

URS

EfW CHP Facility, Devonport

Non-Destructive Testing
Noise Report

2nd October 2013

Prepared for:



UNITED
KINGDOM &
IRELAND



Rev	Date	Details	Prepared by	Checked by	Approved by
0	02.10.13	Final	Daniel Ellis Graduate Environmental Consultant	Alf Maneylaws Associate Noise & Vibration	Ian Roach Associate Environment and Planning

URS Infrastructure & Environment UK Limited
Mayflower House
Armada Way
Plymouth
PL1 1LD

+44 (0)1752 676 700

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EXECUTIVE SUMMARY

On Wednesday 2nd October 2013 noise monitoring was undertaken for MVV Environment Devonport Ltd (MVV) at three sensitive residential receptors close to the site boundary, to determine the noise levels during the first evening of Non-Destructive Testing (NDT).

Noise monitoring occurred during less than ideal conditions, with heavy rain occurring during noise monitoring; these sections of the results were removed. It should be noted that the roads were consistently wet and road traffic noise is expected to be louder as a result. This was more identifiable at Savage Road and Cardinal Ave, where noise is dominated by road traffic. Furthermore some strong winds were noted; however the data for this has not been excluded.

The following noise levels were recorded:

- At R3 (Savage Road): 56 dB L_{Aeq3hr} (façade): 5dB above the baseline.
- At R15 (Talbot Gardens): 48 dB L_{Aeq3hr} (façade): 5dB above the baseline
- At Cardinal Ave: 50 dB L_{Aeq3hr} (free-field)/ 53 dB L_{Aeq3hr} (façade): 2dB above the baseline

Noise levels recorded were within the Plymouth City Council's Code of Construction Practice noise limits for weekday evening work and within 5 dB of the baseline noise level.

Noise was dominated by road traffic and a sports game held on the naval base. No site noise was noticeable at Cardinal Ave and only very occasional instantaneous noises were recorded at both Savage Road and Talbot Gardens, which took the form of a quiet clatter – this was noted as not being louder than other background noises, and potentially unnoticeable to those unaware that NDT was occurring.

1. INTRODUCTION

MVV Environment Devonport Ltd (MVV) undertook Non-Destructive Testing (NDT) outside usual working hours for the first time on 2nd October 2013, between 18:00 and 21:00. MVV commissioned URS to undertake noise monitoring at three sensitive residential receptors close to the site boundary.

This report describes the methodology and findings of the noise survey undertaken on this day.

An introduction to noise perception and an explanation of the terminology used within this report are provided in Appendix A.

1.1 Baseline Noise Limits

Baseline noise levels were monitored prior to NDT works commencing; with noise limits set based on Plymouth City Council's Code of Construction Practice. Table 1 shows baseline noise levels and the noise limits.

TABLE 1: BASELINE NOISE LEVELS AND NOISE LIMITS FOR NDT					
Location	Time	Ambient L _{Aeq,4hr} (dB)		Noise Limits (based on façade measurement)	
		Free Field	Façade	L _{Aeq,4hr} ^{*1} dB	L _{Aeq,1hr} ^{*2} dB
R3 (Savage Road)	Weekend	-	54	64	67
	Weekday	-	51	61	64
R15 (Talbot Gardens)	Weekend	-	45	60	63
	Weekday	-	43	58	61
Cardinal Ave	Weekend	N/A	N/A	N/A	N/A
	Weekday	48	51	61	64

*1 The L_{Aeq,4hr} noise limit shall be applied to both the 3 hour and 4 hour noise measurements of NDT

*2 The L_{Aeq,1hr} noise limit shall be applied when undertaking 1 hour noise measurements of NDT

2. SITE DESCRIPTION

The EfW CHP facility is currently being constructed in the North Yard of Her Majesty’s Naval Base (HMNB), beside Camels Head junction (the junction between the A3064 and Wolseley Road). The development is located close to a number residential properties, most noticeably those in Barne Barton to the north of the site, as well as on Cardinal Ave to the north-east.

