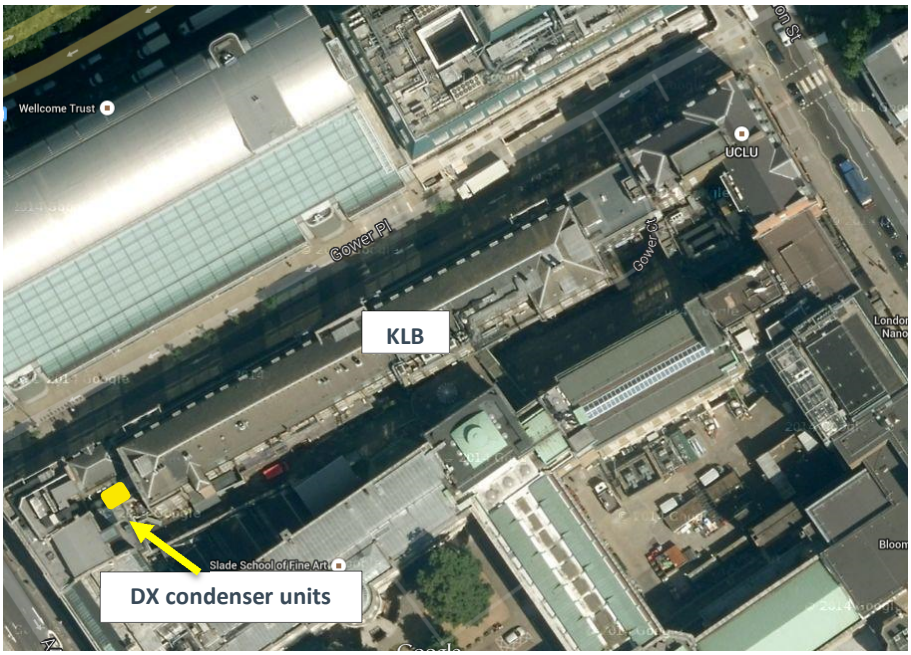
Figure 2-1 Location of DX Condenser units



It is understood that the units will operate in cooling mode only.

Data supplied by the manufacturer, shown in Appendix C, indicates that during operation, the airborne sound pressure level of the proposed condenser units at a distance of 1m will be 58 dB(A).

Noise levels from the condenser units have been assessed at the nearest noise sensitive receptors using the ambient noise measurement data shown in Table 1-6.

For each identified receptor, distances from the condenser units have been calculated from Google Maps plan views of the site and are shown in Table 2-6.

Table 2-6 Assumed distance between the condenser units and adjacent receptors

Receptor	Receptor Type	Distance (m)
UCL Slade School of Fine Art	Higher Education Facility	20
UCL The Bartlett Faculty for the Built Environment	Higher Education Facility	61
UCL Physics Laboratory	Higher Education Facility	84
UCL Health Centre	Health Centre	100
UCL Student Union	Commercial/Office	5
The Wellcome Trust	Office/Library/Gallery	28
Gordon Square	Residential	310

For the purposes of this assessment it has been assumed as a conservative approach, that if the existing building features surrounding the condenser units screen the view from receivers, 10dB attenuation could be expected. If the condenser units are partially screened from receivers, 5dB attenuation has been assumed. If there is a direct line of sight between the condenser units and receiver no screening attenuation has been assumed.

Assuming hemispherical propagation, noise levels from the operation of the condenser units at the noise sensitive receptors have been calculated and are shown in Table 2-7.

.

Table 2-7 Predicted noise levels from the condenser units at noise sensitive receptors

Receptor	Overall SPL from four condenser units dB(A)	Distance (m)	Attenuation due to distance	Barrier Correction	Resulting noise level at receptor dB(A)
UCL Slade School of Fine Art	64	20	26	0	38
UCL The Bartlett Faculty for the Built Environment		61	36	10	18
UCL Physics Laboratory		84	38	5	20
UCL Health Centre		100	40	10	14
UCL Student Union		5	14	0	50
The Wellcome Trust		28	29	10	25
Gordon Square		310	50	10	4

All mechanical plant and equipment to be installed should be selected such that there are no acoustic characteristics that contain clearly audible tonal elements. Therefore, no acoustic feature correction of the noise data has been considered.

Using the information described above, an indicative BS 4142 assessment is shown in Table 2-8. Please note that, should different condenser units be selected for installation, acoustic calculations will need to be repeated to reflect the new units.

Table 2-8 BS4142 assessment summary- condenser units

Receptor	Resulting noise level at receptor dB(A)	Acoustic feature correction (dB)	Rating Level (dB)	Measured dB L_{A90}	Level Difference
UCL Slade School of Fine Art	38	0	38	59	-21
UCL The Bartlett Faculty for the Built Environment	18		18	59	-41
UCL Physics Laboratory	20		20	59	-39
UCL Health Centre	14		14	59	-45
UCL Student Union	50		50	59	-9.1
The Wellcome Trust	25		25	59	-34
Gordon Square	4		4	44	-40

The noise impact assessment shows that for all the nearby noise sensitive receptors, with the exception of the UCL Student Union, comply with the Camden Development Policy 28 of 5dB below background noise levels.

Since the noise sensitive receptor where the Camden Development Policy criteria are not met is part of the UCL campus, it is assumed that the only receptors that should comply with the criteria are The Wellcome Trust and the residential properties on Gordon Square. In both instances the predicted rating noise level from the condenser units is lower than the existing background noise level.

