

**CRUGMOR FARM
PENPARC, CARDIGAN**

NOISE MONITORING AND ASSESSMENT

JULY 2012

Prepared for:

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**CRUGMOR FARM
PENPARC, CARDIGAN**

NOISE MONITORING AND ASSESSMENT

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1.0 INTRODUCTION

ExCAL Limited were commissioned by Mark Davies of Crugmor Farm to undertake a noise survey at residential properties near his farm, to assess the impact if any on the ambient noise levels in these locations resulting from the current and proposed activities on his farm.

Crugmor Farm currently operates a stone aggregate recycling facility under exemption on site. The process involves stone aggregate being graded using a trommel screening unit. The trommel unit separates and removes inert materials from the stone aggregate; in addition to sorting the aggregate into different sizes which can be then used as building material. A Komatsu tracked JCB is also utilised on site to move the aggregate.

The trommel screener operates at various times of the day once or twice a week depending on material and weather within the hours of 0700 to 1700. The trommel is powered by an electric motor which generates very little noise. The main noise emanating from this treatment unit is generated by the tumbling wastes within the rotating drum unit.

The Komatsu JCB also operates at various times of day between the hours of 0700 to 1700. The JCB is typically used upon delivery of stone aggregate to the site and during the processing of aggregate through the trommel machine. The main noise emanating from the JCB is during moving of aggregate

Current proposed plans involve the extension of the stone aggregate recycling area and the development of a green waste recycling facility in the adjacent field. The green waste facility will involve the use of a tractor to create and maintain windrows utilised for the composting process

The objective of the noise monitoring was to determine existing background and operational noise levels and make an assessment of any likely impacts of the proposed extension and green waste composting development at residential receptors inside an approximate 500 meter radius of the farm boundary.

The noise surveys were undertaken at seven locations onsite and at sensitive receptors surrounding the farm on 13th and 25th June 2012.

1.1 TAN 11 Guidance

The assessment of noise has been undertaken in accordance with Technical Advice Note (Wales) 11 Noise and is based on environmental noise levels measured at various locations within the site boundary.

1.1.1 Approach and Assessment Methodology

The assessment considers the existing sources of noise in the vicinity of the proposed development and the potential noise and vibration impacts associated

with the various site operations on the existing residential properties bordering the proposed site.

An assessment has been made of the baseline situation and the potential impacts of the proposals. Environmental advantages and disadvantages have been identified and where appropriate, mitigation measures and/or scheme changes to offset potentially adverse environmental impacts have been suggested.

The assessment also considers the potential impacts from changes in road traffic noise due to the proposed development on the proposed and existing residential properties.

1.1.2 Technical Advice Note (Wales) 11, Noise

Technical Advice Note (Wales) 11, Noise, sets out guidance on noise related planning issues. It gives guidance to the local authorities in Wales on the use of their planning powers to minimise the adverse impact of noise. Specifically it: -

- Outlines the considerations to be taken into account when determining planning applications for both noise-sensitive developments and for those activities which will generate noise;
- Sets out noise exposure categories for residential development, encourages their use and recommends appropriate levels for exposure to different sources of noise; and
- Advises on the use of planning conditions to minimise the impact of noise.

Local planning authorities must ensure that noise generating development does not cause an unacceptable degree of disturbance. They should also bear in mind that if subsequent intensification or change of use results in greater intrusion, consideration should be given to the use of appropriate conditions.

Noise characteristics and levels can vary substantially according to their source and the type of activity involved. In the case of industrial development, for example, the character of the noise should be taken into account as well as its level. Sudden impulses, irregular noise or noise which contains a distinguishable continuous tone will require special consideration.

1.1.3 Noise from industrial and commercial developments

The likelihood of complaints about noise from industrial development can be assessed, where the Standard is appropriate, using guidance in BS 4142: 1990. Tonal or impulsive characteristics of the noise are likely to increase the scope for complaints and this is taken into account by the "rating level" defined in BS 4142. This "rating level" should be used when stipulating the level of noise that can be permitted. The likelihood of complaints is indicated by the difference between the noise from the new development (expressed in terms of the rating level) and the existing background noise. The Standard states that,

'A difference of around 10 dB or higher indicates that complaints are likely. A difference of around 5 dB is of marginal significance'. Since background noise levels vary throughout a 24 hour period it will usually be necessary to assess the acceptability of noise levels for separate periods (e.g. day and night) chosen to suit the hours of operation of the proposed development. Similar considerations apply to developments that will emit significant noise at the weekend as well as during the week. In addition, general guidance on acceptable noise levels within buildings can be found in BS 8233: 1987.

2.0 METHODOLOGY

2.1 Guidance and Terms of Reference

The noise survey and assessment of measurement was based on BS 4142 1997 Method for Rating Industrial Noise Affecting Mixed Residential and Industrial Areas. The British Standard describes methods for determining; a) noise levels from factories, industrial premises, fixed installations or sources of an industrial nature in commercial premises; and b) background noise level.

The standard also describes a method for assessing whether the noise referred to in a) is likely to give complaints from people residing in the building.

2.2 Survey Plan

Noise recordings were taken from seven locations N1 to N8, these are shown on Drawing 196-01-02.D07 of Appendix A.

Recordings were taken for a period of 30min at six locations (N1-N6) and 15min at one location (N7) during the day: -

a) Noise Source under Investigation

Large aggregate crusher driven by an electric motor situated at location B2 of the site Drawing 196-01-02.D08 in Appendix A.

Komatsu tracked JCB also operational at location B2 of site drawing 196-01-02.D08 in Appendix A.

b) Subjective Impressions

There were no acoustic characteristic features or tonal noise distinguishable when the screener or JCB were in operation.

2.3 Periods of Measurements

Appropriate assessment time periods for noise surveys are: -

Daytime hours - 07:00 – 17:00

For a wider range of measurements and events daytime monitoring was divided into six - 30 minute periods and two - 15 minute periods.

Noise levels were measured at a height of 1.5 meters above ground level.

The wind speeds at each location were measured using a hand held anemometer, located 1.5 meters above ground level. The temperature and wind direction were also noted at each location.

2.4 Weather Conditions

Weather conditions during the survey are summarised in Table 1 below.

Table 1 – Survey weather conditions

Survey	Survey Date	Wind		Temperature (°C)
		Direction	Speed (m/s)	
A	13.06.2012	SE	0.4-0.6	9-11
B	25.06.2012	NW	0.3-0.4	8-12

No precipitation or wind speeds greater than 5m/s were experienced during any of these surveys.

2.5 Measurements

The following parameters were measured with the aggregate treatment facility and JCB in operation and not operating at each location: -

L_{AeqT} - the equivalent, continuous, A weighted sound pressure level. This represents the constant level of noise with the same energy content as the varying acoustic noise signal measured over the measurement period 'T' and is the normal parameter used for ambient and specific noise levels.

L_{AF90T} – the level of A weighted noise exceeded for 90% of the measurement 'T' measured with a fast time weighting. This is the parameter used to describe background noise.

L_{AFmax} – the maximum A weighted noise level measured with a fast time.

Further subjective observations relating to characteristics of noise were noted (e.g. Intermittent, Tonal, Impulsive etc.). (see Appendix B)

2.6 Instrumentation

The noise surveys were carried out using a Cirrus Research CR.811 Type 1 Noise Level Meter. The noise meter employed was calibrated at the beginning and end of the surveys using a Cirrus CR.510 Series Acoustic Calibration (reference level 94 dB at 1000 Hz).

The calibrator and meter had been calibrated within the last year against a reference set to UKAS requirements. Calibration Certificates are presented in Appendix C.

There were no drift in calibration levels noted during the surveys.

2.7 Monitoring Locations

The survey locations are illustrated on Drawing 196-01-02.D07 of Appendix A.

Rationales for the monitoring locations are presented in Table 2 below.

Table 2 – Monitoring Point Details

Monitoring Point	Survey Ref	Survey Date	Survey Time	Survey Point Rationale
Location N1	A1	12.06.2012	10:37 – 11:07	15 meters north east of Trommel Screener and generator both were operational during time of survey
Location N2	A2	12.06.2012	11:12 – 11:42	350 meters south east of Trommel Screener and generator both were not operational during time of survey
Location N3	A3	12.06.2012	11:47 – 12:17	400 meters north east of south east of Trommel Screener and generator both were not operational during time of survey
Location N4	A4	12.06.2012	12:21 – 12:36	500 meters north of Trommel Screener and generator both were not operational during time of survey
Location N5	A5	12.06.2012	13:36 – 14:06	250 meters north of Trommel Screener and generator both were not operational during time of survey
Location N6	A6	12.06.2012	14:09 – 14:39	400 meters north of Trommel Screener and generator both were not operational during time of survey metres south east of the site
Location N7	A7	12.06.2012	14:29 – 14:56	525 meters north of Trommel Screener and generator both were not operational during time of survey

Monitoring Point	Survey Ref	Survey Date	Survey Time	Survey Point Rationale
Location N1	B1	25.06.2012	11:12 – 11:42	15 meters north east of Trommel Screener and generator both were operational during time of survey
Location N2	B2	25.06.2012	11:48 – 12:18	350 meters south east of Trommel Screener and generator both were not operational during time of survey
Location N3	B3	25.06.2012	12:24 – 12:54	400 meters north east of south east of Trommel Screener and generator both were not operational during time of survey
Location N4	B4	25.06.2012	12:58 – 13:13	500 meters north of Trommel Screener and generator both were not operational during time of survey
Location N5	B5	25.06.2012	13:36 – 14:06	250 meters north of Trommel Screener and generator both were not operational during time of survey
Location N6	B6	25.06.2012	14:08 – 14:38	400 meters north of Trommel Screener and generator both were not operational during time of survey metres south east of the site
Location N7	B7	25.06.2012	14:46 – 15:01	525 meters north of Trommel Screener and generator both were not operational during time of survey

3.0 RESULTS AND ASSESSMENT

3.1 Noise Assessment Results with machinery off

A Noise assessment was first conducted at the 7 monitoring locations with the machinery off, in order to calculate the L_{Aeq} and L_{A90} levels. The results of this assessment are presented in Table 3 below.

Table 3 - Summary of Noise Levels when the Trommel was not running

Survey Ref:	L_{Aeq}	L_{A90}
	(dBA)	(dBA)
N1	47	37.8
N2	44.9	39.2
N3	41.1	37.9
N4	45.7	36.7
N5	65.8	40.5
N6	51.8	40.9
N7	61.5	42.3

3.2 Noise Assessment Results with machinery on

The Noise assessment was then repeated at the 7 monitoring locations with the machinery on, in order to calculate the L_{Aeq} levels. The results of this assessment are presented in Table 4 below.

Table 4 - Summary of Noise Levels whilst the Trommel was running

Survey Ref:	L_{Aeq}	L_{A90}
	(dBA)	(dBA)
N1	69.6	64.5
N2	47.5	43.6
N3	48.1	44.1
N4	44.6	39.8
N5	51.8	44.7
N6	51.8	38.1
N7	56.5	42.5

3.3 Comparison of Noise Assessment Results

The results of the noise assessments at the selected locations with the machinery on and off were then compared to determine the relative increase in noise due to the machinery. Table 5 below summarises and presents the differences between the two sets of noise monitoring data.

Table 5 – Comparison of Noise Assessment datasets

	Machinery Off	Machinery On	
Survey Ref:	L_{Aeq}	L_{Aeq}	Difference between L_{Aeq} with machinery on and off
	(dBA)	(dBA)	(dBA)
N1	47	69.6	+22.6
N2	44.9	47.5	+2.6
N3	41.1	48.1	+7
N4	45.7	44.6	-1.1
N5	65.8	51.8	-14
N6	51.8	51.8	0
N7	61.5	56.5	-5

Comparison of the data in Table 5 shows that several of the results have a difference less than 3 dB with four being negative values. Therefore in accordance with BS4142 the noise level of the machinery was used to calculate the projected noise at each of the sensitive receptors identified. It is accepted that noise will drop by 6dB with every doubling of distance from the source. The machinery on site generated 69.6 dB at a distance of 15m. This value was used to calculate values for Noise Attenuation with distance, which were then plotted into the graph shown in Appendix D.

The exact distances to the nearest receptor at survey locations N2-N7 were then calculated using a mapping tool using the known location of the site machinery, these are shown in Table 6. Survey location distances were not used as despite the survey locations being as close to receptors as possible, private property prevented the measurement being collected precisely next to each receptor. As the noise will continue to decrease until it reaches the receptor, recalculating a precise distance to each receptor allows greater accuracy when determining the noise level at each receptor from the graph.

