA	N/A	N/A
	Evening[1] - 50 dBA*	39 dBA	45 dBA	N/A
	Night[1] - 45 dBA	36 dBA	42 dBA	41 dBA

Table 7.9 shows that cumulative noise impacts are predicted to be negligible, remaining below the amenity noise goals during all modelled weather conditions.

Noise mitigation measures that form part of the Project design include:

- restricting normal hours of operation to 6:00 am to 10:00 pm, with landfilling operations further restricted to the hours between 6:00 am and 6:00 pm (receival of material would occur after 10:00 pm on occasion); and

- constructing impervious barriers at various positions around the facility, including 10 m high barriers to the north, north west, west and south of the main area of operations and retention of the existing earth mound to the north east of the quarry pit. These barriers are included in the noise modelling results presented in this report.

In addition, it is recommended that the following noise mitigation measures be included in a Noise Management Plan prepared for the site, potentially as part of the overall Waste Management Plan:

- all on-site, fixed and mobile diesel powered plant, excluding road vehicles, are to be correctly fitted and maintained in accordance with the manufacturer's specifications. Particular attention is to be given to engine exhaust systems and the care and maintenance of mufflers and loaders during the last stages of this proposal where plant items are nearer to the surface.

9 *CONCLUSION*

ERM has completed a noise impact assessment for the proposed Light Horse Business Centre at Eastern Creek, NSW.

Conservative modelling has shown that operational noise emissions are predicted to meet the relevant project specific noise criteria at all receivers during calm and prevailing meteorological conditions.

Noise emissions associated with construction activities for the Project will meet the relevant construction noise goal criteria. Sleep disturbance and cumulative noise impact due to the Project are not considered likely. Traffic noise levels are predicted to increase due to Project traffic, but remain below relevant ECRTN criteria.

REFERENCES

Calculation of Road Traffic Noise (CORTN)(1988), Department of Transport, UK.

Department of Environment and Climate Change (1994) of NSW, Environmental Noise Control Manual (ENCM).

Department of Environment and Climate Change (January 2000), Industrial Noise Policy.

Department of Environment and Climate Change (May 1999), Environmental Criteria for Road Traffic Noise (ECRTN).

RTA Technology, Environmental Noise Model (ENM), Windows Version 3.06.

Annex A

Sound Power Spectral Data

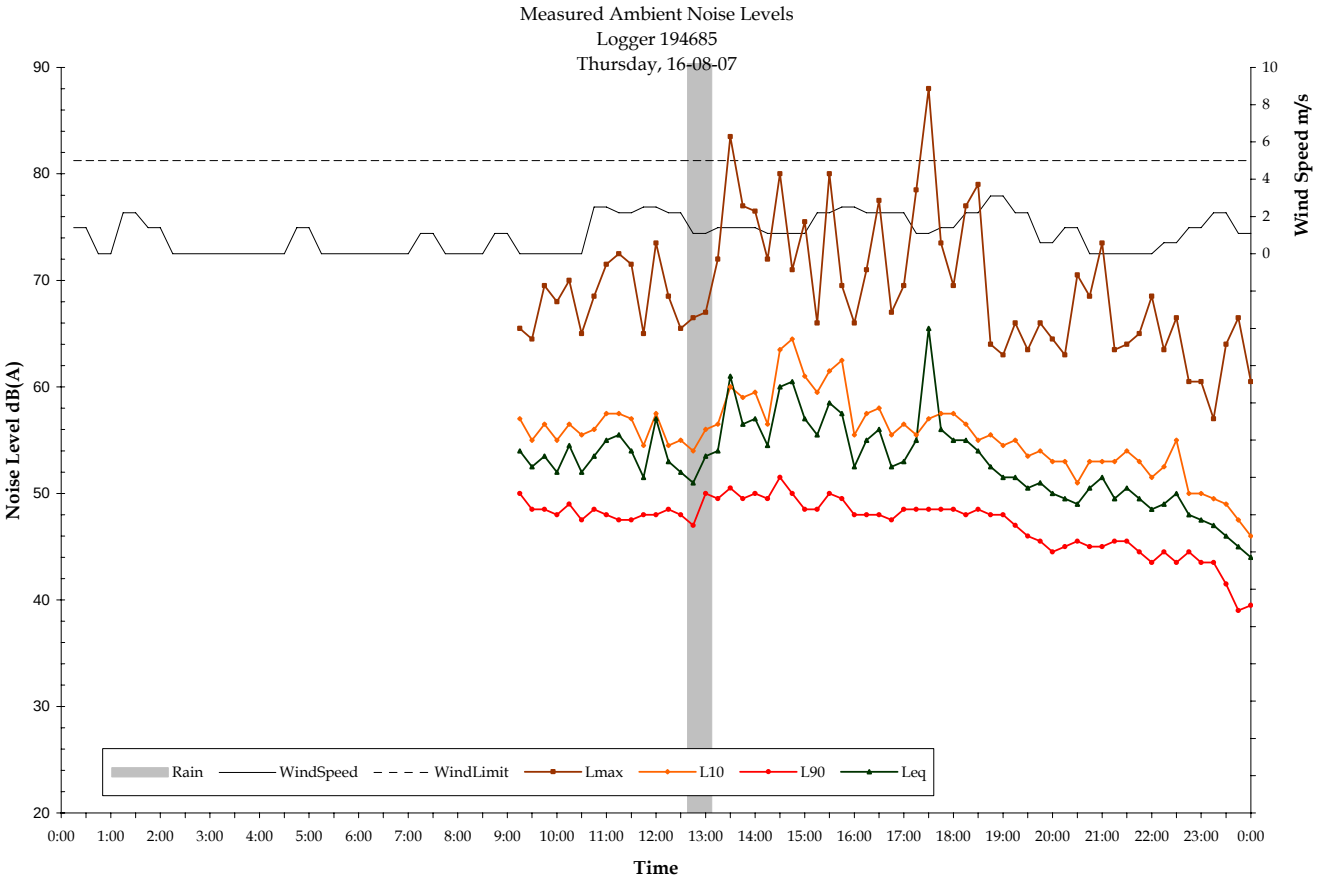
Table A.1 Sound Power Spectral Data

Sound Power Level Spectrum for ENM									
Noise Source	**Linear Frequency (Hz)**								**Total**
	63	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**dB(A)**
CAT 740 Dump Truck	113	106	103	98	97	96	91	83	103
HITACHI AH 500 Dump Truck	116	109	106	101	100	99	94	86	106
IVECO T2700 Water Cart	111	102	102	98	99	100	92	86	105
IVECO T2700 Hooklift Truck	107	98	98	94	95	96	88	82	101
CAT 320 CL Excavator	107	110	102	104	100	97	93	88	106
Hitachi ZX230 Excavator	107	111	102	101	98	96	87	79	104
Hyundai 14LC7 Excavator	112	106	102	102	101	97	87	77	105
CAT980 Loader	113	119	117	110	108	107	101	97	115
CAT996 Loader	112	111	107	106	105	103	95	92	110
CAT Dozer D8R	112	122	109	108	106	107	103	94	113
Mobile Screens EXTEC	117	107	102	98	94	92	89	85	101
Mobile Screens KEYSTRAC	117	107	102	98	94	92	89	85	101
Mobile Crusher EXTECC12	115	114	114	111	110	107	102	96	114
Stationary Crusher	115	114	114	111	110	107	102	96	114

Sound Power Level Spectrum for ENM									
Hyster Forklift	92	105	102	102	95	97	91	84	103
CAT 826 Compactor	107	112	115	110	108	105	99	93	113
IVECO T2700 Water Cart2	111	102	102	98	99	100	92	86	105
Road Truck	118	114	102	95	96	99	94	89	89

Annex B

Unattended Monitoring Data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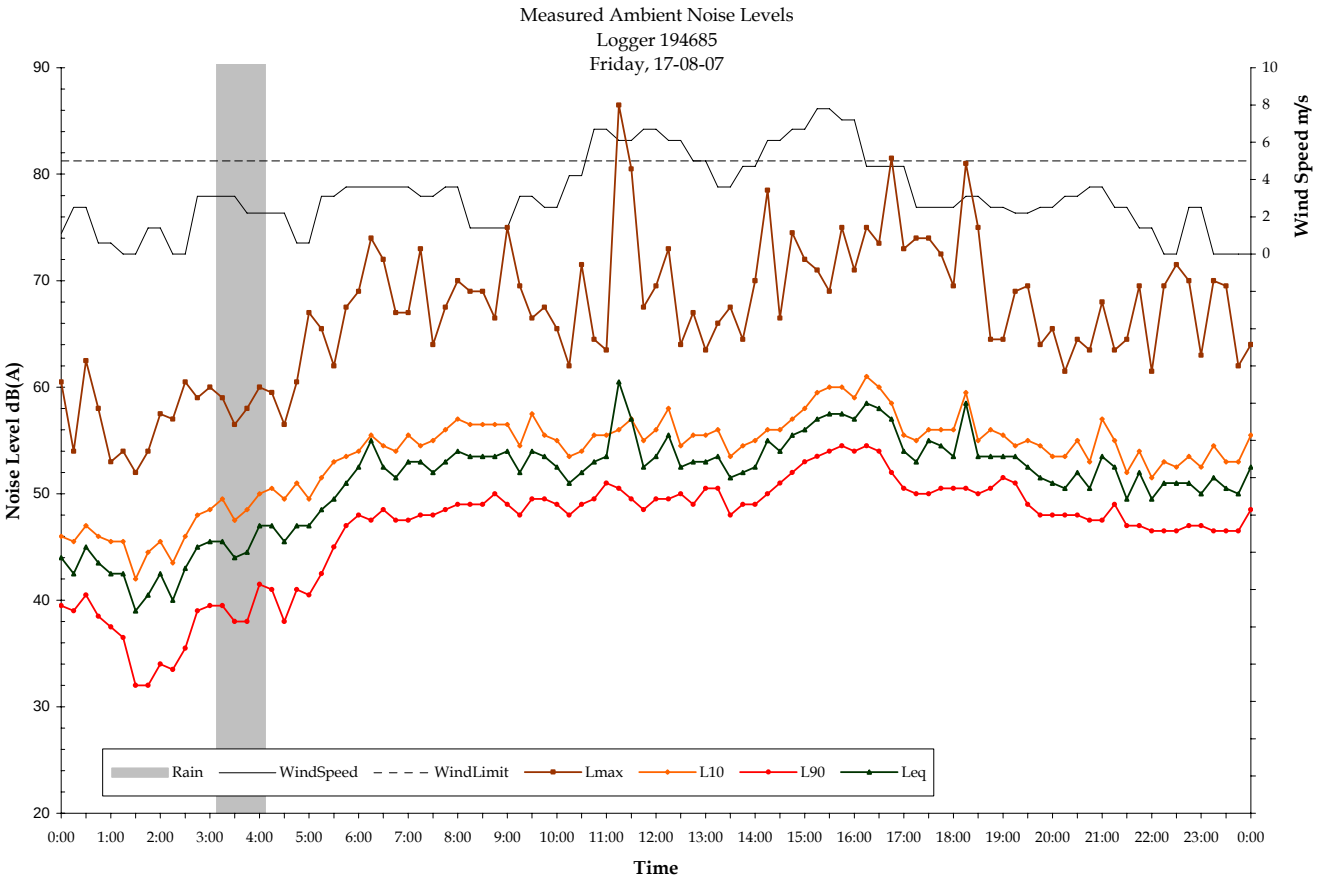
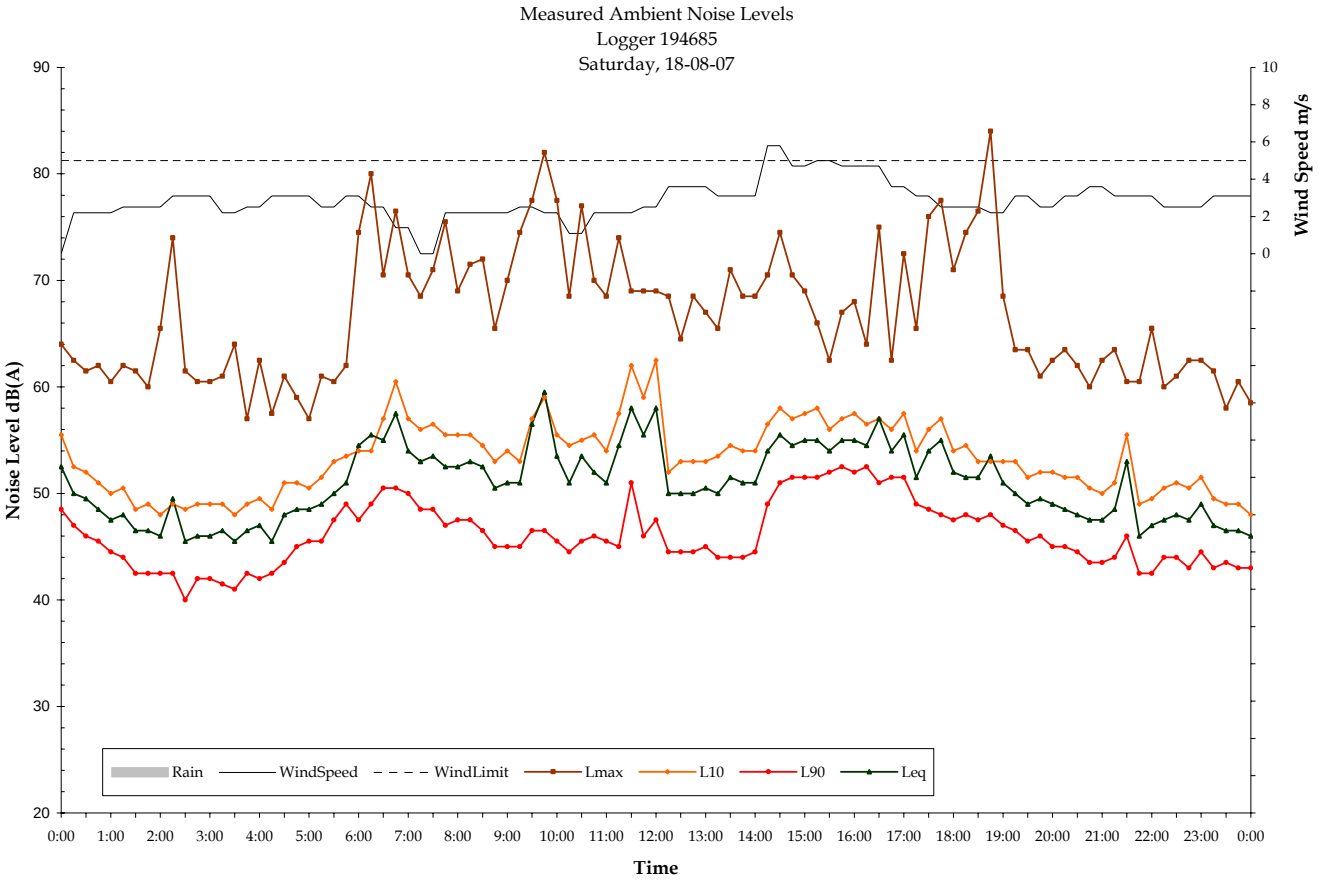
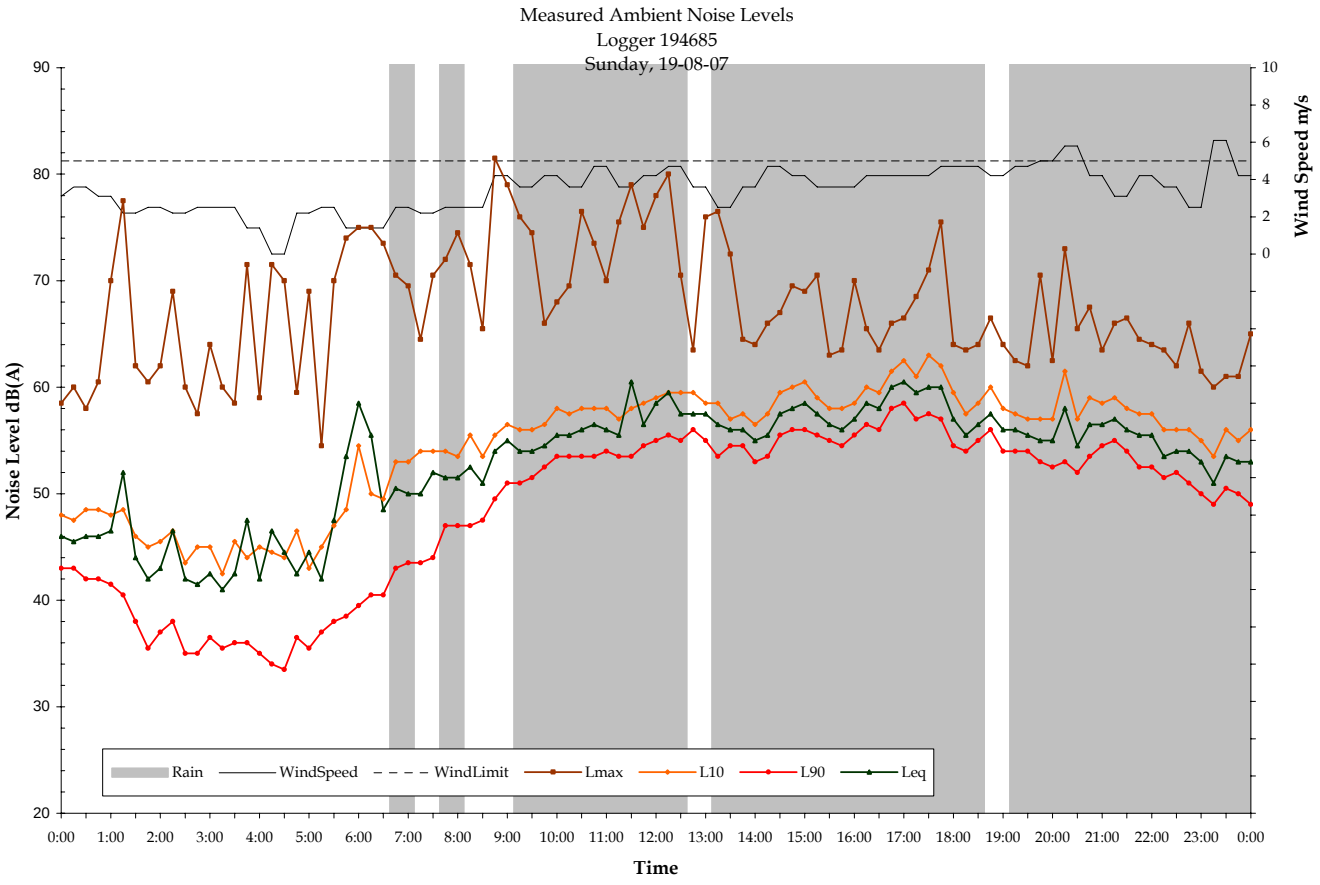
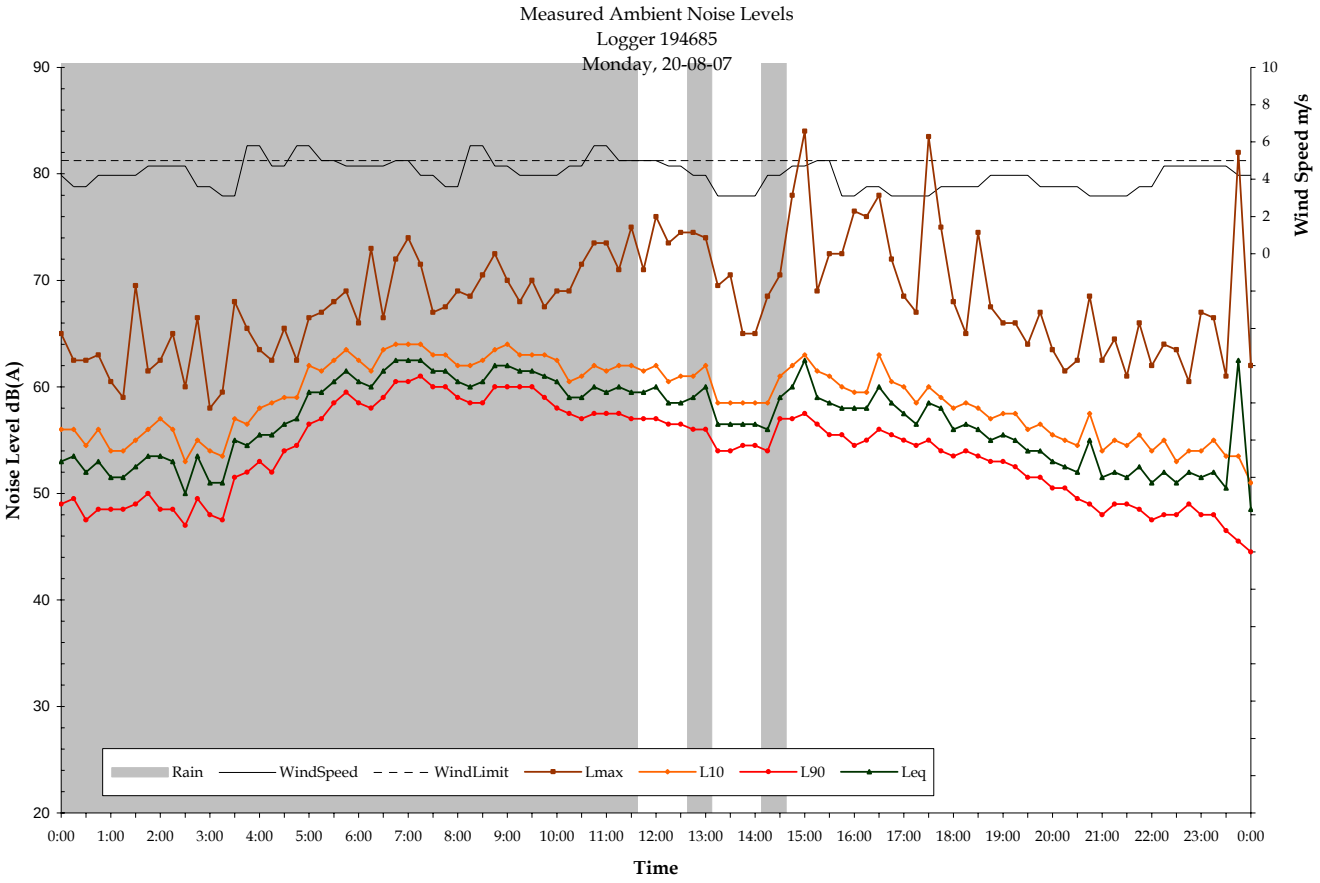
Logger 194685
Thursday, 16-08-07
Noise Level dB(A)
Wind Speed m/s
Time
Rain
WindSpeed
WindLimit
Lmax
L10
L90
Leq

