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CRAIG HILL ACOUSTICS

Acoustic Consultants

QLD & NSW

Cudgen Lakes Sand Quarry

Compliance Noise Monitoring

August 2021

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Cudgen Lakes Sand Quarry

Reference140921/1

Report prepared for	Gales-Kingscliff Pty Limited
Date	Tuesday, 14 September 2021
Site	Cudgen Lakes Sand Quarry
Authorised by	Scott Hollanby
Consultants	Craig Hill Acoustics 7 View Ct Palm Beach. Qld 4221 Mob 0418 762 968 E: craig@craighillacoustics.com.au www:craighillacoustics.com.au
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Contents

1.0 INTRODUCTION

The purpose of this report is to examine noise levels from quarry operations for compliance. Attended monitoring was conducted on Thursday 5th August 2021 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 (nil product)
Loader (Hyundai HL-770
Road Trucks

Table 1.2 Equipment on site not in use

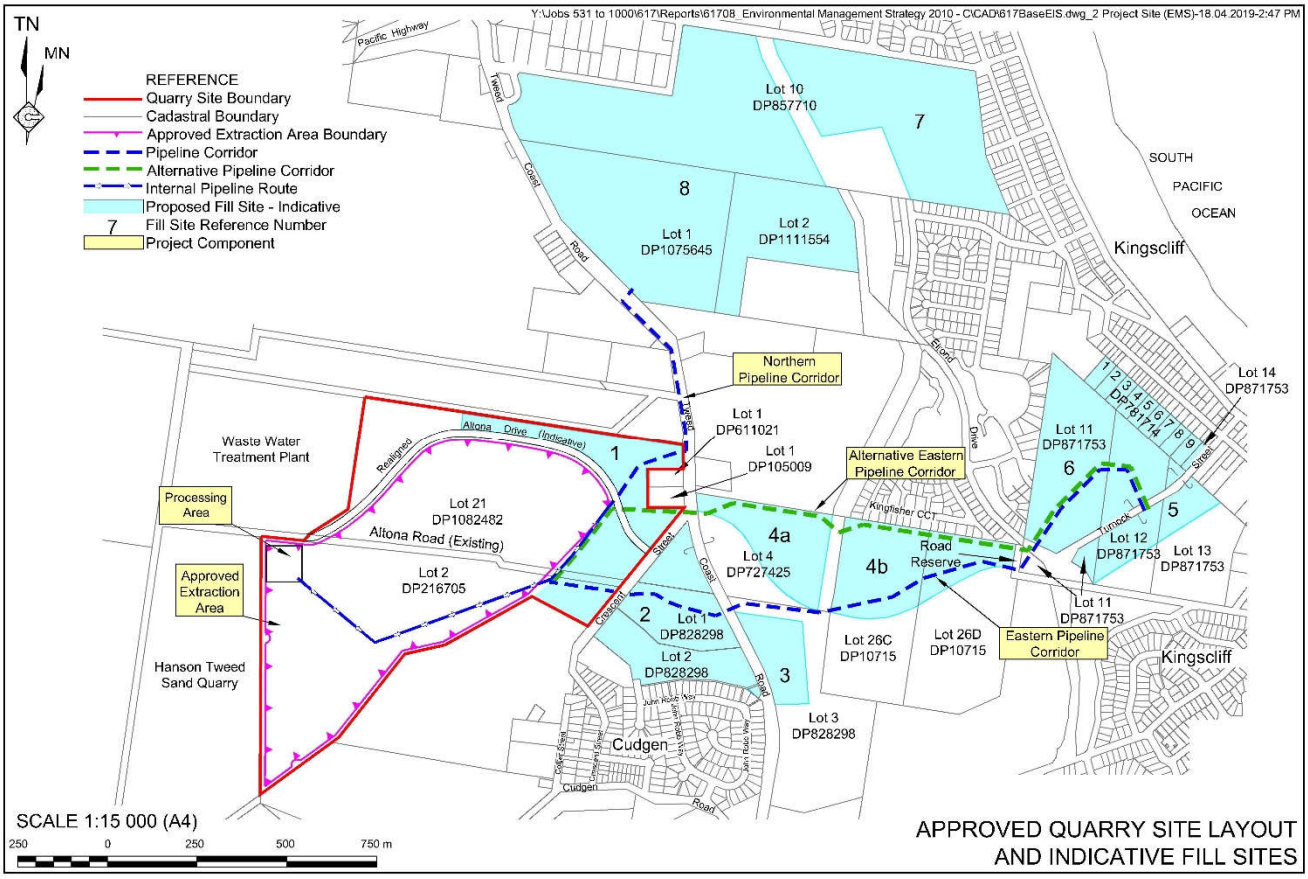
Dredge 8 “
Screener Sandvik
Excavator (Doosan DX 420 LCA)
Haul truck (TerexTA40)

Table 1.3 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

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 1.1 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 2.1 Monitoring locations

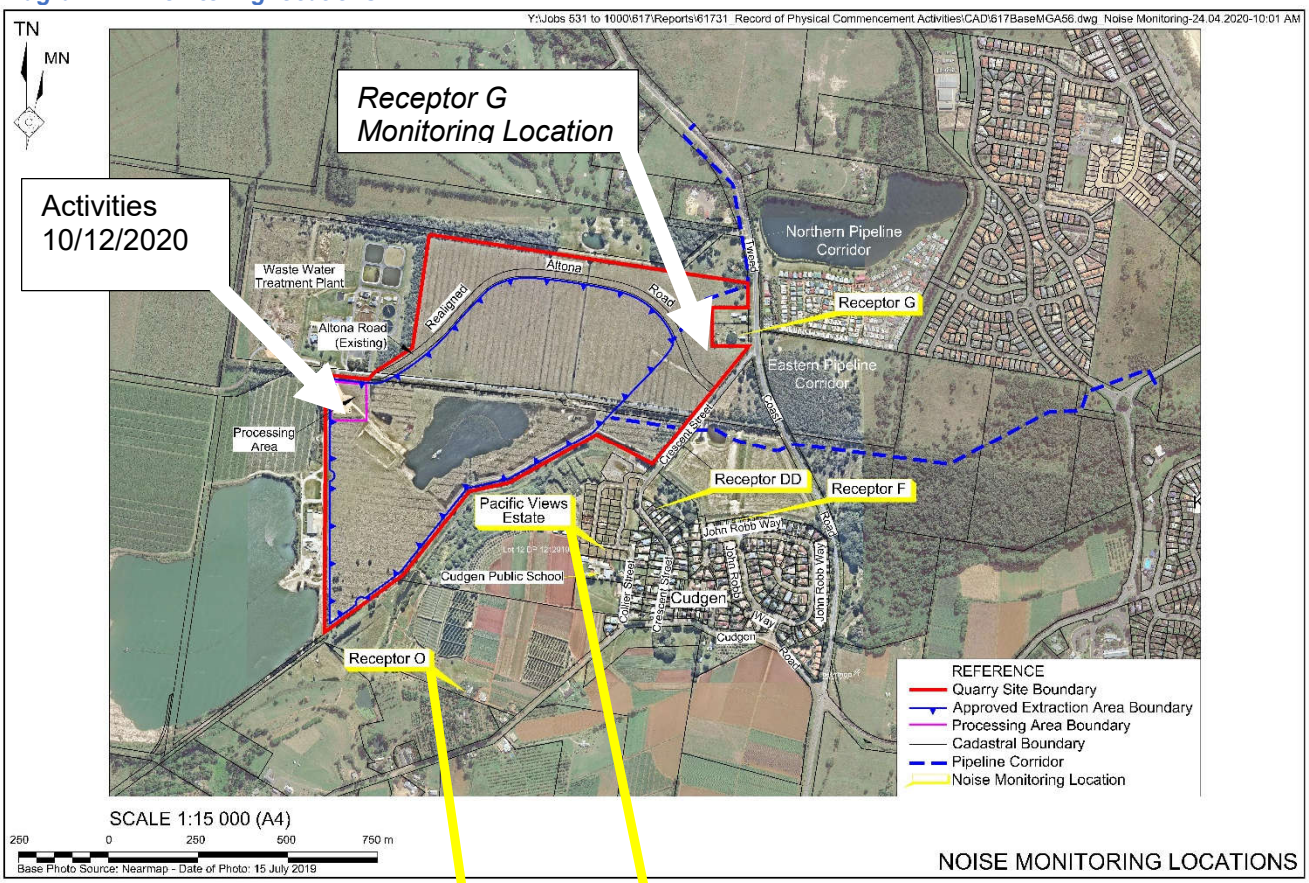
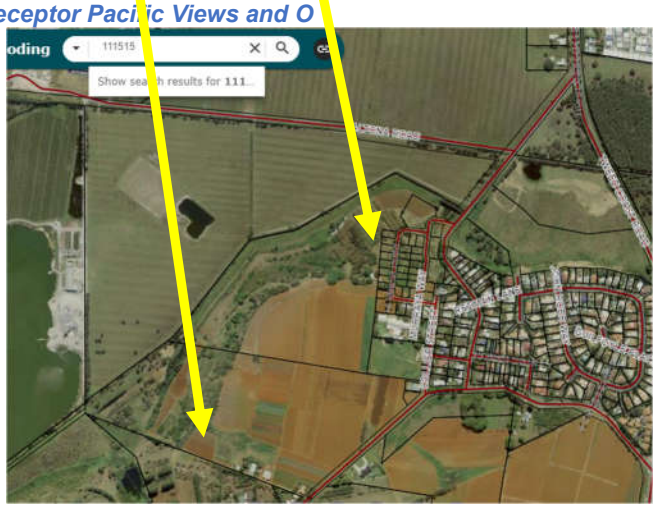


Diagram 2.2 Relocation of Receptor Pacific Views and O



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 949 Serial No 6023. calibrated June 2021.

BSWA Sound Level Calibrator Serial No 490190. calibrated June 2021.

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	60%
Wind Speed	0-5kts
Wind Direction	NW
Atmospheric Pressure	1010 hpa
Cloud Cover	0%
Temp	15-18 C

5.0 TESTING

The following tests were carried out at locations G, O, B, DD and F within 30m of affected dwellings where practical as indicated on the attached site plan.
Tests conducted on Thursday 5th August 2021 between 0800 and 1100 hrs.

- *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. (rear boundary of new residences)*
- *Receptor DD – Residence - 34A Crescent Street. (rear boundary)*
- *Receptor F – Residence - 64 John Robb Way. (rear boundary)*

Table 5.1 Equipment being used at the time of the test 05/08/2021

Operating equipment measured at 20m	LAeq 15 min
CDE Wash Plant (nil product)	-
Loader (Hyundai HL-770	71
Excavator (Doosan DX 420 LCA)	66
Road Trucks	66

Table 5.2 Equipment being used at the time of the test 18/06/2021

Operating equipment measured at 20m	LAeq 15 min
CDE Wash Plant (nil product)	-
Loader (Hyundai HL-770	71
Road Trucks	66

Table 5.3 Equipment in use 10/12/2021

Operating equipment measured at 20m	LAeq 15 min
Loader (Hyundai HL-770	71
Excavator (Doosan DX 420 LCA)	66
Roller compactor CA302	68
Screener Sanvik(QA331)	70

Table 5.4 Equipment in use 10/07/2020

Operating equipment measured at 20m	LAeq 15 min
Loader (Hyundai HL-770	71
Excavator (Doosan DX 420 LCA)	66

Table 5.5 Equipment in use April 2020 test

Operating equipment measured at 20m	LAeq
Screener (QA331)	70
Loader (Cat 926H)	67
Excavator (Cat 329D)	68
End loader and screener	72

5.1 Results

The results of the compliance monitoring are presented in Table 6.1.

Table 5.4 Attended monitoring 05/08/2021

Receptor & Time	Attended Testing LAeq 15 minutes	> Project Criteria (47 LAeq 15min)	> Cumulative Criteria (50 LAeq 11 hrs)	Comments
G 0800 - 0815	50	3	0	Noise from other sources such as traffic noise from Coast Road dominated background. Noise from operations not measurable / distinguishable above background.
O 0830 - 0845	49	2	-1	Noise from other sources such as traffic noise from Pacific Highway dominated background. Noise from operations occasionally audible but not measurable above background.
Pacific Views 0900 - 0915	51	4	1	Noise from other sources such as traffic noise from Pacific Highway dominated background. Noise from operations occasionally audible but not measurable / distinguishable above background.
DD 1000 - 1015	49	2	-1	Noise from other sources such as traffic noise from Coast Road dominated background. Noise from operations not audible or measurable / distinguishable above background.
F 1030 - 1030	48	1	-2	Noise from other sources such as traffic noise from Coast Road dominated background. Noise from operations not audible / distinguishable above background.

6.0 PREDICTED LEVELS

Equipment operations were not either audible or measurable at any of the motoring sites. Measurements were undertaken at approximately 20m from equipment during operations and distance attenuation applied to establish possible levels at monitoring locations.

Table 6.1 shows predicted compliance to the criteria for nominated equipment operations.

Table 6.1 Predicted levels of on site equipment based on measurements at 20m

Receptor	Distance m	Dredge 8" 63LAeq @ 20m	CDE wash plant 70LAeq @ 20 mts (not in use)	Loader 71LAeq @ 20 mts	Excavator 66 LAeq @ 20 m (not in use)	Road Trucks 66 LAeq @ 20 m	Combined	Combined with line of sight attenuation	> Project Day Criteria (47 LAeq 15 min)	> Cumulative Day Criteria (50 LAeq 11 hrs)
		Predicted Levels with Distance attenuation								
G	880m	30	37	38	33	33	42	42	-5	-8
O	600m	33	40	41	36	36	45	45	-2	-5
Pacific Views	555m	34	41	42	37	37	45	47	-0	-3
DD	780m	31	38	39	34	34	43	33	-14	-17
F	900m	30	37	38	33	33	42	32	-15	-18

(not in use): 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)))

7.0 DISCUSSION AND CONCLUSIONS

Noise from operations were not audible or measurable at locations G,F and DD.

Noise from the operations were occasionally audible at locations O and Pacific Views Estate but not measurable due to other noise in the area.

Distance calculations of measured noise levels from operating plant on site indicate 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. This measurement 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 7.1

Receptor	Pre-project / Baseline Levels	Compliance Monitoring LAeq 15 min								Project Criteria	
		Previous testing							Latest tests	LAeq 15 min	LAeq 11 hr
	Unattended logger original report	Attended monitoring 23/08/05	Attended monitoring 10/07/17	Attended monitoring 30/08/18	Attended monitoring 20/04/20	Attended monitoring 20/04/20	Attended monitoring 10/12/20	Attended monitoring 18/06/21	Attended monitoring 05/08/21	>Impact Criteria day and evening 47LAeq	>Cumulative Criteria Day 50LAeq
G	62	63	62	57	55	56	57	55	50	3	0
O	NM	NM	64	46	48	52	53	52	49	2	-1
Pacific Views	55	51	57	48	55	53	52	51	51	4	1
DD	55	53	58	56	56	53	52	50	49	2	-1
F	58	54	43	57	59	55	47	50	48	1	-2

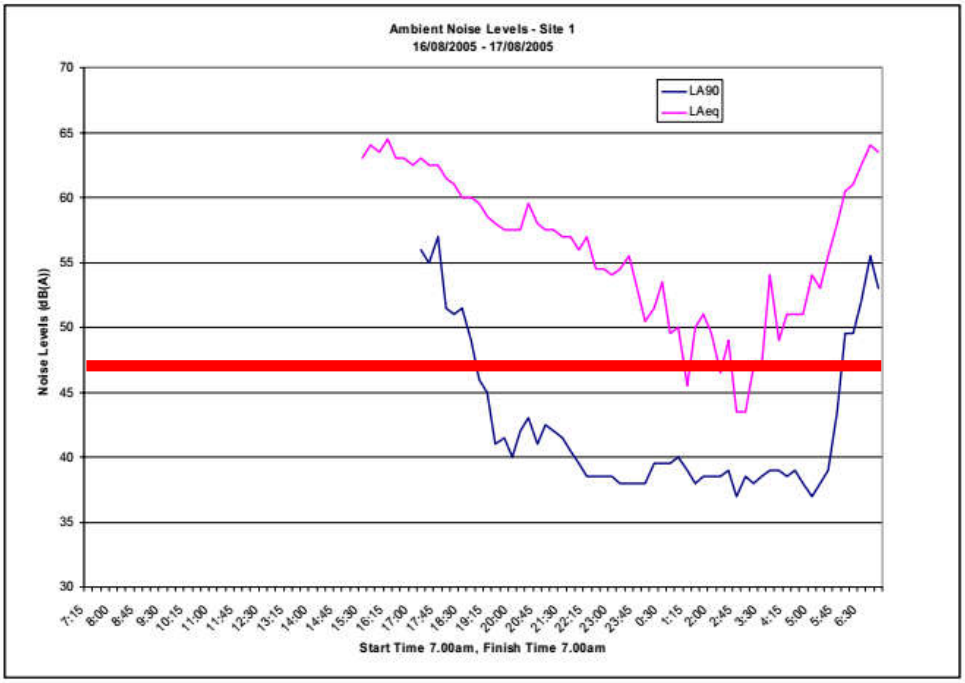
Monitored levels in the area are not unusual for daytime compliance testing. Examination of pre-project data shows ambient LAeq for day and evening rarely drops below the project design levels making it difficult to enable compliance identification.

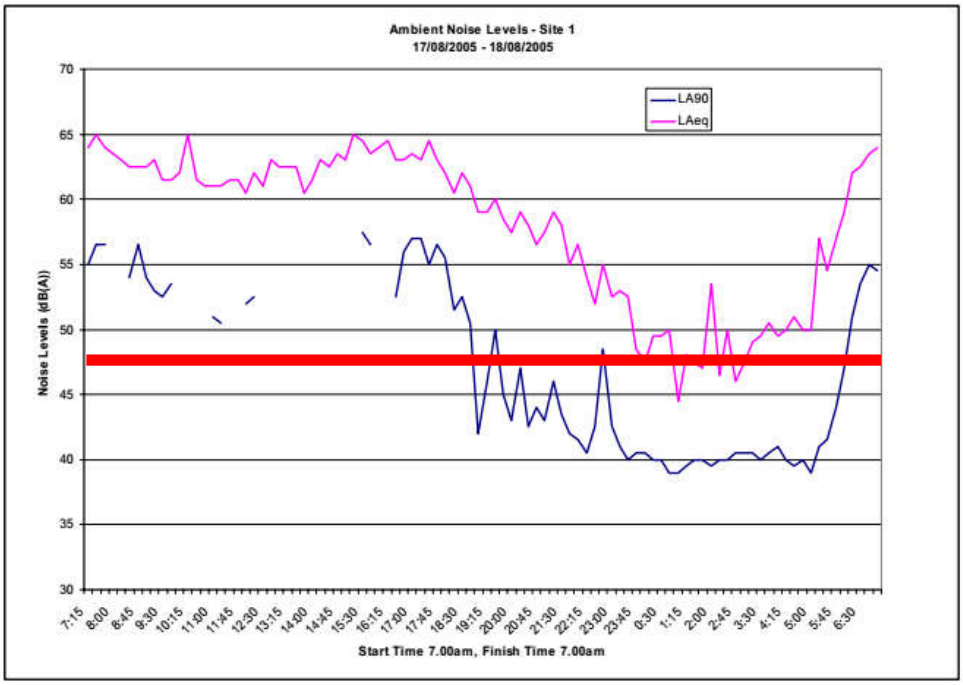
To better demonstrate this, **Appendix A** shows graphs for the pre-project monitoring (Rumble Report No. 617/04 unattended logger). The project criteria for day and evening periods of 47LAeq is indicated by the straight red line. From **Appendix A** it can be seen that the LAeq levels generally do not 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.

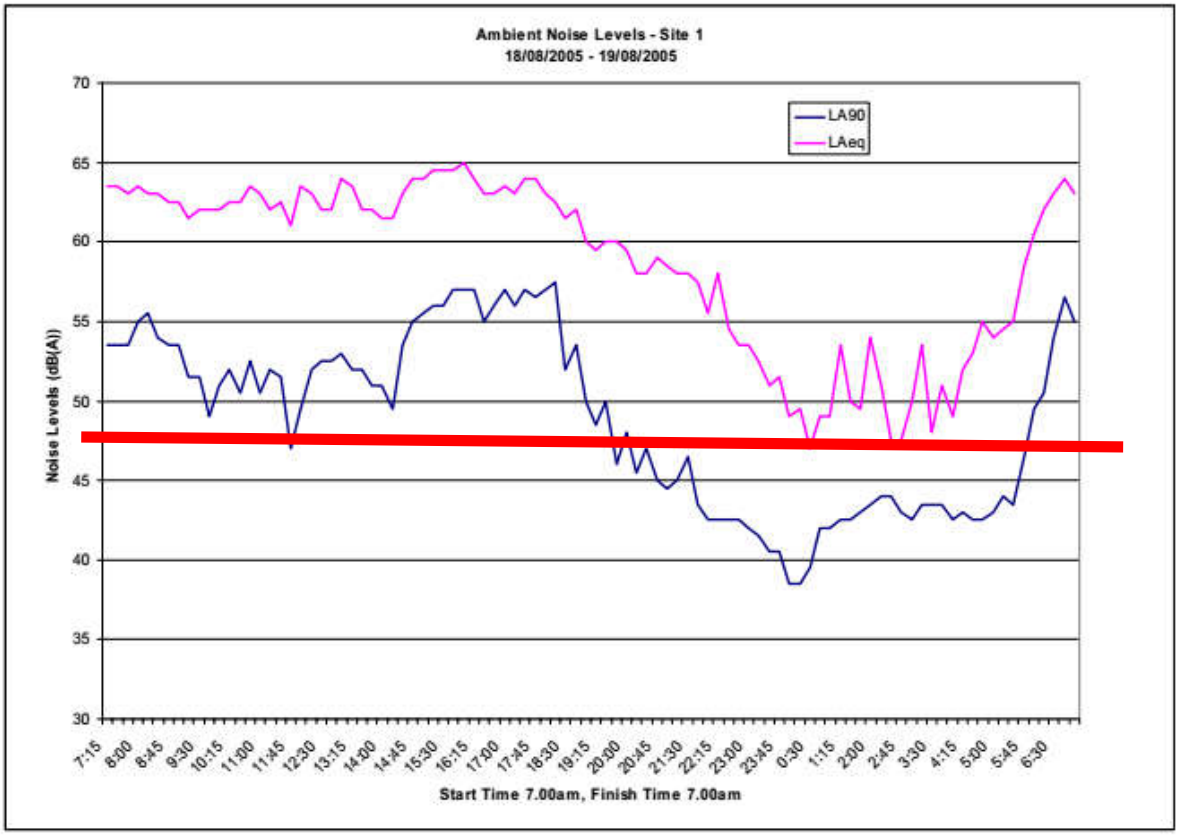
APPENDIX A PRE CONSTRUCTION TESTING

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

SPECIALIST CONSULTANT STUDIES 8 - 87 **GALES-KINGSCLIFF PTY LTD**
Part 8 – Noise Assessment *Cudgen Lakes Sand Extraction Project*
Report No. 617/04