Table 6 – Distance to sensitive receptors calculated from maps

Survey Ref:	Distance on map from machinery location (m)
N2	425
N3	540
N4	650
N5	270
N6	410
N7	570

The graph was then used to calculate the noise levels at each of the sensitive receptors, these are summarised in Table 7 along with the corresponding background noise measurements.

Table 7 – Calculated Noise Attenuation levels at sensitive receptor locations

	Noise Attenuation level with distance at receptor	Machinery off	
Survey Ref:	L_{Aeq}	L_{A90}	Difference from background with machinery off
	(dBA)	(dBA)	(dBA)
N2	41	39.2	1.8
N3	38.8	37.9	0.9
N4	37	36.7	0.3
N5	44.8	40.5	4.3
N6	41.2	40.9	0.3
N7	38.2	42.3	- 4.1

The results in Table 7 show that when calculated noise levels at the sensitive receptors are compared to the measured background noise levels, all receptors have an increase of less than 5dB.

From BS4142, any increase less than 5dBA is deemed marginal and would not be likely to cause complaints.

4.0 CONCLUSIONS

Residential receptors inside an approximate 500 meter radius of the farm boundary were identified as potential sensitive receptors to the proposed development of a green waste composting site and extension to the current stone aggregate recycling site at Crugmor Farm Penparc.

The proposed green waste composting area will involve the creation and maintenance of windrows. Under current proposals this will be achieved using a tractor. The Komatsu tracked JCB currently used in the stone aggregate area will be of equal or greater size than the tractor proposed to be used for the green waste composting area. Therefore it is reasonable to assume that the calculations performed for the stone aggregate facility with the JCB in operation would also be representative of the Noise level generated by the expanded facility, which would include the green waste recycling facility.

All locations assessed have been shown to receive an increase in noise of less than 5dB when the current and proposed site machinery are running together, which would be the worst case scenario under current proposals.

The increase of less than 5 dB is rated by the BS4142 standard as marginal and unlikely to cause complaints.

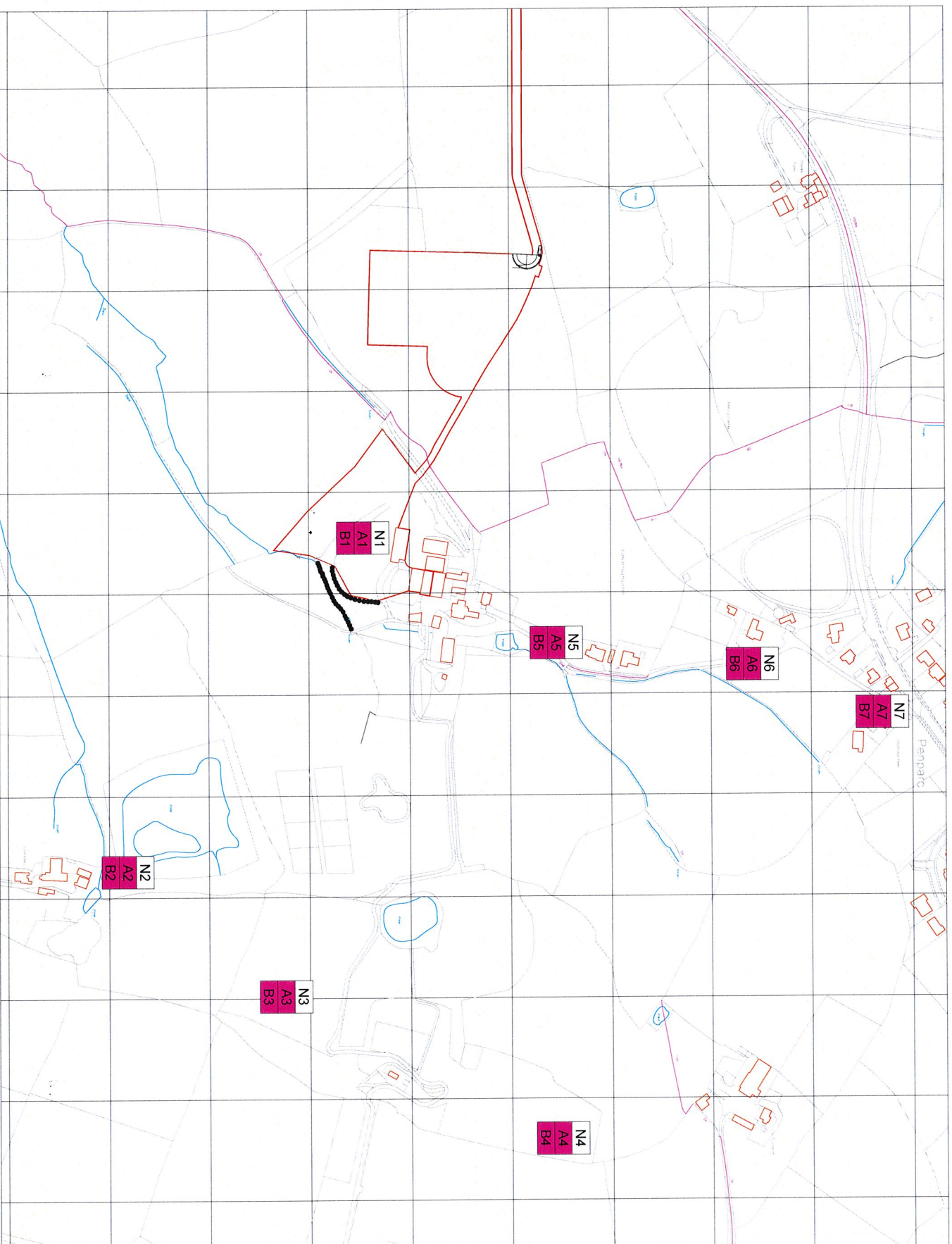
We therefore conclude that the current and proposed machinery to be used at the green waste composting site and stone aggregate recycling facility at Crugmor Farm are unlikely to cause noise complaints from the residential dwellings assessed.

APPENDIX A

Drawing



- Location
- N7 Trammel screener generator operational during survey
 - A6 Trammel screener generator non-operational during survey
 - B6

**Job:**

Environmental Support Services
Supplied to Mr. Marc Davies,
Crugmor Farm,
Penparc, Ceredigion

Title:

Noise Survey Locations

Date:

June 2012

Scale:

1:2000 @ A1

Drawn by:

MKI

Checked by:

RH



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Drawing No: 196-01-02.D07

Revision No: Date:



- L1-L2 Green waste unloading bay lighting - 300w
- L3 Weighbridge lighting - 300w
- L4-L5 Inert waste unloading and processing lighting
- B1 Inert waste unloading bay
- B2 Inert waste processing bay (crushing, screening)
- B3 Holding bays processed materials, 3 bays 20mx20m
- B4 Waste reception bunker 20mx20mx4.5m
- B5 End product holding bunker 20mx15mx4.5m

(Further construction details of B3, B4 and B5 in Drawing Ref.196-01-02.D09)

- S1-S16 Warning signage

Notes:

- 1.) Clay for bunding/Phase 1 compost area to be excavated from composting area and on farm.
- 2.) Existing aggregate from recycling area to be used under compost area Phase 1 (working surface) and under Phase 2 (to create CBR of 20%) and on parking area.
- 3.) ☉ Rainwater harvesting from roof for operational use.

Job:
Environmental Support Services
Supplied to Mr Marc Davies,
Crugmor Farm,
Penparc, Ceredigion

Title:
Proposed Layout Plan

Date: July 2012

Scale: 1:1000 @ A1

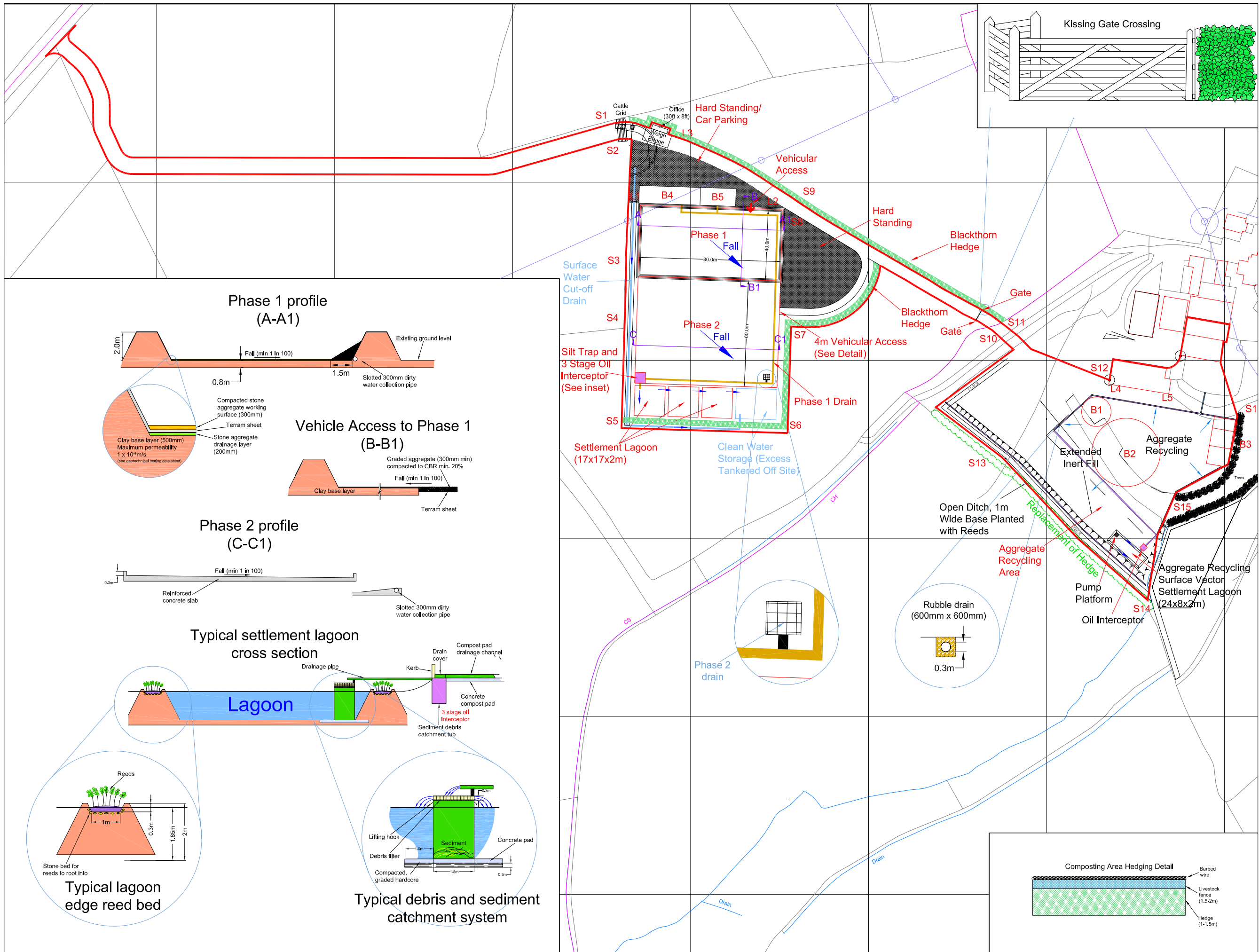
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Checked by: SW

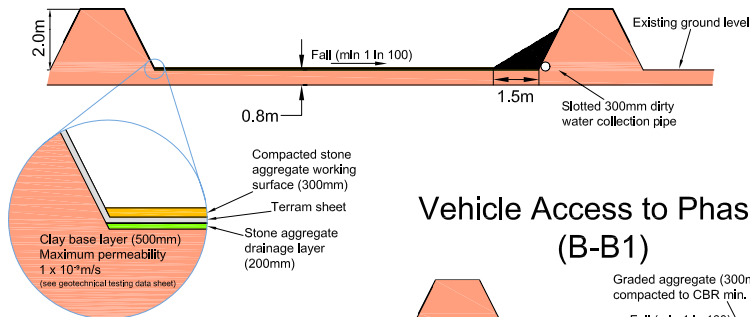
 **ExCAL Limited**
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Drawing No: 196-01-02.D08

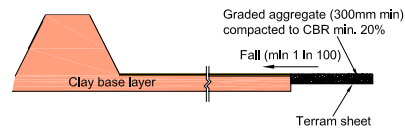
Revision No: A **Date:** 25 July 2012



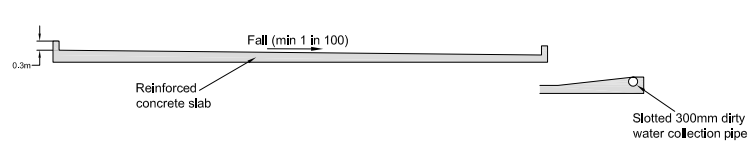
Phase 1 profile (A-A1)