3. METHODOLOGY AND ASSESSMENT CRITERIA

The monitoring procedure conformed to BS 7445: 2003 ‘Description and Measurement of Environmental Noise’, with measurements at Savage Road and Talbot Gardens taken 1 metre from the façade of residential receptors at a height of 1.35 metres. At Cardinal Ave, the measurement was taken free-field, over 3.5 metres from the façade. Average wind speeds were below 5 ms⁻¹ and some stronger intermittent gusts and heavy rain showers.

4. NON-DESTRUCTIVE TESTING NOISE SURVEY

4.1 Protocol

Due to the lack of secure monitoring locations, it was not possible to leave equipment unattended. Consequently, manned noise monitoring has been undertaken.

Monitoring was undertaken simultaneously at three locations representative of the closest receptors to the site during the whole period of NDT works occurring on site; logging L_{Aeq} and L_{AFmax} levels in contiguous 5-minute periods. Table 1 lists the noise monitoring locations shown in Figure 1, Appendix B, as well as the time monitoring was undertaken.

TABLE 2: NOISE MONITORING LOCATION AND TIMINGS				
Location*	Road	Details	Date	Time
R3	Savage Road	Representative of the closest noise sensitive properties to the north west (approx. 100 metres from the Site).	Wednesday 2 nd October 2013 (weekday)	18:00 – 21:00
R15	Talbot Gardens	Representative of the closest noise sensitive properties to the north (approx. 60 metres from the Site).	Wednesday 2 nd October 2013 (weekday)	18:00 – 21:00
-	Cardinal Ave	Representative of the closest noise sensitive properties to the north-east (approx. 200 metres from the Site).	Wednesday 2 nd October 2013 (weekday)	18:00 – 21:00

* Correlates with residential receptors for the Environmental Statement for the EfW CHP facility (11/00750/FUL)

4.2 Instrumentation

Three sound level meters were utilised for the monitoring:

- A Rion NL52 sound level meter, serial number 00510148 was used at R3;
- A Rion NL52 sound level meter, serial number 00620802 was used at R15; and
- A Rion NL52 sound level meter, serial number 00821105 was used at Cardinal Avenue.

Full calibration details are available upon request.

The calibration levels were checked prior to and following the measurements with a:

- Rion NC-74 field calibrator, serial number 34672983.

No significant drift (+/- 0.2 dB) was noted

4.3 Meteorological Conditions

Weather conditions during the measurements were as shown below in Table 3.

TABLE 3: WEATHER CONDITIONS DURING NOISE MONITORING					
Location	Date/Time	Max Wind Speed (m/s)	Wind Direction	Temperature	Precipitation
R3	02/10/2013 18:00-21:00	2.4	SE-SW (varied)	17°C	Heavy rain: 18:00-18:10 19:25-19:35 20:10-20:25
R15	02/10/2013 18:00-21:00	0.3 – 3.8	SE-SW (varied)	17°C	Heavy rain: 18:00-18:10 19:25-19:35 20:10-20:25
Cardinal Ave	02/10/2013 18:00-21:00	1.8 - 3.0 (some stronger gusts exceeding 5 m/s for short periods)	SE-SW (varied)	17°C	Heavy rain: 18:00-18:10 19:25-19:35 20:10-20:25

Data were removed from the noise assessment for periods of rain. It should be noted that the roads were consistently wet and road traffic noise is expected to be louder as a result. This was more identifiable at Savage Road and Cardinal Ave, where noise is dominated by road

traffic. Furthermore some strong winds were noted; however the data for this has not been excluded.

4.4 Commentary

The following observations of local noise sources were made whilst at the site during monitoring:

- At R3 (Savage Road) the noise climate was dominated by local road traffic noise on Savage Road (vehicles and motorbikes) and other surrounding roads (particularly Wolseley Road); trains; a sports game on the floodlit sports pitch in HMNB between approximately 18:45 and 20:30 (approx. 400 metres away, though shielded by the mass of the EfW CHP facility); and wind noise in the trees. Occasional quiet 'clatters' were noted by the surveyor which were presumed to originate from site. It was noted that these site noises were not louder than other background noise, and potentially unnoticeable to those unaware that NDT was occurring.
- At R15 (Talbot Gardens) the noise climate was dominated by a mixture of noise from: road traffic from surrounding roads (particularly Savage Road and Wolseley Road); passing trains; a sports game on the floodlit sports pitch in HMNB between approximately 18:45 and 20:30 (approx. 300 metres away); as well as the noise of birds and animals in Blackie Wood and wind noise in the trees. Also present was occasional noise from vehicles passing on Talbot Gardens and residents talking on their balconies. A low level but audible plant hum noise was also noted, from the direction of HMNB. Occasional noises were noted by the surveyor which were presumed to originate from site. It was noted that these site noises were not louder than other background noise, and potentially unnoticeable to those unaware that NDT was occurring.
- At Cardinal Ave the noise climate was dominated by a mixture of noise from: road traffic on Cardinal Ave (cars manoeuvring, parking and passing etc...) as well as from surrounding roads (particularly Wolseley Road); passing trains; and a sports game on the floodlit sports pitch in HMNB between approximately 18:45 and 20:30 (approx. 500 metres away). No site noise was noticeable at Cardinal Ave.