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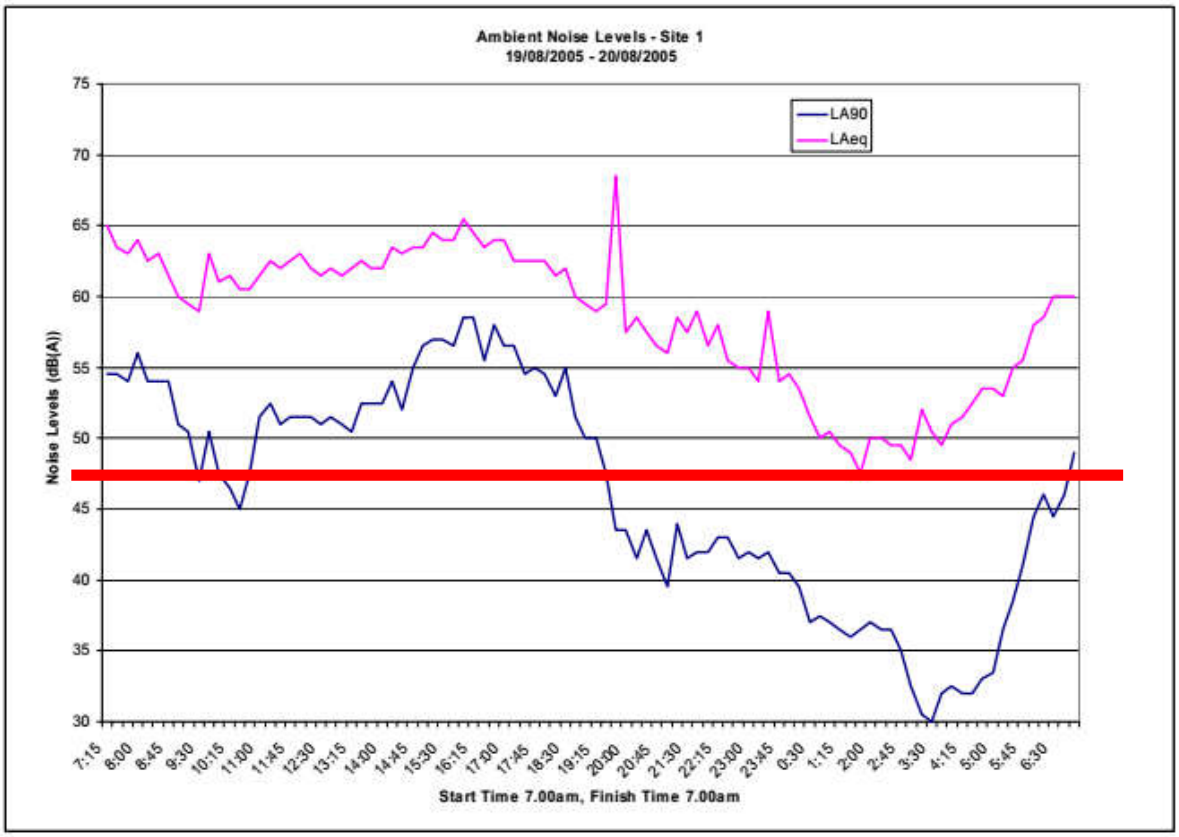
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am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19/08/2005 - 20/08/2005
LA90
LAeq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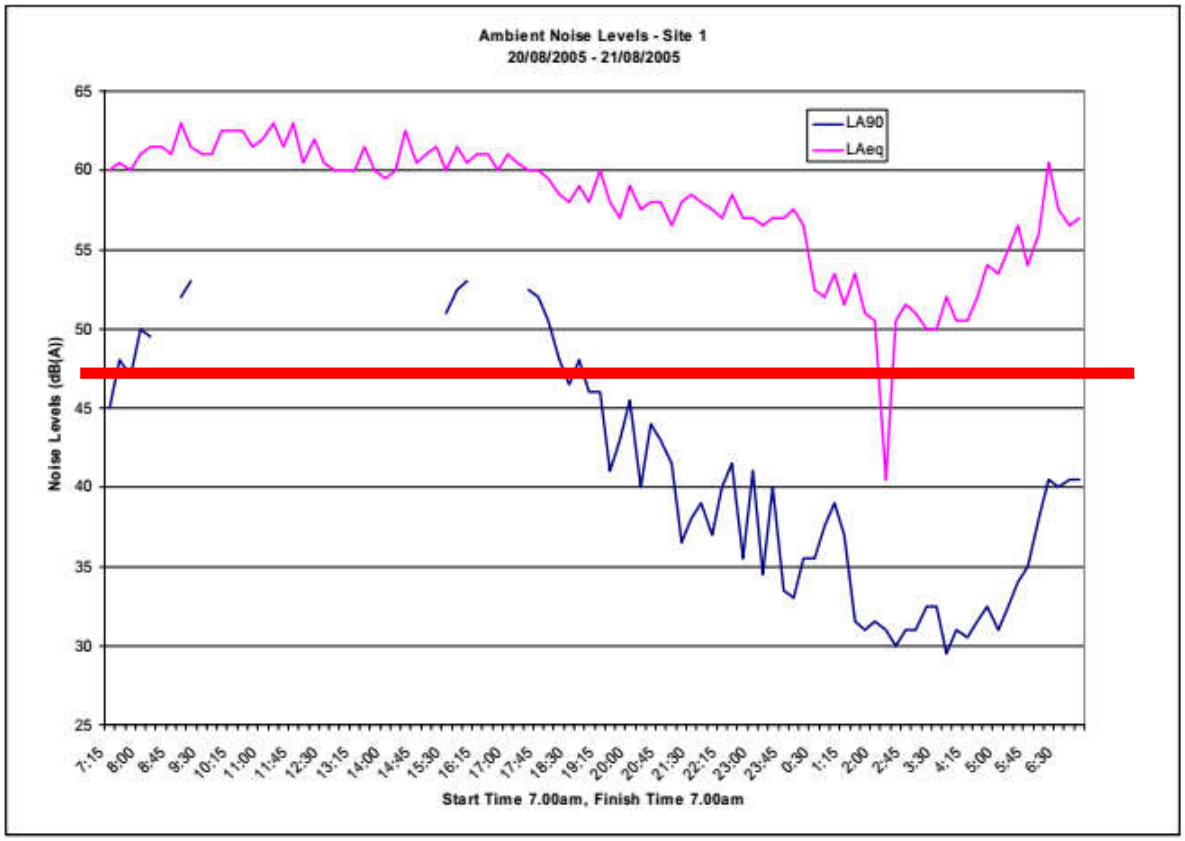
Start Time 7.00am, Finish Time 7.00am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LA90
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Noise Levels (dB(A))
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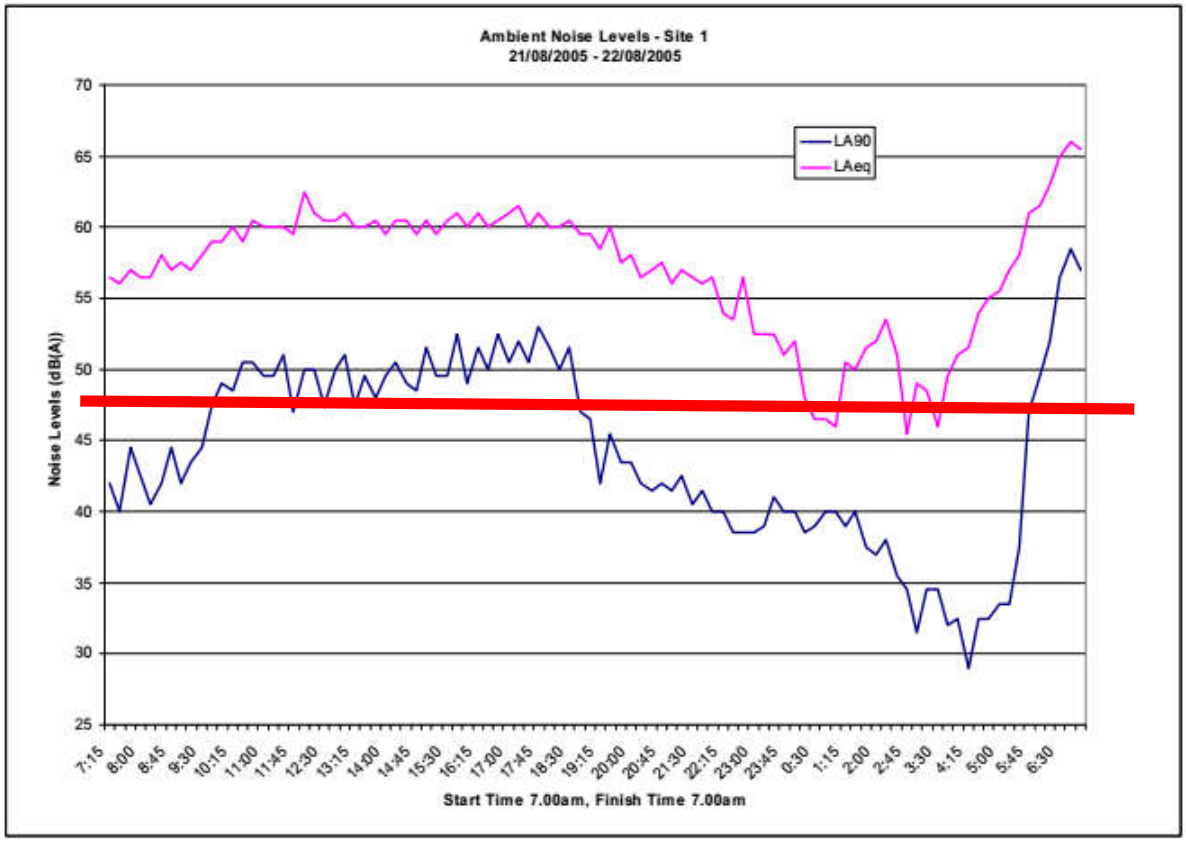
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Noise Levels (dB(A))
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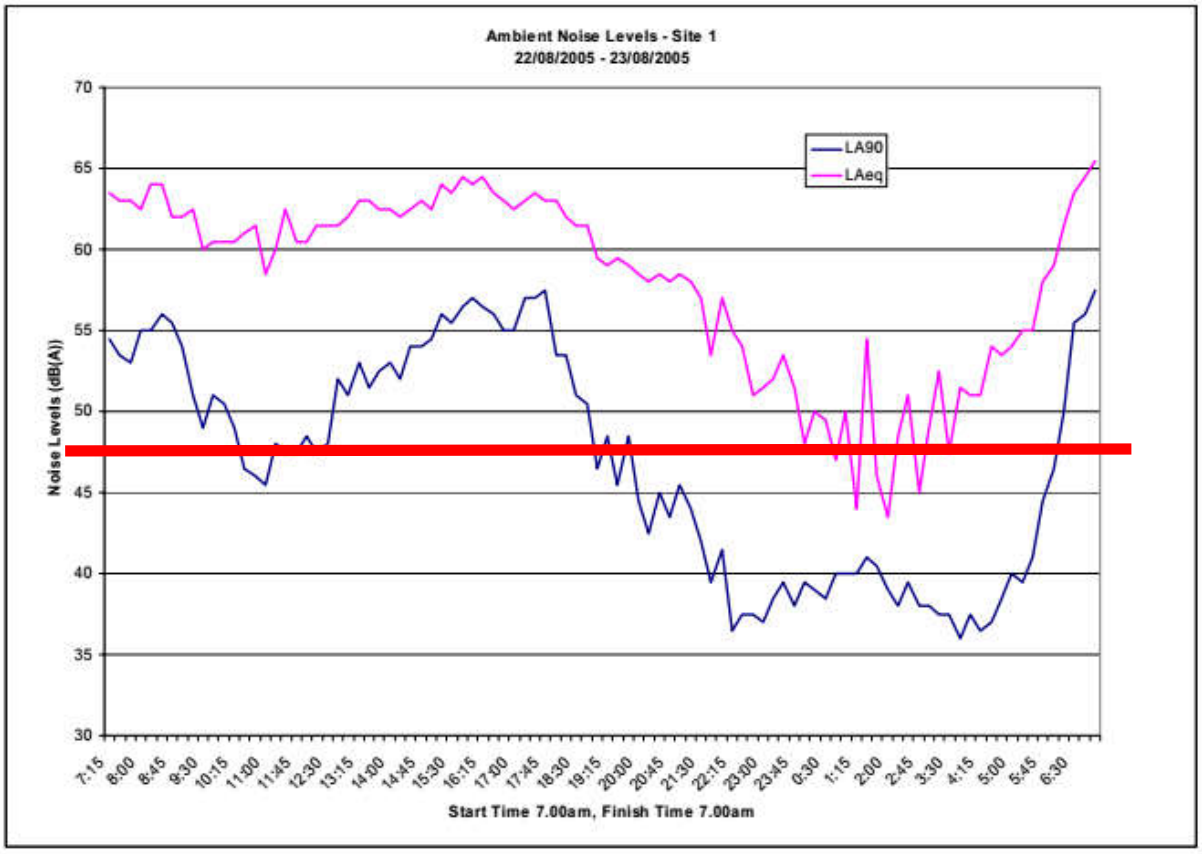
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Noise Levels (dB(A))
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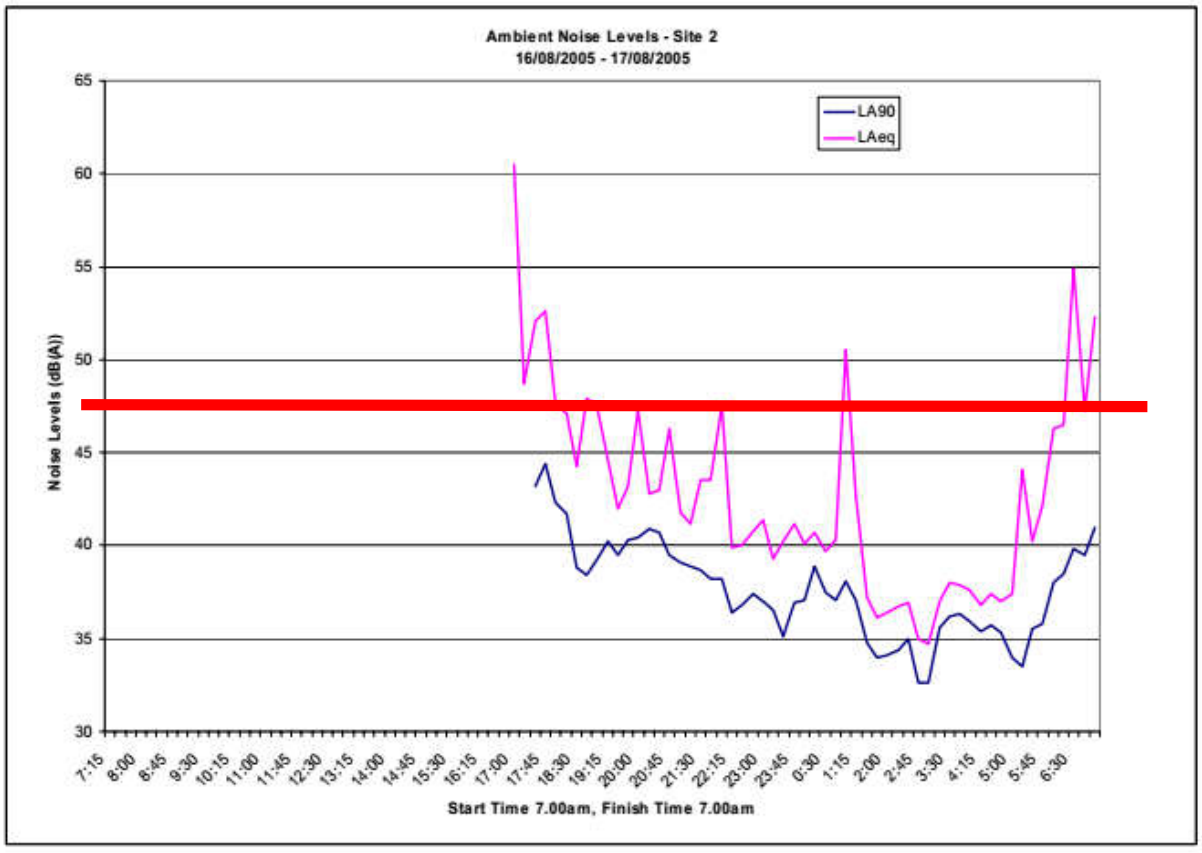
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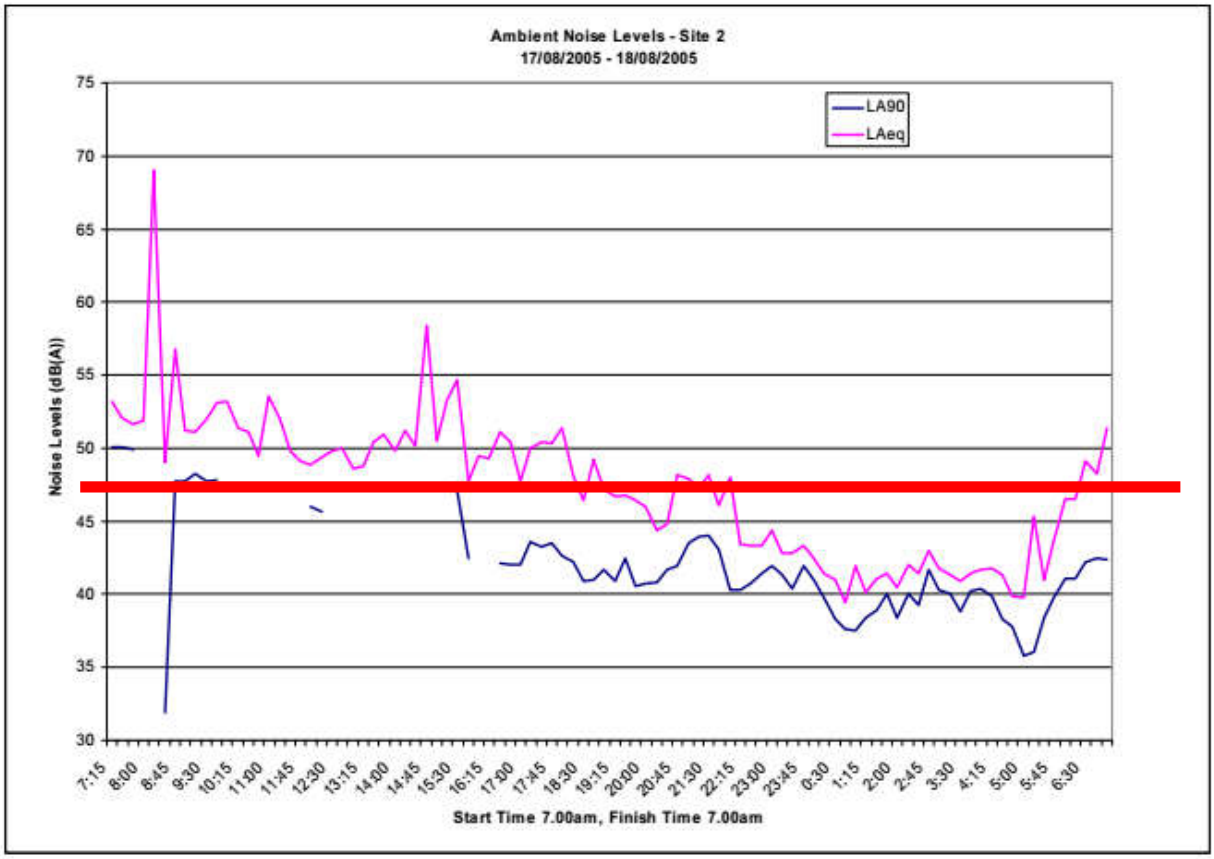
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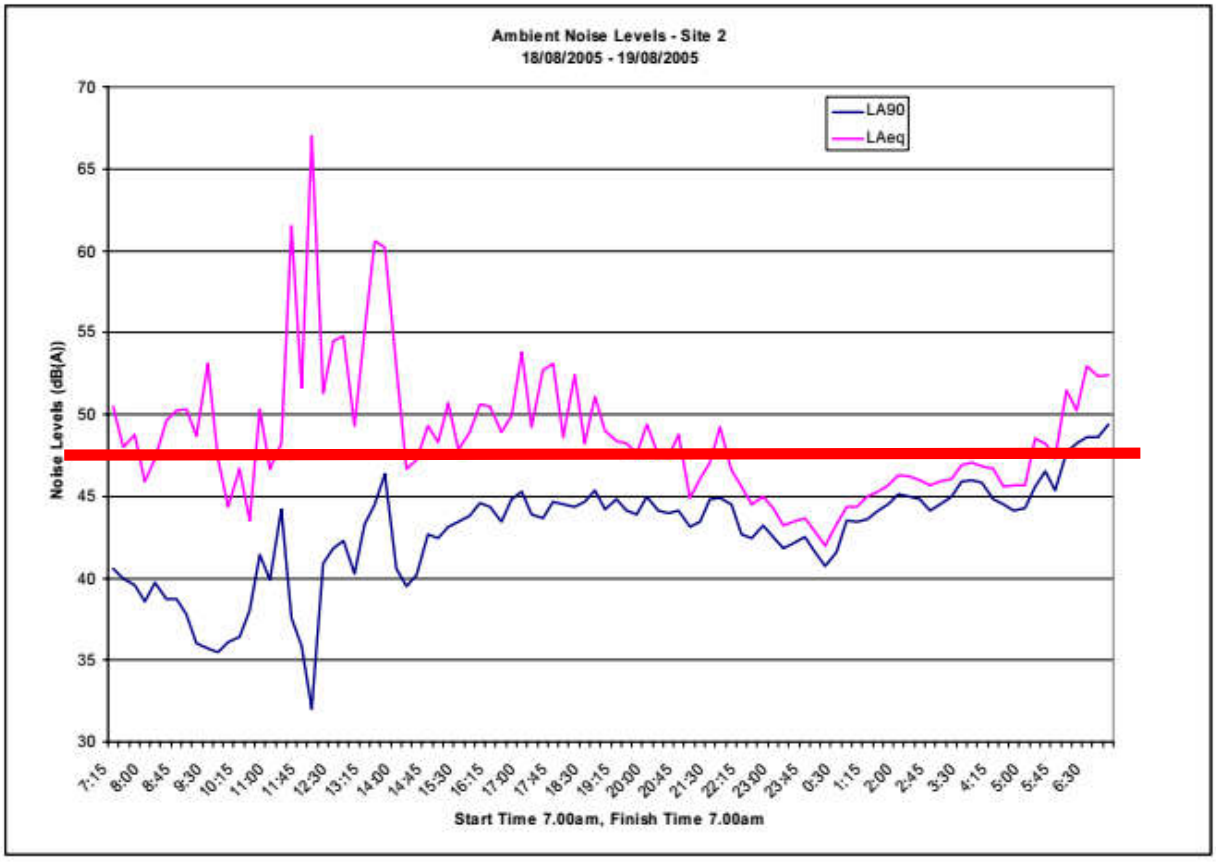
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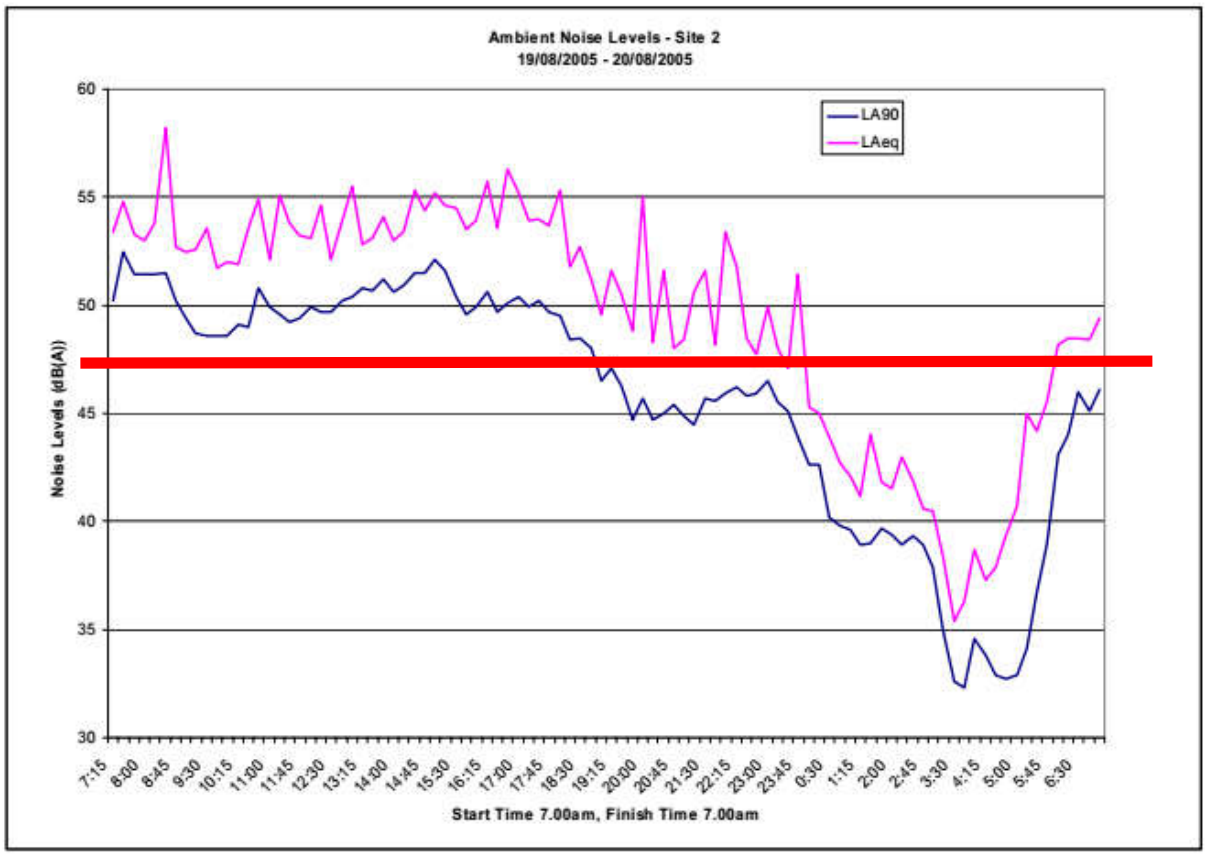
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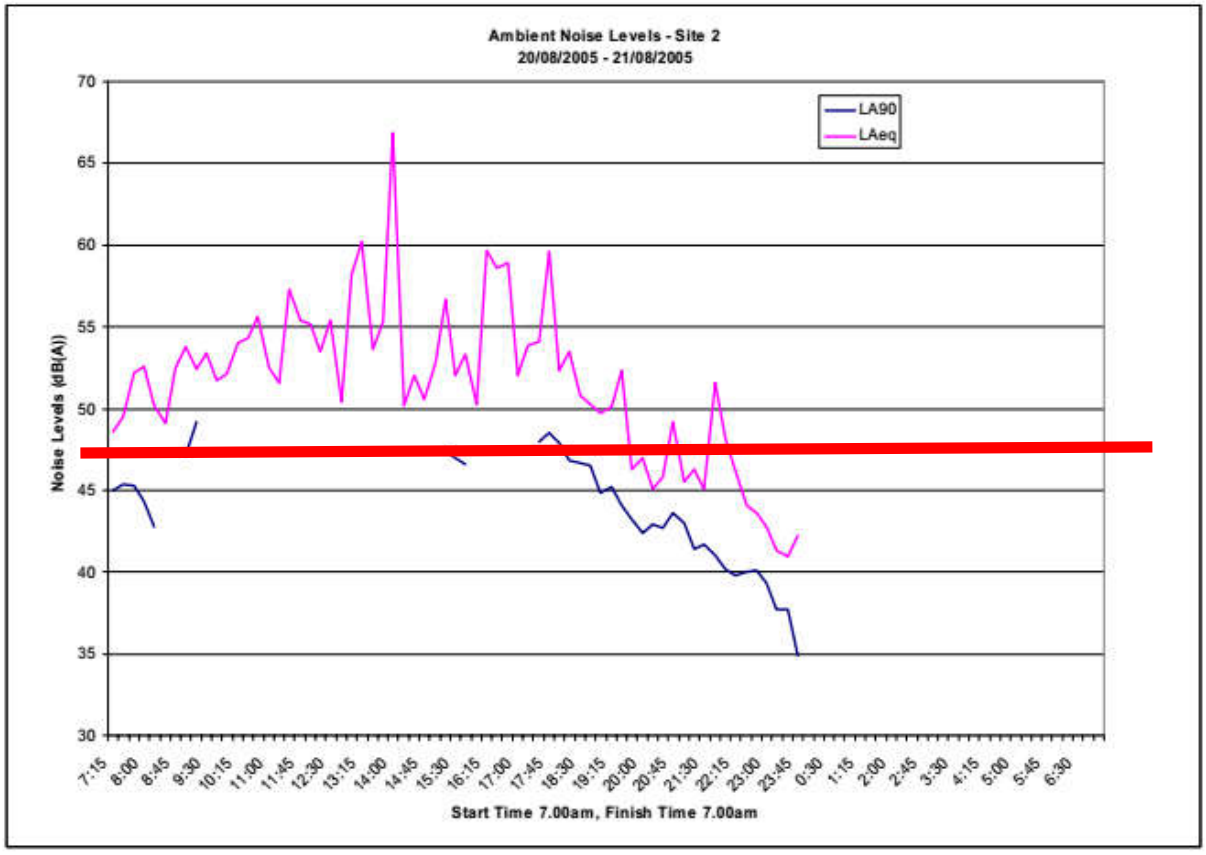
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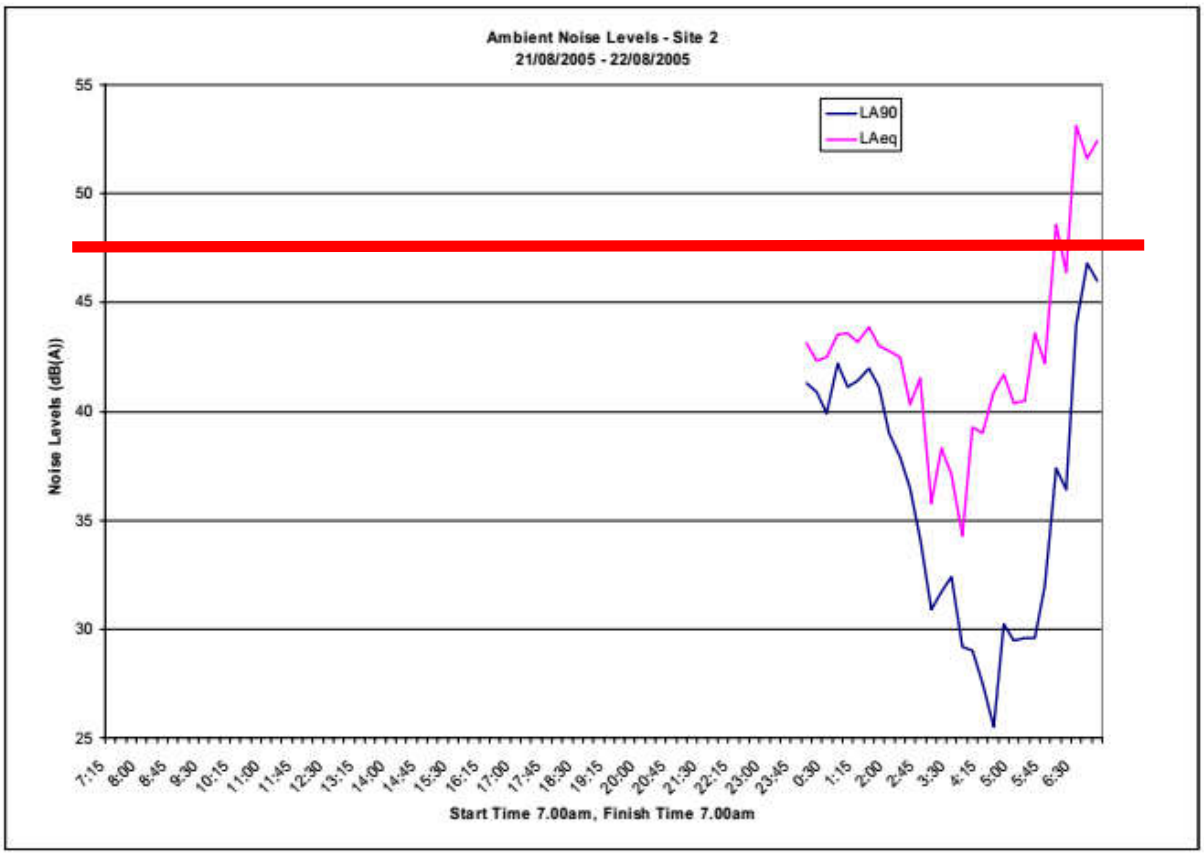
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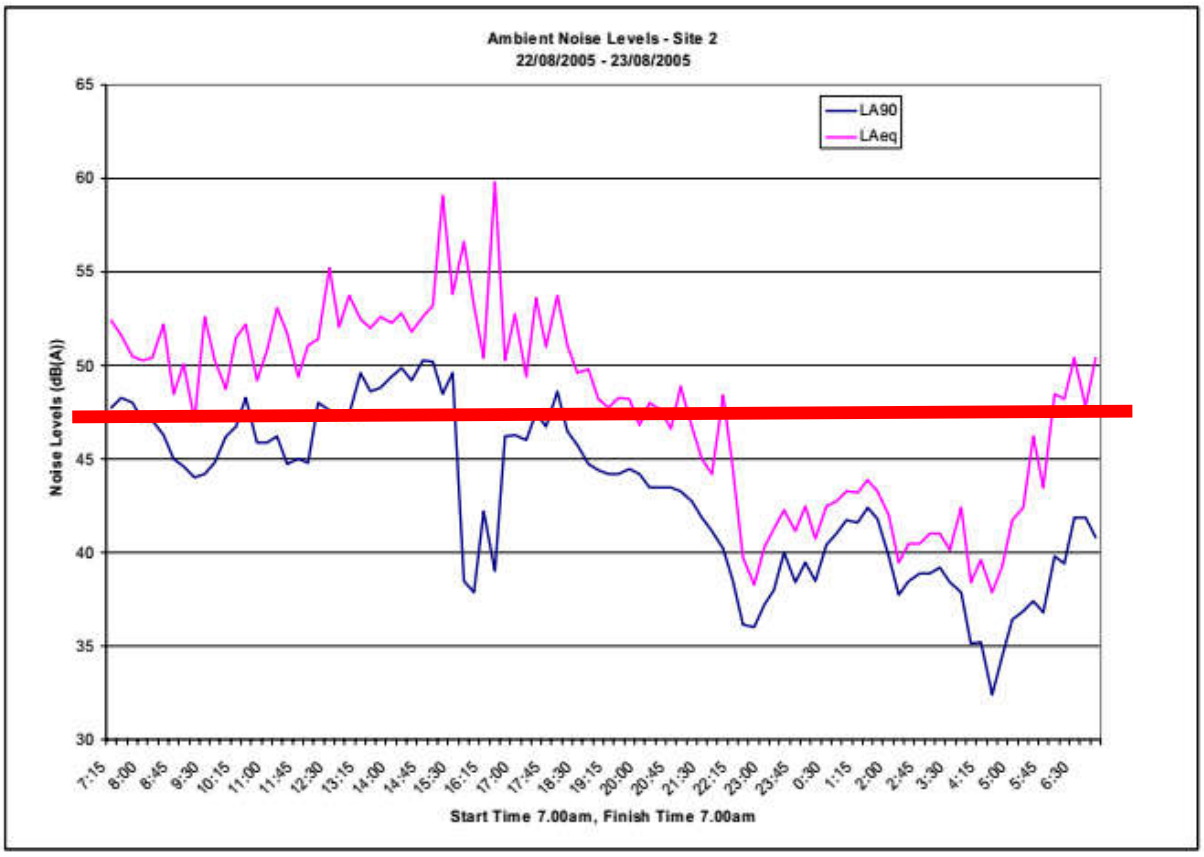
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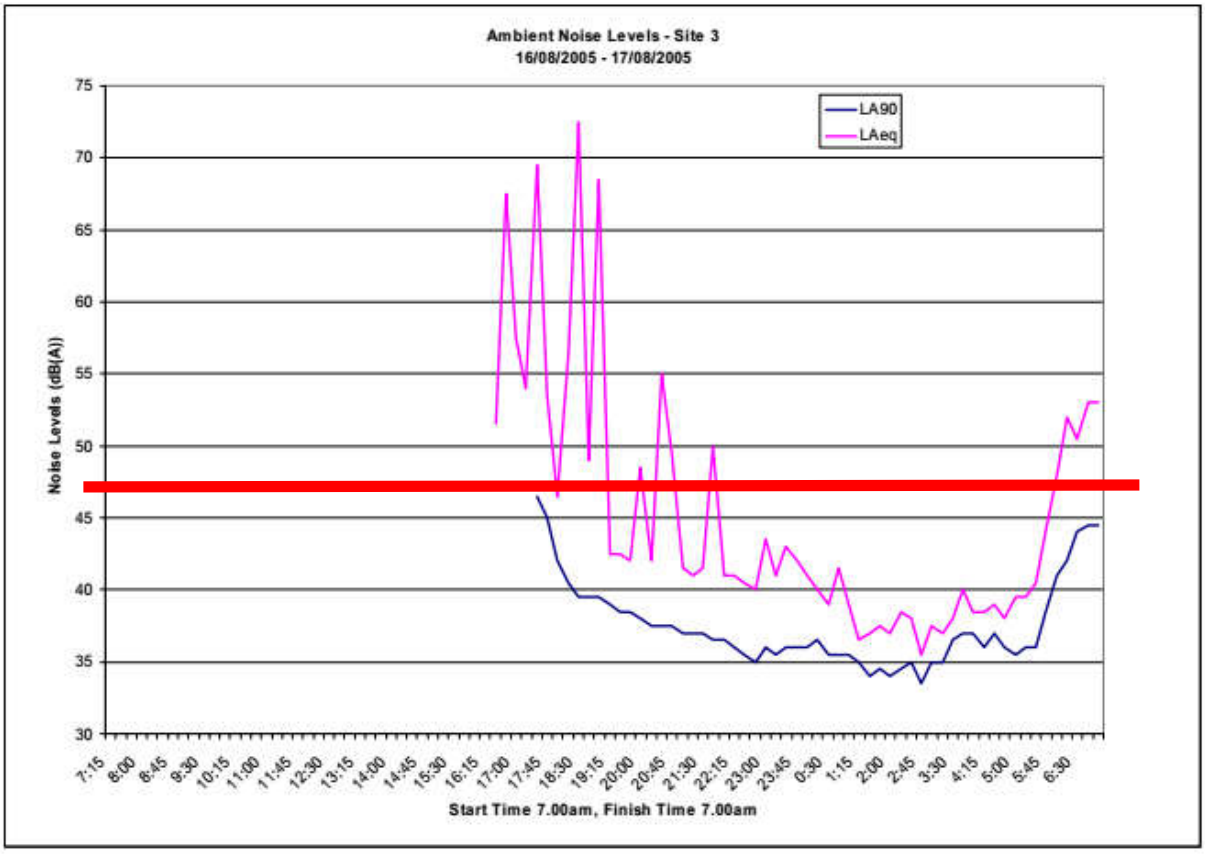
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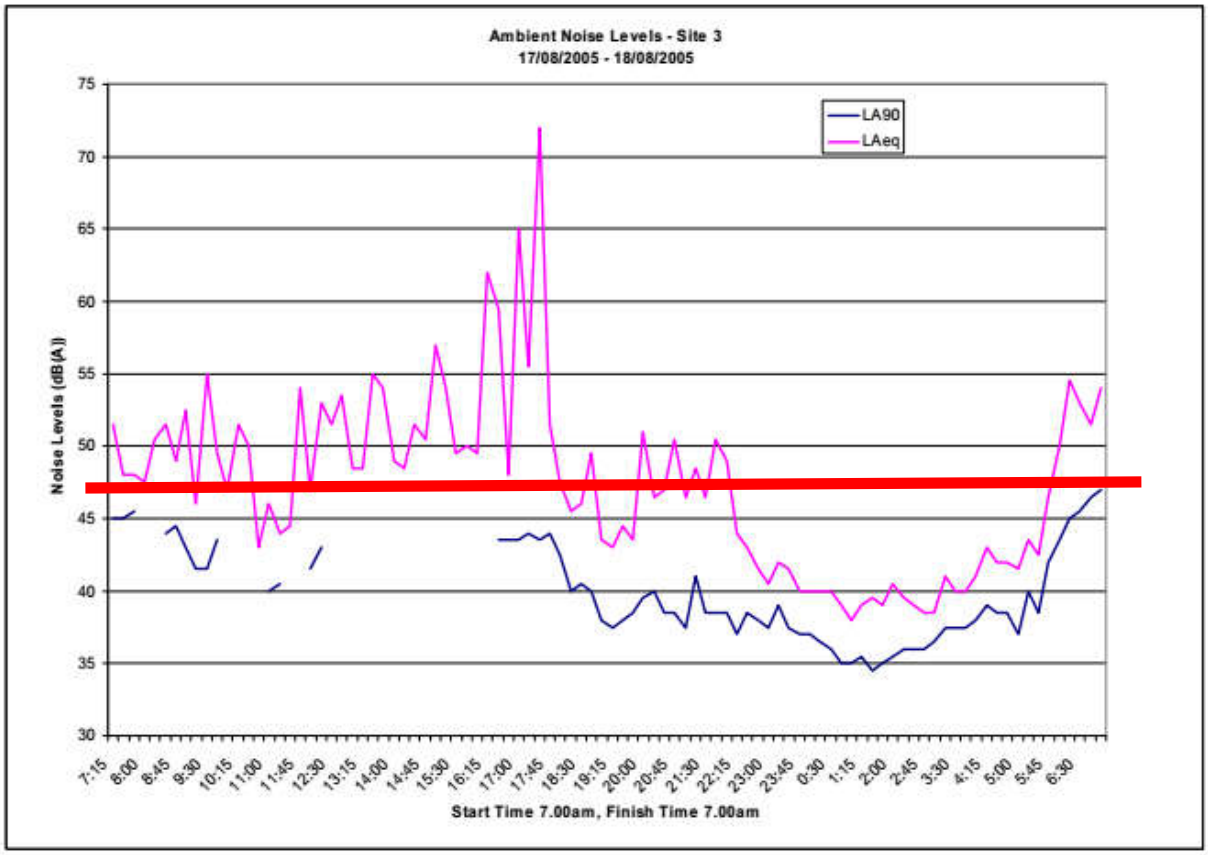
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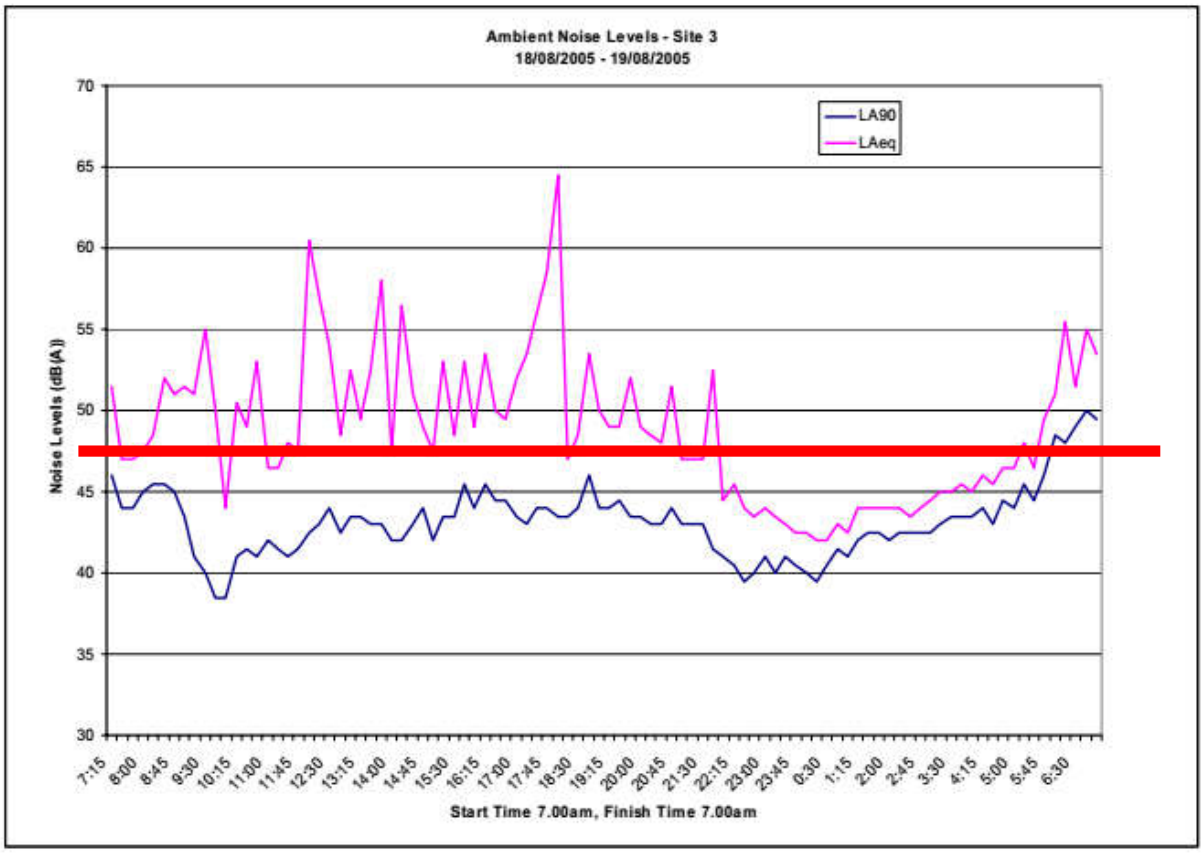
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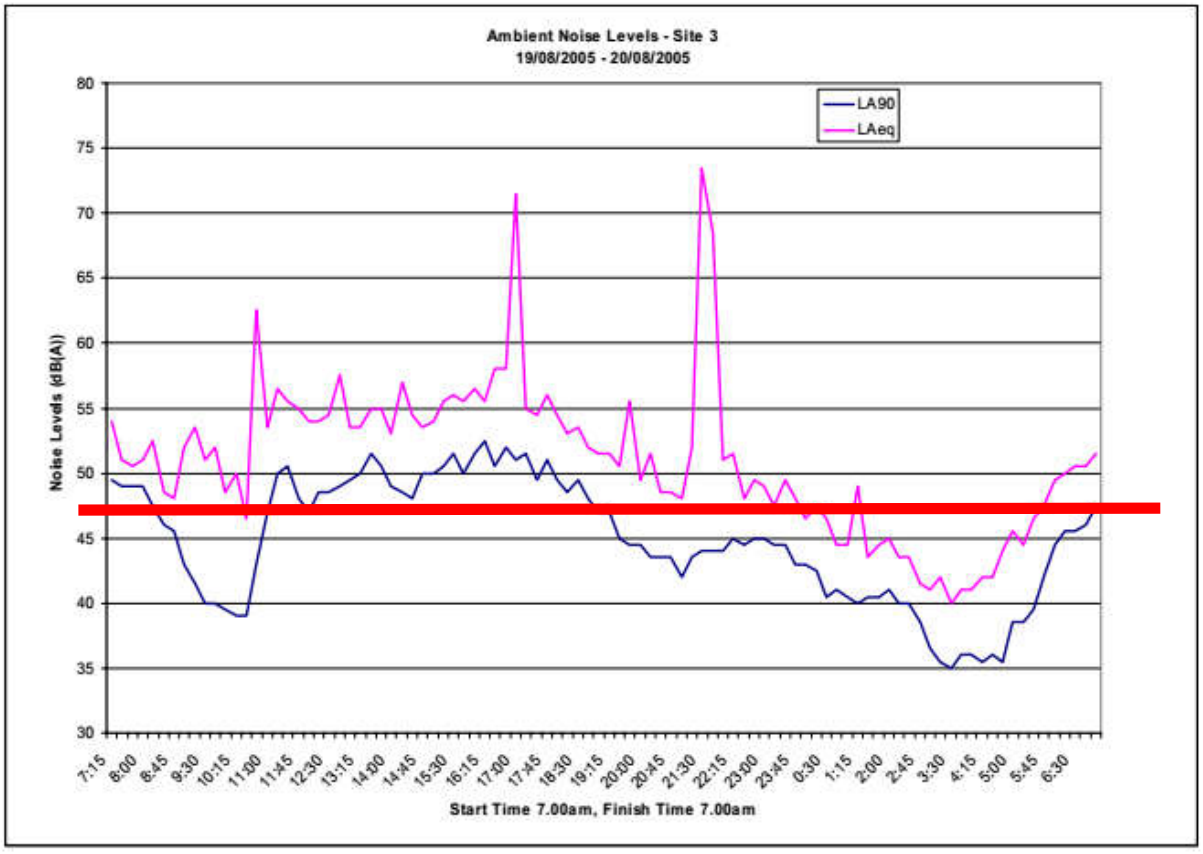
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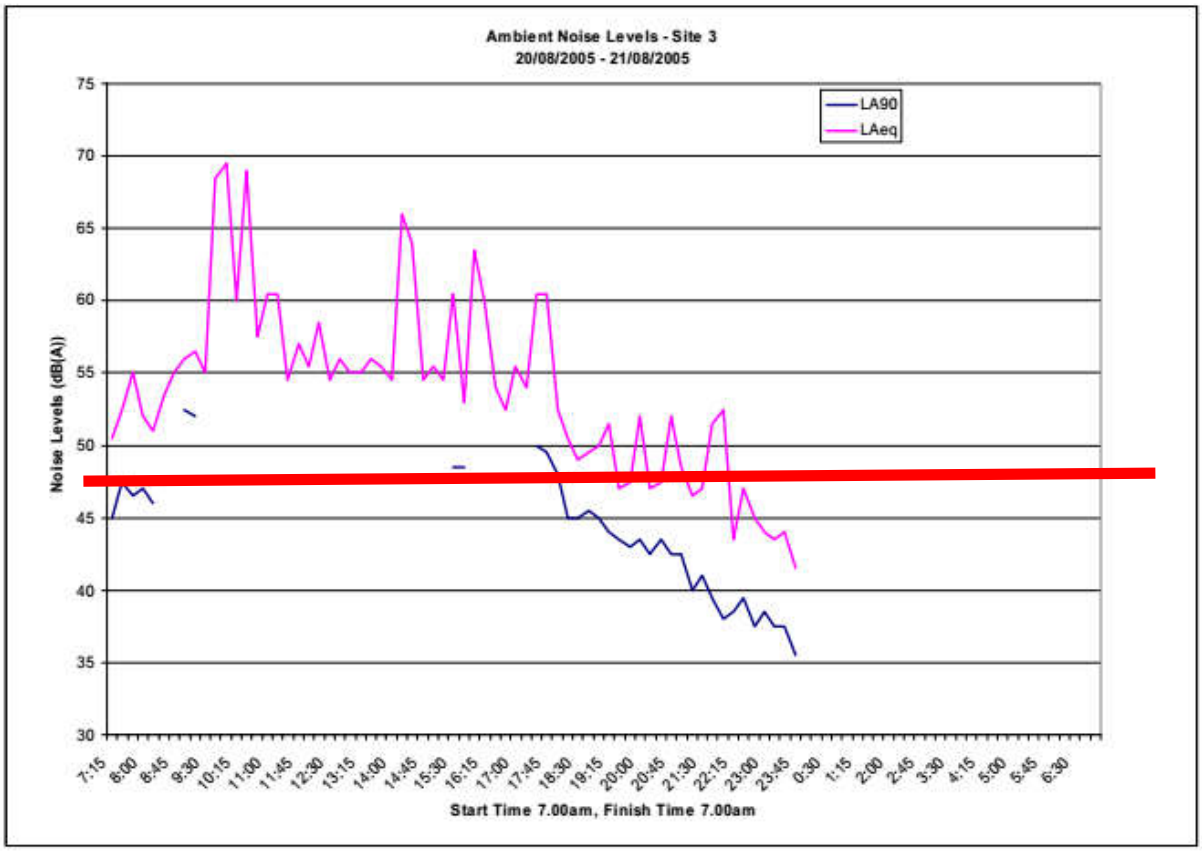
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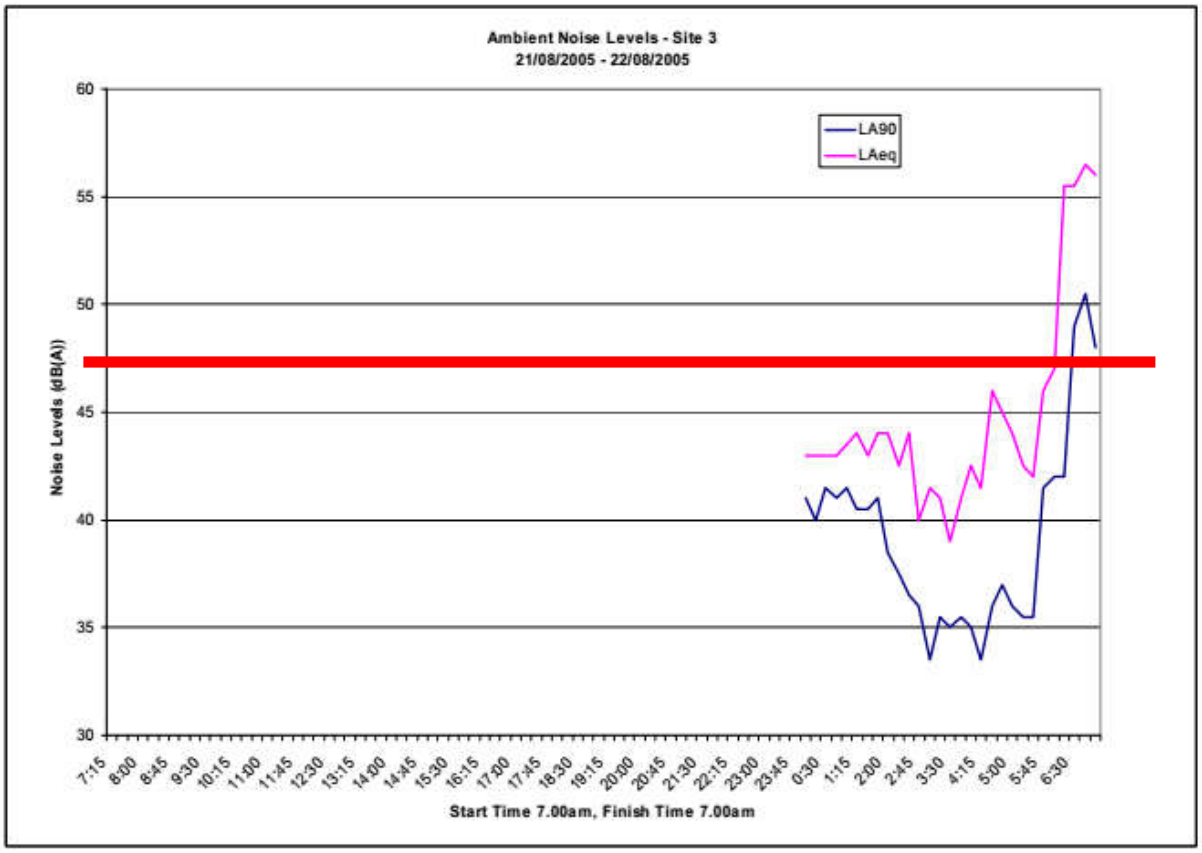
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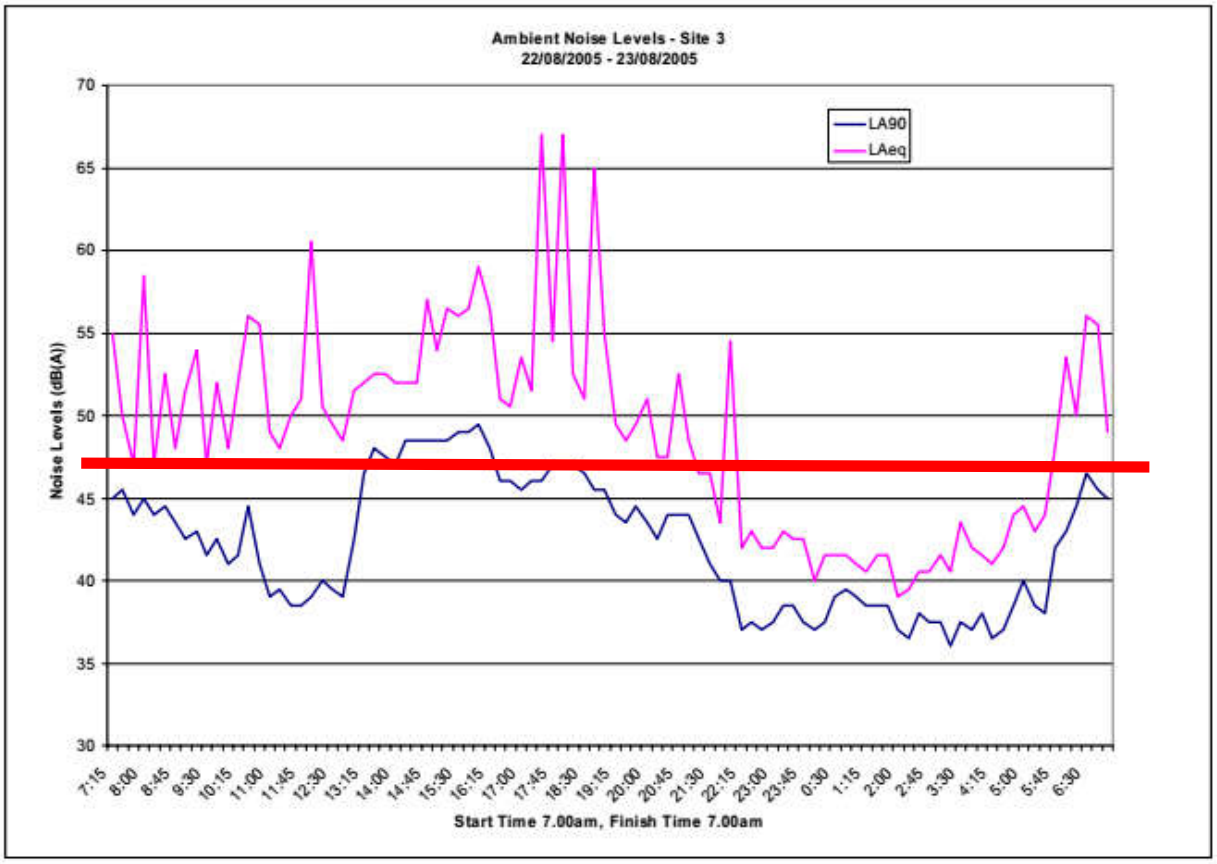
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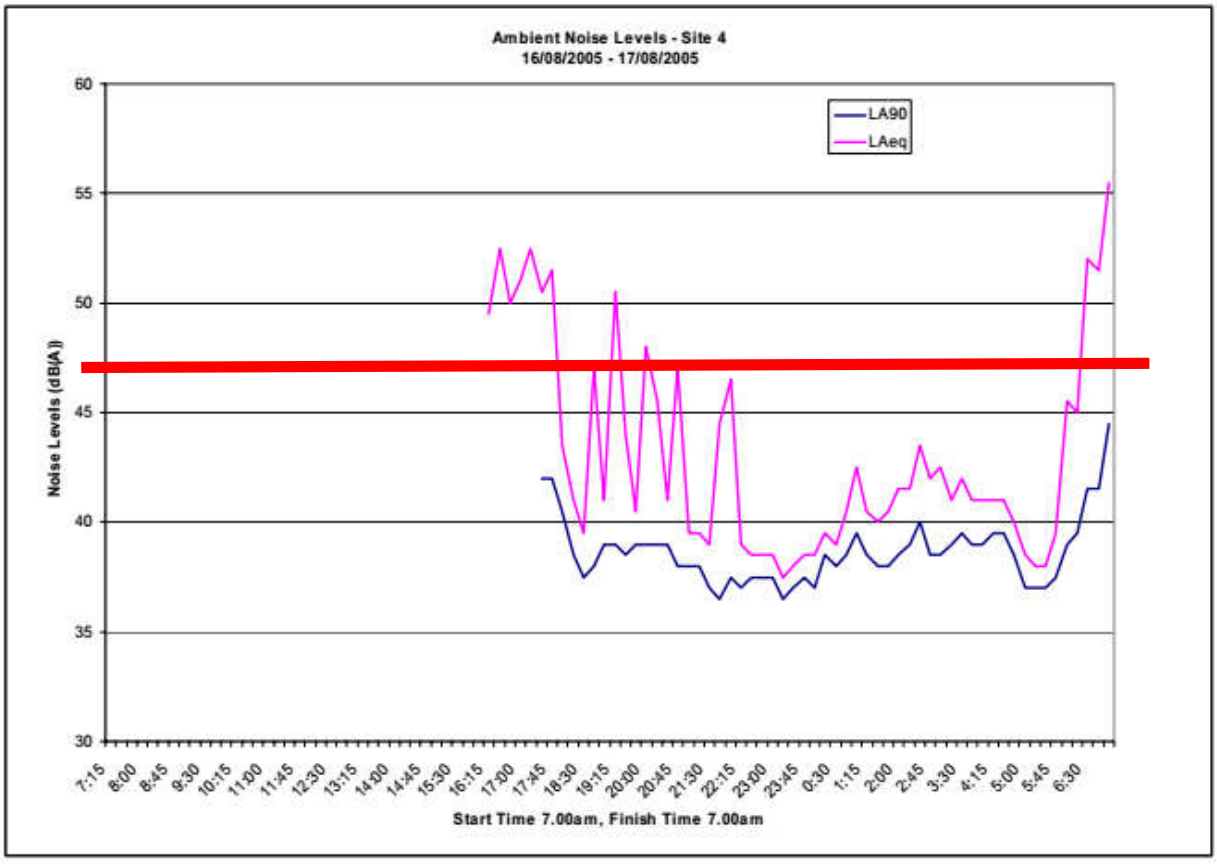
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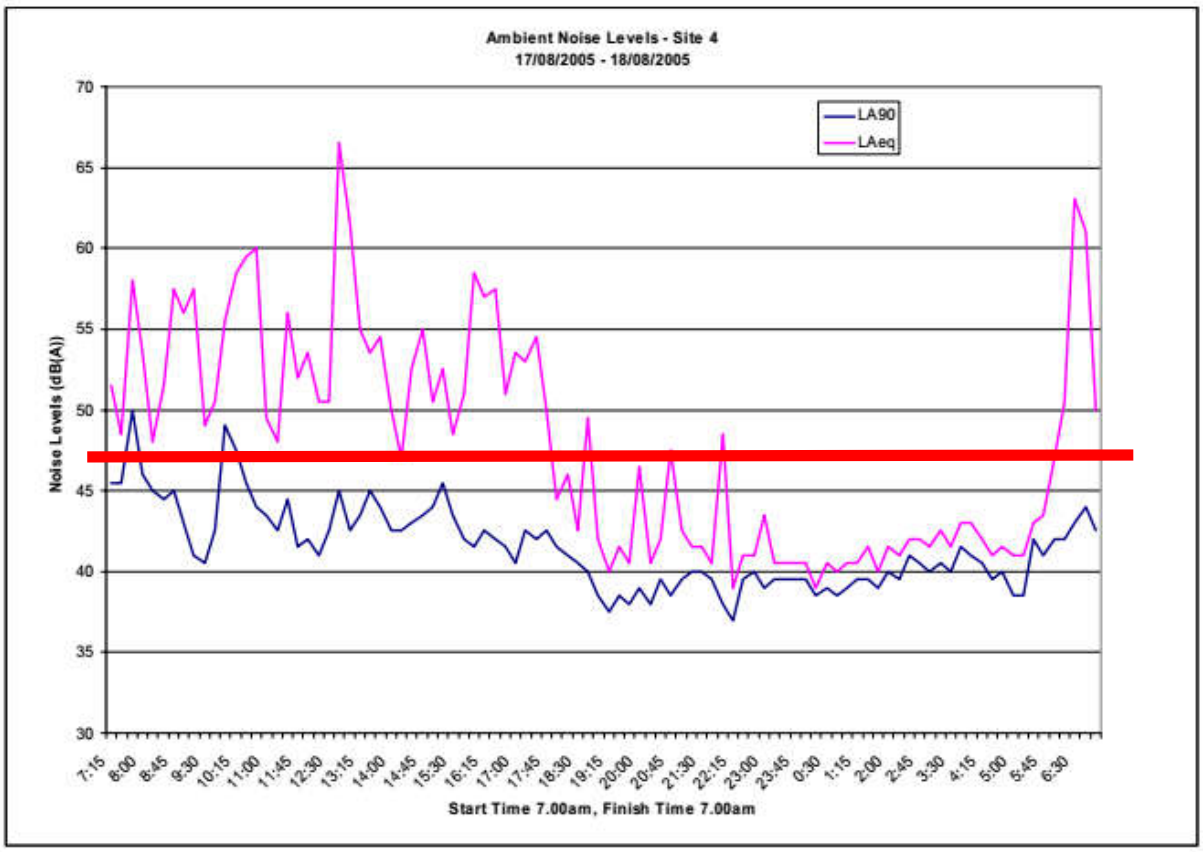
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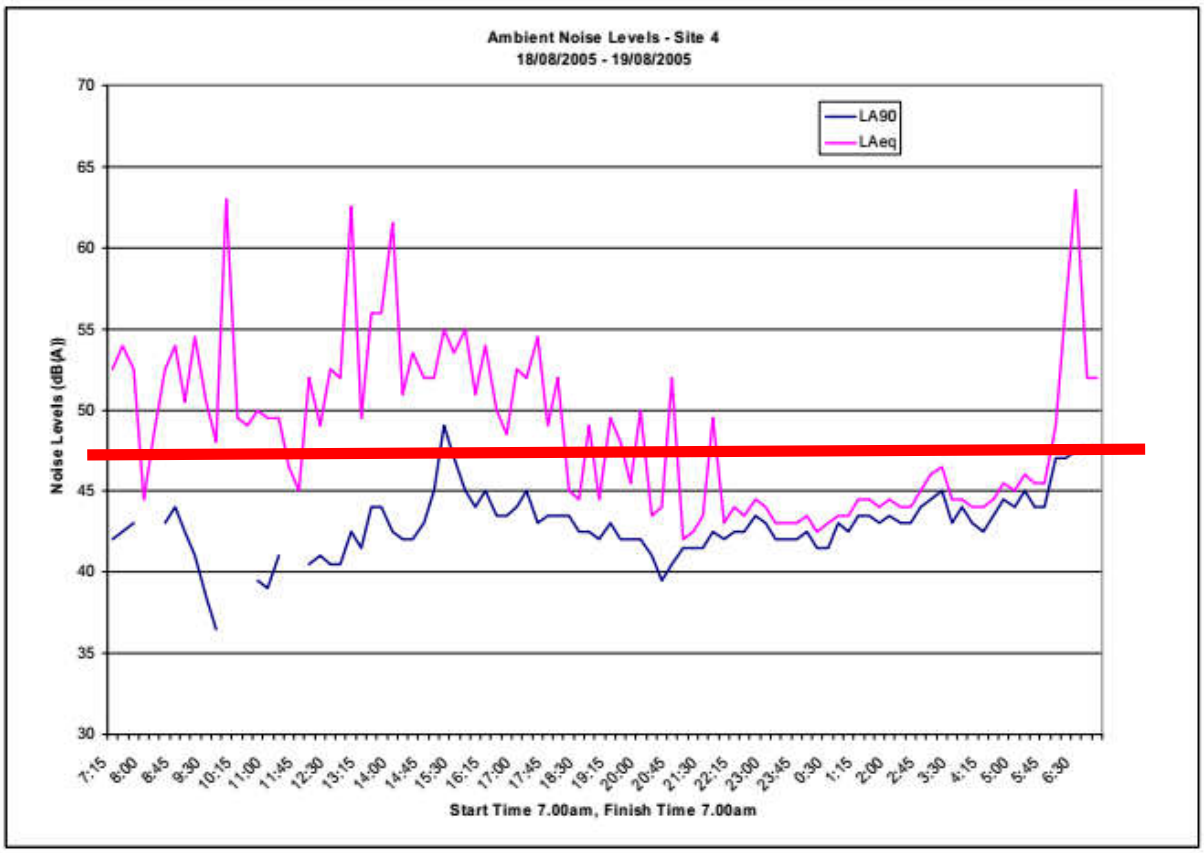
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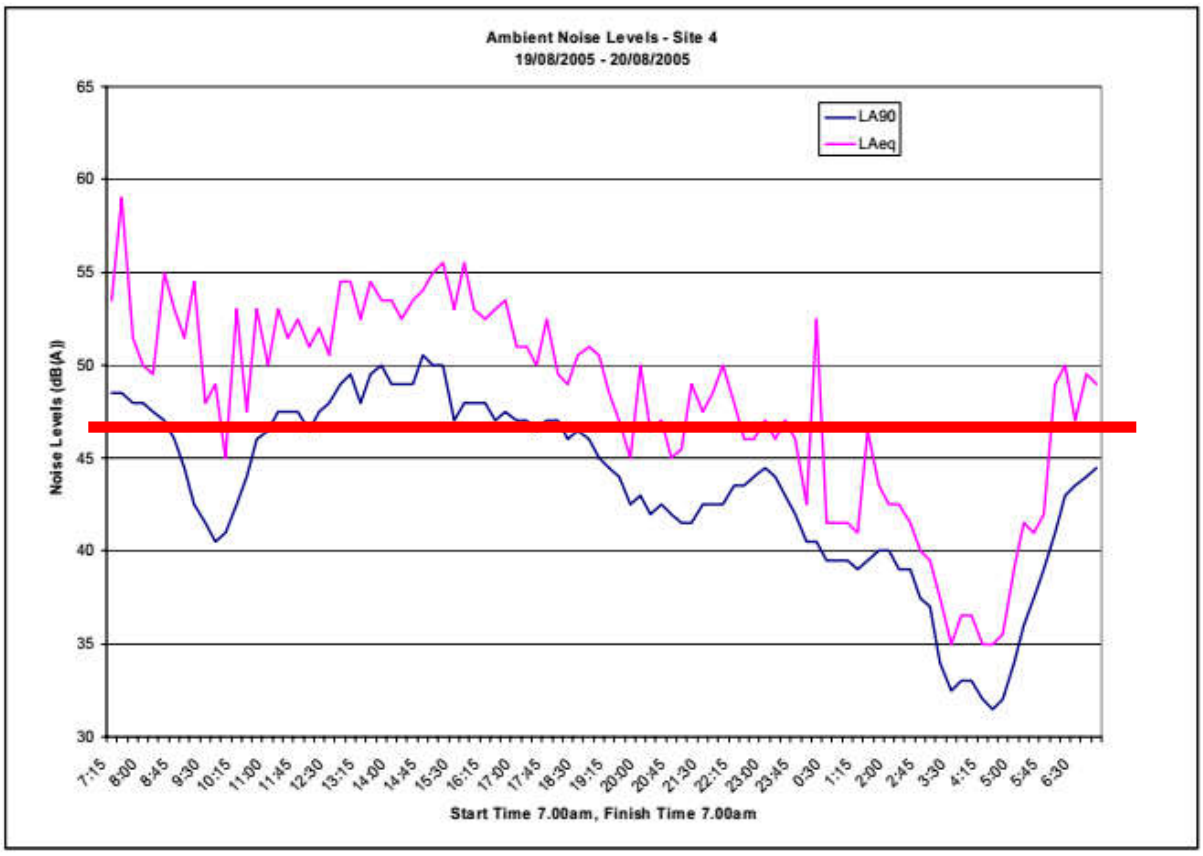
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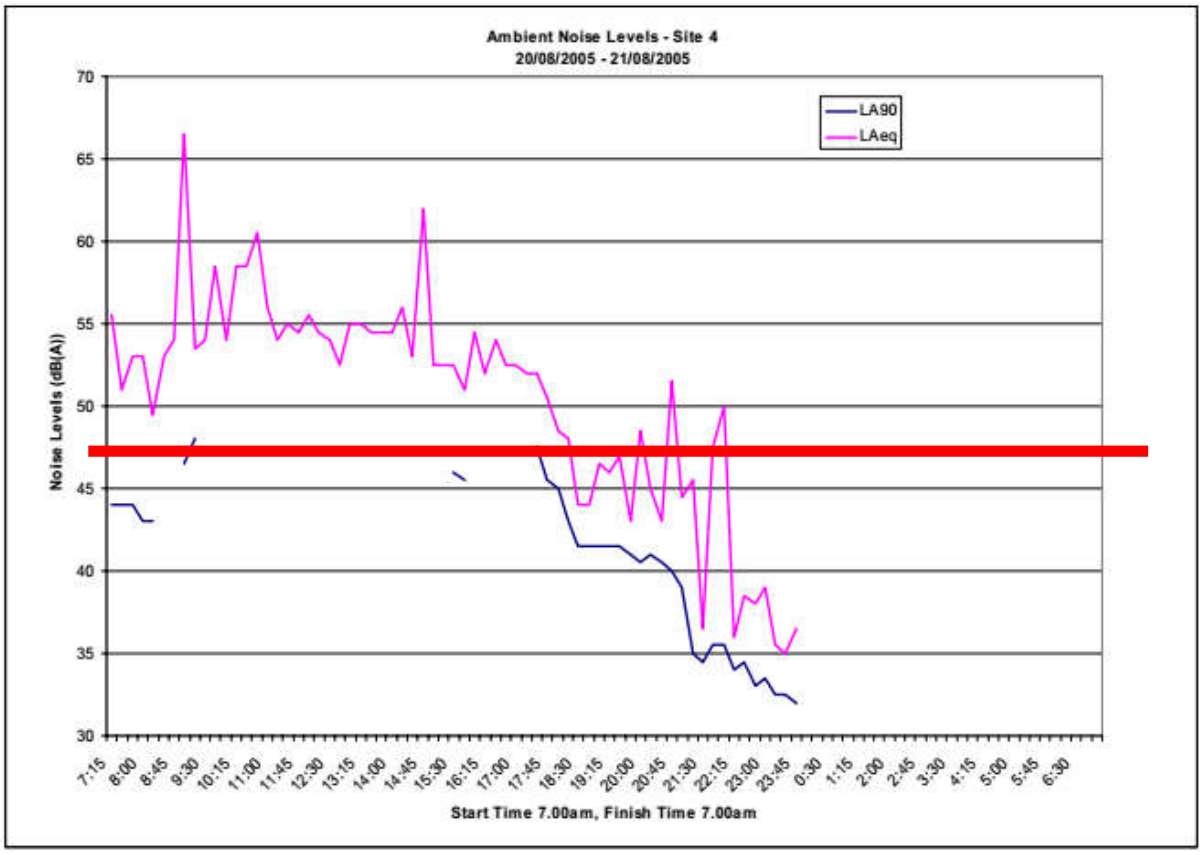
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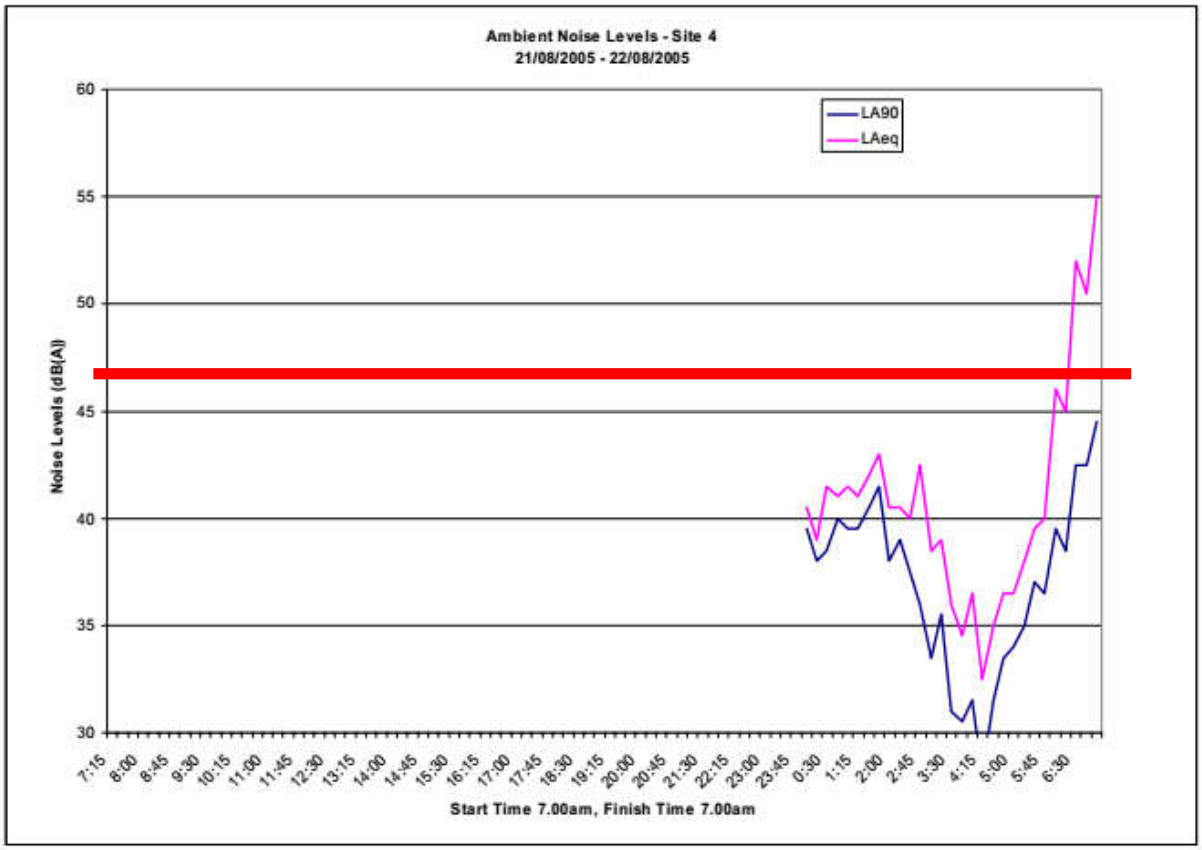
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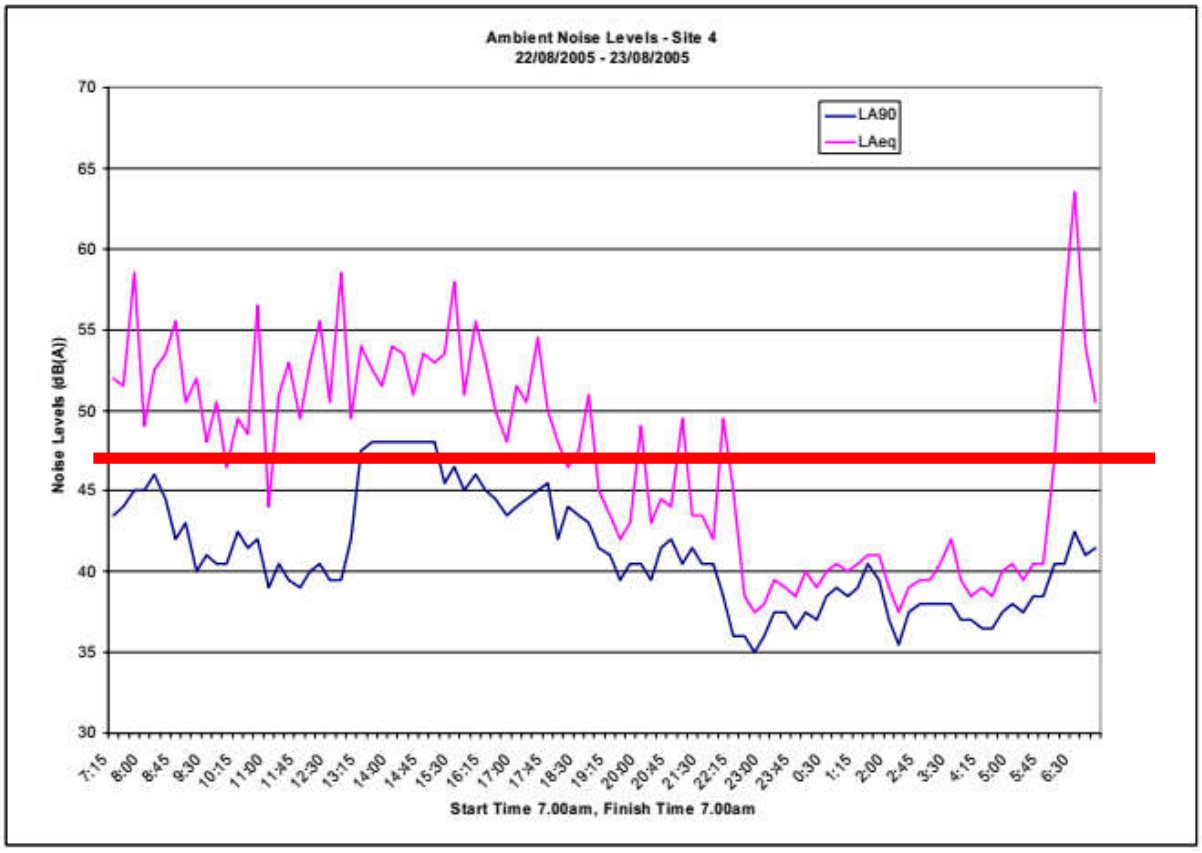
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Start Time 7.00am, Finish Time 7.00am