3. Summary

Kathleen Lonsdale Building will soon undergo extensive refurbishment works, including the replacement of the two existing air cooled packaged chillers located on the roof with new units, the installation of a new mechanical plant room on the first floor of the building and the installation of four external condenser units.

Atkins ANV has been appointed to carry out a background noise survey at the site to allow noise limits to be set in accordance with Camden Borough Council requirements and perform a Noise Impact Assessment to support the Planning Application in relation to the refurbishment of Kathleen Lonsdale Building.

Noise assessment - Chillers

Based on the noise survey results and BS4142 plant noise assessment carried out by Atkins ANV, the rating level resulting from the roof chillers is approximately 1dB lower than the measured background noise level for receptors with a direct line of sight to the chillers. These are all locations on the UCL site and include:

- UCL Slade School of Fine Art,
- UCL The Bartlett Faculty for the Built Environment,
- UCL Physics Laboratory.

For all other receptors (Wellcome Trust, ULC Student Union, UCL Health Centre and residential properties on Gordon Square) the rating level is lower than 5dB below the measured background level, and therefore comply with LB Camden requirements.

The predicted rating noise level from the rooftop plant does not meet the Development Policy requirement of 5dB below the background noise level at all the nearest noise sensitive receptors. However, since the noise sensitive receptors where the Camden Policy criteria are not met are part of the UCL campus, it has been assumed that the only receptors that should comply with the criteria are The Wellcome Trust and the residential properties on Gordon Square.

For both The Wellcome Trust and the residential properties on Gordon Square the predicted rating noise level from the rooftop plant is calculated the be greater than 5dB lower than the existing background noise level.

Noise assessment – First Floor plant room

Calculations have been undertaken to predict the maximum permissible noise level criteria from the new first floor plant room.

Noise assessment – DX Condenser units

Based on the noise survey results and BS4142 plant noise assessment carried out by Atkins ANV the rating level resulting from the condenser units is lower than 5dB below the measured background noise levels at all noise sensitive receptors with the exception of the UCL Student Union.

Since the noise sensitive receptor where the Camden Development Policy criteria are not met is part of the UCL campus, it is assumed that the only receptors that should comply with the criteria are The Wellcome Trust and the residential properties on Gordon Square.

For both The Wellcome Trust and the residential properties on Gordon Square the predicted rating noise level from the rooftop plant is calculated the be greater than 5dB lower than the existing background noise level.

Appendices

Appendix A. Measured Frequency Spectra

A.1. Long term monitoring (18th- 19th June 2014)