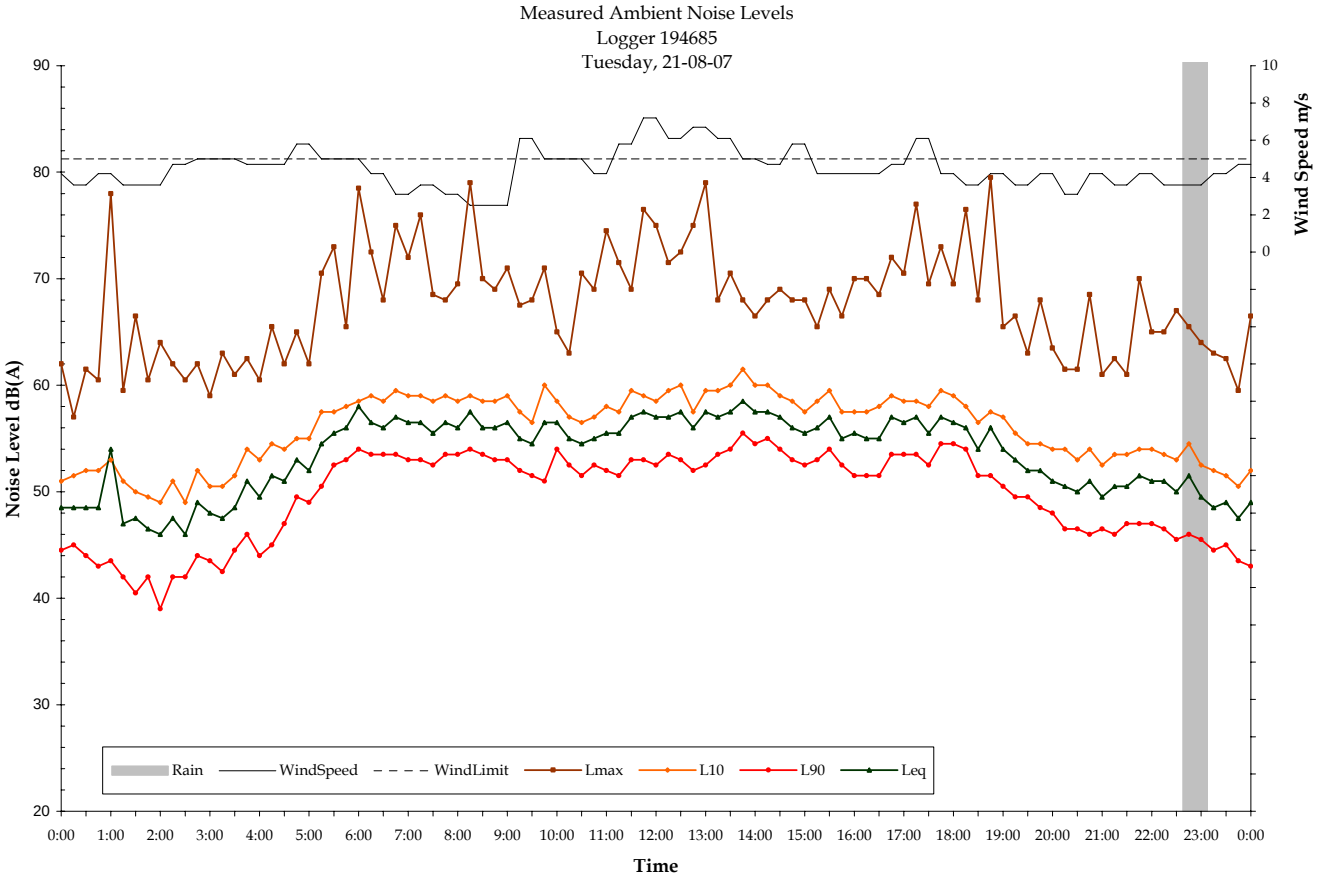

Measured Ambient Noise Levels
Logger 194685
Friday, 17-08-07
Noise Level dB(A)
Wind Speed m/s
Time
Rain
WindSpeed
WindLimit
Lmax
L10
L90
Leq


Measured Ambient Noise Levels
Logger 194685
Saturday, 18-08-07
Noise Level dB(A)
Wind Speed m/s
Time
Rain
WindSpeed
WindLimit
Lmax
L10
L90
Leq

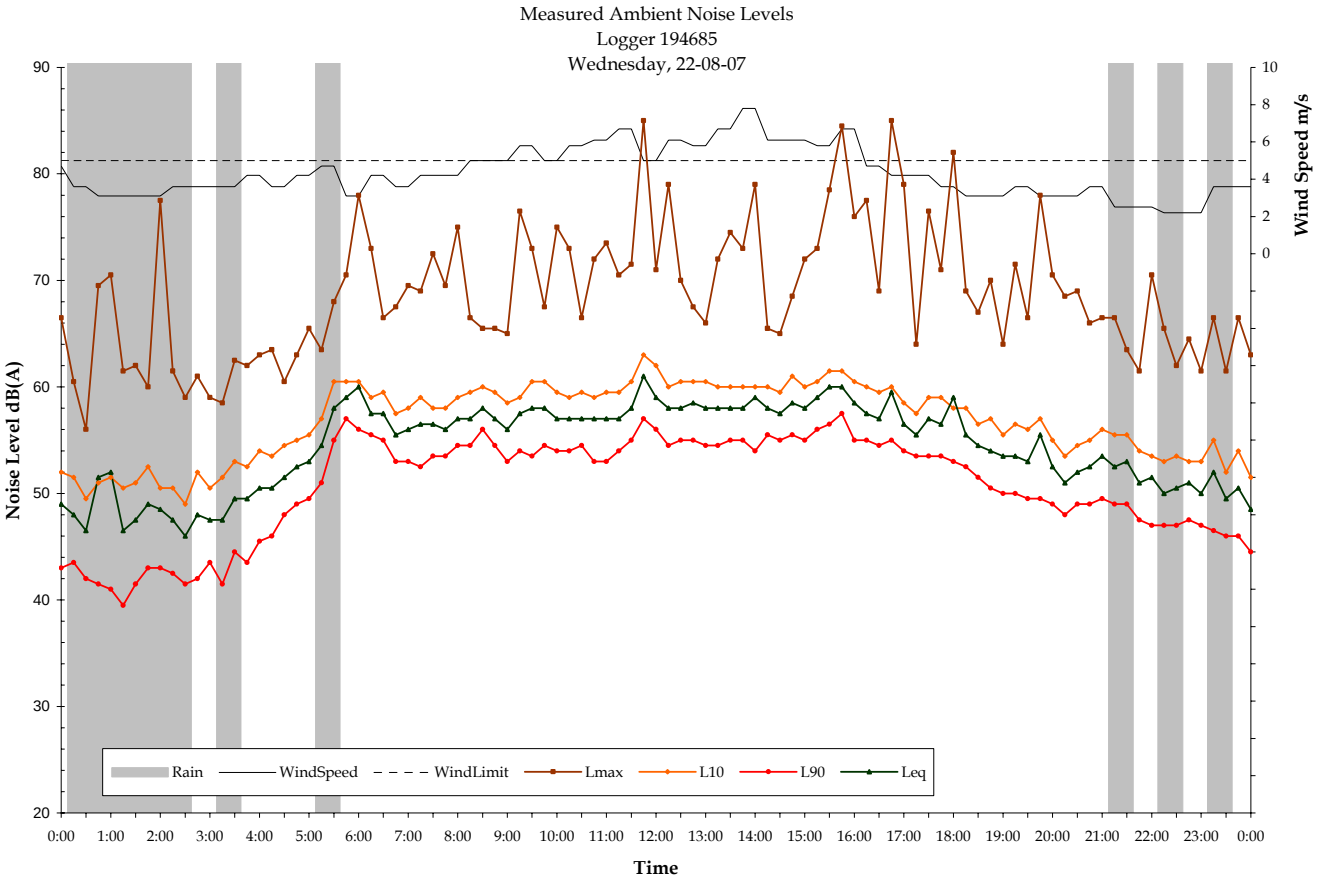

Measured Ambient Noise Levels
Logger 194685
Sunday, 19-08-07
Noise Level dB(A)
Wind Speed m/s
Time
Rain
WindSpeed
WindLimit
Lmax
L10
L90
Leq

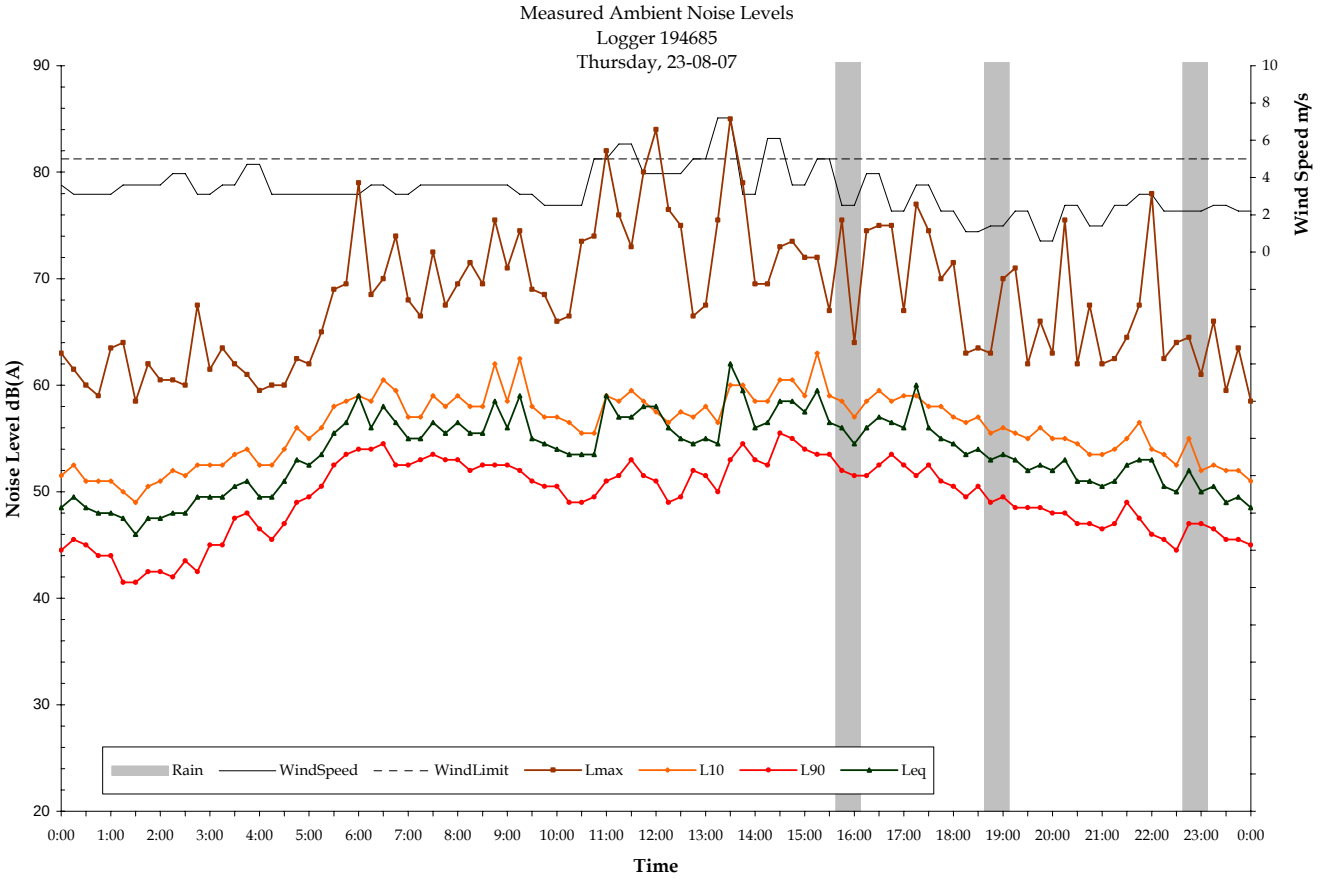
Noise Monitoring Data – 166 McFarlane Drive, Minchinbury, NSW

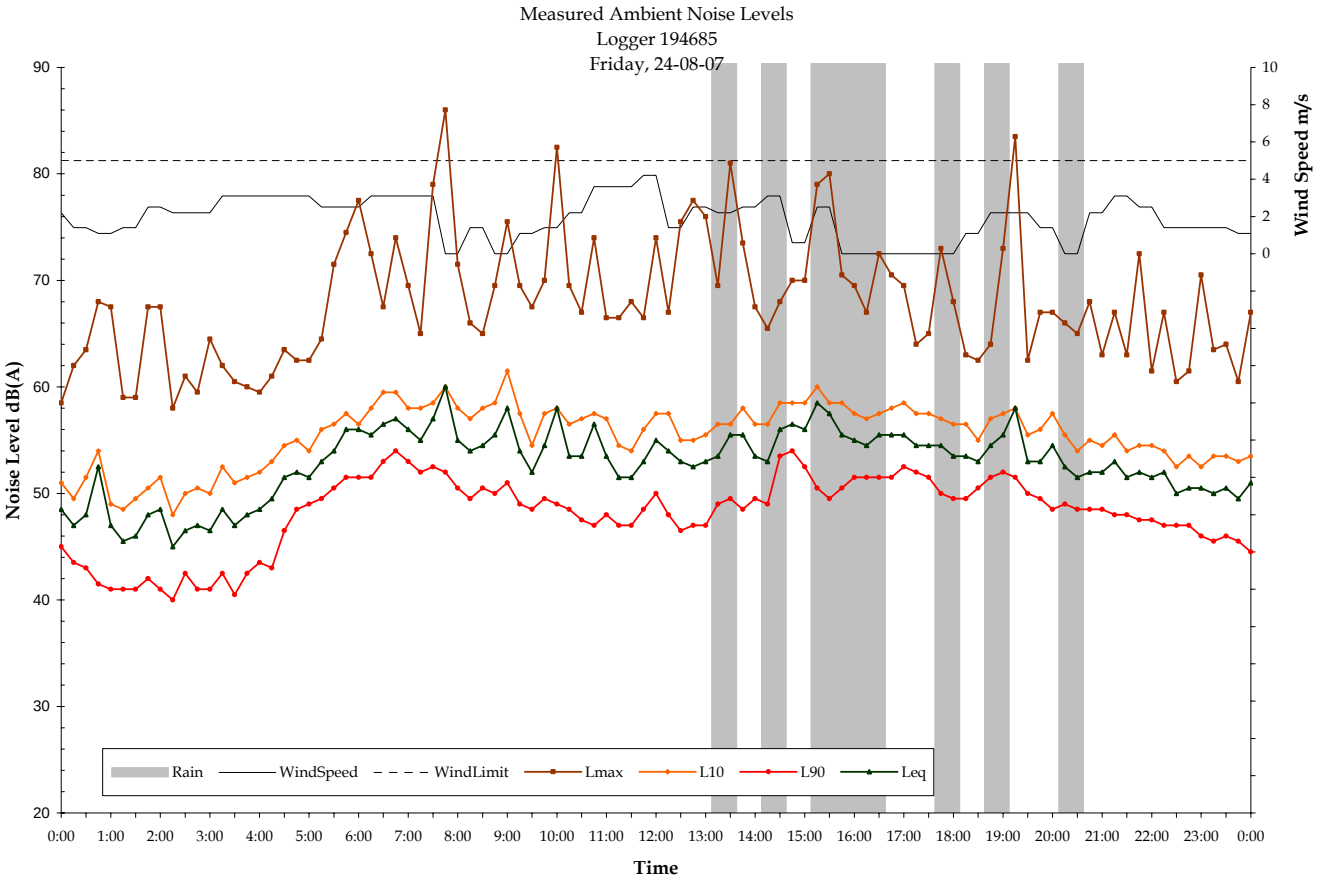


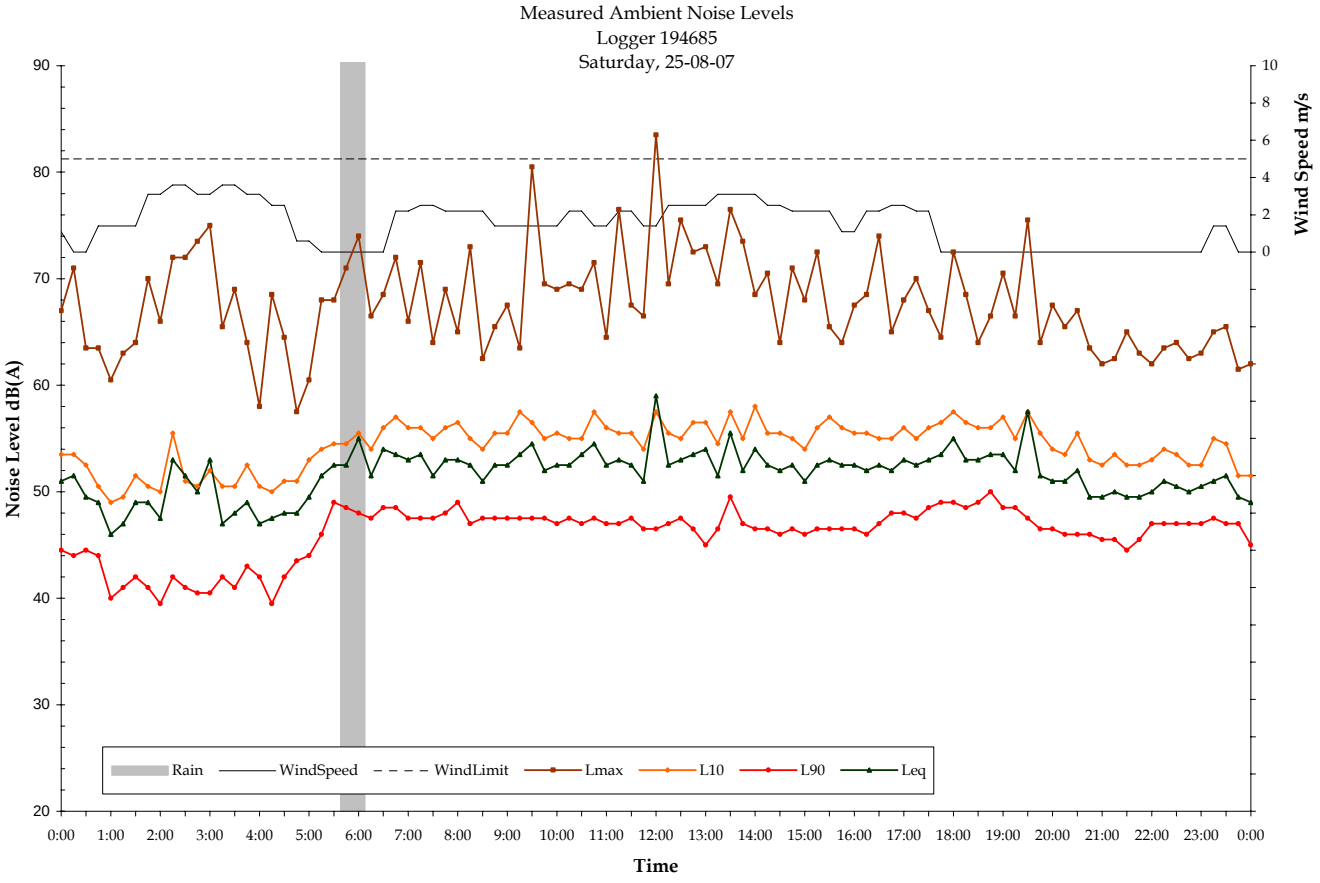


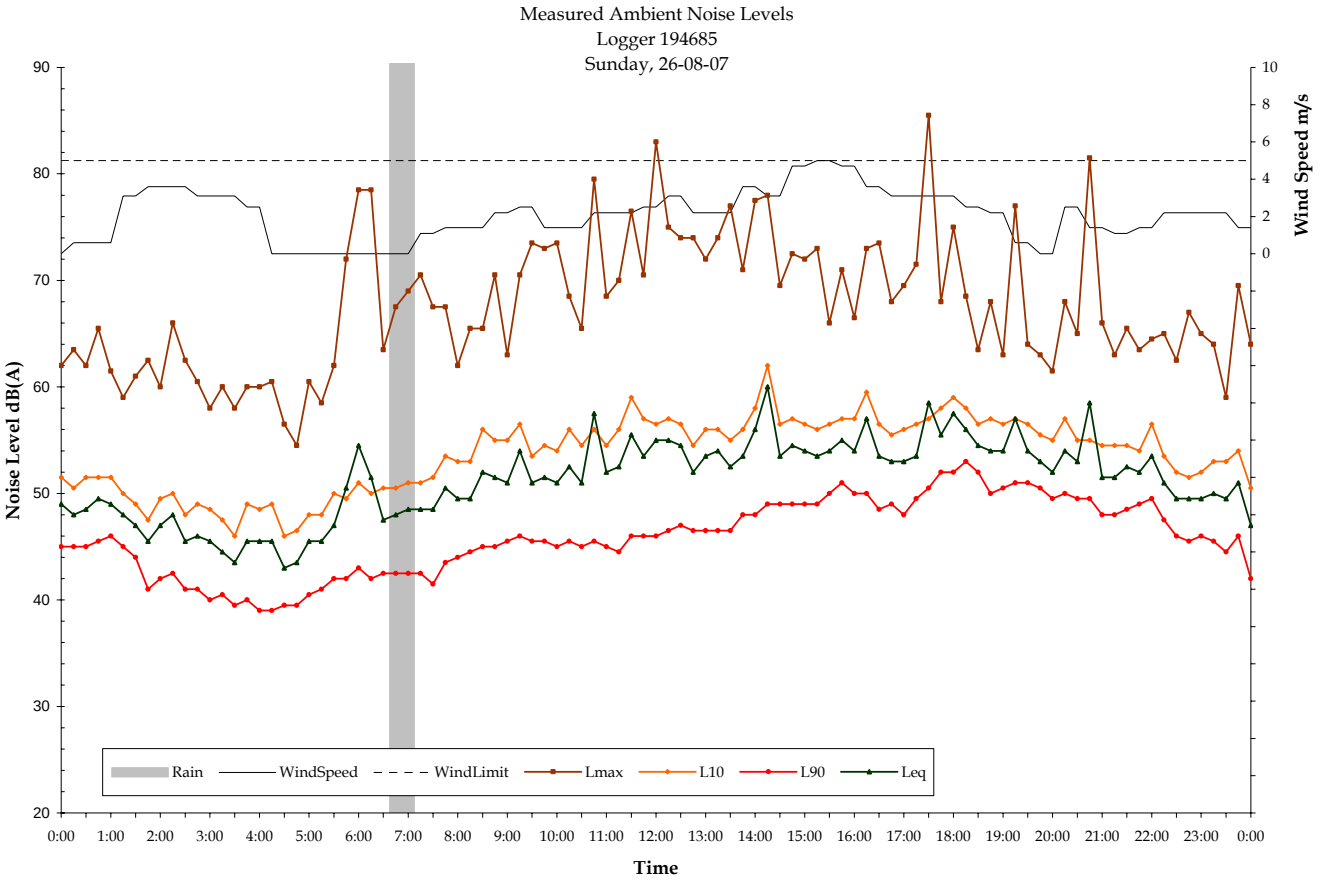
Noise Monitoring Data – 166 McFarlane Drive, Minchinbury, NSW

