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CRAIG HILL ACOUSTICS

Acoustic Consultants

QLD & NSW

Cudgen Lakes Sand Quarry

Compliance Noise Monitoring

Friday, 20 December 2024

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Cudgen Lakes Sand Quarry

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Report prepared for	Gales-Kingscliff Pty Limited
Date	Friday, 20 December 2024
Site	Cudgen Lakes Sand Quarry
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Friday, December 20, 2024©

Contents

1.0 INTRODUCTION

The purpose of this report is to examine noise levels from quarry operations for compliance. Attended monitoring was conducted on the 18th December 2024 at noise sensitive receivers identified in the conditions of approval to establish the compliance status.
Activities on the day were related to dredging and loading product to road registered trucks.

Table 1.1 Equipment being used at the time of the test

CDE (Wash Plant)
Loader (Volvo 180)
Road Trucks and dogs
Dragflow Electric Dredge El180

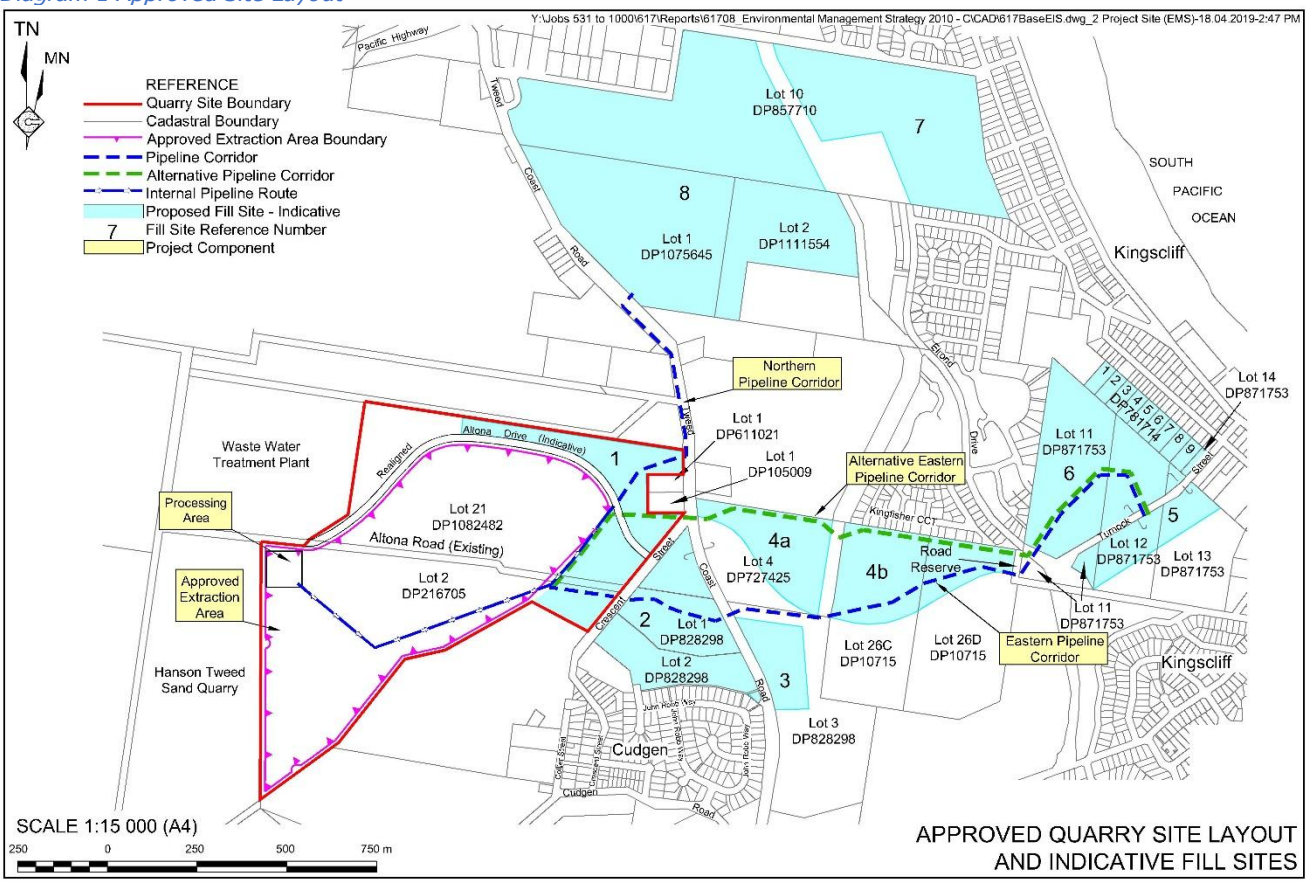
Table 1.2 Hours of operation

Activity	Permissible Hours
Site establishment, dry processing, product transport by road, VENM receipts, other quarrying operations not specified in this table	• 7.00 am to 6.00 pm Monday to Friday • 7.00 am to 1.00 pm Saturday • At no time on Sundays or public holidays
Sand extraction by dredging and pumping to the processing plant, wet processing.	• 7.00 am to 10.00 pm Monday to Friday • 7.00 am to 4.00 pm Saturday • At no time on Sundays or public holidays
Sand extraction by dredging and pumping to fill sites.	• 7.00 am to 6.30 pm Monday to Friday • 7.00 am to 1.00 pm Saturday • At no time on Sundays or public holidays
Operation of dredge to fill pipeline with water or pipeline flushing	• 6.30 am to 7.00 pm Monday to Friday • 6.30 am to 1.30 pm Saturday • At no time on Sundays or public holidays
Maintenance (if inaudible at neighbouring residences)	Any day

Table 1.3 Operational Activities

Activity	Day	Time
Site establishment, sand or soil extraction by excavator, dry processing, product transport by road, VENM receipts, other quarry related activities, maintenance (if audible at neighbouring residences)	Monday – Friday	7:00am to 6:00pm
	Saturday	7:00am to 1:00pm
	Sunday and Public Holidays	Nil

Diagram 1 Approved Site Layout



2.0 LOCATION OF MONITORING

- *Receptor G – Residence - 216 Tweed Coast Road. (line of sight to operations)*
- *Receptor O – Residence - 607 Cudgen Road.(line of sight to operations)*
- *Receptor Pacific Views Estate – Residences – via Collier Street (located to rear of new residences). (line of sight to operations)*
- *Receptor DD – Residence - 34A Crescent Street.(no line of sight)*
- *Receptor F – Residence - 64 John Robb Way. (no line of sight)*

Diagram 2 Monitoring locations

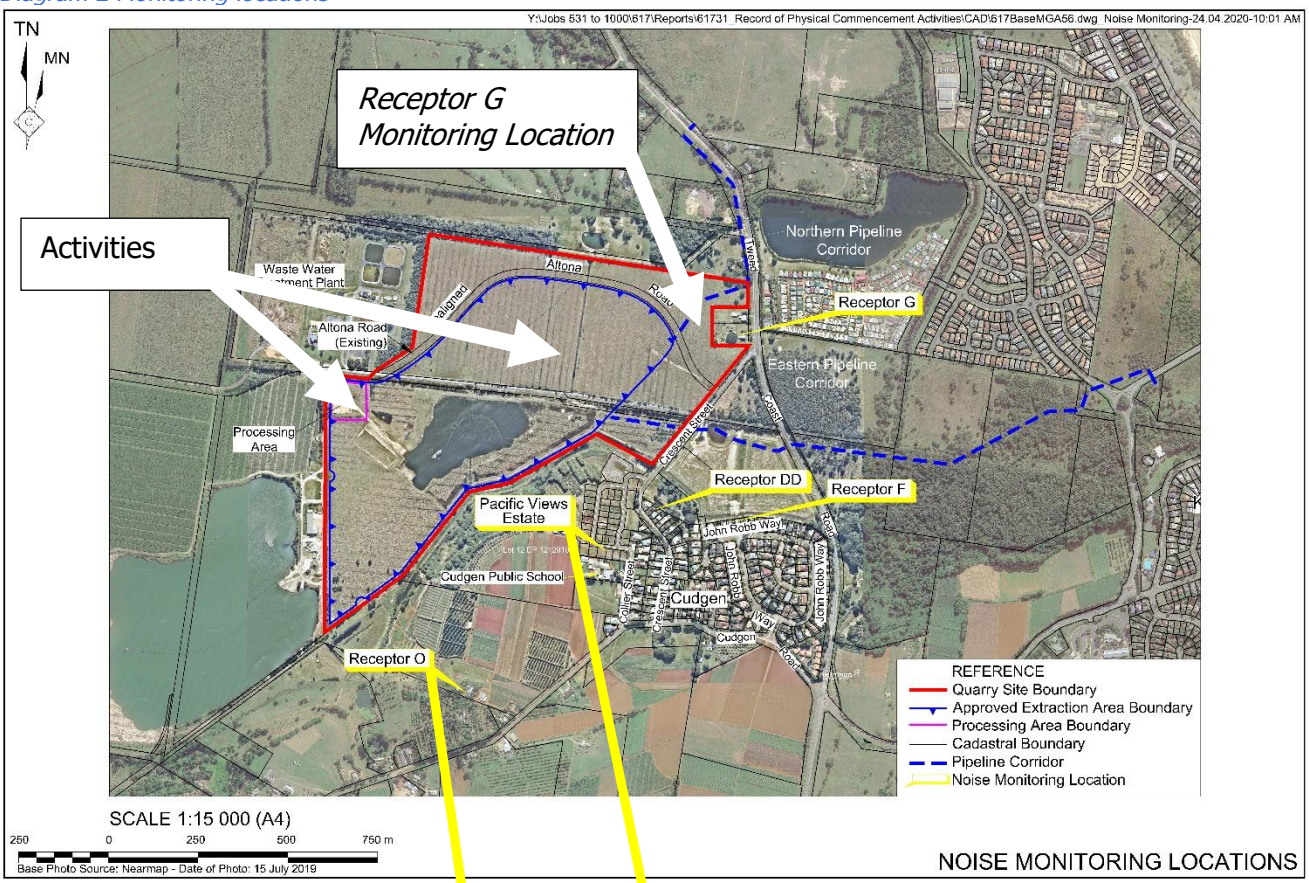
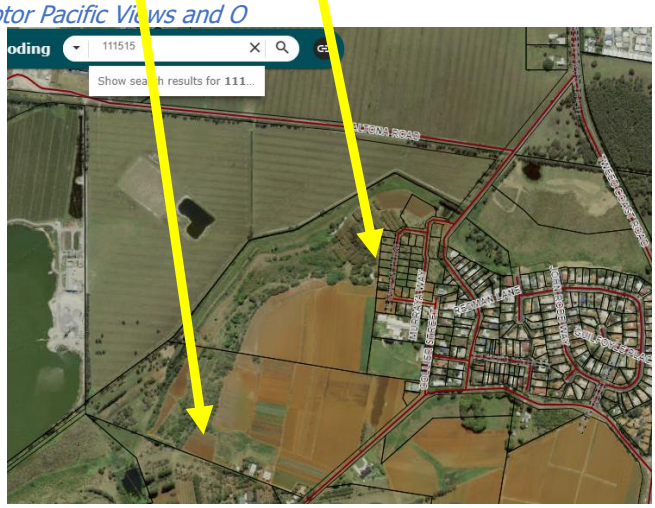
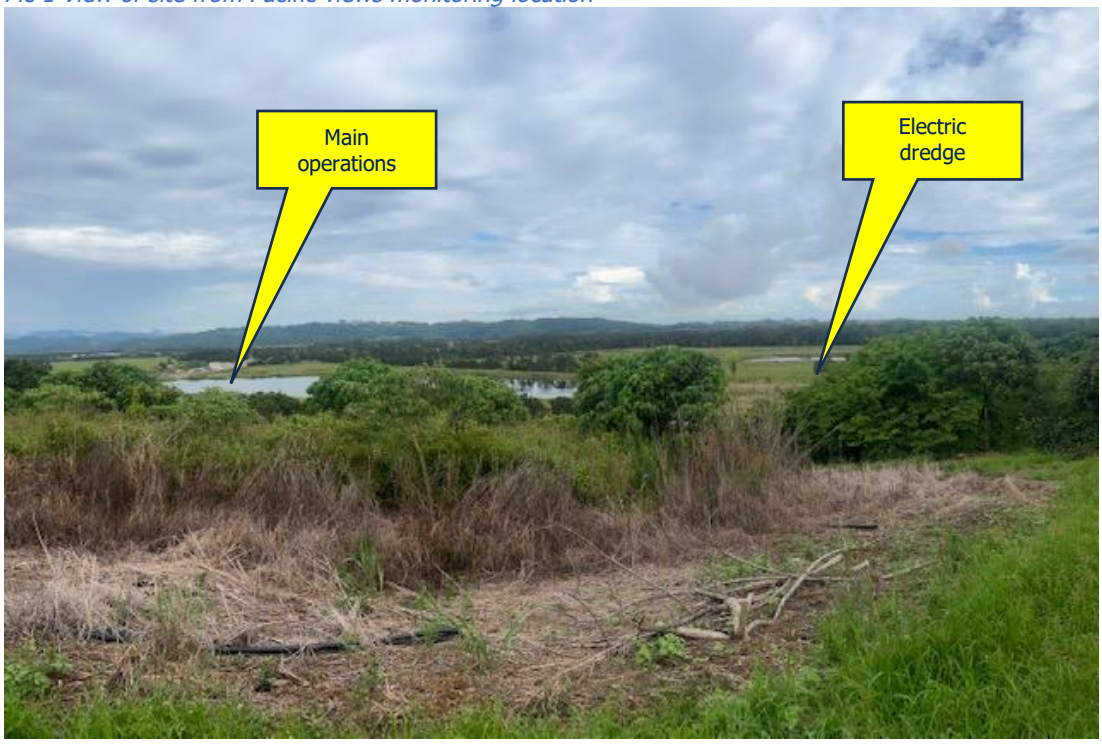


Diagram 3 Relocation of Receptor Pacific Views and O



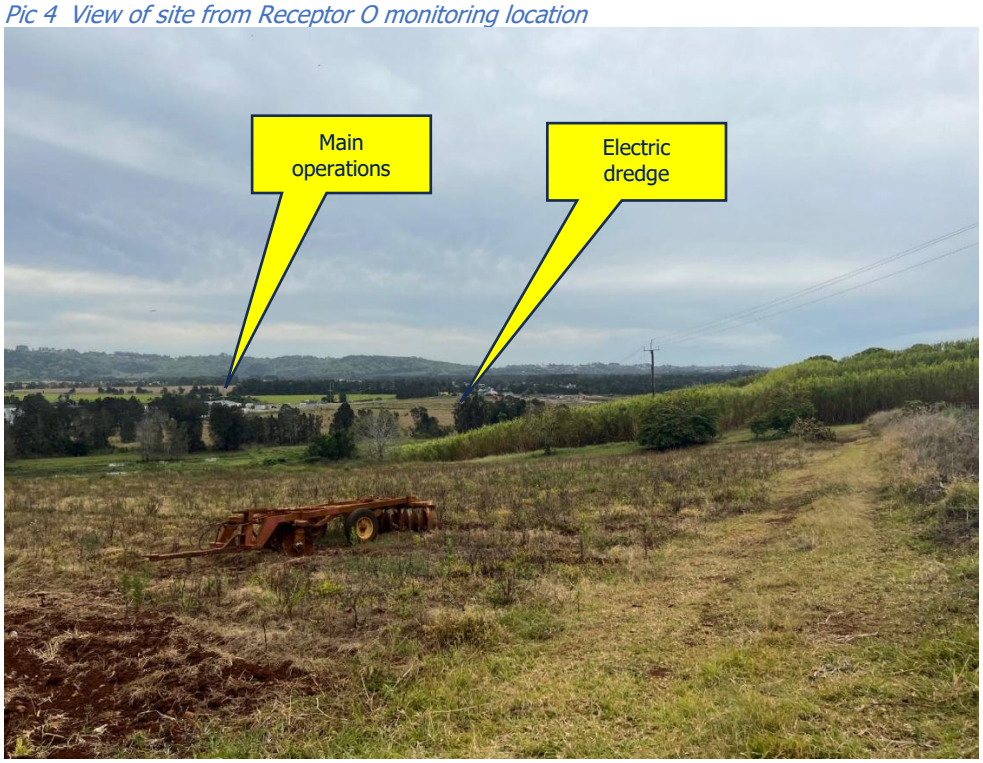
Pic 1 View of site from Pacific views monitoring location



Pic 2 Zoomed in above pic main operations

Pic 3 Zoomed in Electric dredge

Pic 4 View of site from Receptor O monitoring location



3.0 CRITERIA

The relevant impact assessment and cumulative noise criteria as specified in Schedule 3 Conditions 3 and 4 of Project Approval 05_0103B are as follows.