The following tables show the full measured frequency spectrum results in octave bands for L_{Aeq} and L_{A90}.

Table A-1 Measured L_{Aeq} frequency data, in octave bands

Position	Date	Time	Duration	L_{Aeq}	Frequency (Hz)									
					16	31.5	63	125	250	500	1000	2000	4000	8000
1	18/06/2014	11:32	15	61.8	7.9	34.4	42.6	46.6	53.6	54.5	56.9	54.1	52.2	39.1
1	18/06/2014	11:47	15	60.5	8.5	34.7	43	46.6	53	53.4	54.7	52.7	51.6	37.9
1	18/06/2014	12:02	15	60.1	7.7	34.4	42.6	46.2	52.8	52.8	54.4	52	51	37
1	18/06/2014	12:17	15	60.9	8	34.4	43.1	46.9	53.1	53.9	55.4	53	51.6	38
1	18/06/2014	12:32	15	60.5	7.7	34.3	42.8	46.5	52.9	53.3	54.9	52.7	51.3	37.4
1	18/06/2014	12:47	15	60.3	8.4	34.4	43.1	46.6	53.1	53.4	54.7	51.8	51.4	36.6
1	18/06/2014	13:02	15	60.3	8.2	34.3	42.9	46.8	53	53.5	54.4	51.9	51.1	36.6
1	18/06/2014	13:17	15	61	9.2	34.7	43.3	47.5	53.6	53.9	55.3	53.3	51.7	37.5
1	18/06/2014	13:32	15	60.6	9.8	34.6	43.2	47.2	53.3	53.5	54.7	52.7	51.2	36.5
1	18/06/2014	13:47	15	62.7	10.7	34.5	44.1	50.3	56.3	56.5	56.5	54	51.8	36.3
1	18/06/2014	14:02	15	61.9	10.7	35	43.6	47.8	53.7	55.1	56.5	54.3	52.7	38.4
1	18/06/2014	14:17	15	62.4	9.9	35.1	43.8	47.8	54.9	55.6	56.6	55	52.8	39.7
1	18/06/2014	14:32	15	62.3	9.1	34.6	44.5	47.6	54.4	55.6	56.7	54.6	52.9	40.2
1	18/06/2014	14:47	15	62.3	15.9	35.2	44.6	48.5	54.7	56.1	56.9	53.8	52.5	38.2
1	18/06/2014	15:02	15	60.6	8.1	34.5	43.2	46.9	53.2	53.7	54.9	52.3	51.8	36.6
1	18/06/2014	15:17	15	60.8	9	34.5	43.7	46.9	53.5	53.8	55.1	52.7	51.9	36.7
1	18/06/2014	15:32	15	61.2	8.1	34.8	44.2	48.3	53.8	54.2	55.5	53	52.2	37.6
1	18/06/2014	15:47	15	61.2	8.7	34.4	43.3	47	53.8	54.3	55.7	52.9	51.9	37.4
1	18/06/2014	16:02	15	60.5	7.5	34.1	42.8	46.2	53.2	53.7	54.9	52	51.6	36.6
1	18/06/2014	16:17	15	60.6	8.4	34.3	42.9	45.4	53.2	53.7	54.9	52.1	51.8	36.4
1	18/06/2014	16:32	15	60.3	8.1	33.9	42.9	45.2	52.9	53.2	54.9	52.1	51.5	36
1	18/06/2014	16:47	15	60.3	8.3	34.1	42.9	45.5	53.1	53.3	54.6	51.7	51.6	36.2
1	18/06/2014	17:02	15	60	7.8	33.8	42.7	45.4	53	53.1	54.3	51.1	51.5	36
1	18/06/2014	17:17	15	60.4	7.6	33.9	42.3	45.1	52.8	53.6	55	51.5	51.8	36
1	18/06/2014	17:32	15	59.8	7.6	33.7	42.3	45	52.6	52.7	54.2	50.9	51.6	35.9
1	18/06/2014	17:47	15	59.9	7.4	33.6	42.1	44.9	52.6	52.7	54.3	51.1	51.7	35.7
1	18/06/2014	18:02	15	60	7.4	33.7	42.5	45.2	52.7	52.8	54.5	51	51.6	35.7
1	18/06/2014	18:17	15	60.5	7.5	33.7	42.5	45.3	52.6	53.3	55.6	52.1	51.3	35.9
1	18/06/2014	18:32	15	60.9	8.8	34	42.7	46.3	53	53.9	56.4	51.8	51.5	35.8
1	18/06/2014	18:47	15	60.2	7.5	33.9	42.6	45.5	52.5	53.3	55	51.3	51.6	35.9
1	18/06/2014	19:02	15	59.7	7.1	33.8	42.3	45	52.3	52.8	54.3	50.6	50.9	35.6
1	18/06/2014	19:17	15	60	7.1	33.7	42.4	45.1	52.4	52.9	54.9	51	51.1	35.8
1	18/06/2014	19:32	15	59.7	6.9	33.7	42.5	45.2	52.4	52.9	54.3	50.7	50.8	35.6
1	18/06/2014	19:47	15	59.8	7	33.7	42.5	45.2	52.4	52.8	54.6	51.4	50.3	35.6
1	18/06/2014	20:02	15	59.8	7	33.6	42.2	44.9	52.3	52.8	54.2	51.6	50.8	35.6
1	18/06/2014	20:17	15	59.6	6.8	33.3	41.9	44.5	52	52.5	54.1	51.7	50.6	35.8
1	18/06/2014	20:32	15	59.5	6.7	33.6	42	45.6	52	52.3	54.1	51.3	50.3	35.5
1	18/06/2014	20:47	15	59.8	6.9	33.3	41.8	45.2	52.2	52.7	54.3	52	50.8	35.9