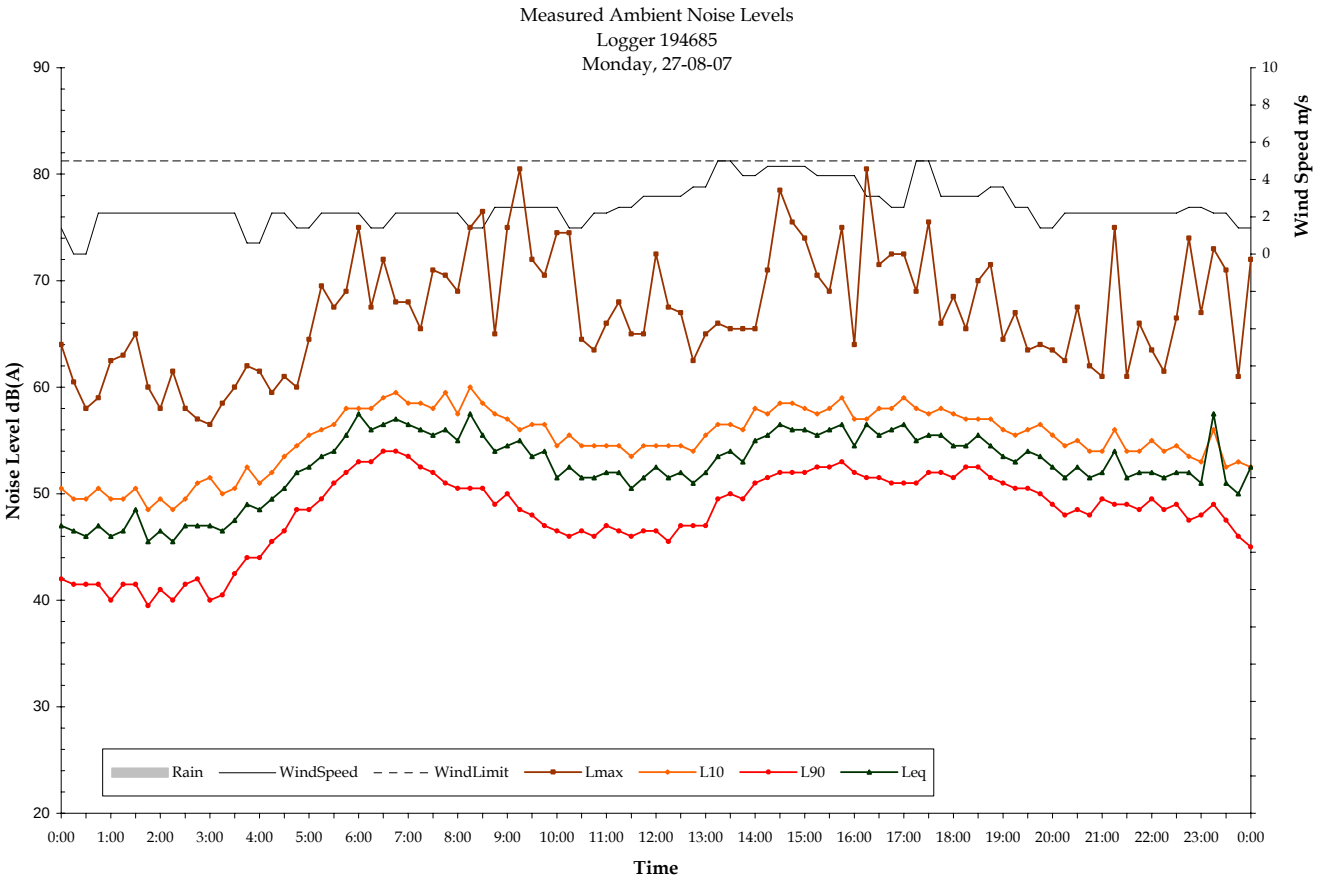


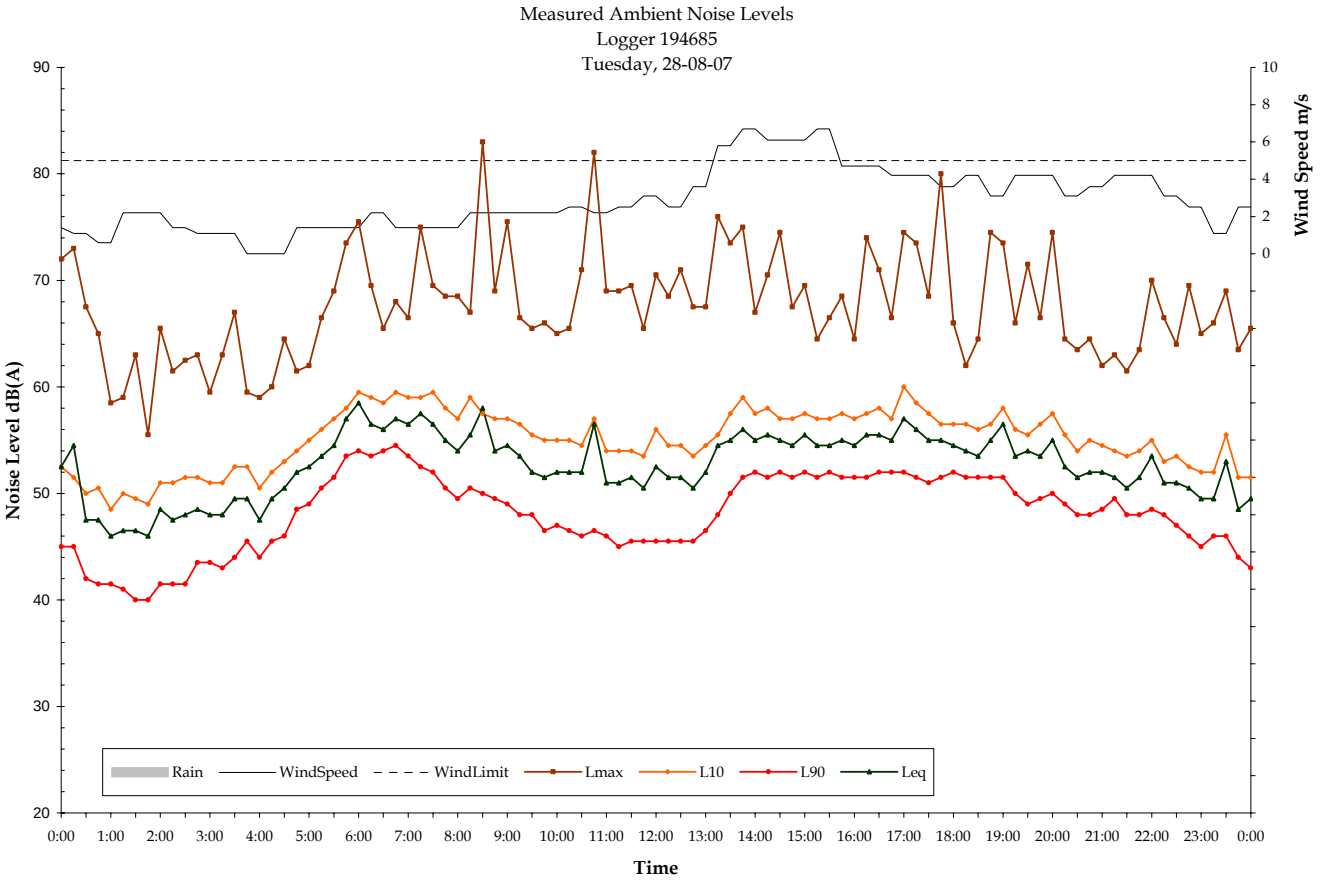


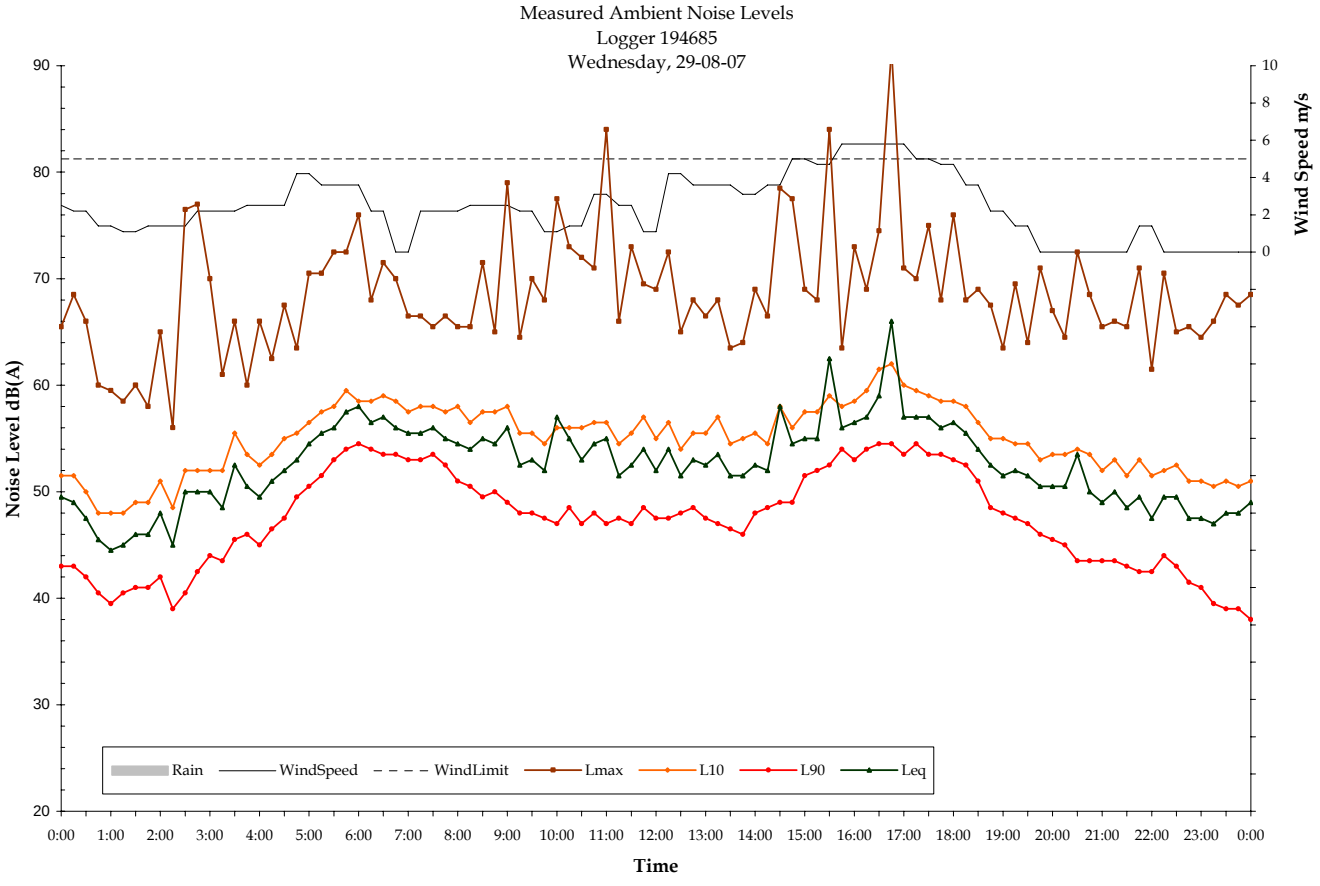

Measured Ambient Noise Levels
Logger 194685
Friday, 24-08-07
Noise Level dB(A)
Wind Speed m/s
Time
Rain
WindSpeed
WindLimit
Lmax
L10
L90
Leq

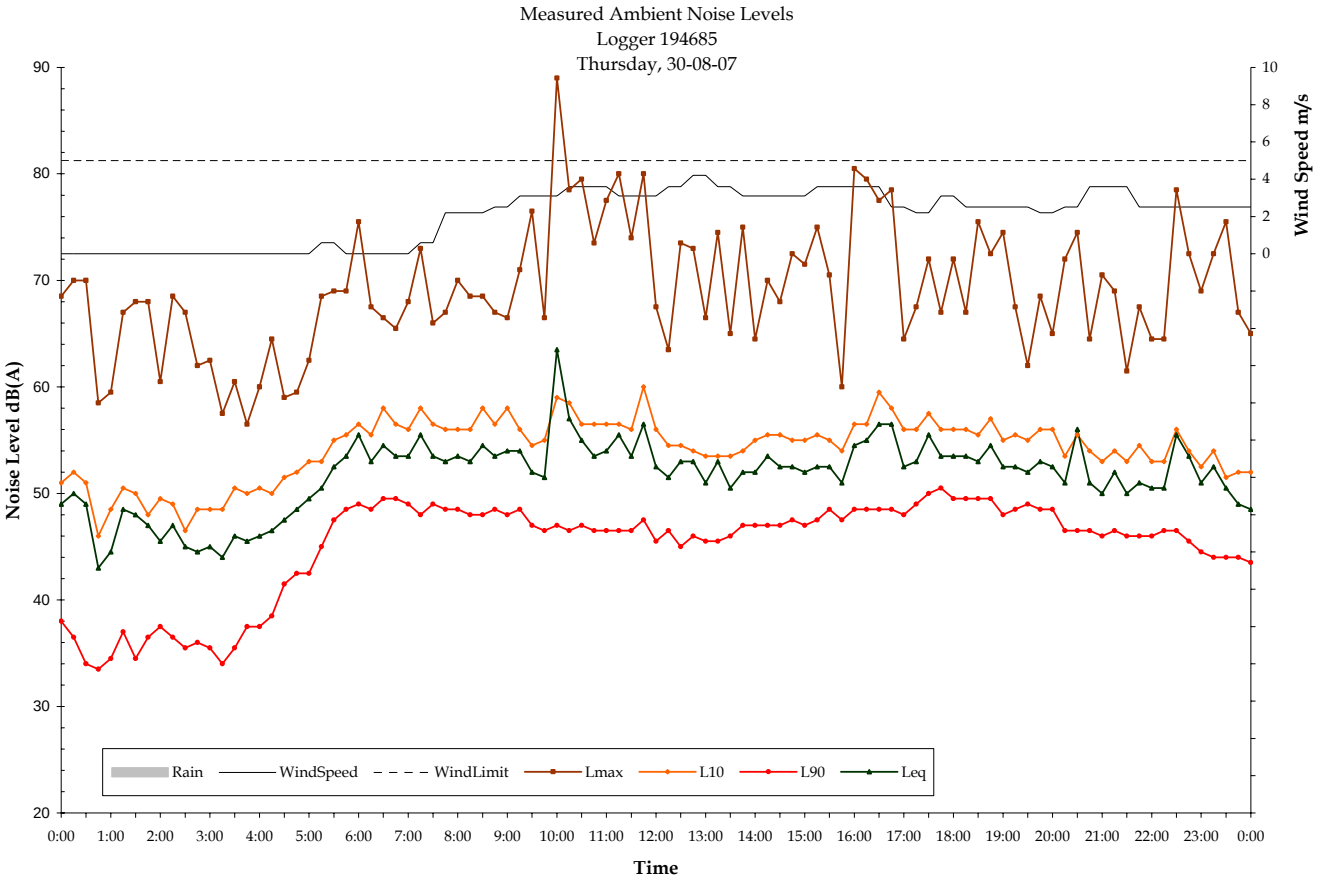

Measured Ambient Noise Levels
Logger 194685
Saturday, 25-08-07
Noise Level dB(A)
Wind Speed m/s
Time
Rain
WindSpeed
WindLimit
Lmax
L10
L90
Leq

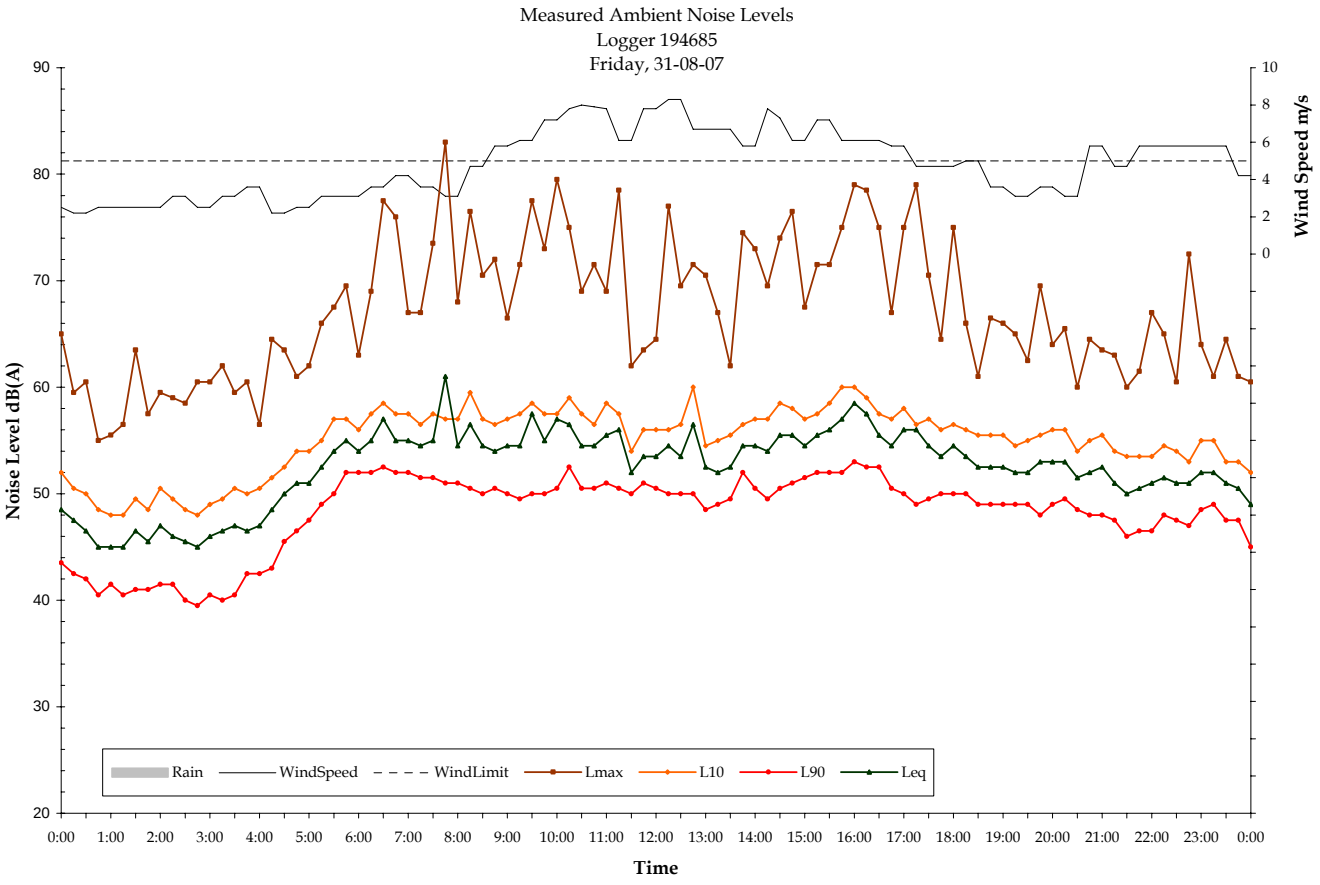

Measured Ambient Noise Levels
Logger 194685
Sunday, 26-08-07
Noise Level dB(A)
Wind Speed m/s
Time
Rain
WindSpeed
WindLimit
Lmax
L10
L90
Leq

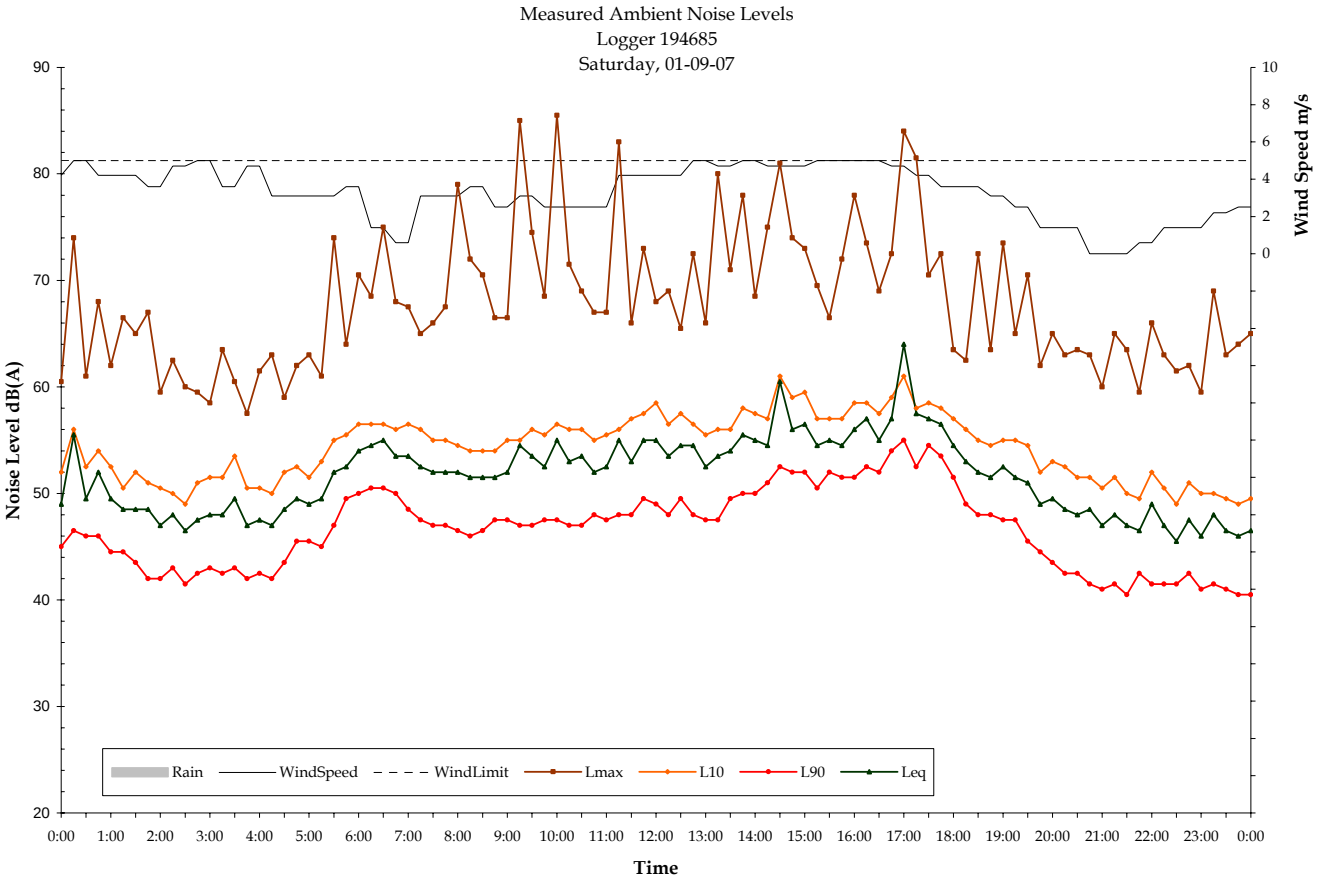

Measured Ambient Noise Levels
Logger 194685
Monday, 27-08-07
Noise Level dB(A)
Wind Speed m/s
Time
Rain
WindSpeed
WindLimit
Lmax
L10
L90
Leq

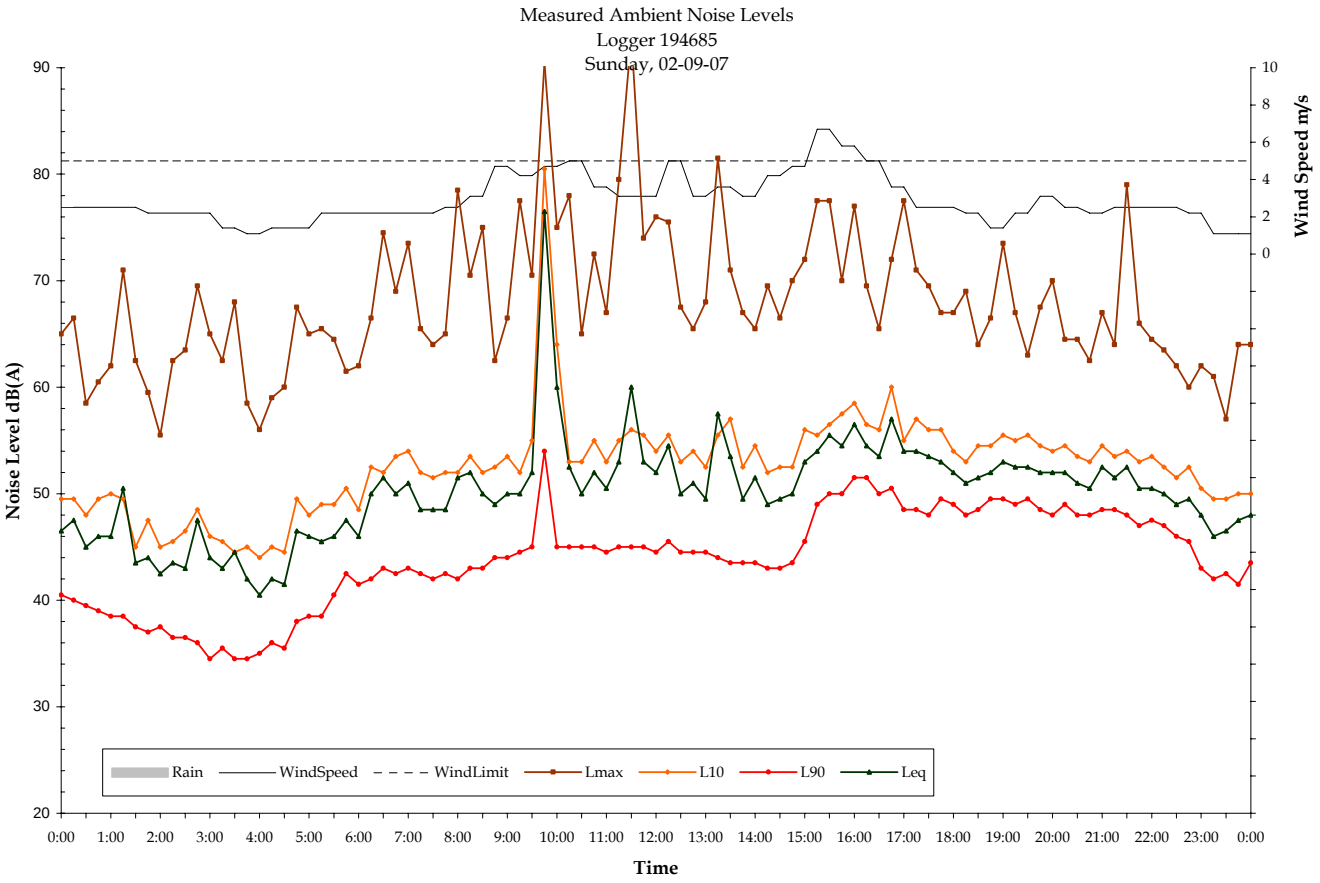

Measured Ambient Noise Levels
Logger 194685
Tuesday, 28-08-07
Noise Level dB(A)
Wind Speed m/s
Rain
WindSpeed
WindLimit
Lmax
L10
L90
Leq
Time