CRAIG HILL ACOUSTICS. ACOUSTIC, CONSULTING, ENGINEERING AND DESIGNS

CRAIG HILL ACOUSTICS

Acoustic Consultants

QLD & NSW

Cudgen Lakes Sand Quarry

Compliance Noise Monitoring

Tuesday, 12 October 2021

CRAIG HILL ACOUSTICS. 7 View Ct . Palm Beach .Qld 4221 .
Mobile 0418 762968 E: craig@craighillacoustics.com.au
Web site; craighillacoustics.com.au

DOCUMENT CONTROL PAGE

Cudgen Lakes Sand Quarry

Reference121021/1

Report prepared for	Gales-Kingscliff Pty Limited
Date	Tuesday, 12 October 2021
Site	Cudgen Lakes Sand Quarry
Authorised by	Scott Hollanby
Consultants	Craig Hill Acoustics 7 View Ct Palm Beach. Qld 4221 Mob 0418 762 968 E: craig@craighillacoustics.com.au www:craighillacoustics.com.au
Signed	Craig Hill (manager) author
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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 1 st October 2021 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 (nil product)
Loader (Hyundai HL-770
Excavator (Doosan DX 420 LCA)
Road Trucks

Table 1.2 Equipment on site not in use

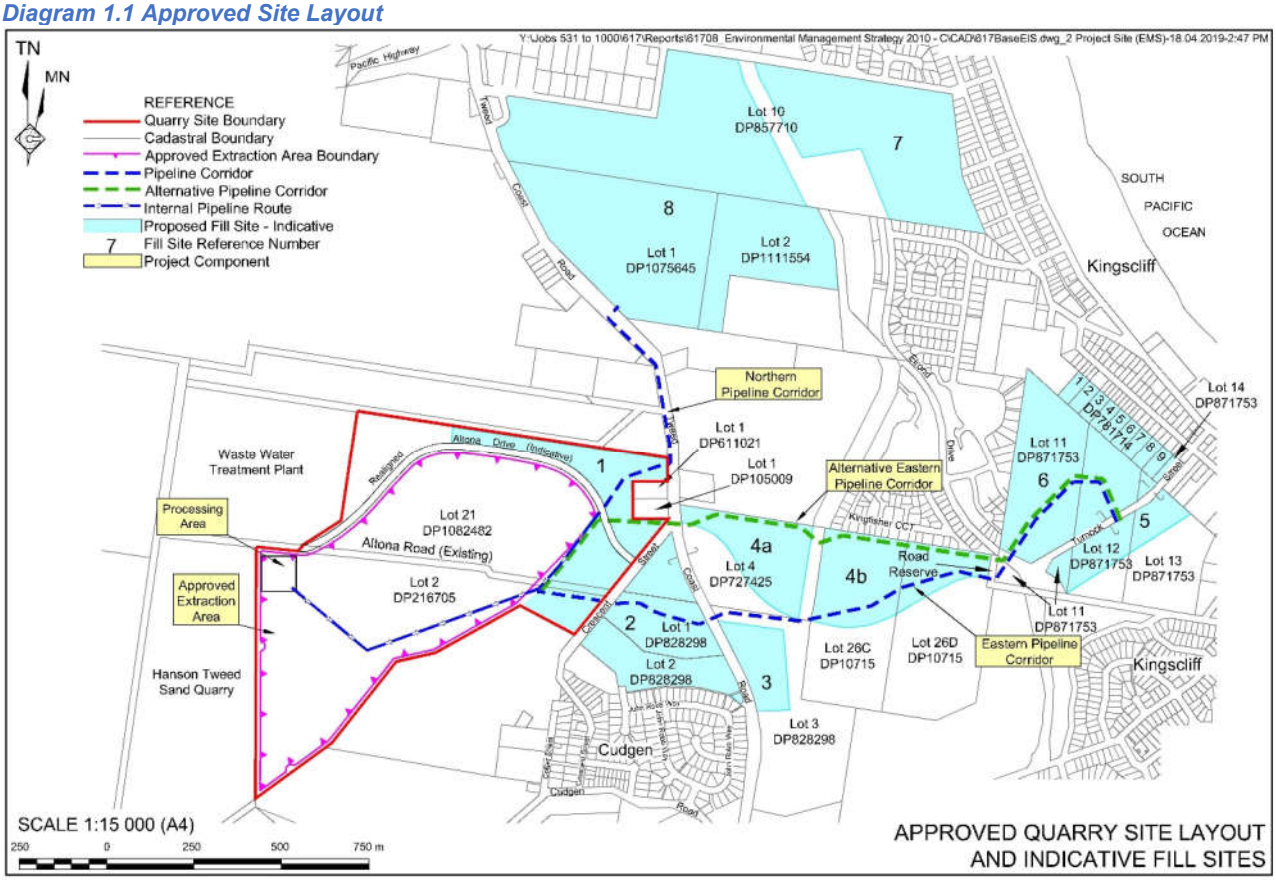
Dredge 8 “

Table 1.3 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

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 1.1 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 2.1 Monitoring locations

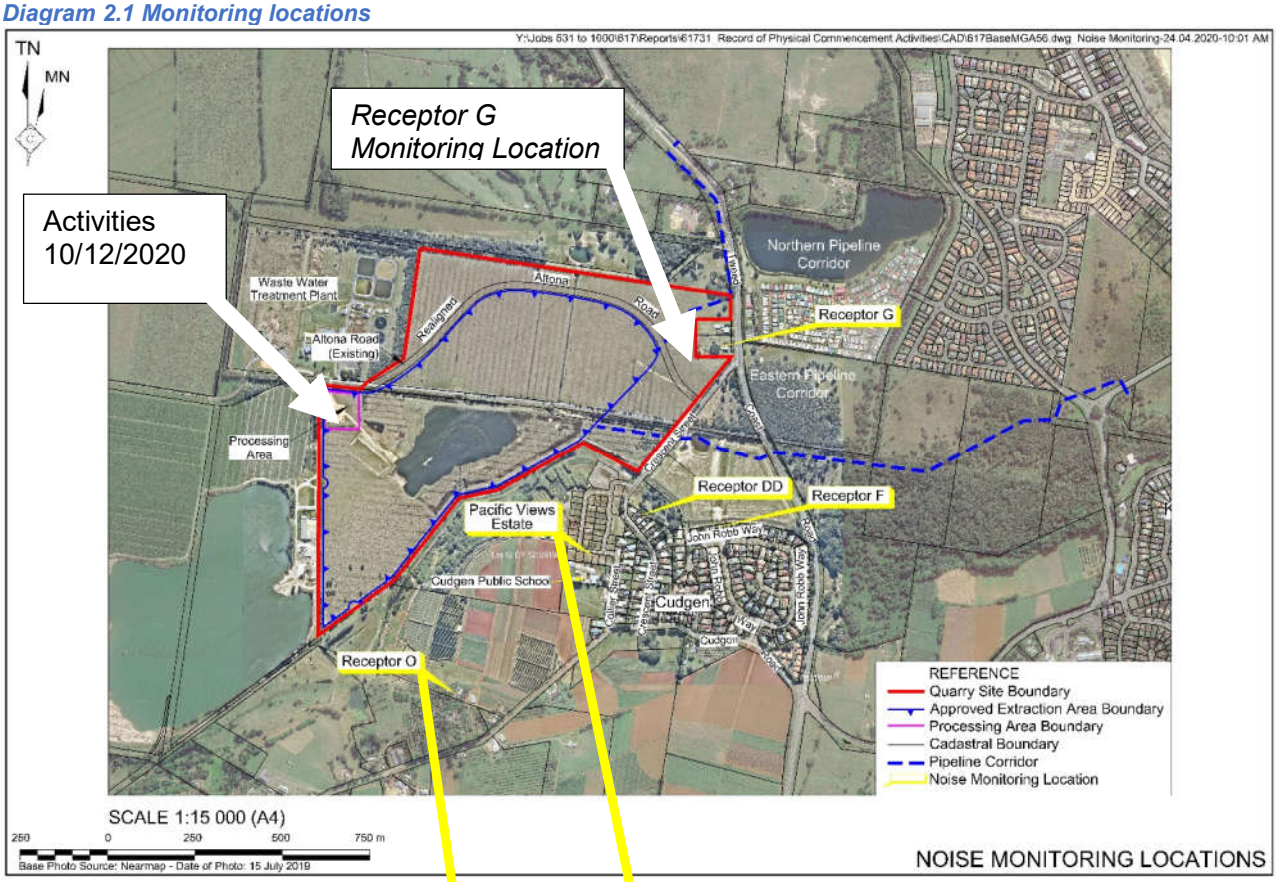
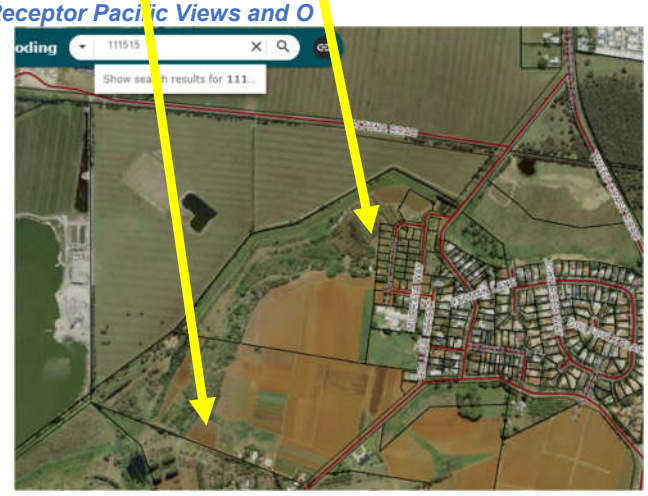


Diagram 2.2 Relocation of Receptor Pacific Views and O



Pic 2.1 View of site from Pacific views monitoring location

Pic 2.2 Zoomed in above pic

Pic 2.3 View of site from Receptor O monitoring location

Pic 2.2 Zoomed in above pic

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 949 Serial No 6023. calibrated June 2021.

BSWA Sound Level Calibrator Serial No 490190. calibrated June 2021.

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	60%
Wind Speed	0-2kts
Wind Direction	N
Atmospheric Pressure	1010 hpa
Cloud Cover	0%
Temp	18-22 C

5.0 TESTING

The following tests were carried out at locations G, O, B, DD and F within 30m of affected dwellings where practical as indicated on the attached site plan.
Tests conducted on 01 October 2021 between 0900 and 1100 hrs.

- *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. (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 01 October 2021

Table 5.1 Equipment being used at the time of the test 01/10/2021

Operating equipment measured at 20m	LAeq 15 min
CDE Wash Plant (nil product)	76
Loader (Hyundai HL-770	71
Excavator (Doosan DX 420 LCA)	66
Road Trucks	66

5.2 Equipment used during previous tests

Table 5.2 Equipment being used previous tests

Operating equipment measured at 20m	LAeq 15 min
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 measured at 20m	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 01/10/2021

Receptor & Time hrs	**Attended Testing LAeq 15 minutes**	**> Project Criteria (47 LAeq 15min)**	**> Cumulative Criteria (50 LAeq 11 hrs)**	**Comments**
G 0900 - 0915	49	2	-1	Noise from other sources such as traffic noise from Coast Road dominated background. Noise from operations not measurable / distinguishable above background.
O 0930 - 0945	51	4	1	Noise from other sources such as traffic noise from Pacific Highway dominated background. Noise from operations occasionally audible but not measurable above background.
Pacific Views 1000 -1015	50	3	0	Noise from other sources such as traffic noise from Pacific Highway dominated background. Noise from operations occasionally audible but not measurable / distinguishable above background.
DD 1100 - 1115	51	4	1	Noise from other sources such as traffic noise from Coast Road dominated background. Noise from operations not audible or measurable / distinguishable above background.
F 1130- 1145	50	3	0	Noise from other sources such as traffic noise from Coast Road dominated background. Noise from operations not audible / distinguishable above background.

7.0 PREDICTED LEVELS

Equipment operations were not either audible or measurable at any of the motoring sites. 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

Receptor	Distance m	Dredge 8" 63LAeq @ 20m	CDE wash plant 70LAeq @ 20 mts (not in use)	Loader 71LAeq @ 20 mts	Excavator 66 LAeq @ 20 m (not in use)	Road Trucks 66 LAeq @ 20 m	Combined	Combined with line of sight attenuation	> Project Day Criteria (47 LAeq 15 min)	> Cumulative Day Criteria (50 LAeq 11 hrs)
		Predicted Levels with Distance attenuation								
G	880m	30	37	38	33	33	42	42	-5	-8
O	600m	33	40	41	36	36	45	45	-2	-5
Pacific Views	555m	34	41	42	37	37	45	47	-0	-3
DD	780m	31	38	39	34	34	43	33	-14	-17
F	900m	30	37	38	33	33	42	32	-15	-18

(not in use): 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 at locations G,F and DD.

Noise from the operations were occasionally audible at locations O and Pacific Views Estate but not measurable due to other noise in the area.

Distance calculations of measured noise levels from operating plant on site indicate 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. This measurement 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

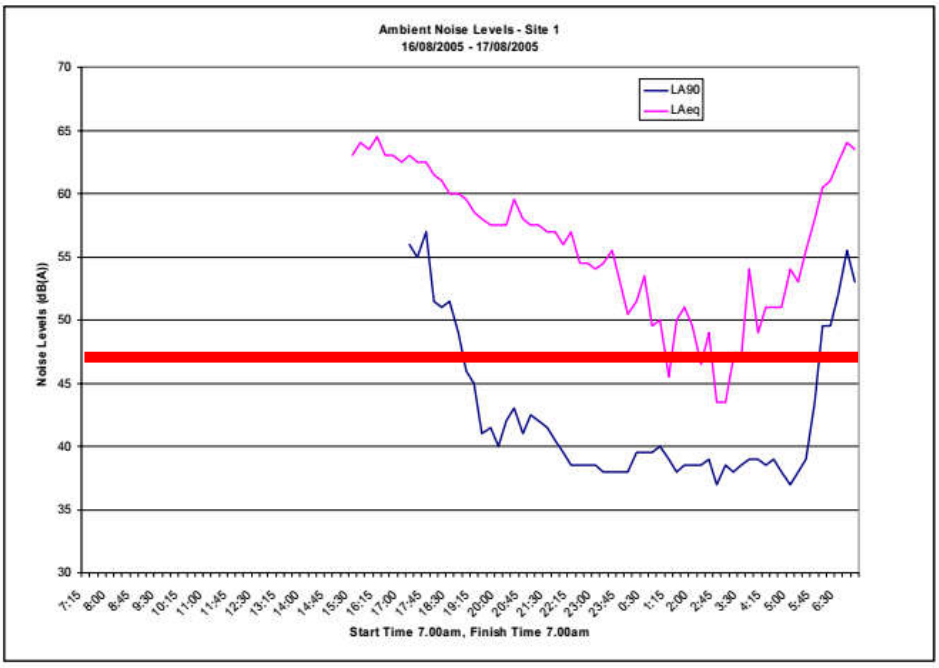
Receptor	Pre-project / Baseline Levels	Compliance Monitoring LAeq 15 min									Project Criteria	
		Previous testing								Latest tests	LAeq 15 min	LAeq 11 hr
	Unattended logger original report	Attended monitoring 23/08/05	Attended monitoring 10/07/17	Attended monitoring	Attended monitoring 20/04/20	Attended monitoring 20/04/20	Attended monitoring 10/12/20	Attended monitoring 18/06/21	Attended monitoring 05/08/21	Attended monitoring 01/10/21	>Impact Criteria day and evening 47LAeq	>Cumulative Criteria Day >50LAeq
G	62	63	62	57	55	56	57	55	50	49	2	-1
O	NM	NM	64	46	48	52	53	52	49	51	4	1
Pacific Views	55	51	57	48	55	53	52	51	51	50	3	0
DD	55	53	58	56	56	53	52	50	49	51	4	1
F	58	54	43	57	59	55	47	50	48	50	3	0

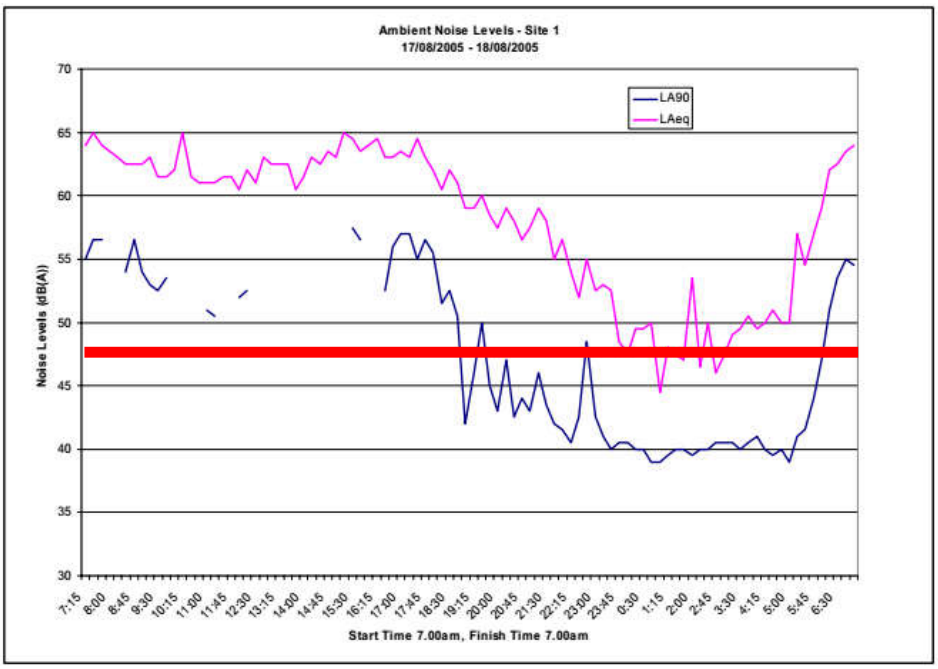
Monitored levels in the area are not unusual for daytime compliance testing. Examination of pre-project data shows ambient LAeq for day and evening rarely drops below the project design levels making it difficult to enable compliance identification.

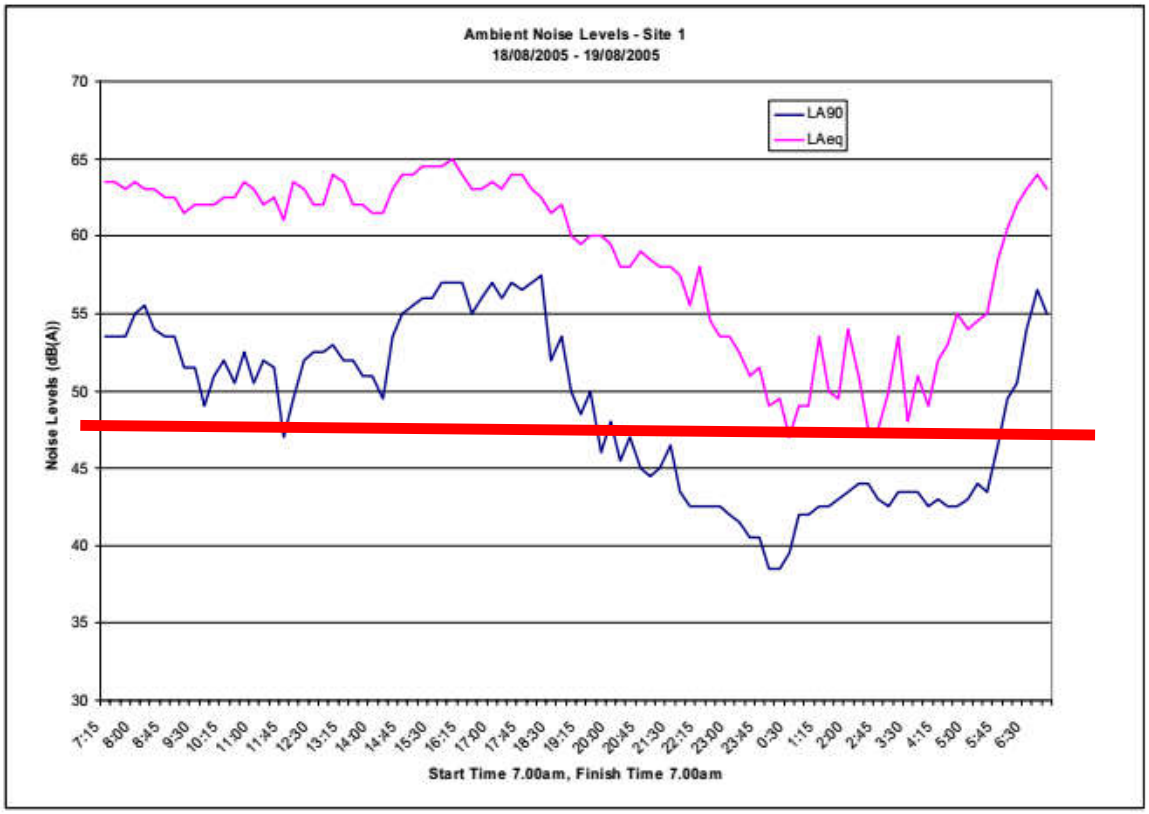
To better demonstrate this, **Appendix A** shows graphs for the pre-project monitoring (Rumble Report No. 617/04 unattended logger). The project criteria for day and evening periods of 47LAeq is indicated by the straight red line. From **Appendix A** it can be seen that the LAeq levels generally do not 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))
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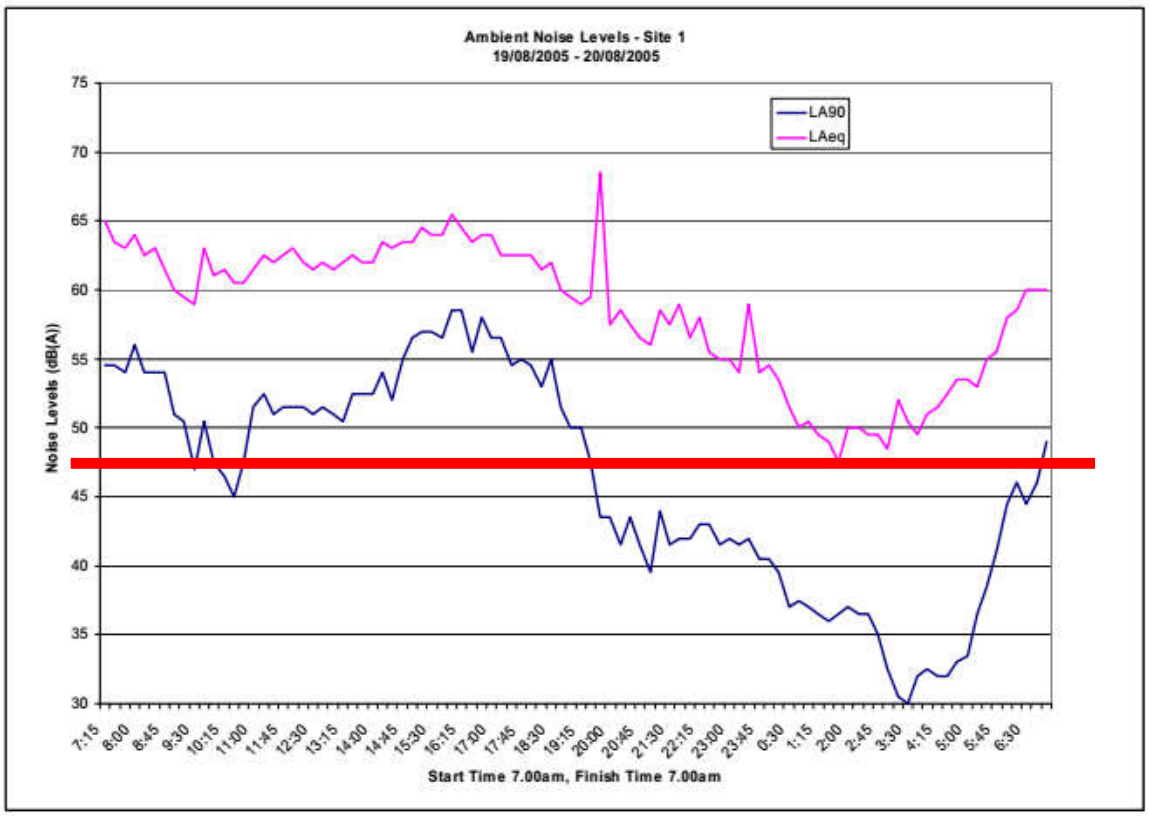
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am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19/08/2005 - 20/08/2005
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LAeq
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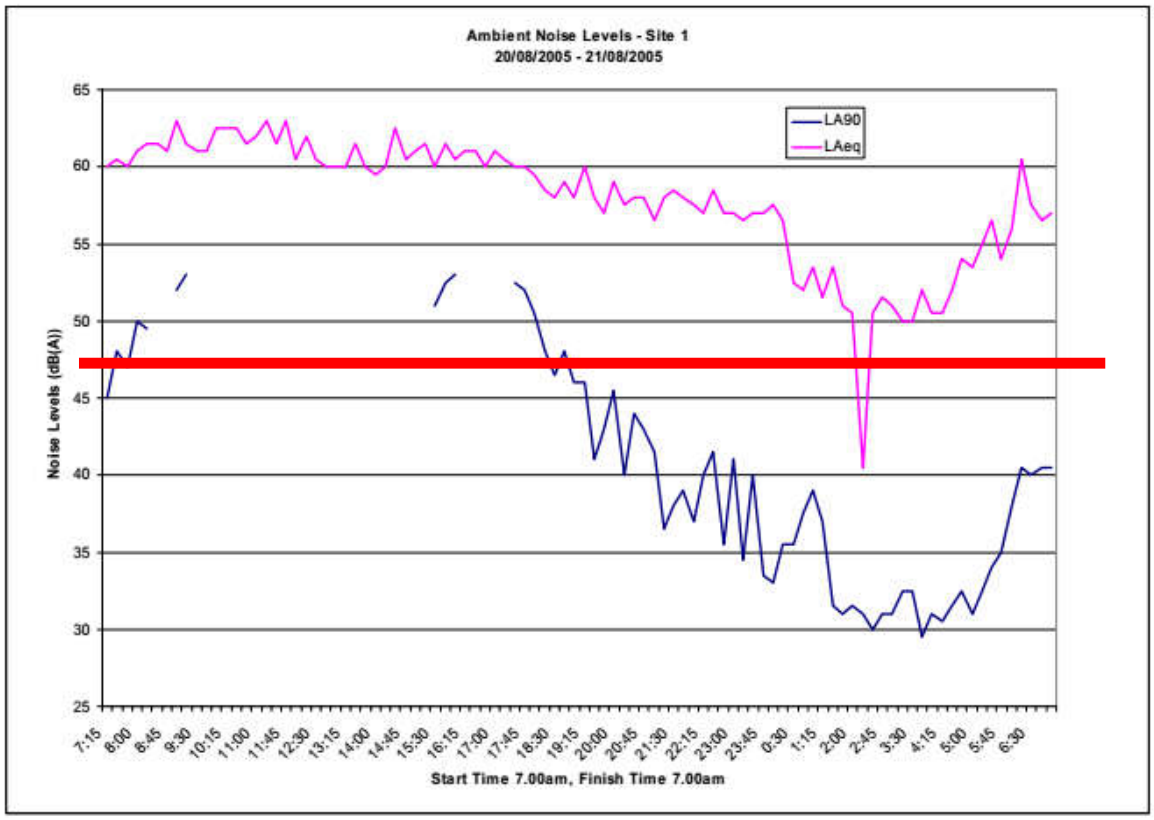
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am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20/08/2005 - 21/08/2005
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LAeq
Noise Levels (dB(A))
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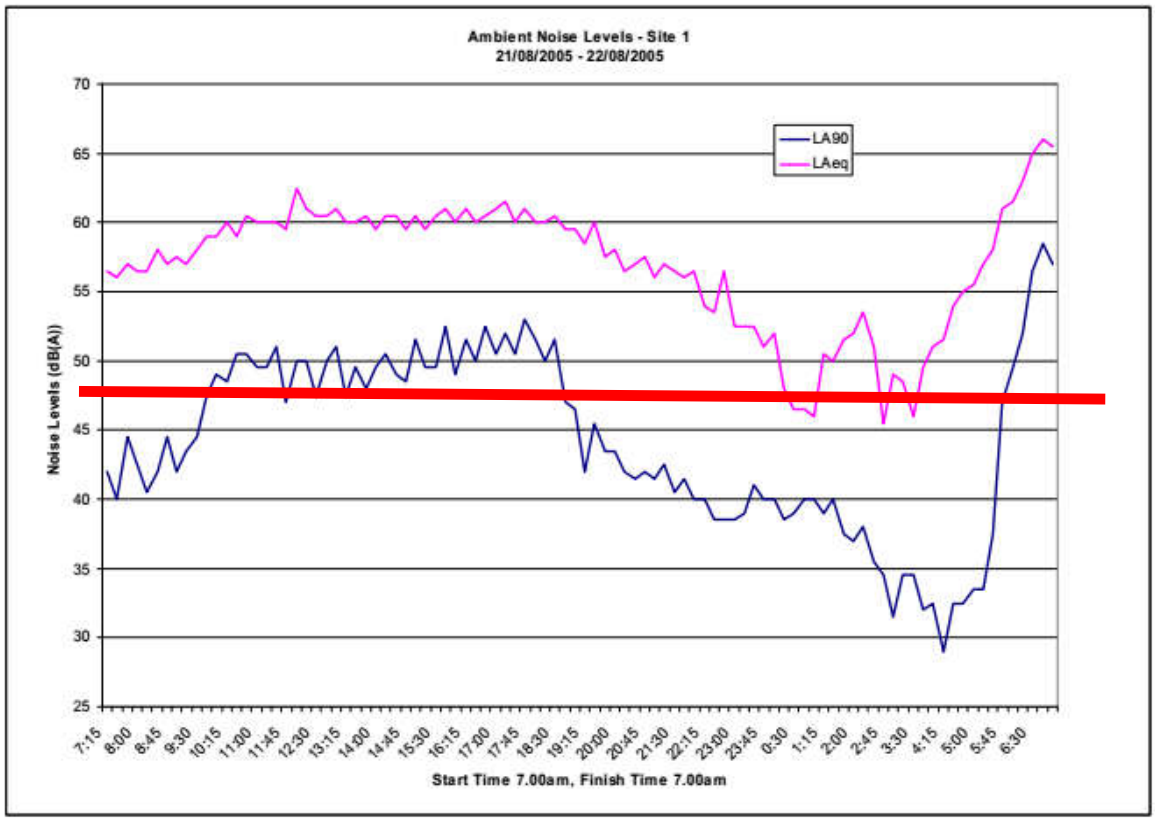
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am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21/08/2005 - 22/08/2005
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LAeq
Noise Levels (dB(A))
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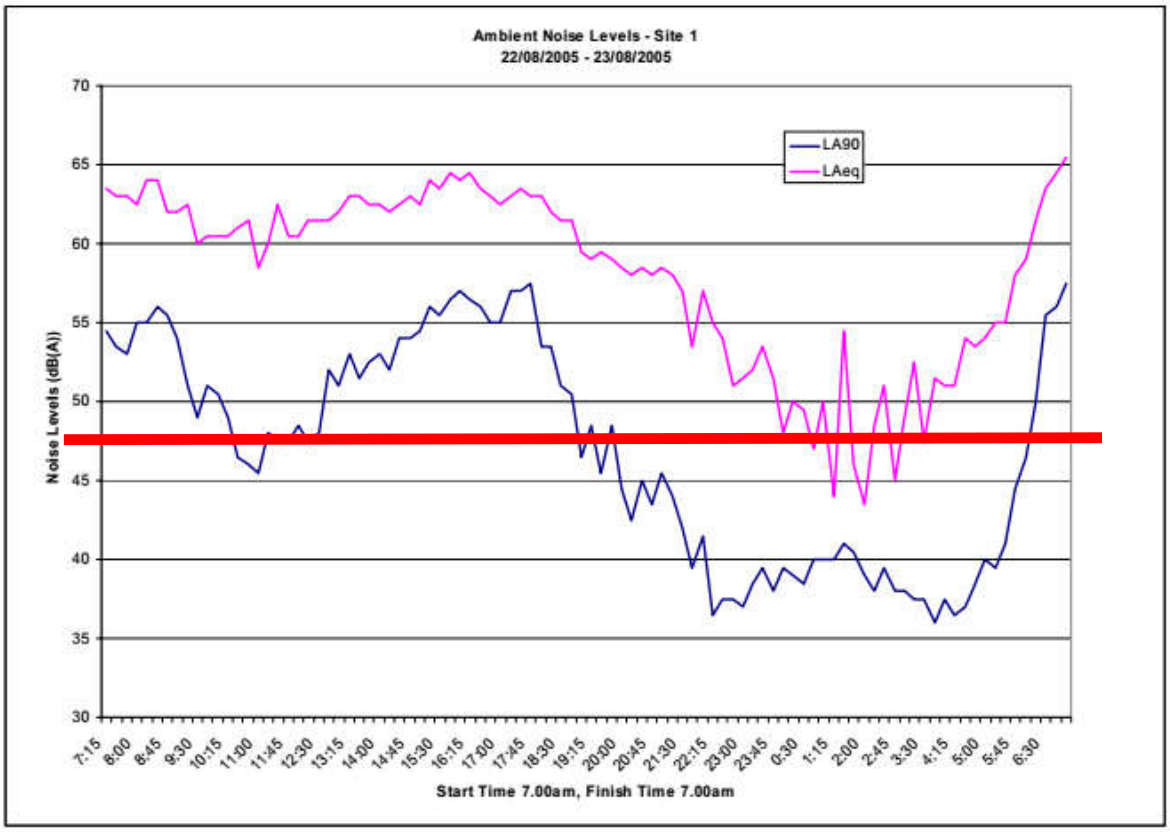
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22/08/2005 - 23/08/2005
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Noise Levels (dB(A))
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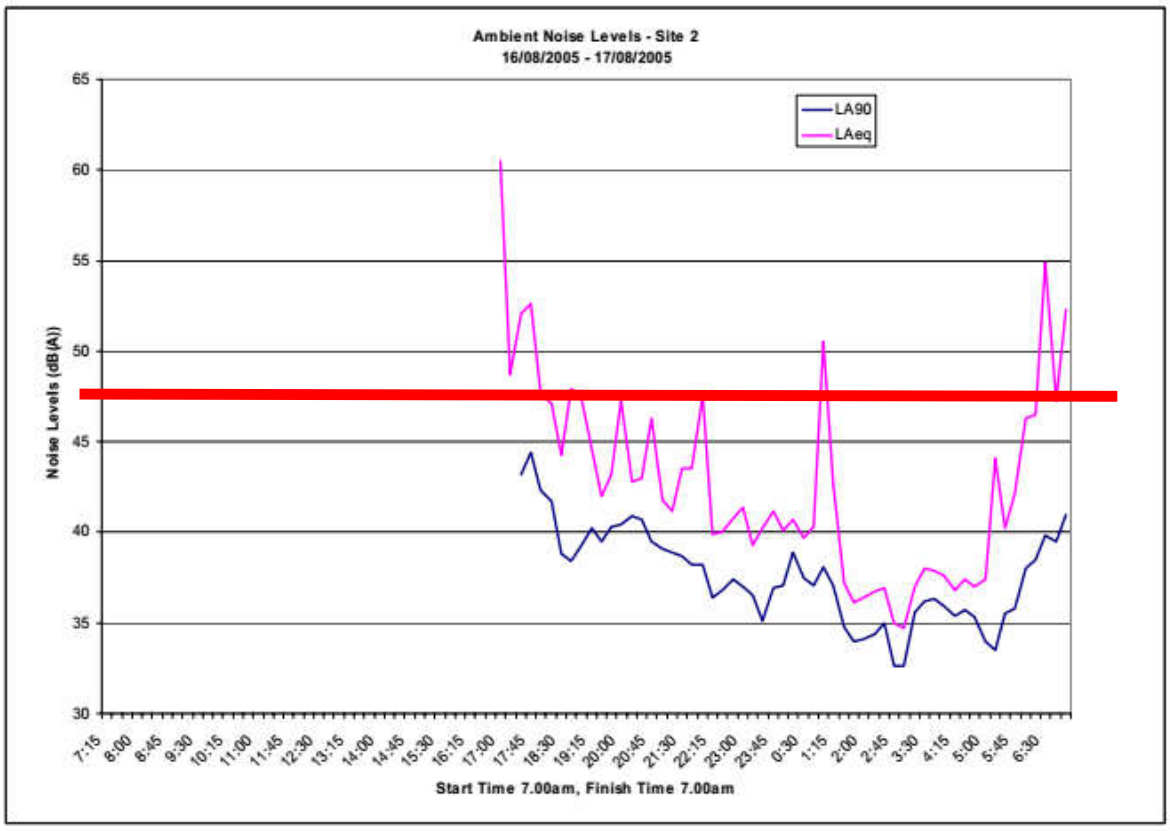
Start Time 7.00am, Finish Time 7.00am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Noise Levels (dB(A))
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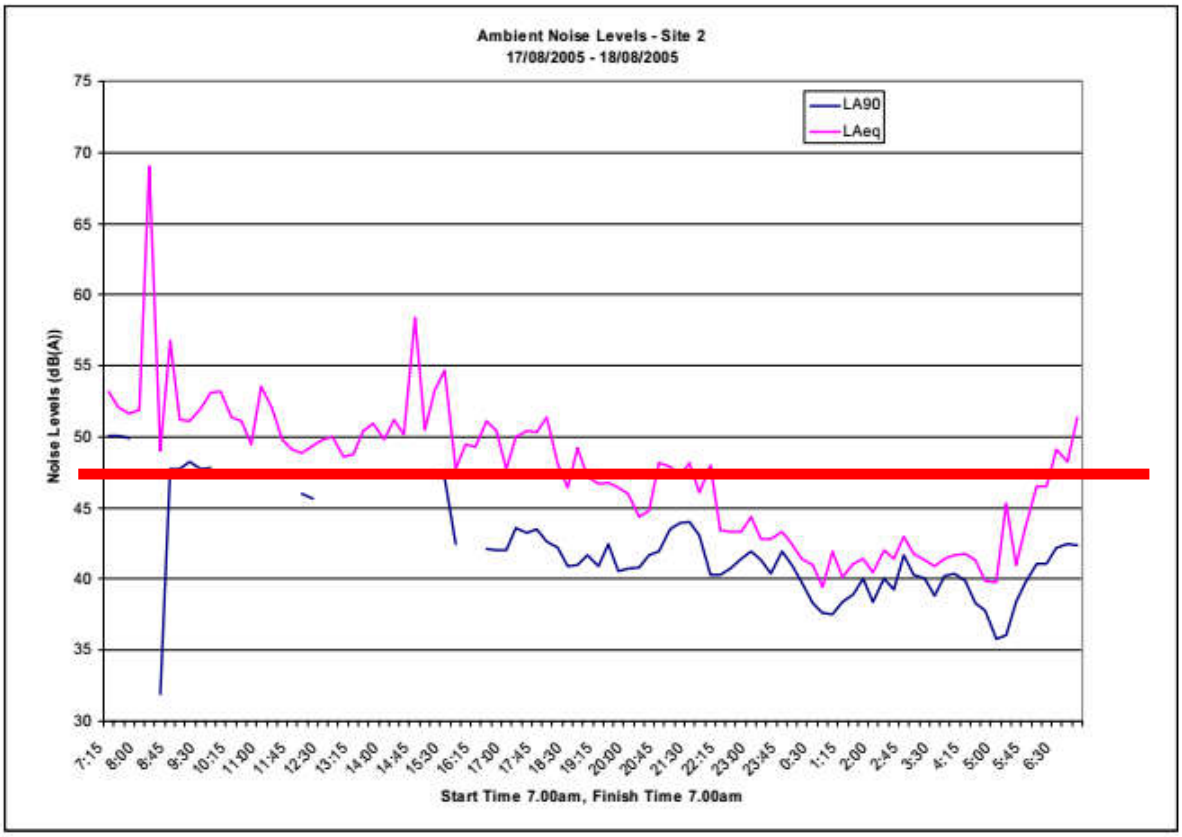
Start Time 7.00am, Finish Time 7.00am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17/08/2005 - 18/08/2005
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Noise Levels (dB(A))
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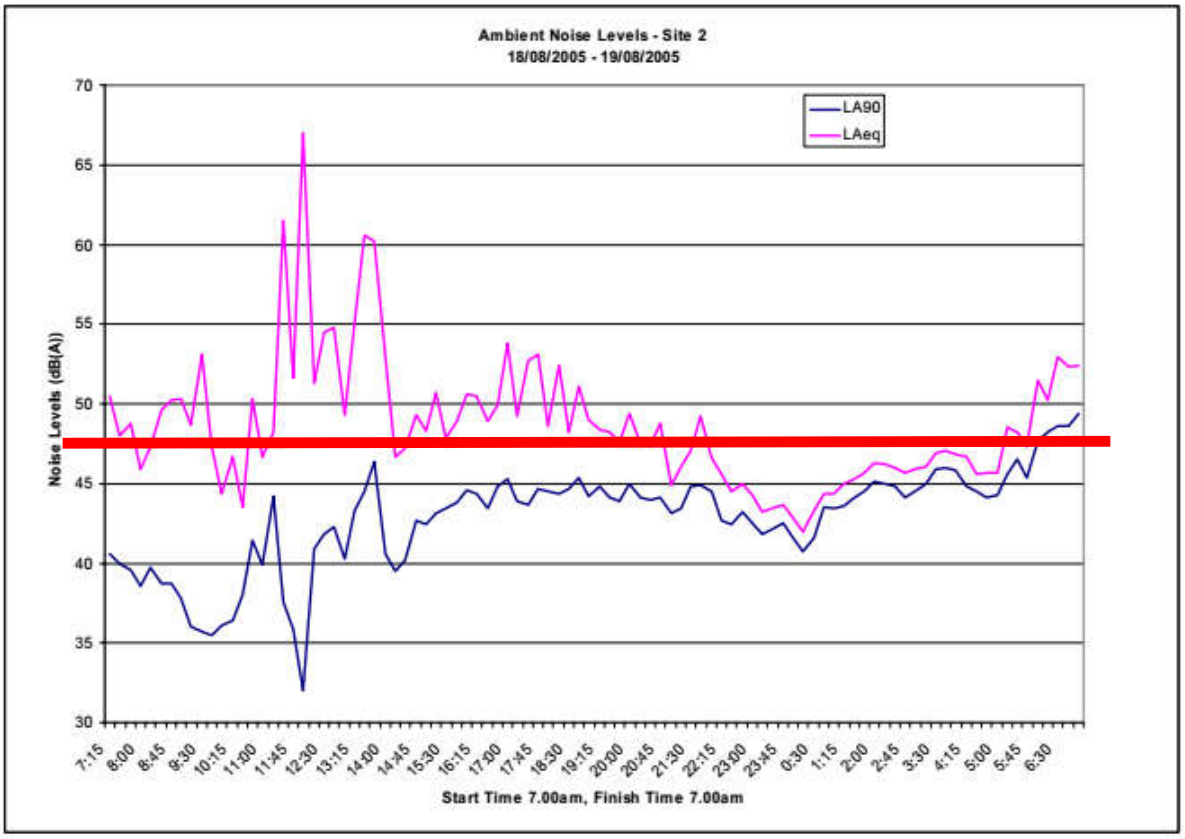
Start Time 7.00am, Finish Time 7.00am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18/08/2005 - 19/08/2005
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Noise Levels (dB(A))
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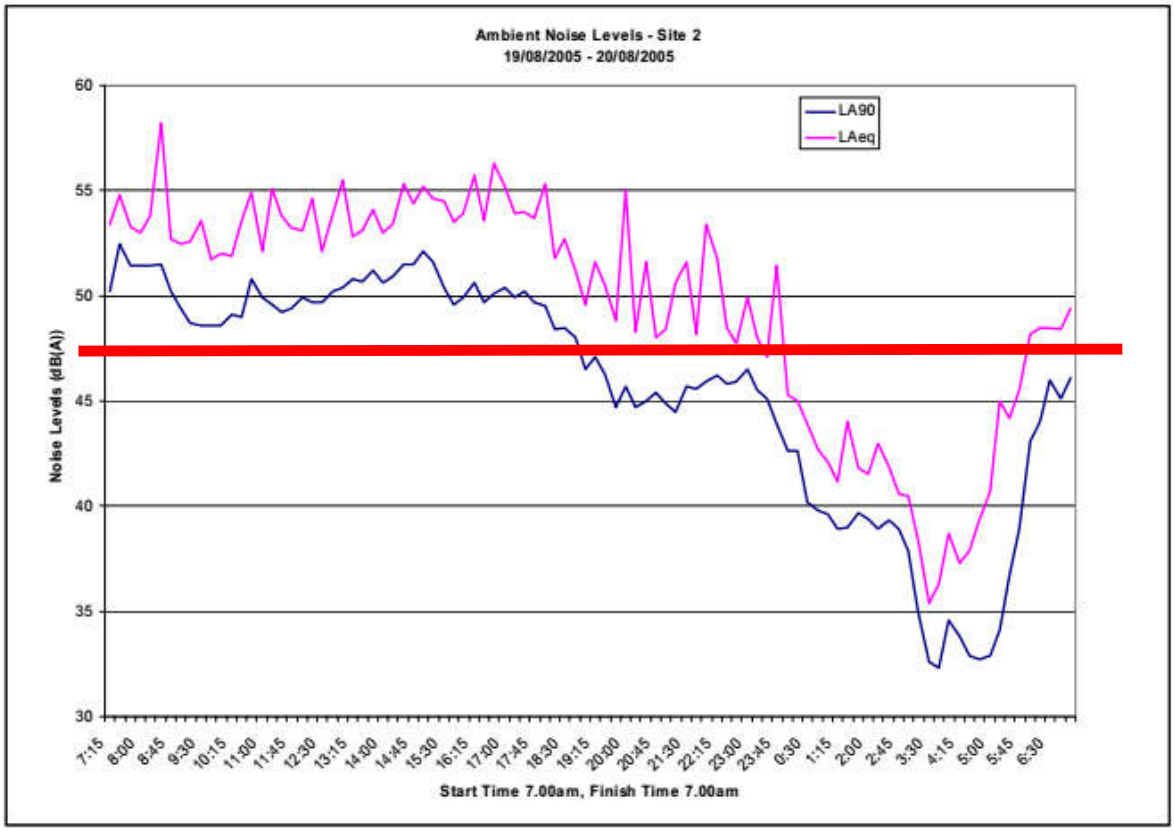
Start Time 7.00am, Finish Time 7.00am


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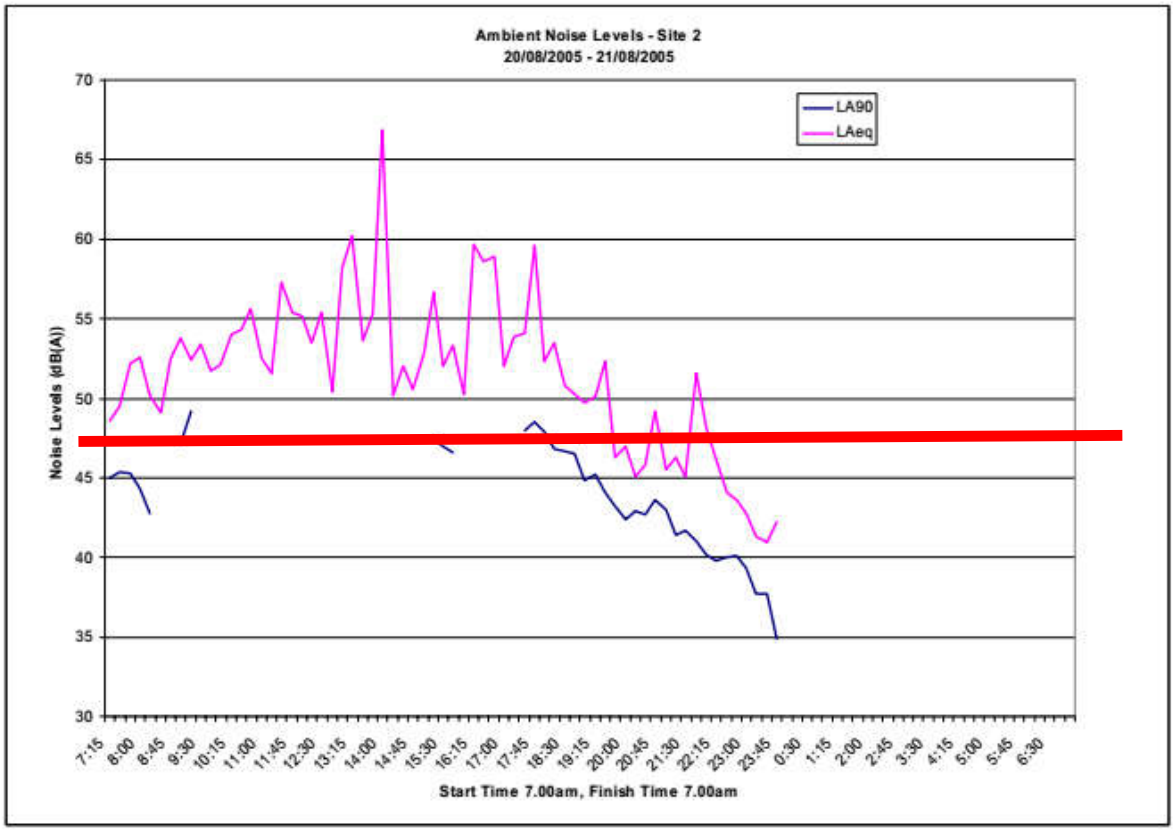
Start Time 7.00am, Finish Time 7.00am