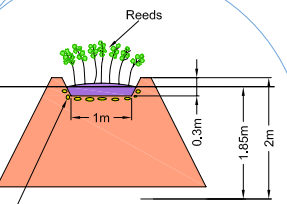
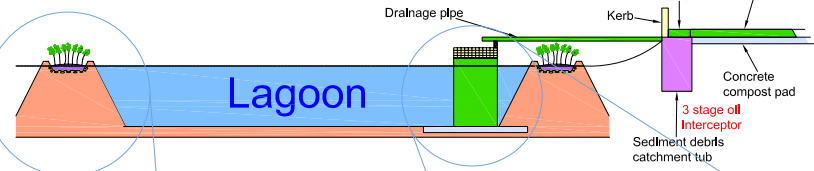
Vehicle Access to Phase 1 (B-B1)



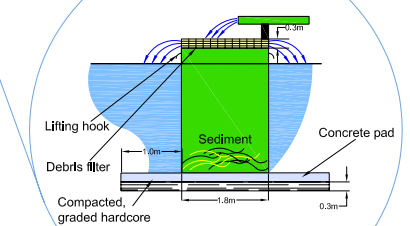
Phase 2 profile (C-C1)



Typical settlement lagoon cross section



Typical lagoon edge reed bed



Typical debris and sediment catchment system

APPENDIX B

Results

Measurement Report

Measurement Details

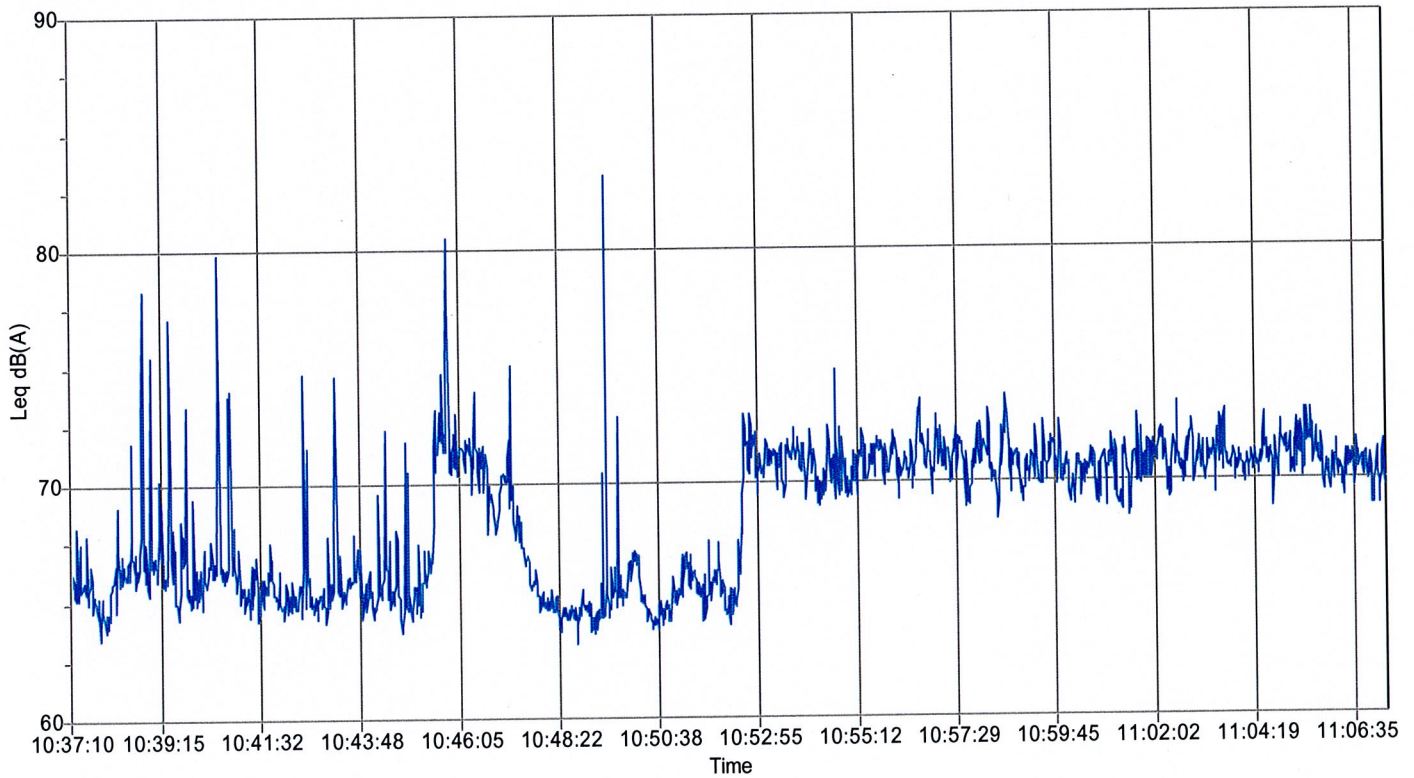
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Sound Level Meter: Cirrus Research plc
Recalibration Due: 30/09/2012
Run Duration: 00:30:02 hh:mm:ss
Range: 40-110 dB
Overload: no
Location: N1 - Survey Ref A1

Notes:

20 metres south east of trommel screener and generator, both were operational during time of survey.
240 ton digger loading waste in to screener.

Data

Leq	69.6 dBA	L1.0	73.6 dBA
Lepd	57.5 dBA	L10.0	71.7 dBA
LAE	101.9 dBA	L50.0	69.6 dBA
LAFmax	87.3 dBA	L90.0	64.5 dBA
Peak	106.7 dBC	L95.0	64.2 dBA
		Lmin	62.3 dBA



Measurement Report

Measurement Details

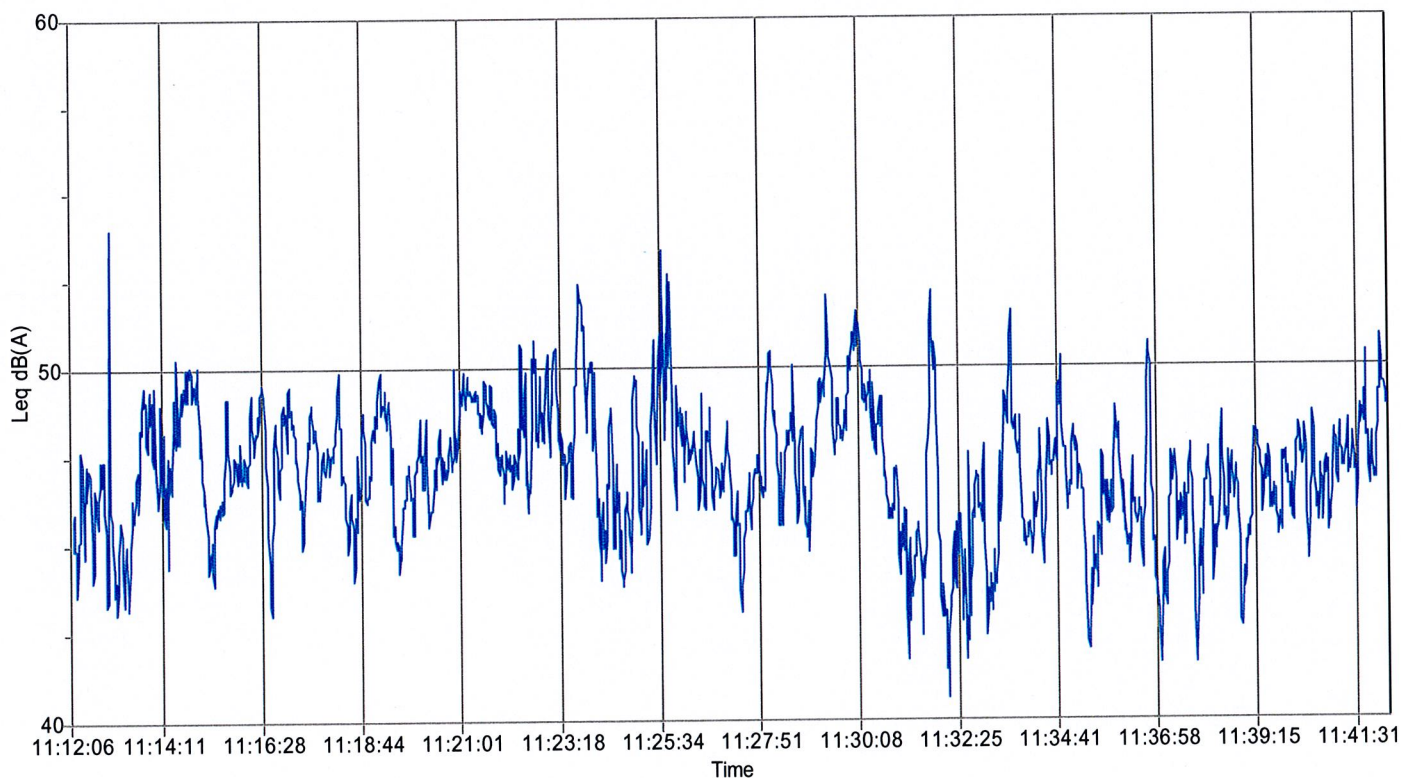
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Sound Level Meter: Cirrus Research plc
Recalibration Due: 30/09/2012
Run Duration: 00:30:02 hh:mm:ss
Range: 40-110 dB
Overload: no
Location: N2 - Survey Ref A2

Notes:

265 metres south east from trommel screener and generator which was running at time of survey.
50 metres north of sensitive receptor.
Birds constant tweeting in the background.

Data

Leq	47.5 dBA	L1.0	50.7 dBA
Lepd	35.5 dBA	L10.0	48.5 dBA
LAE	79.8 dBA	L50.0	46.1 dBA
LAFmax	60.0 dBA	L90.0	43.6 dBA
Peak	81.8 dBC	L95.0	42.9 dBA
		Lmin	39.6 dBA



Measurement Report

Measurement Details

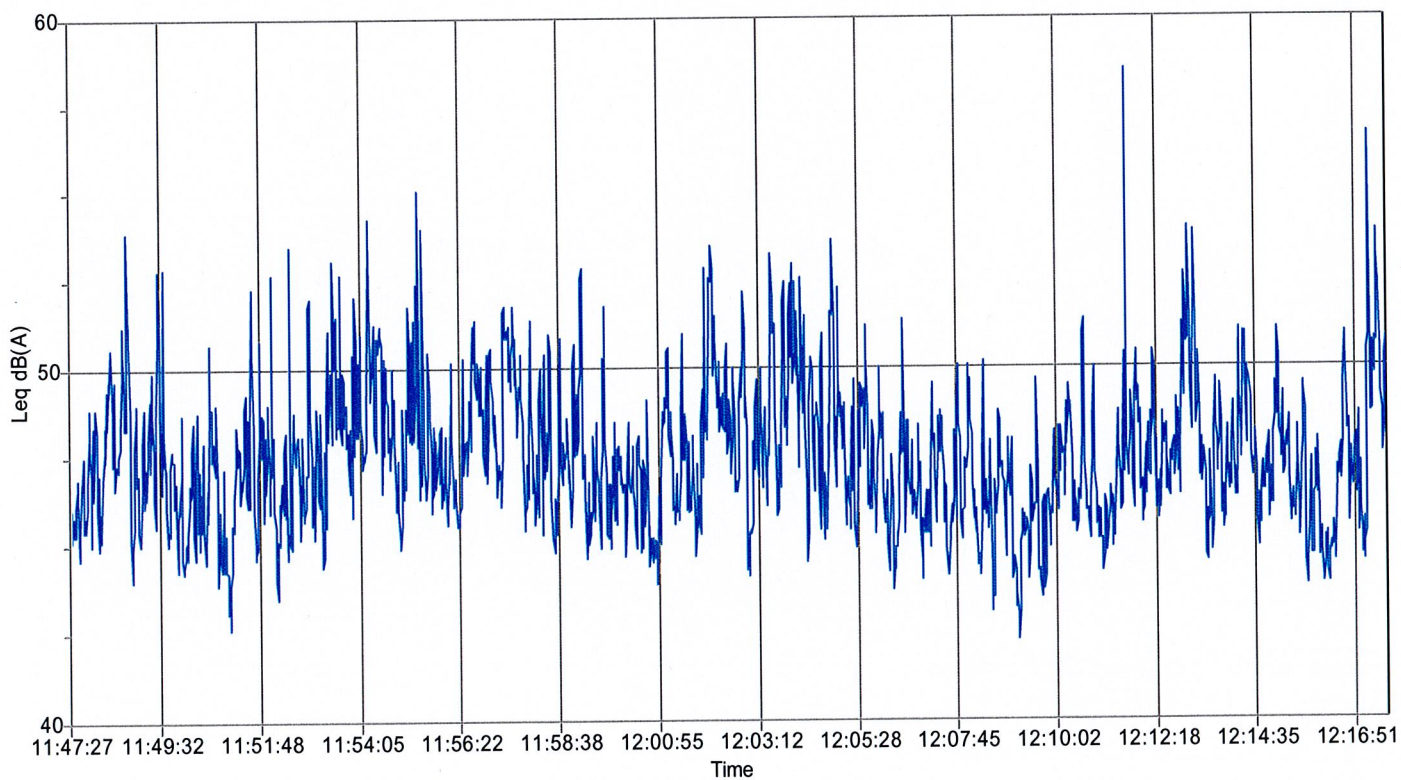
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Sound Level Meter: Cirrus Research plc
Recalibration Due: 30/09/2012
Run Duration: 00:30:01 hh:mm:ss
Range: 40-110 dB
Overload: no
Location: N3 - Survey Ref A3