No long-term site noise was noticed at any receptor, any instantaneous noises recorded from site were noted and are shown in Appendix C, Table C1 to C3.

4.5 Results

The results of noise monitoring undertaken on 2nd October 2013 are given below in Table 4.

The full noise survey data for all three sites are provided in Appendix C, Table C1 to C3.

TABLE 4: BASELINE NOISE LEVELS AND NOISE LIMITS FOR NDT

Location	Date & Time	NDT Noise Level L _{Aeq,3hr} (dB)		Noise Level L _{AFmax} (dB)	Baseline L _{Aeq,4hr} (dB)		Noise Limits (based on façade measurement)	Difference between NDT Noise Level and Baseline (dB)
		Free Field	Façade		Free Field	Façade	L _{Aeq,4hr} dB	
R3	02/10/2013 18:00-21:00	-	56	82	-	51	61	5
R15	02/10/2013 18:00-21:00	-	48	84	-	43	58	5
Cardinal Ave	02/10/2013 18:00-21:00	50	53	74	48	51	61	2

The recorded noise levels at all three receptors were below the adopted noise limits and within 5 dB of the baseline level. It was noted by all surveyors that NDT works were not the dominant noise source at any location; in particular at Cardinal Ave no NDT works noise was picked up by the surveyor. Though the only noise that was noted was the occasional instantaneous noise, these were all recorded by the surveyors and included in Appendix C, Table C1 and C2.

The L_{AFmax} included in Table 4 was not a result of NDT testing, instead due to off-site noises. For Talbot Gardens, this corresponds with the surveyor checking the SLM; and for Savage Road this corresponds with two mopeds starting up and passing the SLM. The cause of the L_{AFmax} at Cardinal Ave is unknown.

It was noted by surveyors that if residents were unaware of NDT occurring, they would unlikely have noticed these minor site noises.

APPENDIX A NOISE PERCEPTION AND TERMINOLOGY

Between the quietest audible sound and the loudest tolerable sound there is a million to one ratio in sound pressure (measured in Pascals (Pa)). Because of this wide range a noise level scale based on logarithms is used in noise measurement called the decibel (dB) scale. Audibility of sound covers a range of approximately 0 to 140 dB.

The human ear system does not respond uniformly to sound across the detectable frequency range and consequently instrumentation used to measure noise is weighted to represent the performance of the ear. This is known as the 'A weighting' and annotated as dB (A). Table 1 below lists the sound pressure level in dB (A) for common situations.

Table 1: Sound Pressure Levels for a Range of Situations

Typical Noise Levels dB(A)	Example
0	Threshold of hearing
30	Rural area at night, still air
40	Public library Refrigerator humming at 2m
50	Quiet office, no machinery Boiling kettle at 0.5m
60	Normal conversation
70	Telephone ringing at 2m Vacuum cleaner at 3m
80	General factory noise level
100	Pneumatic drill at 5m
120	Discotheque - 1m in front of loudspeaker
140	Threshold of pain

The noise level at a measurement point is rarely steady, even in rural areas, and varies over a range dependent upon the effects of local noise sources. Close to a busy road, the noise level may vary over a range of 5 dB(A), whereas in a suburban area this may increase by up to 40 dB(A) and more due to the multitude of noise sources in such areas (cars, dogs, aircraft etc.) and their variable operation. Furthermore, the range of night time noise levels will often be smaller and the levels significantly reduced compared to daytime levels.