Ambient Noise Levels - Site 2
20/08/2005 - 21/08/2005
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Noise Levels (dB(A))
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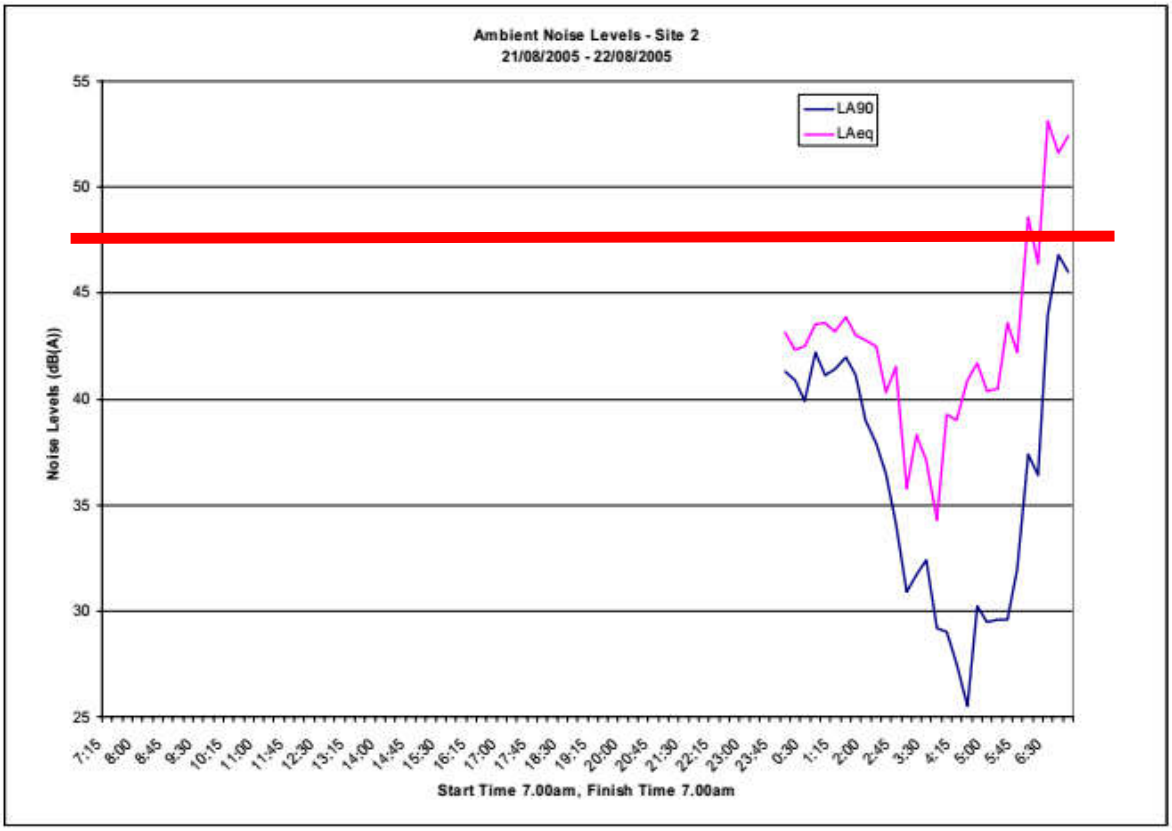
Start Time 7.00am, Finish Time 7.00am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21/08/2005 - 22/08/2005
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Noise Levels (dB(A))
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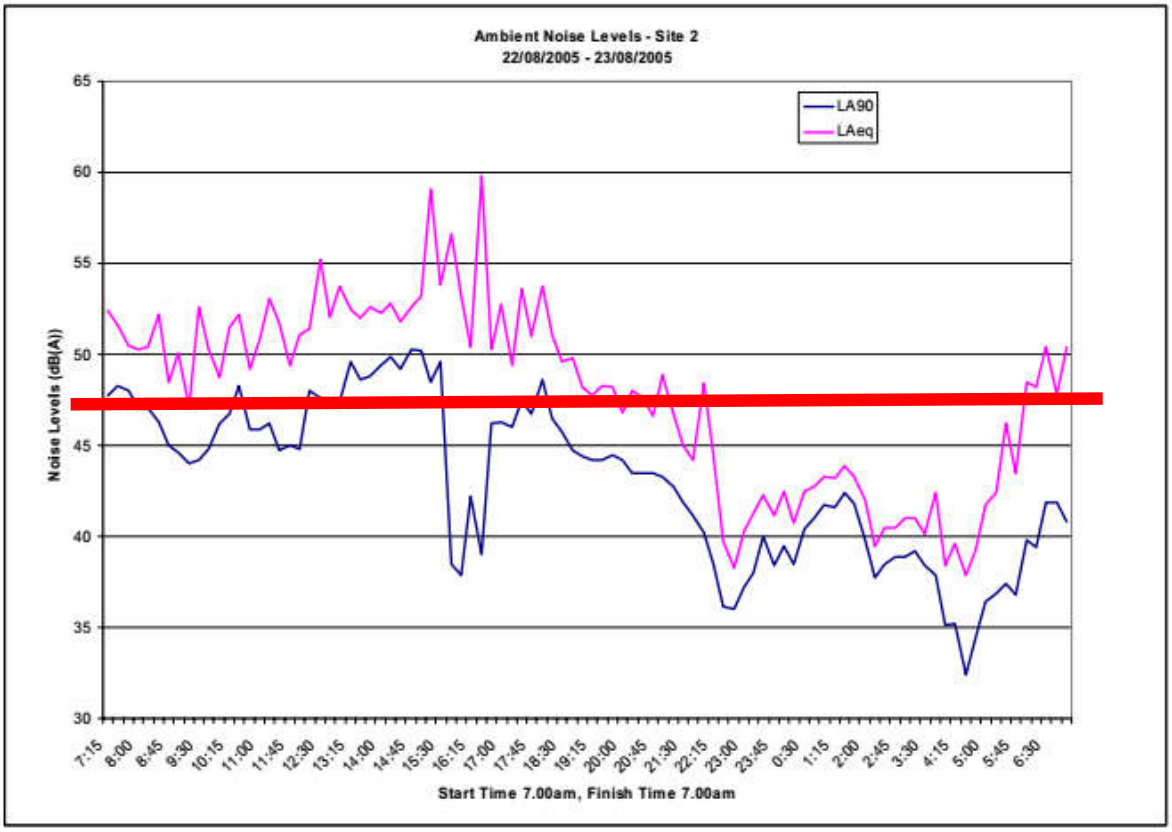
Ambient Noise Levels - Site 2
22/08/2005 - 23/08/2005
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Noise Levels (dB(A))
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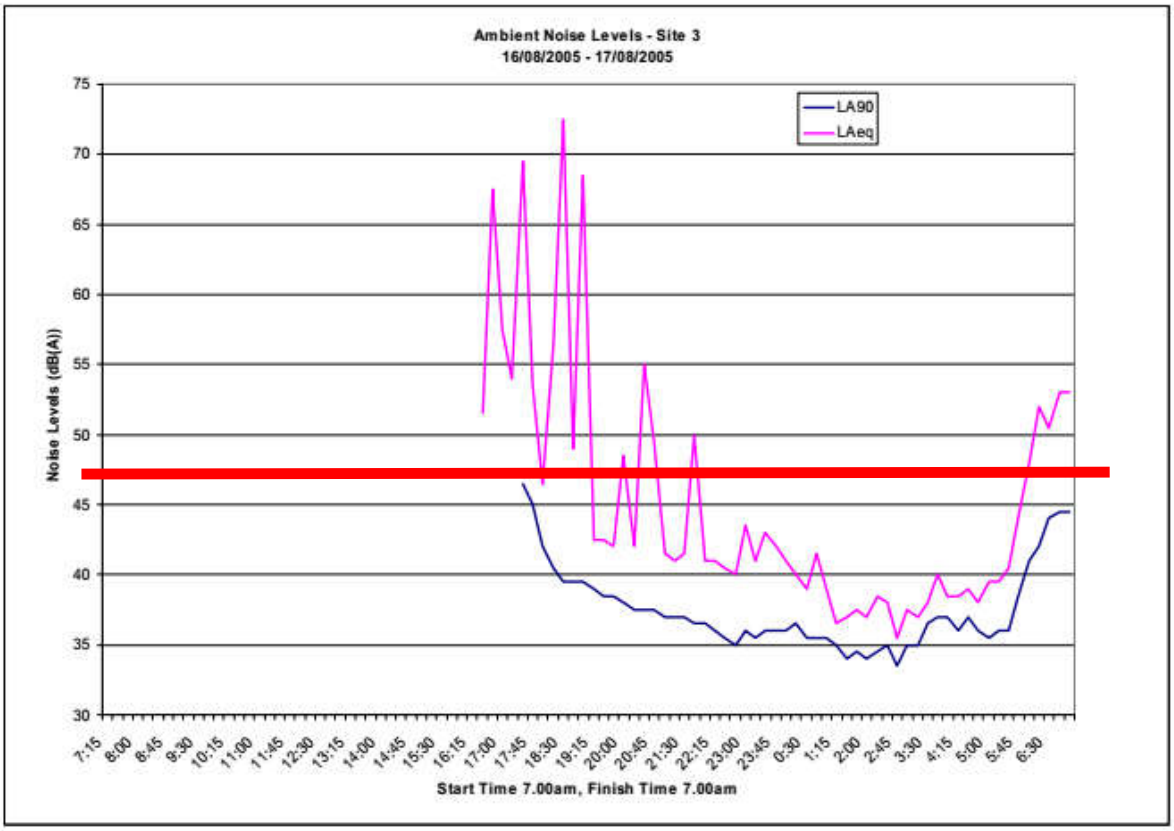
Start Time 7.00am, Finish Time 7.00am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16/08/2005 - 17/08/2005
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LAeq
Noise Levels (dB(A))
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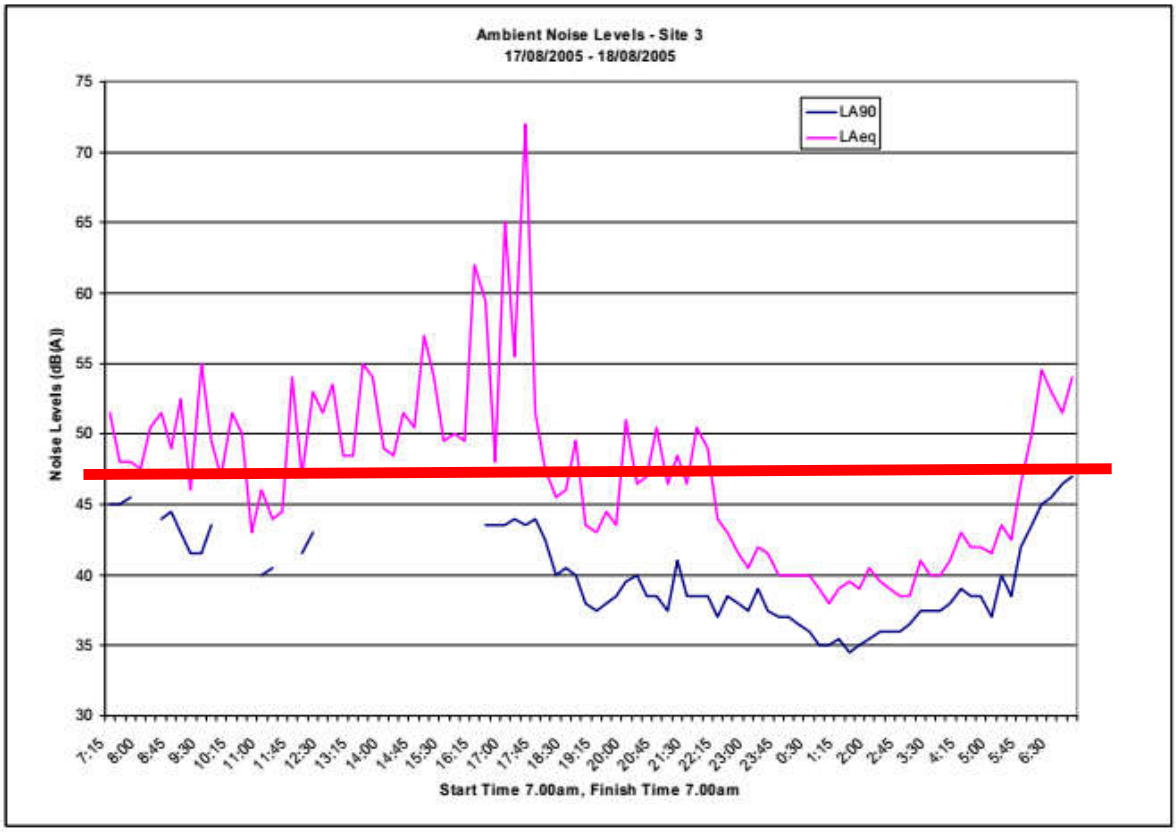
Start Time 7.00am, Finish Time 7.00am


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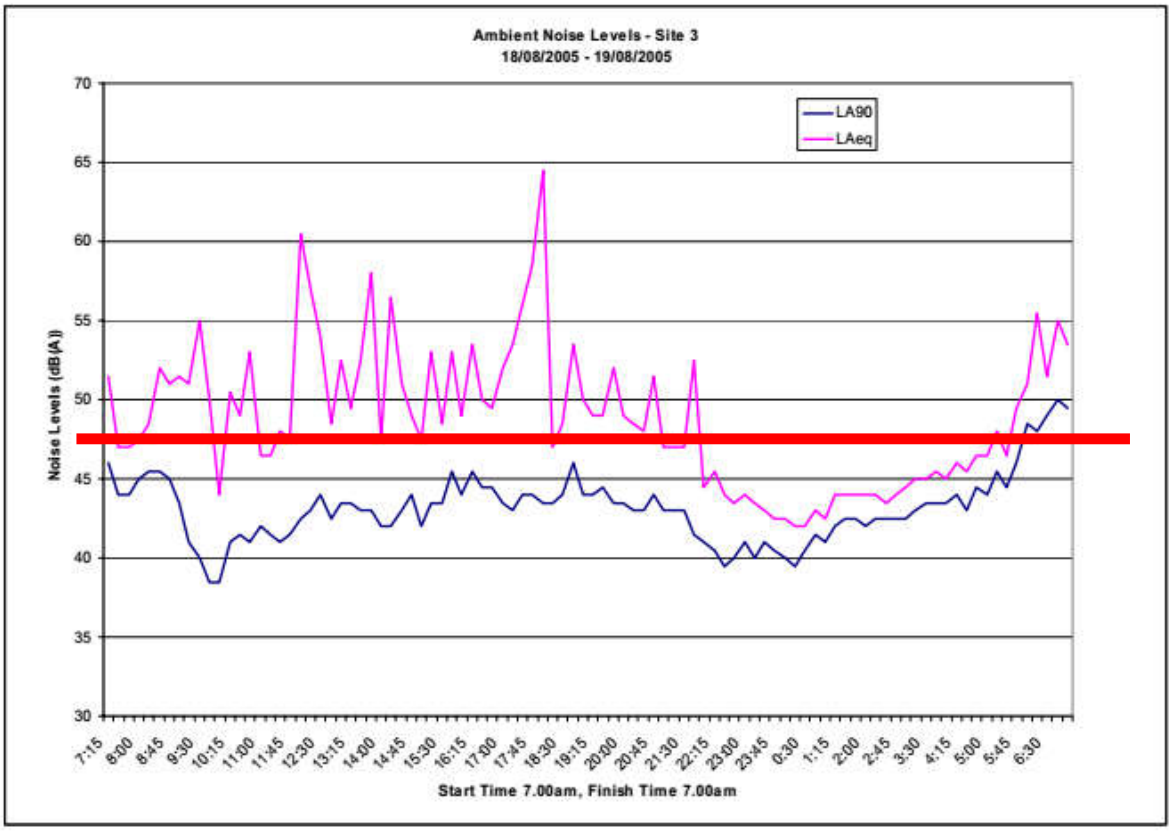
Start Time 7.00am, Finish Time 7.00am


Ambient Noise Levels - Site 3
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Noise Levels (dB(A))
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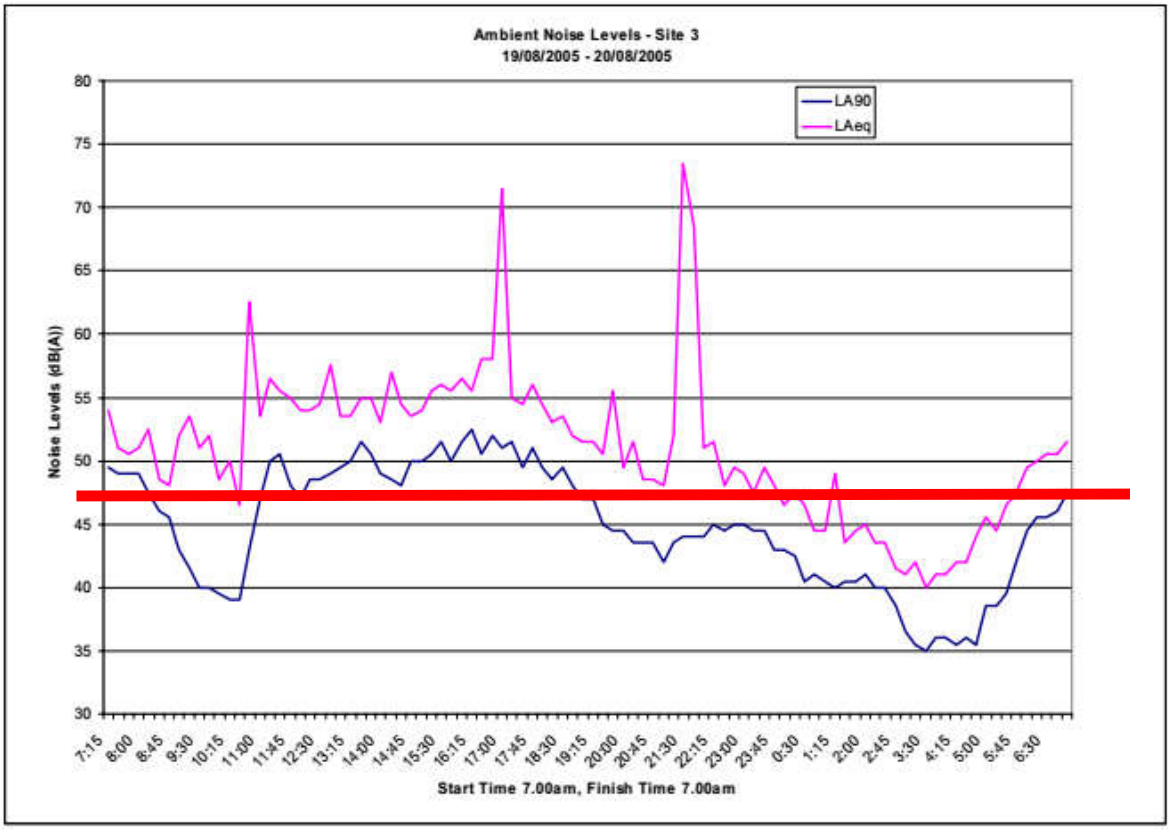
Start Time 7.00am, Finish Time 7.00am


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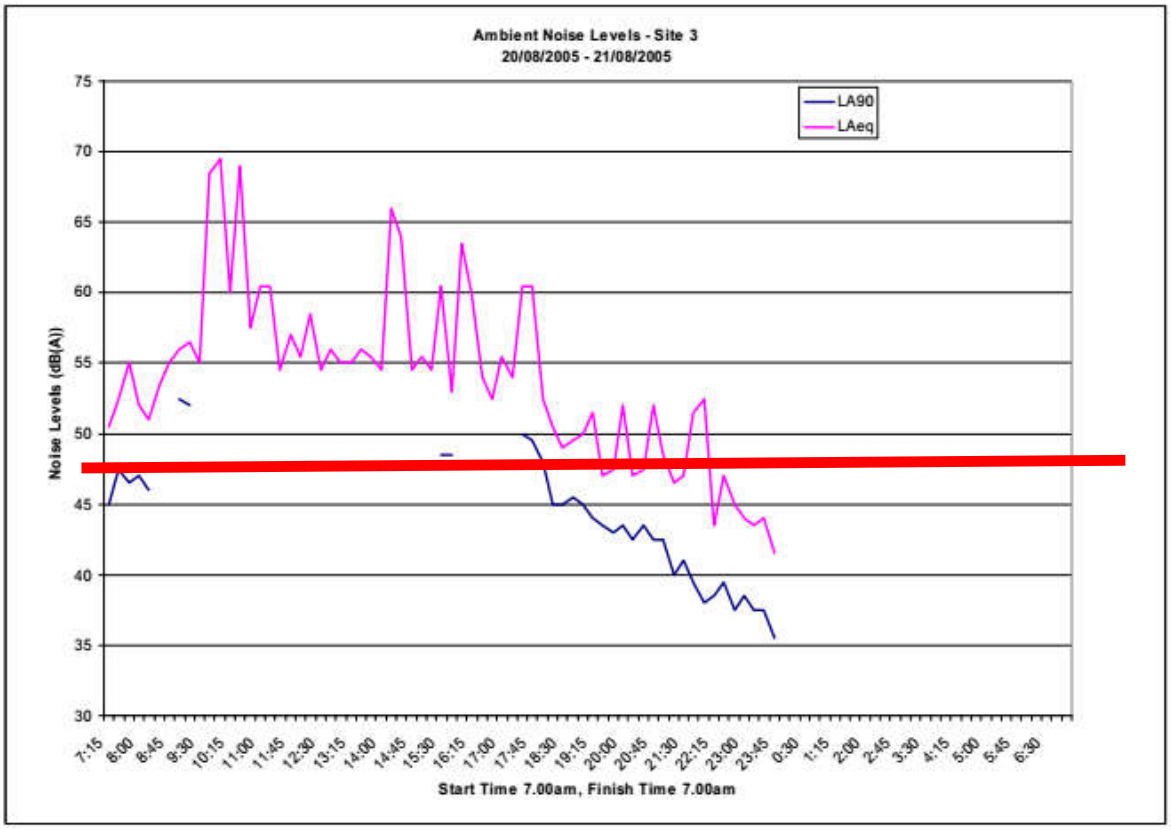
Start Time 7.00am, Finish Time 7.00am


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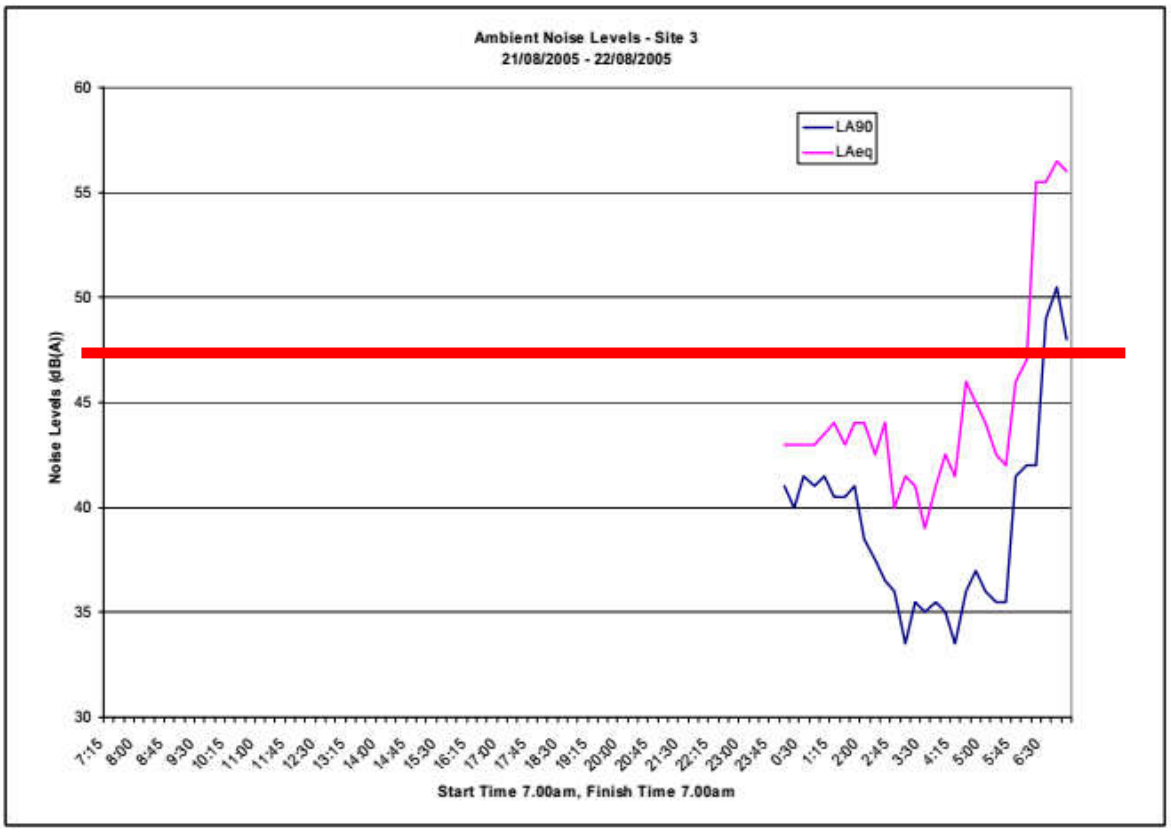
Start Time 7.00am, Finish Time 7.00am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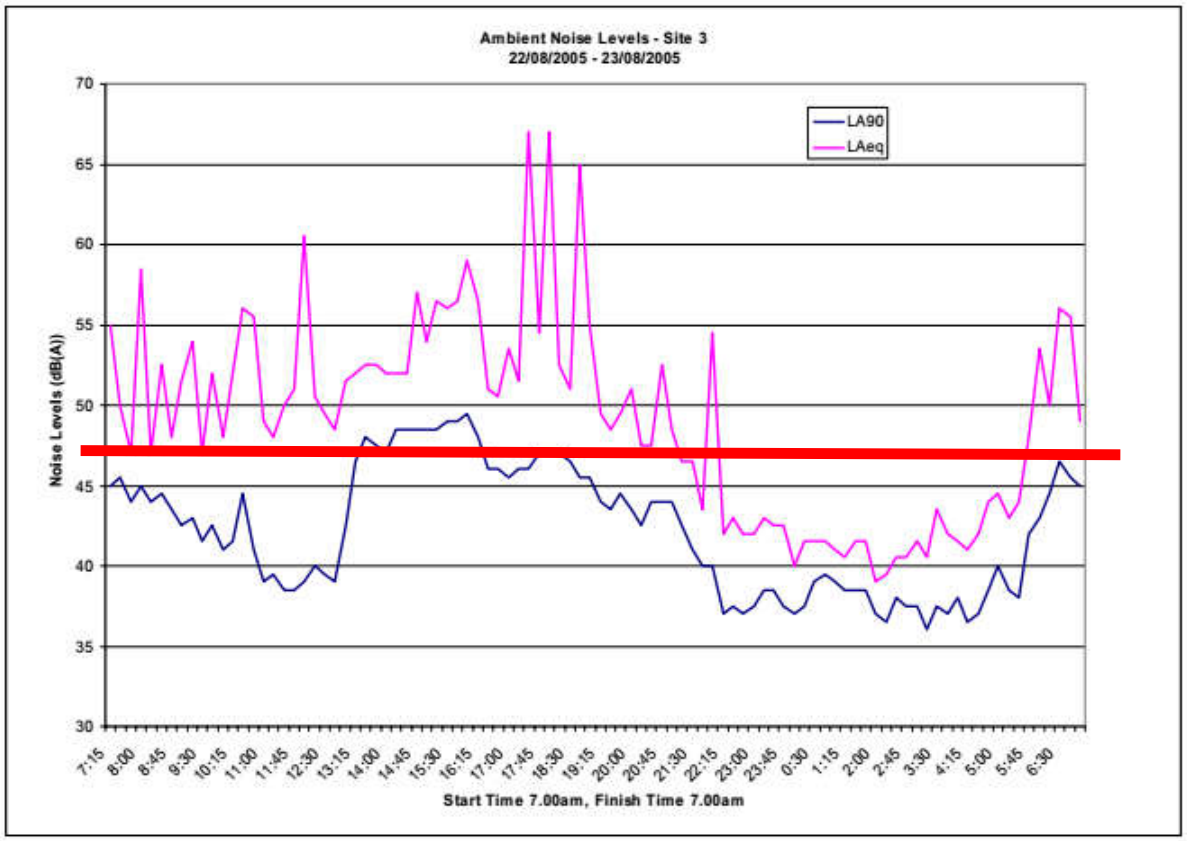
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Noise Levels (dB(A))
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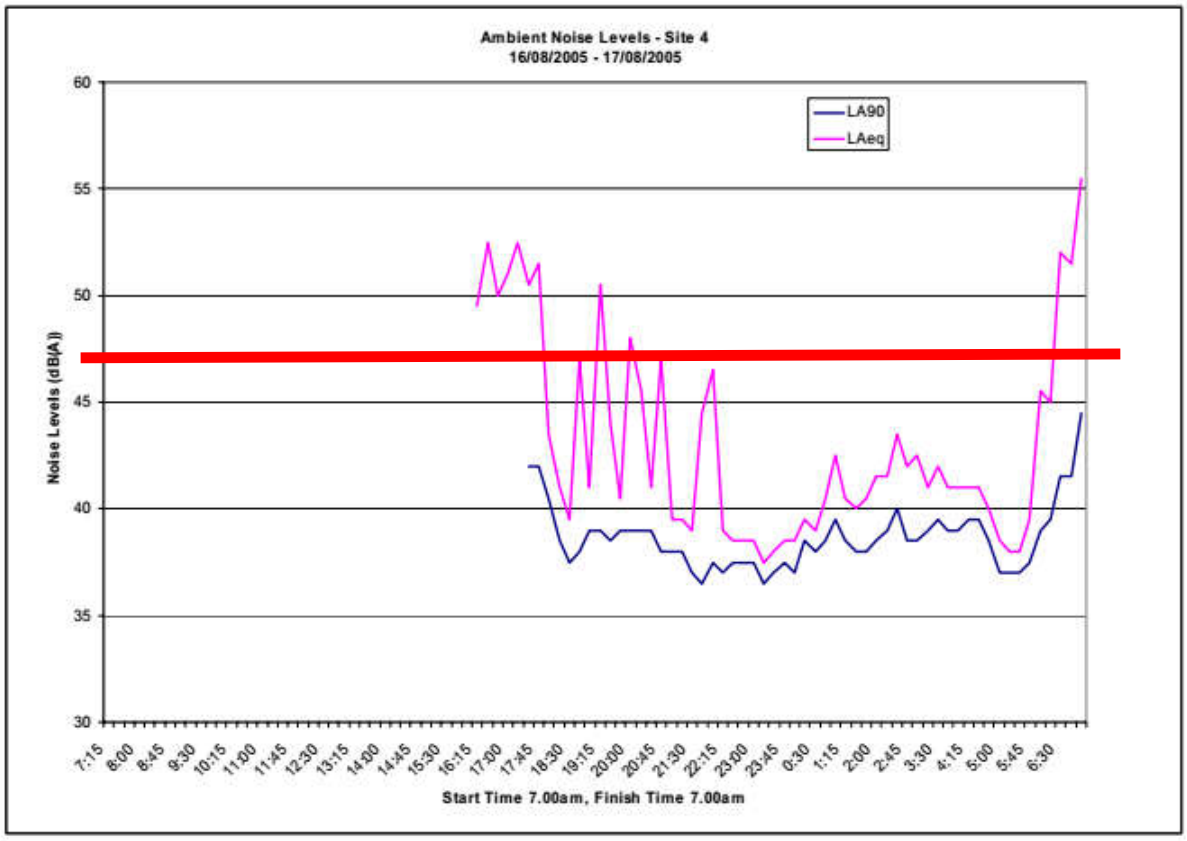
Start Time 7.00am, Finish Time 7.00am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LAeq
Noise Levels (dB(A))
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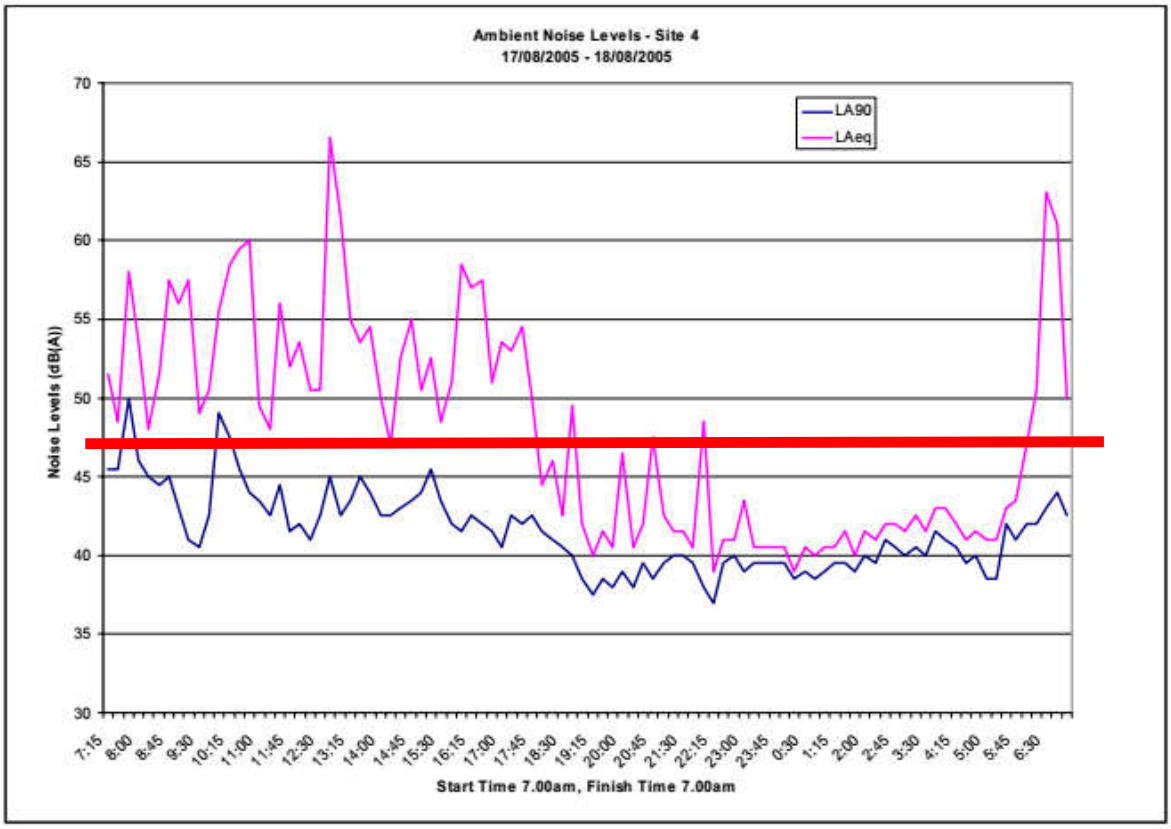
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LAeq
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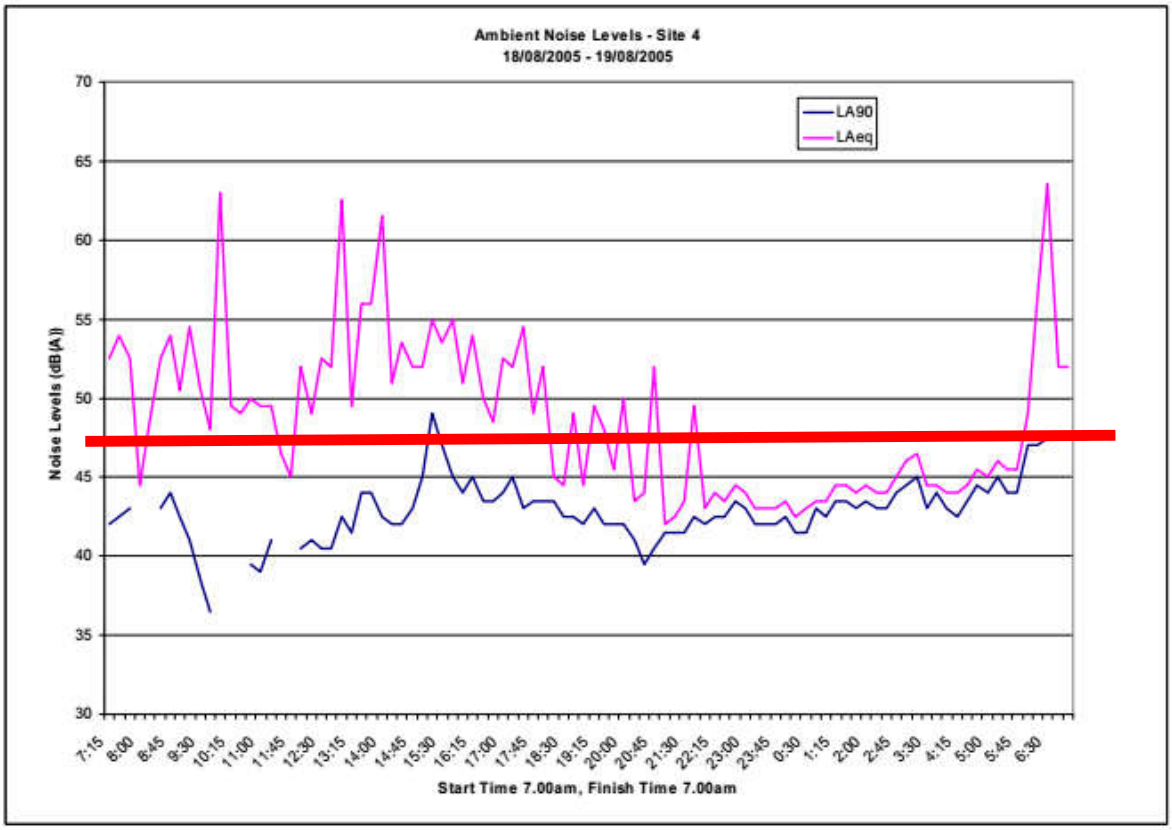
Start Time 7.00am, Finish Time 7.00am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18/08/2005 - 19/08/2005
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LAeq
Noise Levels (dB(A))
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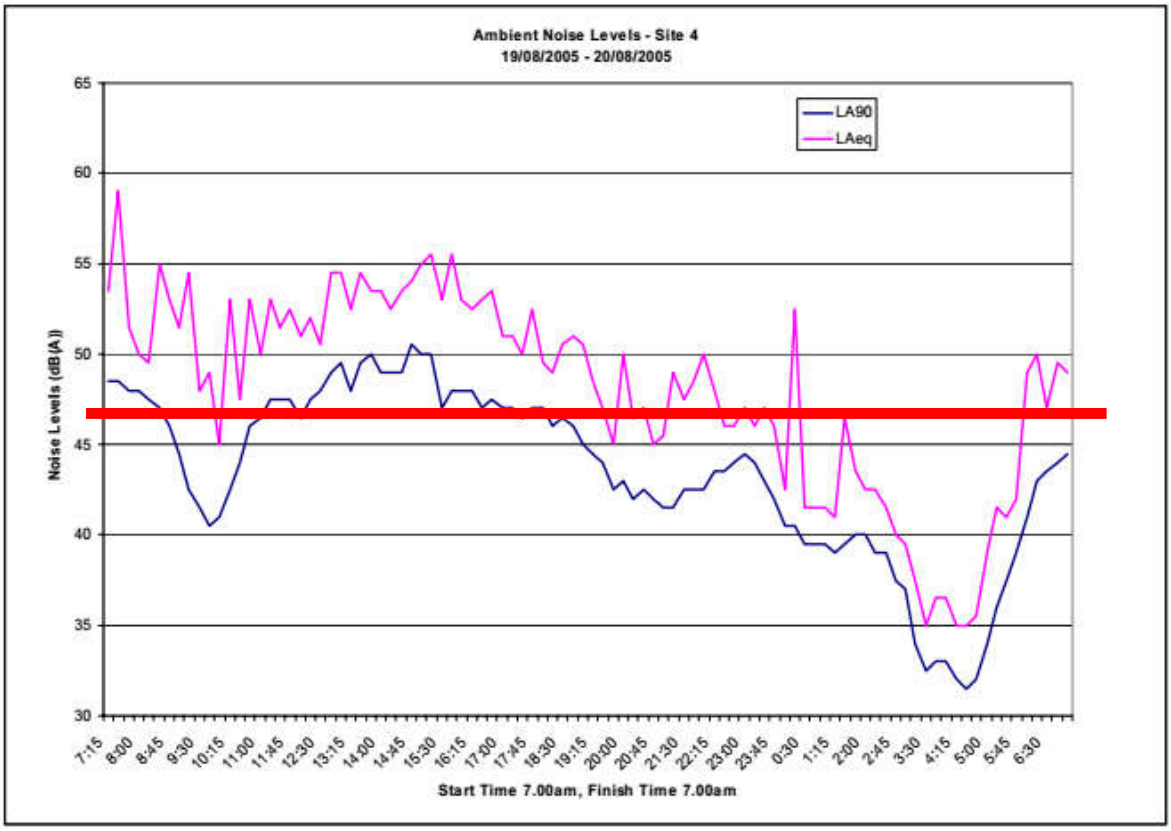
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19/08/2005 - 20/08/2005
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Noise Levels (dB(A))
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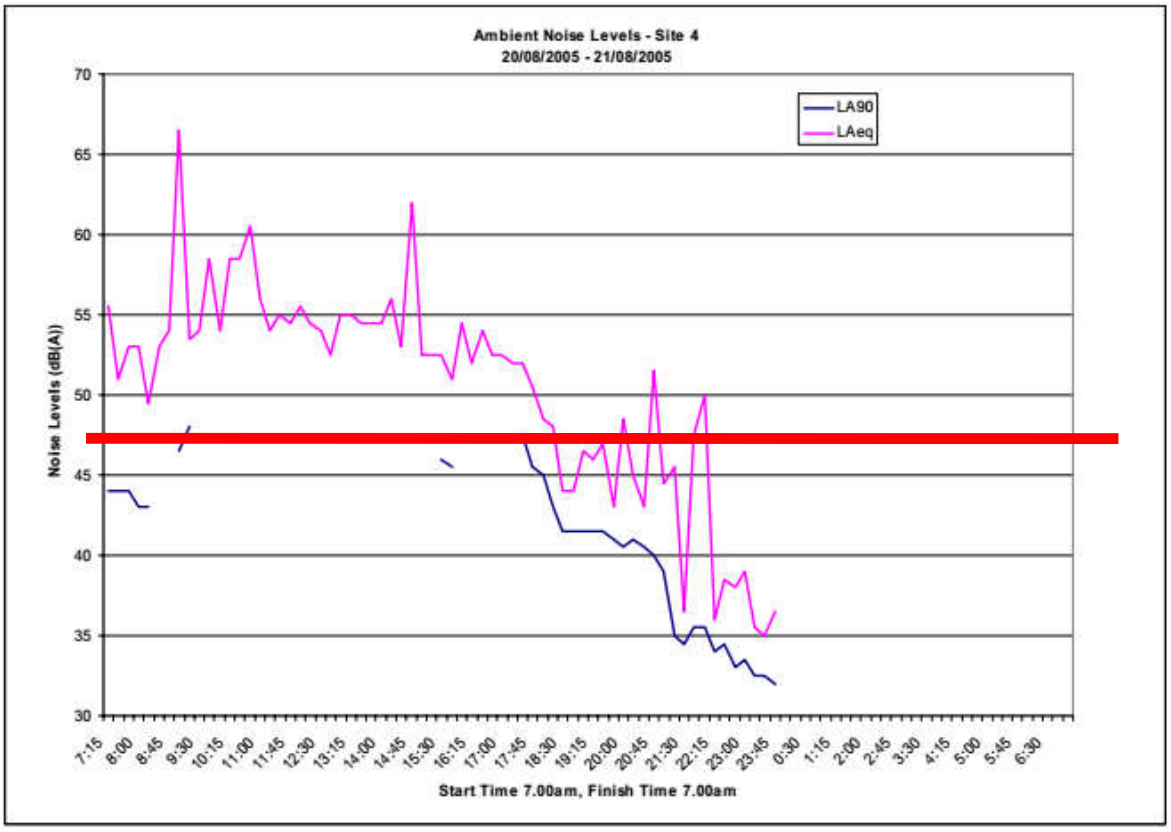
Start Time 7.00am, Finish Time 7.00am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Noise Levels (dB(A))
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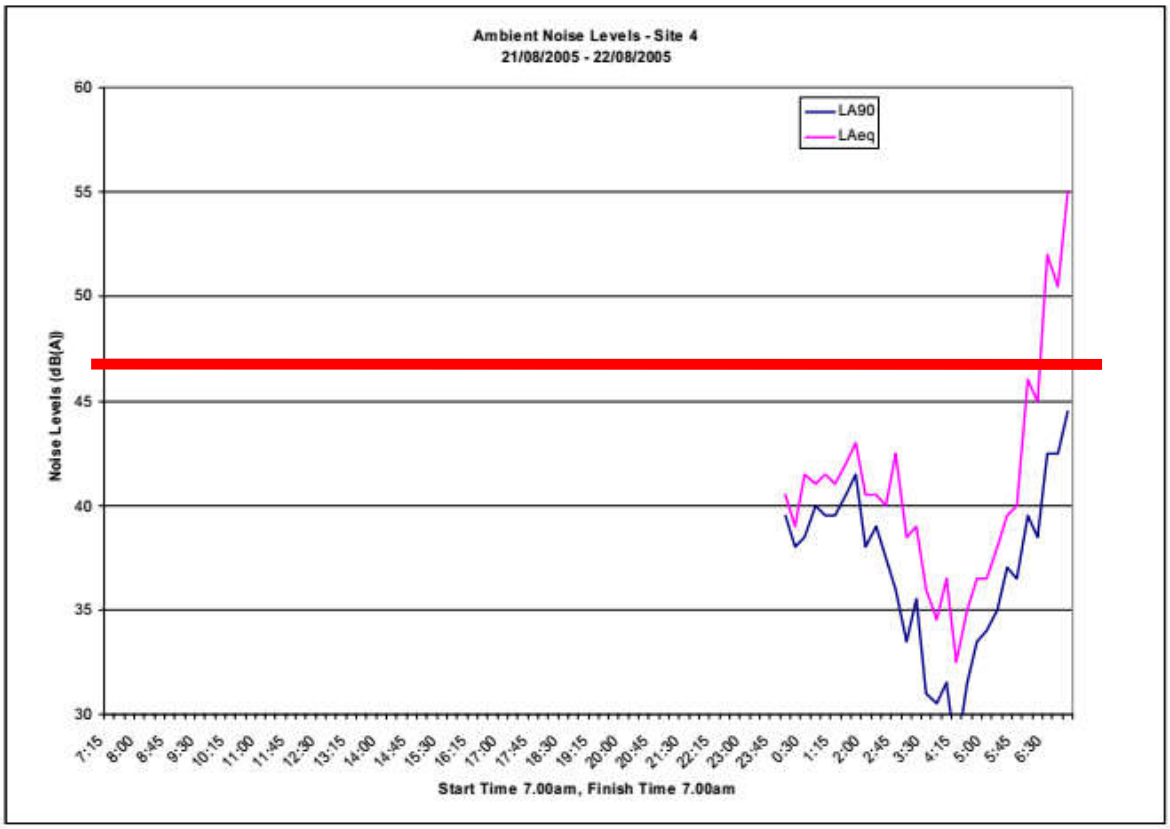
Start Time 7.00am, Finish Time 7.00am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21/08/2005 - 22/08/2005
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LAeq
Noise Levels (dB(A))
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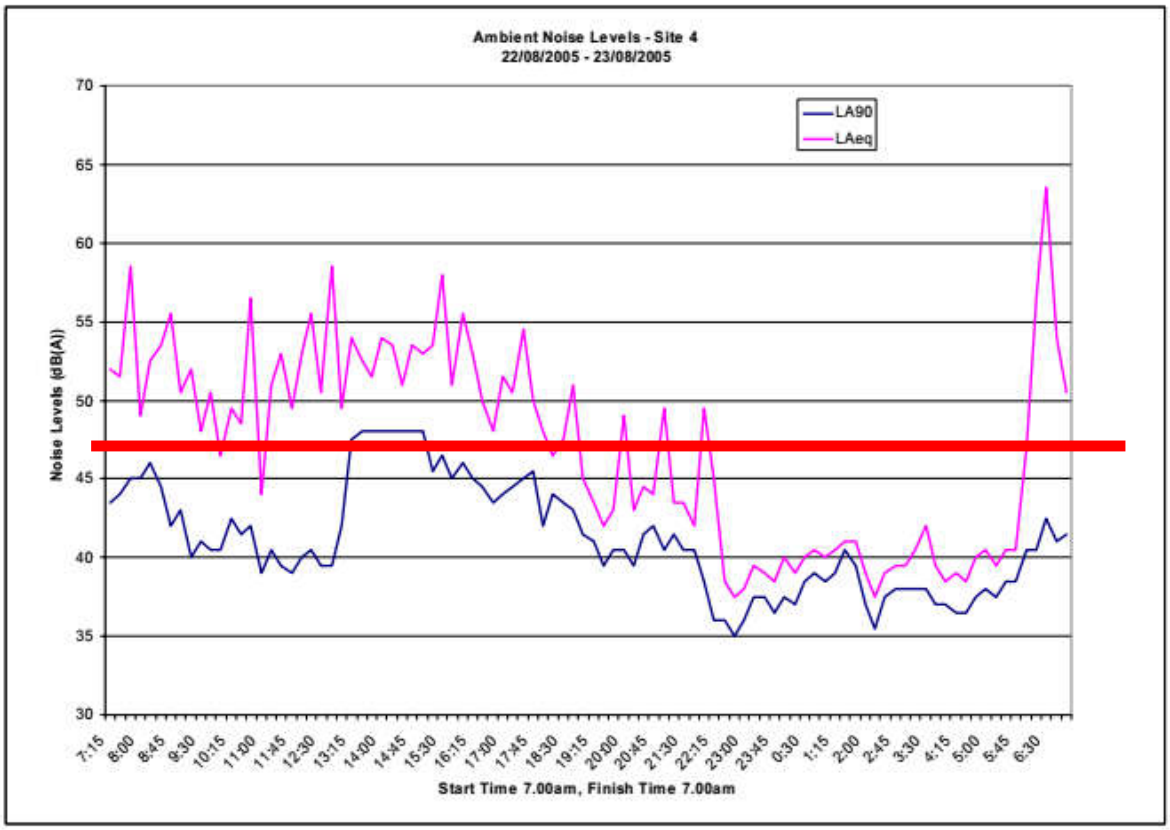
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am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Start Time 7.00am, Finish Time 7.00am