Position	Date	Time	Duration	L_{Aeq}	Frequency (Hz)									
					16	31.5	63	125	250	500	1000	2000	4000	8000
1	18/06/2014	21:02	15	59.7	6.8	33.4	41.8	44.5	52.2	52.4	54.1	52	50.9	35.8
1	18/06/2014	21:17	15	59.8	6.9	33.6	41.9	44.5	52	52.2	54.1	52.4	51.4	36.1
1	18/06/2014	21:32	15	59.6	6.9	33.4	41.7	44.2	51.9	52.2	54	52	51.1	35.9
1	18/06/2014	21:47	15	60.3	6.7	33.1	41.7	44.5	52.1	52.6	54.3	53.8	51.8	38.1
1	18/06/2014	22:02	15	59.6	6.7	33.4	41.8	44.3	52	52.5	54.2	51.8	50.2	36
1	18/06/2014	22:17	15	59.4	6.7	33	41.7	44.3	52	52.4	54	51.3	50.2	35.7
1	18/06/2014	22:32	15	59.7	6.6	33.1	41.7	44.4	52.1	52.6	54.5	51.5	50.5	35.6
1	18/06/2014	22:47	15	59.4	6.6	33	41.7	44.4	52.1	52.5	53.9	50.8	50.6	35.6
1	18/06/2014	23:02	15	59.6	6.6	33	41.6	44.5	52.2	52.6	54.1	50.9	51.1	36
1	18/06/2014	23:17	15	60	7.6	33.1	41.8	45.2	52.4	53.5	54.6	51.4	50.7	35.7
1	18/06/2014	23:32	15	59.3	6.6	32.9	41.6	44.3	51.9	52.3	53.9	50.9	50.5	35.6
1	18/06/2014	23:47	15	59.6	6.5	32.9	41.6	43.9	51.9	52.3	54	51.6	51.4	36.9
1	19/06/2014	00:02	15	59.5	6.8	32.8	41.8	44.4	51.9	52.5	54.1	51.2	50.6	35.8
1	19/06/2014	00:17	15	59.2	6.7	32.6	41.6	44.2	51.8	52.3	53.8	50.7	50.3	35.7
1	19/06/2014	00:32	15	59.1	6.6	32.9	41.6	44.1	51.9	52.2	53.7	50.4	50.1	35.7
1	19/06/2014	00:47	15	59.1	6.5	32.7	41.5	44.1	51.8	52.2	53.7	50.4	50.2	35.9
1	19/06/2014	01:02	15	58.5	6.4	32.8	41.6	44.1	51.8	51.3	52.6	49.6	50.2	35.2
1	19/06/2014	01:17	15	58.4	6.4	32.6	41.4	43.9	51.9	51.1	52.6	49.1	50.2	35.4
1	19/06/2014	01:32	15	58.4	6.3	32.8	41.3	43.7	51.7	51.3	52.6	49	50.2	35.6
1	19/06/2014	01:47	15	58.4	6.3	32.8	41.4	43.8	51.6	51.3	52.6	49	50.1	35.5
1	19/06/2014	02:02	15	58.4	6.3	32.7	41.4	43.9	51.5	51.3	52.6	49.1	49.9	35.6
1	19/06/2014	02:17	15	58.5	6.5	32.6	41.4	44	51.8	51.4	52.8	49.1	50	35.6
1	19/06/2014	02:32	15	58.4	6.4	32.6	41.3	43.6	51.5	51.3	52.4	48.9	50.8	35.4
1	19/06/2014	02:47	15	58.4	6.4	32.7	41.3	43.8	51.9	51.3	52.6	48.9	50.3	35.4
1	19/06/2014	03:02	15	58.7	7	32.8	41.3	43.8	51.8	52	53	49.2	50.2	35.5
1	19/06/2014	03:17	15	58.7	7.4	32.8	41.4	44.1	51.7	51.8	53	49.4	50.2	35.6
1	19/06/2014	03:32	15	58.5	6.4	32.7	41.2	43.6	51.6	51.1	52.6	49	51.3	35.8
1	19/06/2014	03:47	15	58.6	6.4	32.8	41.3	43.7	51.6	51	52.3	49.7	51.7	35.9
1	19/06/2014	04:02	15	58.8	6.7	32.9	41.5	44.6	52	51.2	52.5	49.9	51.5	36
1	19/06/2014	04:17	15	58.7	7	32.8	41.8	46.3	52	51.6	52.9	49.8	49.1	35.7
1	19/06/2014	04:32	15	58.3	6.5	32.6	41.4	43.8	51.7	51.5	52.4	49.2	49	35.4
1	19/06/2014	04:47	15	58.4	6.5	32.9	41.3	43.8	51.8	51.6	52.5	49.2	49.7	35.8
1	19/06/2014	05:02	15	58.5	6.9	33.1	42.3	44	51.7	51.6	52.8	49.6	49.3	36.2
1	19/06/2014	05:17	15	58.4	6.6	32.9	41.4	43.9	52.1	51.5	52.7	49.3	48.9	35.8
1	19/06/2014	05:32	15	58.4	6.8	33.1	41.7	44	51.9	51.5	52.7	49.4	48.7	35.6
1	19/06/2014	05:47	15	58.5	6.9	33.3	41.6	44.1	51.7	51.4	53.1	49.9	49.1	35.5
1	19/06/2014	06:02	15	59	7.2	33.4	41.8	44.3	51.8	51.5	53.4	50.3	50.7	35.9
1	19/06/2014	06:17	15	60.4	7.3	34.2	41.9	44.6	52.3	52.5	54.8	54.2	51.5	36.9
1	19/06/2014	06:32	15	59.6	7.1	34.3	42	45.1	52.2	52.3	53.9	50.7	52	36.4
1	19/06/2014	06:47	15	60.3	7.7	33.8	42.6	46.9	53.2	53.6	54.6	51	51.6	36.6
1	19/06/2014	07:02	15	59.9	7.6	33.6	42.2	45.4	52.6	52.8	54.1	51	51.9	37.1
1	19/06/2014	07:17	15	59.2	7.2	33.6	41.8	44.8	52.1	52	53.3	49.8	51.9	36.3
1	19/06/2014	07:32	15	59.8	7.7	35	42.6	45.3	52.3	52.6	53.9	51.8	51.5	37.1
1	19/06/2014	07:47	15	61.4	8.5	35.1	42.8	45.5	52.6	53.9	55.3	55.5	52.6	39.5
1	19/06/2014	08:02	15	60.3	8	35	43.2	45.6	52.5	53.8	54.4	52	51.9	39.5
1	19/06/2014	08:17	15	64	8.4	35.9	43.2	47	53	54.3	62	53.8	51.8	40.8
1	19/06/2014	08:32	15	62	7.8	34	42.6	47.2	54	55	56.9	54.5	52.4	39.8
1	19/06/2014	08:47	15	62.2	7.5	34.7	43	47	54.6	55	56.4	55.2	52.8	39.3