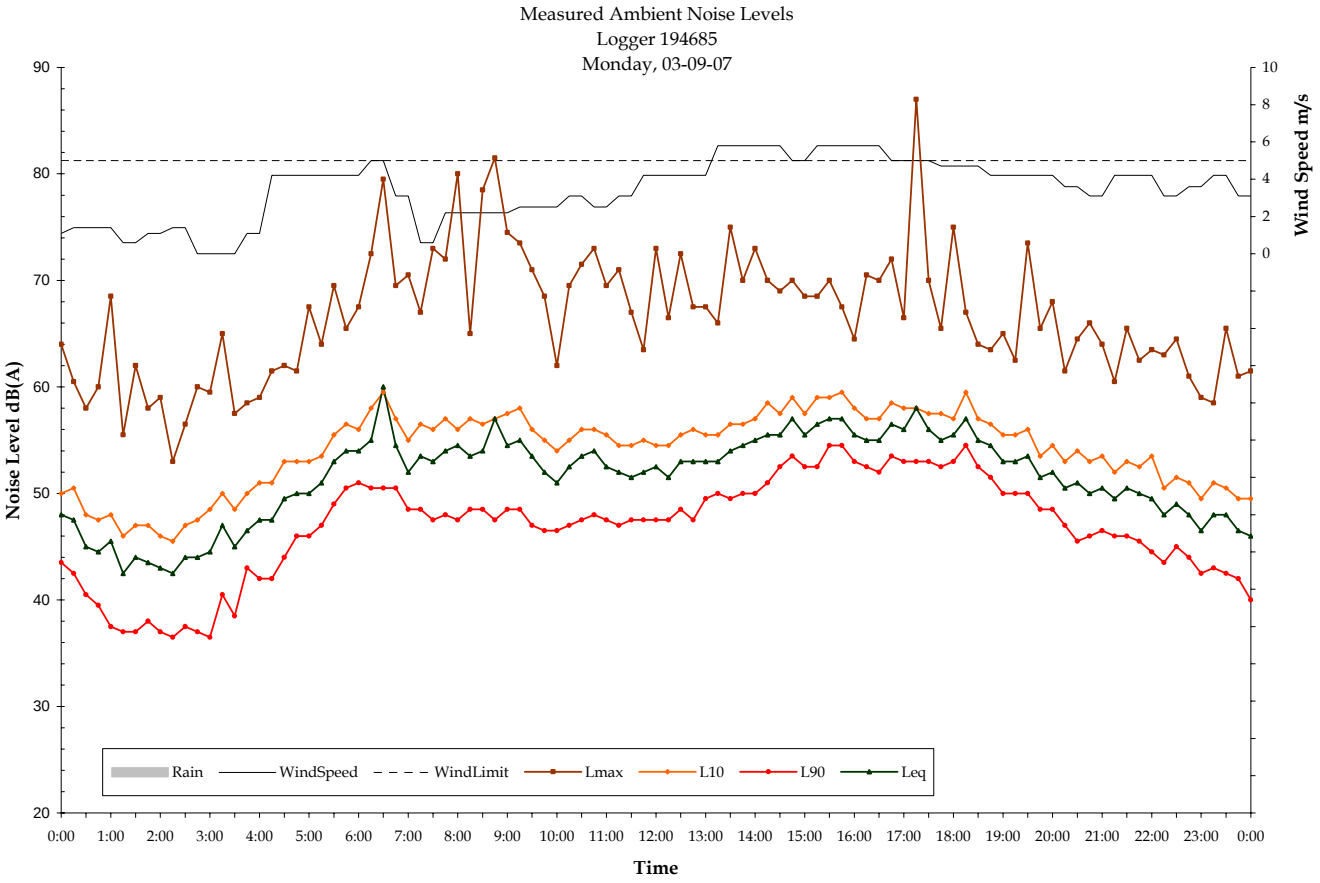

Measured Ambient Noise Levels
Logger 194685
Wednesday, 29-08-07
Noise Level dB(A)
Wind Speed m/s
Rain
WindSpeed
WindLimit
Lmax
L10
L90
Leq
Time

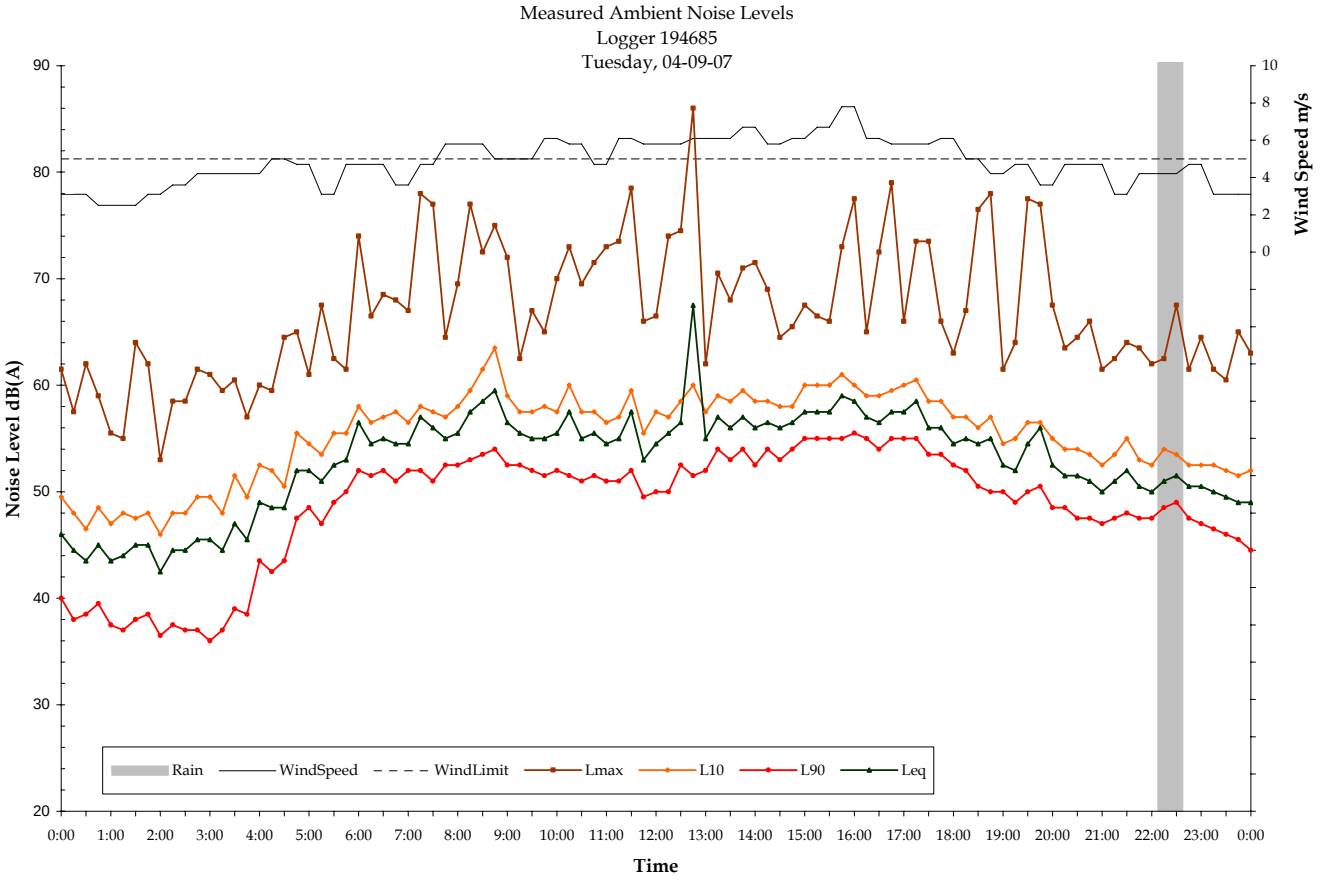

Measured Ambient Noise Levels
Logger 194685
Thursday, 30-08-07
Noise Level dB(A)
Wind Speed m/s
Rain
WindSpeed
WindLimit
Lmax
L10
L90
Leq
Time

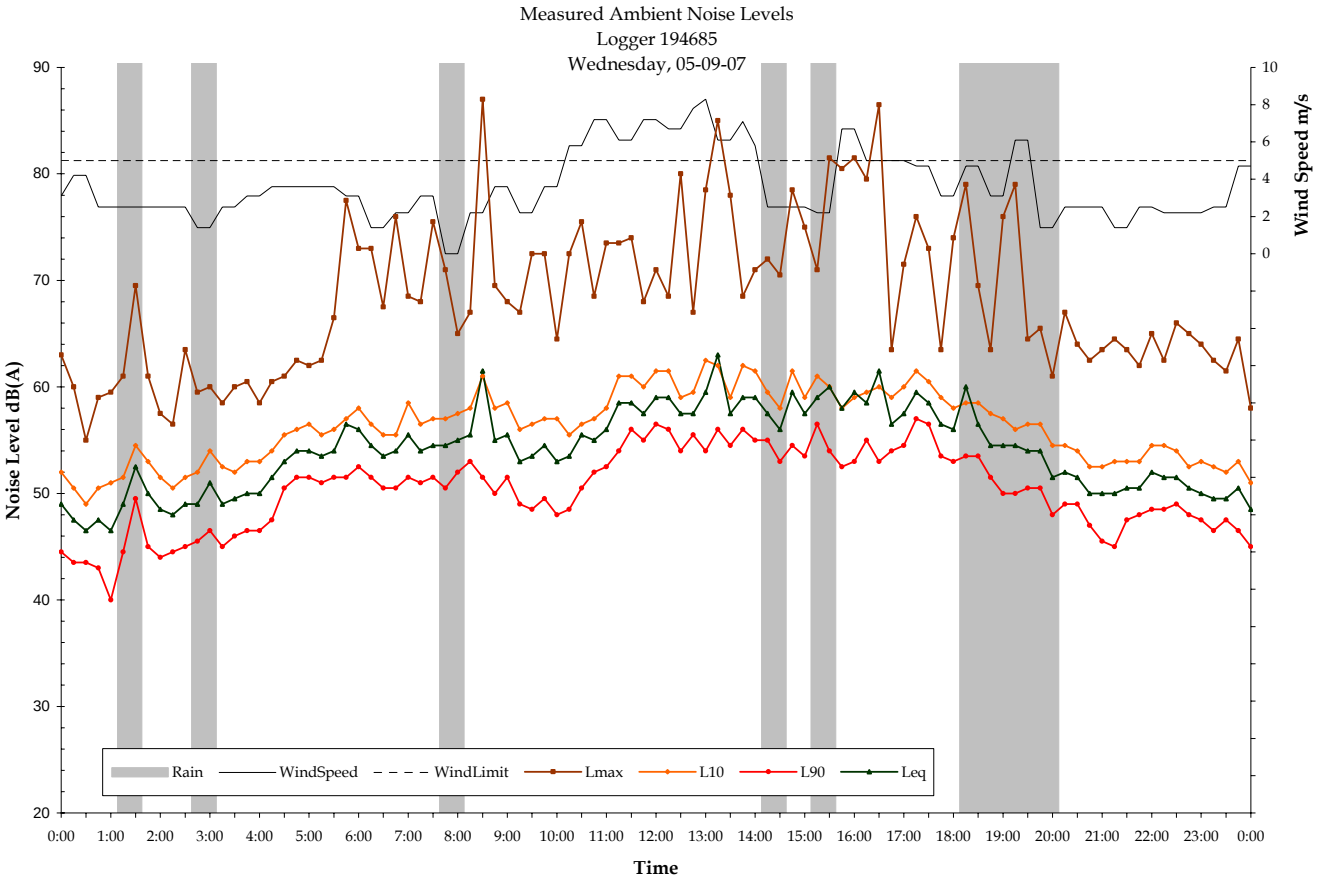

Measured Ambient Noise Levels
Logger 194685
Friday, 31-08-07
Noise Level dB(A)
Wind Speed m/s
Rain
WindSpeed
WindLimit
Lmax
L10
L90
Leq
Time

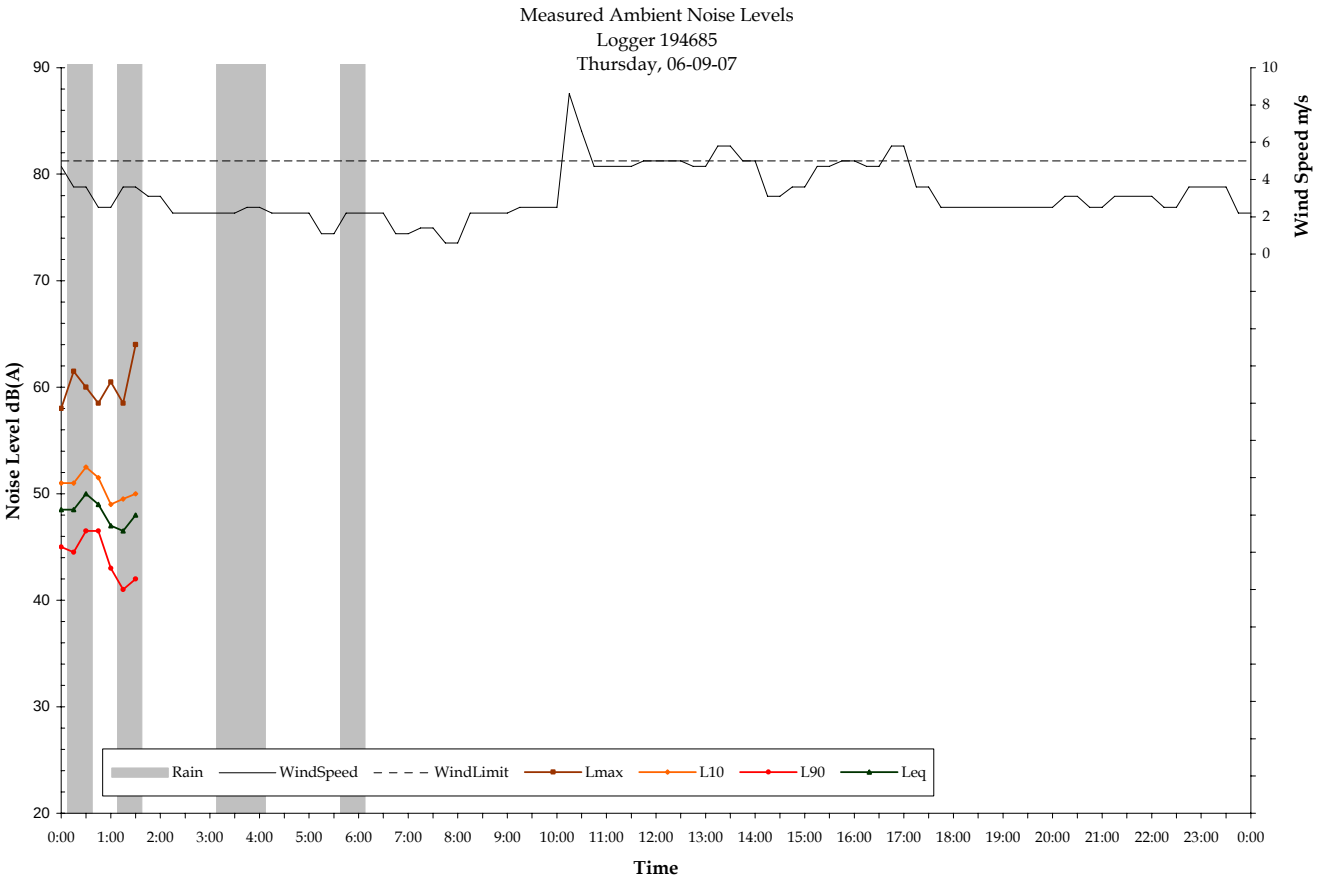

Measured Ambient Noise Levels
Logger 194685
Saturday, 01-09-07
Noise Level dB(A)
Wind Speed m/s
Rain
WindSpeed
WindLimit
Lmax
L10
L90
Leq
Time


Measured Ambient Noise Levels
Logger 194685
Sunday, 02-09-07
Noise Level dB(A)
Wind Speed m/s
Rain
WindSpeed
WindLimit
Lmax
L10
L90
Leq
Time

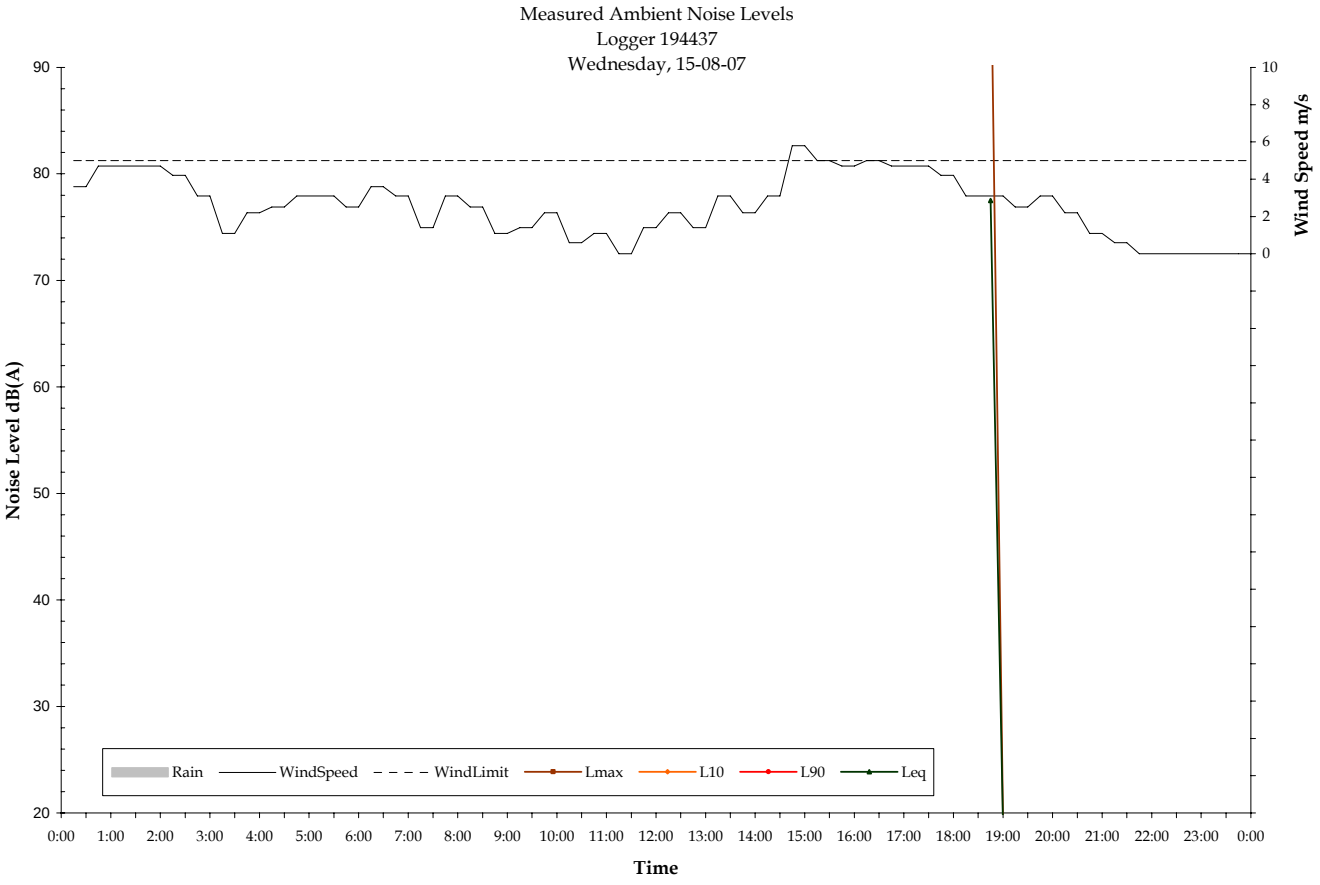

Measured Ambient Noise Levels
Logger 194685
Monday, 03-09-07
Noise Level dB(A)
Wind Speed m/s
Rain
WindSpeed
WindLimit
Lmax
L10
L90
Leq
Time

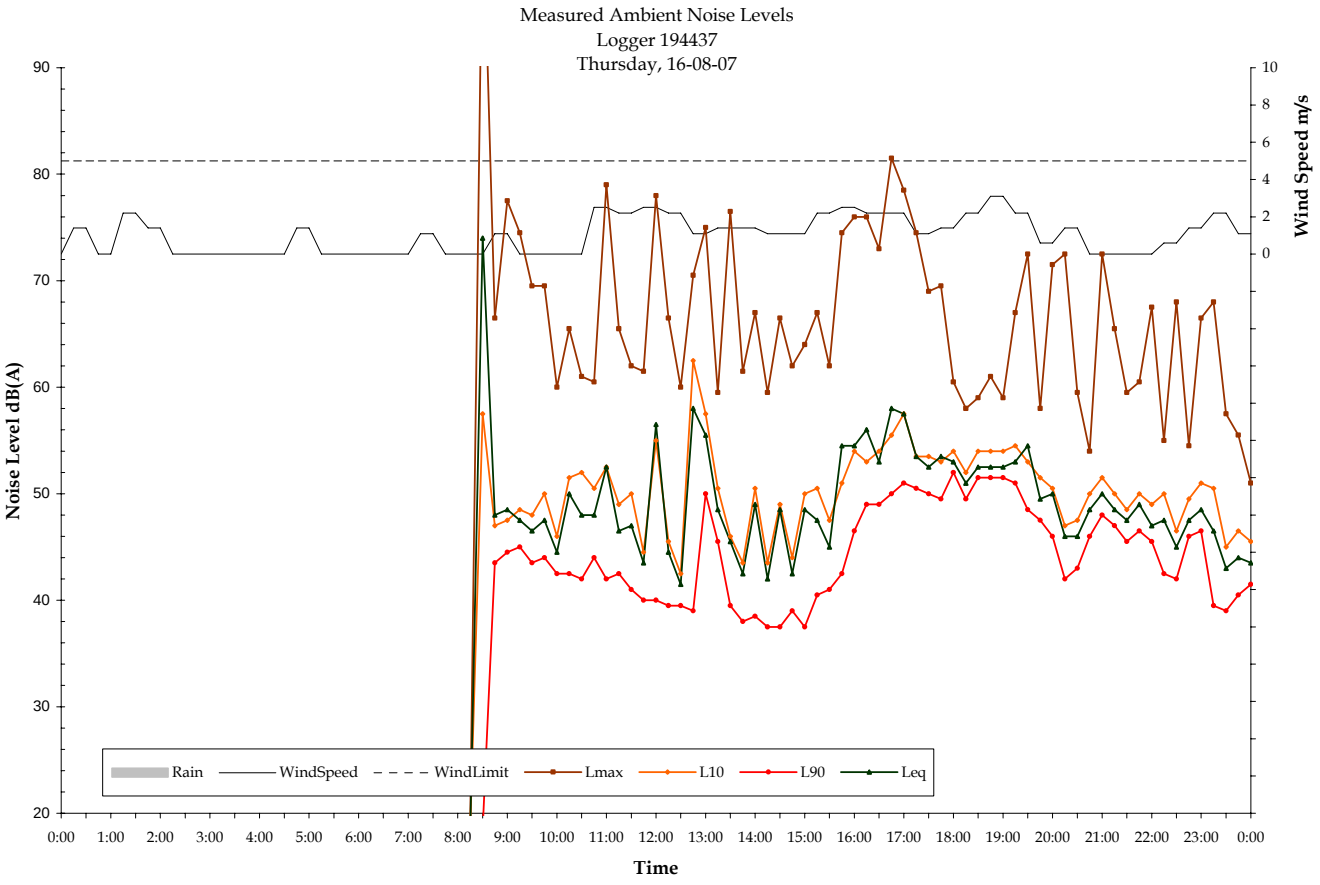

Measured Ambient Noise Levels
Logger 194685
Tuesday, 04-09-07
Noise Level dB(A)
Wind Speed m/s
Rain
WindSpeed
WindLimit
Lmax
L10
L90
Leq
Time