CRAIG HILL ACOUSTICS. ACOUSTIC, CONSULTING, ENGINEERING AND DESIGNS

CRAIG HILL ACOUSTICS

Acoustic Consultants

QLD & NSW

Cudgen Lakes Sand Quarry

Compliance Noise Monitoring

Saturday, 23 April 2022

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Web site; craighillacoustics.com.au

DOCUMENT CONTROL PAGE

Cudgen Lakes Sand Quarry

Reference230422/1

Report prepared for	Gales-Kingscliff Pty Limited
Date	Saturday, 23 April 2022
Site	Cudgen Lakes Sand Quarry
Authorised by	Scott Hollanby
Consultants	Craig Hill Acoustics 7 View Ct Palm Beach. Qld 4221 Mob 0418 762 968 E: craig@craighillacoustics.com.au www:craighillacoustics.com.au
Signed	Craig Hill (manager) author
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Revision History		
No	Date Issued	Comments
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2	Scott Hollamby <scott@rwcorkery.com>	

Saturday, April 23, 2022©

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 08 April 2022 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 (Hyundai HL-770
Excavator (Doosan DX 420 LCA)
Road Trucks
Dredge 8 “

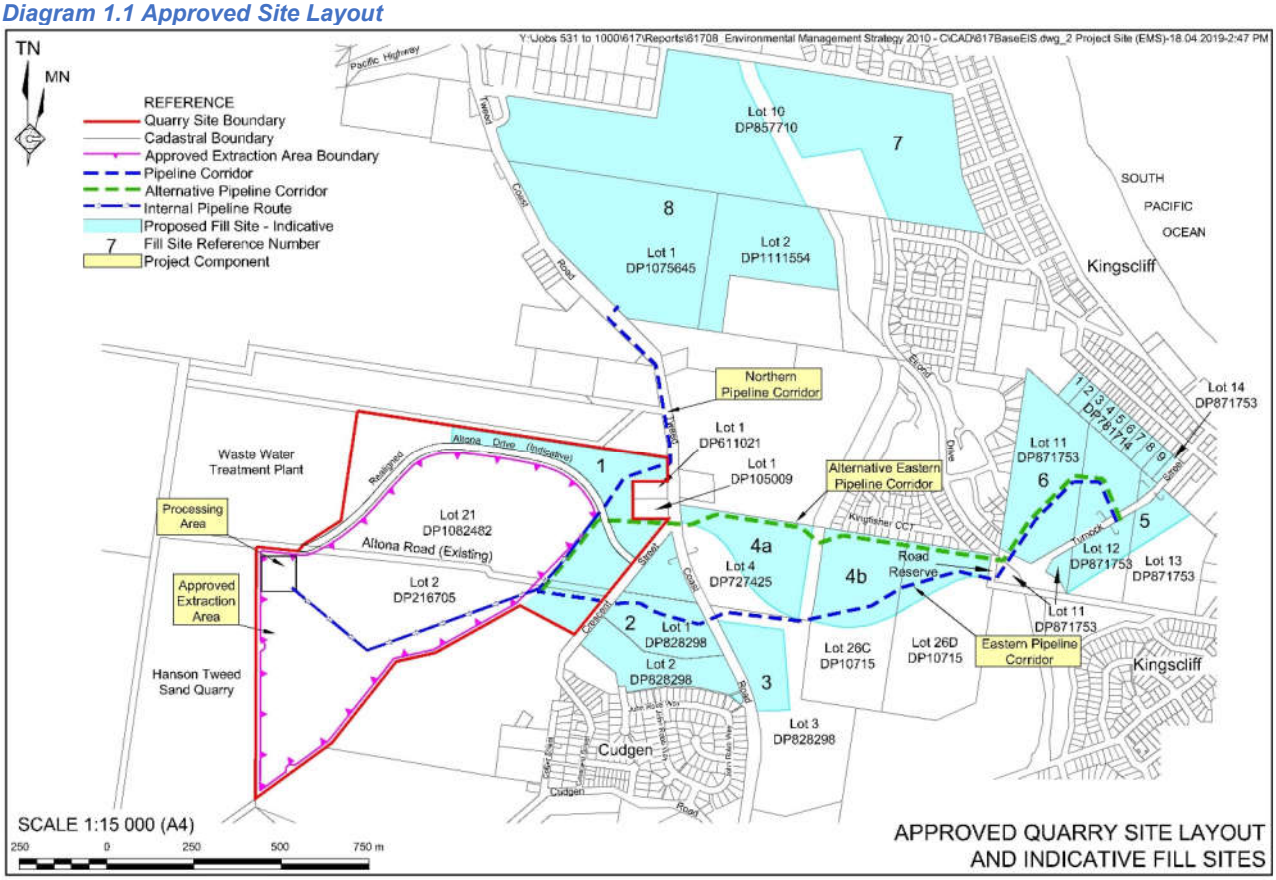
Table 1.3 Hours of operation

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 1.4 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 1.1 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 2.1 Monitoring locations

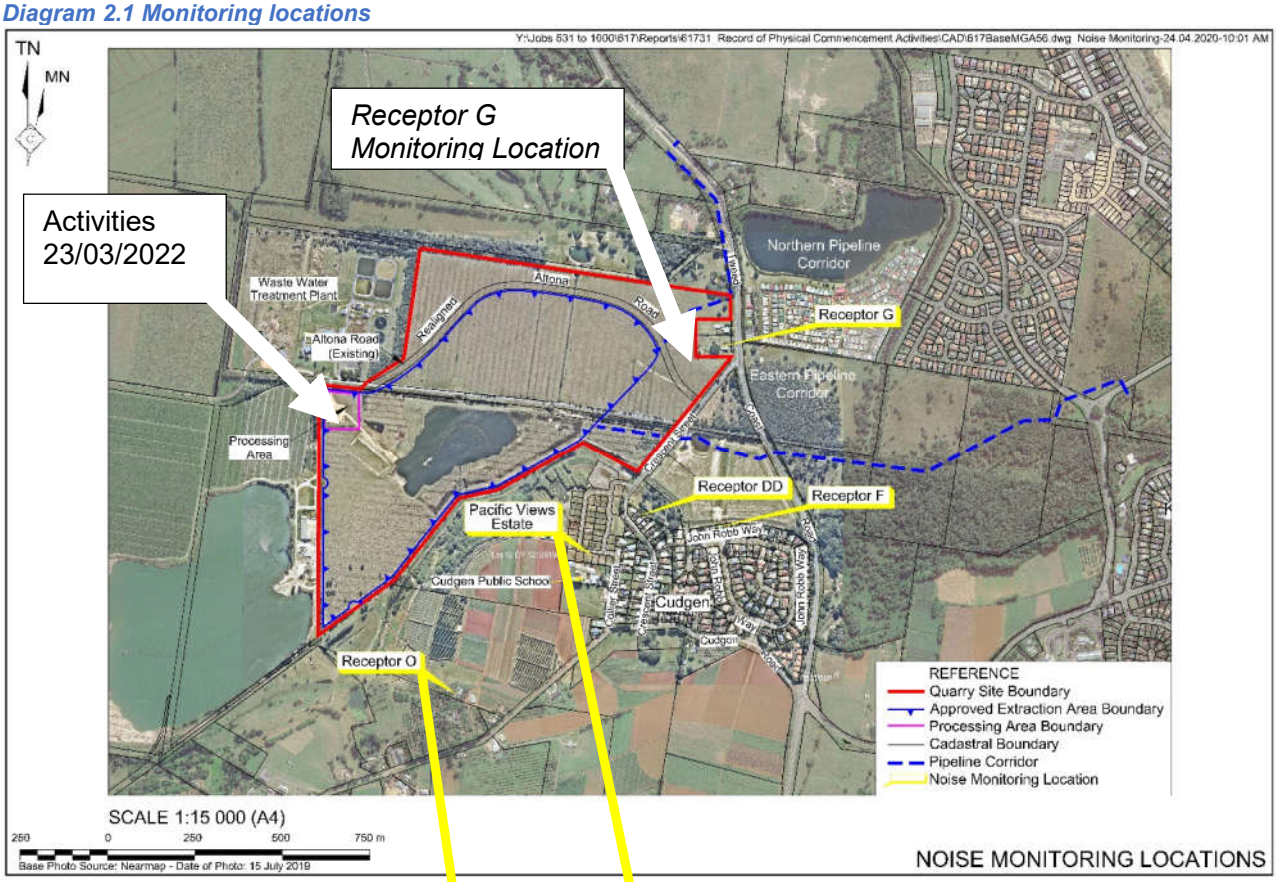
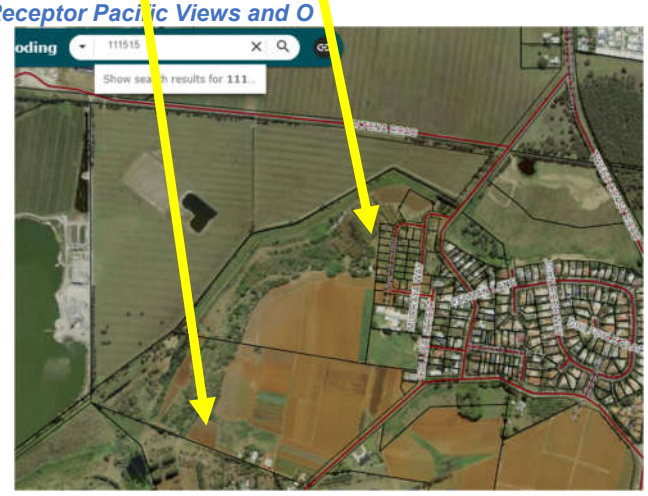


Diagram 2.2 Relocation of Receptor Pacific Views and O



Pic 2.1 View of site from Pacific views monitoring location

Pic 2.2 Zoomed in above pic

Pic 2.3 View of site from Receptor O monitoring location

Pic 2.2 Zoomed in above pic

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 March 2022.

BSWA Sound Level Calibrator Serial No 490190. calibrated June 2021.

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	78%
Wind Speed	5-10 kts
Wind Direction	SE
Atmospheric Pressure	1010 hpa
Cloud Cover	0%
Temp	20-25 C

5.0 TESTING

The following tests were carried out at locations G, O, B, DD and F within 30m of affected dwellings where practical as indicated on the attached site plan.
Tests conducted on 08 April 2022 between 1215 and 1430 hrs.

- *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. (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 08 March 2022

Table 5.1 Equipment being used at the time of the test 08/04/2022

Operating equipment measured at 20m	LAeq 15 min
CDE Wash Plant	76
Loader (Hyundai HL-770	71
Excavator (Doosan DX 420 LCA)	66
Road Trucks	66
Dredge	63

5.2 Equipment used during previous tests

Table 5.2 Equipment being used previous tests

Date 01/10/2021	
Operating equipment measured at 20m	LAeq 15 min
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 measured at 20m	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 08/04/2022

Receptor & Time hrs	**Attended Testing LAeq 15 minutes**	**> Project Criteria (47 LAeq 15min)**	**> Cumulative Criteria (50 LAeq 11 hrs)**	**Comments**
G 1215-1230	47	0	-3	Noise from other sources such as traffic noise from Coast Road dominated background. Noise from operations not measurable / distinguishable above background.
O 1245-1300	50	3	0	Noise from other sources such as traffic noise from Pacific Highway dominated background. Noise from operations occasionally audible but not measurable above background.
Pacific Views 1315-1330	51	4	1	Noise from other sources such as traffic noise from Pacific Highway dominated background. Noise from operations occasionally audible but not measurable / distinguishable above background.
DD 1345-1400	52	5	2	Noise from other sources such as traffic noise from Coast Road dominated background. Noise from operations not audible or measurable / distinguishable above background.
F 1415-1430	49	2	-1	Noise from other sources such as traffic noise from Coast Road dominated background. Noise from operations not audible / distinguishable above background.

7.0 PREDICTED LEVELS

Equipment operations were not either audible or measurable at any of the motoring sites. 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

Receptor	Distance m	Dredge 8'' 63 LAeq @ 20m	CDE wash plant 70LAeq @ 20 mts (not in use)	Loader 71LAeq @ 20 mts	Excavator 66 LAeq @ 20 m (not in use)	Road Trucks 66 LAeq @ 20 m	Combined	Combined with line of sight attenuation	> Project Day Criteria (47 LAeq 15 min)	> Cumulative Day Criteria (50 LAeq 11 hrs)
		Predicted Levels with Distance attenuation								
G	880m	30	37	38	33	33	42	42	-5	-8
O	600m	33	40	41	36	36	45	45	-2	-5
Pacific Views	555m	34	41	42	37	37	45	47	-0	-3
DD	780m	31	38	39	34	34	43	33	-14	-17
F	900m	30	37	38	33	33	42	32	-15	-18

(not in use): 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 at locations G,F and DD.

Noise from the operations were occasionally audible at locations O and Pacific Views Estate but not measurable due to other noise in the area.

Distance calculations of measured noise levels from operating plant on site indicate 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. This measurement 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

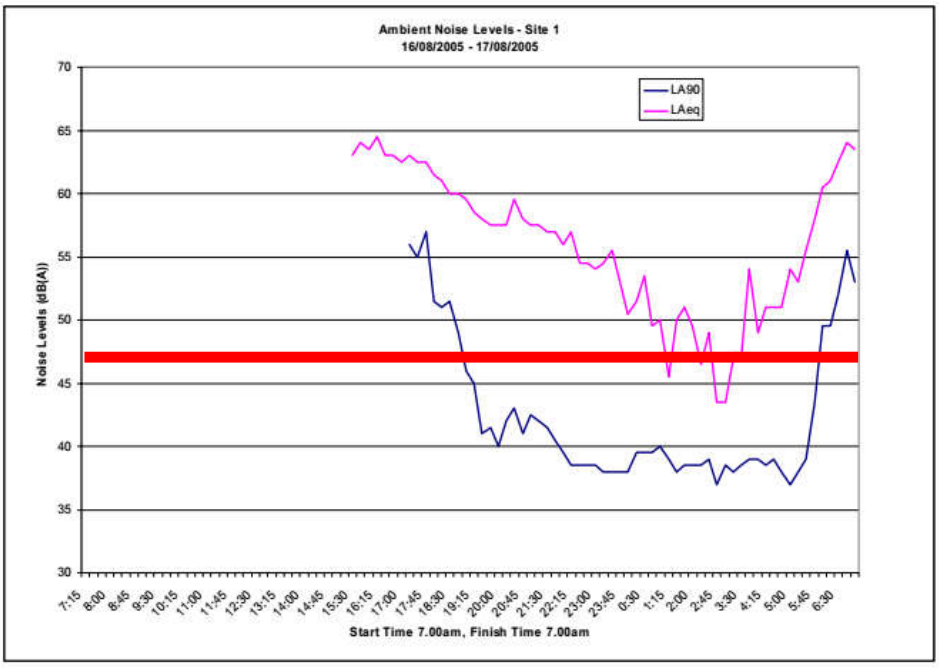
Receptor	Pre-project / Baseline Levels	Compliance Monitoring LAeq 15 min										Project Criteria	
		Previous testing									Latest tests	LAeq 15 min	LAeq 11 hr
	Unattended logger original report	23/08/05	10/07/17	30/08/18	20/04/20	20/04/20	10/12/20	18/06/21	05/08/21	01/10/21	08/04//22	>Impact Criteria day and evening 47LAeq	>Cumulative Criteria Day >50LAeq
G	62	63	62	57	55	56	57	55	50	49	47	0	-3
O	NM	NM	64	46	48	52	53	52	49	51	50	3	0
Pacific Views	55	51	57	48	55	53	52	51	51	50	51	4	1
DD	55	53	58	56	56	53	52	50	49	51	52	5	2
F	58	54	43	57	59	55	47	50	48	50	49	2	-1

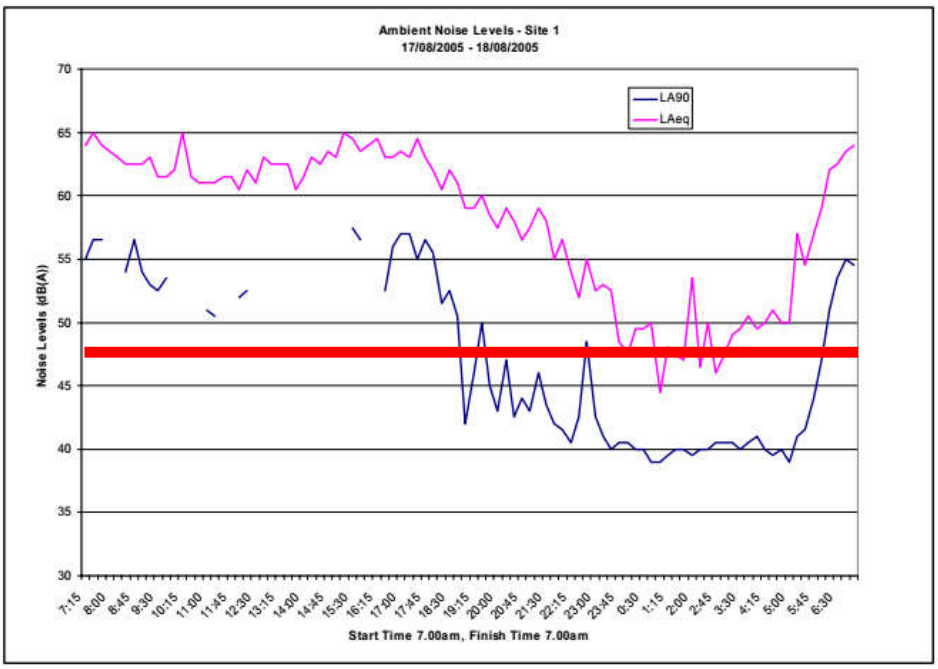
Monitored levels in the area are not unusual for daytime compliance testing. Examination of pre-project data shows ambient LAeq for day and evening rarely drops below the project design levels making it difficult to enable compliance identification.

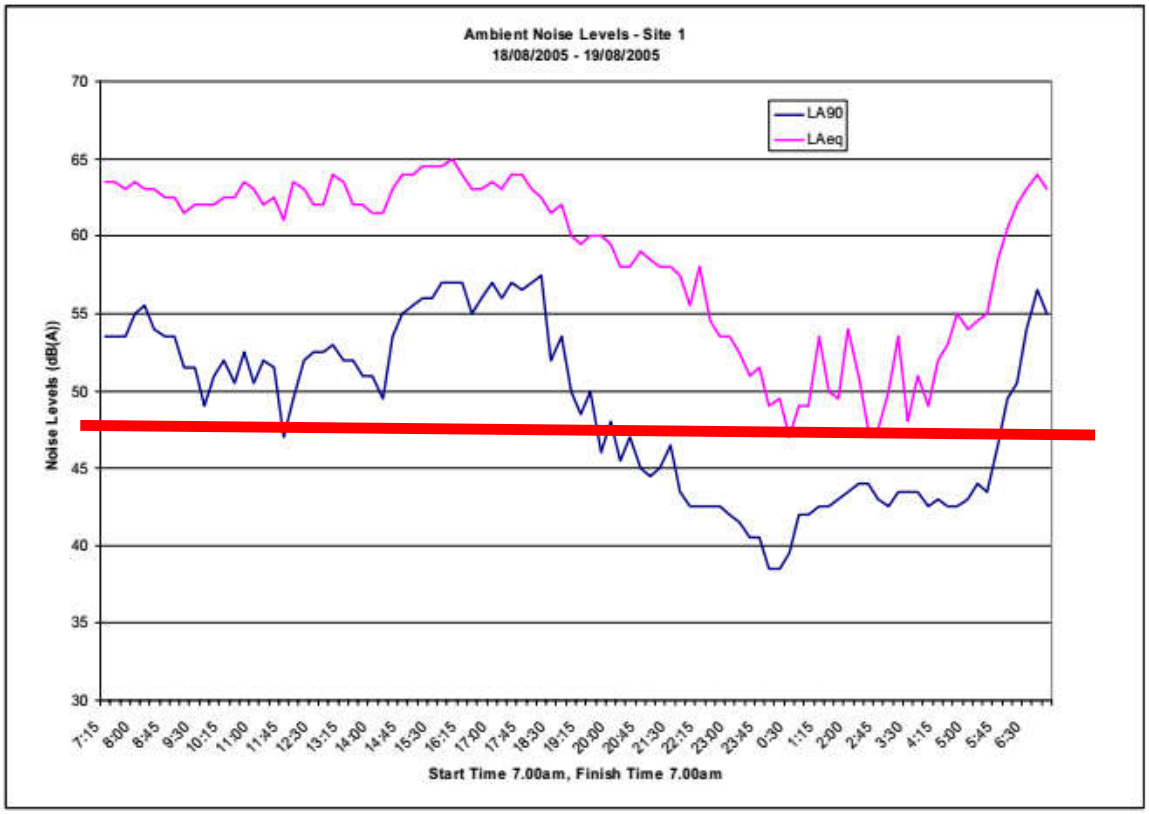
To better demonstrate this, **Appendix A** shows graphs for the pre-project monitoring (Rumble Report No. 617/04 unattended logger). The project criteria for day and evening periods of 47LAeq is indicated by the straight red line. From **Appendix A** it can be seen that the LAeq levels generally do not 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.