The equivalent continuous A-weighted sound pressure level, LAeq, is the single number that represents the average sound energy measured over that period. The LAeq is the sound level of a notionally steady sound having the same energy as a fluctuating sound over a specified measurement period.

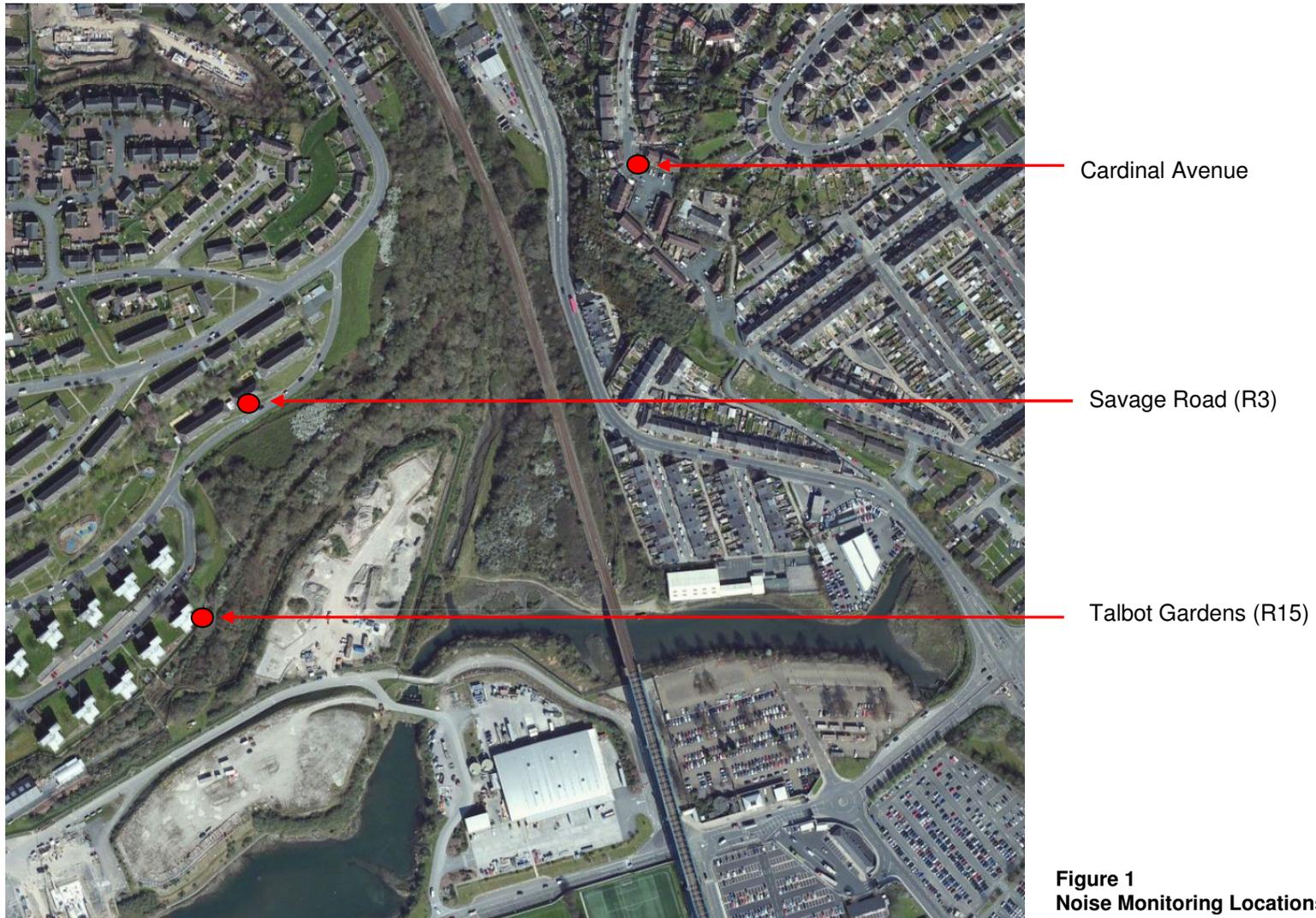
Human subjects are generally only capable of noticing changes in noise levels of no less than 3 dB(A). It is generally accepted that a change of 10 dB(A) in an overall, steady noise level is perceived to the human ear as a doubling (or halving) of the noise level.