3.1 Impact Assessment Criteria

Table 3.1 Impact Assessment Criteria

Receiver Location	Day and Evening LAeq (15 min) dB(A)
Residences on privately owned land	47

3.2 Cumulative Noise Criteria

The project combined with the noise generated by other industrial development does not exceed the following amenity criteria on any privately owned land.

LAeq (11 hour) 50 dB(A) – Day;
LAeq (4 hour) 45 dB(A) - Evening and
LAeq(9 hour) 40 dB(A) - Night

L_{A90} corresponds to the A-weighted sound pressure level which is exceeded for 90% of the time. This parameter is used to measure the background noise level.

L_{Aeq} corresponds to the equivalent or energy-averaged level

4.0 SOUND MEASUREMENTS

4.1 Equipment

The following equipment was utilised during the test assessments:
Svantec Type 1, Sound and Vibration Analyser Model 977C Serial N0 98824, calibrated November 2024.
Svantec SV-33B Sound Level Calibrator Serial No 127992, calibrated August 2024.
The above equipment complies with the requirements of Australian Standards 1259.2 1990, Sound Level Meters, Part 2 Integrating – Averaging, as required by the Australian Standards.
Equipment was calibrated before the tests and checked after and found to be within the acceptable drift.
The above equipment complies with the requirements in **IEC 61672.**

4.2 Atmospheric Conditions

The atmospheric conditions during the period of monitoring are provided in Table 4.1.

Table 4.1 Atmospheric Conditions

Humidity	90%
Wind Speed	0
Wind Direction	-
Atmospheric Pressure	1010 hpa
Cloud Cover	0%
Temp	28C

5.0 TESTING

The following tests were carried out at locations G, O, Pacific Views Estate, DD and F within 30m of affected dwellings where practical as indicated on the attached site plan.
Tests conducted on 18 December 2024 between 0900 and 1100 hrs DST

- *Receptor G – Residence - 216 Tweed Coast Road. (rear boundary)*
- *Receptor O – Residence – 607 Cudgen Road. (rear boundary)*
- *Receptor Pacific Views Estate – Residences – via Collier Street. (opposite rear boundary of new residences)*
- *Receptor DD – Residence - 34A Crescent Street. (rear boundary)*
- *Receptor F – Residence - 64 John Robb Way. (rear boundary)*

5.1 On site equipment 18 December 2024

Table 5.1 Equipment on site at the time of the test 18/12/2024

On site equipment	LAeq 15 min at 20 metres
CDE Wash Plant	76
Loader (Hyundai HL-770	71
Road Trucks	66
Dredge (new electric)	48

5.2 Equipment used during previous tests

Table 5.2 Equipment being used previous tests

Date:20/12/ 2023	Previous tests LAeq 15 min at 20 metres
Operating equipment	
CDE Wash Plant	76
Loader (Hyundai HL-770	71
Excavator	66
Road Trucks	66
Dredge (electric)	48
Date:08/03/2022	
CDE Wash Plant	76
Loader (Hyundai HL-770	71
Excavator (Doosan DX 420 LCA)	66
Road Trucks	66
Dredge (electric)	48
Date 01/10/2021	
CDE Wash Plant (nil product)	76
Loader (Hyundai HL-770	71
Excavator (Doosan DX 420 LCA)	66
Road Trucks	66
Date 05/08/2021	
CDE Wash Plant (nil product)	76
Loader (Hyundai HL-770	71
Excavator (Doosan DX 420 LCA)	66
Road Trucks	66
Date 18/06/2021	
CDE Wash Plant (nil product)	-
Loader (Hyundai HL-770	71
Road Trucks	66
Date 10/12/2021	
Loader (Hyundai HL-770	71
Excavator (Doosan DX 420 LCA)	66
Roller compactor CA302	68
Screener Sanvik(QA331)	70
Date 10/07/2020	
Loader (Hyundai HL-770	71
Excavator (Doosan DX 420 LCA)	66
Date April 2020	
Operating equipment	LAeq
Screener (QA331)	70
Loader (Cat 926H)	67
Excavator (Cat 329D)	68
End loader and screener	72

6.0 Attended monitoring results and criteria compliance

The results of attended monitoring and criteria compliance are presented in Table 6.1 below.

Table 6.1 Attended monitoring 18/12/2024

Receptor & Time hrs	**Attended Testing LAeq 15 minutes**	**> Project Criteria (47 LAeq 15min)**	**> Cumulative Criteria (50 LAeq 11 hrs)**	**Comments**
G 0900-0915	45	-2	-5	Noise from other sources such as traffic noise from Tweed Coast Road dominated background. Noise from operations not measurable / distinguishable above background.
O 0930-0945	47	0	-3	Noise from other sources such as traffic noise from Pacific Highway dominated background. Noise from operations not audible or measurable above background.
Pacific Views 0955-1005	49	+2	-1	Noise from other sources such as traffic noise from Pacific Highway dominated background. Noise from operations not audible or measurable above background
DD 1010-1035	47	0	-3	Noise from other sources such as traffic noise from Tweed Coast Road dominated background. Noise from operations not audible or measurable / distinguishable above background.
F 1045-1100	47	0	-3	Noise from other sources such as traffic noise from Tweed Coast Road dominated background. Noise from operations not audible / distinguishable above background.

7.0 PREDICTED LEVELS

Measurements were undertaken at approximately 20m from equipment during operations and distance attenuation applied to establish possible levels at monitoring locations.
Table 7.1 shows predicted compliance to the criteria for nominated equipment operations.

Table 7.1 Predicted levels of on site equipment based on measurements at 20m

Receiver and source	LAeq	Source SPL @20m	Characteristic	Adjust character	Corrected LAeq 20m	Correction LAeq 20m	No of events 15 min	Duration of event	Correct 15min	Adjusted source	Distance	Minus distance attenuation	Building sound shell shielding	Adj building shield and distance attenuation	Barrier correction line or sight correction	Adj barrier correction	>47 LAeq 15 min	>50 LAeq 11 hrs
G																	47	50
Elec dredge	48	48	0	48	0	48	1	900	0	48	880	15	0	15	0	15	-32	-35
Wash	71	71	0	71	0	71	1	900	0	71	880	38	0	38	0	38	-9	-12
Loader	66	66	0	66	0	66	1	900	0	66	880	33	0	33	0	33	-14	-17
Excavator	66	66	0	66	0	66	1	900	0	66	880	33	0	33	0	33	-14	-17
Trucks	63	63	0	63	0	63	1	900	0	63	880	30	0	30	0	30	-17	-20
Total																41	-6	-9
O																		
Elec dredge	48	48	0	48	0	48	1	900	0	48	600	18	0	18	0	18	-29	-32
Elec dredge	71	71	0	71	0	71	1	900	0	71	600	41	0	41	0	41	-6	-9
Wash	66	66	0	66	0	66	1	900	0	66	600	36	0	36	0	36	-11	-14
Loader	66	66	0	66	0	66	1	900	0	66	600	36	0	36	0	36	-11	-14
Excavator	63	63	0	63	0	63	1	900	0	63	600	33	0	33	0	33	-14	-17
Trucks																44	-3	-6
PV																		
Elec dredge	48	48	0	48	0	48	1	900	0	48	555	19	0	19	0	19	-28	-31
Wash	71	71	0	71	0	71	1	900	0	71	555	42	0	42	0	42	-5	-8
Loader	66	66	0	66	0	66	1	900	0	66	555	37	0	37	0	37	-10	-13
Excavator	66	66	0	66	0	66	1	900	0	66	555	37	0	37	0	37	-10	-13
trucks	63	63	0	63	0	63	1	900	0	63	555	34	0	34	0	34	-13	-16
Total																45	-2	-5
DD																		
Elec dredge	48	48	0	48	0	48	1	900	0	48	780	16	0	16	10	6	-41	-44
Wash	71	71	0	71	0	71	1	900	0	71	780	39	0	39	10	29	-18	-21
Loader	66	66	0	66	0	66	1	900	0	66	780	34	0	34	10	24	-23	-26
Excavator	66	66	0	66	0	66	1	900	0	66	780	34	0	34	10	24	-23	-26
Trucks	63	63	0	63	0	63	1	900	0	63	780	31	0	31	10	21	-26	-29
Total																32	-15	-18
F																		
Elec dredge	48	48	0	48	0	48	1	900	0	48	900	15	0	15	10	5	-42	-45
Wash	71	71	0	71	0	71	1	900	0	71	900	38	0	38	10	28	-19	-22
Loader	66	66	0	66	0	66	1	900	0	66	900	33	0	33	10	23	-24	-27
Excavator	66	66	0	66	0	66	1	900	0	66	900	33	0	33	10	23	-24	-27
Trucks	63	63	0	63	0	63	1	900	0	63	900	30	0	30	10	20	-27	-30
Total																30	-17	-20

Some of equipment not in use on the day but included in prediction to demonstrate compliance

$Lp(R2) = Lp(R1) - 20 \cdot \log_{10}(R2/R1)$
Where:
Lp(R1) = Sound Pressure Level at Initial location.
Lp(R2) = Sound Pressure Level at the new location.
R1 = Distance from the noise source to initial location.
R2 = Distance from noise source to the new location.
Logarithmic addition=10*LOG(SUM(10^(user range/10)))

8.0 DISCUSSION AND CONCLUSIONS

Noise from operations were not audible or measurable above ambient levels at locations G, O, Pacific Views, DD and F.

Distance calculations of equipment noise levels from plant in Table 7.1 shows that operations would be within the criteria of 47LAeq and not likely to be a major contributor the 50 LAeq cumulative criteria.

Monitoring for accumulative levels was only conducted over 15 minutes. These predictions would be relative for continuous operations over an 11 hour period. For shorter duration operations this figure would be reduced by 2 to 5 dB with breaks for lunch and working an 8 hour day.

Table 8.1 Compliance monitoring

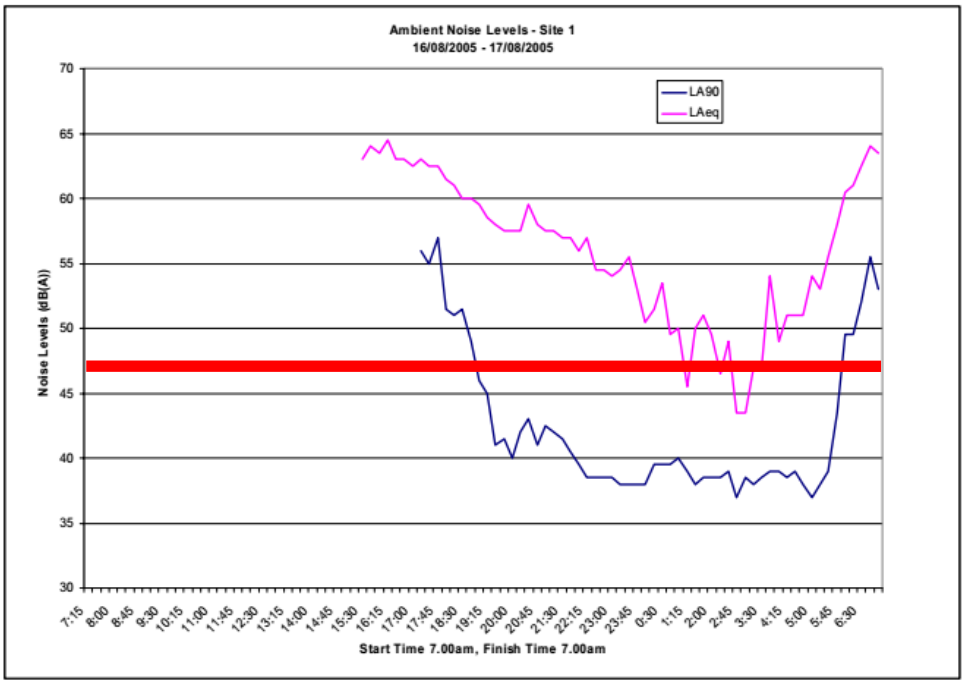
Receptor	Pre-project / Baseline Levels	Compliance Monitoring LAeq 15 min												Project Criteria and Latest Test		
		Previous attended testing												Latest tests LAeq 15 min	LAeq 15 min	LAeq 11 hr
	Unattended logger original report	23/08/05	10/07/17	30/08/18	20/04/20	20/04/20	10/12/20	18/06/21	05/08/21	01/10/21	08/04//22	08/08/22	20/12/23	18/12/24	>Impact Criteria day and evening 47LAeq	>Cumulative Criteria Day >50LAeq
G	62	63	62	57	55	56	57	55	50	49	47	47	46	45	-2	-5
O			64	46	48	52	53	52	49	51	50	48	48	47	0	-3
Pacific Views	55	51	57	48	55	53	52	51	51	50	51	48	50	49	+2	-1
DD	55	53	58	56	56	53	52	50	49	51	52	50	48	47	0	-3
F	58	54	43	57	59	55	47	50	48	50	49	49	48	47	0	-3

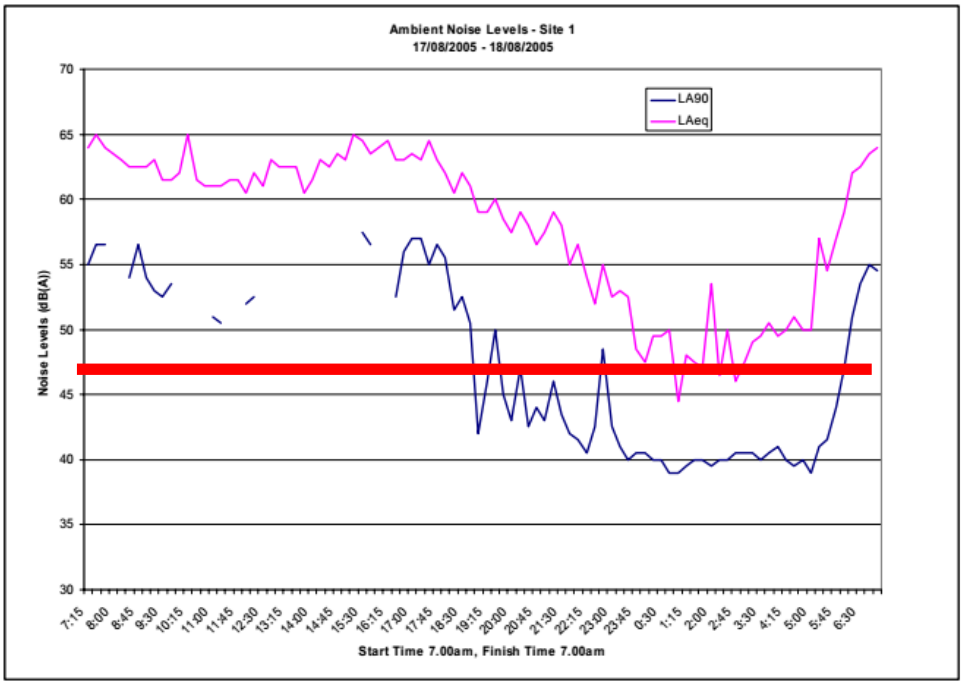
Monitored levels in the area are not unusual for daytime compliance testing. Examination of pre-project data shows ambient LAeq for day and evening rarely drops below the project design levels making it difficult to enable compliance identification.