Position	Date	Time	Duration	L_{Aeq}	Frequency (Hz)									
					16	31.5	63	125	250	500	1000	2000	4000	8000
1	19/06/2014	09:02	15	60	7.4	34.5	43.1	46.6	52.7	53.2	54	51.8	50.8	36.8
1	19/06/2014	09:17	15	60.1	7.5	34.4	43.2	46.7	52.9	53.3	54.2	51.6	50.6	36.7
1	19/06/2014	09:32	15	60.1	7.2	34.3	43	46.4	52.7	52.9	53.9	52.1	51.9	40.1
1	19/06/2014	09:47	15	60	7.5	34.4	43.3	46.9	52.8	52.9	54	51.8	51.2	36.7
1	19/06/2014	10:02	15	60	8.4	34	42.7	46.3	52.8	52.8	54.3	51.8	51.5	36.7
1	19/06/2014	10:17	15	60.5	8.1	34.3	43.3	46.7	52.7	52.8	55.3	53	51.3	36.9
1	19/06/2014	10:32	15	60.3	7.4	34	42.9	46.7	53.1	53.7	54.4	51.7	51.4	36.8

Table A-2 Measured L_{A90} frequency data, in octave bands

Position	Date	Time	Duration	L_{A90}	Frequency (Hz)									
					16	31.5	63	125	250	500	1000	2000	4000	8000
1	18/06/2014	11:32	15	59.5	3.8	32.1	40.4	44.9	51.6	52.2	53.6	51.2	50	36.2
1	18/06/2014	11:47	15	59.1	4.1	31.9	40.5	44.8	51.2	51.5	52.9	50.6	49.5	35.6
1	18/06/2014	12:02	15	59.5	3.8	32	40.6	44.8	51.6	52	53.5	50.9	49.1	35.9
1	18/06/2014	12:17	15	59.7	4	31.9	40.6	45	51.6	52.4	54	51.1	49.7	35.9
1	18/06/2014	12:32	15	59.5	3.8	32	40.8	44.9	51.5	52.2	53.8	50.8	49.4	35.8
1	18/06/2014	12:47	15	59.7	3.9	32	41	45.2	51.9	52.5	53.9	50.9	49.4	35.7
1	18/06/2014	13:02	15	59.7	3.9	32.1	41	45.4	51.8	52.7	53.8	51.1	49.4	35.6
1	18/06/2014	13:17	15	60	4.4	32.2	41.2	45.8	52.1	52.8	53.9	51.3	49.8	35.5
1	18/06/2014	13:32	15	59.8	4.4	32.3	41.1	45.8	52	52.7	53.6	51	49.5	35.3
1	18/06/2014	13:47	15	60	4.7	32	41.3	46	52.2	52.8	53.9	51.3	50	35.3
1	18/06/2014	14:02	15	60.2	4.4	32.2	41.2	45.6	52	53	54.3	51.6	50.2	35.5
1	18/06/2014	14:17	15	60.3	4.7	32.4	41.6	46.1	52.8	53.4	54.3	51.8	50.7	36.2
1	18/06/2014	14:32	15	61.1	4.3	32.2	42.6	46.1	53.2	54.1	55.1	52.8	50.9	38
1	18/06/2014	14:47	15	60.6	4.5	32.2	41.8	46	52.8	53.3	54.8	52.1	50.9	36.3
1	18/06/2014	15:02	15	60	4	32.1	41.2	45.5	51.9	52.9	53.9	51.3	50.2	35.6
1	18/06/2014	15:17	15	60.2	4.1	32.1	41.3	45.3	52.2	52.9	54.2	51.6	50.3	35.8
1	18/06/2014	15:32	15	60.1	4	32.2	41.3	45.6	52.3	53	54.1	51.3	50.1	35.7
1	18/06/2014	15:47	15	60.3	3.9	31.9	41.3	45.5	52.4	53.1	54.4	51.4	50.3	35.7
1	18/06/2014	16:02	15	60	3.7	31.9	41	44.6	51.8	52.8	54.1	51.1	50.1	35.5
1	18/06/2014	16:17	15	59.9	3.8	31.9	41	44.1	51.9	52.9	53.9	50.9	50.1	35.4
1	18/06/2014	16:32	15	59.6	3.9	31.7	41	43.9	51.6	52.4	53.8	50.7	49.8	35.1
1	18/06/2014	16:47	15	59.7	3.9	31.7	40.9	44.1	51.7	52.6	53.8	50.8	49.8	35.2
1	18/06/2014	17:02	15	59.5	3.9	31.4	40.7	44	51.8	52.4	53.4	50.3	49.9	35.1
1	18/06/2014	17:17	15	59.5	3.8	31.7	40.4	43.6	51.6	52.2	53.8	50.3	50.3	35.2
1	18/06/2014	17:32	15	59.3	3.4	31.4	40.3	43.6	51.4	52	53.3	50	49.9	35
1	18/06/2014	17:47	15	59.3	3.5	31.2	40.2	43.6	51.4	52	53.4	50.2	50	34.9
1	18/06/2014	18:02	15	59.4	3.5	31	40.5	43.8	51.5	52.1	53.6	50.3	50.1	35
1	18/06/2014	18:17	15	59.4	3.6	31.4	40.5	43.9	51.2	52.2	53.8	50.2	49.7	35
1	18/06/2014	18:32	15	59.7	3.5	31.7	40.7	44.1	51.3	52.3	54.5	50.6	50.1	35
1	18/06/2014	18:47	15	59.5	3.5	31.6	40.8	44	51.1	52.3	53.8	50.4	49.9	35.1
1	18/06/2014	19:02	15	59.2	3.3	31.6	40.4	43.6	51	52	53.4	49.9	49.2	34.9
1	18/06/2014	19:17	15	59.4	3.3	31.5	40.5	43.7	51.1	52.2	53.6	50.3	49.6	35.2
1	18/06/2014	19:32	15	59.2	3.1	31.5	40.6	43.9	51.1	52.1	53.4	50	49.1	35
1	18/06/2014	19:47	15	59.2	3.2	31.4	40.5	43.8	51	52	53.8	50.3	48.9	34.9
1	18/06/2014	20:02	15	59.2	3.2	31.3	40.3	43.6	50.9	52	53.5	50.9	49.3	35
1	18/06/2014	20:17	15	59.1	3.1	31.1	40	43.2	50.7	51.7	53.3	50.8	49.2	35
1	18/06/2014	20:32	15	59	3	31.4	40.1	43.2	50.6	51.6	53.4	50.6	48.9	34.9
1	18/06/2014	20:47	15	59.1	3.1	31.2	40	43.2	50.7	51.6	53.5	50.9	49.2	35.2
1	18/06/2014	21:02	15	59.2	3.1	31.1	39.9	43.2	50.9	51.6	53.5	51.3	49.4	35.2
1	18/06/2014	21:17	15	59.1	3	31.2	39.9	43	50.7	51.6	53.4	51.2	49.3	35.2
1	18/06/2014	21:32	15	59.1	3.1	31.1	39.9	42.9	50.6	51.5	53.4	51.3	49.3	35.2
1	18/06/2014	21:47	15	59.1	3	30.8	39.9	43.1	50.6	51.6	53.3	51.1	49.1	35.4
1	18/06/2014	22:02	15	59	3.1	31.1	39.8	43.1	50.6	51.7	53.5	51.1	48.7	35.3
1	18/06/2014	22:17	15	58.9	2.9	30.8	39.8	43	50.5	51.7	53.3	50.3	48.9	35.1
1	18/06/2014	22:32	15	58.9	2.8	30.9	39.9	43.1	50.6	51.7	53.3	50.2	49.4	35.1
1	18/06/2014	22:47	15	59	2.8	30.9	39.8	43.1	50.6	51.7	53.3	50.2	49.5	35.1
1	18/06/2014	23:02	15	59.1	2.8	30.8	39.7	43.1	50.7	51.8	53.5	50.2	49.9	35.2