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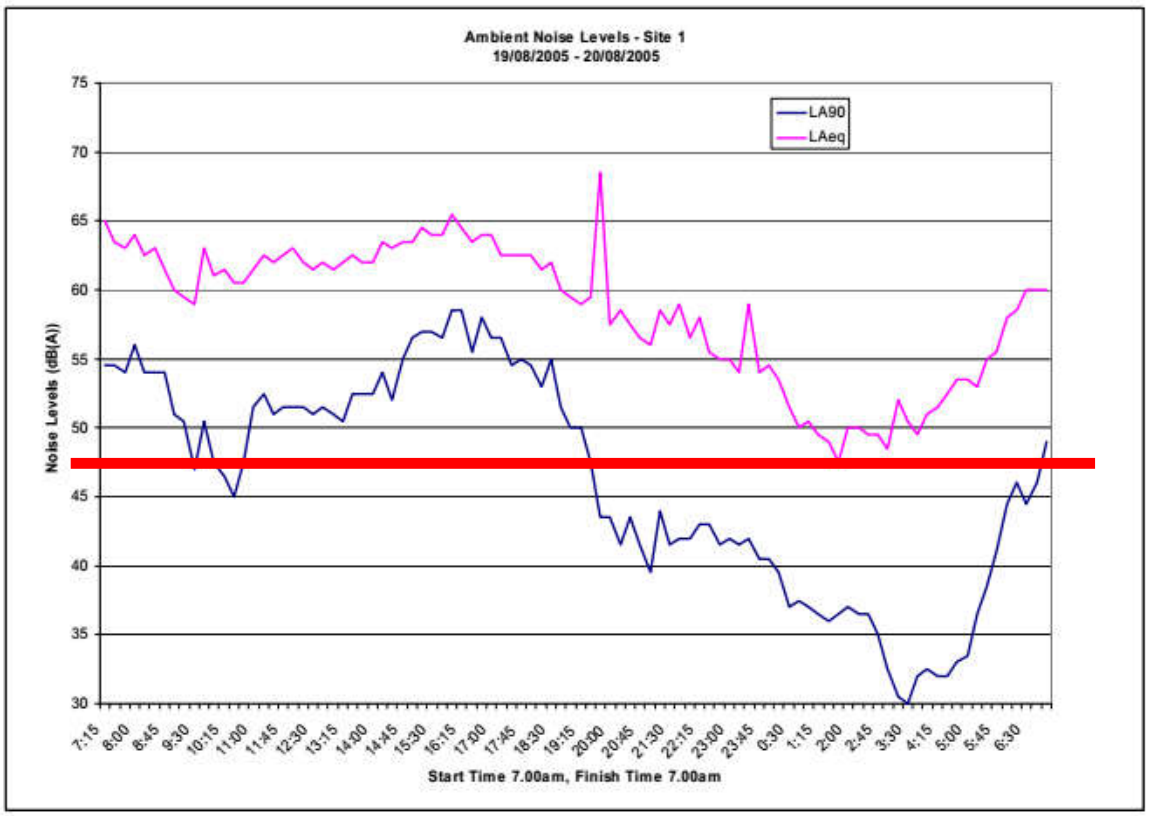
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LAeq
Noise Levels (dB(A))
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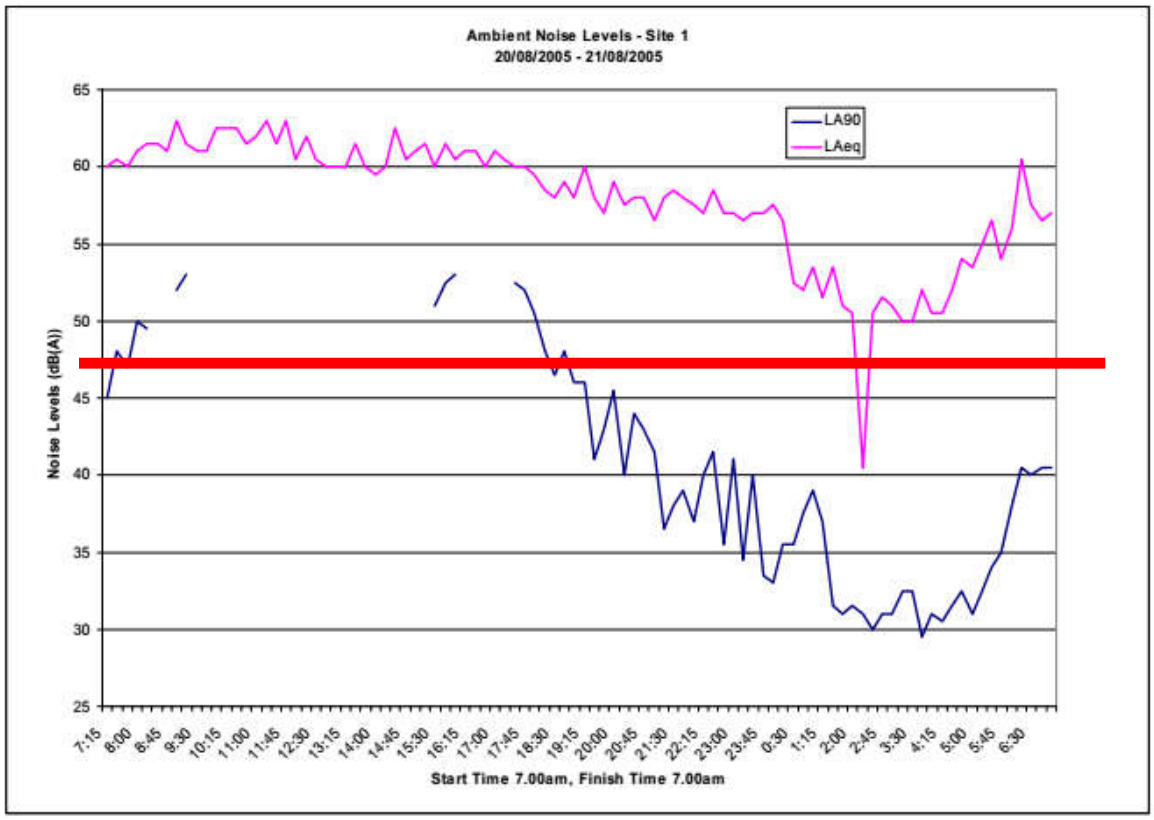
Start Time 7.00am, Finish Time 7.00am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20/08/2005 - 21/08/2005
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LAeq
Noise Levels (dB(A))
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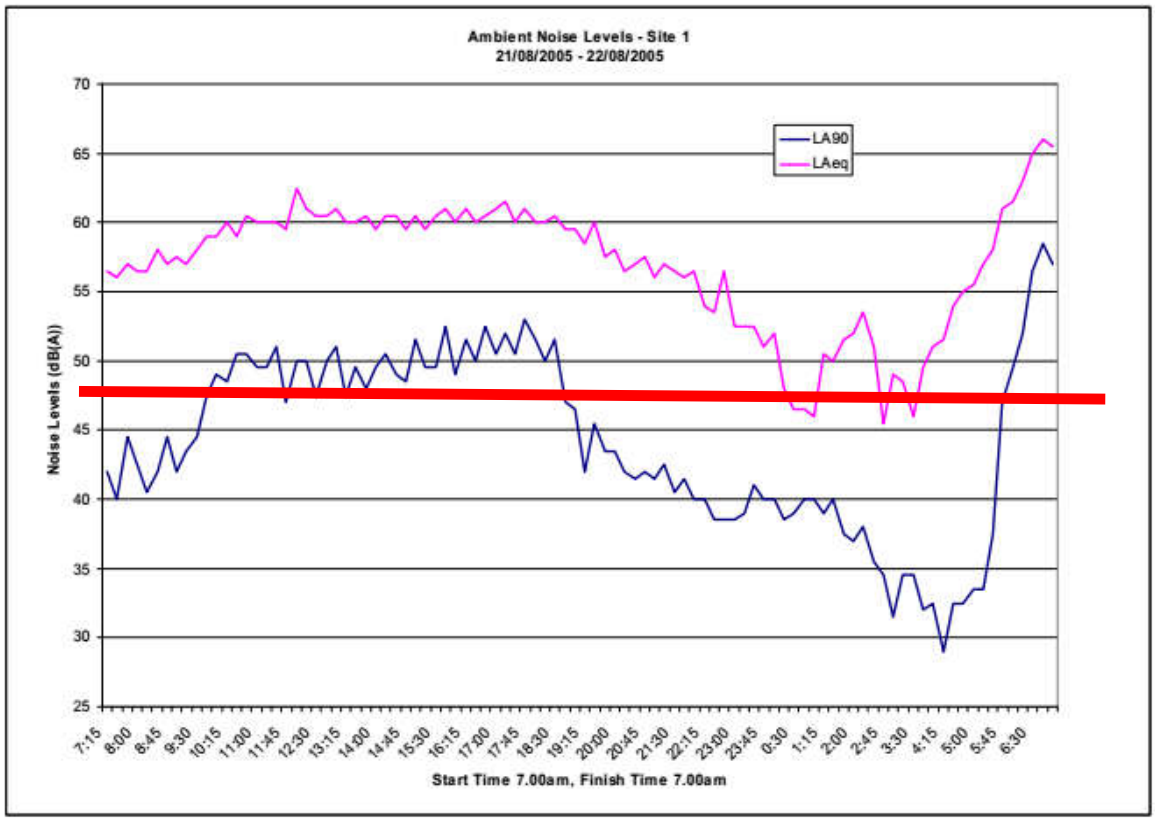
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LAeq
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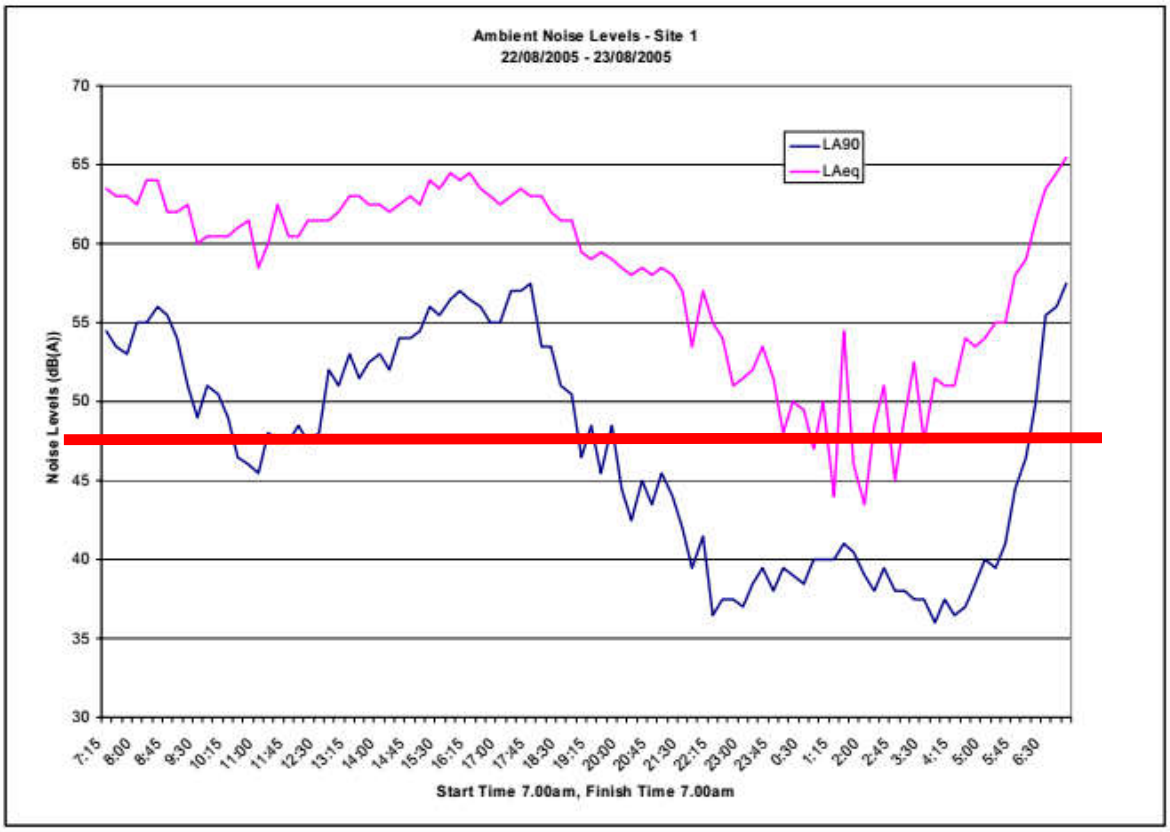
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LAeq
Noise Levels (dB(A))
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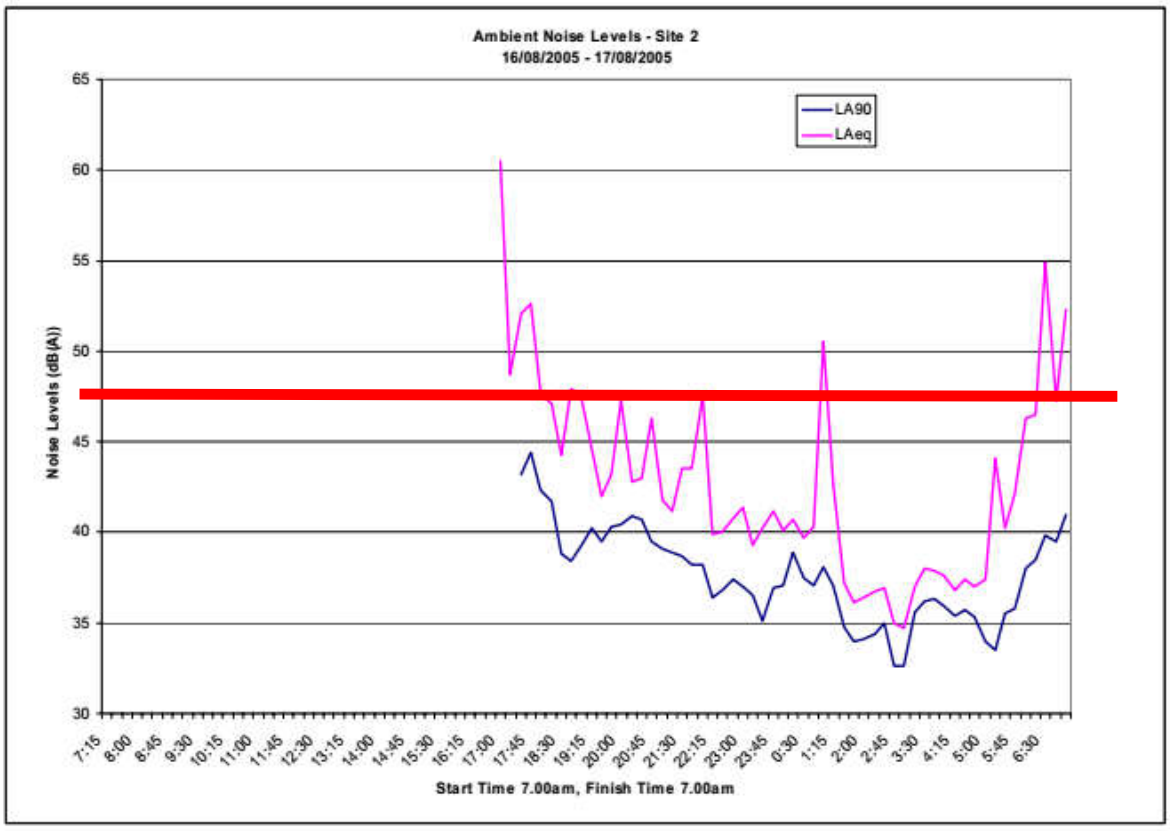
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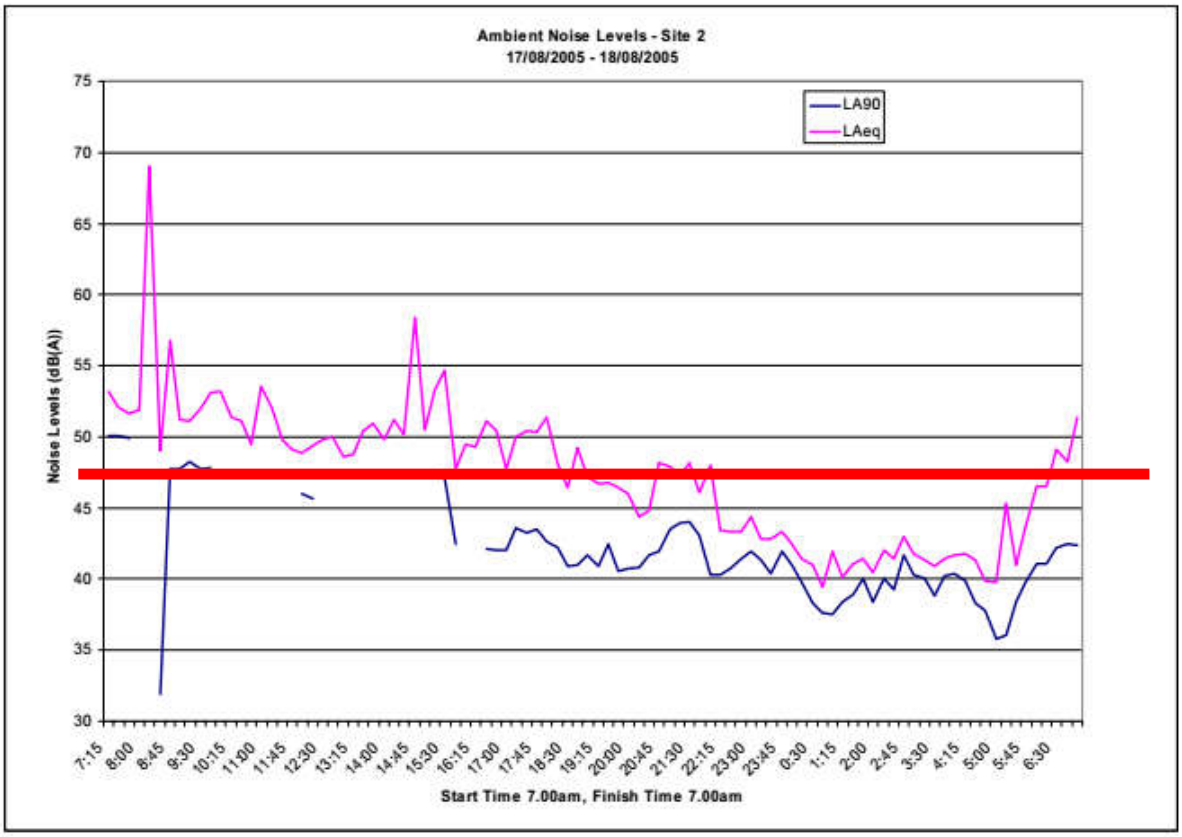
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LAeq
Noise Levels (dB(A))
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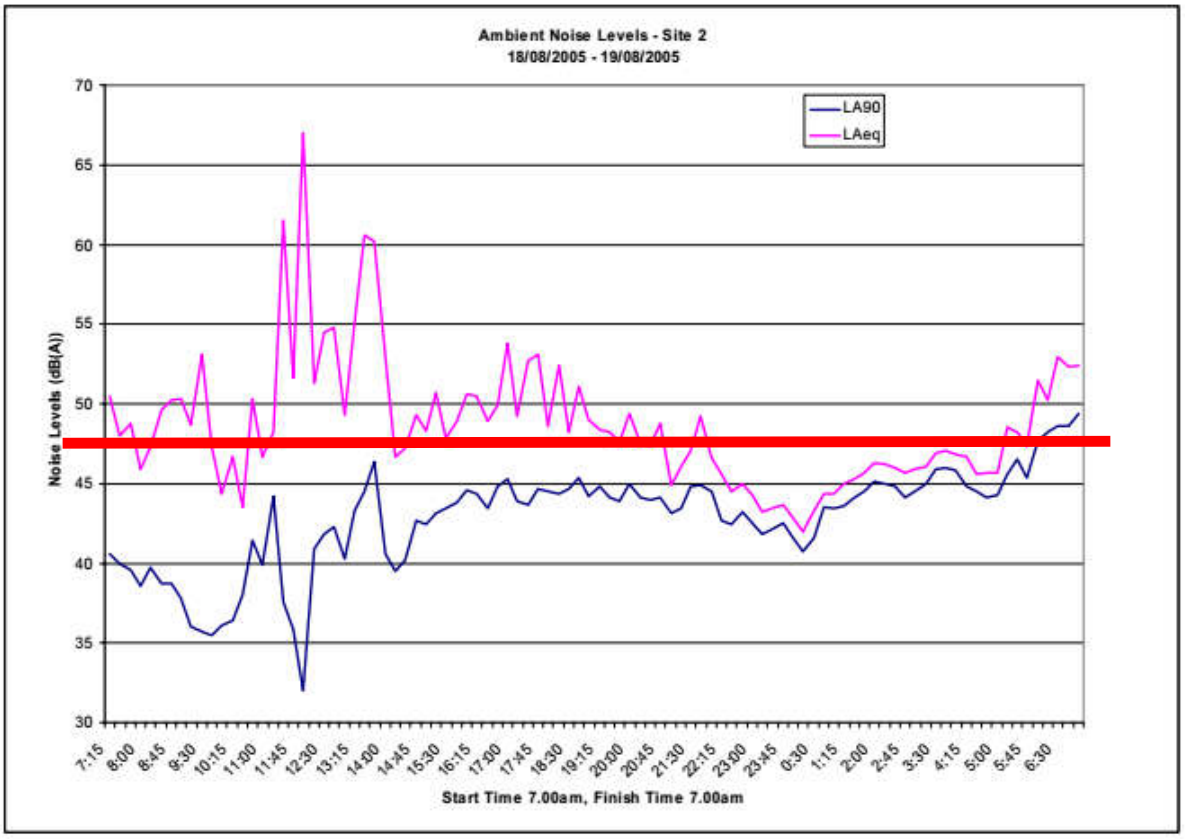
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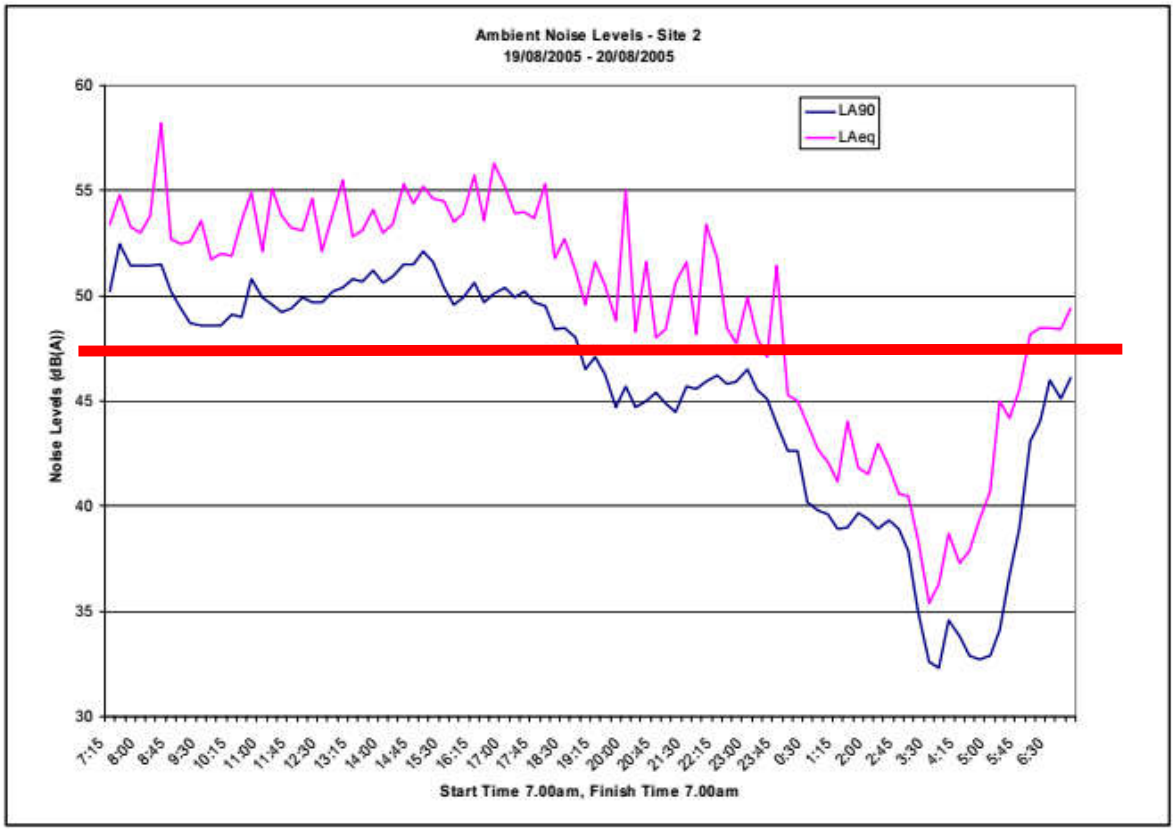
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Noise Levels (dB(A))
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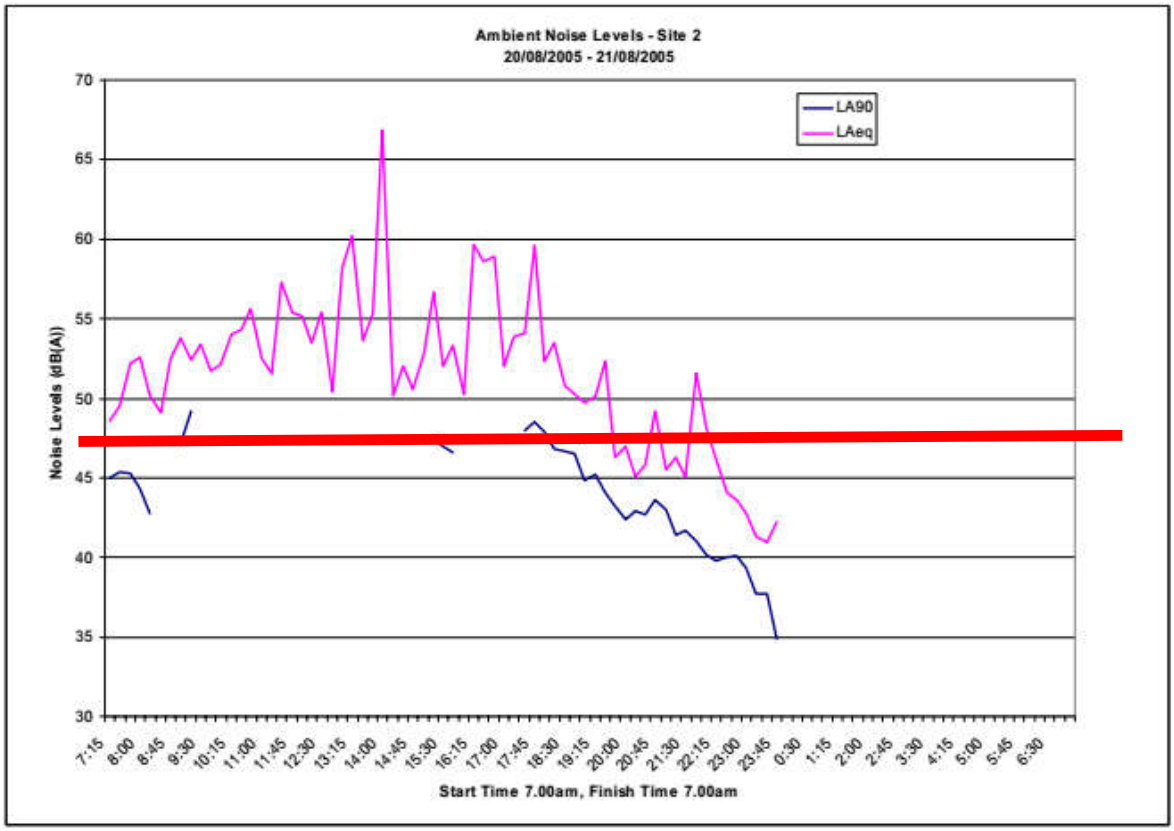
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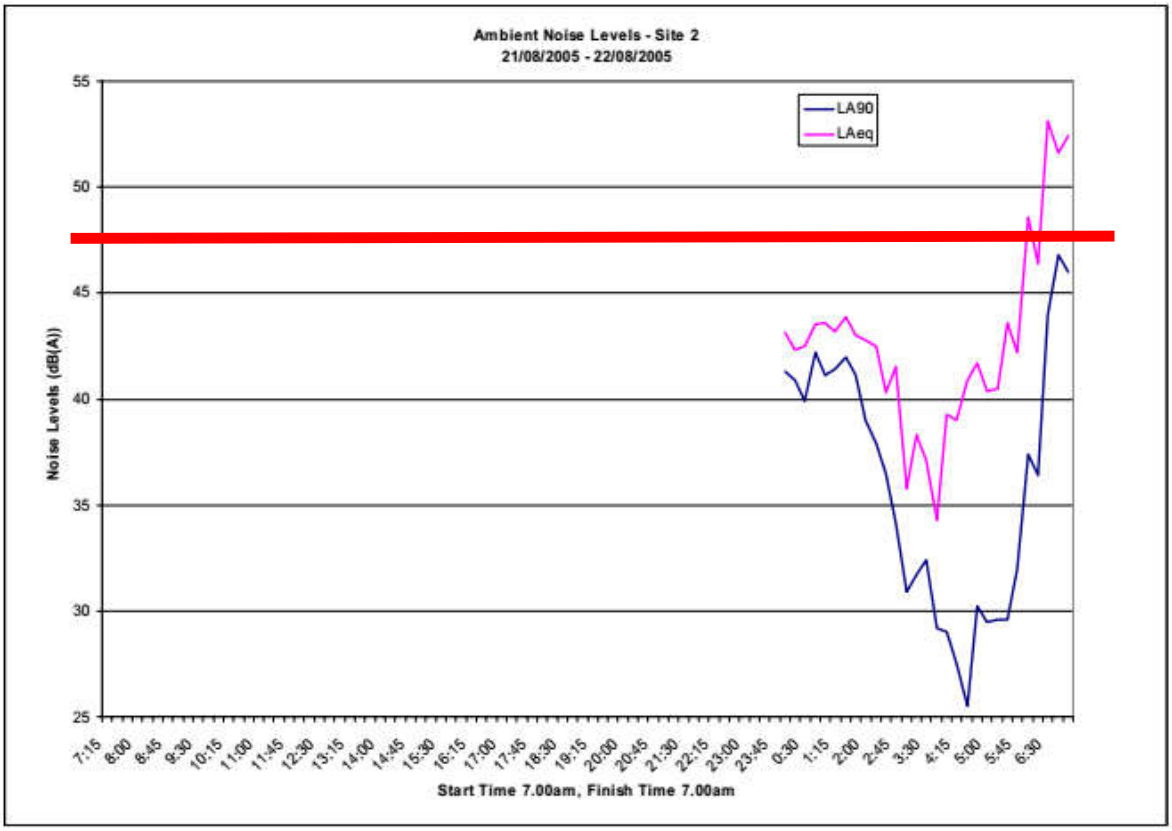
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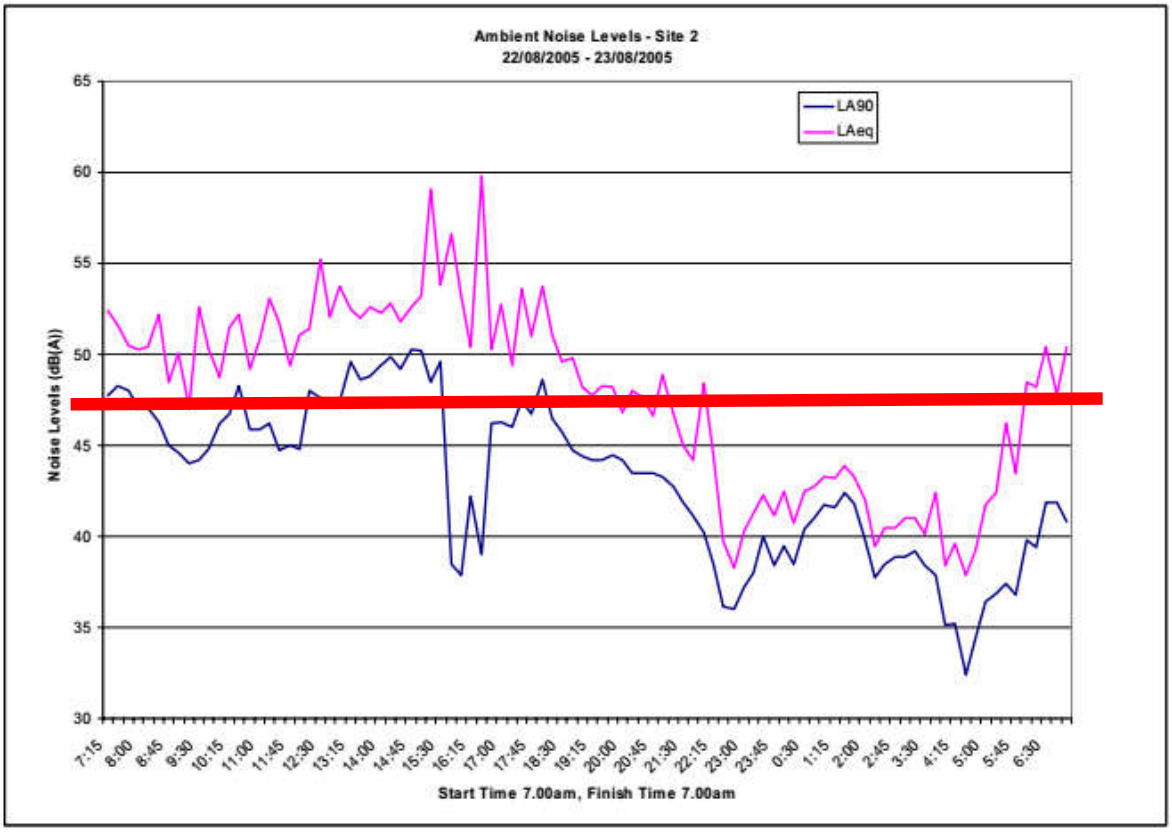
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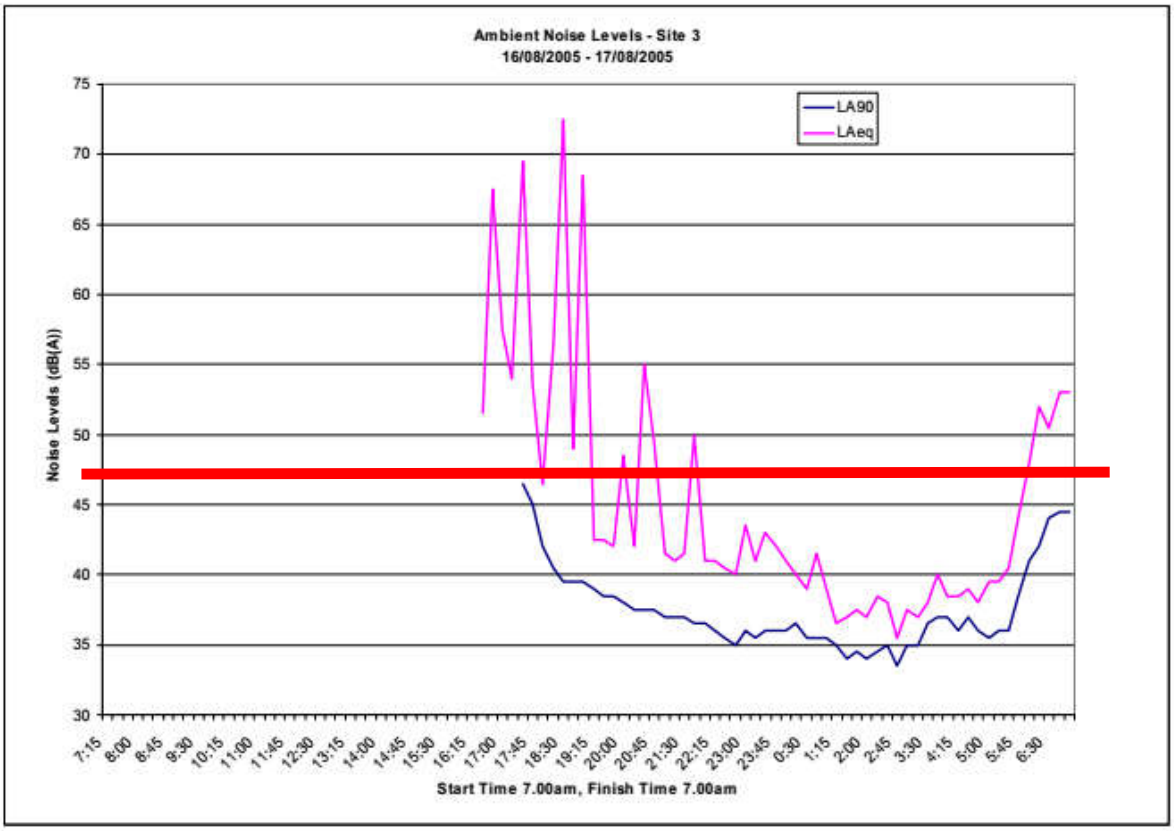
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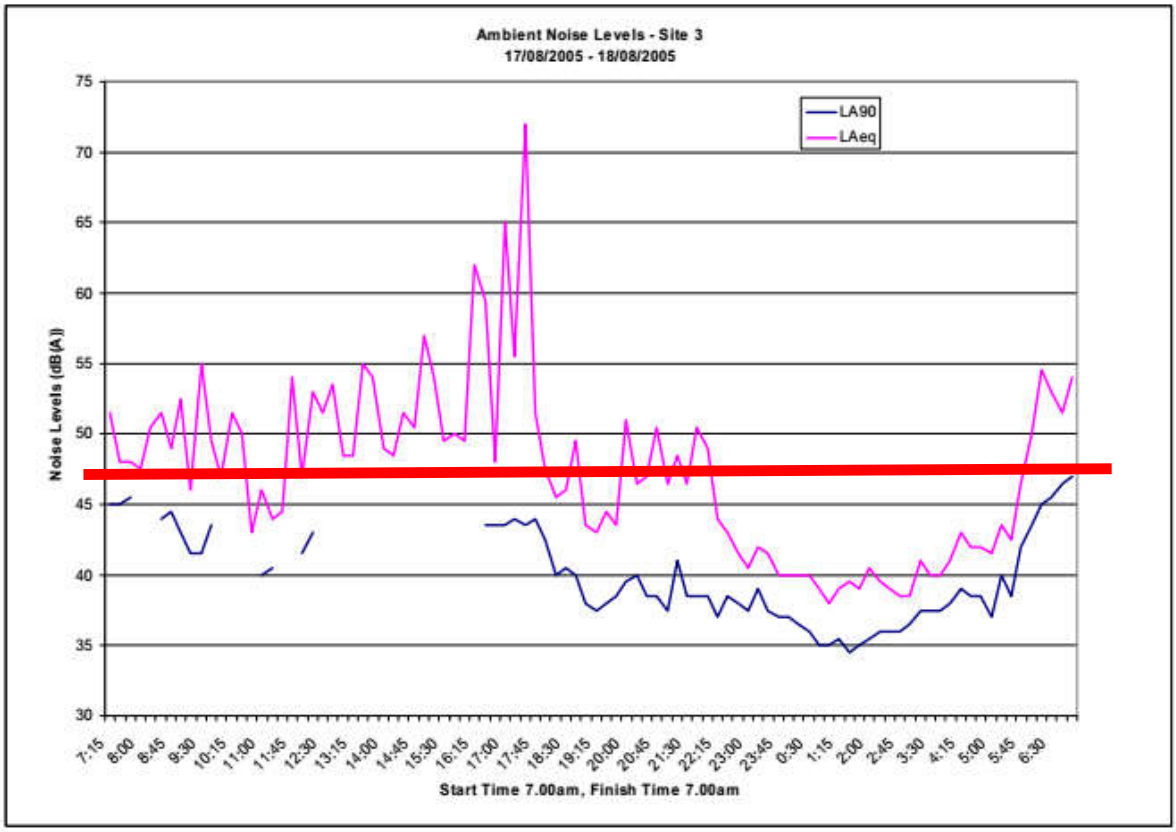
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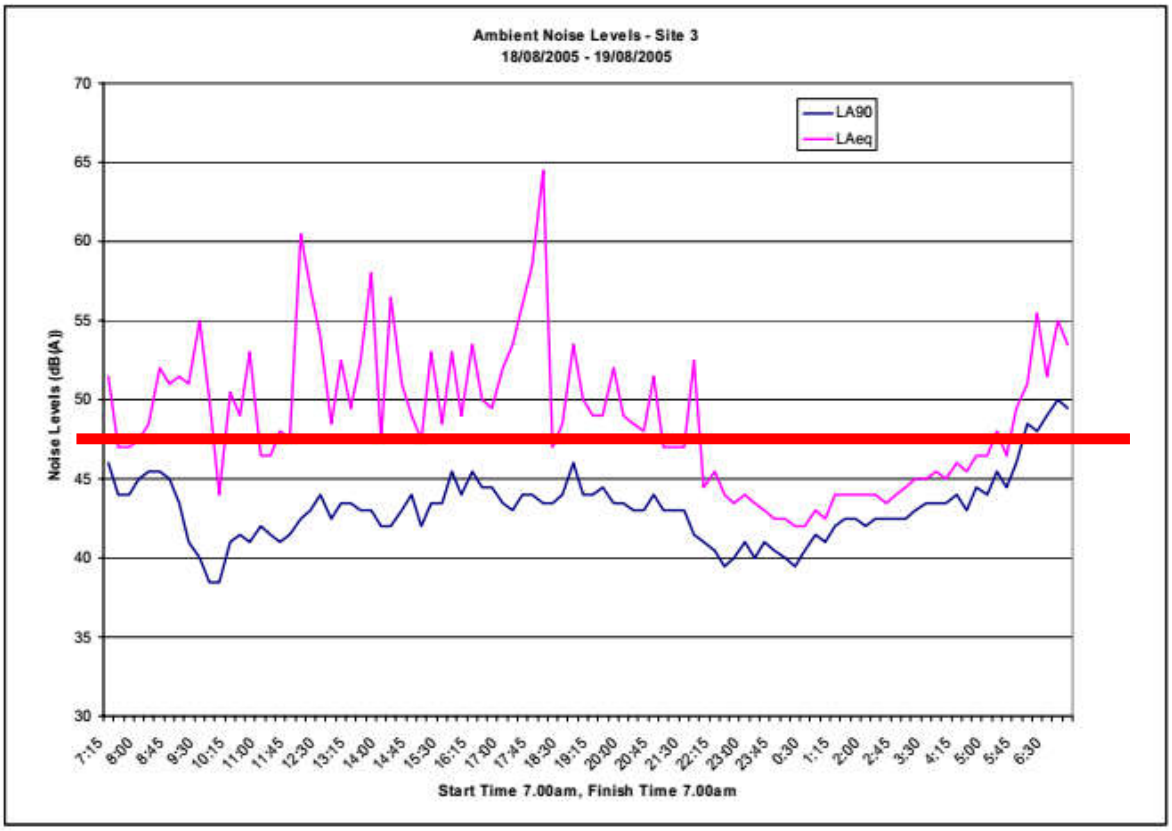
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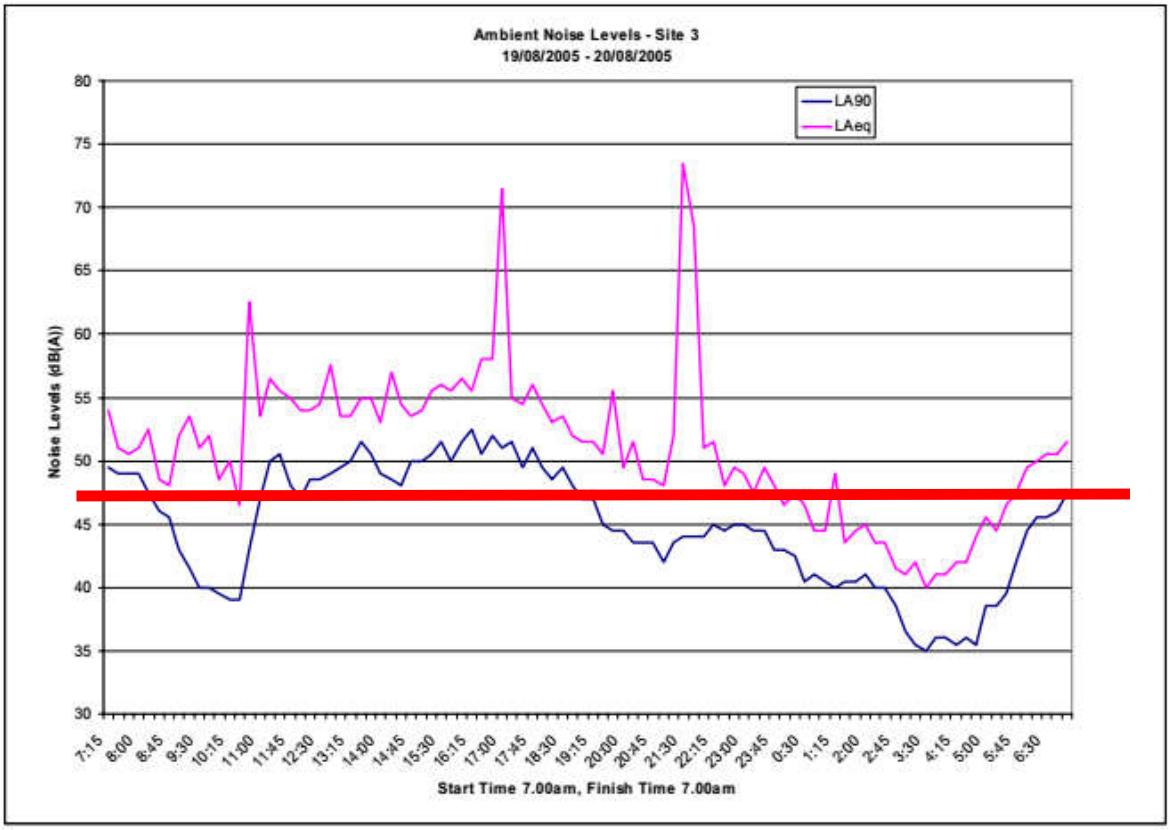
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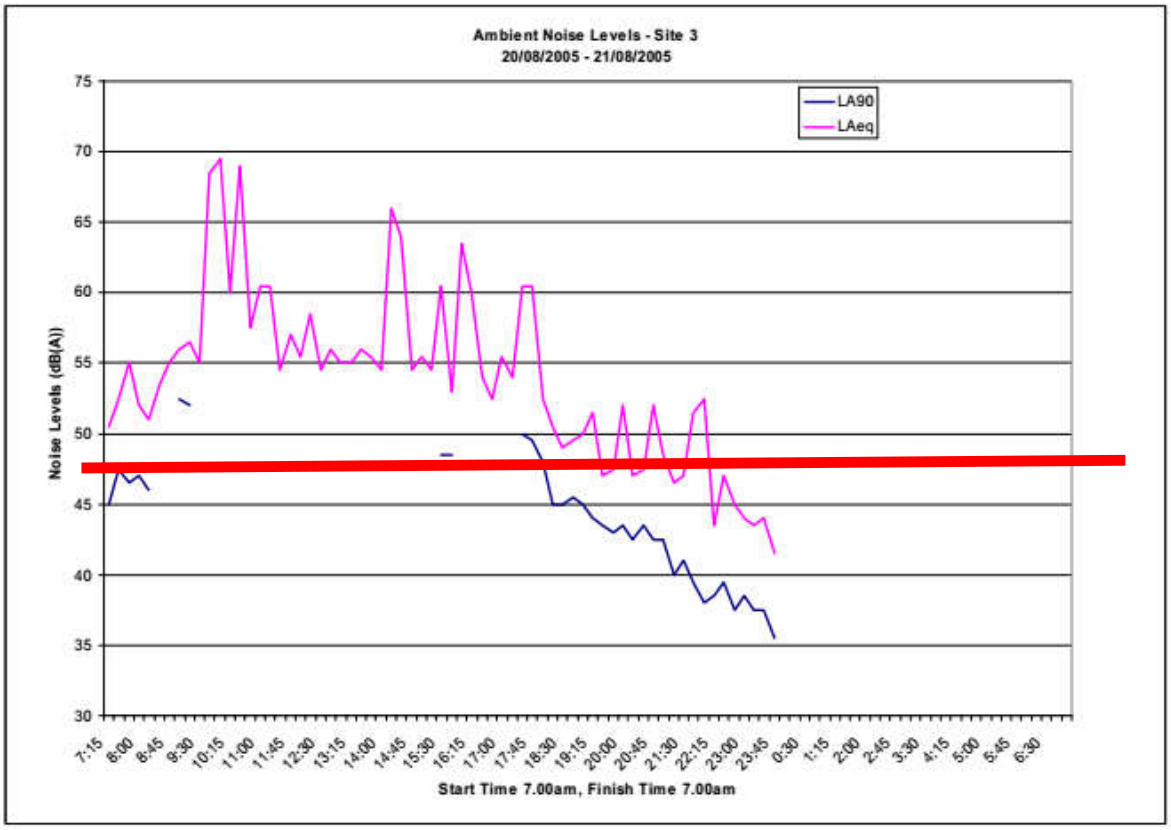
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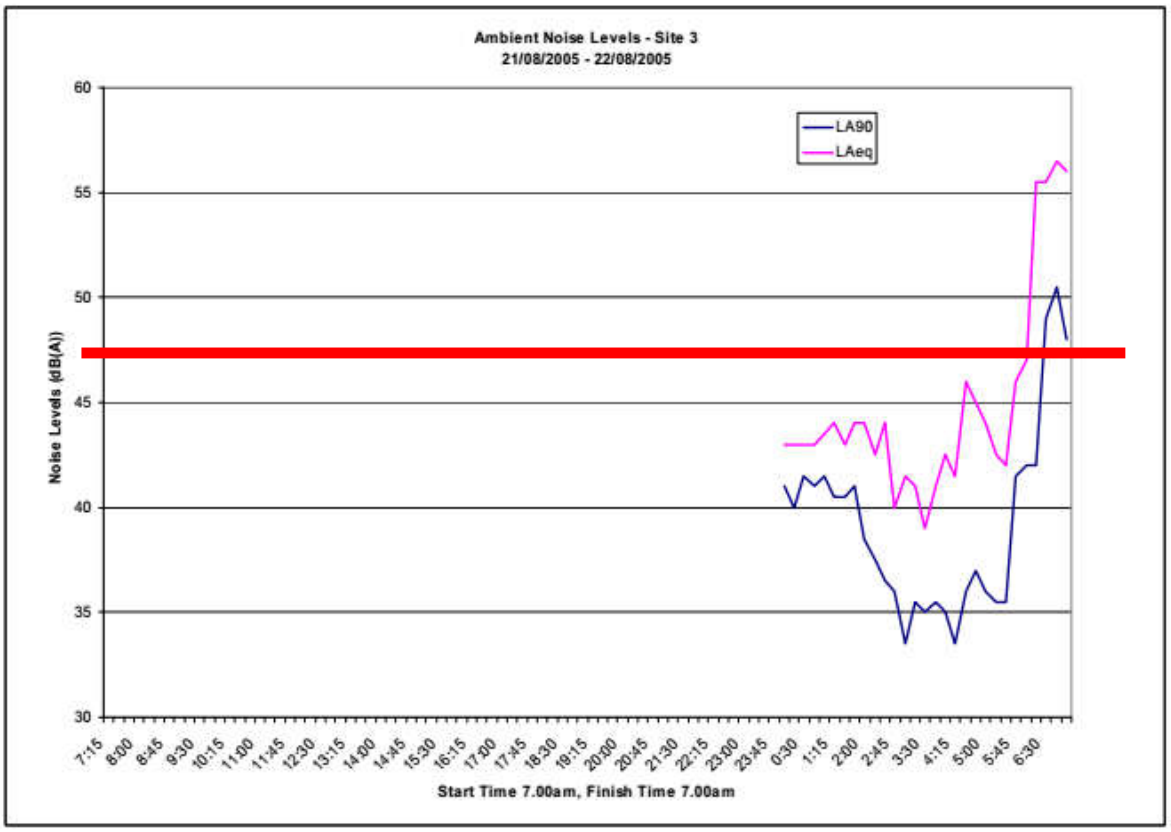
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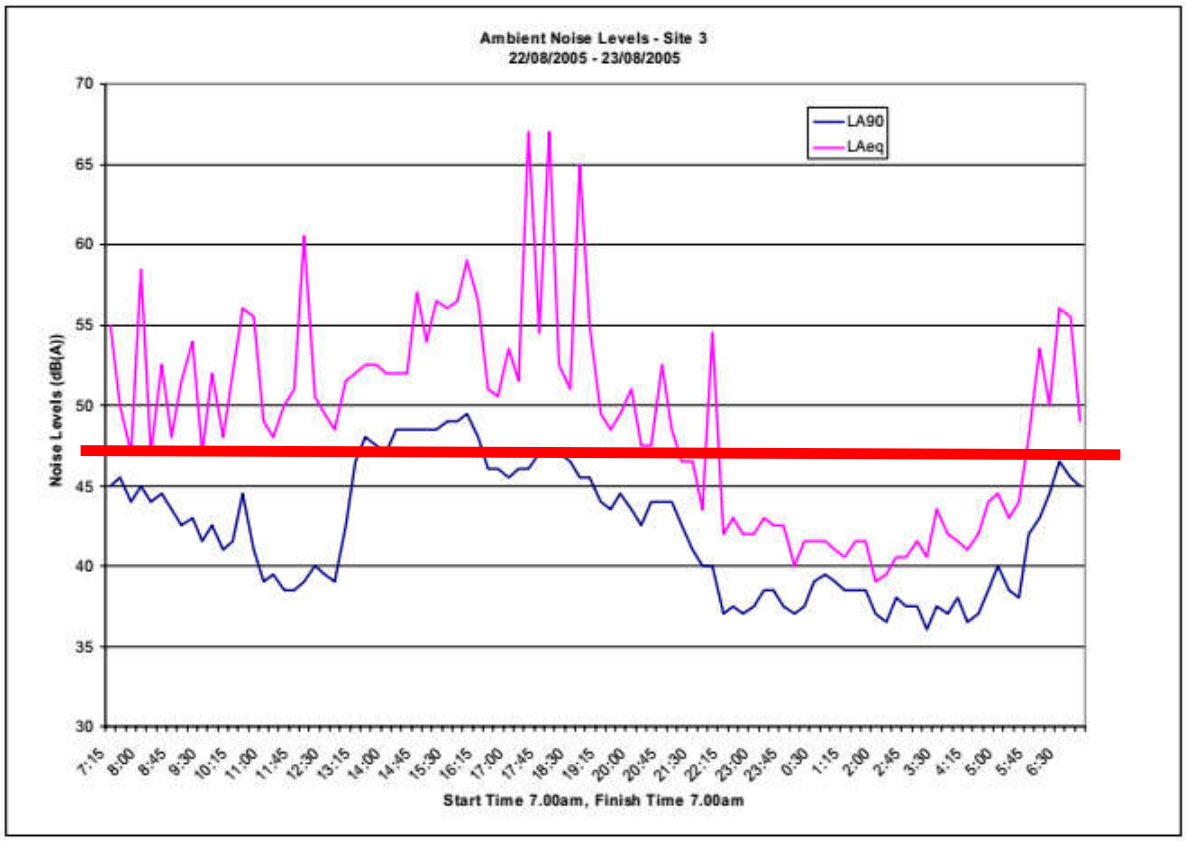
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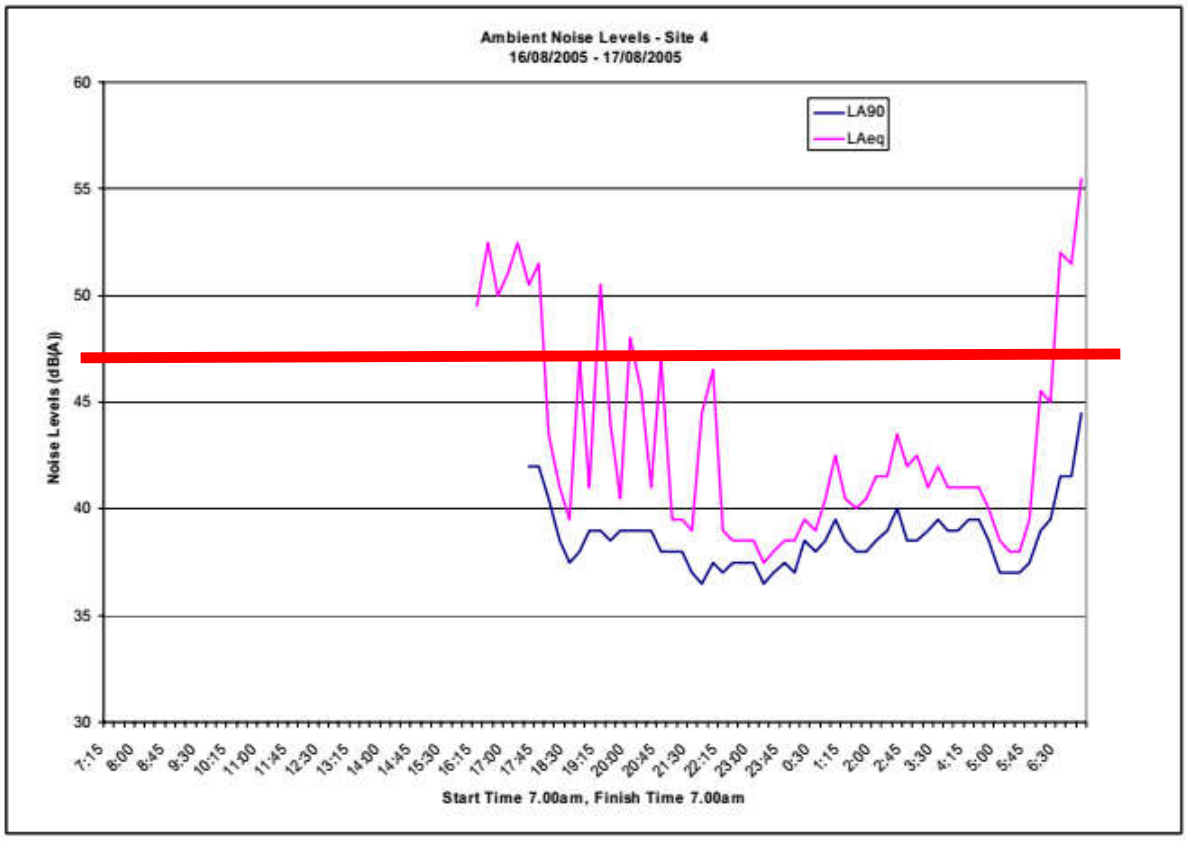
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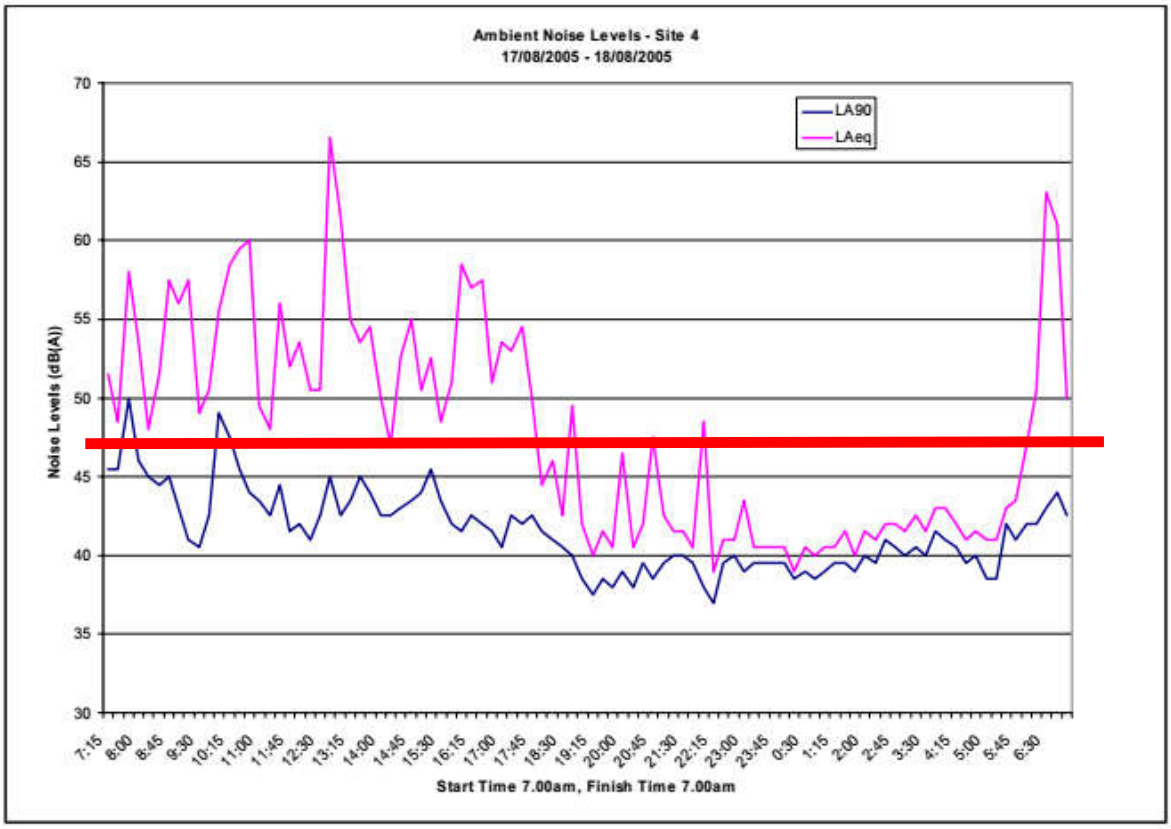
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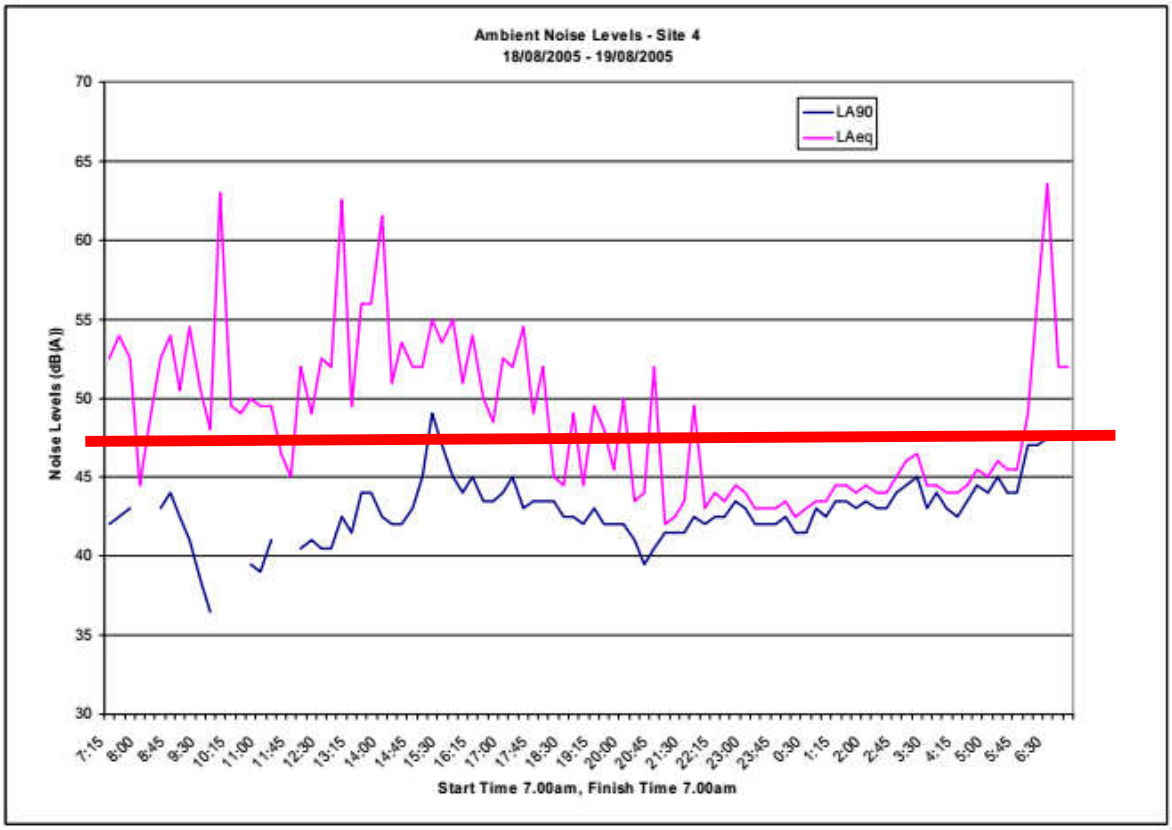
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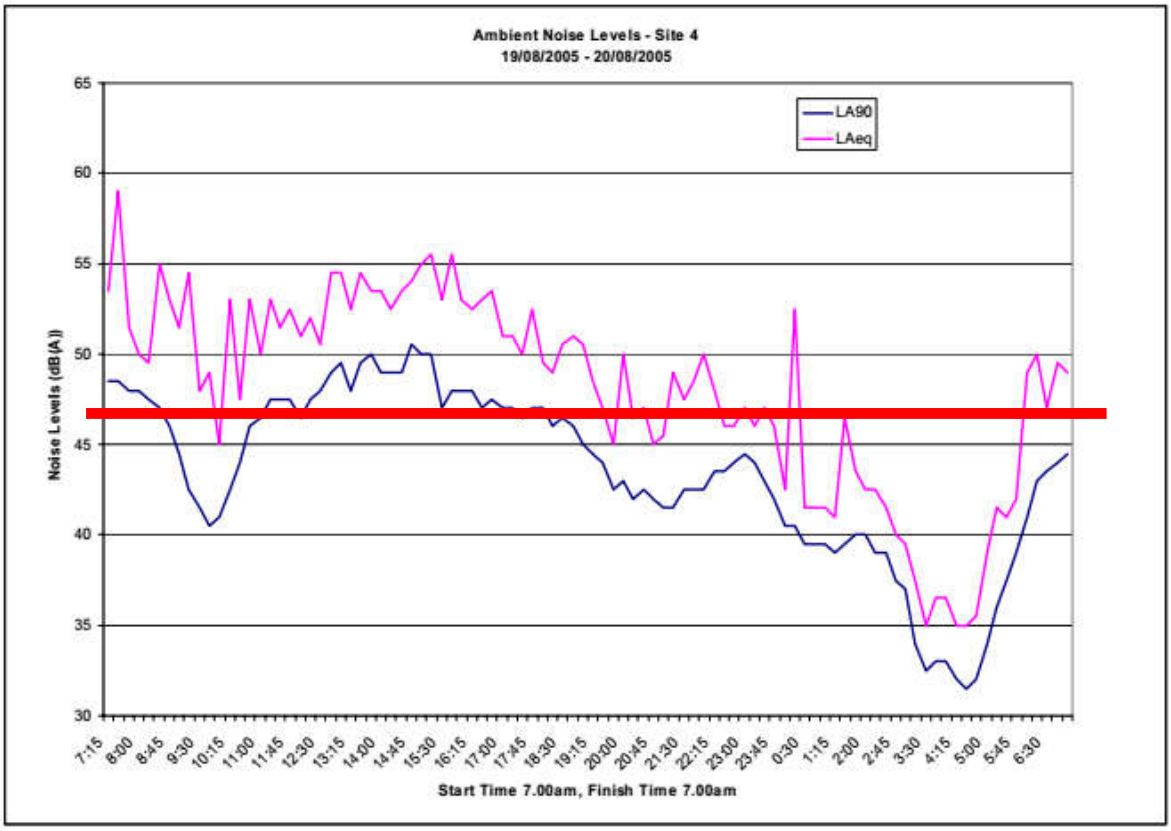
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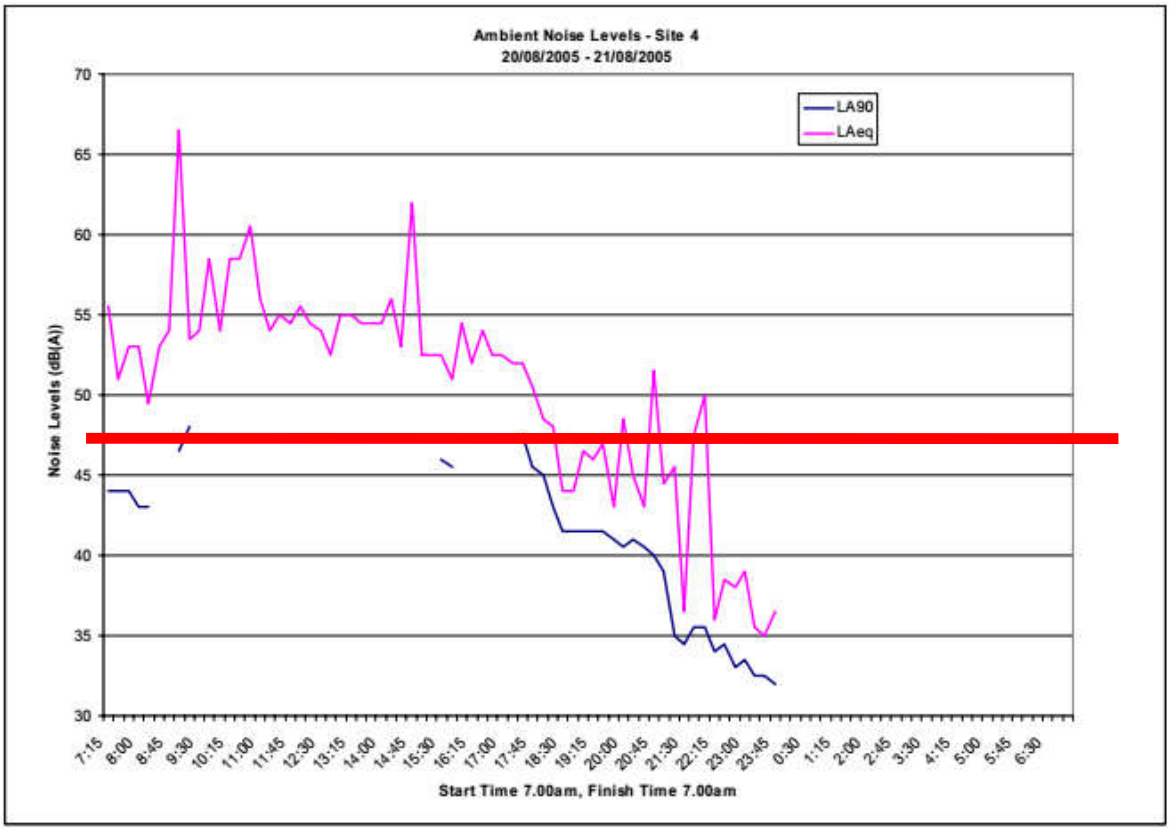
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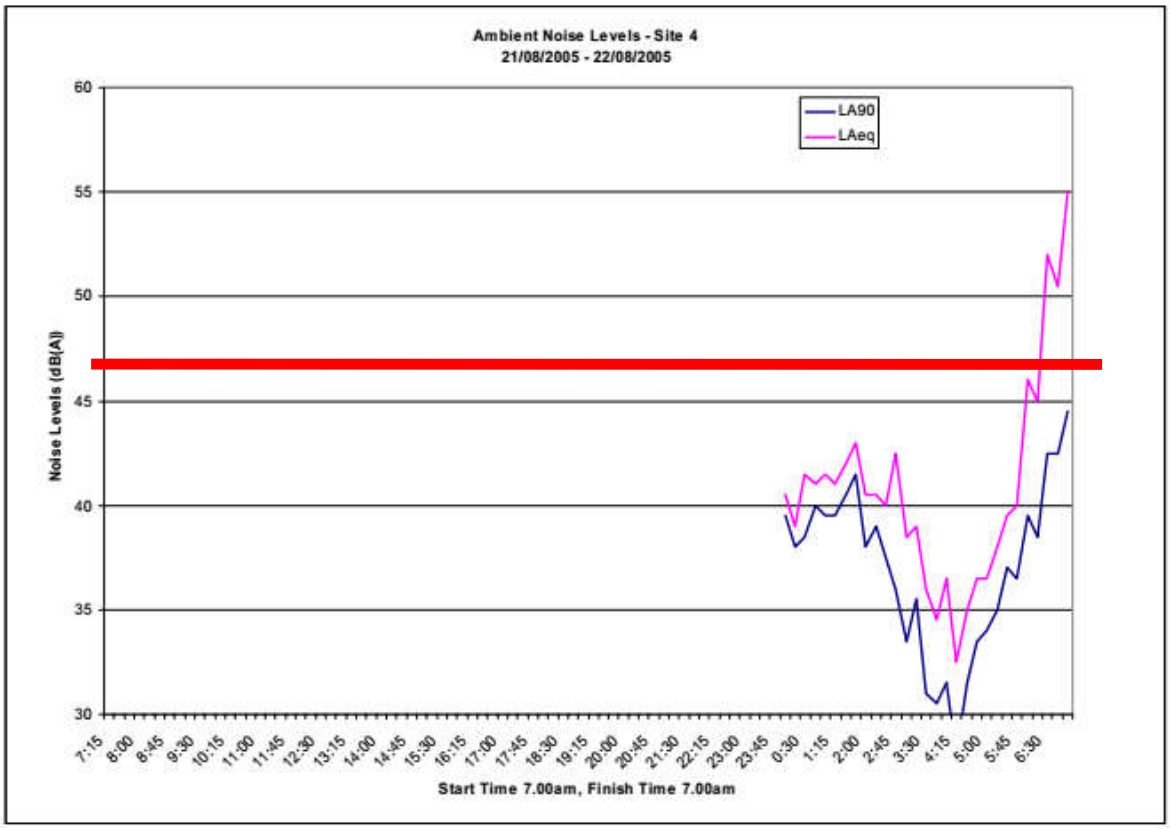
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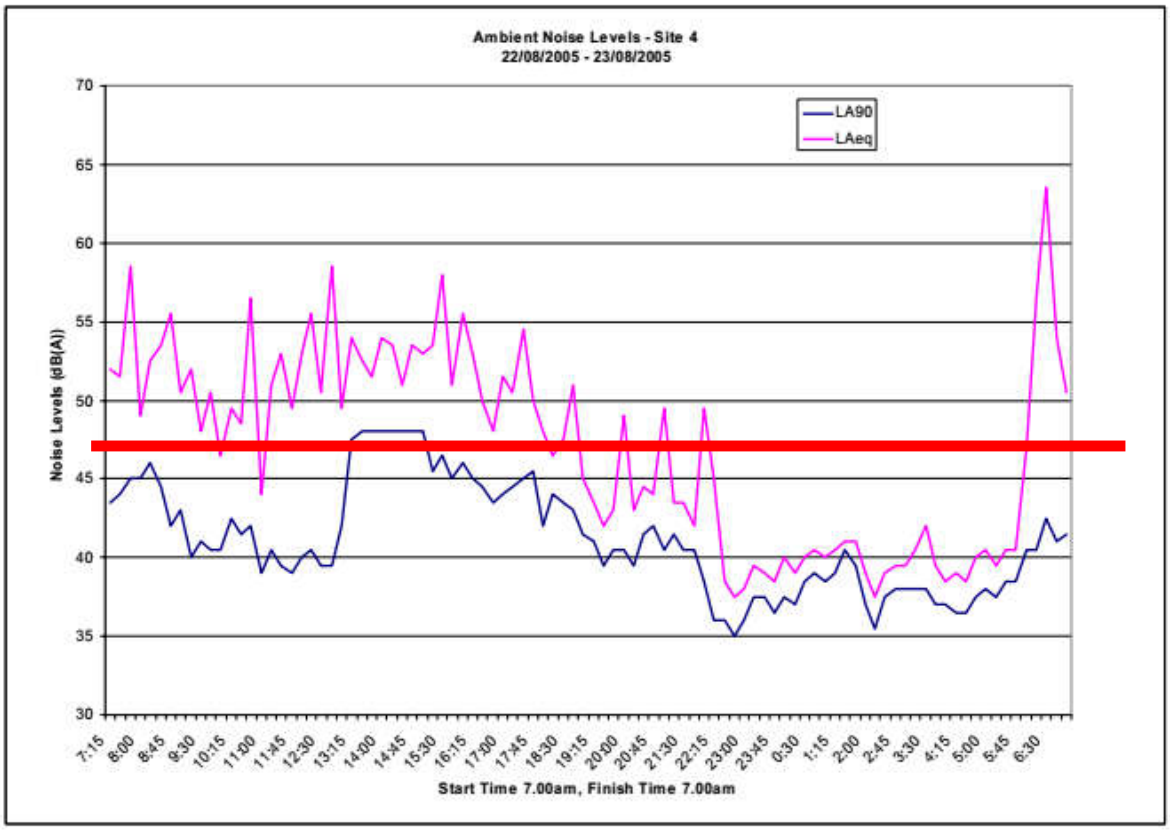
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Start Time 7.00am, Finish Time 7.00am

CRAIG HILL ACOUSTICS. ACOUSTIC, CONSULTING, ENGINEERING AND DESIGNS

CRAIG HILL ACOUSTICS

Acoustic Consultants

QLD & NSW

Cudgen Lakes Sand Quarry

Compliance Noise Monitoring

Tuesday, 09 August 2022

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Mobile 0418 762968 E: craig@craighillacoustics.com.au
Web site; craighillacoustics.com.au

DOCUMENT CONTROL PAGE

Cudgen Lakes Sand Quarry

Reference:090822/2

Report prepared for	Gales-Kingscliff Pty Limited
Date	Tuesday, 09 August 2022
Site	Cudgen Lakes Sand Quarry
Authorised by	Scott Hollamby
Consultants	Craig Hill Acoustics 7 View Ct Palm Beach. Qld 4221 Mob 0418 762 968 E: craig@craighillacoustics.com.au www:craighillacoustics.com.au
Signed	Craig Hill (manager) author
Copy	1 □ 2 x3 □ 4 □ 5 □ 6 □

Revision History		
No	Date Issued	Comments
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2	Scott Hollamby <scott@rwcorkery.com>	

Tuesday, August 9, 2022©

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 08 August 2022 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 (Hyundai HL-770
`Excavator (Doosan DX 420 LCA)
Road Trucks
Dredge 8 “

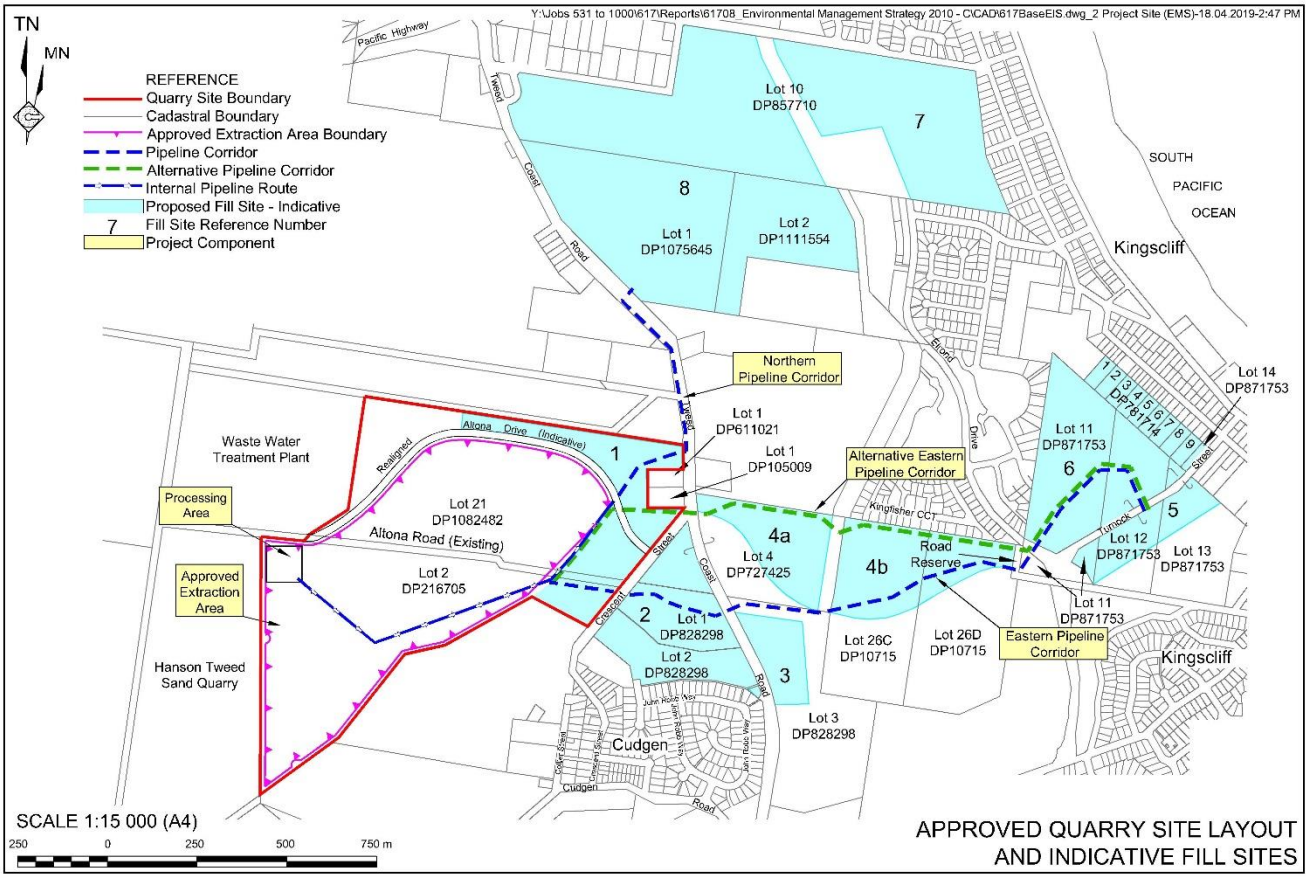
Table 1.3 Hours of operation

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 1.4 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 1.1 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 2.1 Monitoring locations

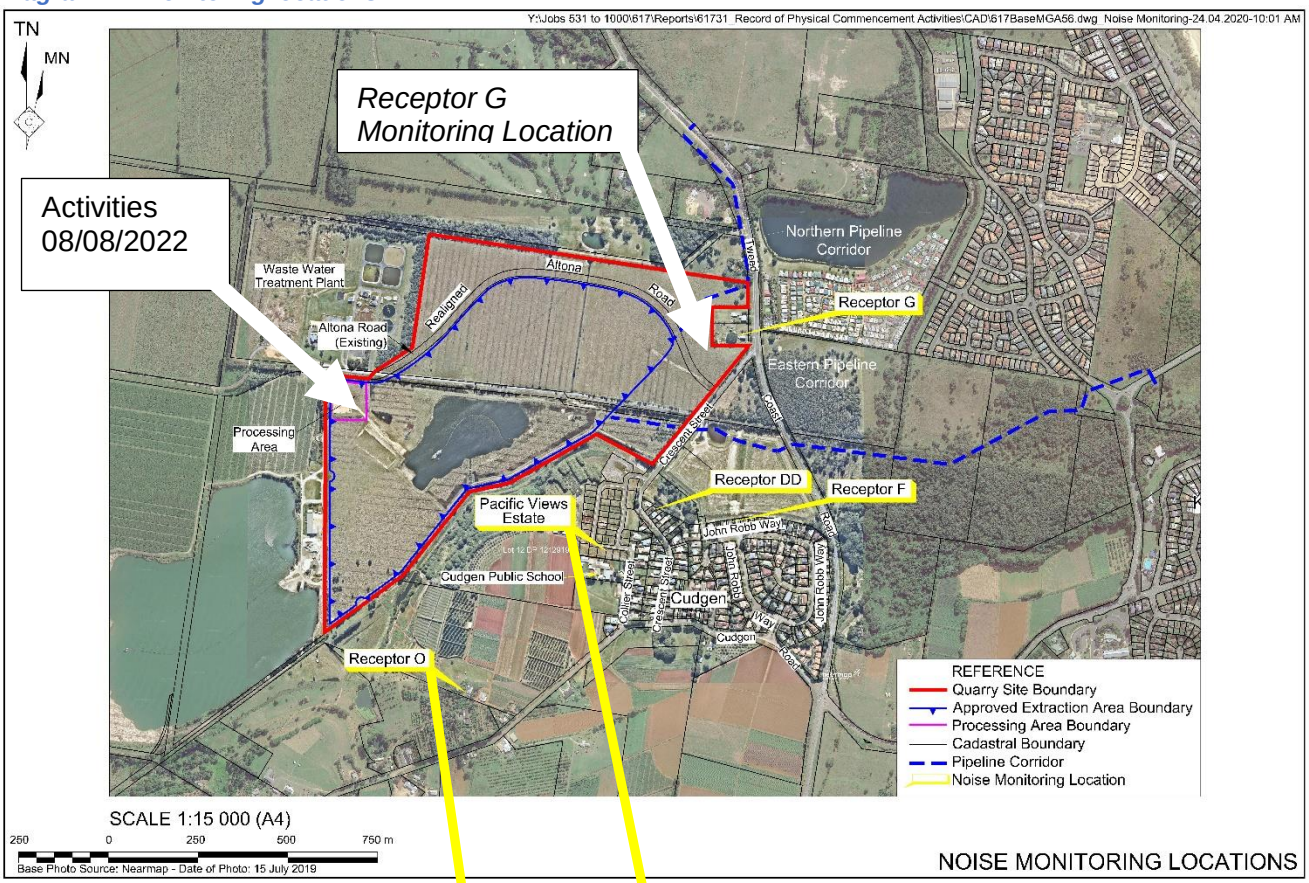
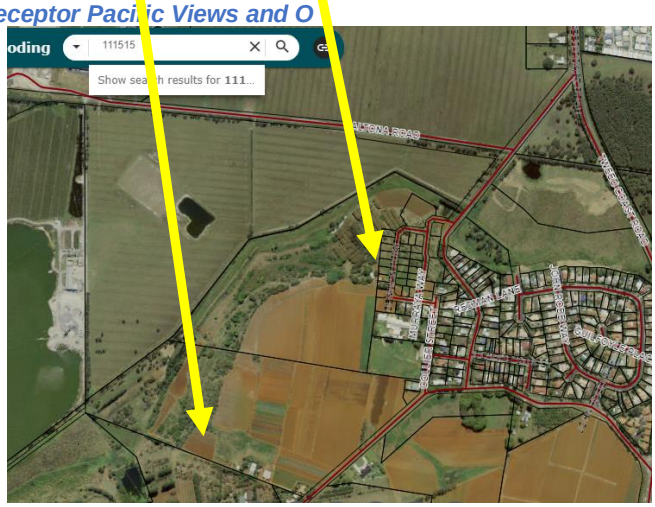


Diagram 2.2 Relocation of Receptor Pacific Views and O



Pic 2.1 View of site from Pacific views monitoring location

Pic 2.2 Zoomed in above pic

Pic 2.3 View of site from Receptor O monitoring location

Pic 2.2 Zoomed in above pic

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 March 2022.