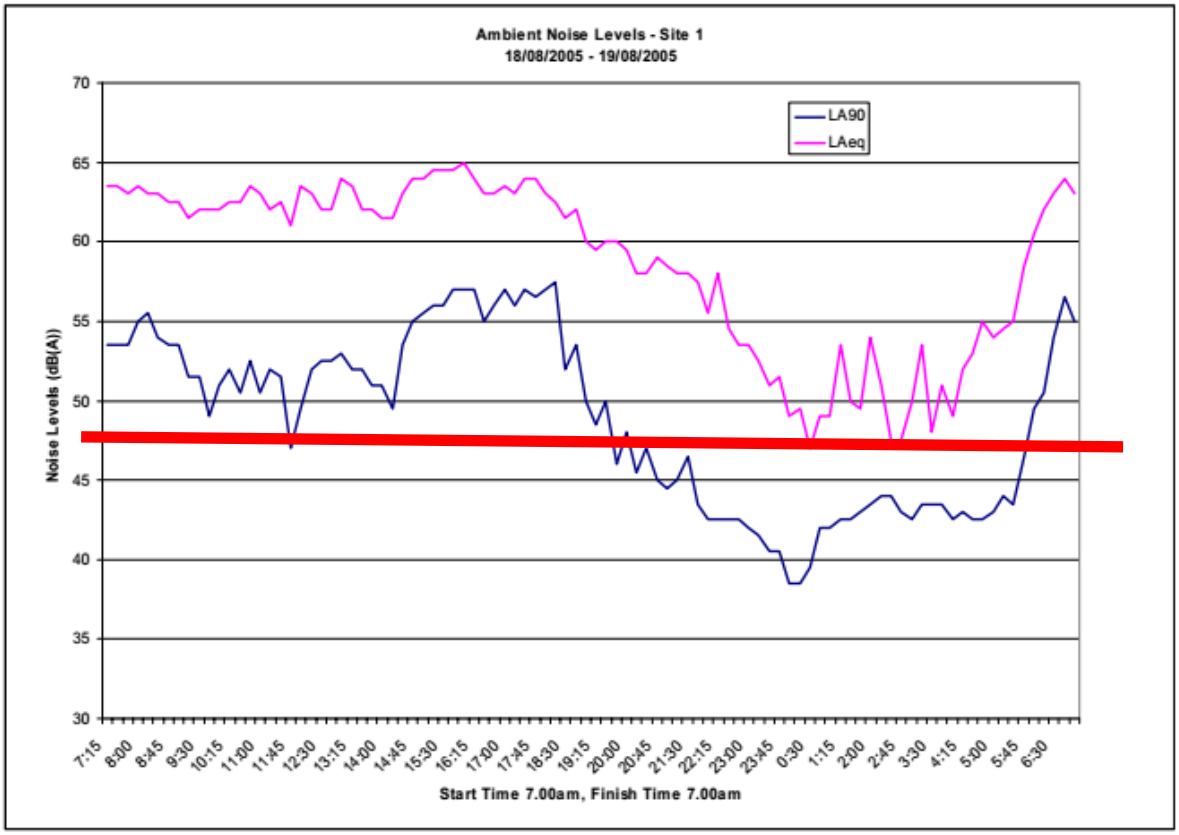
To better demonstrate this, Appendix A shows graphs for the pre-project monitoring (Rumble Report No. 617/04 unattended logger). The project criteria for day and evening periods of 47LAeq is indicated by the straight red line. From Appendix A it can be seen that the LAeq levels generally do not fall below the project criteria until the night time period, at which time the Quarry is not approved to operate. This issue will be further considered during future monitoring events.

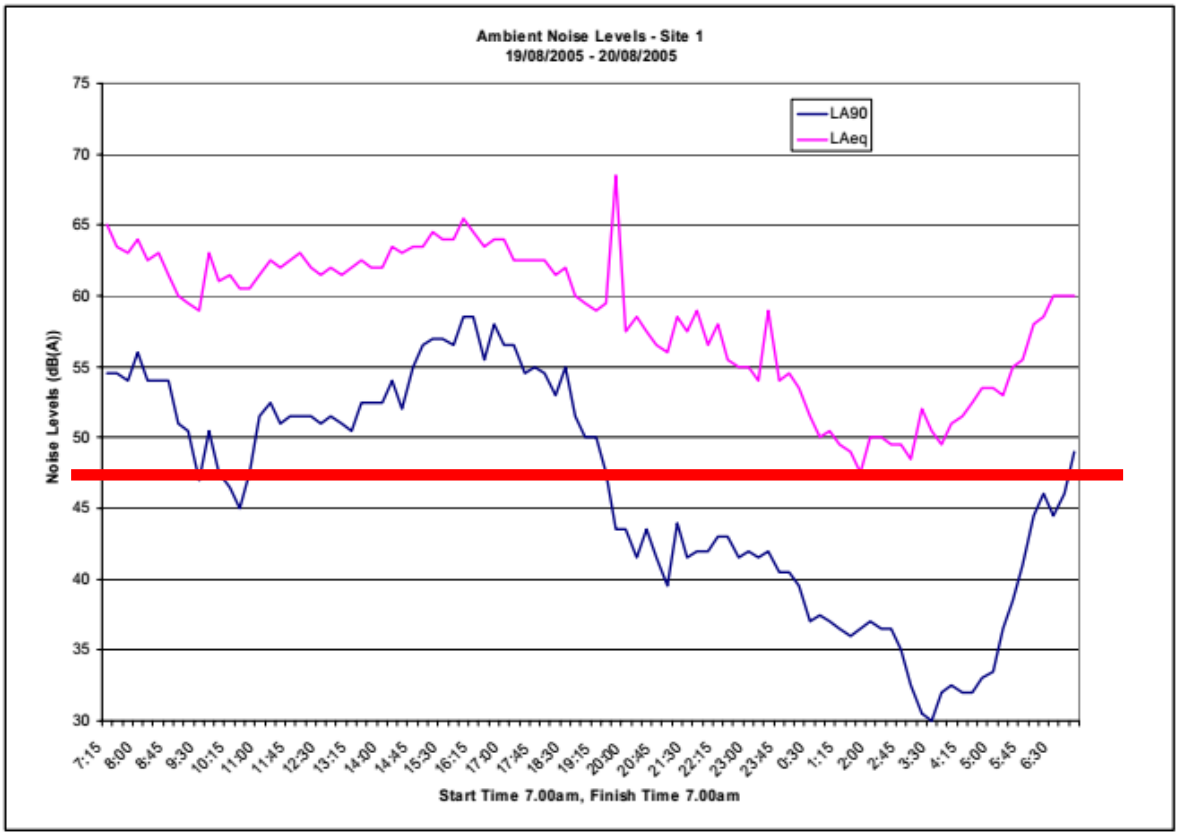
APPENDIX A PRE CONSTRUCTION TESTING

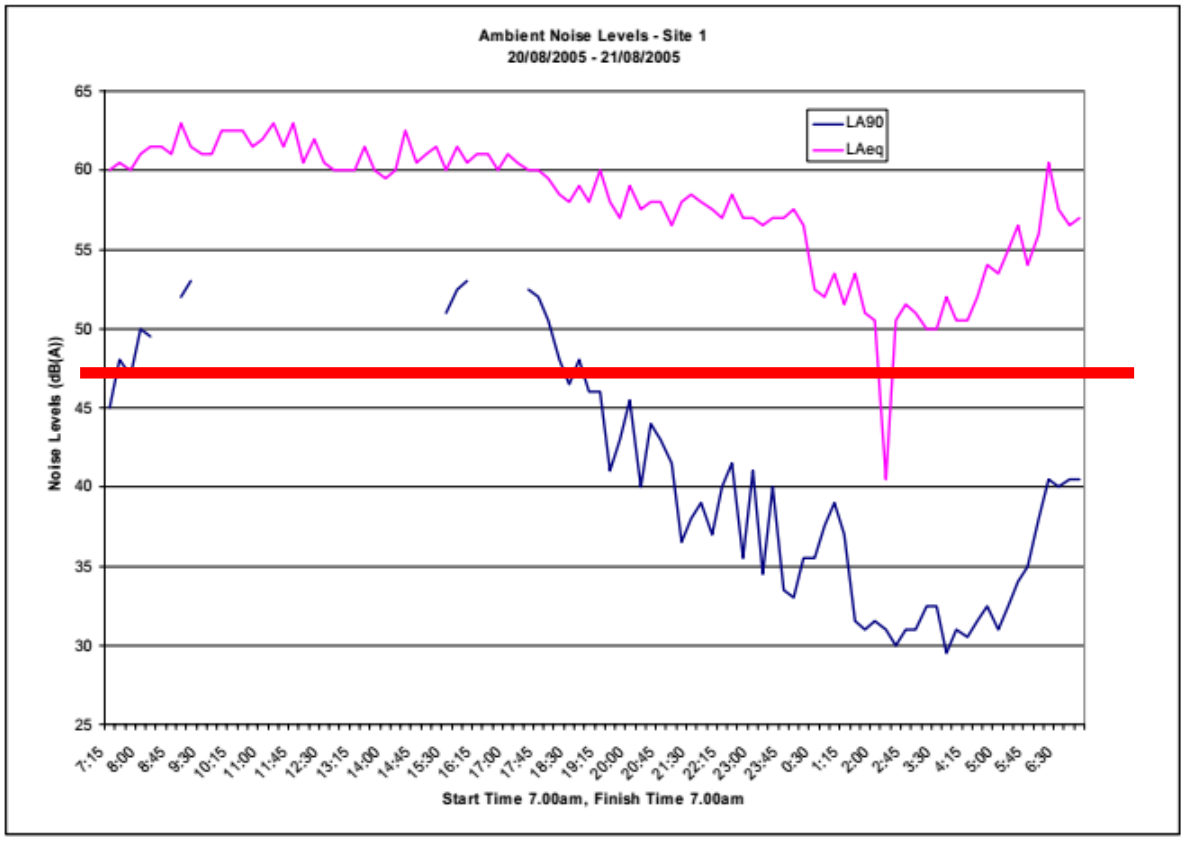
Measurements taken by Ron Rumble Pty Ltd and originally presented in Ron Rumble, (2008). Noise Assessment Report 61704- Part B.

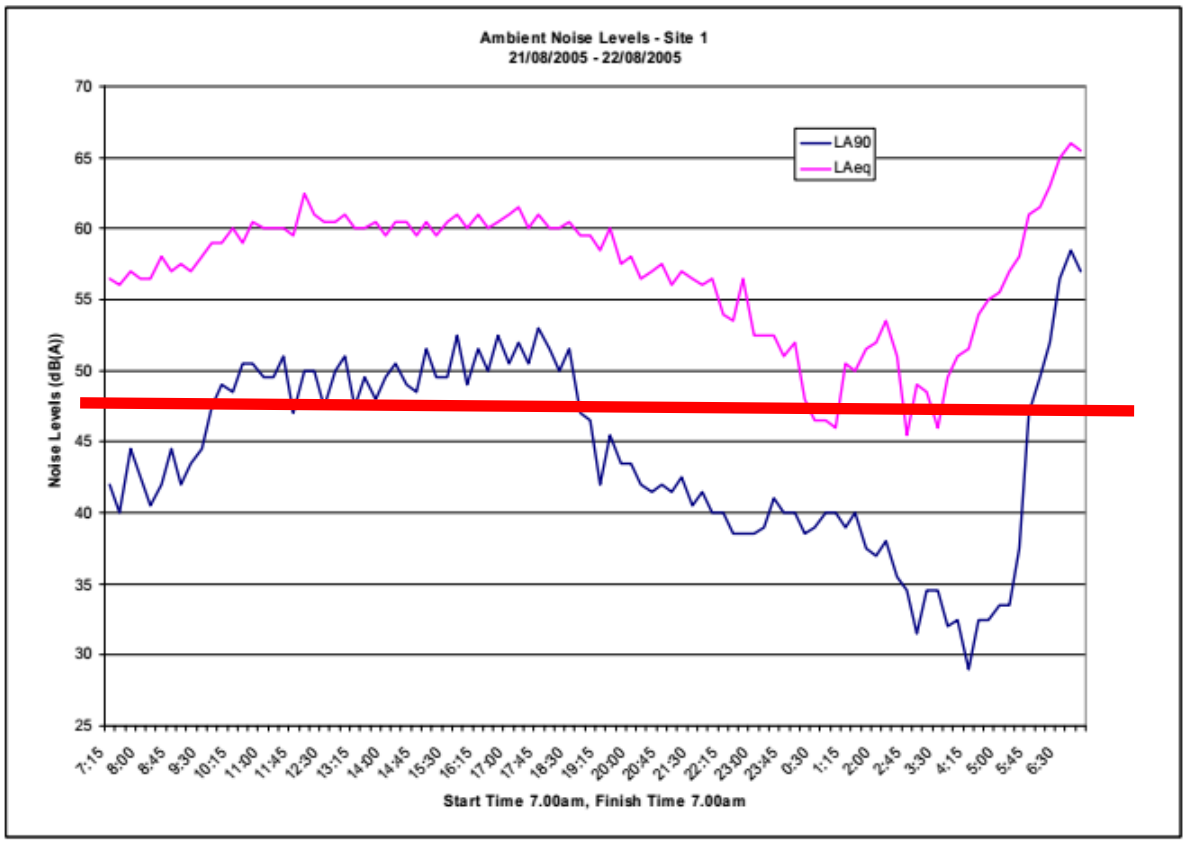





Ambient Noise Levels - Site 1
18/08/2005 - 19/08/2005
LA90
LAeq
Noise Levels (dB(A))
70
65
60
55
50
45
40
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am


Ambient Noise Levels - Site 1
19/08/2005 - 20/08/2005
LA90
LAeq
Noise Levels (dB(A))
75
70
65
60
55
50
45
40
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am


Ambient Noise Levels - Site 1
20/08/2005 - 21/08/2005
LA90
LAeq
Noise Levels (dB(A))
65
60
55
50
45
40
35
30
25
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am