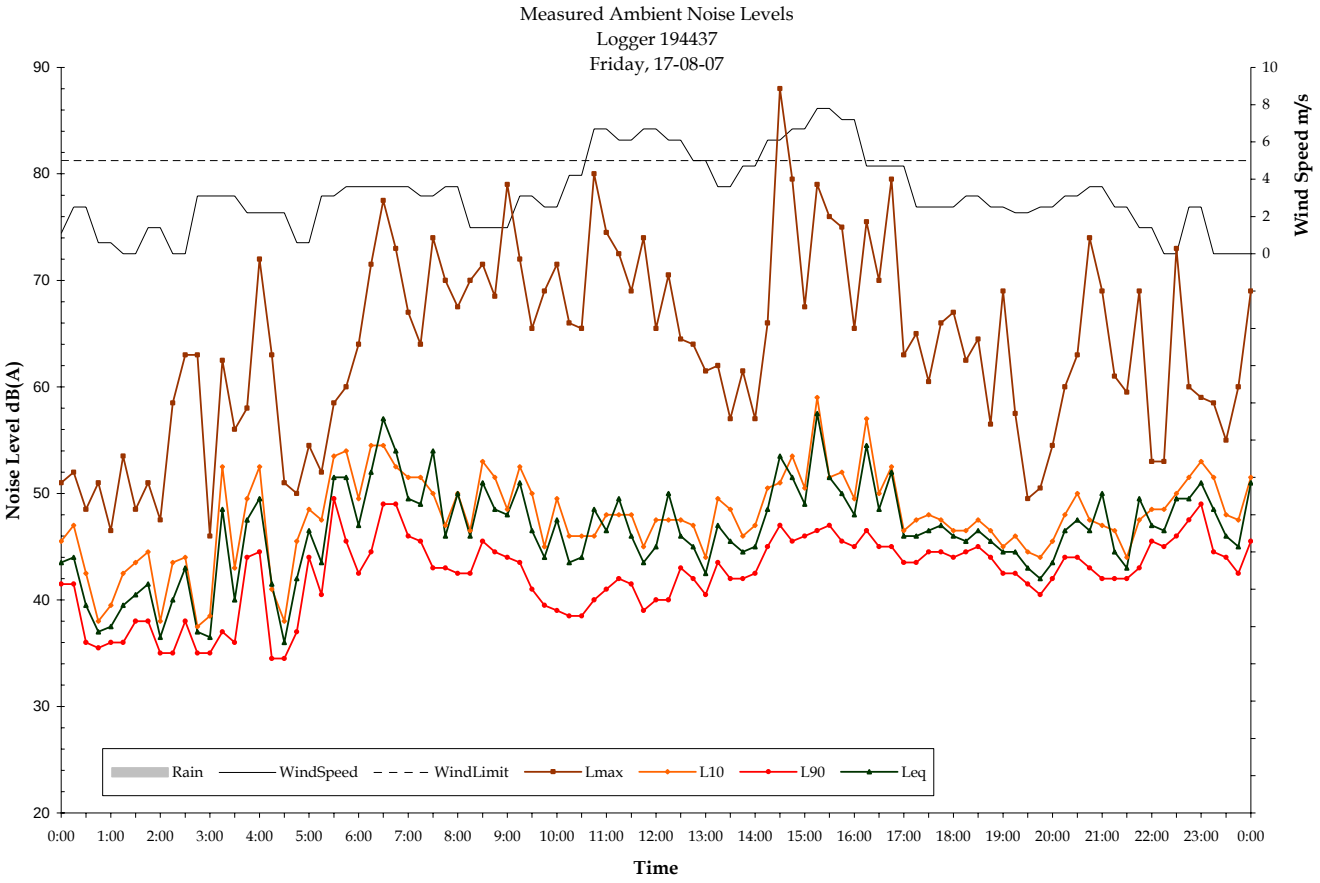

Measured Ambient Noise Levels
Logger 194685
Wednesday, 05-09-07
Noise Level dB(A)
Wind Speed m/s
Time
Rain
WindSpeed
WindLimit
Lmax
L10
L90
Leq

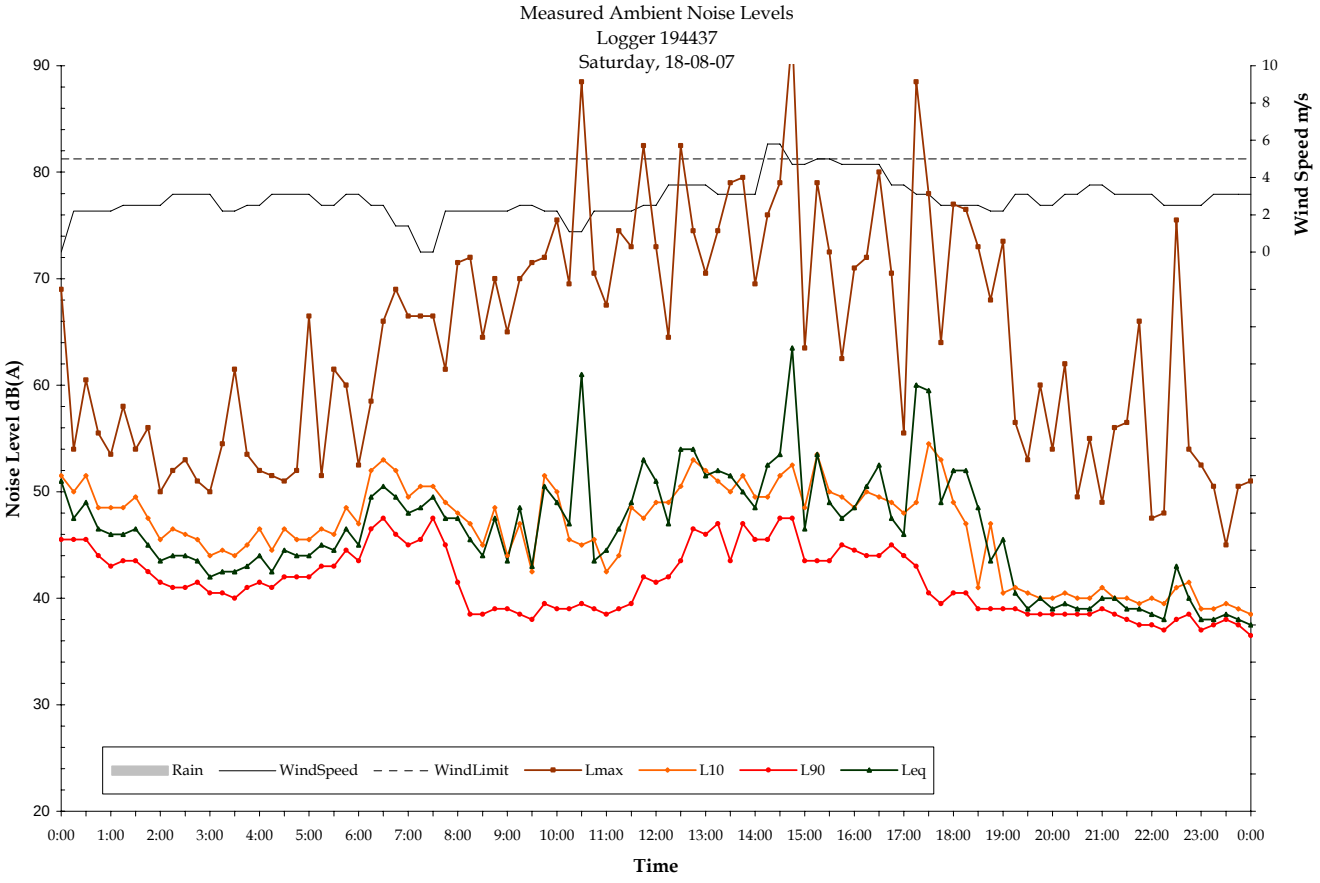

Measured Ambient Noise Levels
Logger 194685
Thursday, 06-09-07
Noise Level dB(A)
Wind Speed m/s
Time
Rain
WindSpeed
WindLimit
Lmax
L10
L90
Leq

Noise Monitoring Data – 12 Swamphen Street, Erskine Park, NSW

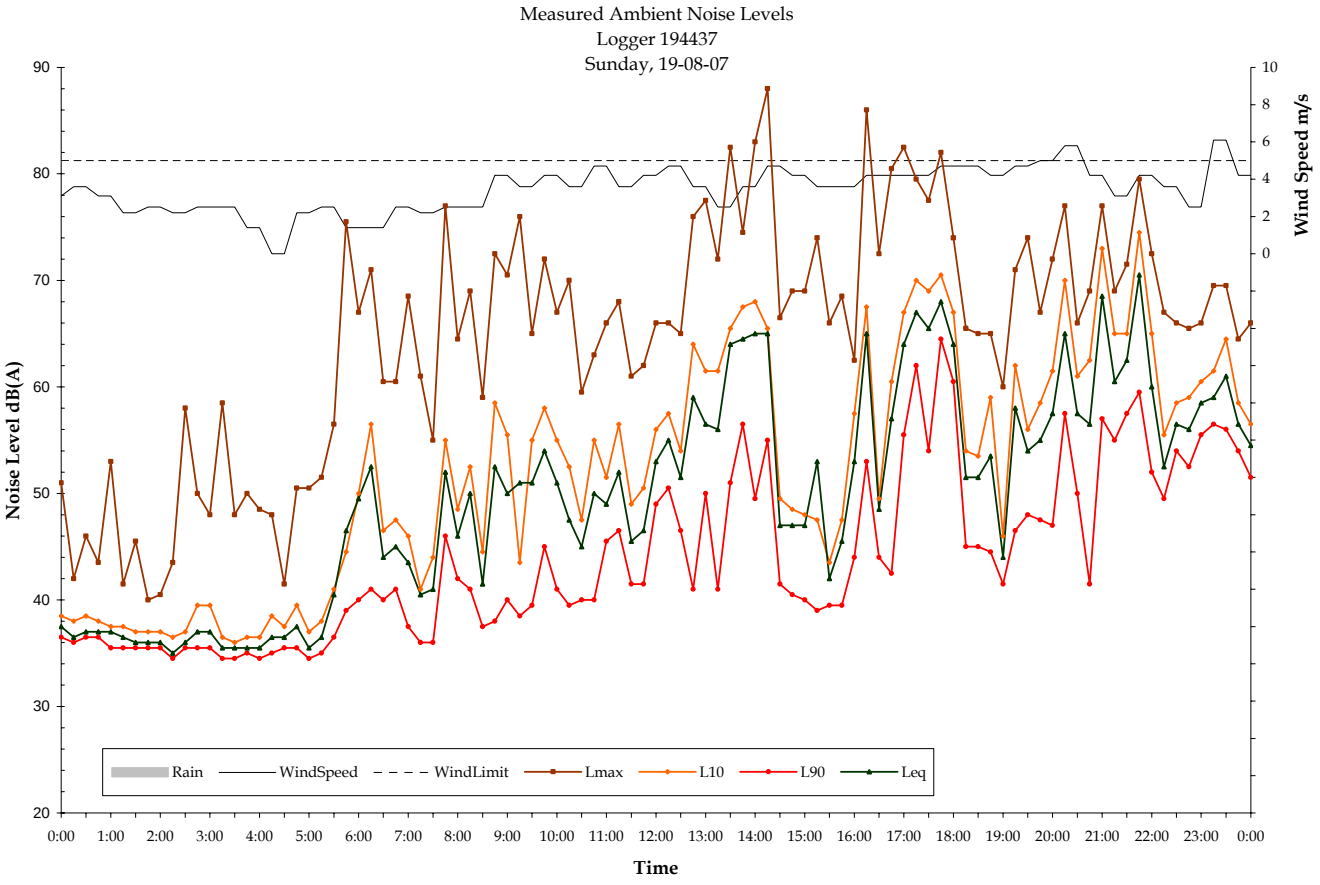


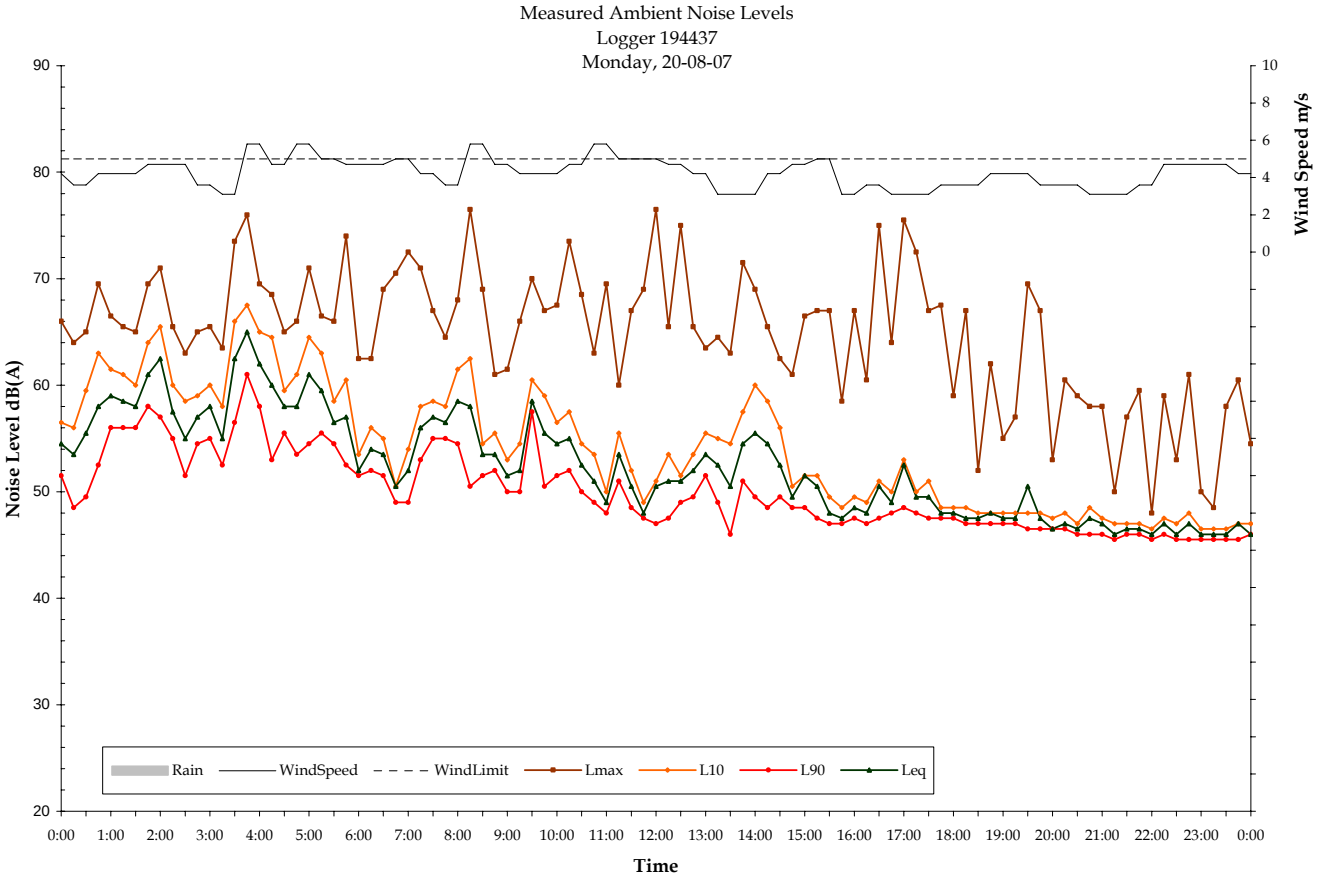


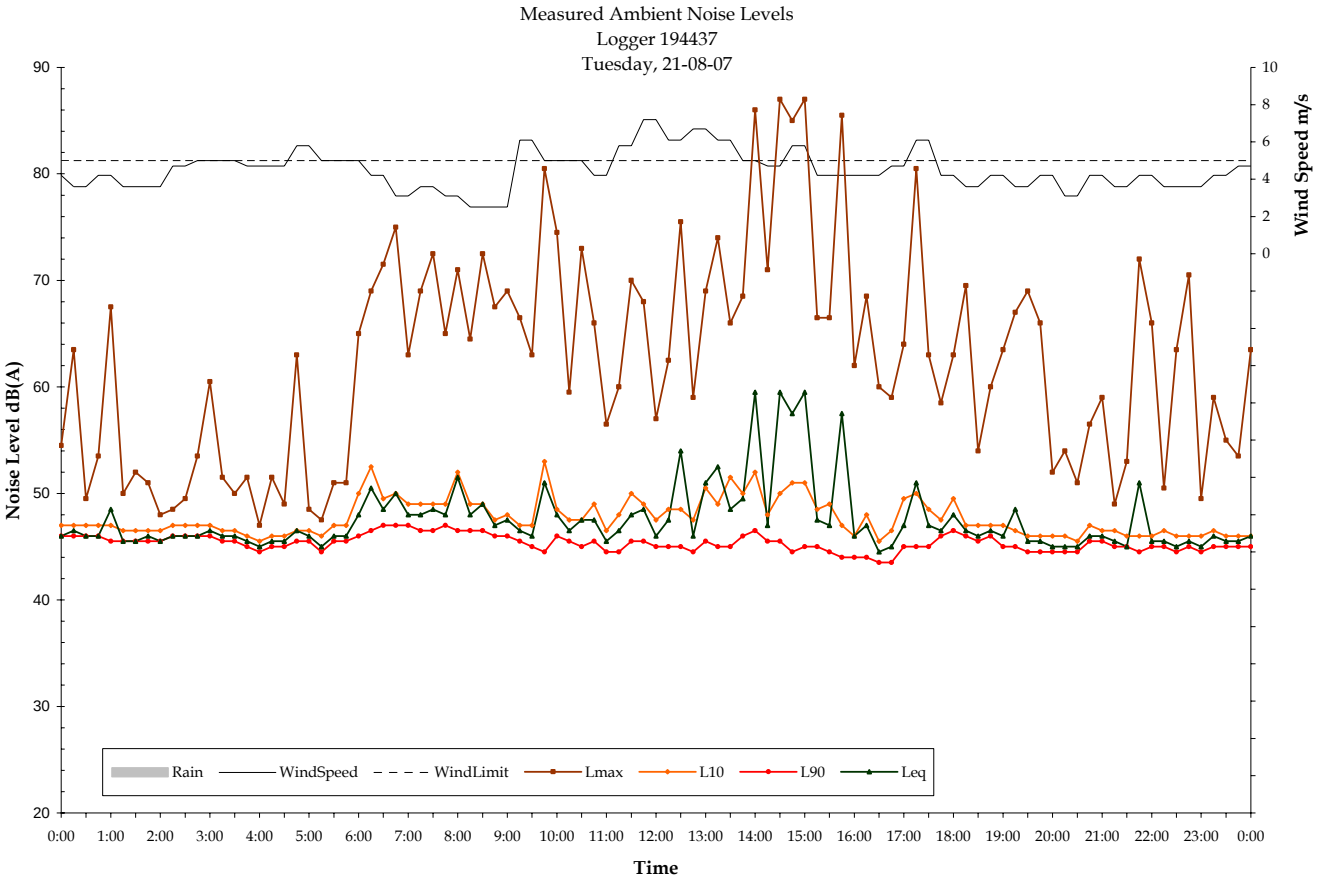

Measured Ambient Noise Levels
Logger 194437
Friday, 17-08-07
Noise Level dB(A)
Wind Speed m/s
Rain
WindSpeed
WindLimit
Lmax
L10
L90
Leq
Time

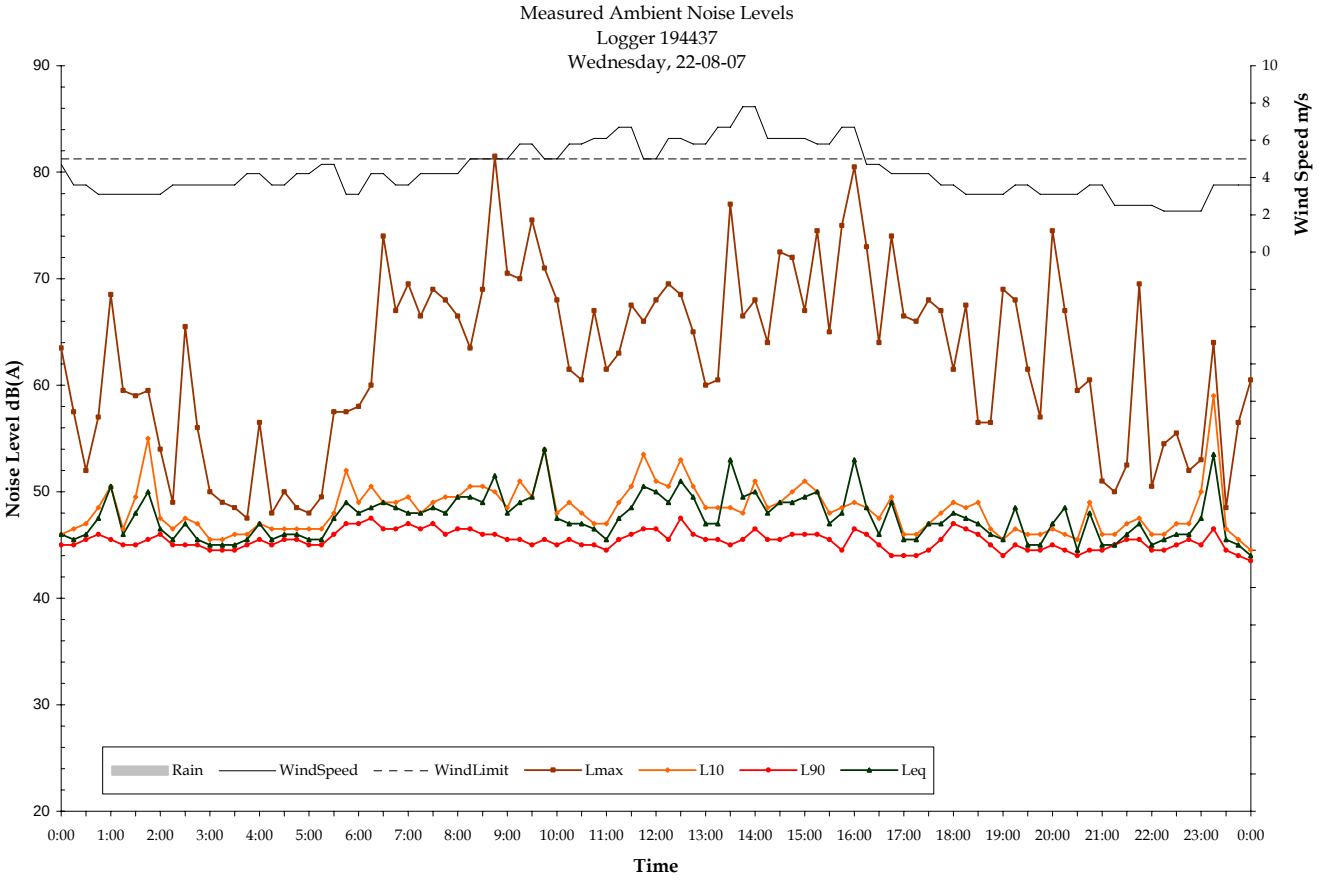

Measured Ambient Noise Levels
Logger 194437
Saturday, 18-08-07
Noise Level dB(A)
Wind Speed m/s
Rain
WindSpeed
WindLimit
Lmax
L10
L90
Leq
Time