Notes:

275 metres east of trommel screener and generator which was running at time of survey.
Birds constantly tweeting in the background

Data

Leq	48.1 dBA	L1.0	52.6 dBA
Lepd	36.1 dBA	L10.0	49.3 dBA
LAE	80.5 dBA	L50.0	46.2 dBA
LAFmax	64.3 dBA	L90.0	44.1 dBA
Peak	81.9 dBC	L95.0	43.6 dBA
		Lmin	41.3 dBA



Measurement Report

Measurement Details

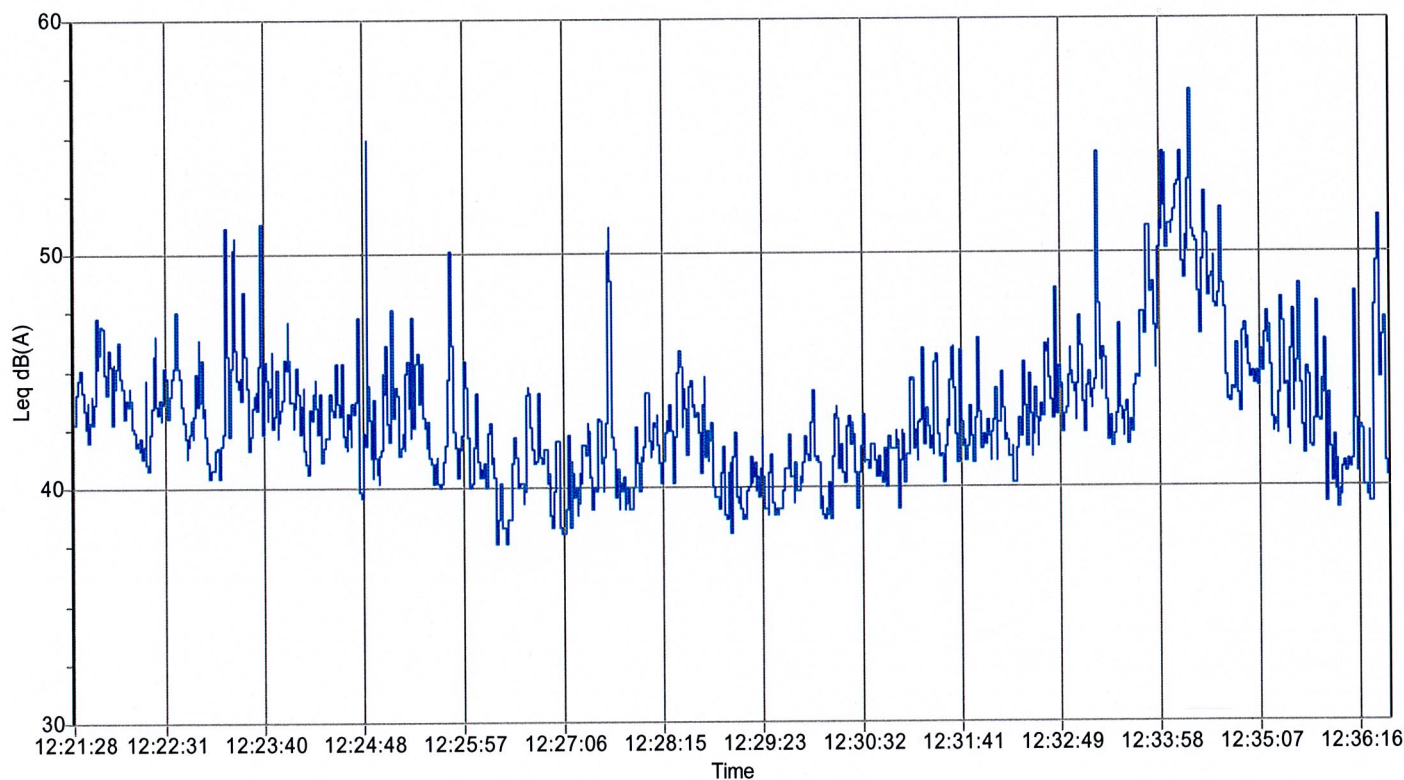
Date and Time: 13/06/2012 12:21
Sound Level Meter: Cirrus Research plc
Recalibration Due: 30/09/2012
Run Duration: 00:15:04 hh:mm:ss
Range: 40-110 dB
Overload: no
Location: N4 - Survey Ref A4

Notes:

465 metres north east from the trommel screener and generator which was running at time of survey.
Neighbouring farm 100 metres north of noise monitor.
Aeroplane overhead 12:34

Data

Leq	44.6 dBA	L1.0	52.1 dBA
Lepd	29.5 dBA	L10.0	45.6 dBA
LAE	74.0 dBA	L50.0	41.8 dBA
LAFmax	60.0 dBA	L90.0	39.8 dBA
Peak	90.1 dBC	L95.0	39.4 dBA
		Lmin	38.1 dBA



Measurement Report

Measurement Details

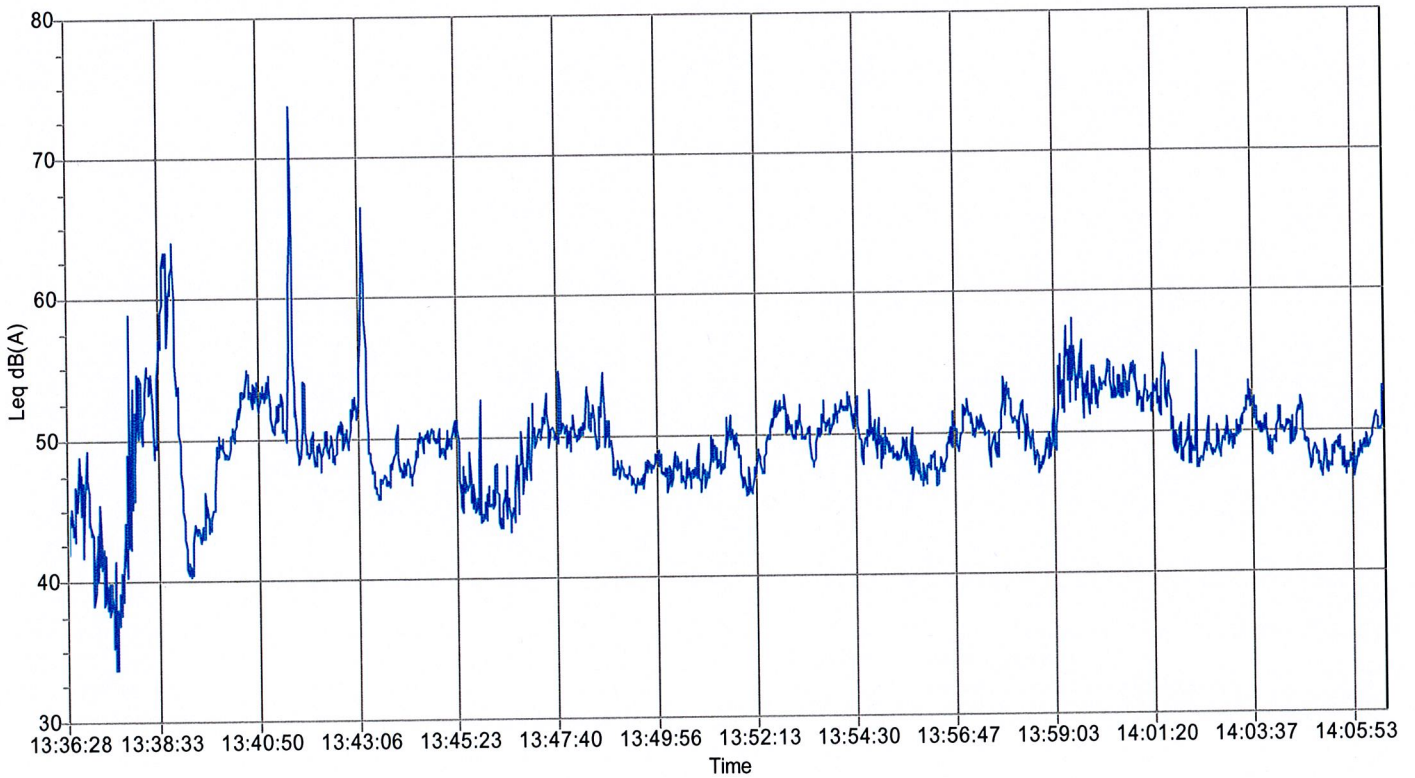
Date and Time: 13/06/2012 13:36
Sound Level Meter: Cirrus Research plc
Recalibration Due: 30/09/2012
Run Duration: 00:30:00 hh:mm:ss
Range: 40-110 dB
Overload: no
Location: N5 - Survey Ref A5

Notes:

225 metres north of trommel screener and generator which was running at time of survey.
20 metres from sensitive receptor.
Car passing 13:38, 13:40 & 13:43

Data

Leq	51.8 dBA	L1.0	60.0 dBA
Lepd	39.8 dBA	L10.0	52.4 dBA
LAE	84.2 dBA	L50.0	48.5 dBA
LAFmax	75.9 dBA	L90.0	44.7 dBA
Peak	94.5 dBC	L95.0	42.7 dBA
		Lmin	36.7 dBA



Measurement Report

Measurement Details

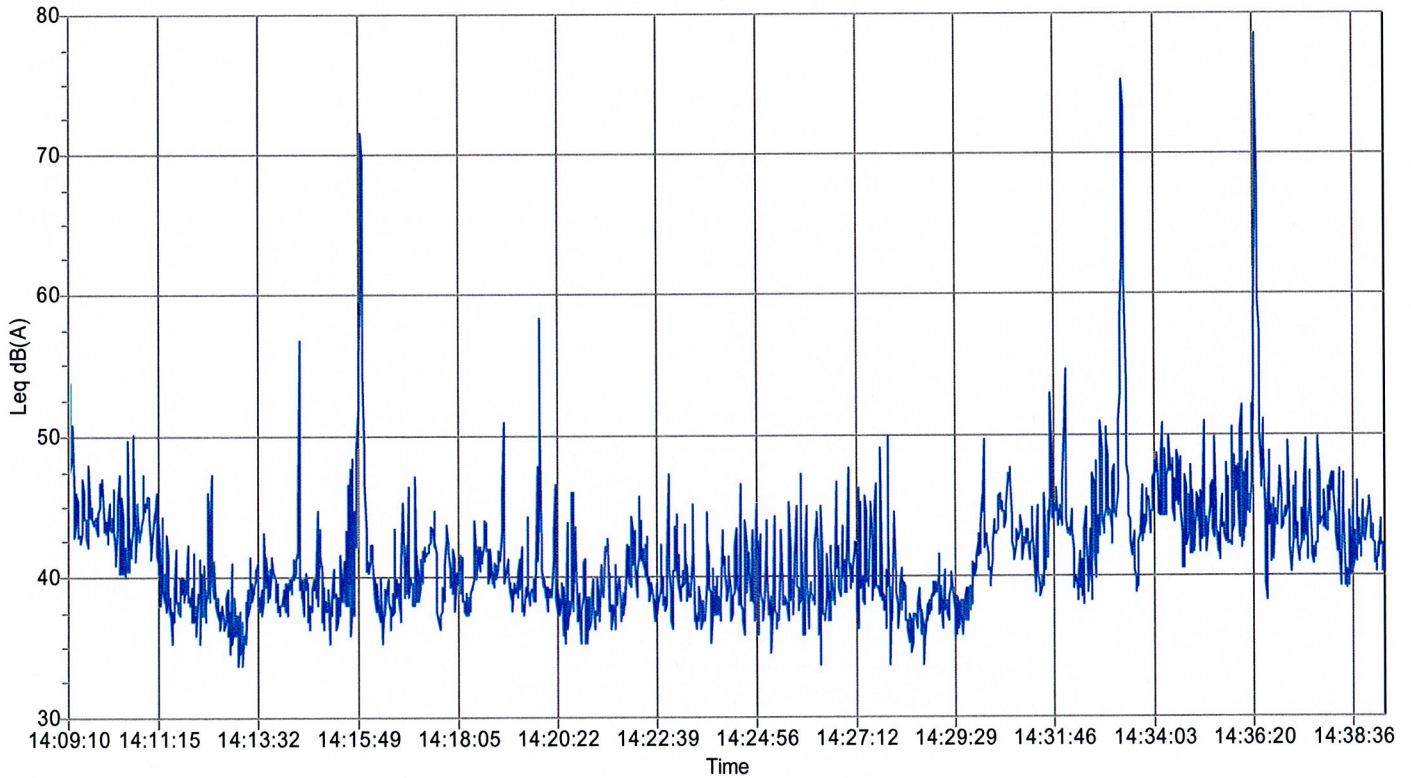
Date and Time: 13/06/2012 14:09
Sound Level Meter: Cirrus Research plc
Recalibration Due: 30/09/2012
Run Duration: 00:30:01 hh:mm:ss
Range: 40-110 dB
Overload: no
Location: N6 - Survey Ref A6