Ambient Noise Levels - Site 1
21/08/2005 - 22/08/2005
LA90
LAeq
Noise Levels (dB(A))
70
65
60
55
50
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40
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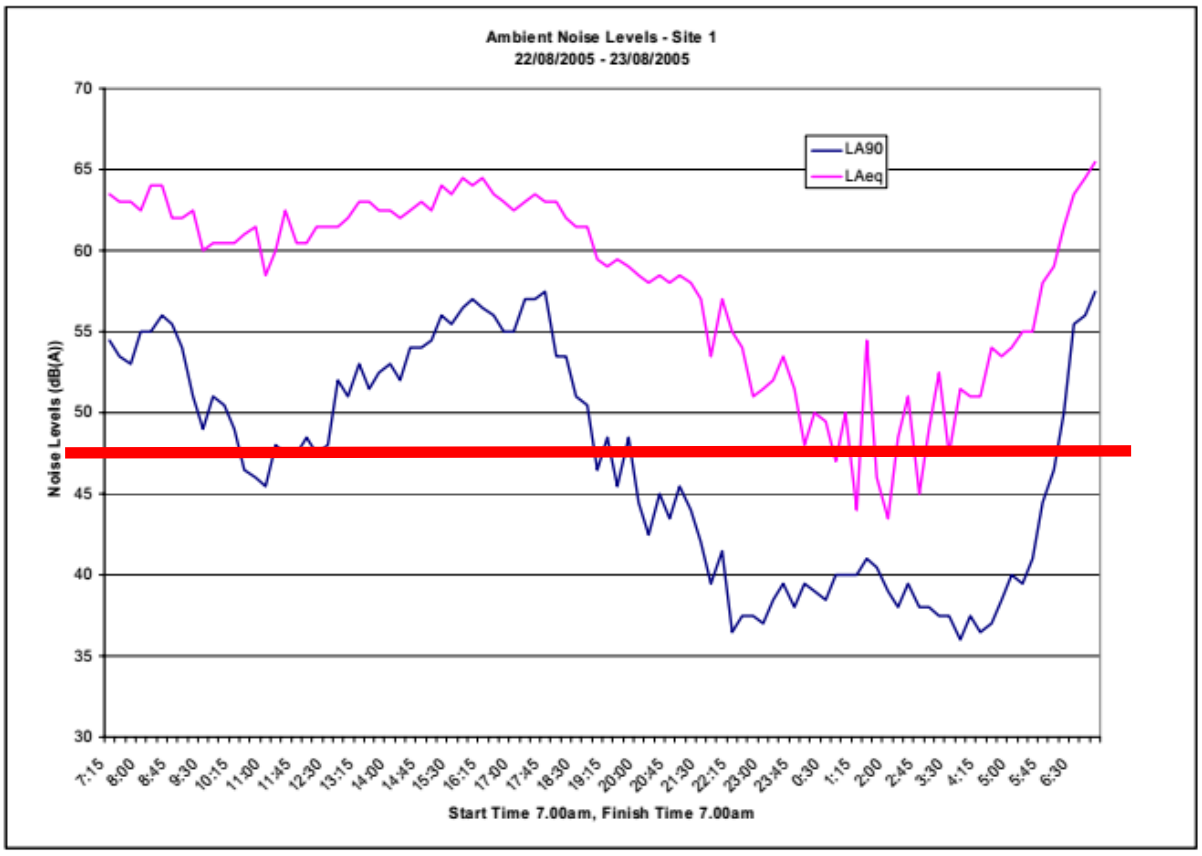
30
25
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am


Ambient Noise Levels - Site 1
22/08/2005 - 23/08/2005
LA90
LAeq
Noise Levels (dB(A))
70
65
60
55
50
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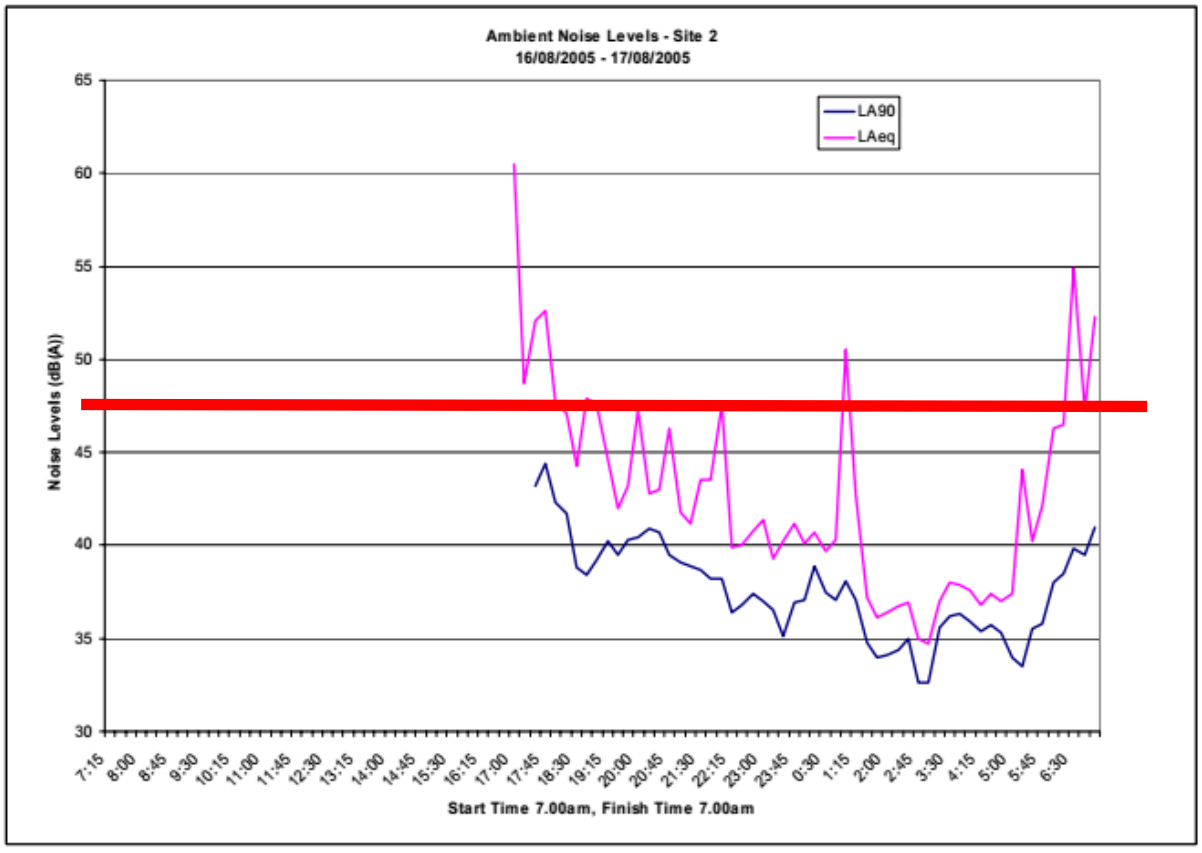
40
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am


Ambient Noise Levels - Site 2
16/08/2005 - 17/08/2005
LA90
LAeq
Noise Levels (dB(A))
65
60
55
50
45
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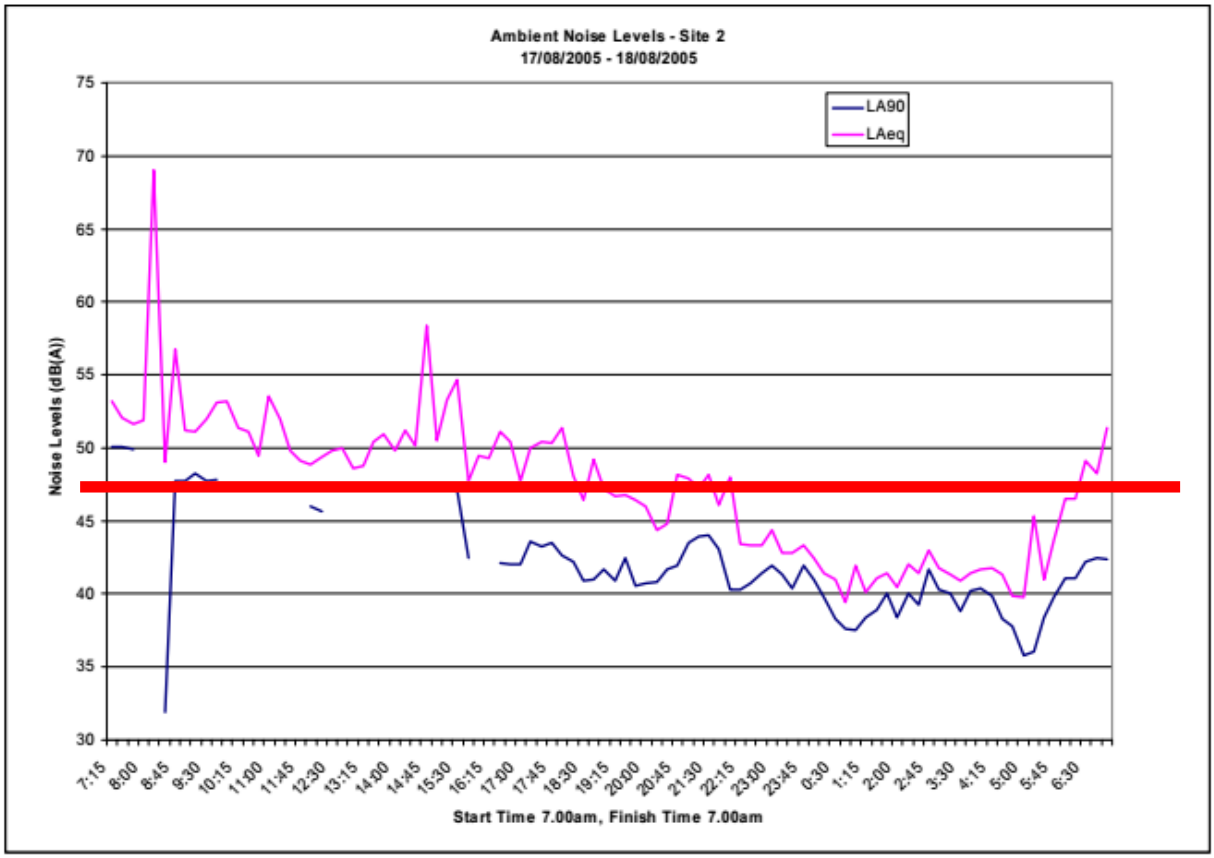
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am


Ambient Noise Levels - Site 2
17/08/2005 - 18/08/2005
LA90
LAeq
Noise Levels (dB(A))
75
70
65
60
55
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45
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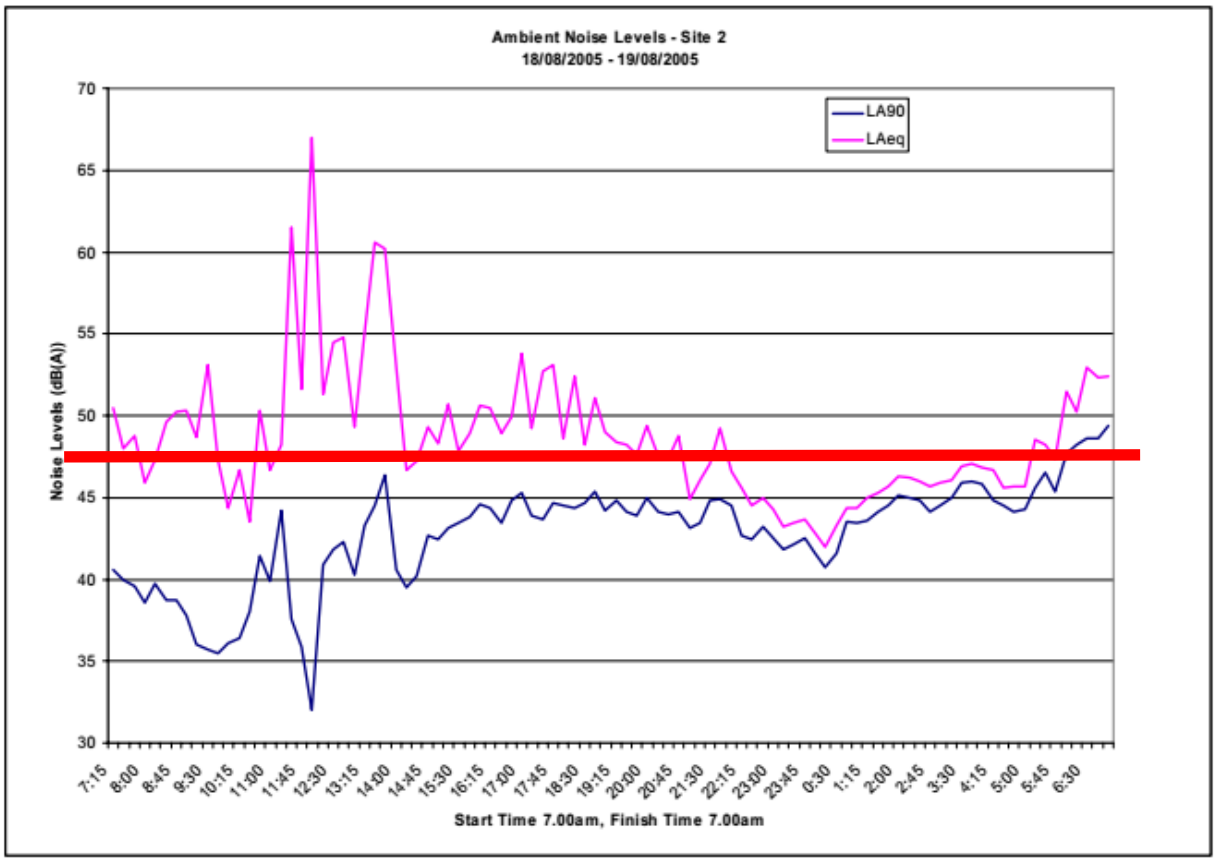
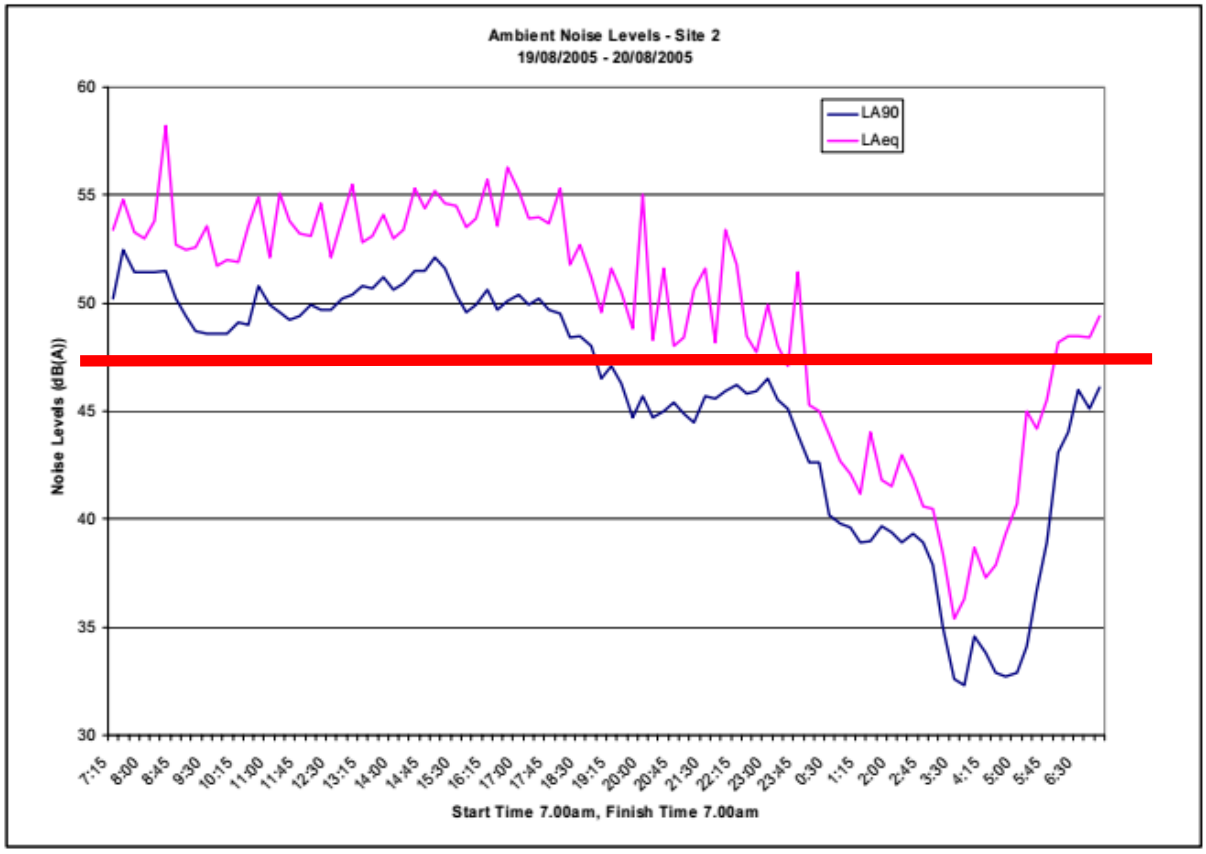
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am