BSWA Sound Level Calibrator Serial No 490190. calibrated August 2022.

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	60%
Wind Speed	5kts
Wind Direction	SSE
Atmospheric Pressure	1020 hpa
Cloud Cover	0%
Temp	20C

5.0 TESTING

The following tests were carried out at locations G, O, B, DD and F within 30m of affected dwellings where practical as indicated on the attached site plan.
Tests conducted on 08 August 2022 between 1000 and 11145 hrs.

- *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 08 August 2022

Table 5.1 Equipment being used at the time of the test 08/08/2022

Operating equipment	LAeq 15 min at 20 metres
CDE Wash Plant	76
Loader (Hyundai HL-770	71
Excavator (Doosan DX 420 LCA)	66
Road Trucks	66
Dredge	63

5.2 Equipment used during previous tests

Table 5.2 Equipment being used previous tests

Date:08 March 2022	
Operating equipment	Previous tests LAeq 15 min at 20 metres
CDE Wash Plant	76
Loader (Hyundai HL-770	71
Excavator (Doosan DX 420 LCA)	66
Road Trucks	66
Dredge	63
Date 01/10/2021	
Operating equipment	LAeq 15 min
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 08/08/2022

Receptor & Time hrs	**Attended Testing LAeq 15 minutes**	**> Project Criteria (47 LAeq 15min)**	**> Cumulative Criteria (50 LAeq 11 hrs)**	**Comments**
G 1000-1015	47	0	-3	Noise from other sources such as traffic noise from Coast Road dominated background. Noise from operations not measurable / distinguishable above background.
O 1020-1035	48	1	-2	Noise from other sources such as traffic noise from Pacific Highway dominated background. Noise from operations occasionally audible but not measurable above background.
Pacific Views 1100-1115	48	1	-2	Noise from other sources such as traffic noise from Pacific Highway dominated background. Noise from operations occasionally audible but not measurable above background.
DD 1120-1125	50	3	0	Noise from other sources such as traffic noise from Coast Road dominated background. Noise from operations not audible or measurable / distinguishable above background.
F 1130-1145	49	2	-1	Noise from other sources such as traffic noise from Coast Road dominated background. Noise from operations not audible / distinguishable above background.

7.0 PREDICTED LEVELS

Equipment operations were not either audible or measurable at any of the motoring sites. 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

Receptor	Distance metres	Dredge 8" 63 LAeq @ 20m	CDE wash plant 70LAeq @ 20 mts (not in use)	Loader 71LAeq @ 20 mts	Excavator 66 LAeq @ 20 m (not in use)	Road Trucks 66 LAeq @ 20 m	Combined	Combined with line of sight attenuation	> Project Day Criteria (47 LAeq 15 min)	> Cumulative Day Criteria (50 LAeq 11 hrs)
		Predicted Levels with Distance attenuation								
G	880m	30	37	38	33	33	42	42	-5	-8
O	600m	33	40	41	36	36	45	45	-2	-5
Pacific Views	555m	34	41	42	37	37	45	47	-0	-3
DD	780m	31	38	39	34	34	43	33	-14	-17
F	900m	30	37	38	33	33	42	32	-15	-18

(not in use): 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 at locations G,F,O and DD.

Noise from the operations was occasionally audible at Locations O and Pacific Views Estate but was not measurable due to other noise.
Distance calculations of measured noise levels from operating plant on site indicate 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. This measurement 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

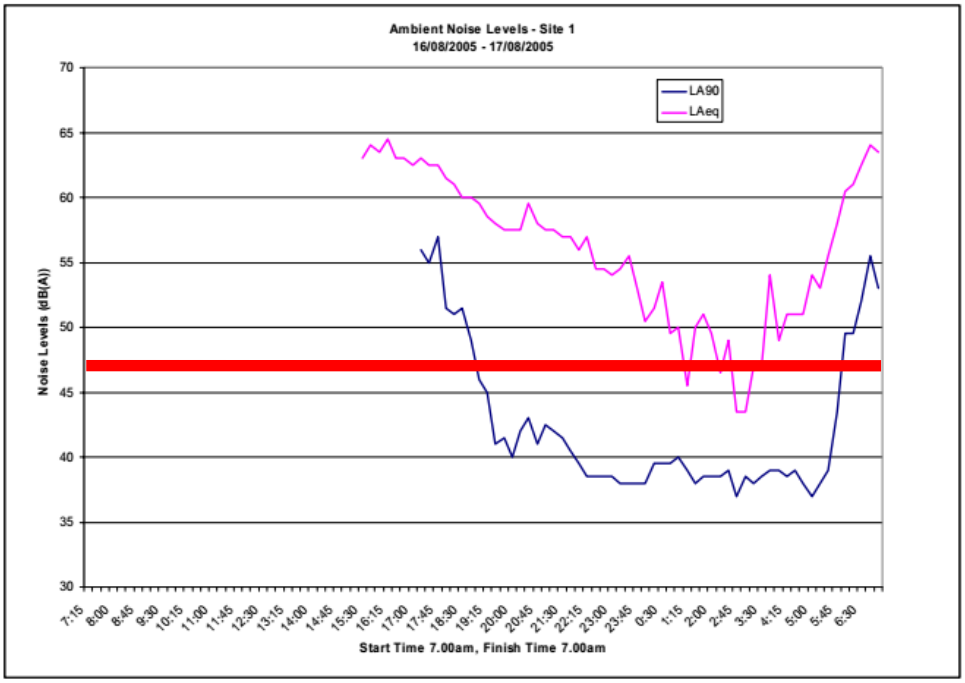
Receptor	**Pre-project / Baseline Levels**	**Compliance Monitoring LAeq 15 min**											**Project Criteria**	
		Previous testing										Latest tests	LAeq 15 min	LAeq 11 hr
	Unattended logger original report	23/08/05	10/07/17	30/08/18	20/04/20	20/04/20	10/12/20	18/06/21	05/08/21	01/10/21	08/04//22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

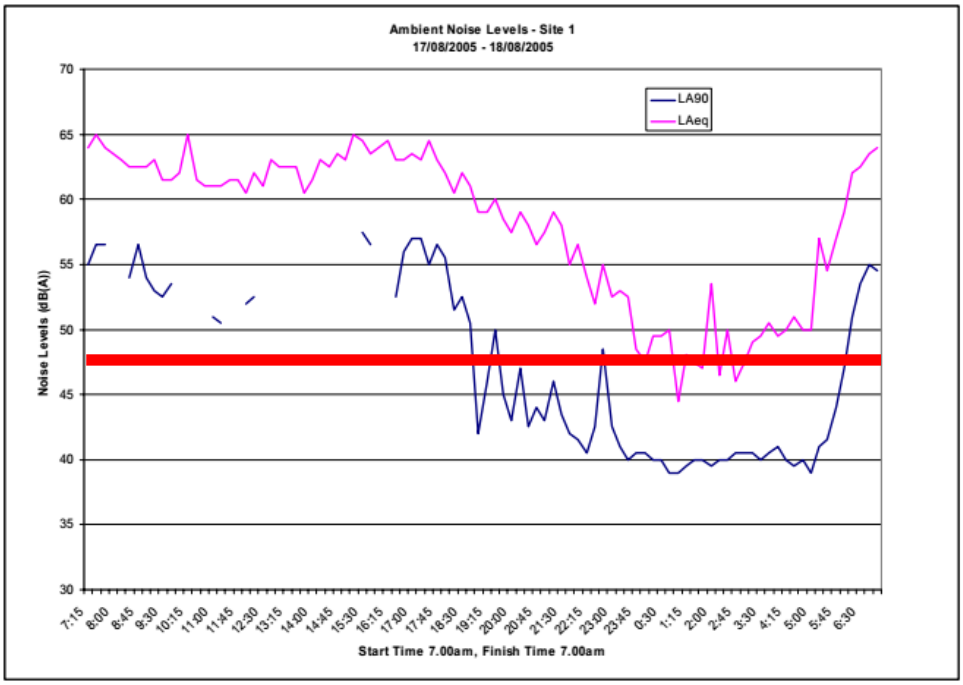
Monitored levels in the area are not unusual for daytime compliance testing. Examination of pre-project data shows ambient LAeq for day and evening rarely drops below the project design levels making it difficult to enable compliance identification.

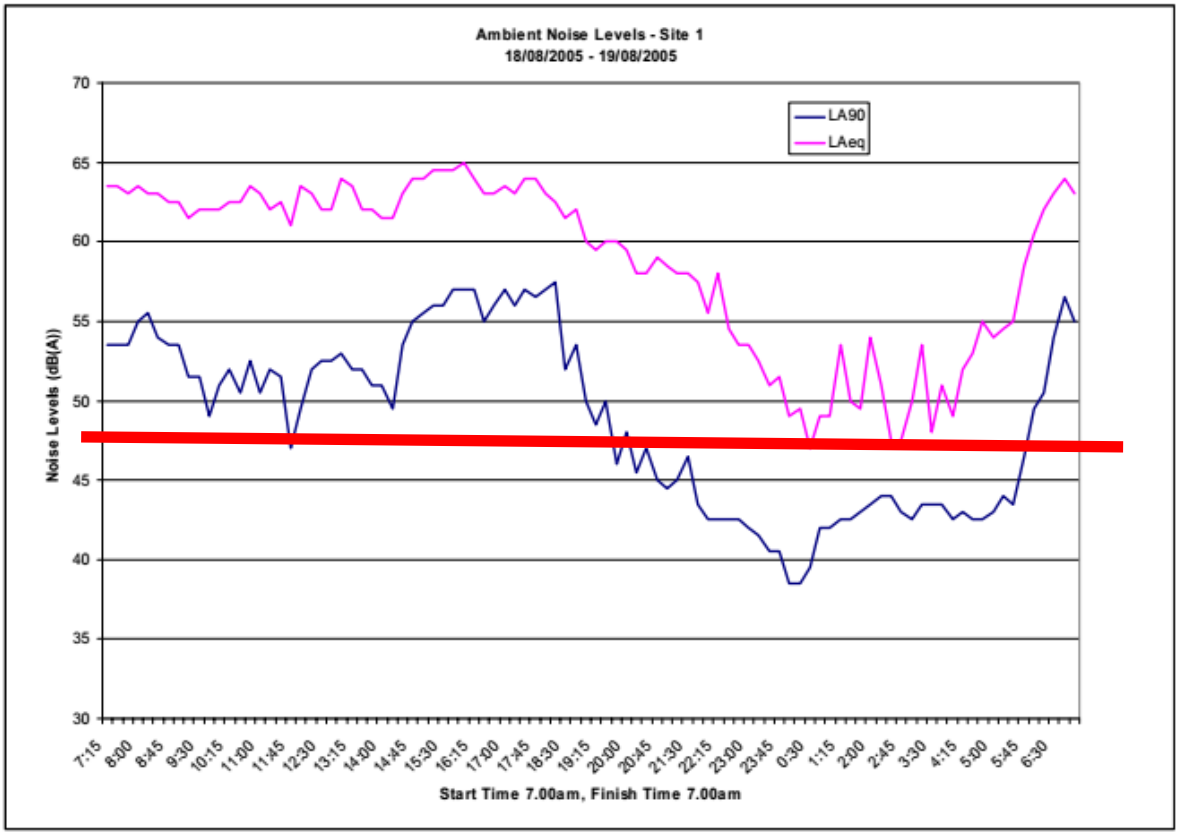
To better demonstrate this, **Appendix A** shows graphs for the pre-project monitoring (Rumble Report No. 617/04 unattended logger). The project criteria for day and evening periods of 47LAeq is indicated by the straight red line. From **Appendix A** it can be seen that the LAeq levels generally do not 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))
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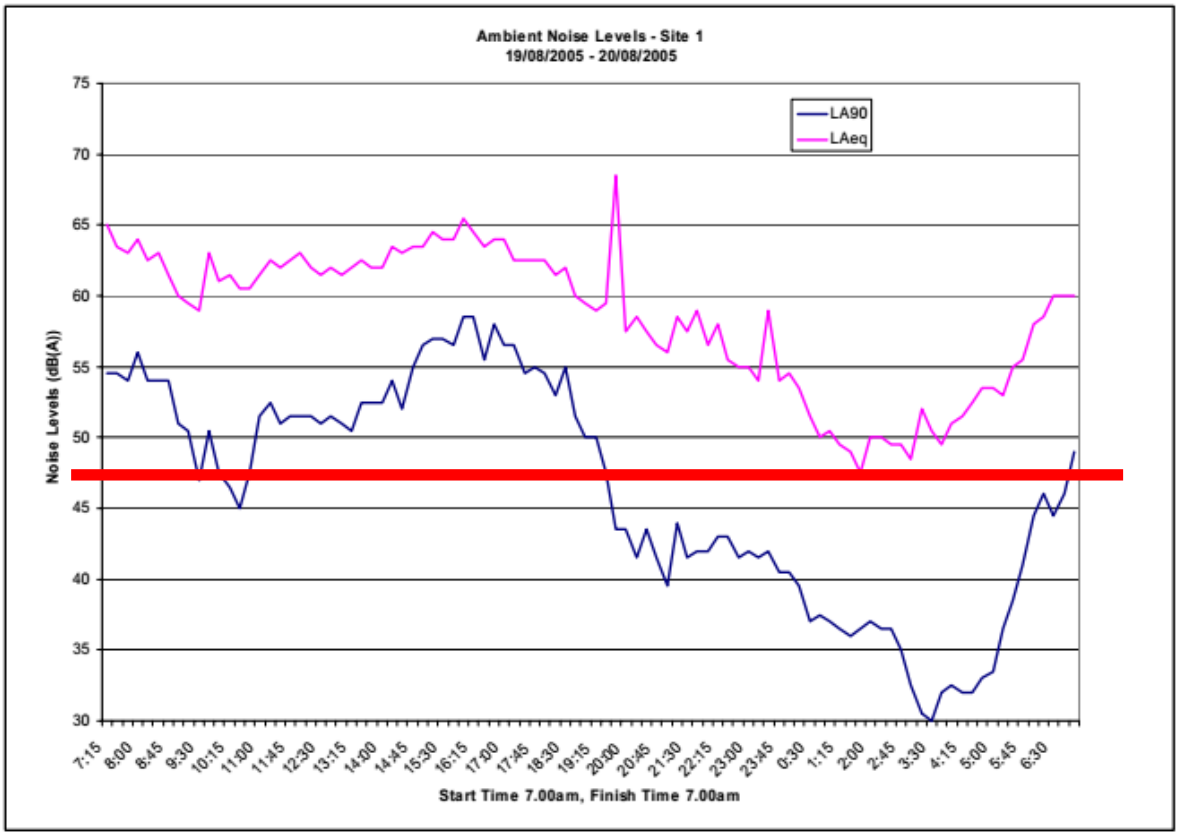
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am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LA90
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Noise Levels (dB(A))
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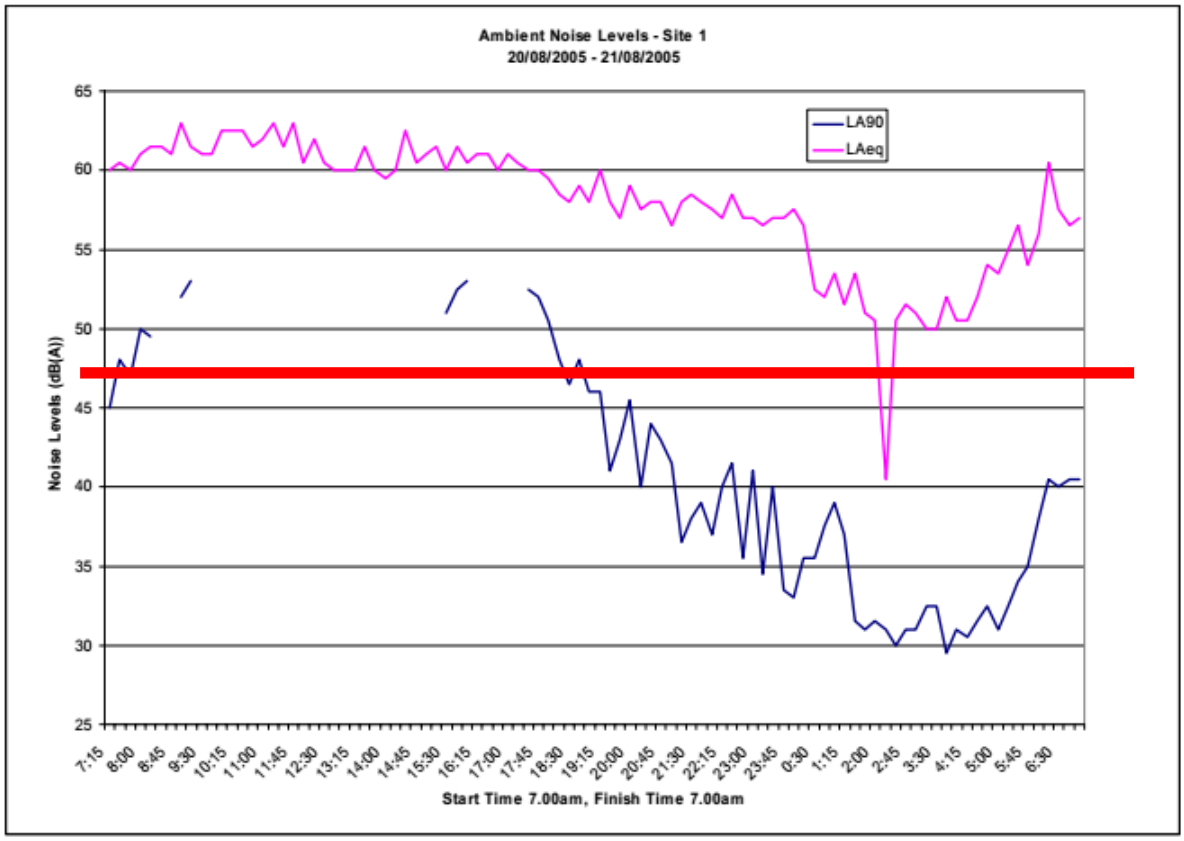
Start Time 7.00am, Finish Time 7.00am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20/08/2005 - 21/08/2005
LA90
LAeq
Noise Levels (dB(A))
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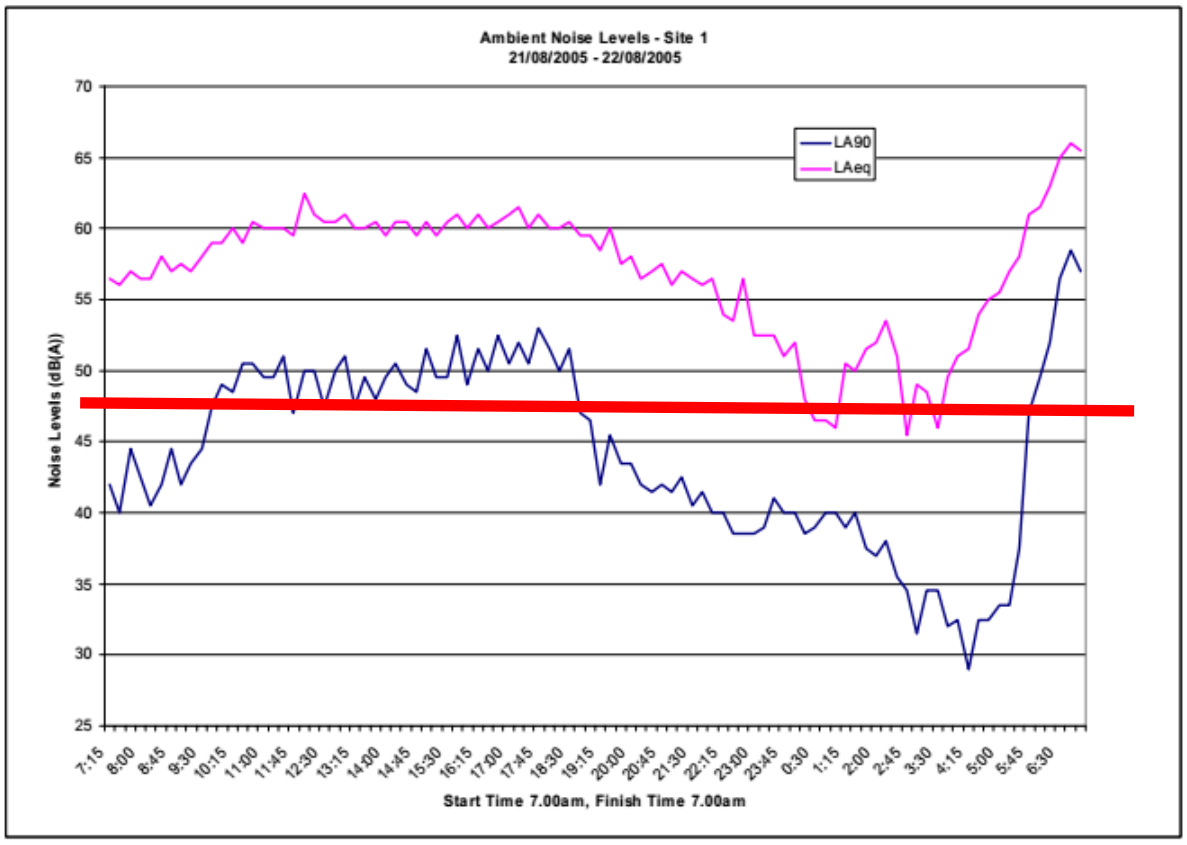
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Noise Levels (dB(A))
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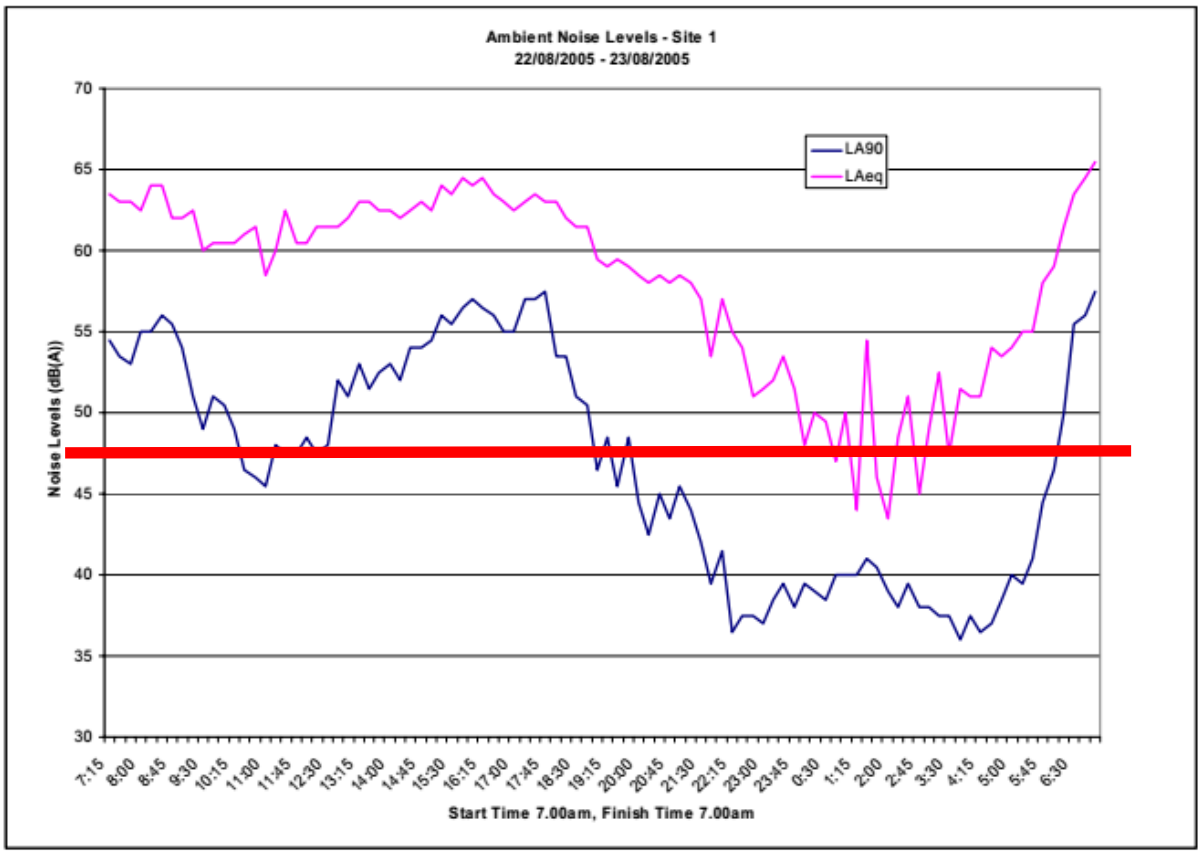
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Noise Levels (dB(A))
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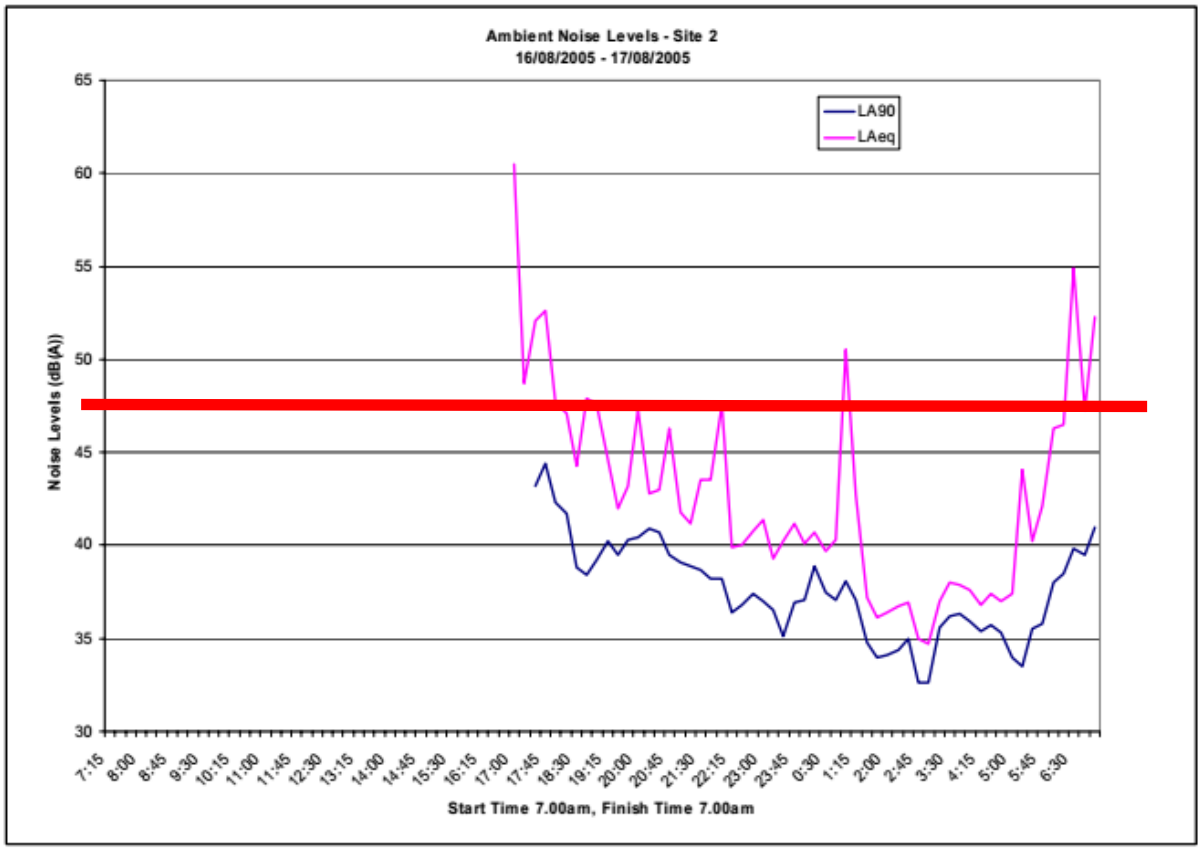
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LAeq
Noise Levels (dB(A))
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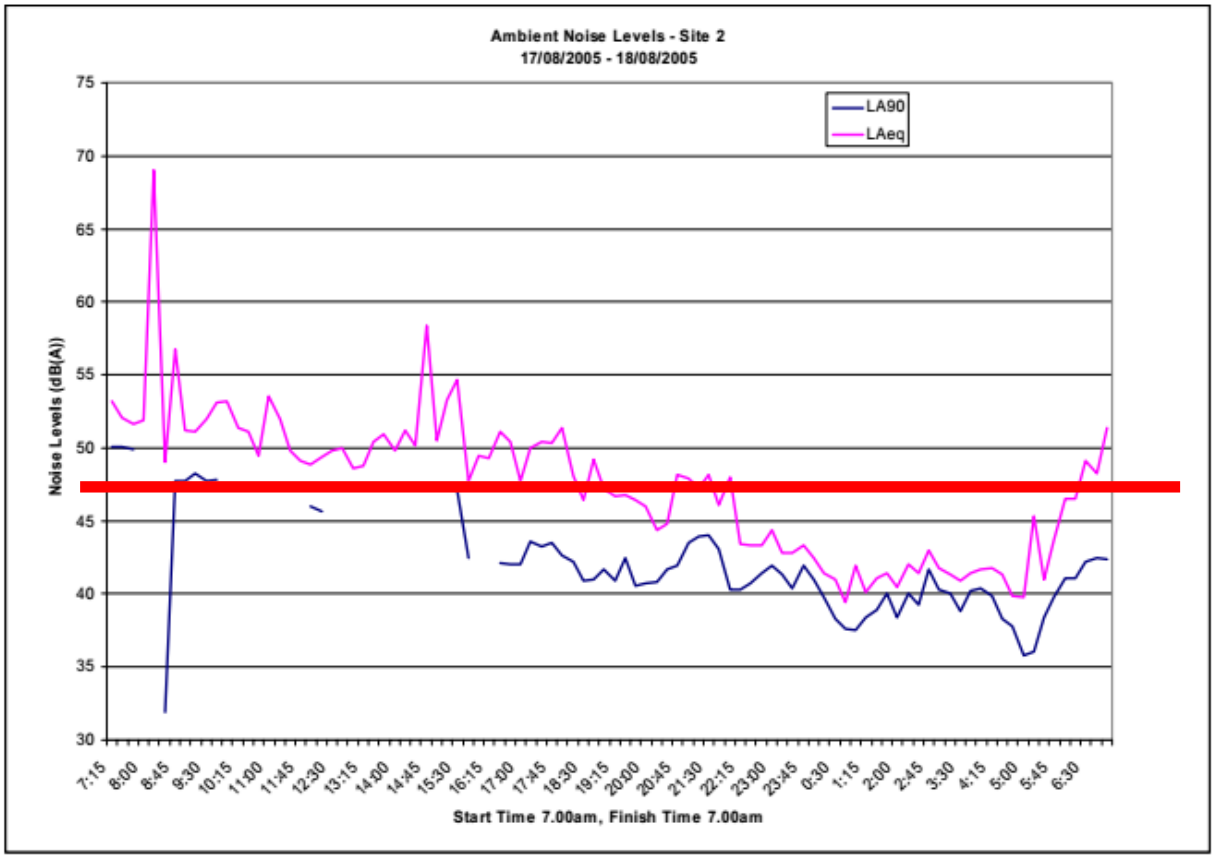
Start Time 7.00am, Finish Time 7.00am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17/08/2005 - 18/08/2005
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LAeq
Noise Levels (dB(A))
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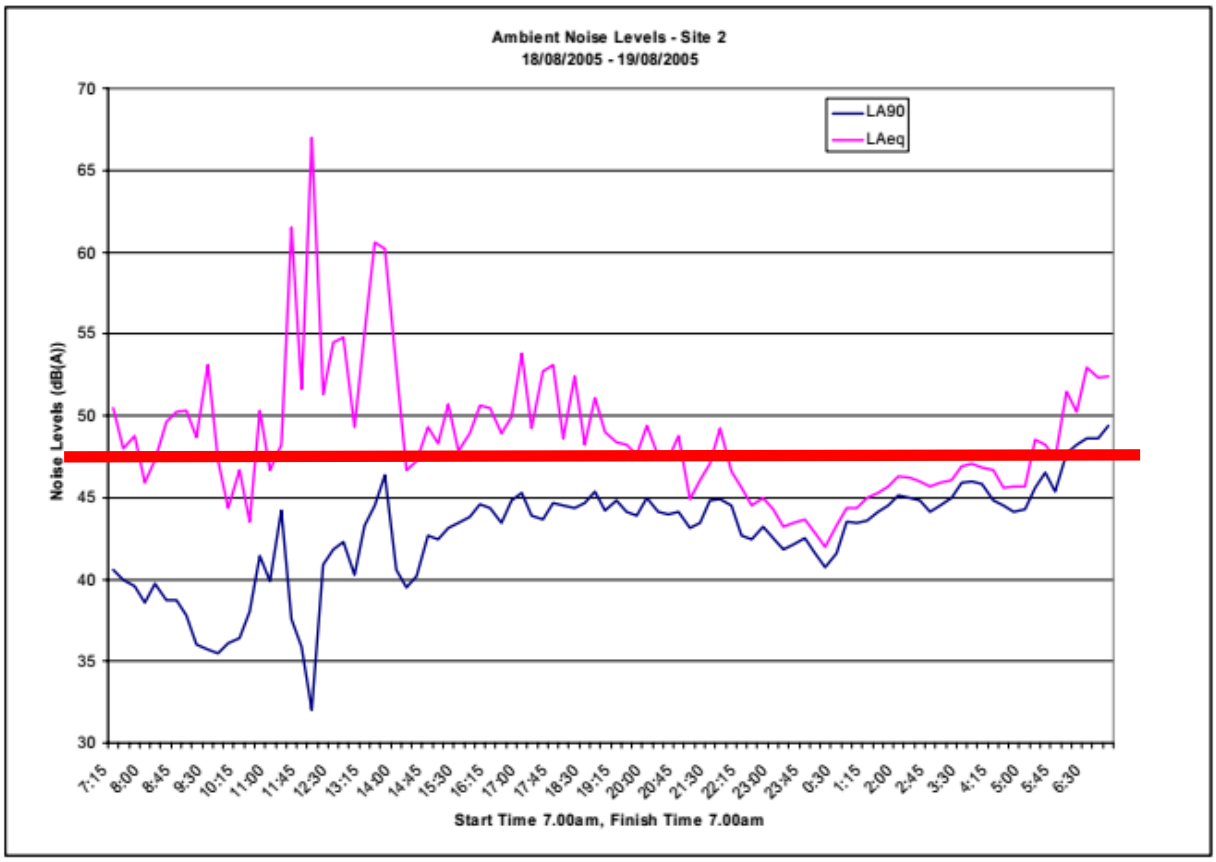
Start Time 7.00am, Finish Time 7.00am