A parameter that is widely accepted as reflecting human perception of the ambient noise is the background noise level, LA90. This is the noise level exceeded for 90% of the measurement period and generally reflects the noise level in the lulls between individual noise events. Over a 1-hour period the LA90 will be the noise level exceeded for 54 minutes.

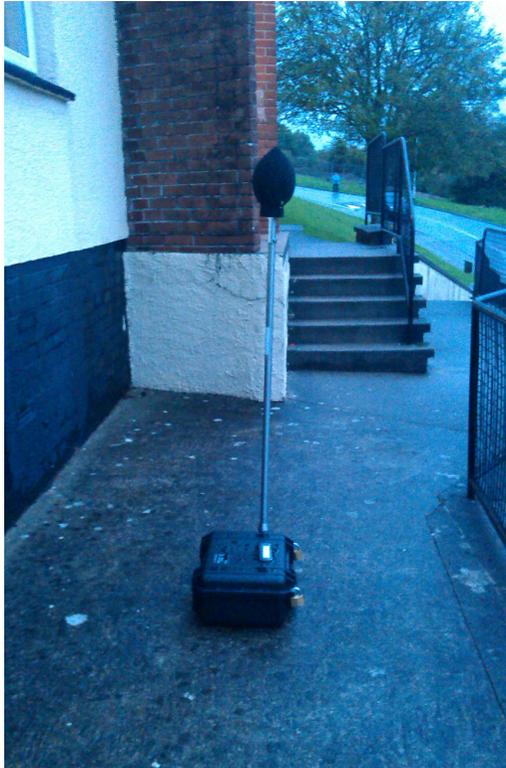
The parameter LA10 is used to describe road traffic noise. This is the noise level exceeded for 10 % of the measurement period. Over a one hour period, the LA10 will be the noise level exceeded for 6 minutes.



APPENDIX B NOISE MONITORING RECEPTORS



Receptor R3 (Savage Road)



Receptor R15 (Talbot Gardens)



Cardinal Avenue



APPENDIX C FULL NOISE MONITORING RESULTS

Tables C1 to C3 list the full suite of measured noise data.

TABLE C1: SAVAGE ROAD MEASURED NOISE LEVELS					
Date & Start time	Duration	L _{Aeq} (dB)	L _{AFmax} (dB)	L _{AF90} (dB)	Notes
02/10/2013 18:00	05:00.0	Rain			
02/10/2013 18:05	05:00.0				Quiet instantaneous noise from site – like a clattering sound
02/10/2013 18:10	05:00.0	55.7	70.2	49.3	
02/10/2013 18:15	05:00.0	62.8	81.8	49.5	2 mopeds starting up and passing
02/10/2013 18:20	05:00.0	53.1	65.2	49.3	
02/10/2013 18:25	05:00.0	58.6	76.9	48.8	
02/10/2013 18:30	05:00.0	53.1	65	49.4	
02/10/2013 18:35	05:00.0	54.2	64.5	49.2	Quiet instantaneous noise from site
02/10/2013 18:40	05:00.0	58.3	75.8	48.9	Moped starting up and passing
02/10/2013 18:45	05:00.0	52.5	68.3	48.6	Attack alarm accidentally activated Sports game began
02/10/2013 18:50	05:00.0	52	62.9	48.1	
02/10/2013 18:55	05:00.0	50.3	63	48.4	
02/10/2013 19:00	05:00.0	54.7	71.3	48.3	Dog barking and noise from children
02/10/2013 19:05	05:00.0	53.9	66.1	48.4	