Ambient Noise Levels - Site 2
18/08/2005 - 19/08/2005
LA90
LAeq
Noise Levels (dB(A))
70
65
60
55
50
45
40
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am


Ambient Noise Levels - Site 2
19/08/2005 - 20/08/2005
LA90
LAeq
Noise Levels (dB(A))
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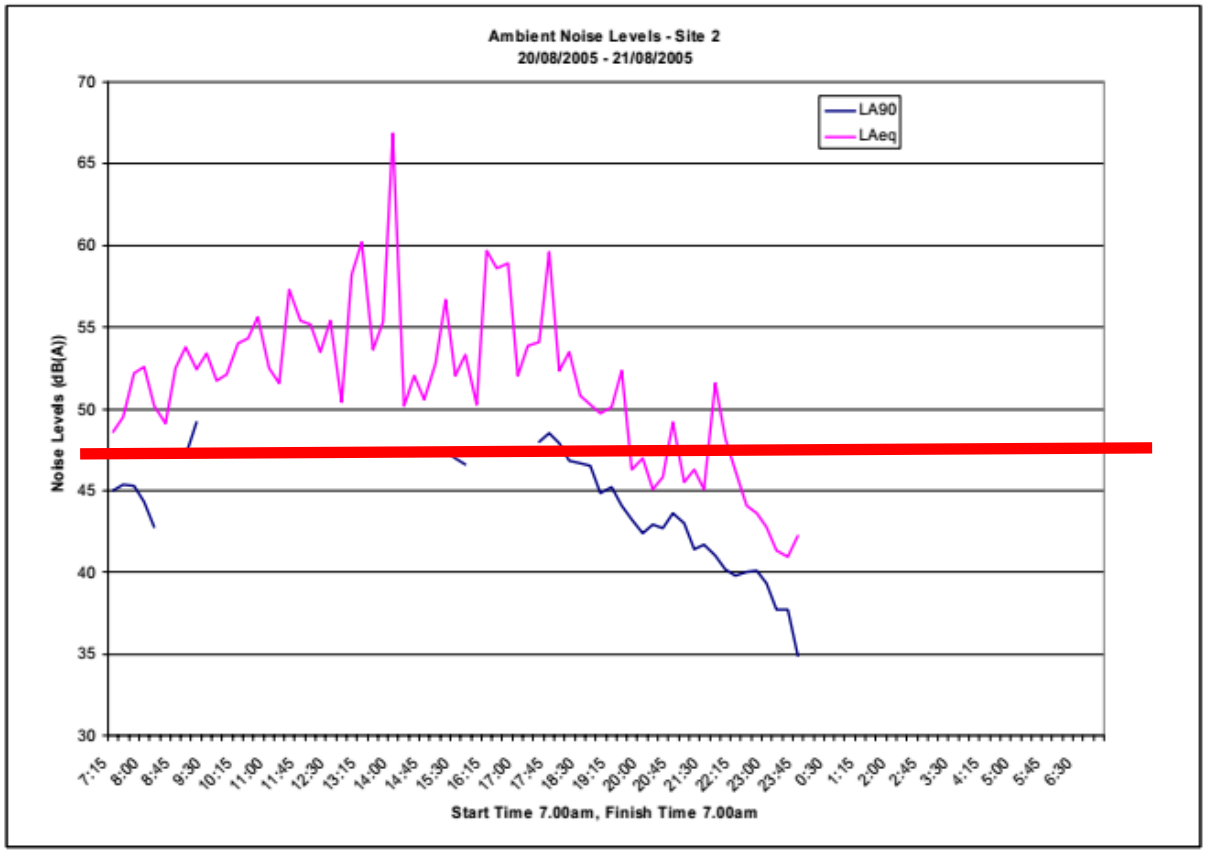
Start Time 7.00am, Finish Time 7.00am


Ambient Noise Levels - Site 2
20/08/2005 - 21/08/2005
LA90
LAeq
Noise Levels (dB(A))
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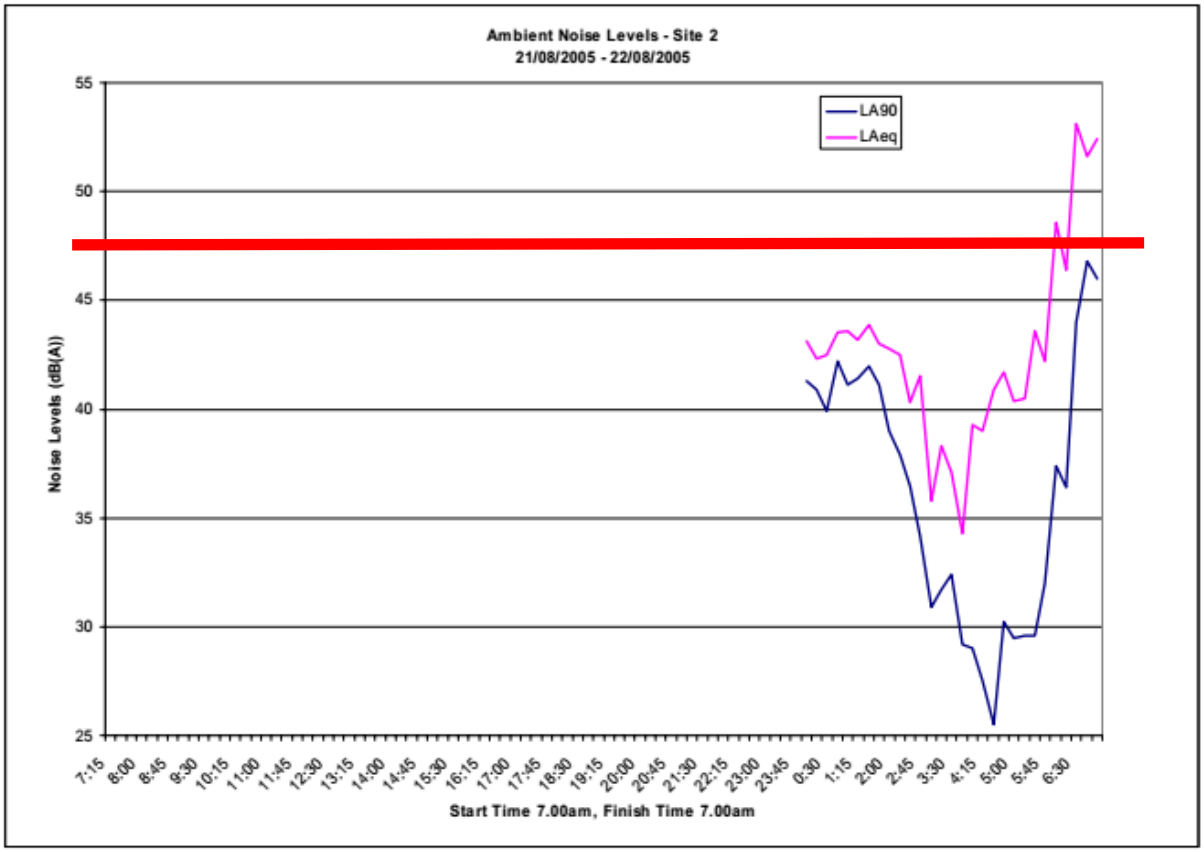
Start Time 7.00am, Finish Time 7.00am


Ambient Noise Levels - Site 2
21/08/2005 - 22/08/2005
LA90
LAeq
Noise Levels (dB(A))
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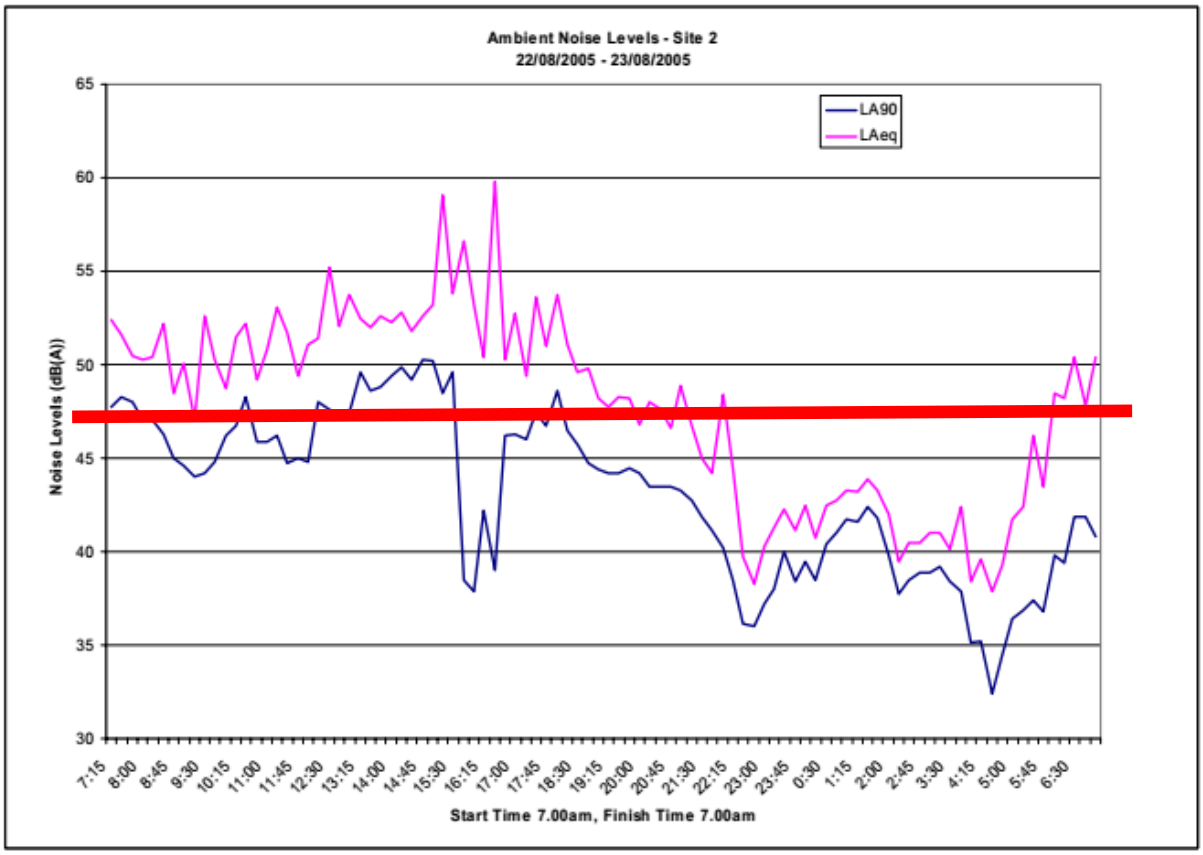
Start Time 7.00am, Finish Time 7.00am


Ambient Noise Levels - Site 2
22/08/2005 - 23/08/2005
LA90
LAeq
Noise Levels (dB(A))
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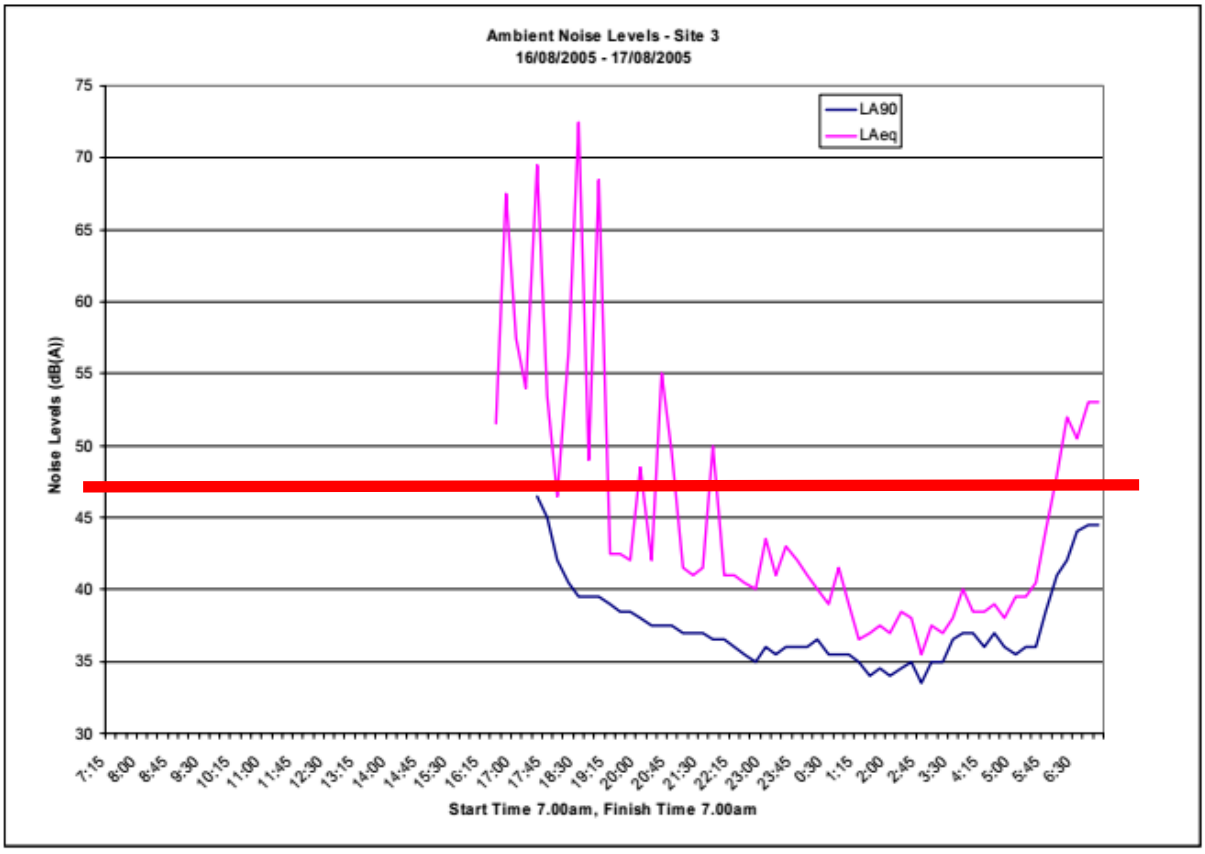
Start Time 7.00am, Finish Time 7.00am