Position	Date	Time	Duration	L_{A90}	Frequency (Hz)									
					16	31.5	63	125	250	500	1000	2000	4000	8000
1	18/06/2014	23:17	15	59	3	30.7	39.8	43.3	50.6	51.8	53.4	50.1	49.5	35.1
1	18/06/2014	23:32	15	58.9	2.9	30.7	39.8	42.9	50.4	51.6	53.3	50.2	49.3	35.2
1	18/06/2014	23:47	15	58.9	2.8	30.7	39.7	42.7	50.4	51.6	53.3	50.2	49.4	35.2
1	19/06/2014	00:02	15	58.9	2.9	30.5	39.9	43	50.6	51.7	53.4	50.3	49.3	35.3
1	19/06/2014	00:17	15	58.8	2.9	30.3	39.8	42.9	50.6	51.6	53.2	50.1	49	35.2
1	19/06/2014	00:32	15	58.7	2.9	30.7	39.8	42.9	50.5	51.5	53.2	49.9	49.1	35.2
1	19/06/2014	00:47	15	58.7	2.7	30.5	39.7	42.8	50.5	51.4	53.1	49.9	49	35.4
1	19/06/2014	01:02	15	58	2.5	30.6	39.7	42.7	50.4	50.5	51.9	48.9	49	34.7
1	19/06/2014	01:17	15	58	2.6	30.4	39.6	42.5	50.4	50.5	52	48.6	49.1	34.8
1	19/06/2014	01:32	15	57.9	2.6	30.7	39.5	42.5	50.3	50.5	52	48.5	49.1	35.1
1	19/06/2014	01:47	15	57.9	2.5	30.7	39.5	42.5	50.1	50.5	52	48.4	49.1	34.9
1	19/06/2014	02:02	15	57.9	2.5	30.6	39.5	42.6	50.2	50.6	52	48.6	48.8	34.9
1	19/06/2014	02:17	15	57.9	2.7	30.5	39.5	42.6	50.3	50.6	52.1	48.5	49	34.9
1	19/06/2014	02:32	15	57.9	2.6	30.5	39.4	42.4	50.1	50.5	51.8	48.4	49.4	34.8
1	19/06/2014	02:47	15	57.9	2.7	30.5	39.4	42.4	50.4	50.4	51.9	48.3	49	34.7
1	19/06/2014	03:02	15	57.9	2.8	30.6	39.4	42.3	50.3	50.4	51.9	48.4	48.9	34.8
1	19/06/2014	03:17	15	57.9	2.7	30.6	39.4	42.5	50.2	50.5	52.1	48.5	49	34.9
1	19/06/2014	03:32	15	58	2.6	30.6	39.4	42.4	50.2	50.3	52	48.4	49.3	35.1
1	19/06/2014	03:47	15	58.1	2.4	30.8	39.4	42.4	50.1	50.4	51.8	48.9	49.9	35.1
1	19/06/2014	04:02	15	58.2	2.8	30.7	39.5	42.5	50.5	50.4	51.9	49.1	48.6	35
1	19/06/2014	04:17	15	58	3	30.6	39.7	42.8	50.6	50.8	52.2	48.9	48.1	34.8
1	19/06/2014	04:32	15	57.8	2.8	30.5	39.5	42.6	50.3	50.6	51.8	48.6	48	34.9
1	19/06/2014	04:47	15	57.8	2.8	30.8	39.5	42.5	50.4	50.7	51.8	48.4	48.4	35
1	19/06/2014	05:02	15	57.9	3	30.6	39.6	42.5	50.3	50.7	51.9	48.6	48.1	35
1	19/06/2014	05:17	15	57.9	2.8	30.7	39.5	42.6	50.6	50.7	52	48.6	47.8	35.1
1	19/06/2014	05:32	15	57.9	3	30.7	39.7	42.7	50.5	50.6	52.1	48.6	47.6	34.8
1	19/06/2014	05:47	15	57.9	3.1	30.9	39.7	42.7	50.3	50.6	52.4	48.9	47.7	34.7
1	19/06/2014	06:02	15	58.3	3.1	31.1	39.9	42.9	50.4	50.6	52.6	49.1	48.5	35.1
1	19/06/2014	06:17	15	58.7	3.5	31.3	39.9	43.2	50.8	51.1	53	49.4	49.4	35.2
1	19/06/2014	06:32	15	58.6	3.2	31	39.9	43.1	50.6	50.9	52.7	49.1	49.9	35.2
1	19/06/2014	06:47	15	58.6	3.5	31	40	43.3	50.8	51.1	52.9	49.2	49.4	35.2
1	19/06/2014	07:02	15	58.6	3.4	31	39.9	43.3	50.7	51.1	52.7	49.2	49.5	35.5
1	19/06/2014	07:17	15	58.7	3.3	31.2	39.9	43.3	50.7	51.1	52.7	49.1	50	35.5
1	19/06/2014	07:32	15	58.5	3.5	31.3	40.1	43.5	50.5	51.2	52.7	49.2	49.4	35.5
1	19/06/2014	07:47	15	58.9	3.6	31.7	40.3	43.6	50.8	51.6	52.8	49.5	50	35.6
1	19/06/2014	08:02	15	59	3.7	31.7	40.5	43.7	50.9	52.1	52.9	49.7	49.3	35.6
1	19/06/2014	08:17	15	59.2	3.8	31.6	40.4	44.5	51.4	52.3	53.2	50	49.5	35.6
1	19/06/2014	08:32	15	60.2	3.7	31.6	40.5	45.4	52.2	53	54.1	51.9	50	36.1
1	19/06/2014	08:47	15	59.4	3.5	32.2	40.8	45.1	51.9	52.1	53	50.5	50.1	35.8
1	19/06/2014	09:02	15	59.2	3.6	31.9	41.1	45.2	51.4	52.1	52.9	50.4	48.9	35.6
1	19/06/2014	09:17	15	59.4	3.6	32.1	41.2	45.3	51.7	52.3	53.2	50.3	49.2	35.6
1	19/06/2014	09:32	15	59.1	3.4	31.9	41	45.1	51.4	51.9	52.8	50.2	49.3	35.5
1	19/06/2014	09:47	15	59.3	3.7	31.9	41.1	45.3	51.6	52	52.9	50.4	49.4	35.6
1	19/06/2014	10:02	15	59.3	3.4	31.6	40.9	45	51.5	52	53.1	50.5	49.6	35.7
1	19/06/2014	10:17	15	59.2	3.6	31.6	41	45.2	51.4	51.9	52.9	50.3	49.5	35.7
1	19/06/2014	10:32	15	59.2	3.4	31.6	40.8	45.3	51.4	51.8	52.8	50.4	49.4	35.6