Notes:

385 meters north of trommel screener and generator which was running at time of survey.
Noise meter 15m from sensitive receptor.
Lorry passing 14:15, 14:33 & 14:36.
Birds constantly tweeting in the background.

Data

Leq	51.8 dBA	L1.0	56.1 dBA
Lepd	39.8 dBA	L10.0	44.9 dBA
LAE	84.2 dBA	L50.0	40.1 dBA
LAFmax	81.0 dBA	L90.0	38.1 dBA
Peak	103.3 dBC	L95.0	37.8 dBA
		Lmin	36.8 dBA



Measurement Report

Measurement Details

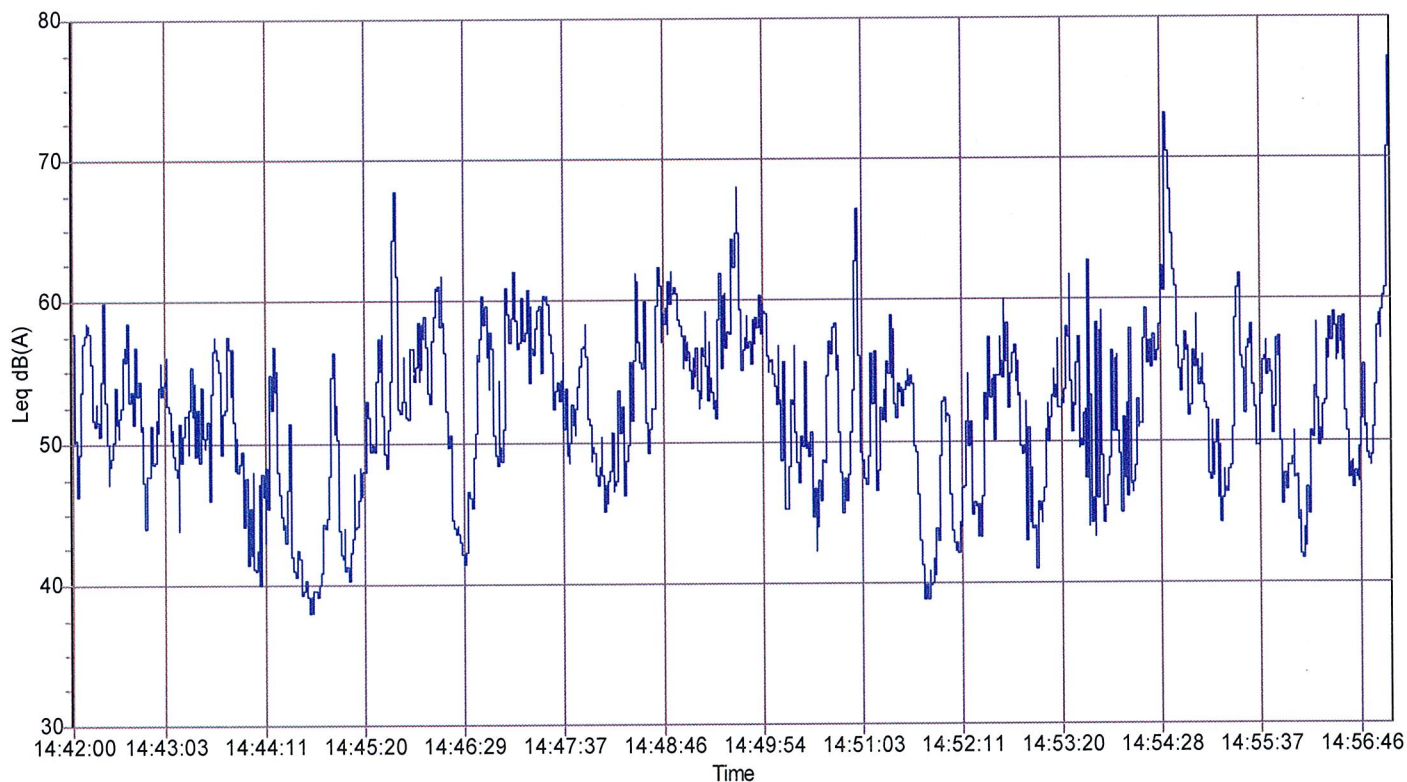
Date and Time: 13/06/2012 14:42
Sound Level Meter: Cirrus Research plc
Recalibration Due: 30/09/2012
Run Duration: 00:15:01 hh:mm:ss
Range: 40-110 dB
Overload: no
Location: N7 - Survey Ref A7

Notes:

525 meters north of trommel screener and generator which was running at the time of the survey.
5 meters from sensitive receptors.
Constant flow of traffic noise coming from the A4971

Data

Leq	56.5 dBA	L1.0	65.2 dBA
Lepd	41.5 dBA	L10.0	58.5 dBA
LAE	85.9 dBA	L50.0	51.2 dBA
LAFmax	78.7 dBA	L90.0	42.5 dBA
Peak	98.0 dBC	L95.0	40.8 dBA
		Lmin	38.2 dBA



Measurement Report

Measurement Details

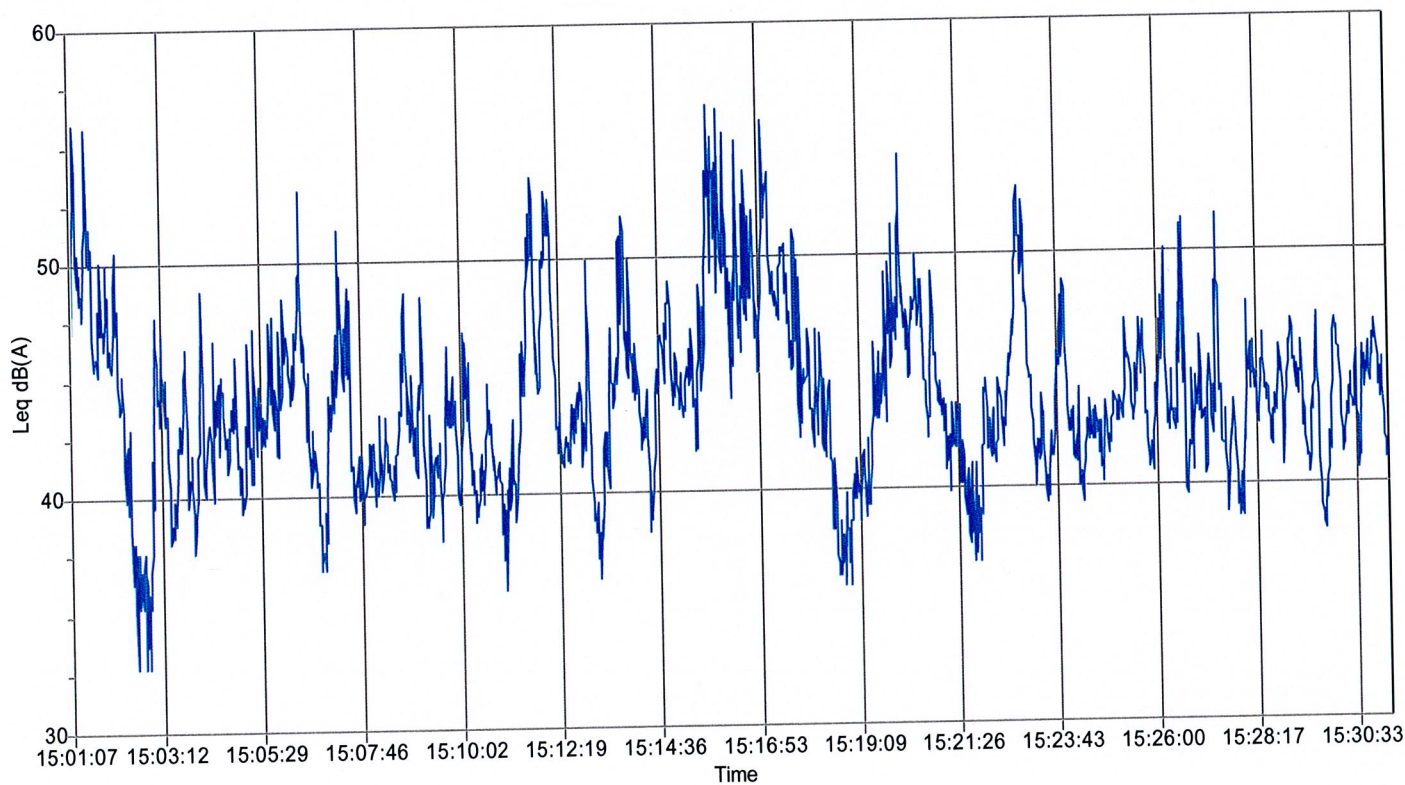
Date and Time: 13/06/2012 15:01
Sound Level Meter: Cirrus Research plc
Recalibration Due: 30/09/2012
Run Duration: 00:30:00 hh:mm:ss
Range: 40-110 dB
Overload: no
Location: N8 -Survey Ref A8

Notes:

670 meters from the trommel and generator which was running at the time of the survey
Constant flow of traffic noise from the A4971.