Ambient Noise Levels - Site 3
16/08/2005 - 17/08/2005
LA90
LAeq
Noise Levels (dB(A))
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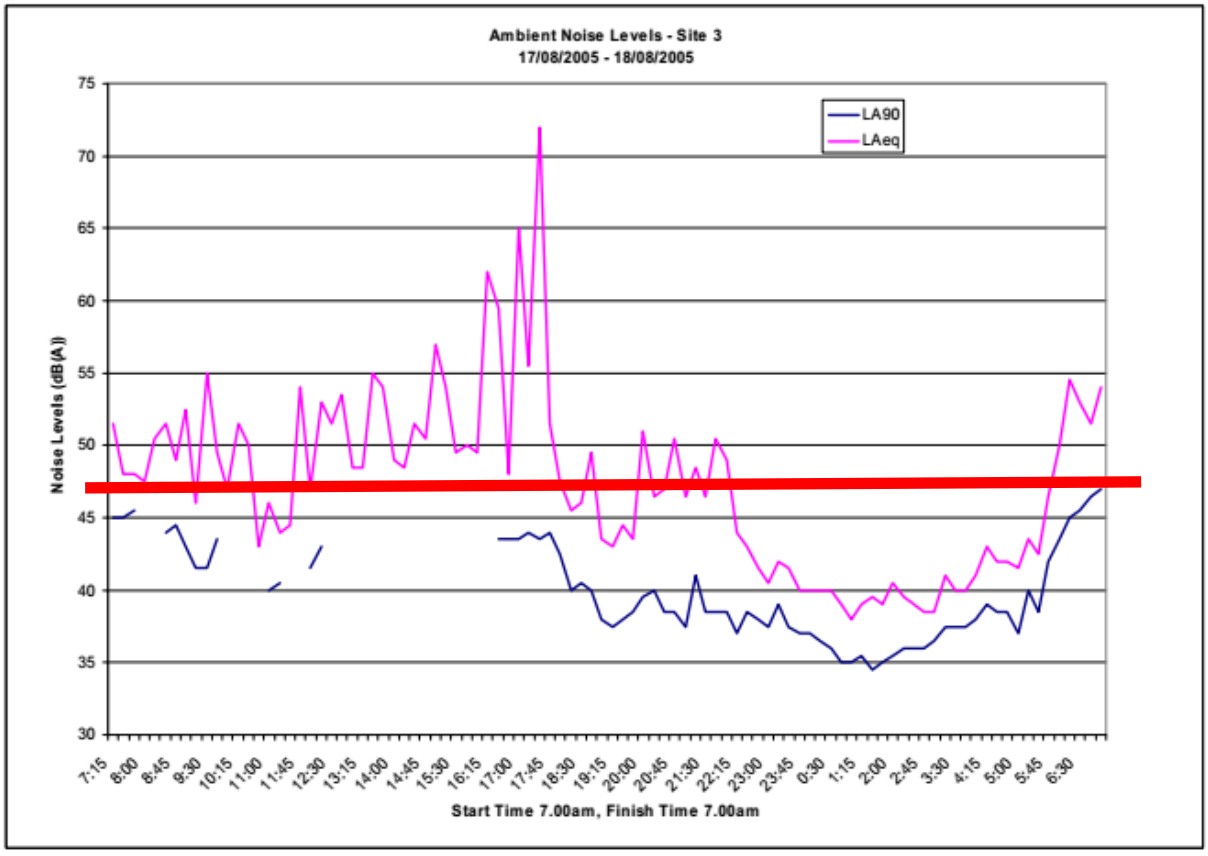
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am


Ambient Noise Levels - Site 3
17/08/2005 - 18/08/2005
LA90
LAeq
Noise Levels (dB(A))
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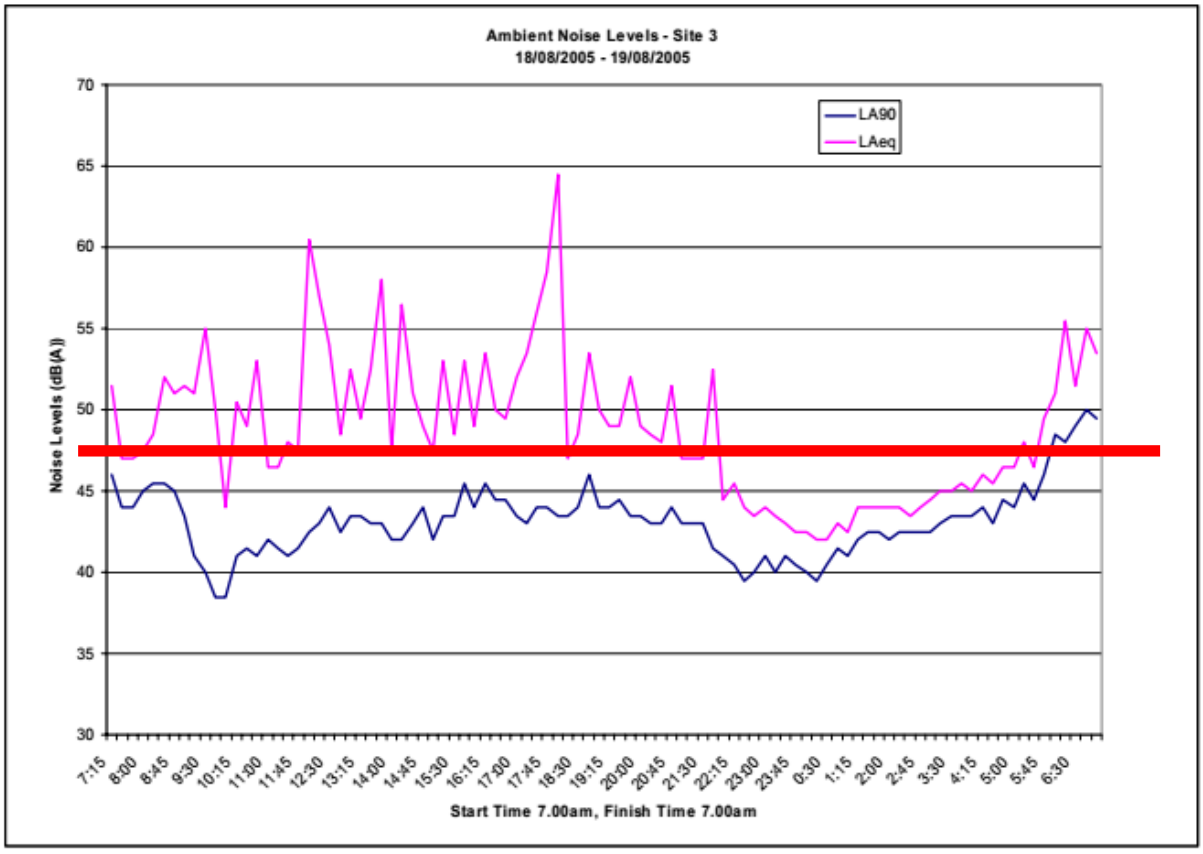
Start Time 7.00am, Finish Time 7.00am


Ambient Noise Levels - Site 3
18/08/2005 - 19/08/2005
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LAeq
Noise Levels (dB(A))
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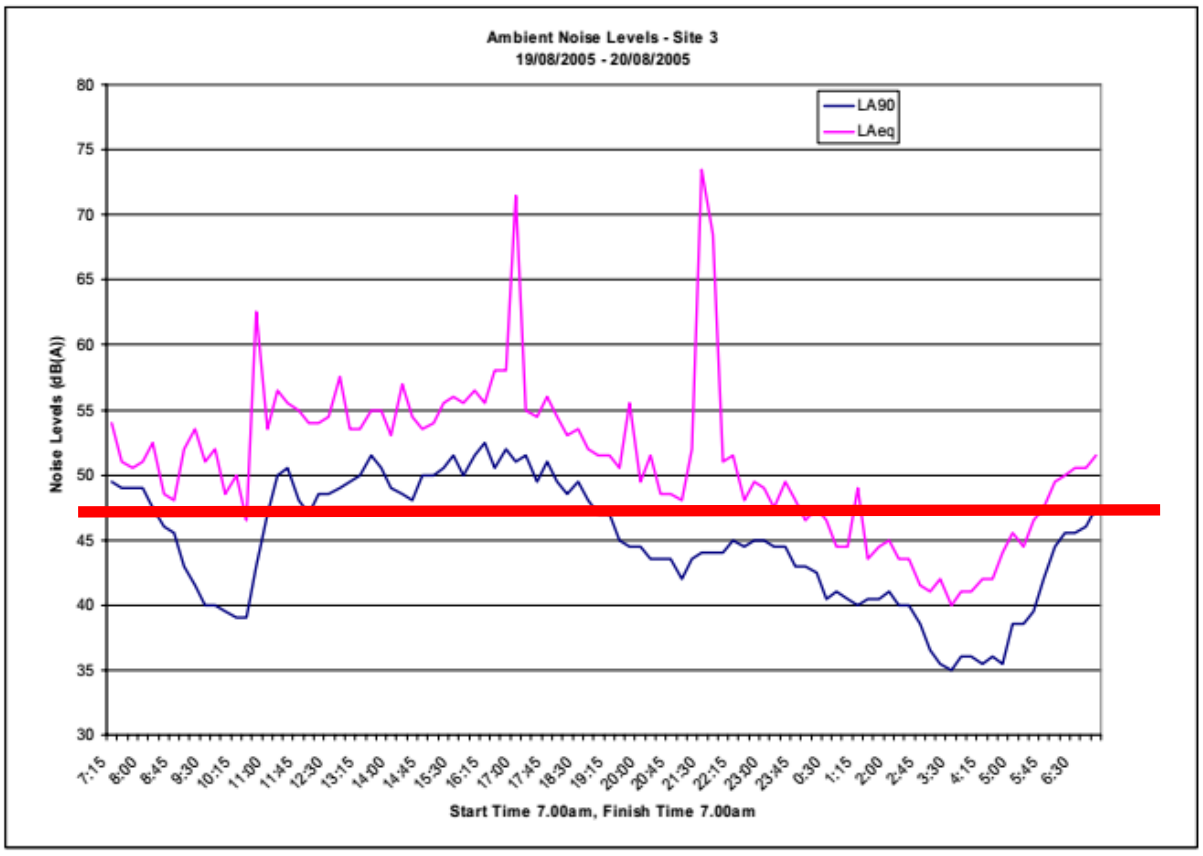
Start Time 7.00am, Finish Time 7.00am


Ambient Noise Levels - Site 3
19/08/2005 - 20/08/2005
LA90
LAeq
Noise Levels (dB(A))
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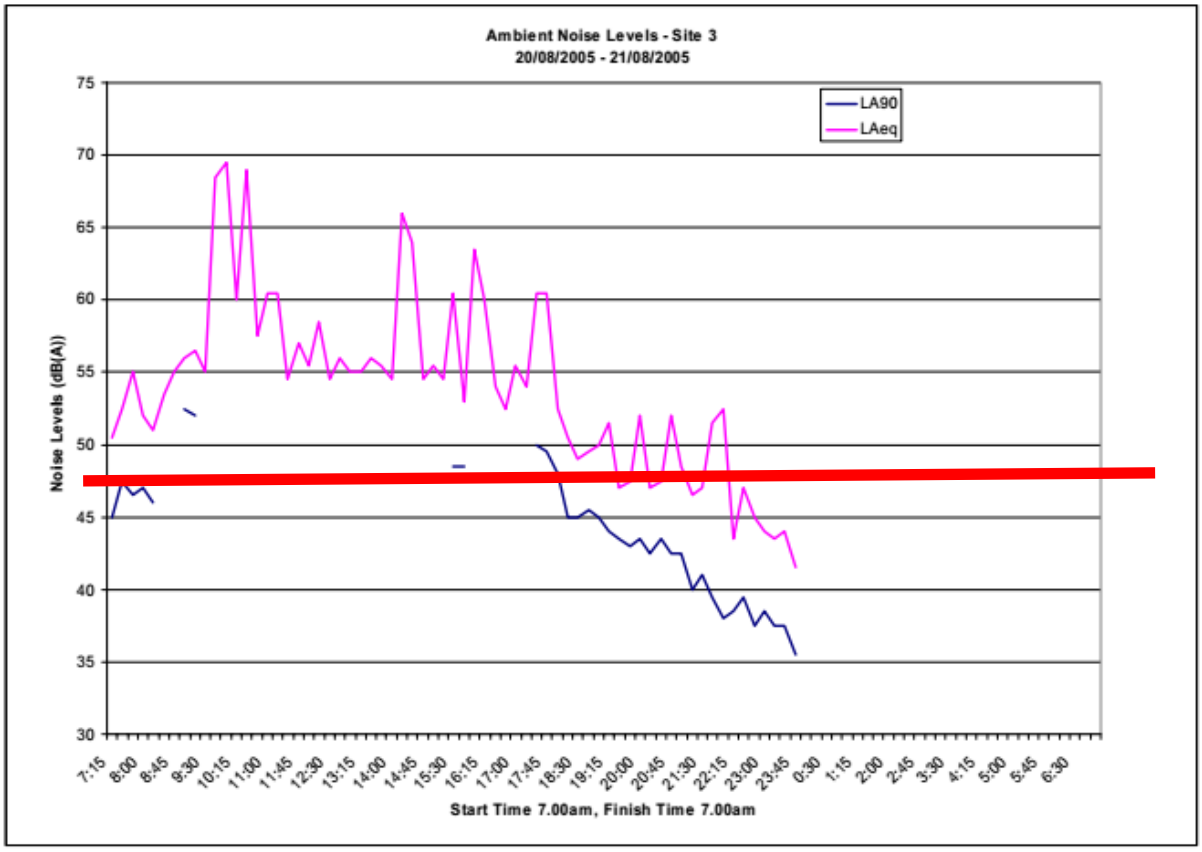
Start Time 7.00am, Finish Time 7.00am