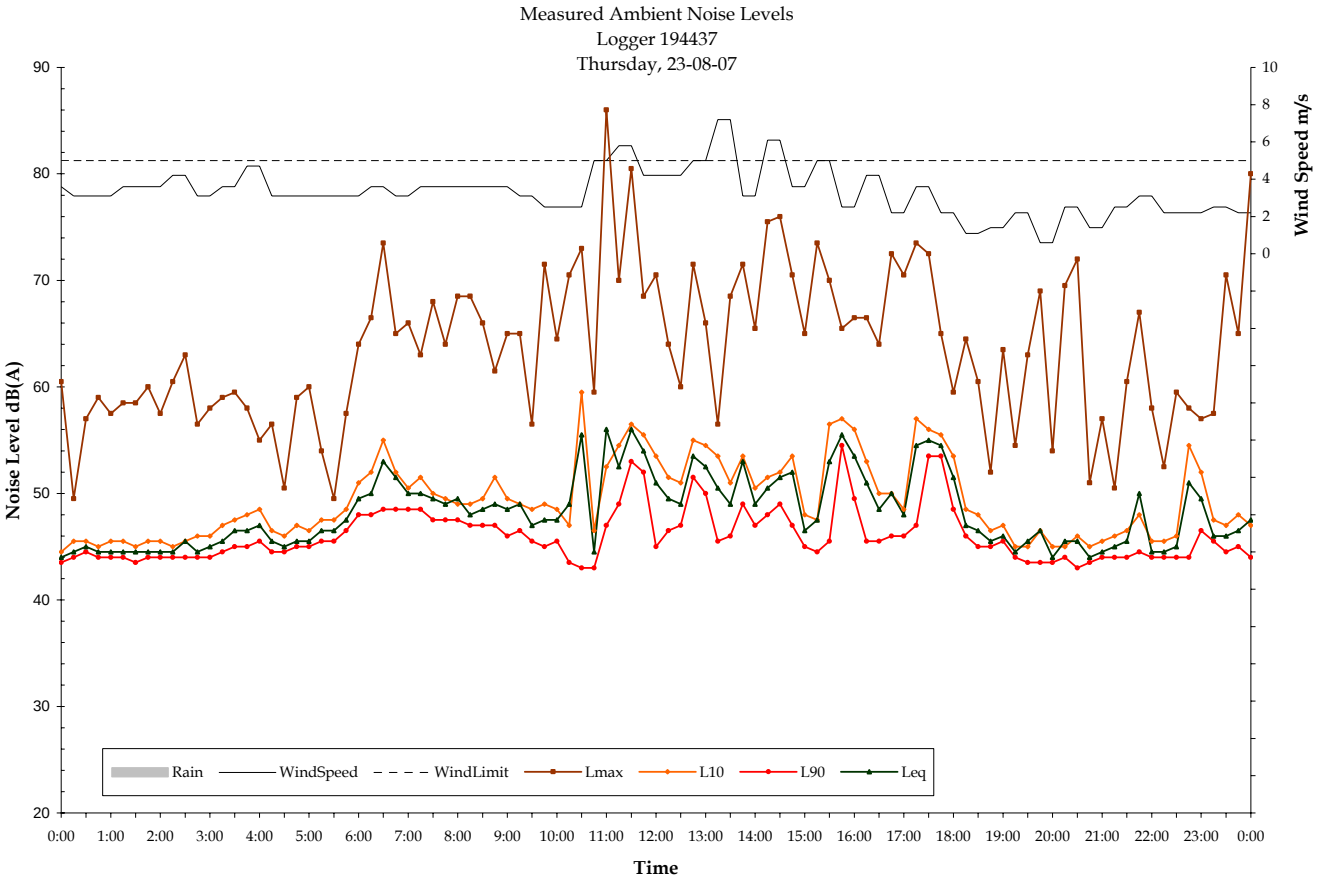
Noise Monitoring Data – 12 Swamphen Street, Erskine Park, NSW

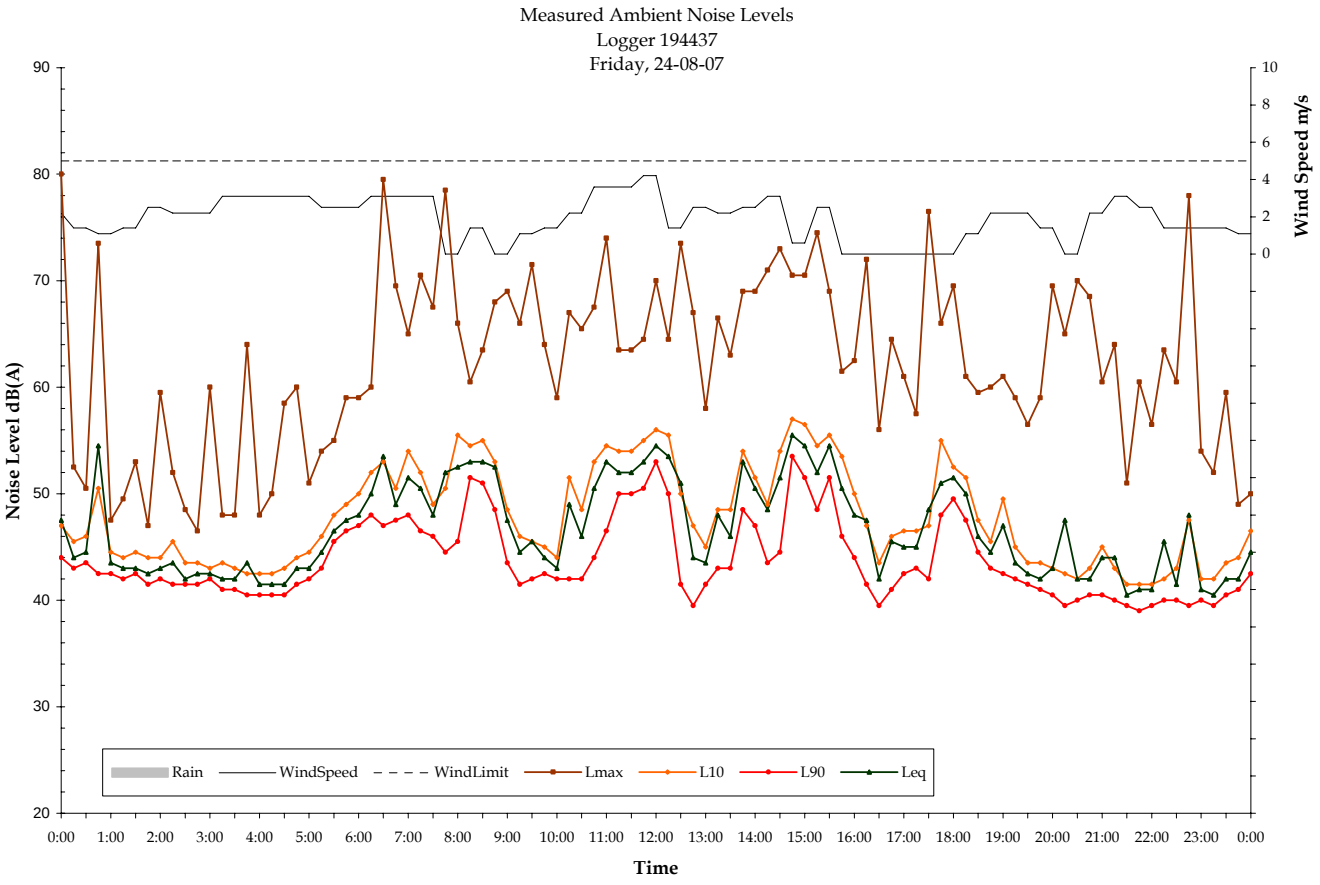




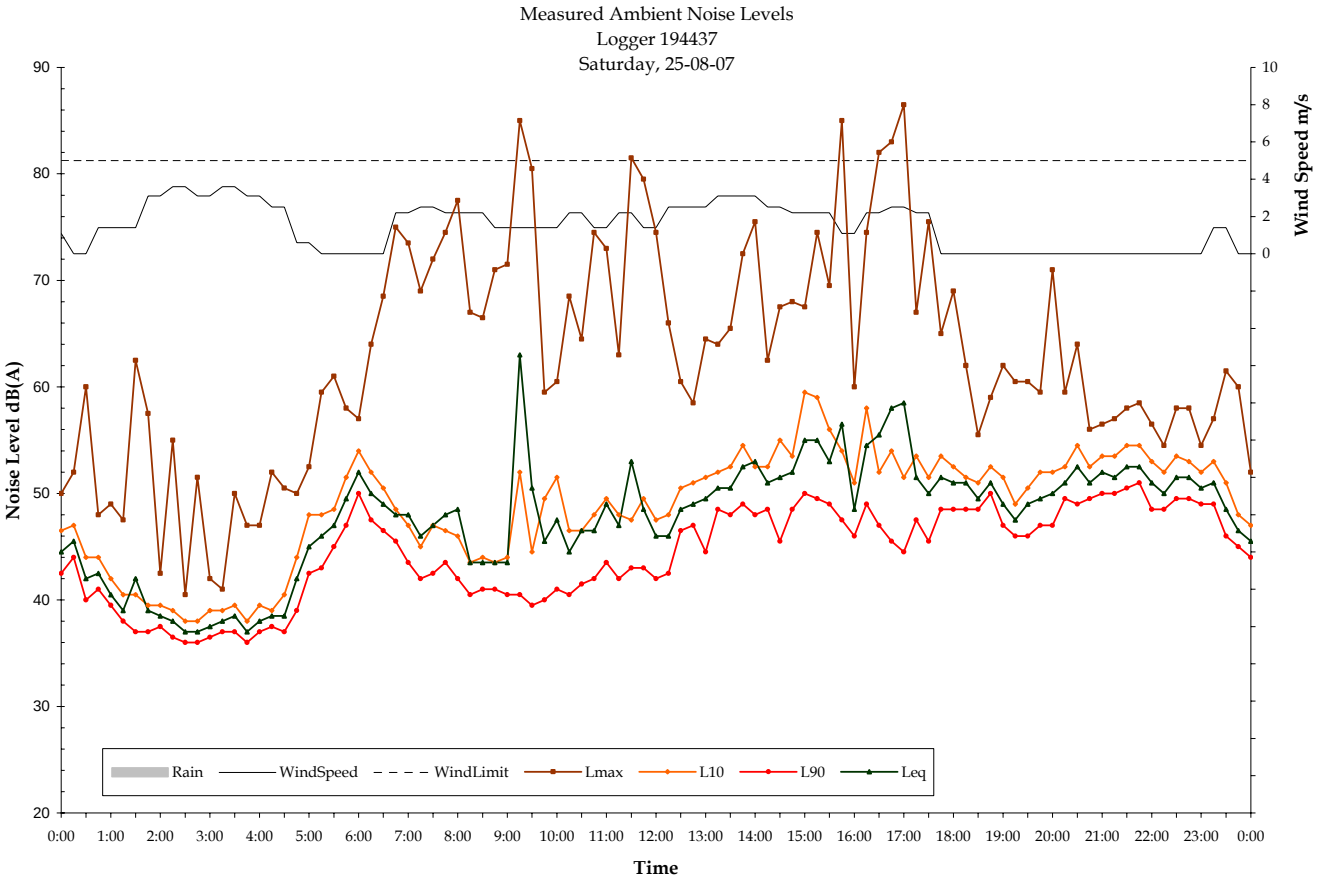

Measured Ambient Noise Levels
Logger 194437
Tuesday, 21-08-07
Noise Level dB(A)
Wind Speed m/s
Rain
WindSpeed
WindLimit
Lmax
L10
L90
Leq
Time

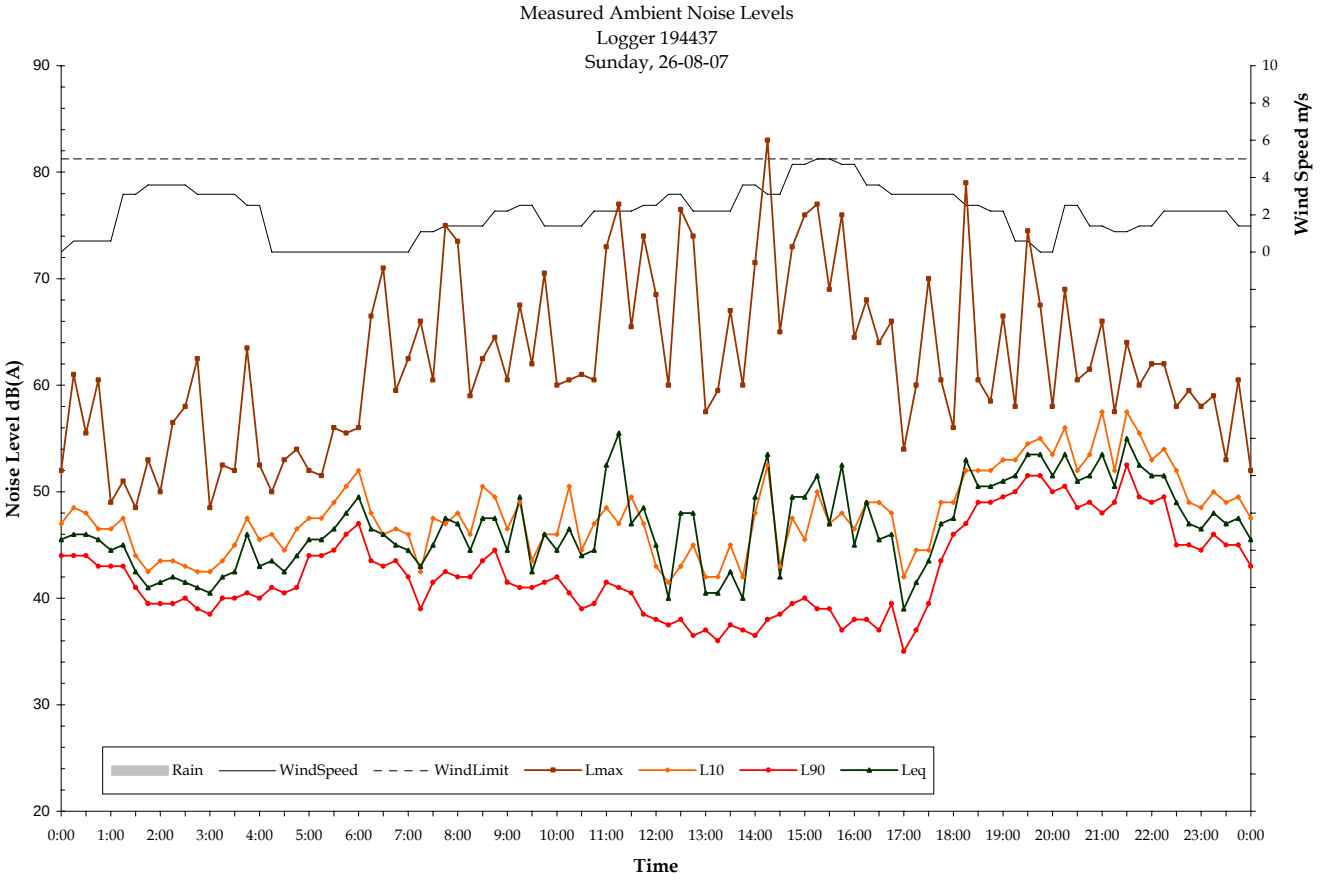

Measured Ambient Noise Levels
Logger 194437
Wednesday, 22-08-07
Noise Level dB(A)
Wind Speed m/s
Rain
WindSpeed
WindLimit
Lmax
L10
L90
Leq
Time


Measured Ambient Noise Levels
Logger 194437
Thursday, 23-08-07
Noise Level dB(A)
Wind Speed m/s
Rain
WindSpeed
WindLimit
Lmax
L10
L90
Leq
Time

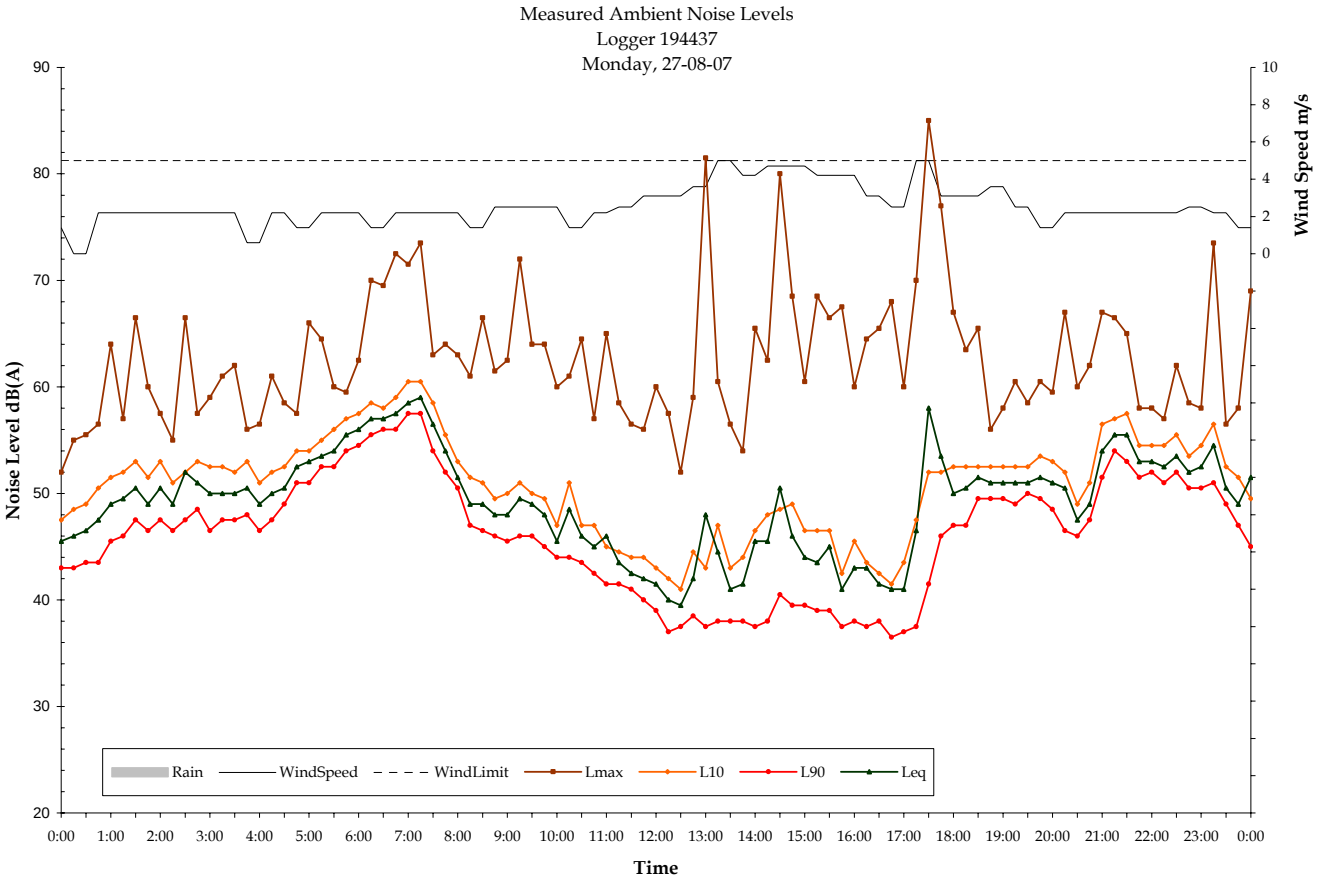

Measured Ambient Noise Levels
Logger 194437
Friday, 24-08-07
Noise Level dB(A)
Wind Speed m/s
Rain
WindSpeed
WindLimit
Lmax
L10
L90
Leq
Time

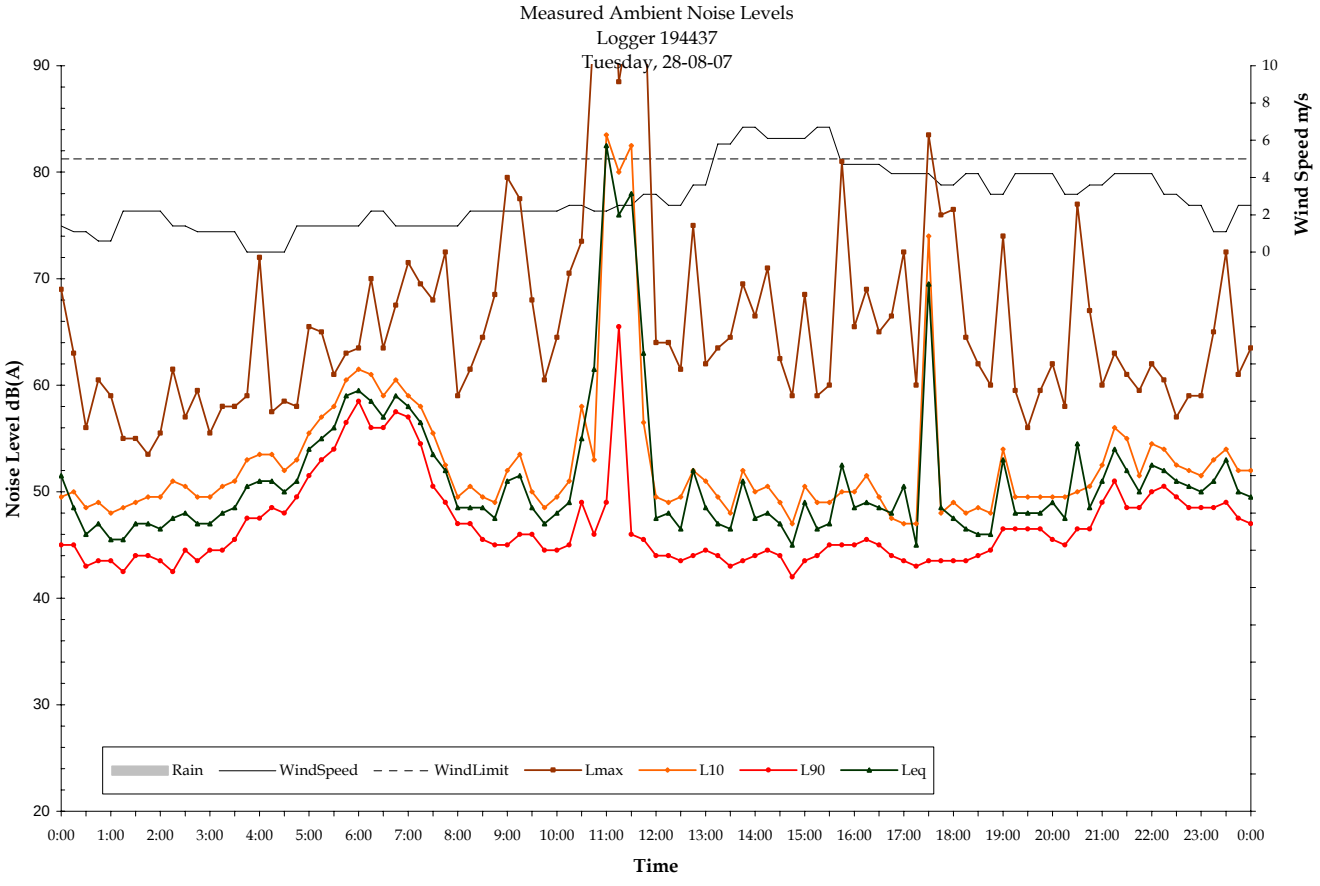
Noise Monitoring Data – 12 Swamphen Street, Erskine Park, NSW