Ambient Noise Levels - Site 2
18/08/2005 - 19/08/2005
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Noise Levels (dB(A))
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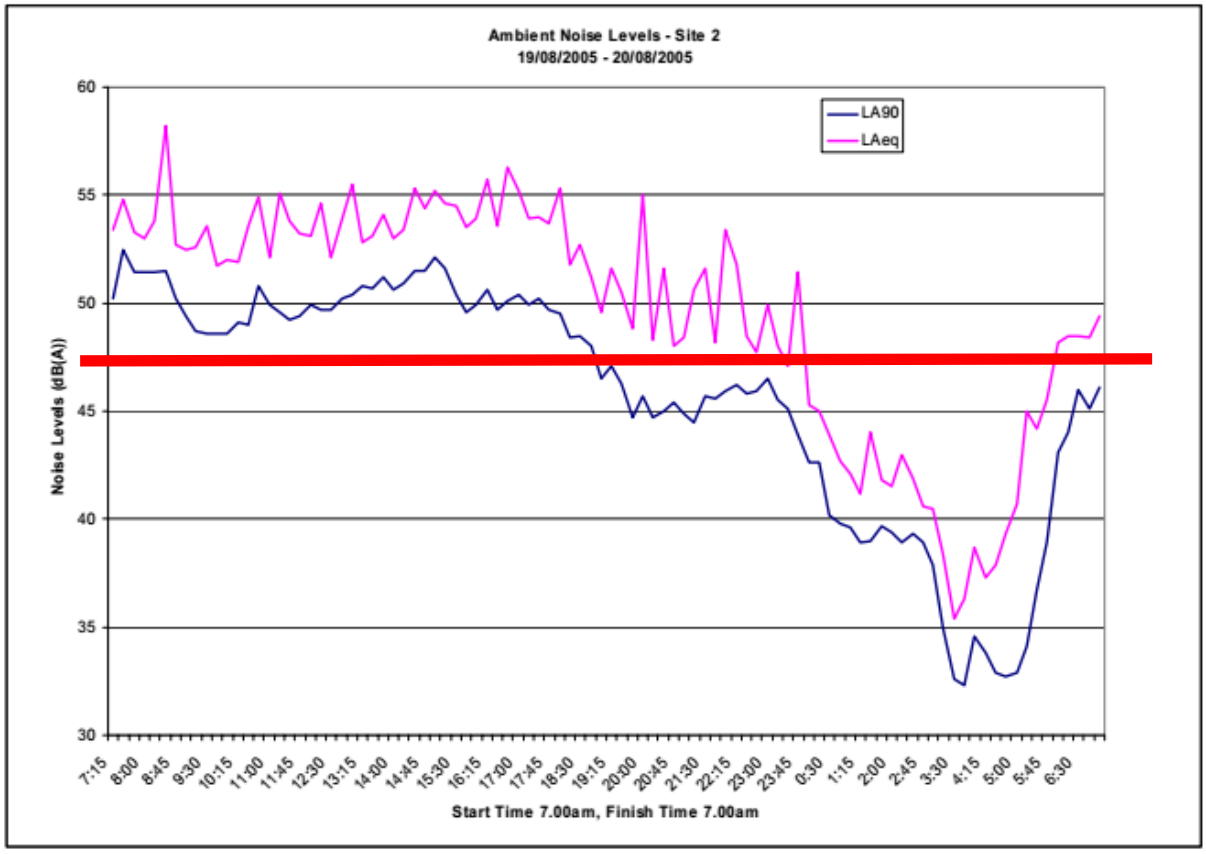
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Noise Levels (dB(A))
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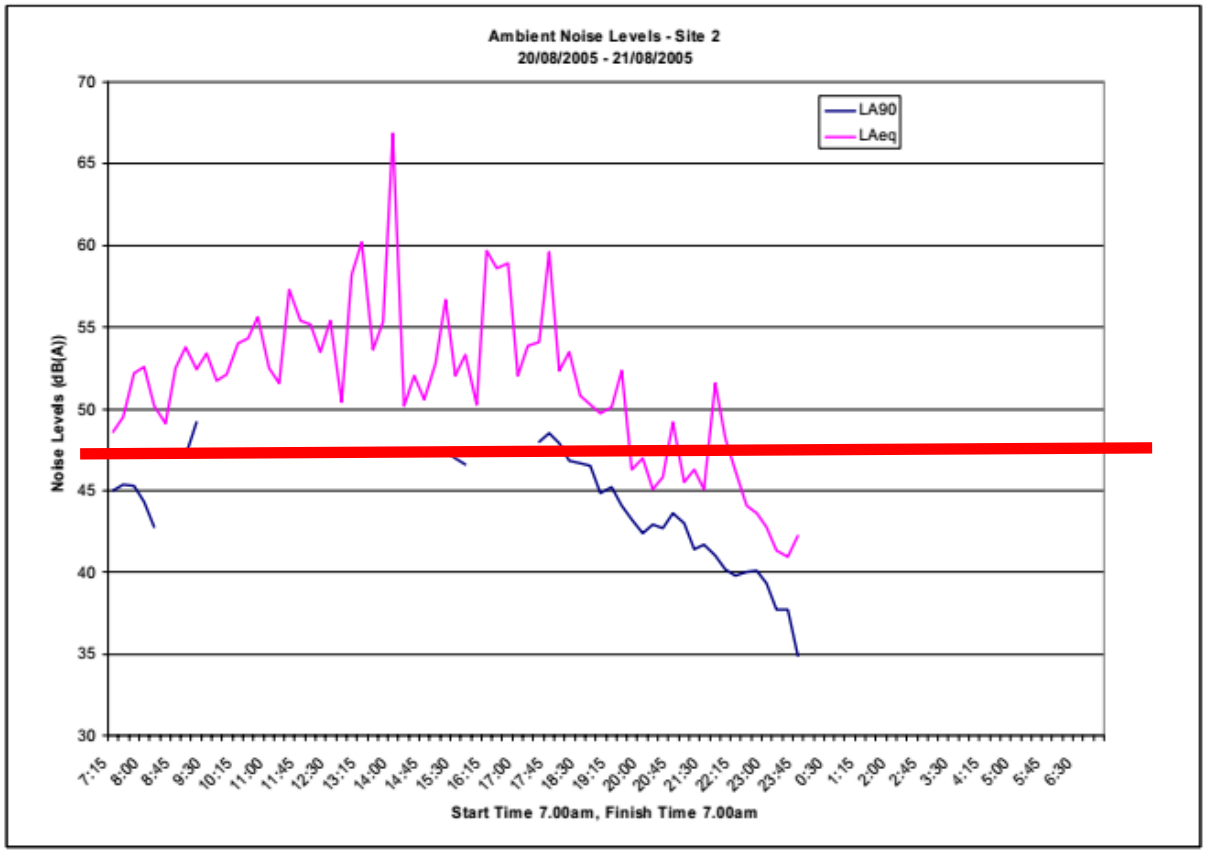
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Noise Levels (dB(A))
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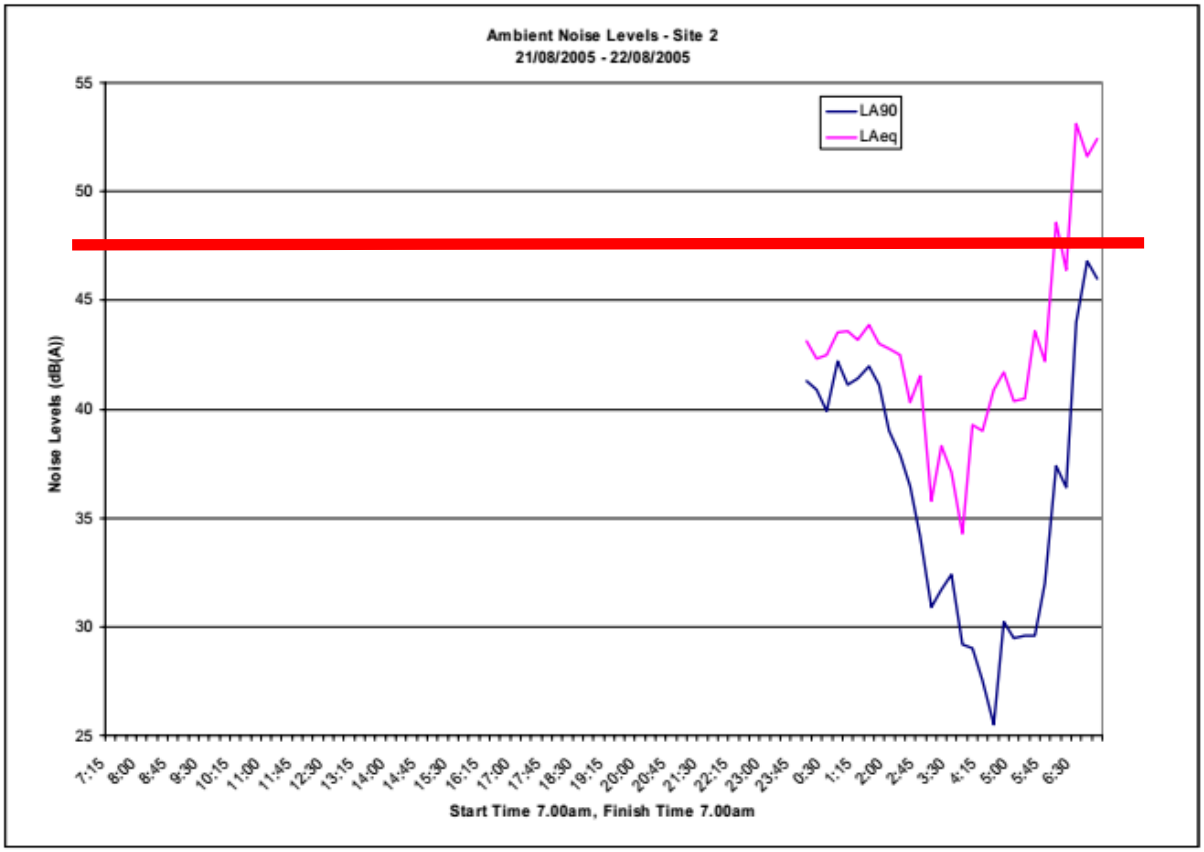
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LAeq
Noise Levels (dB(A))
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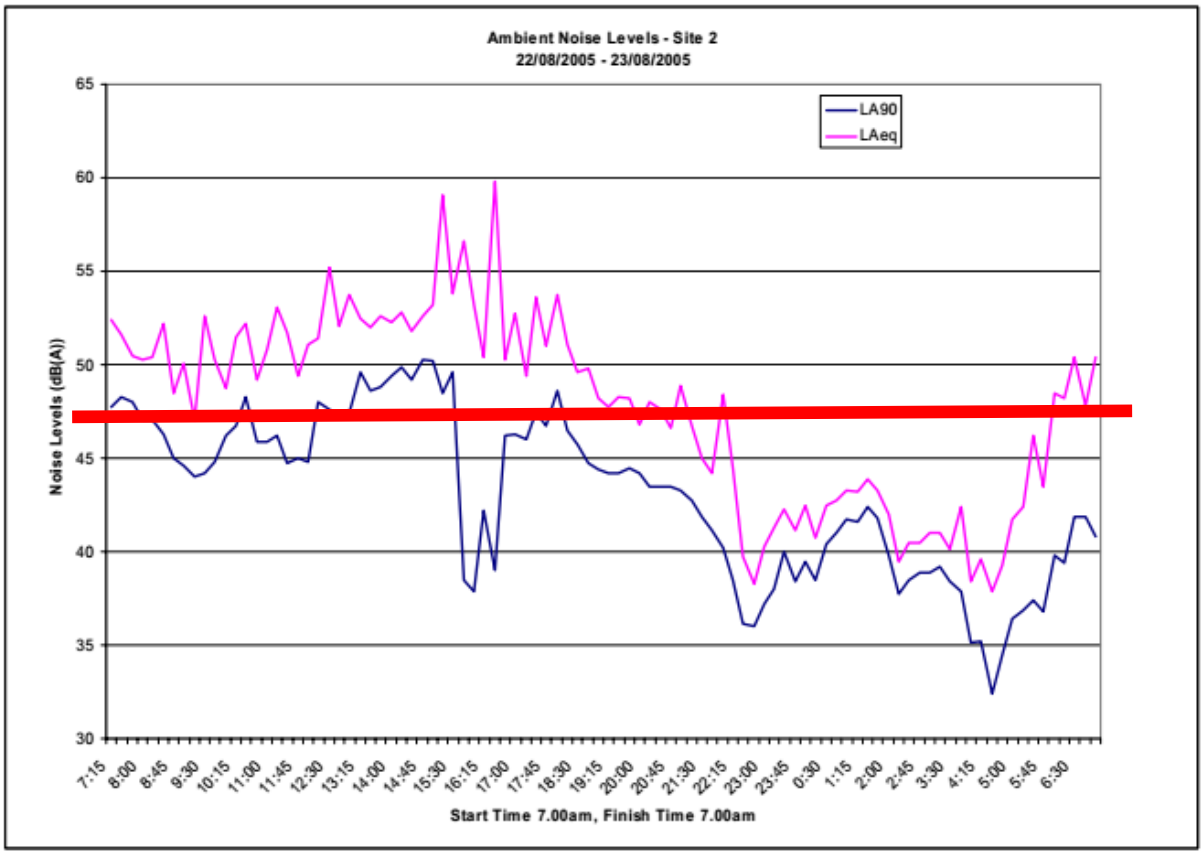
Start Time 7.00am, Finish Time 7.00am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22/08/2005 - 23/08/2005
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Noise Levels (dB(A))
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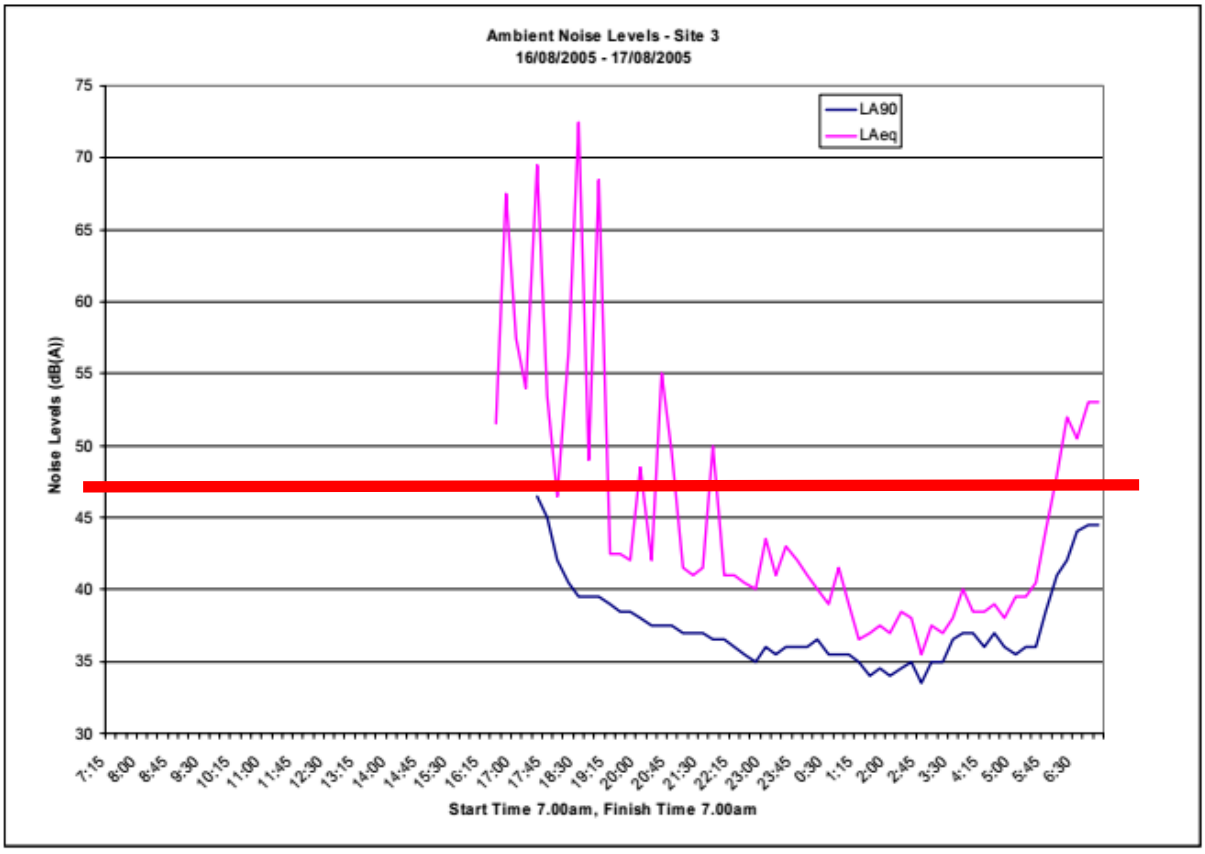
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16/08/2005 - 17/08/2005
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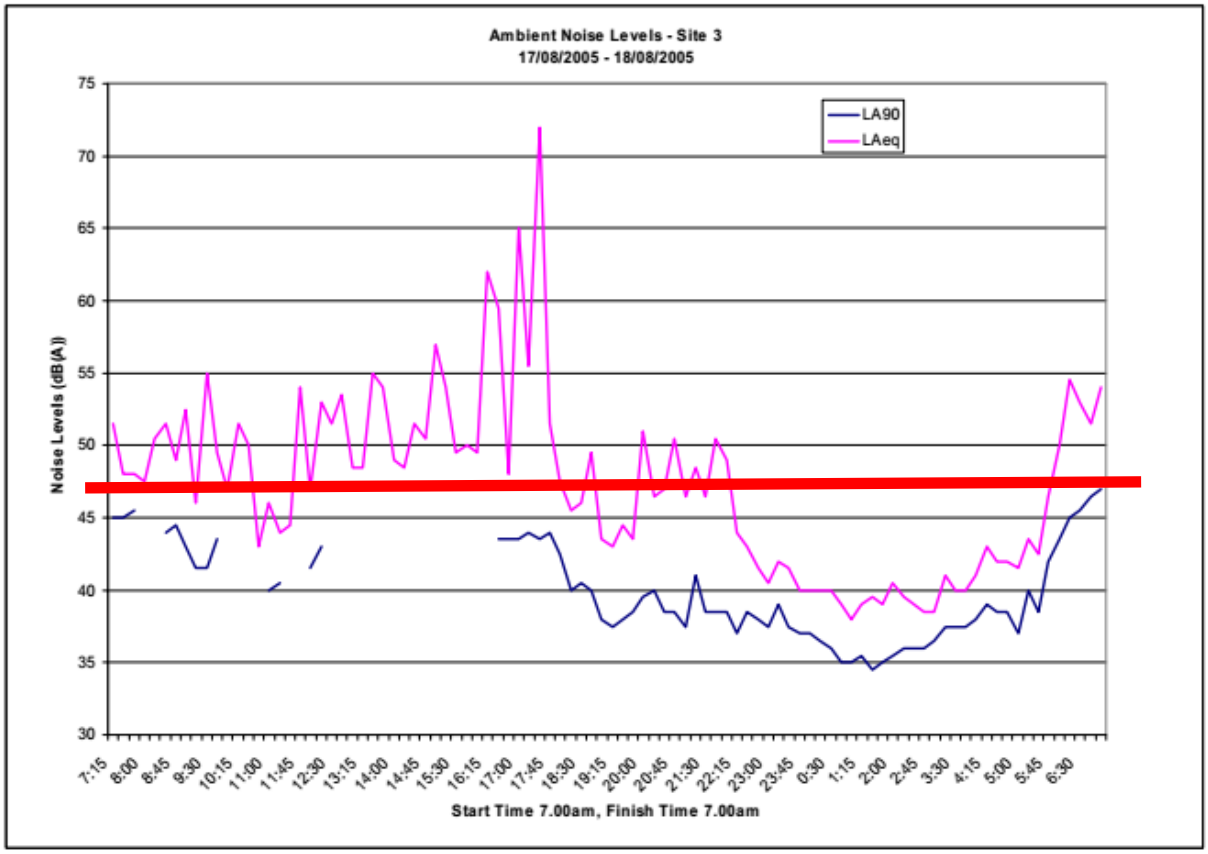
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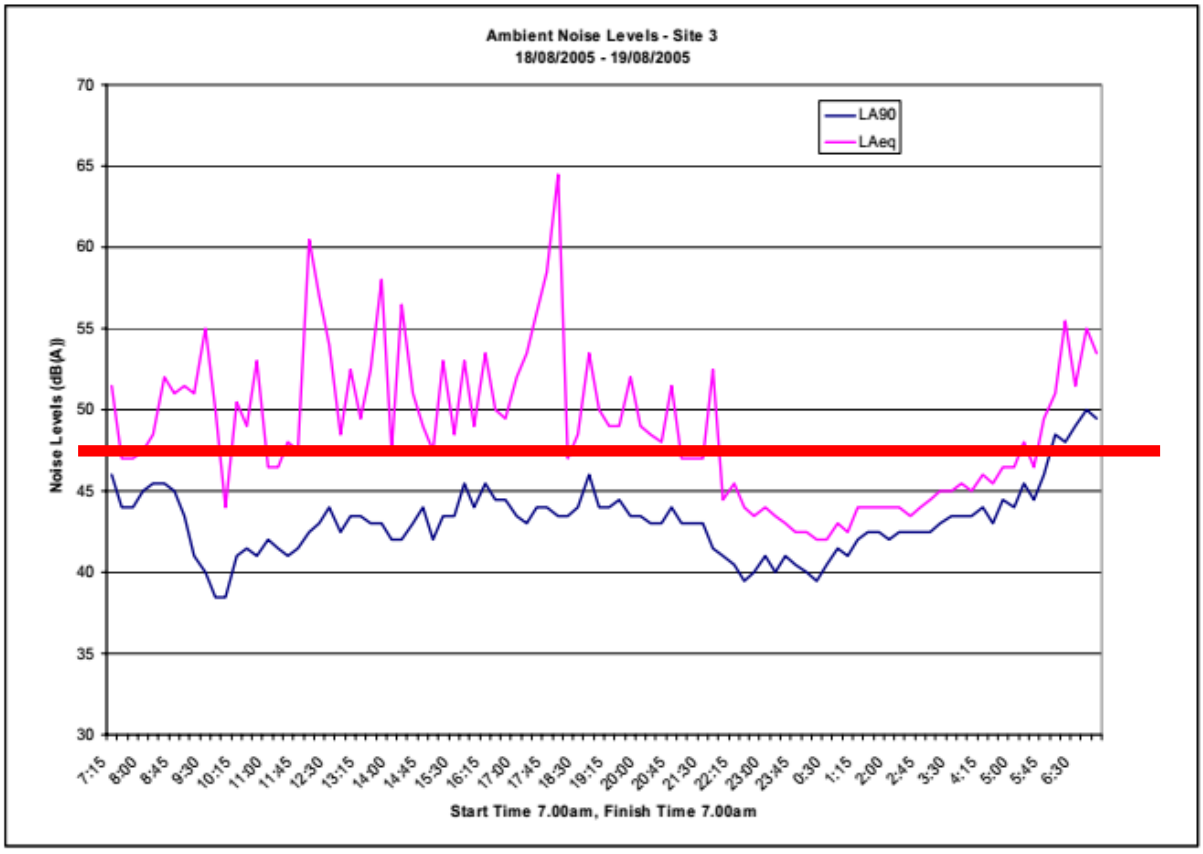
Start Time 7.00am, Finish Time 7.00am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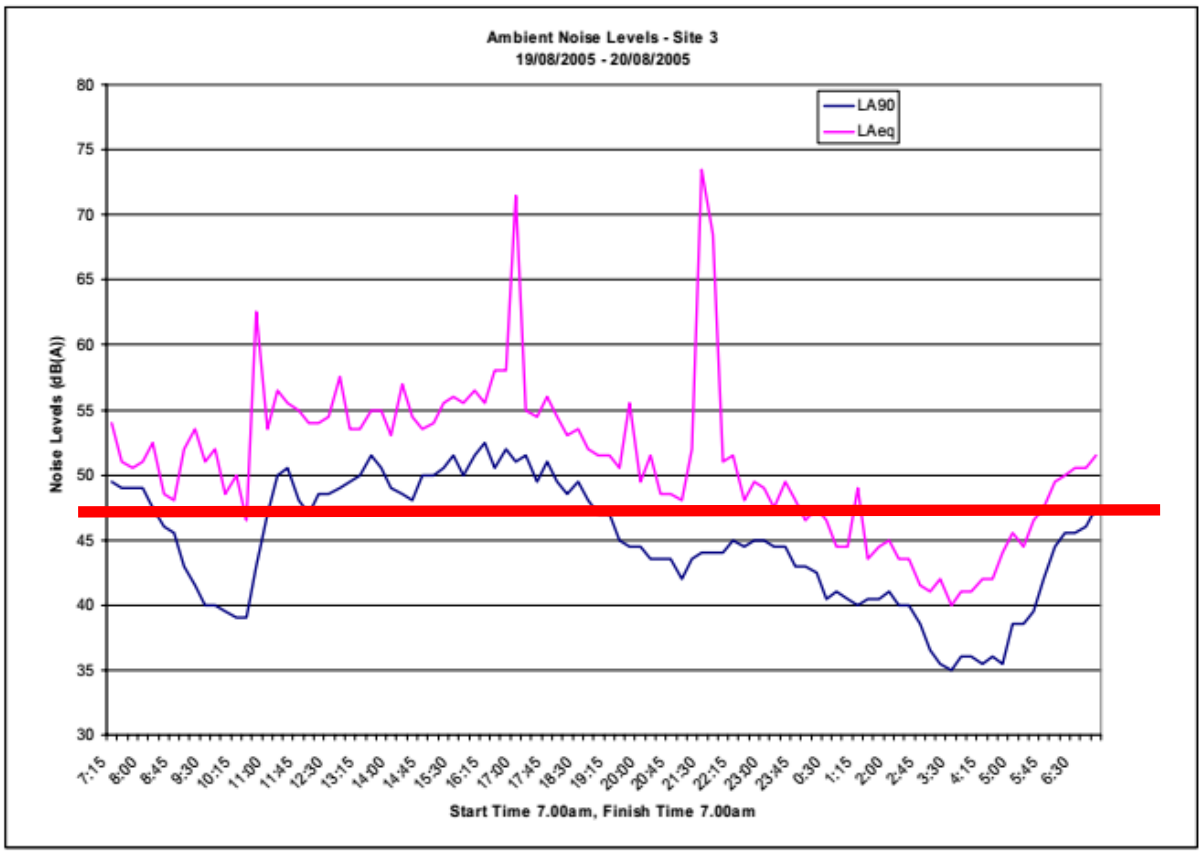
Start Time 7.00am, Finish Time 7.00am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LAeq
Noise Levels (dB(A))
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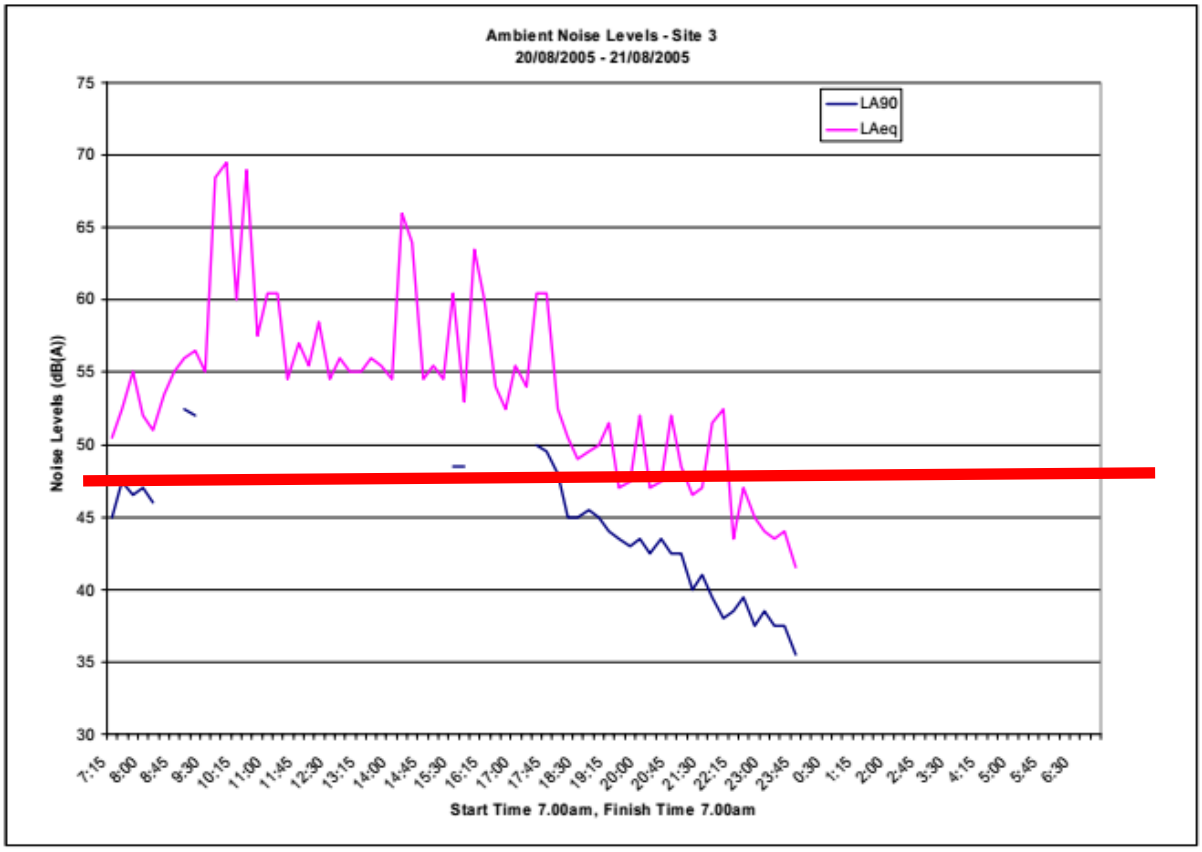
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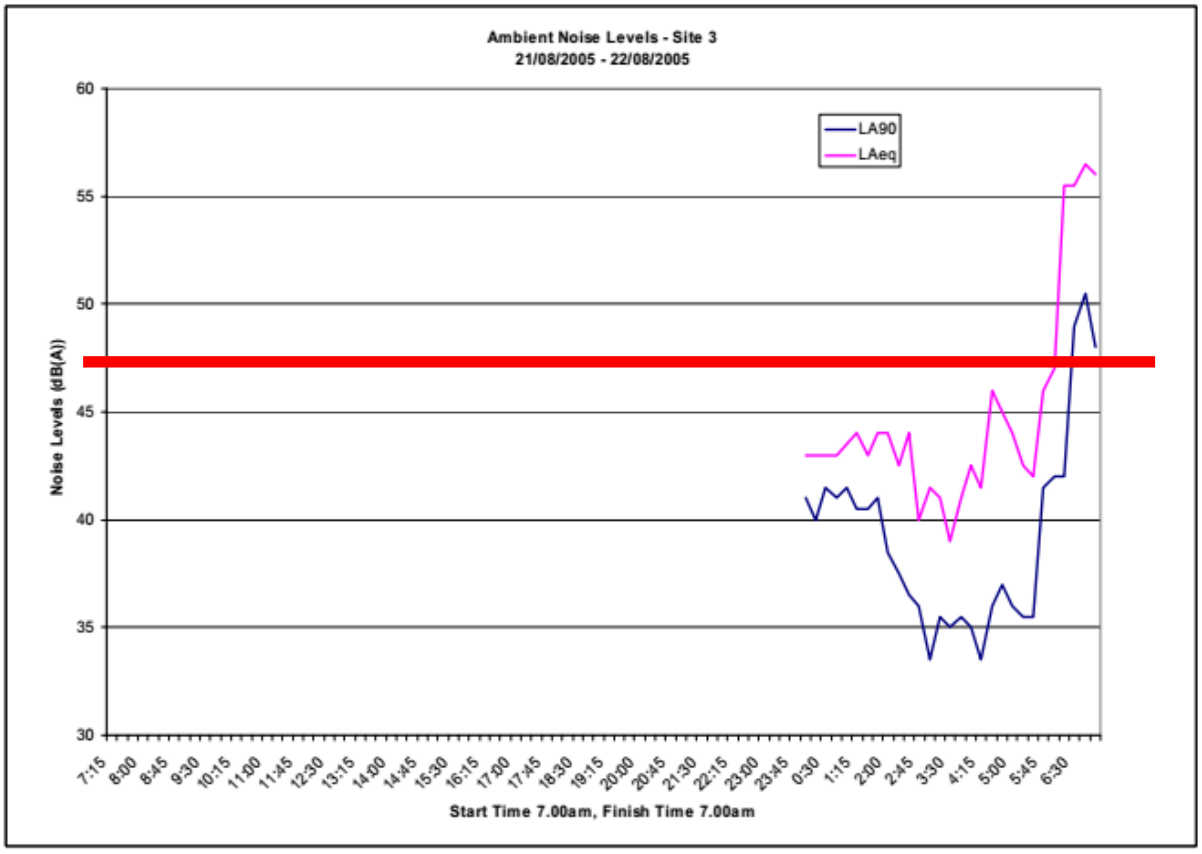
Ambient Noise Levels - Site 3
21/08/2005 - 22/08/2005
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Noise Levels (dB(A))
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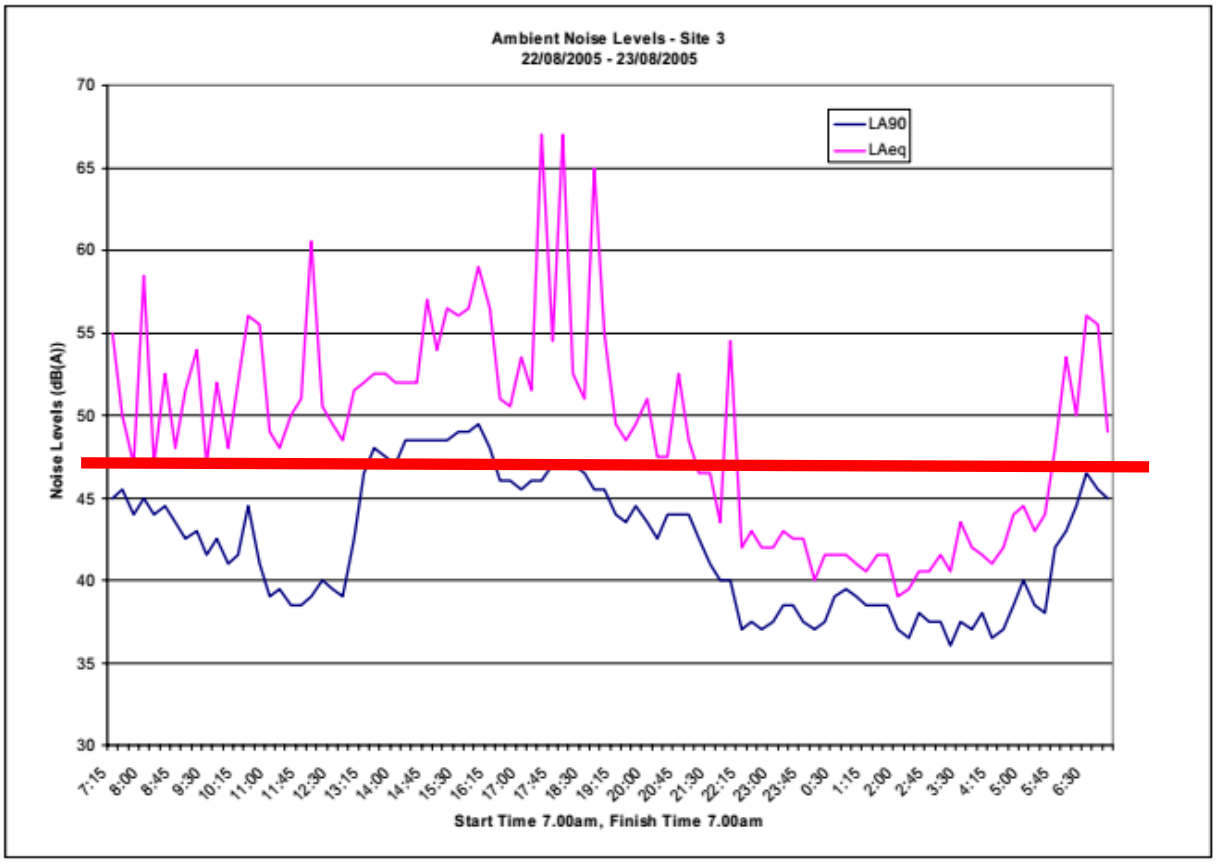
Start Time 7.00am, Finish Time 7.00am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22/08/2005 - 23/08/2005
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Noise Levels (dB(A))
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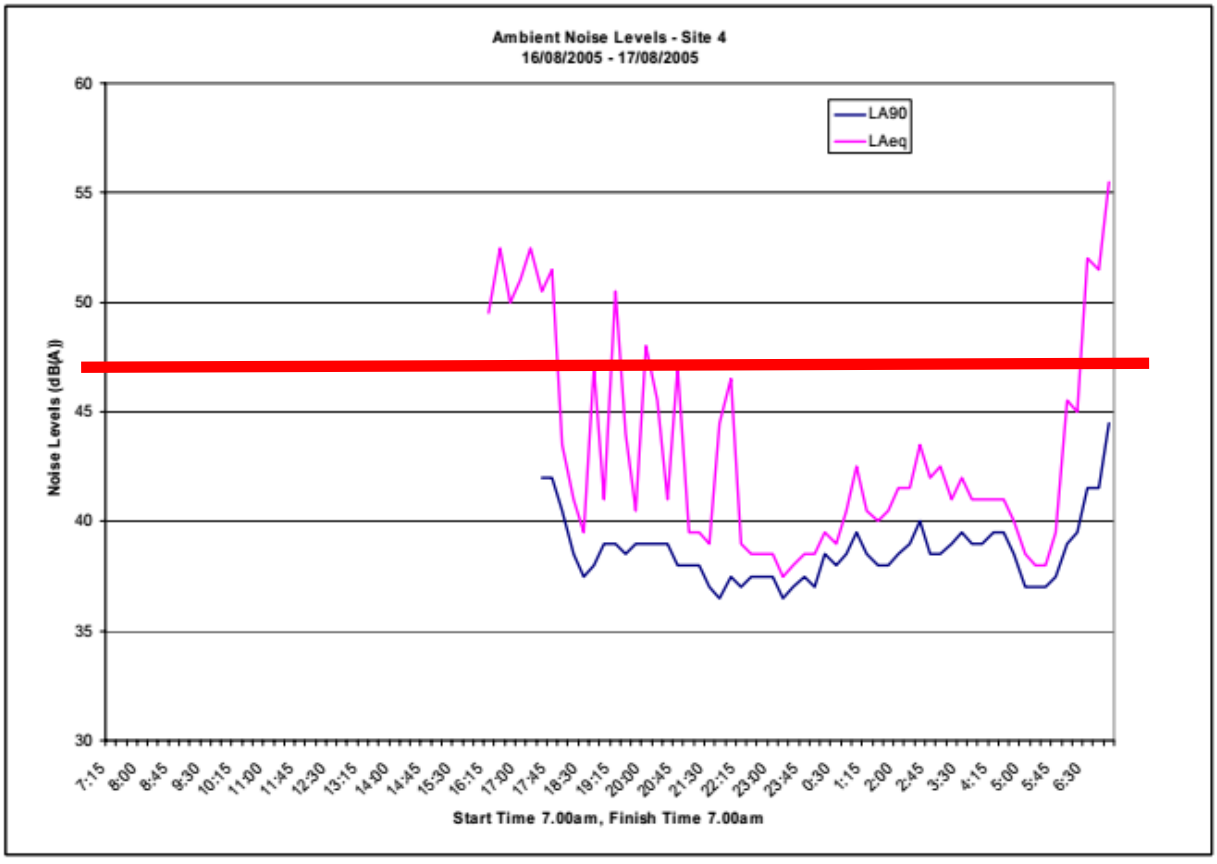
Ambient Noise Levels - Site 4
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LAeq
Noise Levels (dB(A))
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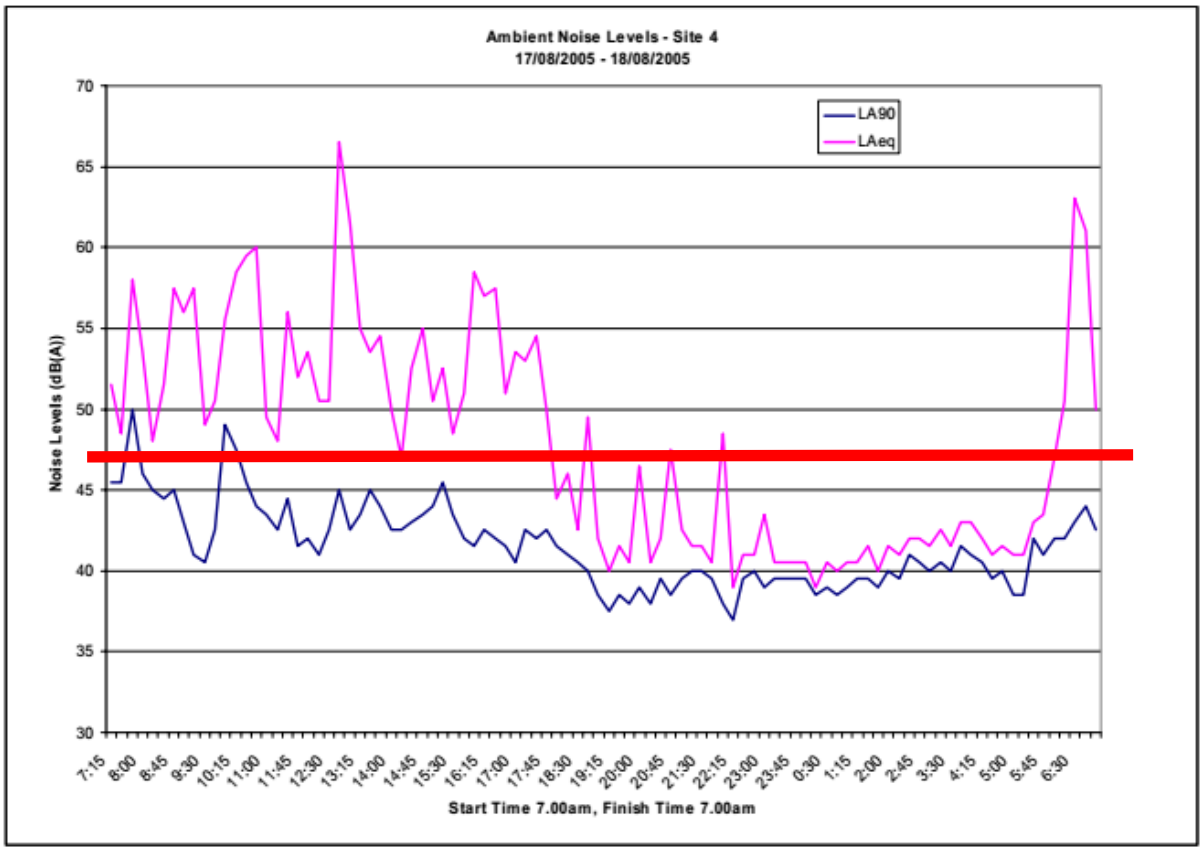
Start Time 7.00am, Finish Time 7.00am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17/08/2005 - 18/08/2005
LA90
LAeq
Noise Levels (dB(A))
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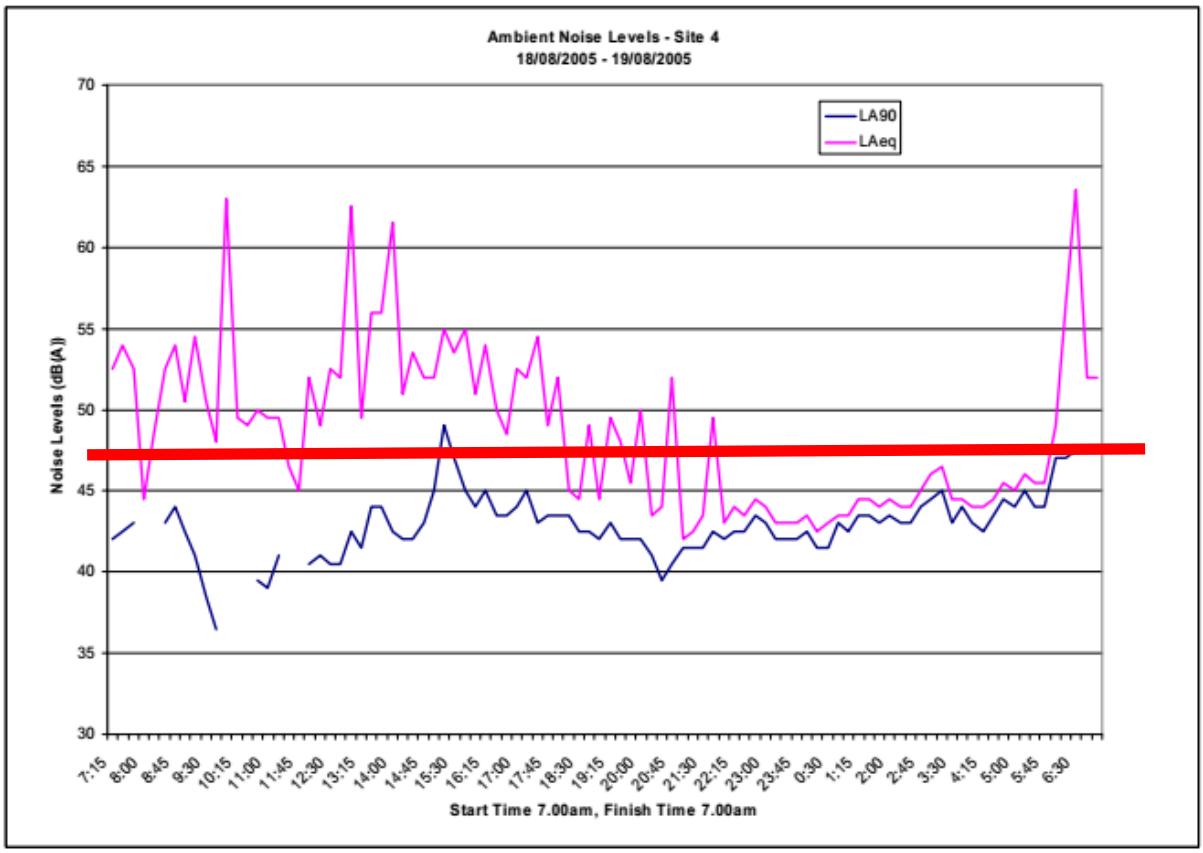
Start Time 7.00am, Finish Time 7.00am


Ambient Noise Levels - Site 4
18/08/2005 - 19/08/2005
LA90
LAeq
Noise Levels (dB(A))
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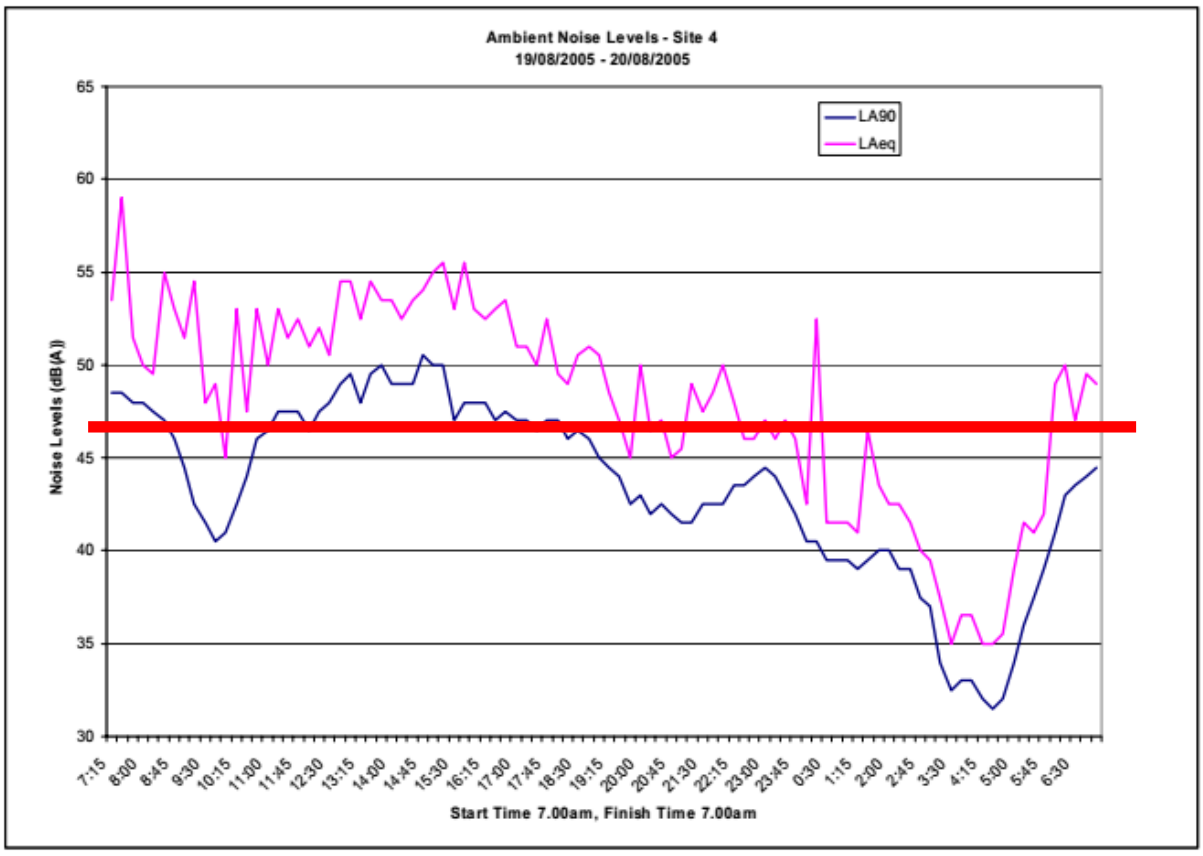
Start Time 7.00am, Finish Time 7.00am


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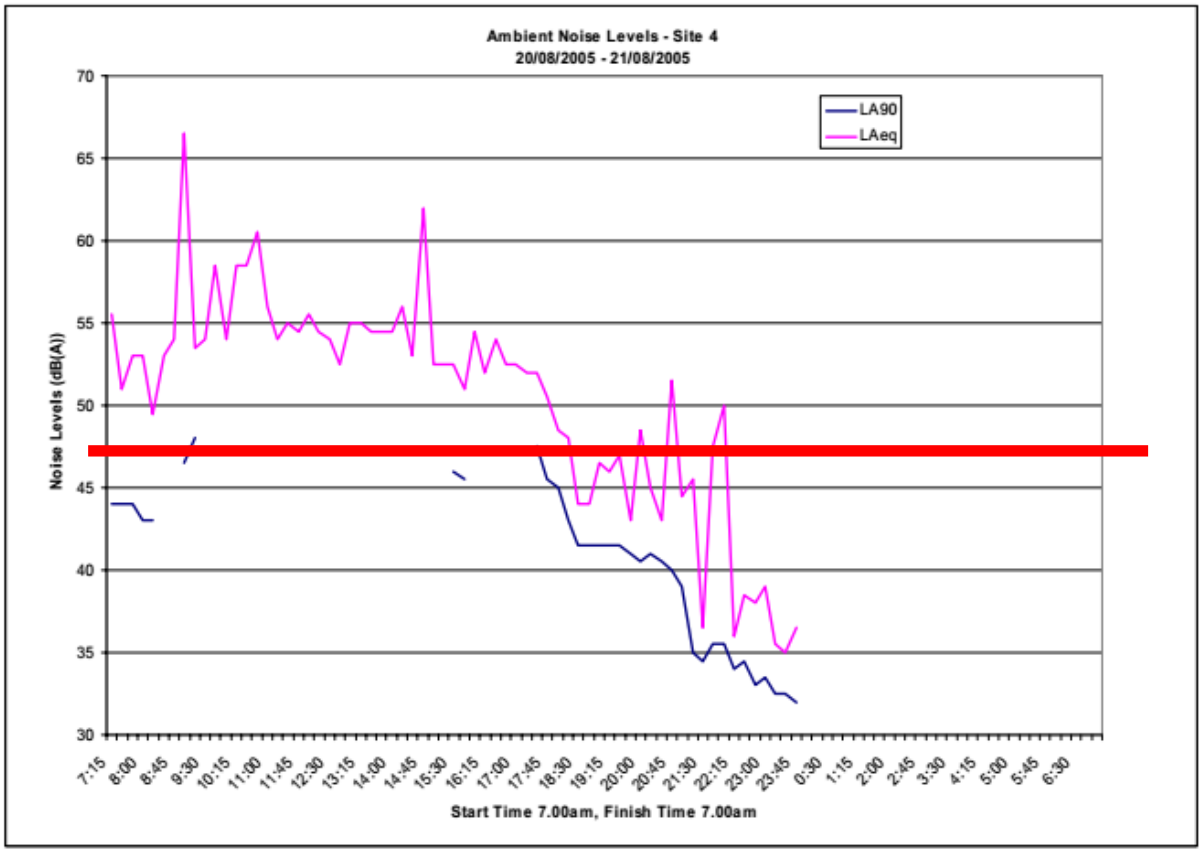
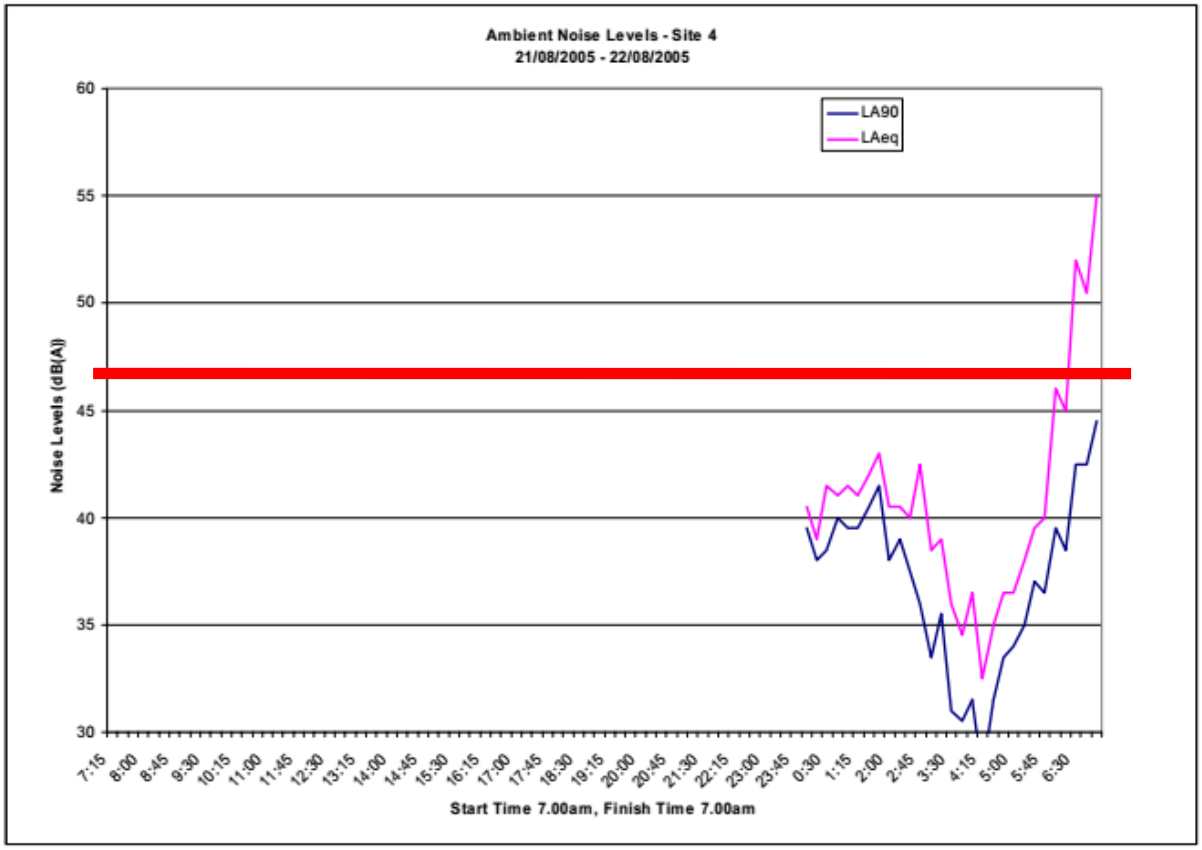
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am


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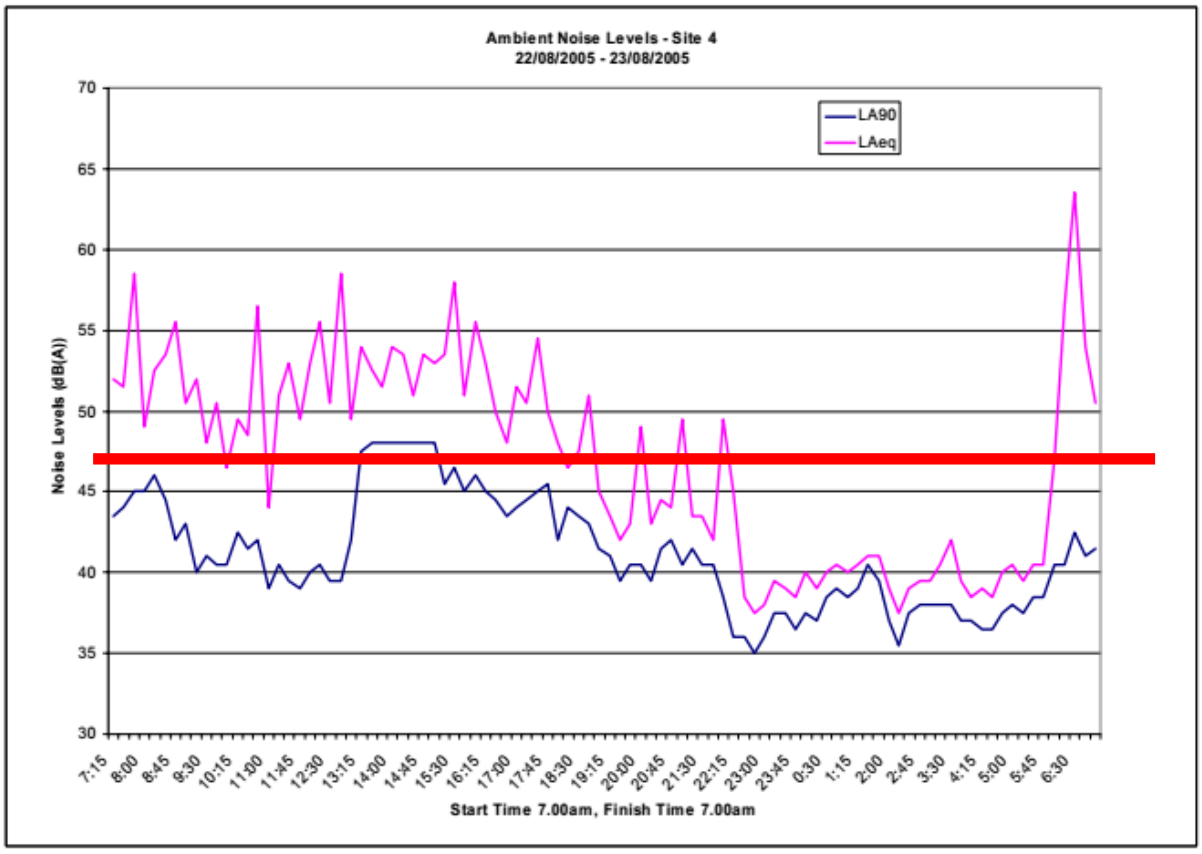
55
50
45
40
35
30
7:15 8:00 8:45 9:30 10:15 11:00 11:45 12:30 13:15 14:00 14:45 15:30 16:15 17:00 17:45 18:30 19:15 20:00 20:45 21:30 22:15 23:00 23:45 0:30 1:15 2:00 2:45 3:30 4:15 5:00 5:45 6:30
Start Time 7.00am, Finish Time 7.00am


Ambient Noise Levels - Site 4
22/08/2005 - 23/08/2005
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