Ambient Noise Levels - Site 3
20/08/2005 - 21/08/2005
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Noise Levels (dB(A))
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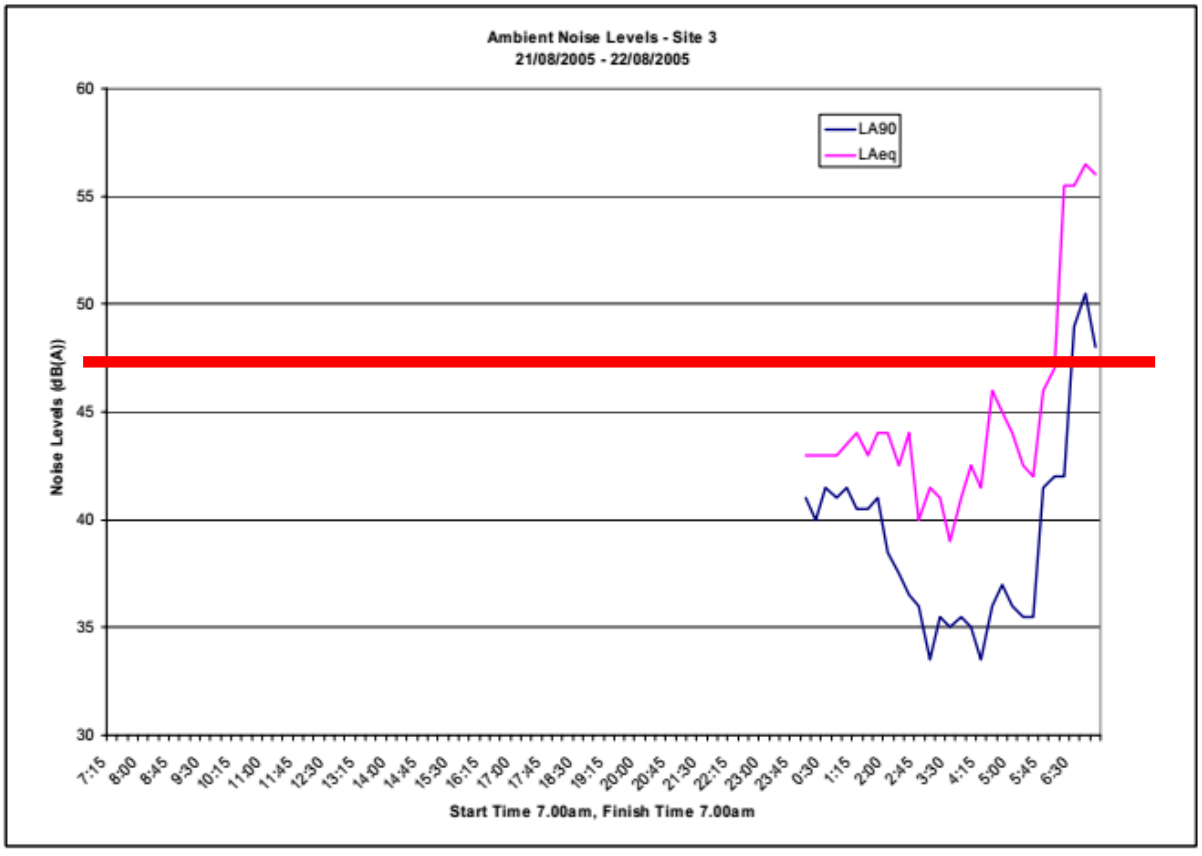
Start Time 7.00am, Finish Time 7.00am


Ambient Noise Levels - Site 3
21/08/2005 - 22/08/2005
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Noise Levels (dB(A))
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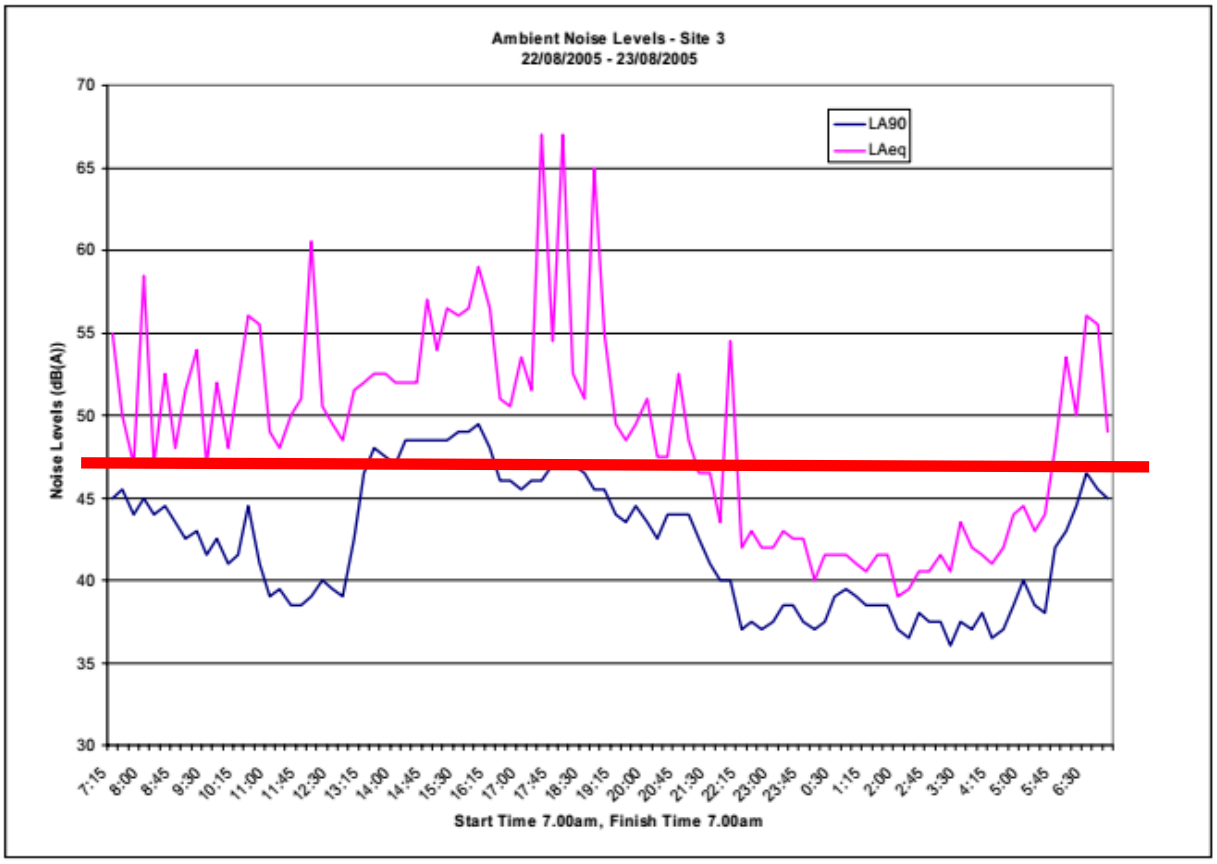
Start Time 7.00am, Finish Time 7.00am


Ambient Noise Levels - Site 3
22/08/2005 - 23/08/2005
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Noise Levels (dB(A))
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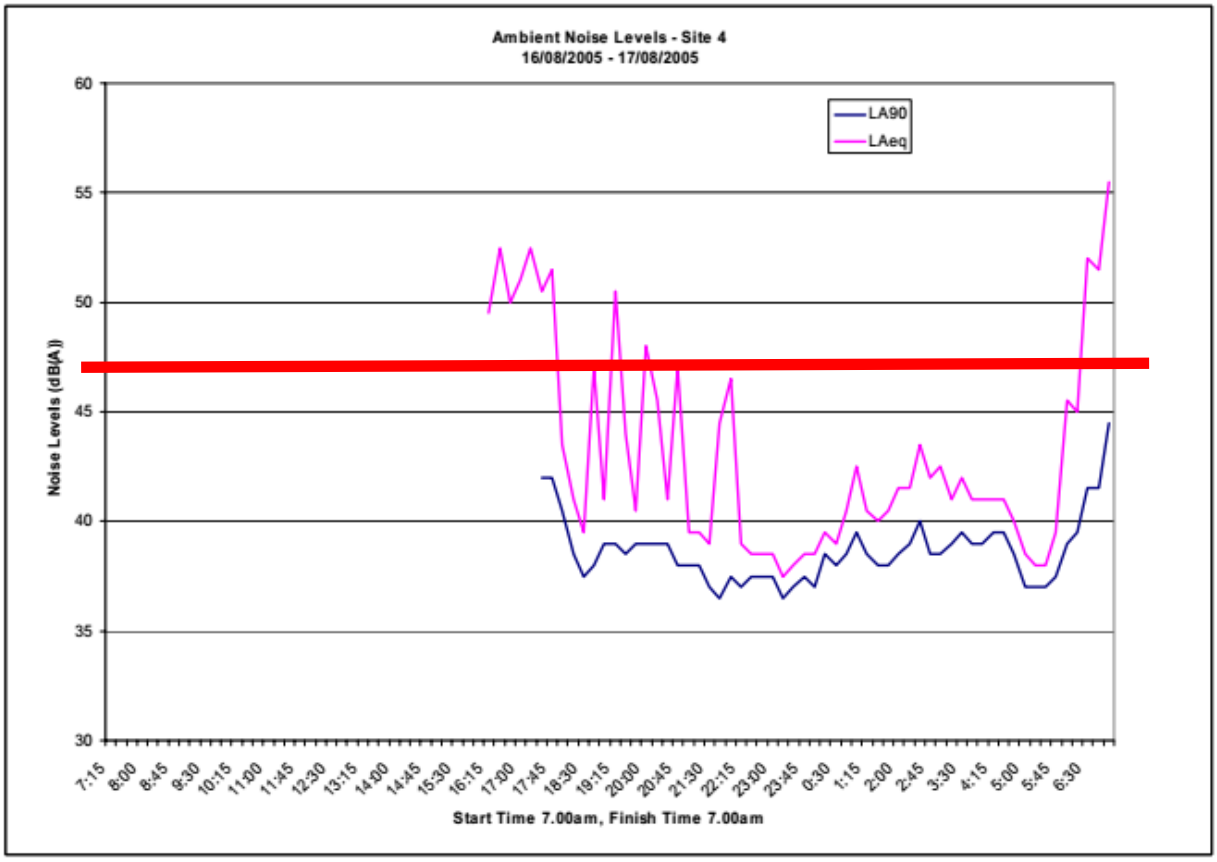
Start Time 7.00am, Finish Time 7.00am


Ambient Noise Levels - Site 4
16/08/2005 - 17/08/2005
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Noise Levels (dB(A))
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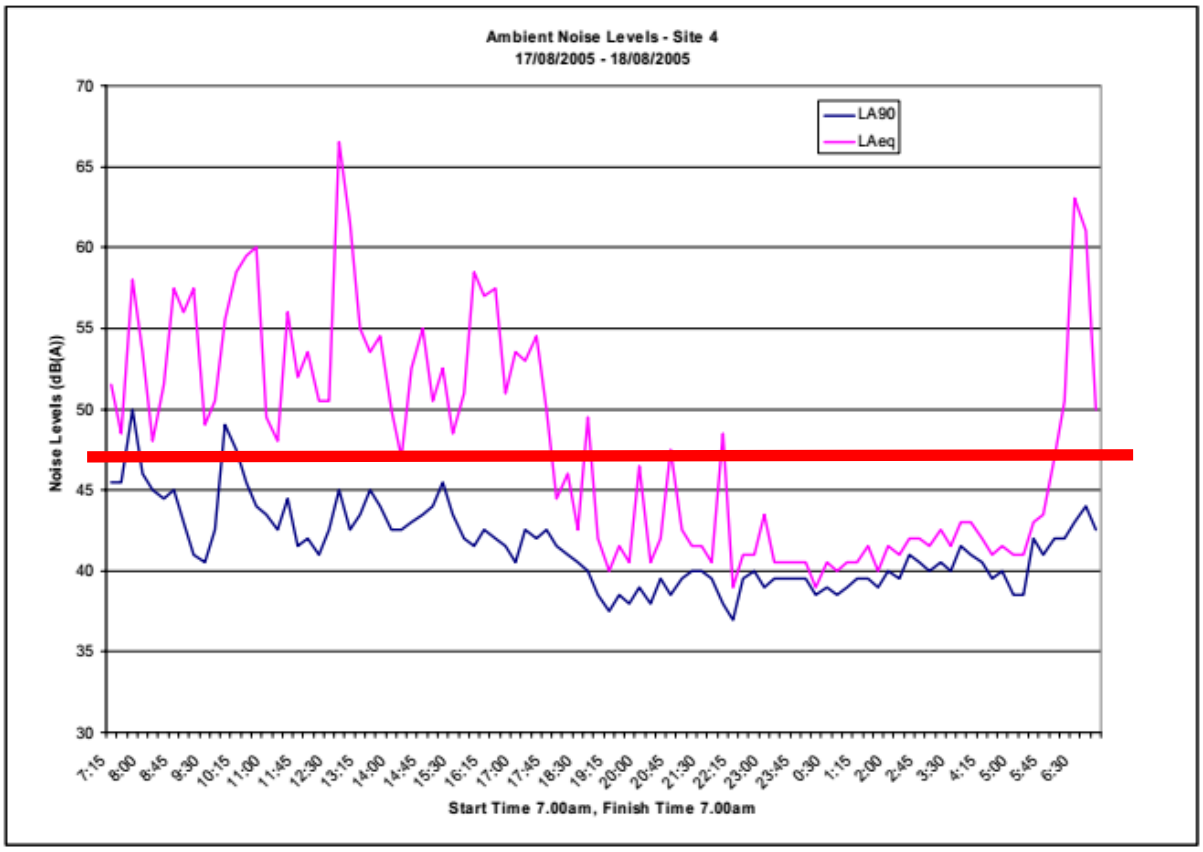
Start Time 7.00am, Finish Time 7.00am


Ambient Noise Levels - Site 4
17/08/2005 - 18/08/2005
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Noise Levels (dB(A))
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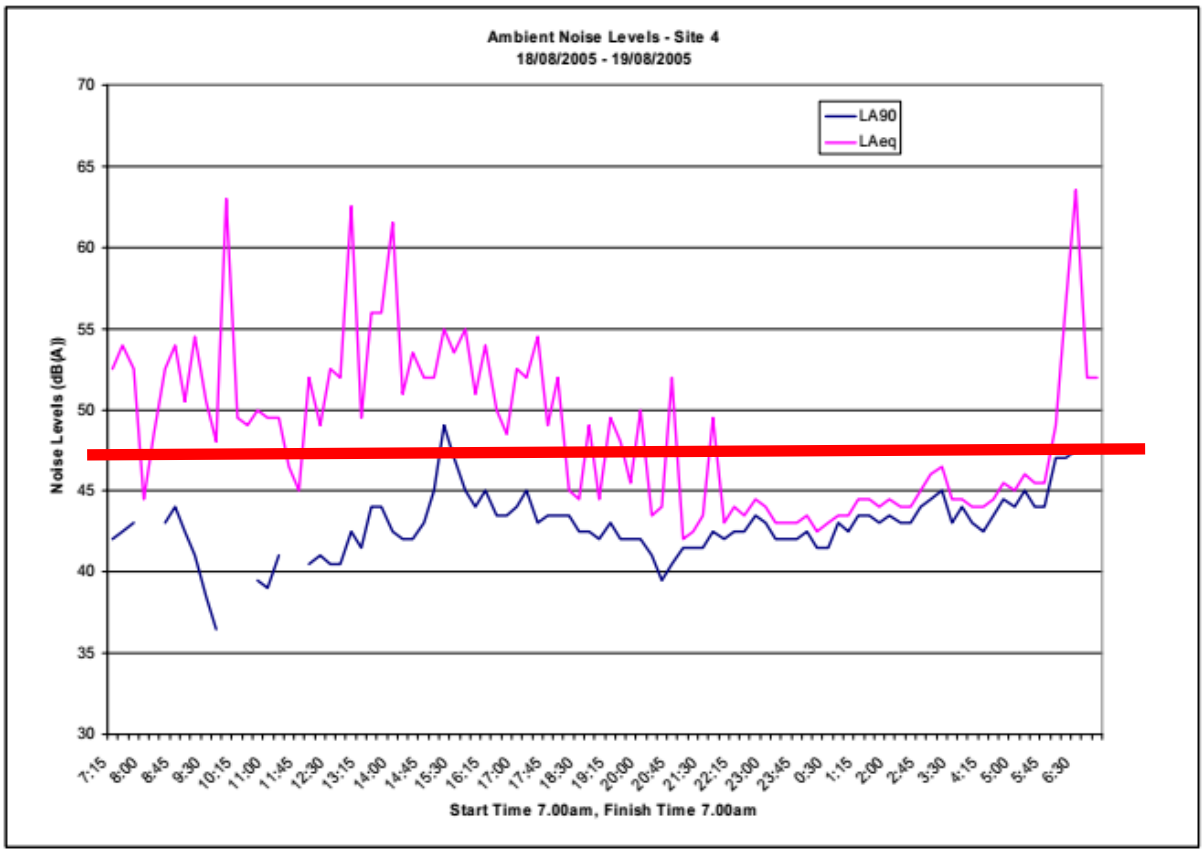
Start Time 7.00am, Finish Time 7.00am