Data

Leq	45.6 dBA	L1.0	52.9 dBA
Lepd	33.5 dBA	L10.0	47.6 dBA
LAE	77.9 dBA	L50.0	42.6 dBA
LAFmax	60.8 dBA	L90.0	39.6 dBA
Peak	89.4 dBC	L95.0	38.9 dBA
		Lmin	36.6 dBA



Measurement Report

Measurement Details

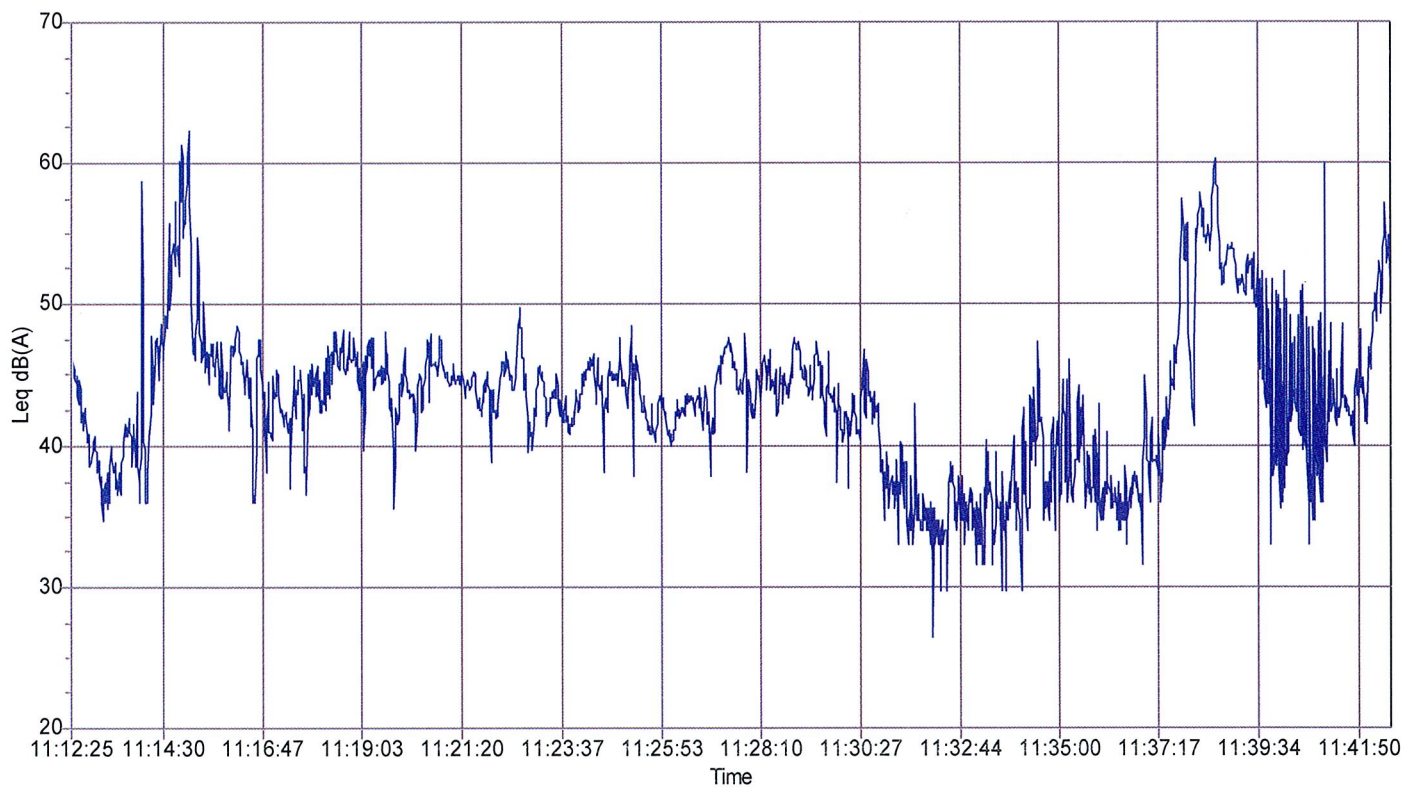
Date and Time: 25/06/2012 11:12
Sound Level Meter: Cirrus Research plc
Recalibration Due: 30/09/2012
Run Duration: 00:30:01 hh:mm:ss
Range: 40-110 dB
Overload: no
Location: N1 - Survey Ref B1

Notes:

20 meters south east from trommel screener not running at the time of the survey.
Lorries passing by 25m from noise meter.
Bulldozer in the background screening.

Data

Leq	47.0 dBA	L1.0	57.1 dBA
Lepd	34.9 dBA	L10.0	48.0 dBA
LAE	79.3 dBA	L50.0	42.4 dBA
LAFmax	67.6 dBA	L90.0	37.8 dBA
Peak	100.8 dBC	L95.0	37.5 dBA
		Lmin	36.7 dBA



Measurement Report

Measurement Details

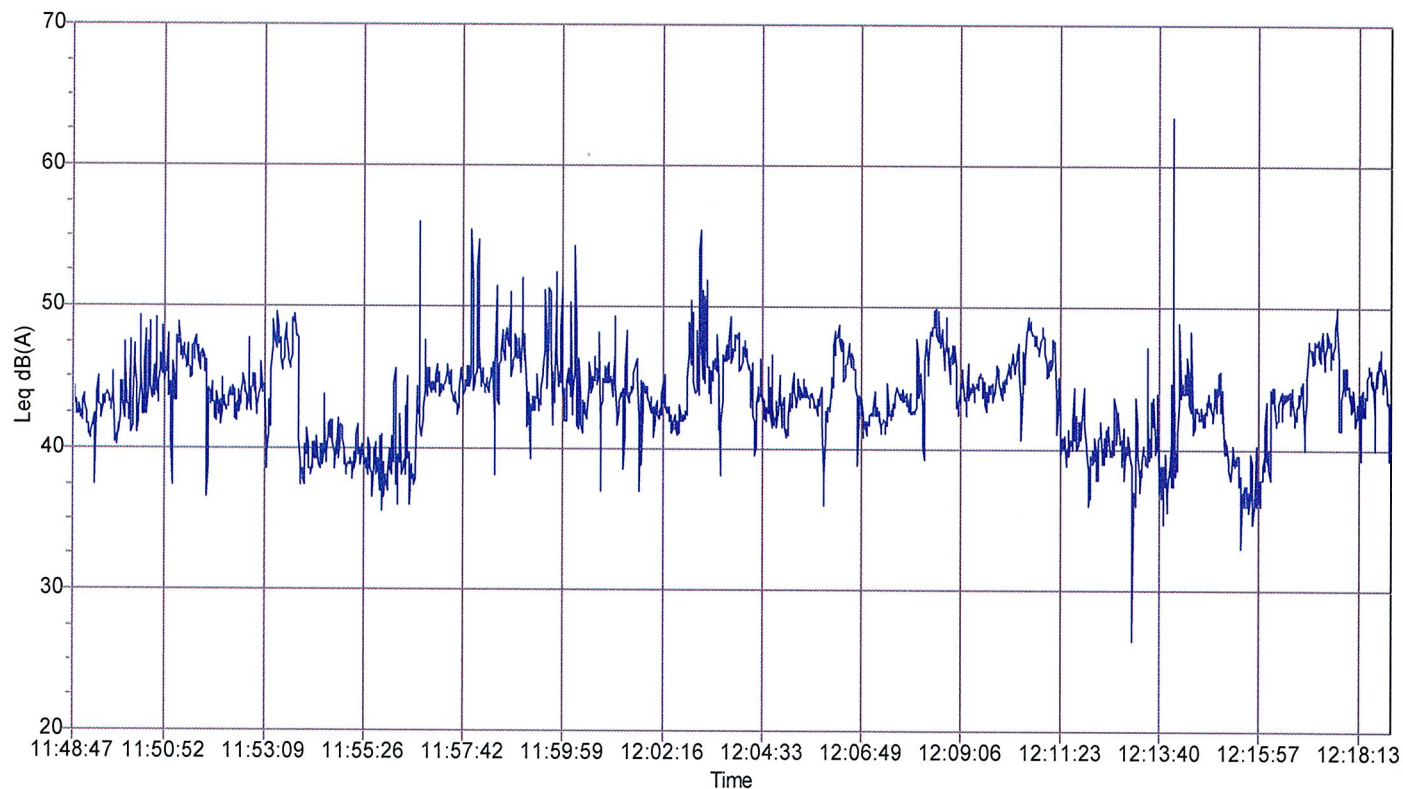
Date and Time: 25/06/2012 11:48
Sound Level Meter: Cirrus Research plc
Recalibration Due: 30/09/2012
Run Duration: 00:30:02 hh:mm:ss
Range: 40-110 dB
Overload: no
Location: N2 -Survey Ref B2

Notes:

265 meters south east from trommel screener not running during the time of the survey.
Bulldozer screening in the field.
Birds tweeting constantly in the background.

Data

Leq	44.9 dBA	L1.0	50.0 dBA
Lepd	32.8 dBA	L10.0	46.3 dBA
LAE	77.2 dBA	L50.0	42.6 dBA
LAFmax	70.3 dBA	L90.0	39.2 dBA
Peak	93.0 dBC	L95.0	38.5 dBA
		Lmin	37.0 dBA



Measurement Report

Measurement Details

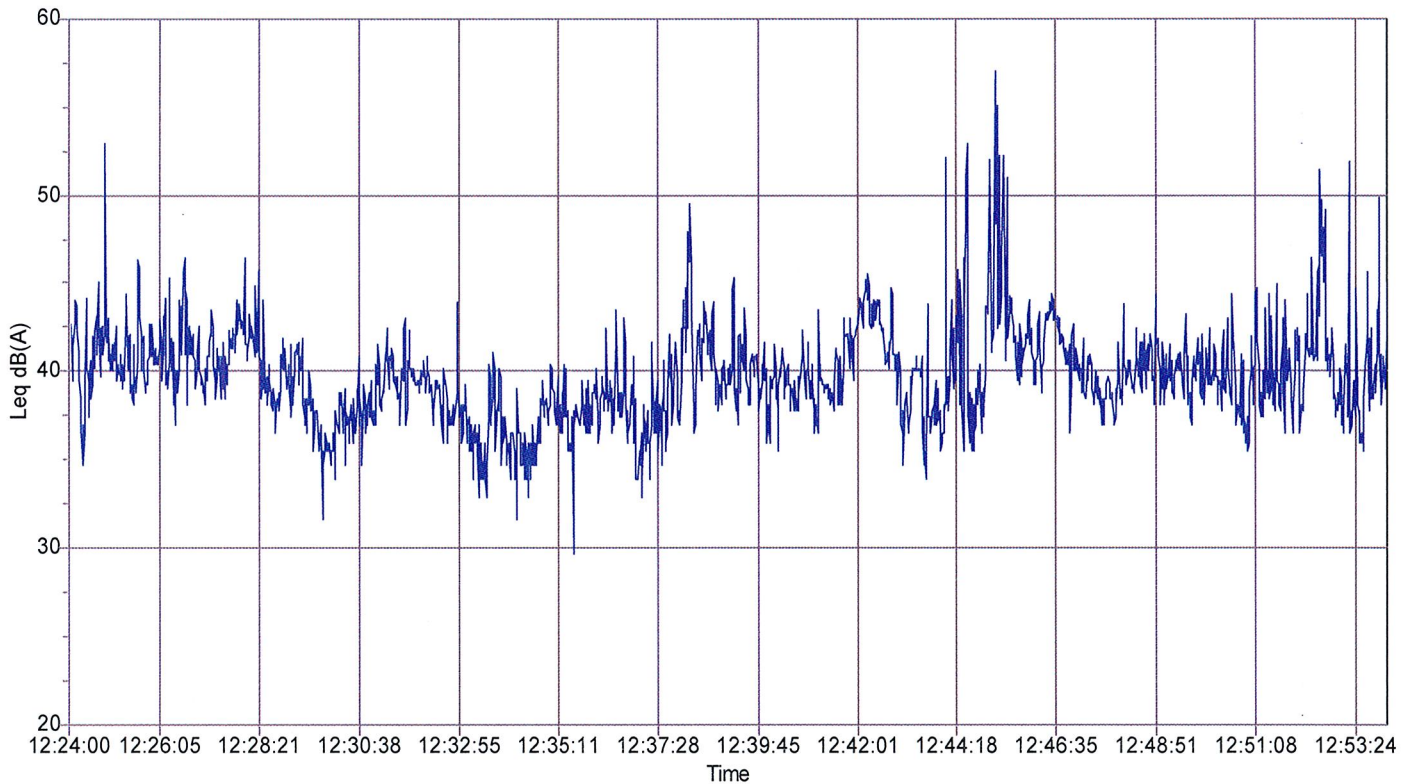
Date and Time: 25/06/2012 12:24
Sound Level Meter: Cirrus Research plc
Recalibration Due: 30/09/2012
Run Duration: 00:29:59 hh:mm:ss
Range: 40-110 dB
Overload: no
Location: N3 - Survey Ref B3

Notes:

275 meters from trommel screener which was not running at the time of survey.
Bulldozers and birds tweeting in the background.