A.2. Short term monitoring (17th- 18th, 22nd March 2016)

Table A-4 Measured L_{Aeq} frequency data, in octave bands

Position	Date	Time	Duration	L_{Aeq}	Frequency (Hz)									
					16	31.5	63	125	250	500	1000	2000	4000	8000
1	(2016/03/17)	23:07	15	55.5	65.0	66.5	64.1	59.5	57.9	51.8	49.6	46.7	39.3	29.5
1	(2016/03/22)	10:28	15	71.7	68.1	68.2	69.3	68.7	69.1	66.9	67.3	66.5	56.4	46.6
2	(2016/03/17)	23:33	15	61.6	59.4	62.3	63.6	62.1	59.8	57.5	56.0	55.3	50.5	43.0
2	(2016/03/22)	09:57	15	62.9	61.1	64.8	66.0	63.7	60.9	59.7	57.6	55.9	51.1	43.1
3	(2016/03/18)	00:18	15	65.2	72.3	66.7	71.3	67.9	66.5	62.5	60.8	55.2	47.0	37.0
3	(2016/03/22)	11:11	15	68.2	72.7	72.0	76.0	71.3	69.2	65.0	63.3	59.3	53.7	48.6
3	(2016/03/22)	12:12	15	67.9	72.9	72.5	74.5	70.5	68.5	64.6	63.1	59.3	53.6	47.5
3	(2016/03/22)	14:03	15	68.4	75.1	72.5	74.4	70.5	68.7	65.1	63.8	60.0	53.6	45.0
4	(2016/03/18)	00:00	15	61.6	63.4	63.7	66.9	64.0	61.7	58.5	57.1	53.2	47.0	43.1
4	(2016/03/22)	10:54	15	72.4	66.4	71.7	74.5	68.4	70.6	68.9	68.4	64.9	57.8	48.7
4	(2016/03/22)	11:55	15	71.6	64.8	70.6	73.7	69.2	68.7	68.1	67.5	64.5	57.2	46.9
4	(2016/03/22)	13:45	15	74.4	64.7	69.5	71.9	71.6	72.5	71.0	69.9	68.4	59.5	48.5
5	(2016/03/18)	00:46	15	52.1	53.5	56.3	60.7	55.9	51.8	47.7	48.5	43.4	36.1	28.0
5	(2016/03/22)	11:34	15	59.1	59.7	65.2	69.1	58.4	56.1	55.2	54.4	51.2	49.4	41.8
5	(2016/03/22)	13:23	15	58.0	59.7	63.7	67.5	60.2	56.6	55.0	53.6	49.9	44.7	38.1
5	(2016/03/22)	14:23	15	57.5	60.3	63.6	66.6	58.8	55.1	54.3	53.4	49.5	43.6	34.9