TABLE C1: SAVAGE ROAD MEASURED NOISE LEVELS

Date & Start time	Duration	L _{Aeq} (dB)	L _{AFmax} (dB)	L _{AF90} (dB)	Notes
02/10/2013 19:10	05:00.0	52.5	61.3	48.5	
02/10/2013 19:15	05:00.0	52.4	63.8	47.4	Quiet instantaneous noise from site
02/10/2013 19:20	05:00.0	61.9	82.3	47.5	Moped starting up and passing
02/10/2013 19:25	05:00.0	Rain			
02/10/2013 19:30	05:00.0				
02/10/2013 19:35	05:00.0	54.2	66	46.9	Quiet instantaneous noise from site
02/10/2013 19:40	05:00.0	58.5	76	47.9	Moped starting up and passing
02/10/2013 19:45	05:00.0	54.9	64.7	48.1	
02/10/2013 19:50	05:00.0	52.9	66.5	47.1	Speeding car and distant siren
02/10/2013 19:55	05:00.0	50.4	69.5	46.8	
02/10/2013 20:00	05:00.0	53.3	64.4	46.9	Resident walking past
02/10/2013 20:05	05:00.0	54.3	67.4	47.4	
02/10/2013 20:10	05:00.0	Rain			
02/10/2013 20:15	05:00.0				
02/10/2013 20:20	05:00.0				
02/10/2013 20:25	05:00.0	55.2	69.2	48.6	
02/10/2013 20:30	05:00.0	51.3	65.1	47.3	Sports game finishes
02/10/2013 20:35	05:00.0	55.6	71.1	47.6	Delivery lorry stopped and unloaded

TABLE C1: SAVAGE ROAD MEASURED NOISE LEVELS

Date & Start time	Duration	L _{Aeq} (dB)	L _{AFmax} (dB)	L _{AF90} (dB)	Notes
02/10/2013 20:40	05:00.0	54.1	71.9	47.3	
02/10/2013 20:45	05:00.0	48.9	63.2	46.7	
02/10/2013 20:50	05:00.0	51.6	64.5	46.7	Dog barking in distance Unidentified low whirring sound from site direction (18:53 -59)
02/10/2013 20:55	05:00.0	50.4	62	46.8	Unidentified low whirring sound from site direction (18:53 -59)

TABLE C2: TALBOT GARDENS MEASURED NOISE LEVELS

Date & Start time	Duration	L _{Aeq} (dB)	L _{AFmax} (dB)	L _{AF90} (dB)	Notes
02/10/2013 18:00	05:00.0	Rain			
02/10/2013 18:05	05:00.0				Shuttle bus engine
02/10/2013 18:10	05:00.0	47.9	61	45.6	Shuttle bus engine Two quiet instantaneous noises from site
02/10/2013 18:15	05:00.0	49.6	60.4	45.6	
02/10/2013 18:20	05:00.0	48.4	61.2	45	
02/10/2013 18:25	05:00.0	49.2	73.6	44.8	
02/10/2013 18:30	05:00.0	54	83.7	45.7	Checked equipment
02/10/2013 18:35	05:00.0	46.7	56.2	44.5	Two quiet instantaneous noises from site and voices for few seconds
02/10/2013 18:40	05:00.0	46.9	61.5	44.6	
02/10/2013 18:45	05:00.0	47.5	58.3	44.7	Sports game starts
02/10/2013 18:50	05:00.0	47.7	63.2	45.1	
02/10/2013 18:55	05:00.0	49.9	61.1	44.3	
02/10/2013 19:00	05:00.0	48.8	61.4	44.5	
02/10/2013 19:05	05:00.0	48.9	63.9	45.2	
02/10/2013 19:10	05:00.0	48.9	60.6	45.2	
02/10/2013 19:15	05:00.0	46.8	54.8	44.4	
02/10/2013 19:20	05:00.0	47.4	59.6	44.9	
02/10/2013 19:25	05:00.0	Rain			
02/10/2013 19:30	05:00.0				

TABLE C2: TALBOT GARDENS MEASURED NOISE LEVELS

Date & Start time	Duration	L _{Aeq} (dB)	L _{AFmax} (dB)	L _{AF90} (dB)	Notes
02/10/2013 19:35	05:00.0	48.2	60.1	43.1	Resident talking on balcony behind SLM
02/10/2013 19:40	05:00.0	46.6	60.2	44	
02/10/2013 19:45	05:00.0	49.4	63.3	44	
02/10/2013 19:50	05:00.0	46.7	64.2	43.3	Distant siren
02/10/2013 19:55	05:00.0	46.4	57.1	43.3	Residents talking on balcony in block
02/10/2013 20:00	05:00.0	51.7	82.3	43.8	
02/10/2013 20:05	05:00.0	49.5	62	44.5	Checked equipment
02/10/2013 20:10	05:00.0	Rain			
02/10/2013 20:15	05:00.0				
02/10/2013 20:20	05:00.0				
02/10/2013 20:25	05:00.0	48.1	66.9	44.2	
02/10/2013 20:30	05:00.0	46.2	58.3	43.8	Sports game finished
02/10/2013 20:35	05:00.0	46.9	58.3	43.7	Unidentified quiet noise from site for 1 minute Motorbike starting up and leaving on Talbot Gardens
02/10/2013 20:40	05:00.0	45.1	52.4	43.6	Unidentified light instantaneous noises – like a vehicle door closing