Data

Leq	41.1 dBA	L1.0	47.5 dBA
Lepd	29.0 dBA	L10.0	42.1 dBA
LAE	73.4 dBA	L50.0	39.5 dBA
LAFmax	60.0 dBA	L90.0	37.9 dBA
Peak	89.2 dBC	L95.0	37.6 dBA
		Lmin	36.3 dBA



Measurement Report

Measurement Details

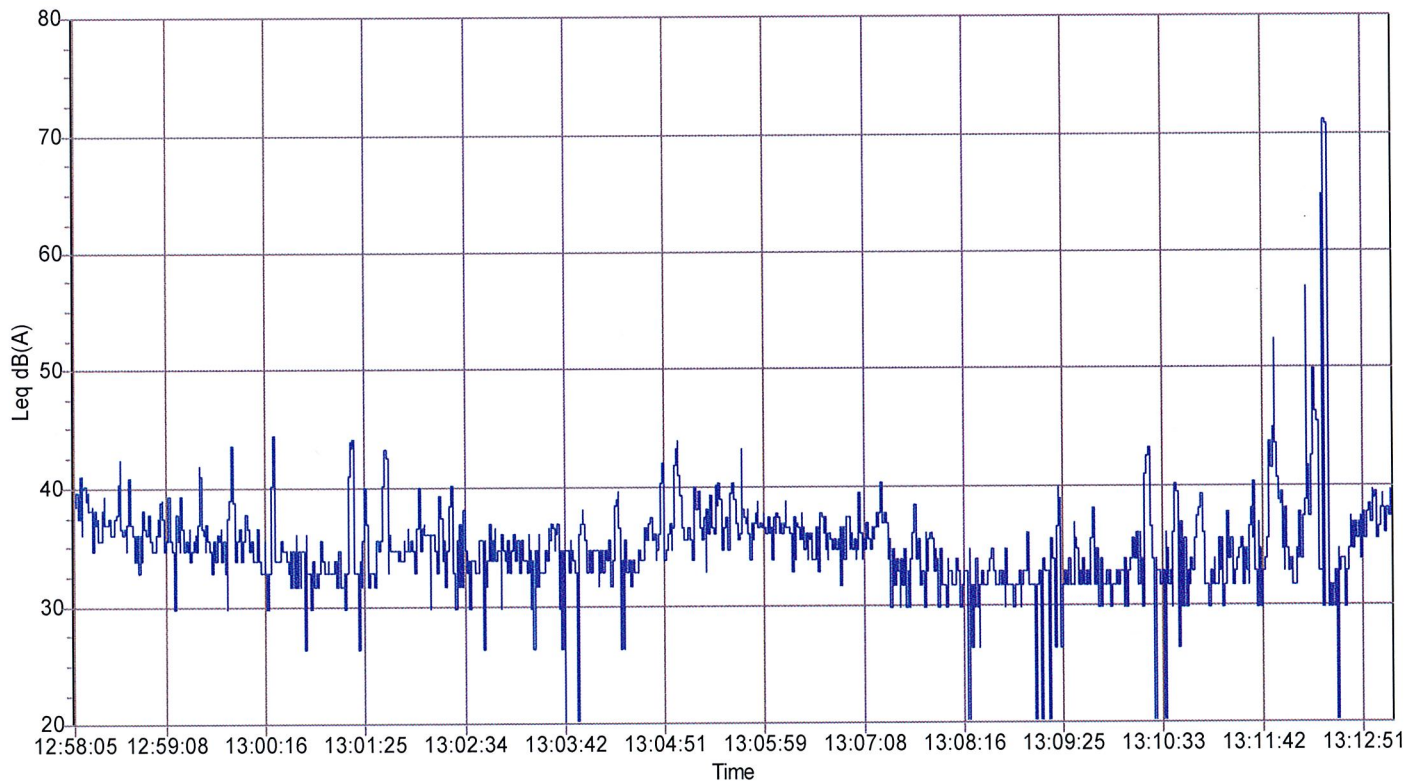
Date and Time: 25/06/2012 12:58
Sound Level Meter: Cirrus Research plc
Recalibration Due: 30/09/2012
Run Duration: 00:15:04 hh:mm:ss
Range: 40-110 dB
Overload: no
Location: N4 - Survey Ref B4

Notes:

385 meters north of trommel screener and generator which was not running at the time of the survey
Birds constantly tweeting.
Aeroplane overhead 13:12

Data

Leq	45.7 dBA	L1.0	43.9 dBA
Lepd	30.6 dBA	L10.0	38.9 dBA
LAE	75.0 dBA	L50.0	37.3 dBA
LAFmax	79.8 dBA	L90.0	36.7 dBA
Peak	100.9 dBC	L95.0	36.7 dBA
		Lmin	36.3 dBA



Measurement Report

Measurement Details

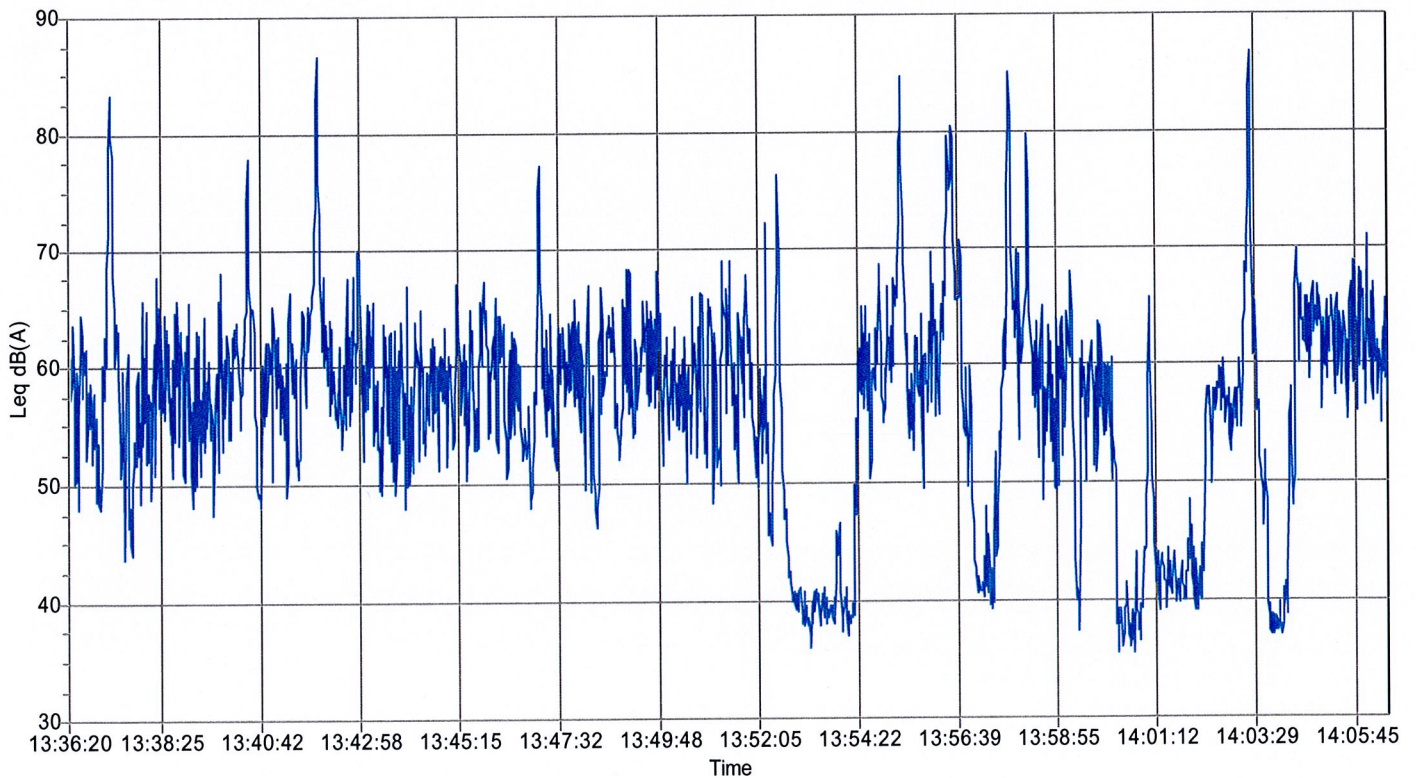
Date and Time: 25/06/2012 13:36
Sound Level Meter: Cirrus Research plc
Recalibration Due: 30/09/2012
Run Duration: 00:30:01 hh:mm:ss
Range: 40-110 dB
Overload: no
Location: N5 - Survey Ref B5

Notes:

225 meters north of the trommel screener and generator which was not running at the time of the survey.
20 meters from sensitive receptor.
Constant flow of lorries back and fore to farm.
Two builders working on bungalow with pneumatic drills, 20 meters from noise meter.
Constant stream of traffic, lorries, vans to the farm.
Workmen with pneumatic hammer drills 20m from noise meter.

Data

Leq	65.8 dBA	L1.0	77.9 dBA
Lepd	53.8 dBA	L10.0	65.7 dBA
LAE	98.2 dBA	L50.0	56.1 dBA
LAFmax	88.6 dBA	L90.0	40.5 dBA
Peak	107.0 dBC	L95.0	39.1 dBA
		Lmin	37.1 dBA



Measurement Report

Measurement Details

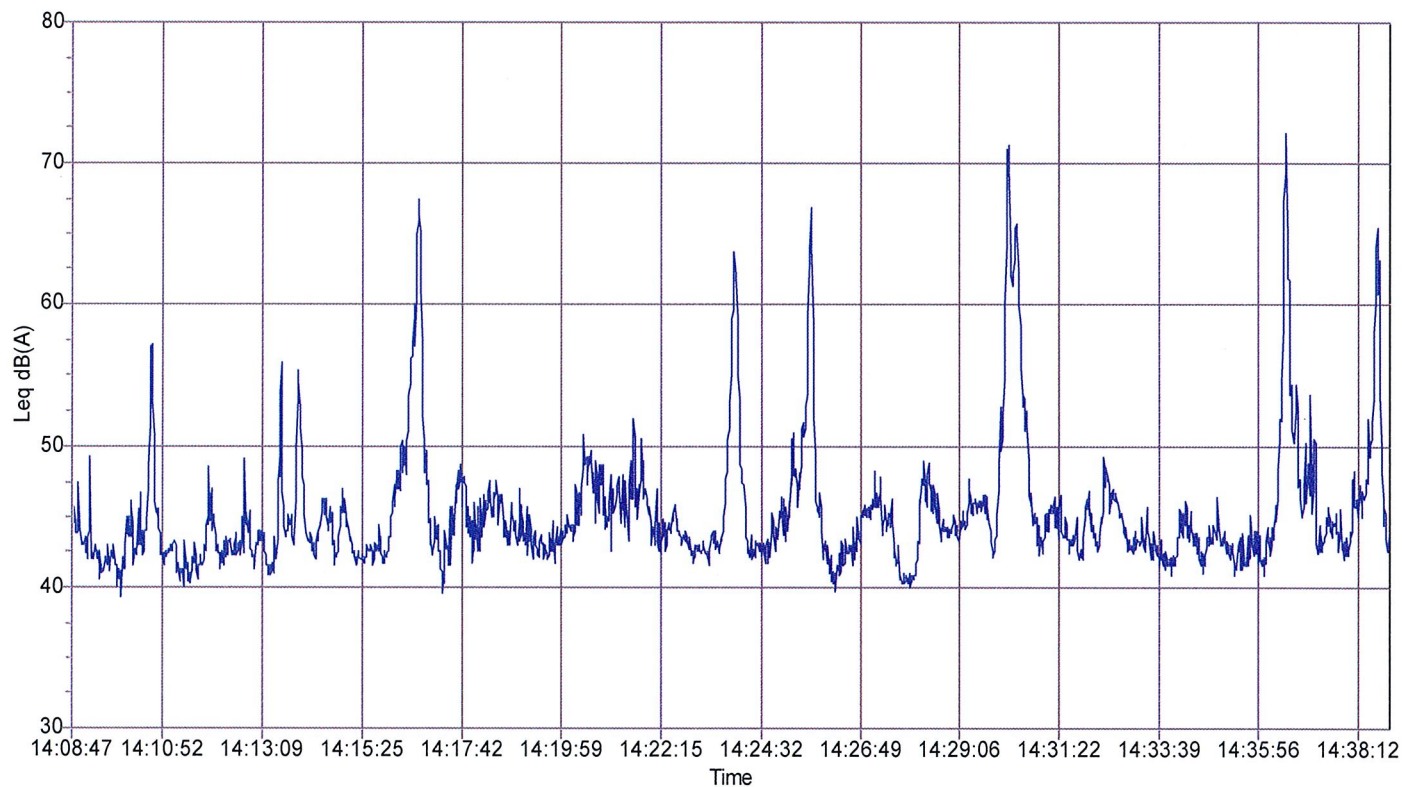
Date and Time: 25/06/2012 14:08
Sound Level Meter: Cirrus Research plc
Recalibration Due: 30/09/2012
Run Duration: 00:30:05 hh:mm:ss
Range: 40-110 dB
Overload: no
Location: N6 - Survey Ref B6

Notes:

385 meters north of trommel screener and generator which was not running at the time of survey.
Constant flow of lorries back and fore to the farm.