Table A-5 Measured L_{A90} frequency data, in octave bands

Position	Date	Time	Duration	L_{A90}	Frequency (Hz)									
					16	31.5	63	125	250	500	1000	2000	4000	8000
1	(2016/03/17)	23:07	15	54.4	59.6	62.0	60.8	56.1	56.0	50.6	47.5	44.4	38.1	27.9
1	(2016/03/22)	10:28	15	68	62.1	63.9	66.1	66.3	67.2	65.4	63.7	56.5	50.0	42.6
2	(2016/03/17)	23:33	15	60.2	53.8	58.2	59.6	58.3	57.1	55.3	54.0	54.0	49.5	42.0
2	(2016/03/22)	09:57	15	61.1	55.1	59.6	61.2	60.6	58.1	57.2	55.4	54.2	49.1	40.0
3	(2016/03/18)	00:18	15	63.5	66.3	61.4	67.0	65.2	64.2	60.5	58.5	52.2	44.3	33.7
3	(2016/03/22)	11:11	15	65.4	66.2	64.9	70.5	66.7	66.4	62.2	60.1	54.6	47.2	35.7
3	(2016/03/22)	12:12	15	65.2	66.5	65.2	69.5	66.9	65.9	62.1	59.9	54.8	47.5	36.0
3	(2016/03/22)	14:03	15	65.6	67.6	65.6	69.4	67.0	66.3	62.6	60.2	54.8	47.3	35.7
4	(2016/03/18)	00:00	15	59.1	56.4	58.3	60.8	59.0	58.3	55.6	53.9	49.4	43.5	42.0
4	(2016/03/22)	10:54	15	70.6	58.8	64.6	66.4	62.8	67.9	65.9	66.5	62.8	54.7	42.8
4	(2016/03/22)	11:55	15	70.1	58.0	64.2	66.1	62.5	66.2	66.1	65.5	62.8	55.2	42.8
4	(2016/03/22)	13:45	15	70.3	57.8	63.1	66.1	65.3	68.4	67.6	65.4	62.5	55.4	43.6
5	(2016/03/18)	00:46	15	44.5	47.6	49.9	52.6	47.0	44.5	41.5	39.7	34.2	24.6	14.7
5	(2016/03/22)	11:34	15	51.9	50.0	56.0	61.6	52.4	49.8	48.5	47.1	42.5	34.2	21.8
5	(2016/03/22)	13:23	15	53	51.0	55.7	60.3	53.1	51.0	50.0	47.8	43.4	35.2	23.6
5	(2016/03/22)	14:23	15	52.4	50.8	56.0	59.3	53.8	50.3	49.3	47.5	43.1	34.3	21.6

Appendix B. Equipment Calibration Certificates

B.1. Long term monitoring (18th- 19th June 2014)

The long term noise survey was conducted using the following Class 1 specification noise measurement equipment.

Table B-1 Details of Survey Equipment (Set 37)

Set	Type	Manufacturer	Model	Serial	Date of Last Calibration	Calibration Certificate No.
40	Sound Level Meter	Rion	NL-52	620856	20/07/2012	CONF071218
	Microphone	Rion	UC-59	03692	20/07/2012	CONF071218
	Preamplifier	Rion	NH-25	20916	20/07/2012	CONF071218
	Calibrator	Rion	NC-74	35125801	07/12/2012	CONF111222

MEASUREMENT SYSTEMS

CERTIFICATE OF CONFORMANCE

Date of Issue	**07 December 2012**
Customer	**Atkins Limited**
Certificate Number	**CONF111222**

	Manufacturer	**Type**	**Serial Number**
Acoustic Calibrator	Rion	NC-74	35125801

This is to certify that the instrument was tested and calibrated at the Manufacturer's factory according to their specification and that the product satisfied all the relevant requirements of the following Standards:

IEC 60942:2003 Class 1 (Electroacoustics - Sound Calibrators)

The instrument also received a functional check by ANV Measurement Systems prior to despatch in the UK, in accordance with our standard procedures.

Signed..... Position.Calibration Manager Date.07/12/12.....

BEAUFORT COURT, 17 ROEBUCK WAY, MILTON KEYNES, MK5 8HL
☎ 01908 642846 🖹 01908 642814
✉ info@noise-and-vibration.co.uk 💻 www.noise-and-vibration.co.uk

MEASUREMENT SYSTEMS

CERTIFICATE OF CONFORMANCE

Date of Issue	**20 July 2012**
Customer	**Atkins Noise & Vibration**
Certificate Number	**CONF071218**

	Manufacturer	Type	Serial Number
Sound Level Meter	Rion	NL-52	00620856
Preamplifier	Rion	NH-25	20916
Microphone	Rion	UC-59	03692

This is to certify that the instrument was tested and calibrated at the Manufacturer's factory according to their specification and that the product satisfied all the relevant requirements of the following Standards:

IEC 61672-1:2002 Class 1.

The instrument also received a functional check by ANV Measurement Systems prior to despatch in the UK, in accordance with our standard procedures.

Signed. Amrat C Patel Position. Laboratory Manager Date. 20/07/2012

BEAUFORT COURT, 17 ROEBUCK WAY, MILTON KEYNES, MK5 8HL
☎ 01908 642846 🖹 01908 642814
✉ info@noise-and-vibration.co.uk 💻 www.noise-and-vibration.co.uk

B.2. Short term monitoring (17th- 18th, 22nd March 2016)

Table B-2 Details of Survey Equipment (Set 33)

Set	Type	Manufacturer	Model	Serial	Date of Last Calibration	Calibration Certificate No.
33	Sound Level Meter	Norsonic	118	31474	13/01/2015	17743
	Microphone	Gras	40AF	11038	13/01/2015	17743
	Preamplifier	Norsonic	1206	30626	13/01/2015	Included
	Calibrator	Norsonic	1251	31009	13/01/2015	08054