TABLE C2: TALBOT GARDENS MEASURED NOISE LEVELS

Date & Start time	Duration	L _{Aeq} (dB)	L _{AFmax} (dB)	L _{AF90} (dB)	Notes
02/10/2013 20:45	05:00.0	44.8	51.3	42.9	
02/10/2013 20:50	05:00.0	46	55.6	42.6	Dog barking from either site/naval base – Table Top Mountain direction
02/10/2013 20:55	05:00.0	47.8	76.5	43.1	

TABLE C3: CARDINAL AVE MEASURED NOISE LEVELS

Date & Start time	Duration	L _{Aeq} (dB)	L _{AFmax} (dB)	L _{AF90} (dB)	Notes
02/10/2013 18:00	05:00.0	Rain			
02/10/2013 18:05	05:00.0				
02/10/2013 18:10	05:00.0	55.1	70.2	46.9	
02/10/2013 18:15	05:00.0	47	53.2	45.5	Noise from house
02/10/2013 18:20	05:00.0	53	68.4	45.5	
02/10/2013 18:25	05:00.0	48	54.7	45.8	
02/10/2013 18:30	05:00.0	47.3	53.8	45.2	
02/10/2013 18:35	05:00.0	47.5	56.6	45.7	
02/10/2013 18:40	05:00.0	49.9	66.2	45.5	Noise from house Plane passing
02/10/2013 18:45	05:00.0	51.1	66.5	45.8	Sports game began
02/10/2013 18:50	05:00.0	49.5	64.5	45.1	
02/10/2013 18:55	05:00.0	46.5	52	44.6	Voice on loudspeaker
02/10/2013 19:00	05:00.0	49.7	60.6	44.6	
02/10/2013 19:05	05:00.0	47.5	61.7	45.3	
02/10/2013 19:10	05:00.0	53.1	70.7	45.6	
02/10/2013 19:15	05:00.0	46.5	52.5	44.7	
02/10/2013 19:20	05:00.0	51.3	64.5	44.3	Car alarm
02/10/2013 19:25	05:00.0	Rain			
02/10/2013 19:30	05:00.0				
02/10/2013 19:35	05:00.0	52.5	70.2	44.7	Noise from house
02/10/2013 19:40	05:00.0	50.7	69.4	45.1	Strong wind gusts
02/10/2013 19:45	05:00.0	50.8	66.6	45	
02/10/2013 19:50	05:00.0	49.7	63.7	44.2	Siren

TABLE C3: CARDINAL AVE MEASURED NOISE LEVELS

Date & Start time	Duration	L _{Aeq} (dB)	L _{AFmax} (dB)	L _{AF90} (dB)	Notes
02/10/2013 19:55	05:00.0	46.4	53.6	44.1	Refuse bin fell over
02/10/2013 20:00	05:00.0	47.3	57.8	43.7	
02/10/2013 20:05	05:00.0	53.2	70.1	45.3	
02/10/2013 20:10	05:00.0	Rain			
02/10/2013 20:15	05:00.0				
02/10/2013 20:20	05:00.0				
02/10/2013 20:25	05:00.0	46.5	56.9	44.4	
02/10/2013 20:30	05:00.0	53.4	74.2	44.9	Sports game finished
02/10/2013 20:35	05:00.0	47	58.8	44.7	Strong wind gusts
02/10/2013 20:40	05:00.0	46	55.9	43.9	Children kicking ball against a wall
02/10/2013 20:45	05:00.0	45.9	57.3	44.2	
02/10/2013 20:50	05:00.0	46	55.3	43.6	
02/10/2013 20:55	05:00.0	46.3	55.5	43.8	