Data

Leq	51.8 dBA	L1.0	64.9 dBA
Lepd	39.8 dBA	L10.0	48.6 dBA
LAE	84.2 dBA	L50.0	42.9 dBA
LAFmax	76.8 dBA	L90.0	40.9 dBA
Peak	100.9 dBC	L95.0	40.5 dBA
		Lmin	39.2 dBA



Measurement Report

Measurement Details

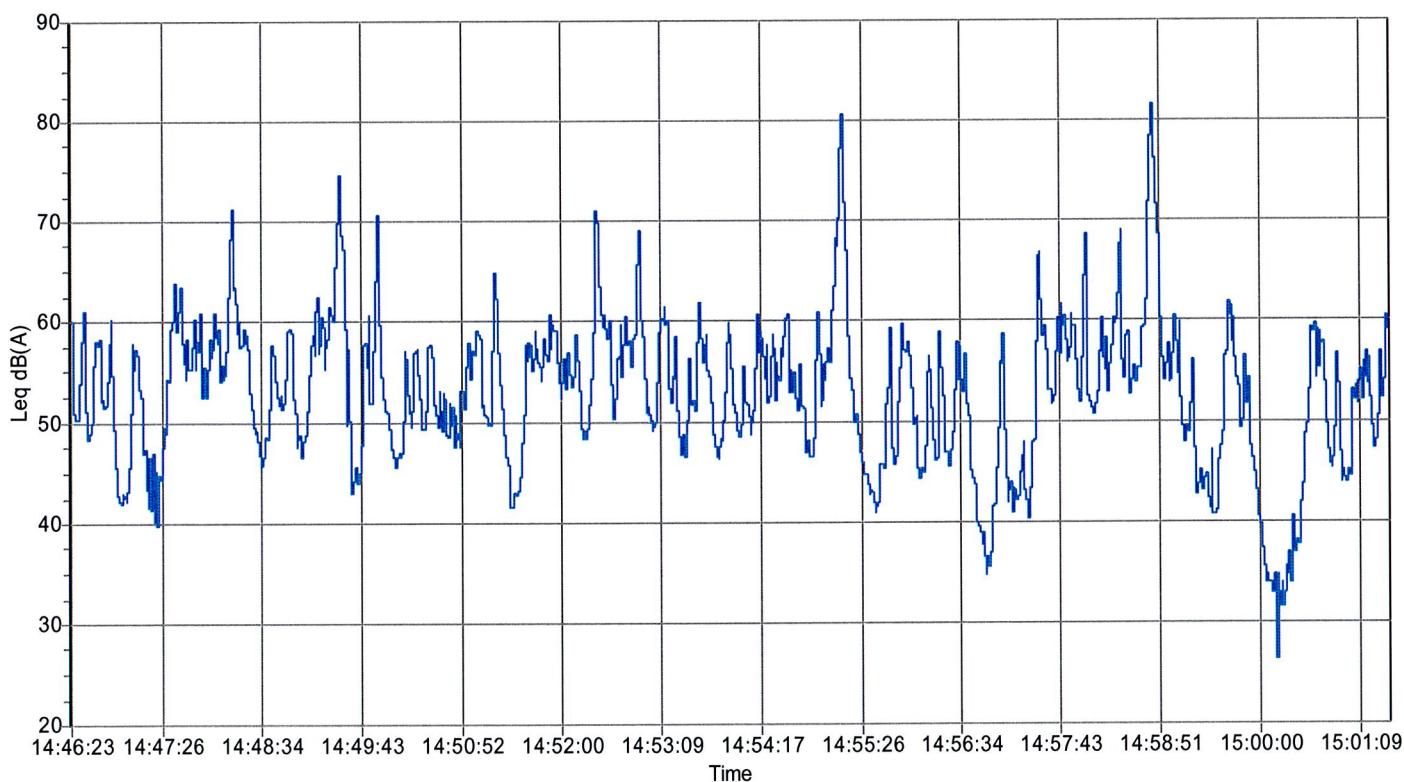
Date and Time: 25/06/2012 14:46
Sound Level Meter: Cirrus Research plc
Recalibration Due: 30/09/2012
Run Duration: 00:15:00 hh:mm:ss
Range: 40-110 dB
Overload: no
Location: N7 - Survey Ref B7

Notes:

525 meters north of trommel screener and generator which was not running at the time of survey.
5 meters from sensitive receptors.
Constant flow of traffic noise coming from the A4971.
Van with trailer passing 14:55 & 14:59
Lorries turning into the farm road.

Data

Leq	61.5 dBA	L1.0	72.0 dBA
Lepd	46.4 dBA	L10.0	60.0 dBA
LAE	90.9 dBA	L50.0	52.2 dBA
LAFmax	83.5 dBA	L90.0	42.3 dBA
Peak	98.0 dBC	L95.0	40.2 dBA
		Lmin	36.3 dBA



Measurement Report

Measurement Details

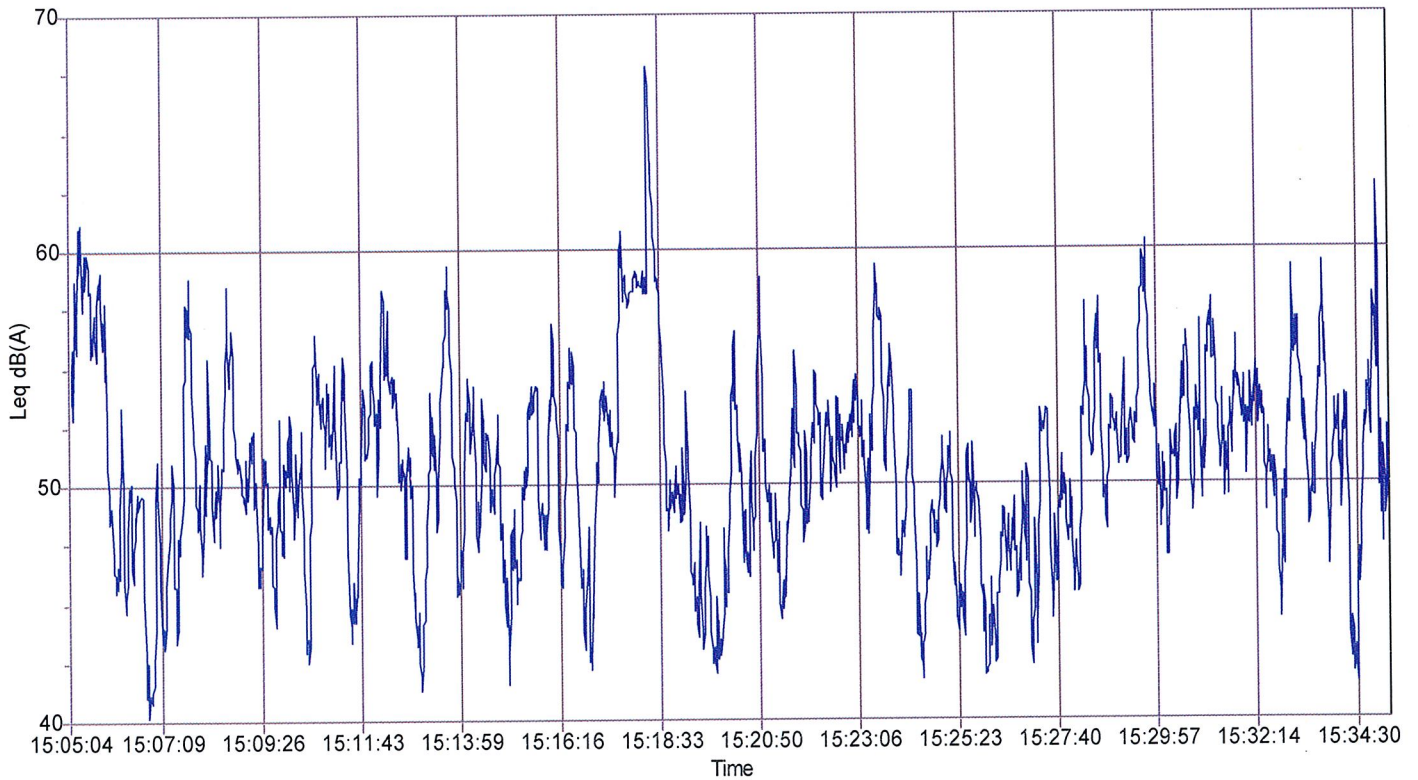
Date and Time: 25/06/2012 15:05
Sound Level Meter: Cirrus Research plc
Recalibration Due: 30/09/2012
Run Duration: 00:30:00 hh:mm:ss
Range: 40-110 dB
Overload: no
Location: N8 - Survey Ref B8

Notes:

670 meters from trommel screener and generator which was not running at the time of survey.
Constant flow of traffic noise from the A4971.

Data

Leq	52.9 dBA	L1.0	59.7 dBA
Lepd	40.9 dBA	L10.0	55.5 dBA
LAE	85.3 dBA	L50.0	49.7 dBA
LAFmax	70.7 dBA	L90.0	44.1 dBA
Peak	96.5 dBC	L95.0	42.7 dBA
		Lmin	39.5 dBA



APPENDIX C

Calibration Certificates

Certificate of Calibration



Equipment Details

Instrument Manufacturer	Cirrus Research plc
Instrument Type	Acoustic Calibrator
Model Number	CR:513A
Serial Number	030607

Calibration Procedure

The acoustic calibrator detailed above has been calibrated to the published data as described in the operating manual. The procedures and techniques used to follow the recommendations of the IEC standard Electroacoustics – Sound Calibrators IEC 60942:2003, IEC 60942:1997, BS EN 60942:1998 and BS EN 60942:2003 where applicable. The calibrator's main output is 94.00 dB (1 Pa) and this was set within the 0.01 dB resolution of the test system, i.e. one hundredth of a decibel. Numbers in {parenthesis} refer to the paragraph in IEC 60942.

Calibration Traceability

The calibrator above was calibrated against the calibration laboratory standards held by Cirrus Research plc. These are traceable to International Standards {A.0.6}. The standards are:

Microphone Type	B&K4180	Serial Number	1893453	Calibration Ref.	S 6009
Pistonphone Type	B&K4220	Serial Number	613843	Calibration Ref.	S 5964

Calibration Climate Conditions

The climatic test conditions were all maintained within the permitted limits of IEC 60942:1997.

Temperature	{B.3.2}	Permitted band	15°C to 25°C
Humidity	{B.3.2}	Permitted band	30% to 90% RH
Static Pressure	{B.3.2}	Permitted band	85 kPa to 105 kPa
Ambient Noise Level	{B.3.3.6}	Max permitted level	64 dB(Z)

Measurement Results

The figures below are the Calibration Laboratory test limits for this model calibrator and have a smaller tolerance than those permitted in IEC 60942.

94 dB Output	94.01	dB	Permitted band	93.95 to 94.05dB
104 dB Output	103.98	dB	Permitted band	103.80 to 104.30dB
Frequency	997	Hz	Permitted band	990 to 1010Hz

Uncertainty

With an uncertainty coefficient of $k=2$, i.e. a 95% confidence level, the uncertainty of each measure is

94 dB Output	± 0.13 dB	104 dB Output	± 0.14 dB
Frequency	± 0.1 Hz	Level Stability	± 0.04 dB

Calibrated by

Calibration Date 30 September 2011

Calibration Certificate Number 195367

This Calibration Certificate is valid for 12 months from the date above.

Cirrus Research plc, Acoustic House, Bridlington Road, Hunmanby, North Yorkshire, YO14 0PH
Telephone: +44 (0) 1723 891655 Fax: +44 (0) 1723 891742
Email: sales@cirrusresearch.co.uk

Certificate of Calibration



Equipment Details

Instrument Manufacturer	Cirrus Research plc
Instrument Type	Sound Level Meter
Model Number	CR:821B
Serial Number	C18930FE

Calibration Procedure

The instrument detailed above has been calibrated to the published test and calibration data as detailed in the instrument handbook, using the techniques recommended in the latest revisions of the International Standards IEC 61672-1:2002, IEC 60651:1979, IEC 60804:2001, IEC 61260:1995, IEC 60942:1997, IEC 61252:1993, ANSI S1.4-1983, ANSI S1.11-1986 and ANSI S1.43-1997 where applicable.

Sound Level Meters: All Calibration procedures were carried out by substituting the microphone capsule with a suitable electrical signal, apart from the final acoustic calibration.

Calibration Traceability

The equipment detailed above was calibrated against the calibration laboratory standards held by Cirrus Research plc. Which are traceable to the appropriate International Standards.

The Cirrus Research plc calibration laboratory standards are:

Microphone Type	B&K4180	Serial Number	1893453	Calibration Ref.	S 6009
Pistonphone Type	B&K4220	Serial Number	613843	Calibration Ref.	S 5964

Calibrated by

A handwritten signature in black ink, appearing to read 'T. A. Goodall'.

Calibration Date

30 September 2011

Calibration Certificate Number

195366

This Calibration Certificate is valid for 12 months from the date above.

APPENDIX D

Noise Attenuation Graph

Noise Attenuation with distance 69.6 dB