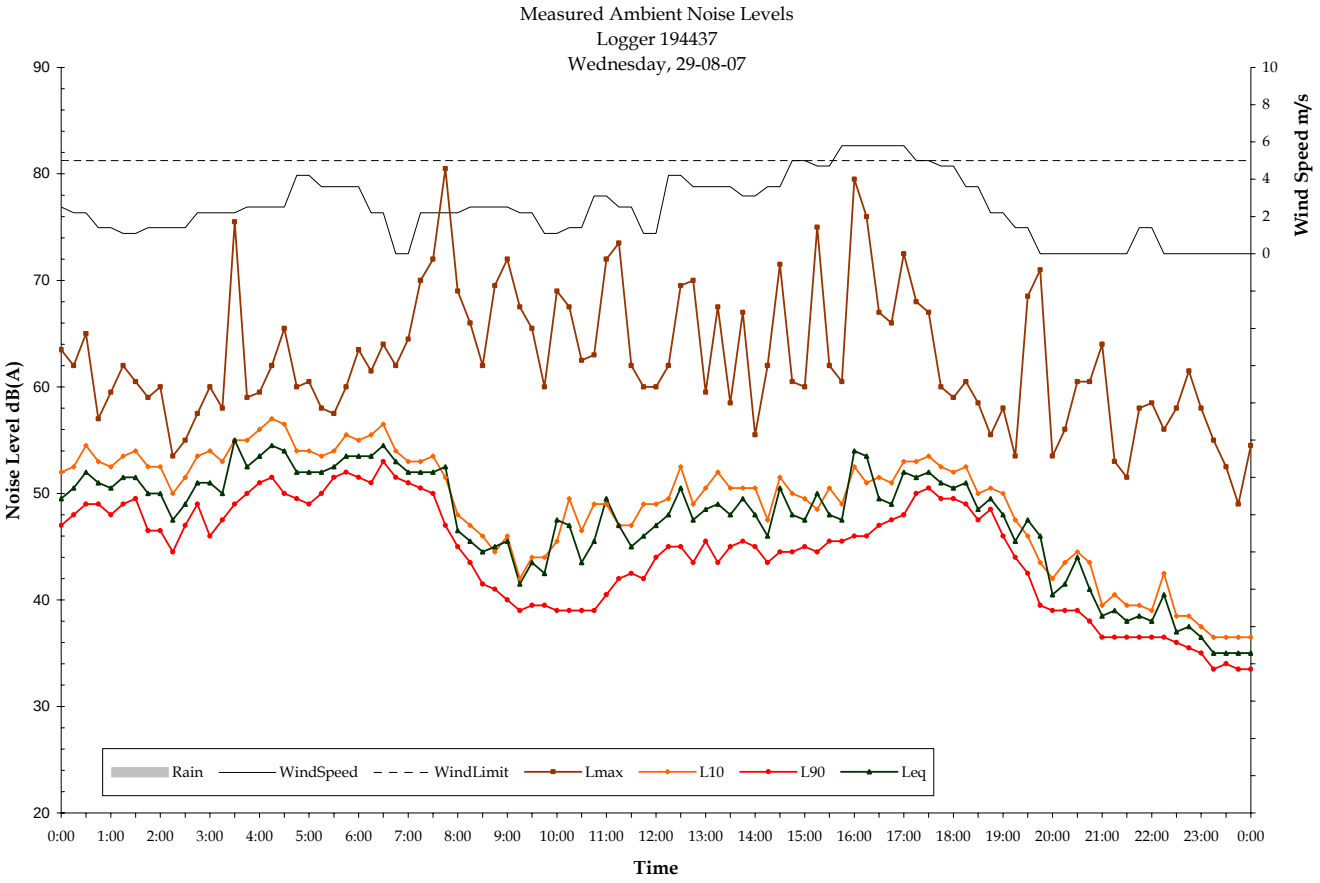


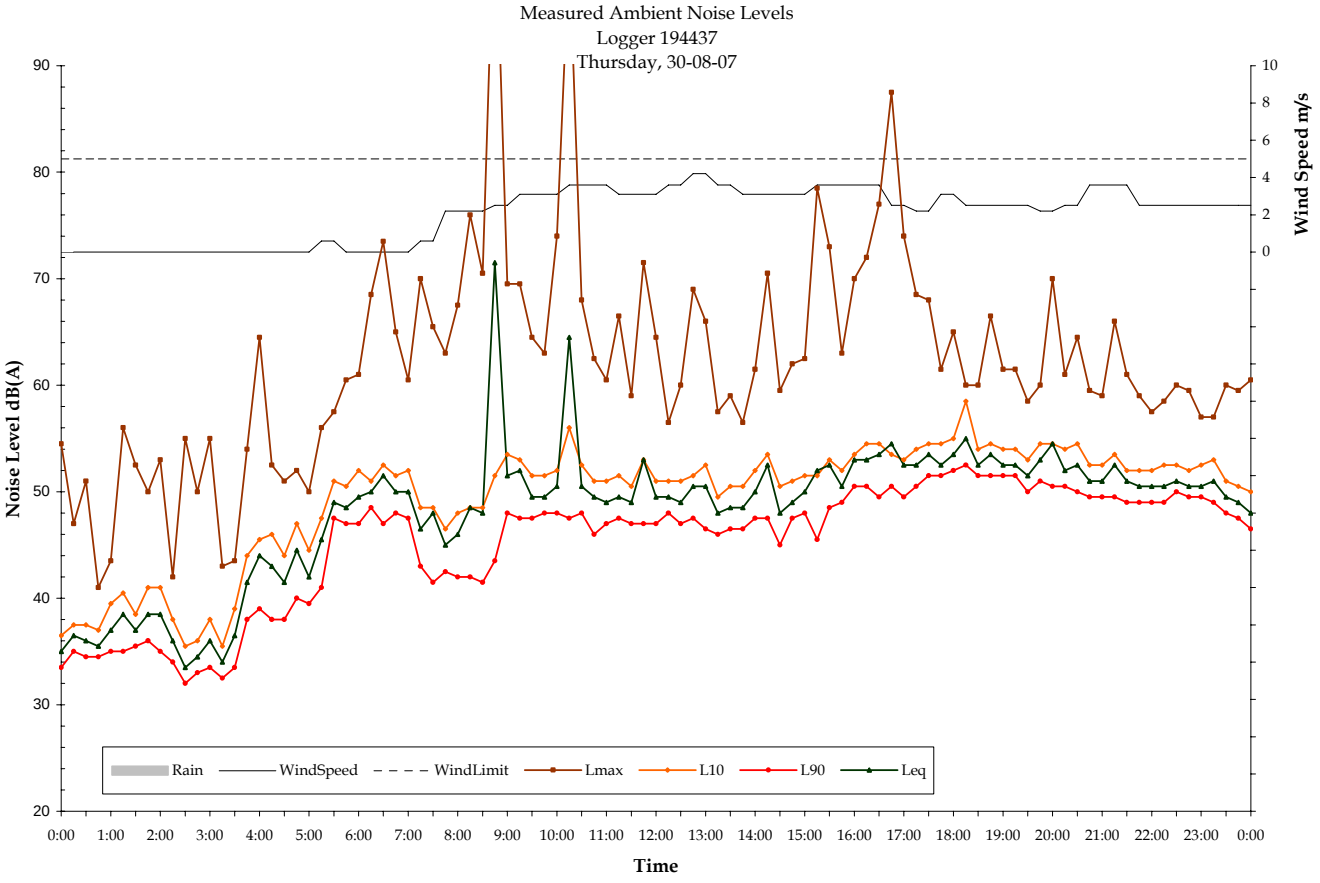


Noise Monitoring Data – 12 Swamphen Street, Erskine Park, NSW

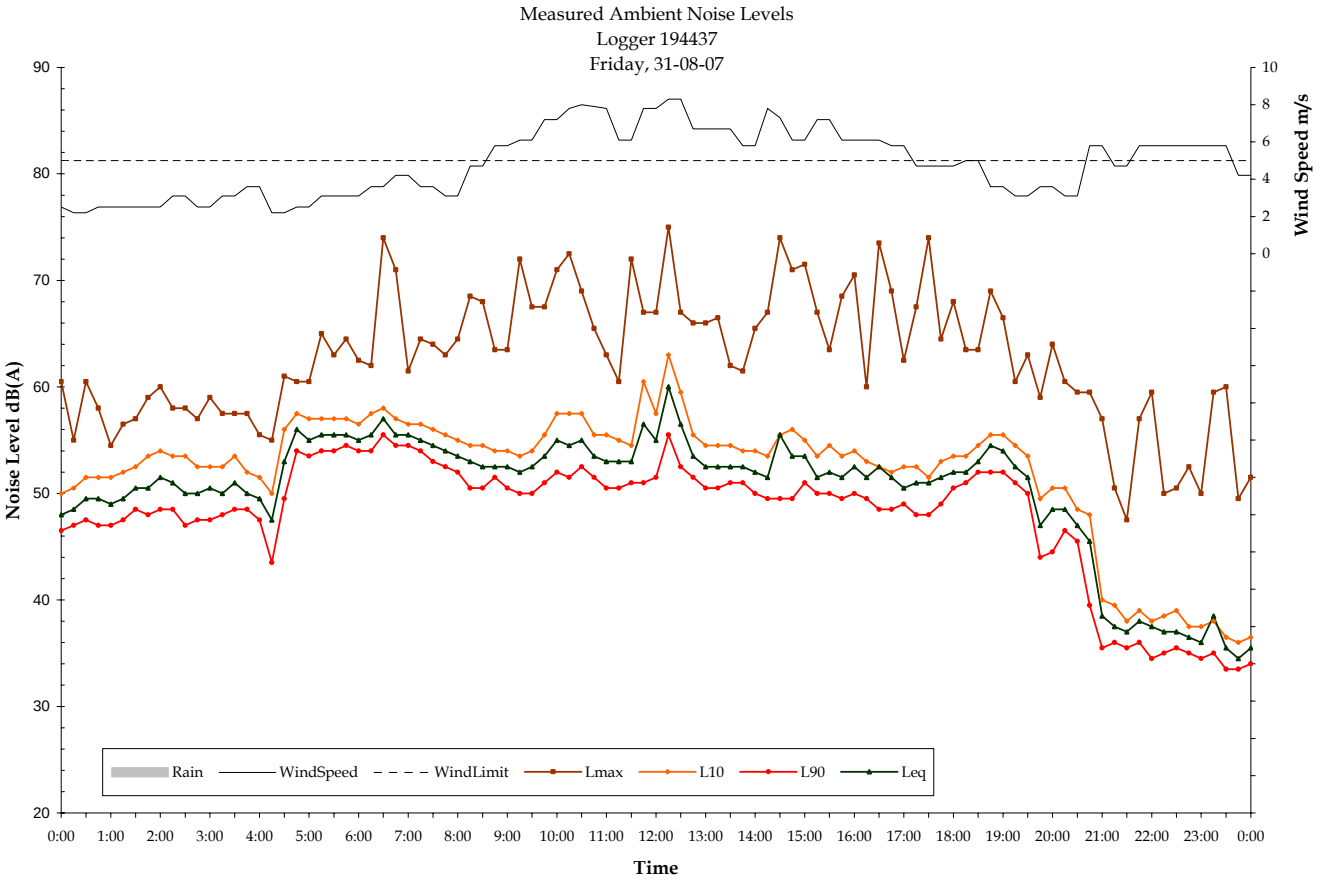


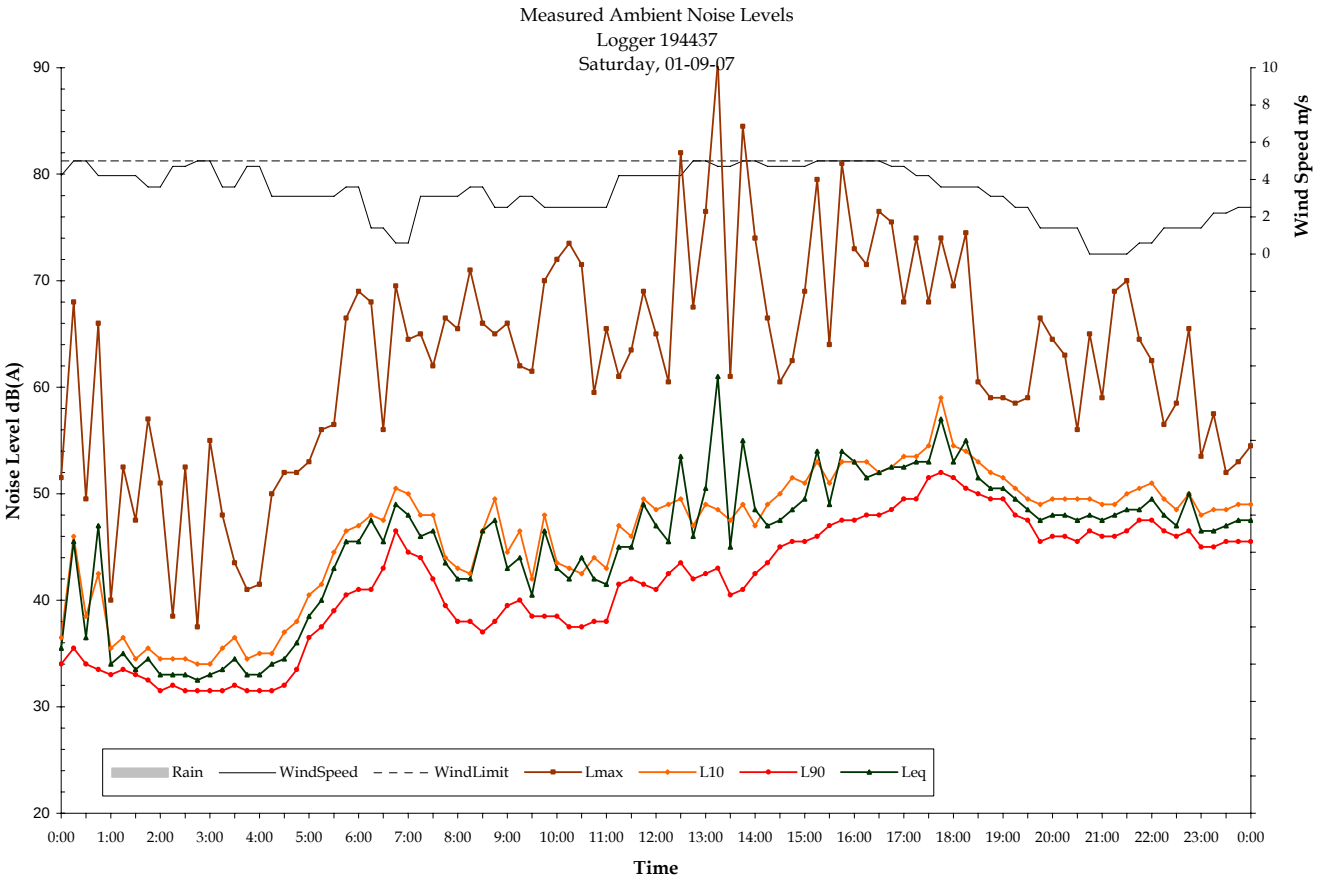



Measured Ambient Noise Levels
Logger 194437
Wednesday, 29-08-07
Noise Level dB(A)
Wind Speed m/s
Rain
WindSpeed
WindLimit
Lmax
L10
L90
Leq
Time

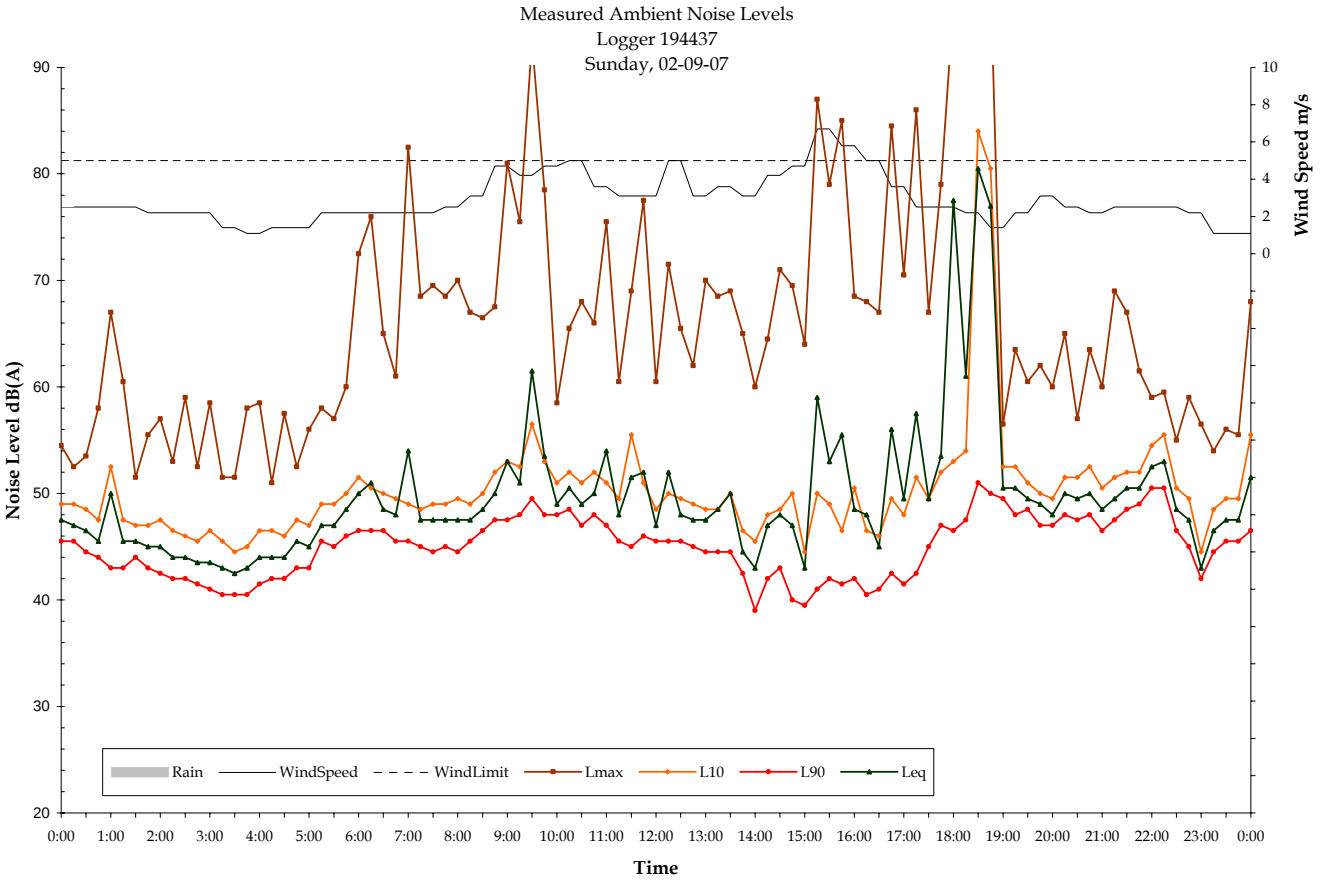

Measured Ambient Noise Levels
Logger 194437
Thursday, 30-08-07
Noise Level dB(A)
Wind Speed m/s
Rain
WindSpeed
WindLimit
Lmax
L10
L90
Leq
Time

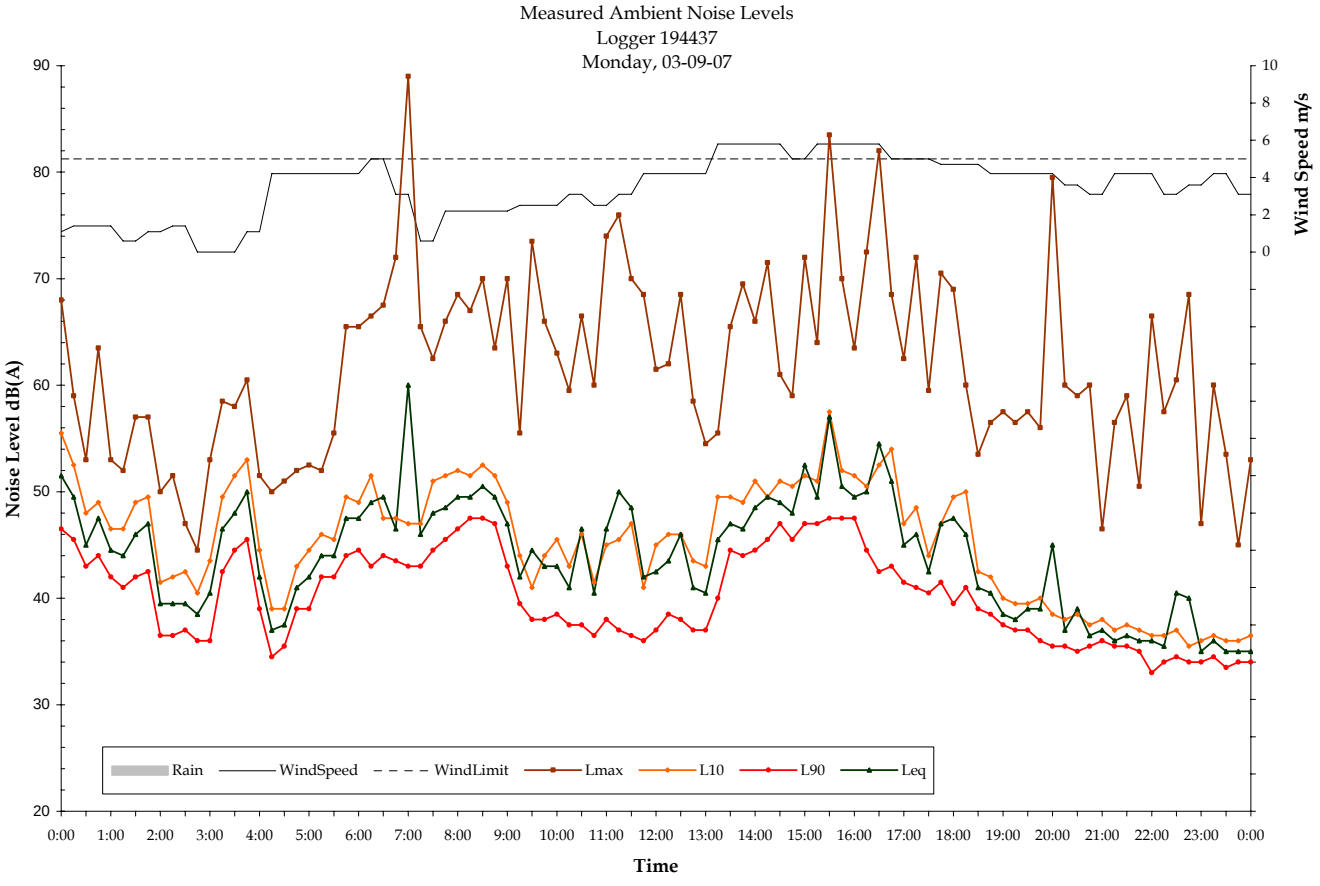
Noise Monitoring Data – 12 Swamphen Street, Erskine Park, NSW