Ambient Noise Levels - Site 4
18/08/2005 - 19/08/2005
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Noise Levels (dB(A))
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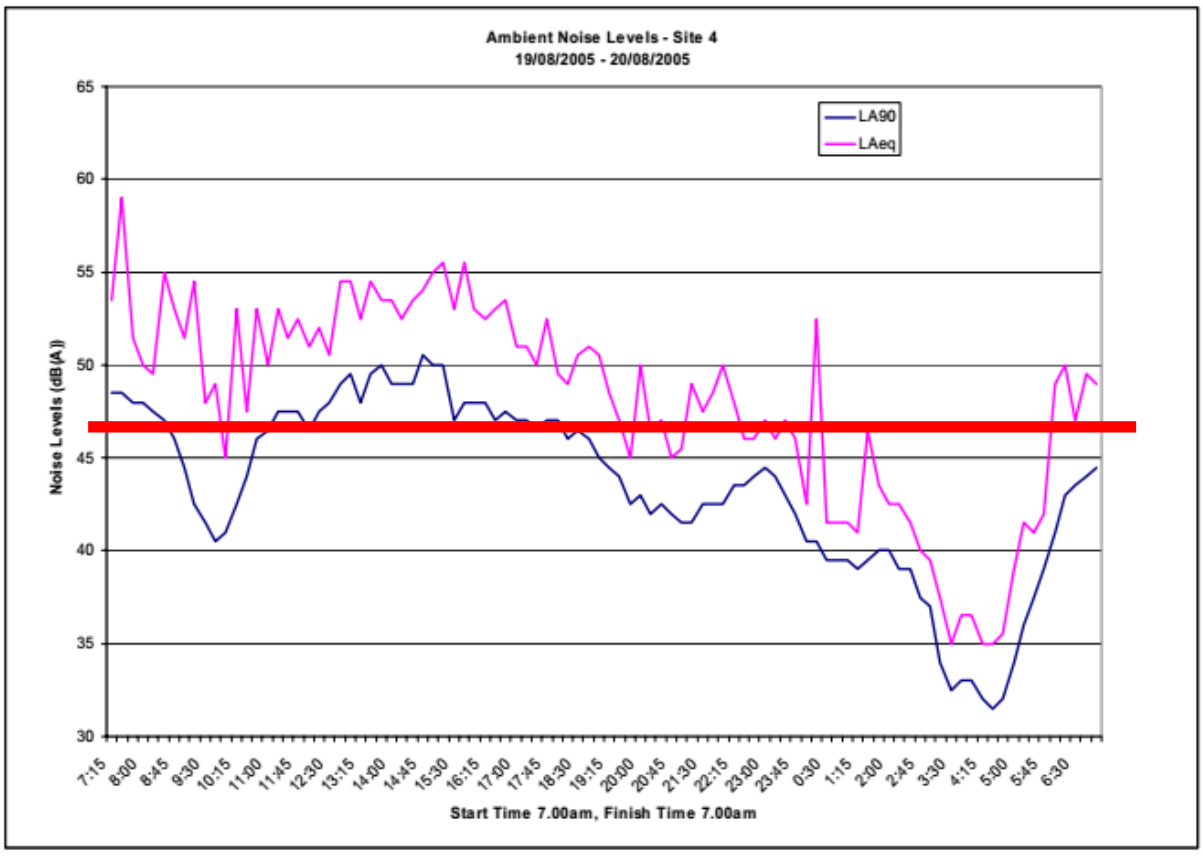
Start Time 7.00am, Finish Time 7.00am


Ambient Noise Levels - Site 4
19/08/2005 - 20/08/2005
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Noise Levels (dB(A))
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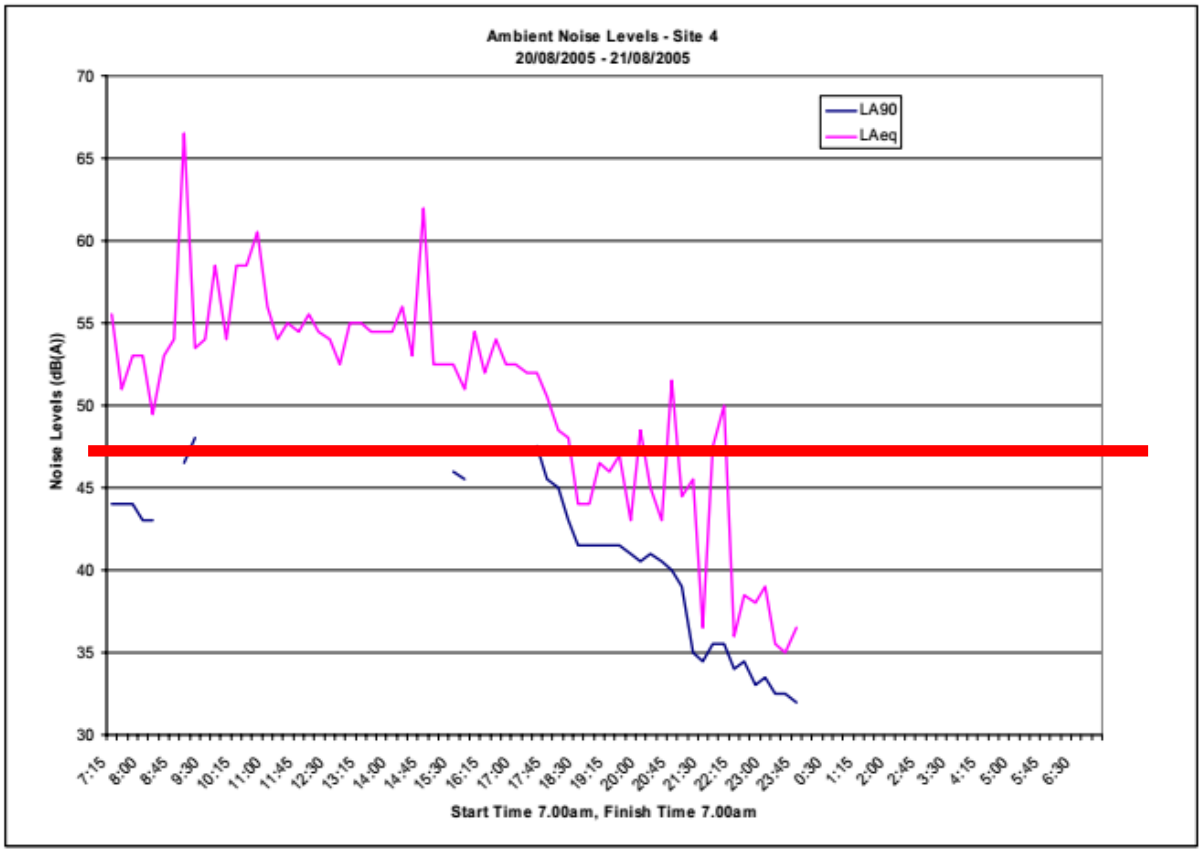
Start Time 7.00am, Finish Time 7.00am


Ambient Noise Levels - Site 4
20/08/2005 - 21/08/2005
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Noise Levels (dB(A))
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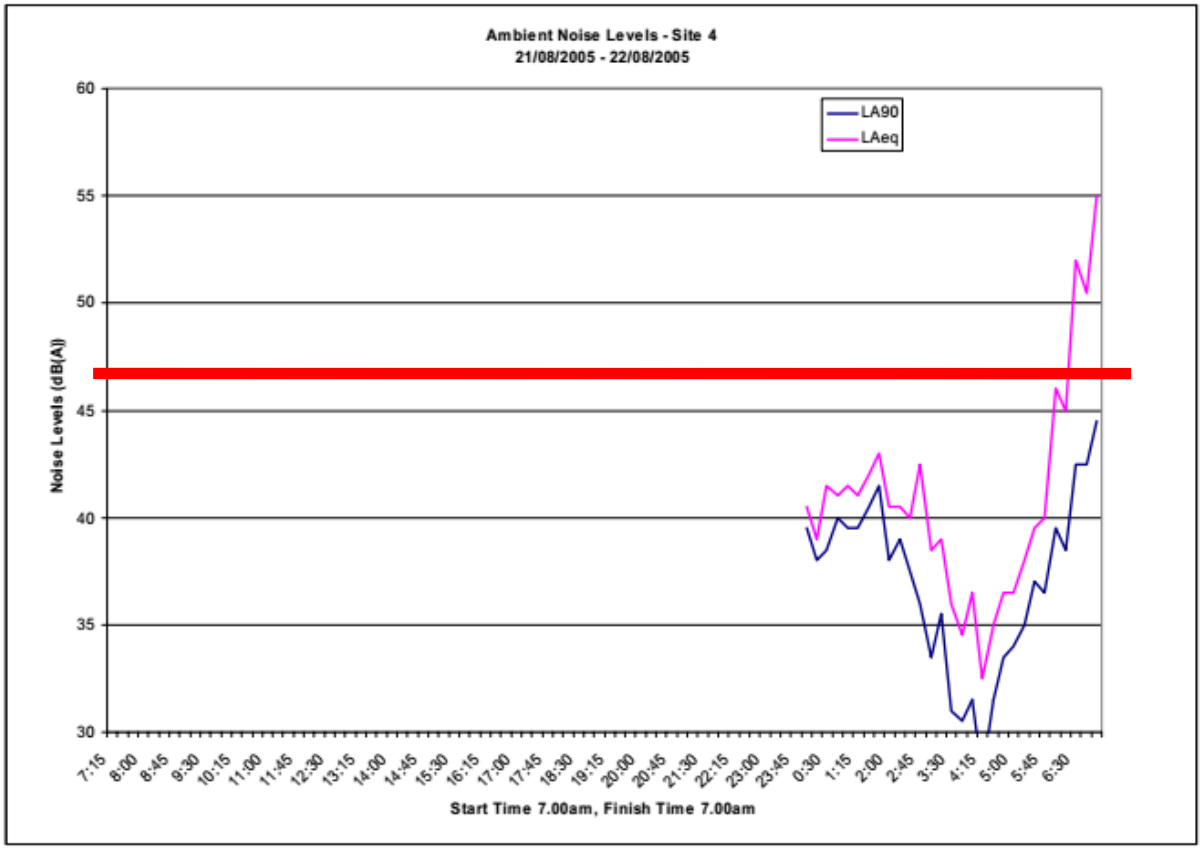
Start Time 7.00am, Finish Time 7.00am


Ambient Noise Levels - Site 4
21/08/2005 - 22/08/2005
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Noise Levels (dB(A))
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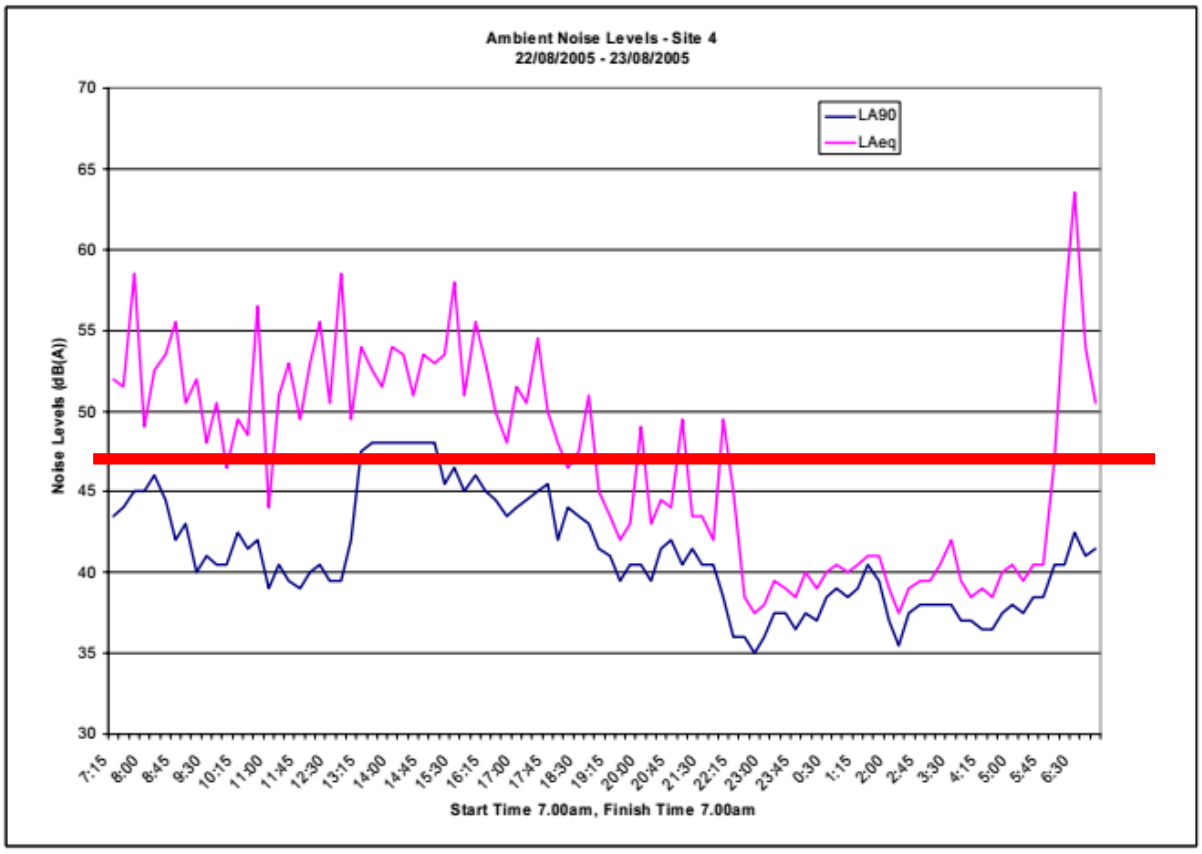
Start Time 7.00am, Finish Time 7.00am


Ambient Noise Levels - Site 4
22/08/2005 - 23/08/2005
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LAeq
Noise Levels (dB(A))
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Start Time 7.00am, Finish Time 7.00am