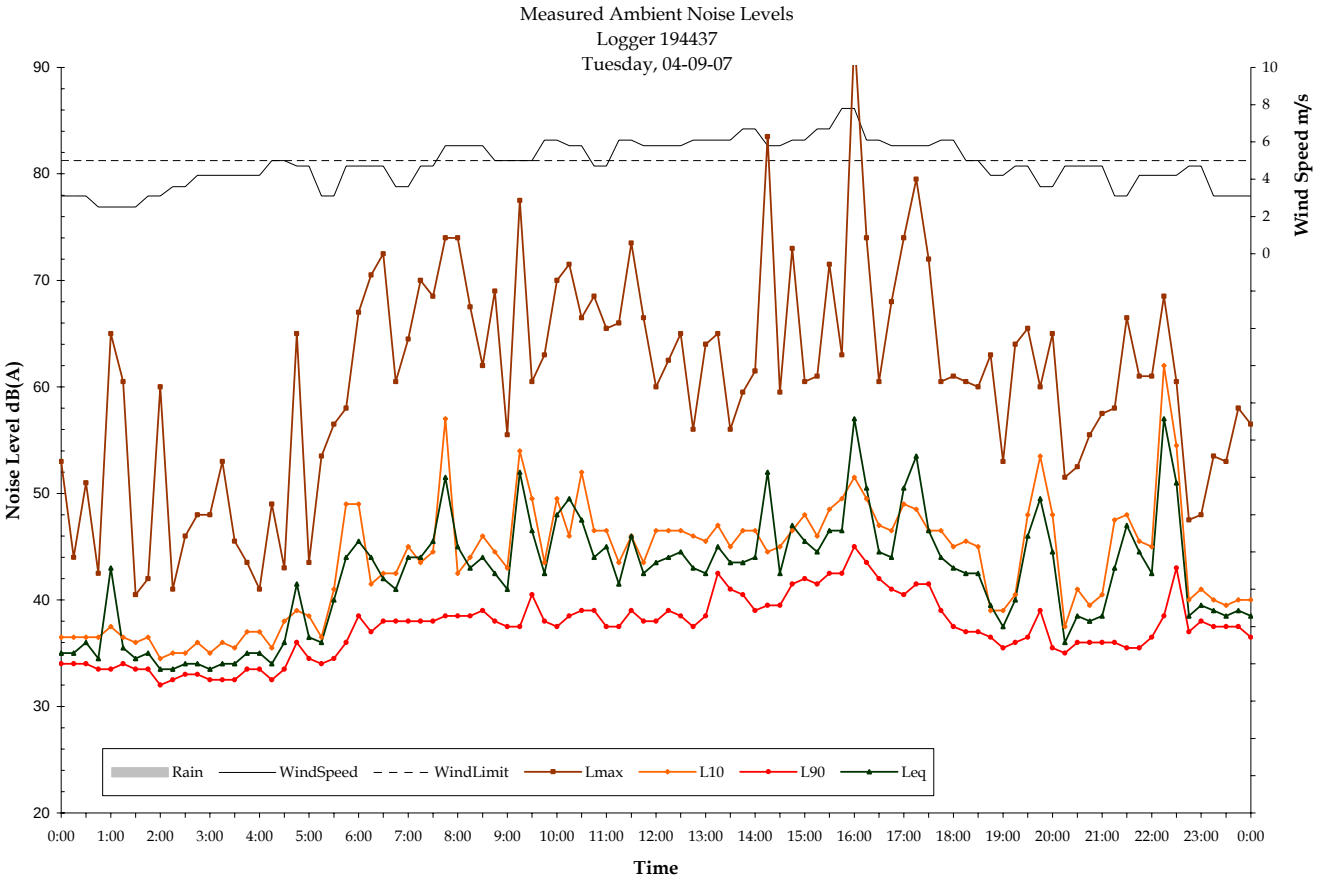


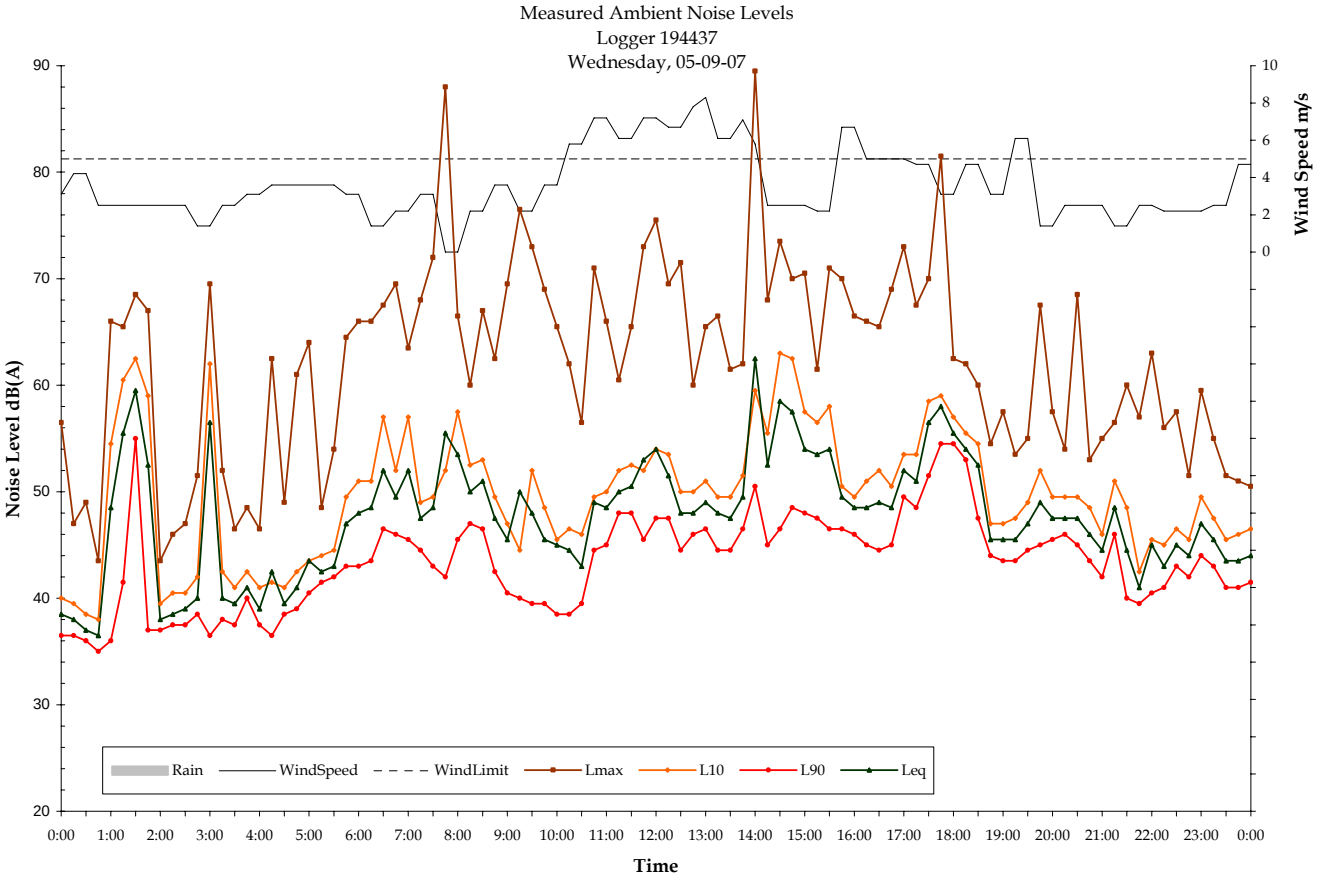


Noise Monitoring Data – 12 Swamphen Street, Erskine Park, NSW

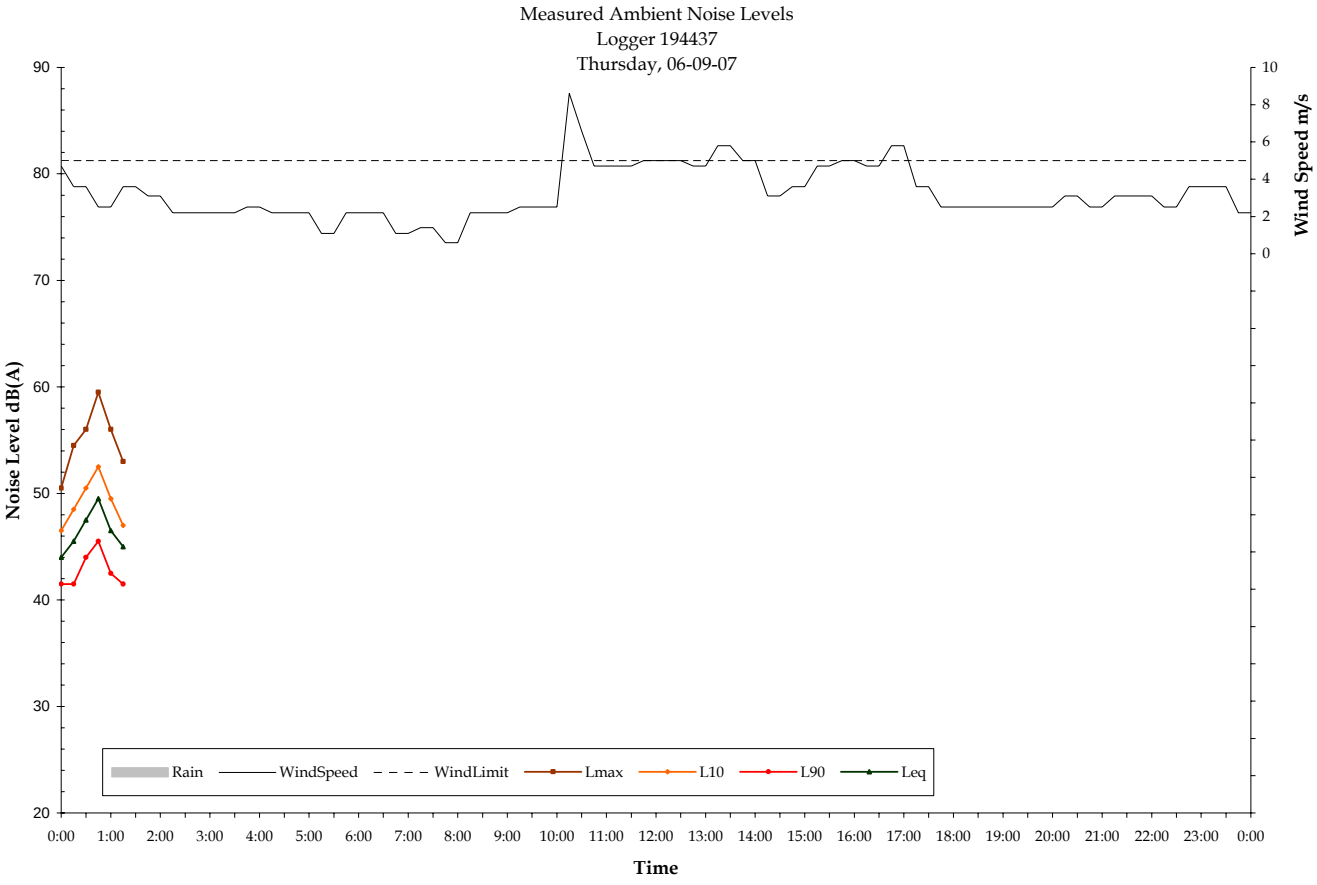





Measured Ambient Noise Levels
Logger 194437
Tuesday, 04-09-07
Noise Level dB(A)
Wind Speed m/s
Rain
WindSpeed
WindLimit
Lmax
L10
L90
Leq
Time


Measured Ambient Noise Levels
Logger 194437
Wednesday, 05-09-07
Noise Level dB(A)
Wind Speed m/s
Rain
WindSpeed
WindLimit
Lmax
L10
L90
Leq
Time

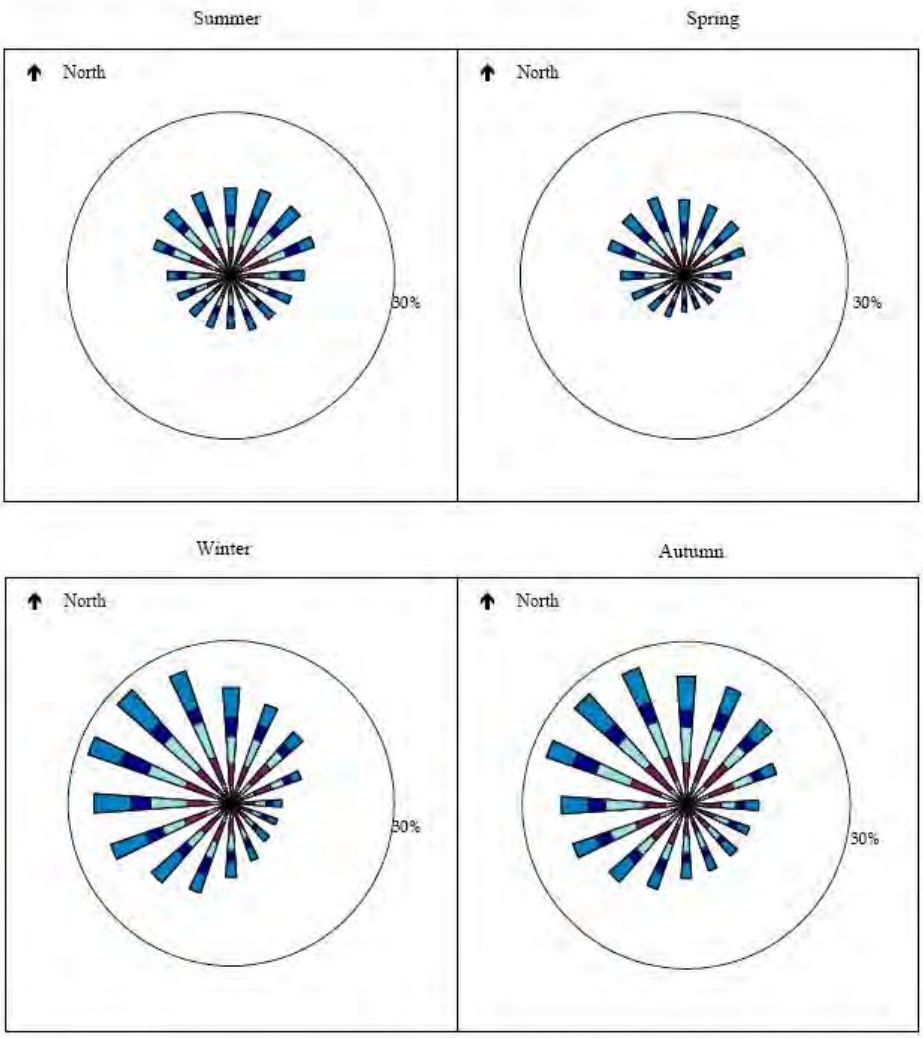
Noise Monitoring Data – 12 Swamphen Street, Erskine Park, NSW

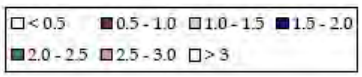


Annex C

Vector Wind Roses Annual Hourly Wind Analysis

Day





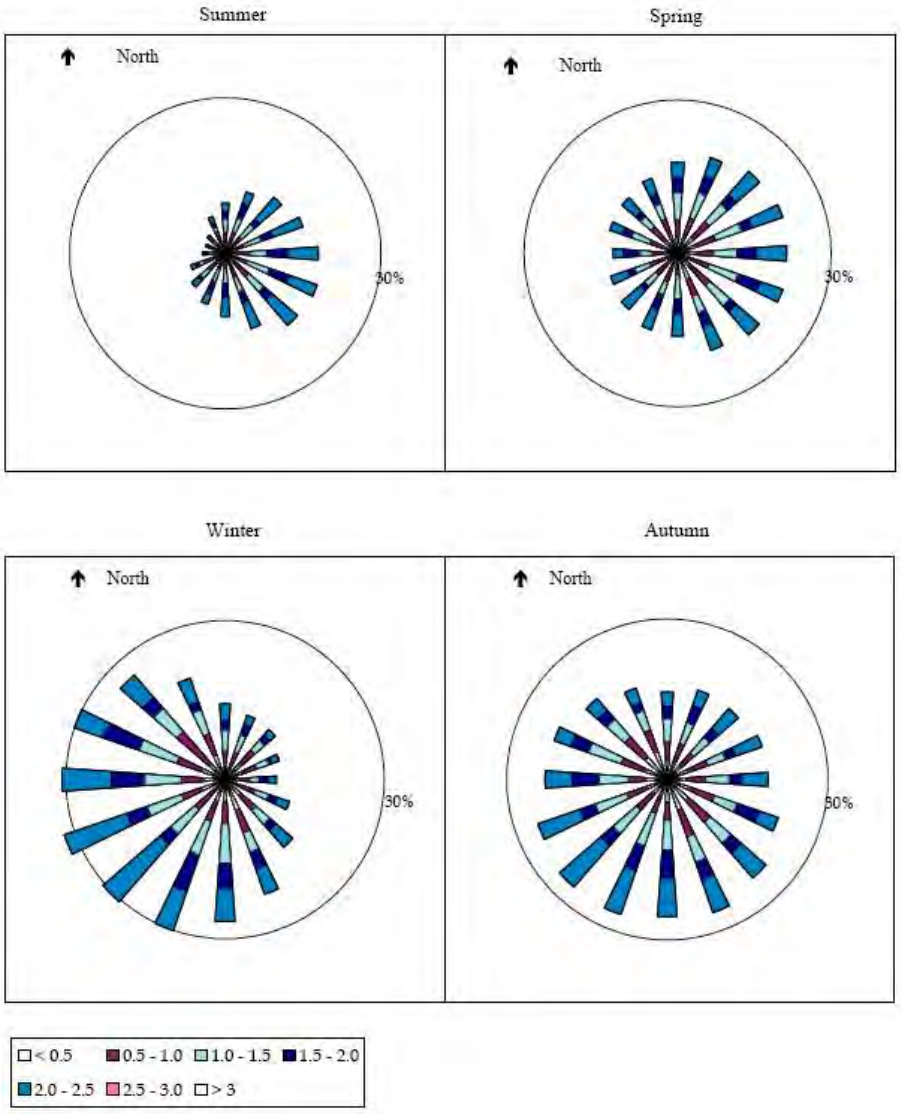
Data Source: Anvil Site at Wybong Rd
Data Range: 10 min, 01-04-02 to 30-11-03

The segments of each arm represent the six valid wind speed classes, with increasing windspeed from the centre outwards. The length of each arm represents the vector components (for each direction) of wind speeds 3m/s or below as a proportion of the total time for the period .
The circle represents the 30% occurrence threshold.

29/11/07

Environmental Resources Management Australia

Evening



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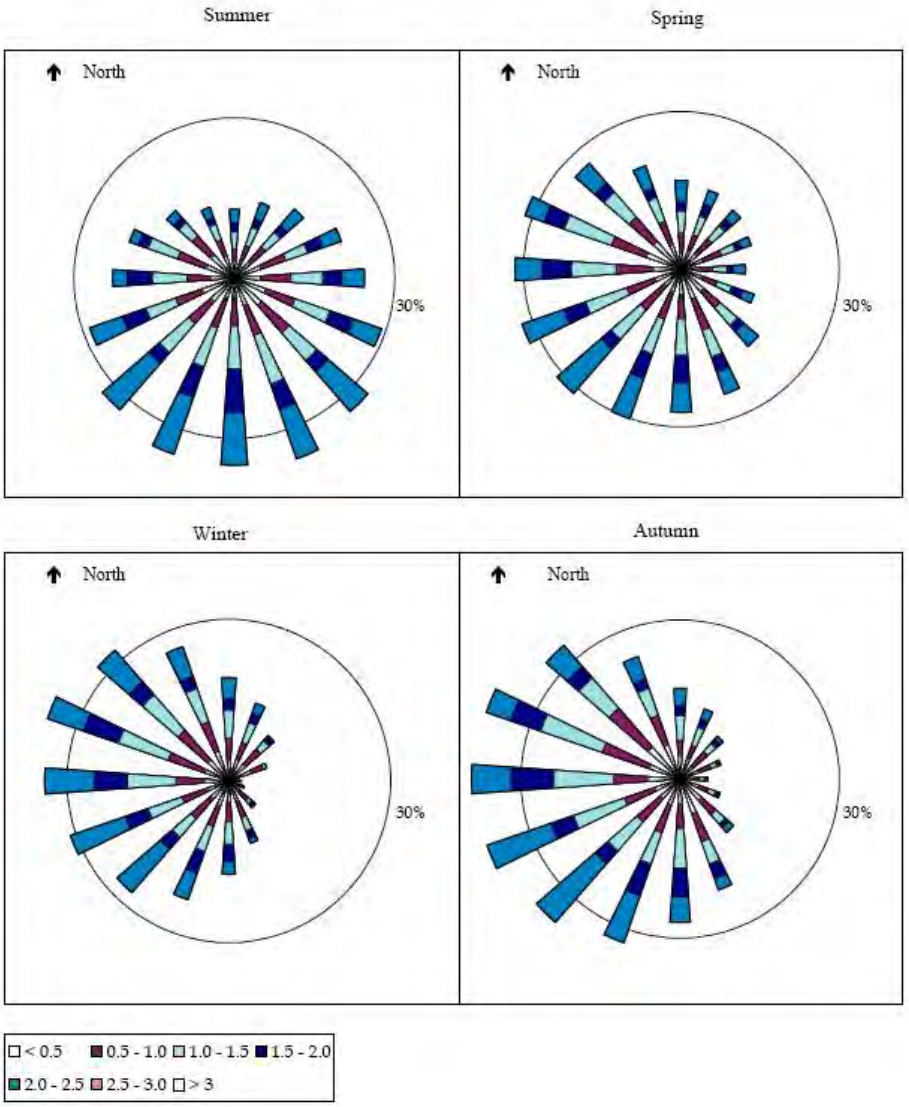
Night



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Annex D

Noise Contours

Legend

Noise Level

- 35 dB(A)
- 40 dB(A)
- 45 dB(A)
- 50 dB(A)
- 55 dB(A)
- School
- Receiver Location
- Site Boundary

Suffix	*Revisions*	*Date*	*Init*
R0	Preliminary Issue	10-01-08	JS
R1	CTour Data Source Change	11-01-08	JS
R2	School Locations Added	01-08-08	JF

Figure D.1

$L_{eq,15minute}$ Daytime Operational Noise Levels, dB(A) - Year 5

Client:	ThaQuarry Pty Ltd		
Project:	Light Horse Buisiness Centre EA		
Drawing No:	0071234_GIS11	Suffix No:	R2
Date:	01/08/2008	Drawing size:	A4
Drawn by:	JF	Reviewed by:	JK
Source:	© 2007 Google TM		
Scale:	Refer Scale Bar		

N

0 95 190 380 570 Meters

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Building C, 33 Saunders St, Pyrmont, NSW 2009
Telephone +61 2 8584 8888

ERM

Legend

Noise Level

- 35 dB(A)
- 40 dB(A)
- 45 dB(A)
- 50 dB(A)
- 55 dB(A)
- School
- Receiver Location
- Site Boundary

Suffix	*Revisions*	*Date*	*Init*
R0	Preliminary Issue	10-01-08	JS
R1	CTour Data Source Change	11-01-08	JS
R2	School Locations Added	04-08-08	JF

Figure D.2

$L_{eq,15minute}$ Daytime Operational Noise Levels, dB(A) - Year 13

Client:	ThaQuarry Pty Ltd		
Project:	Light Horse Buisiness Centre EA		
Drawing No:	0071234_GIS12	Suffix No:	R2
Date:	04/08/2008	Drawing size:	A4
Drawn by:	JF	Reviewed by:	JK
Source:	© 2007 Google TM		
Scale:	Refer Scale Bar		

N

0 95 190 380 570 Meters

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ERM

Legend

Noise Level

- 35 dB(A)
- 40 dB(A)
- 45 dB(A)
- 50 dB(A)
- School
- Receiver Location
- 60 dB(A)
- Site Boundary

Suffix	*Revisions*	*Date*	*Init*
R0	Preliminary Issue	10-01-08	JS
R1	CTour Data Source Change	11-01-08	JS
R2	School Locations Added	04-08-08	JF

Figure D.3

$L_{eq,15minute}$ Daytime Operational Noise Levels, dB(A) - Year 20

Client:	ThaQuarry Pty Ltd		
Project:	Light Horse Buisiness Centre EA		
Drawing No:	0071234_GIS13	Suffix No:	R2
Date:	04/08/2008	Drawing size:	A4
Drawn by:	JF	Reviewed by:	JK
Source:	© 2007 Google TM		
Scale:	Refer Scale Bar		

N

0 95 190 380 570 Meters

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