

Report No. Coram.R2.rev1
For: PHILIP MEADOWCROFT ARCHITECTS

CORAM CAMPUS – NEW EAST BUILDING

ENVIRONMENTAL NOISE – PLANNING

PHASE A

Lucie Zalberg BSc(Physics) MSc(Architectural Acoustics) MIOA
Paul Gillieron BSc(Physics) MIOA
130 Brixton Hill
London SW2 1RS

t - 020 8671 2223
e - lucie@gsacoustics.org / paul@gsacoustics.org
m - www.gsacoustics.org

August 2013

TABLE OF CONTENTS

1.0 Summary..... 3

FIGURES4

 Figure 1 View and survey location (Position 1)5

 Figure 2: Photo showing microphone Position 16

 Figure 3: Site Plan showing proposed New East Building and New Electrical Sub Station.....7

 Figure 4: Proposed Roof Plan showing proposed plant location8

 Figure 5: Proposed Section showing proposed plant location.....9

APPENDICES.....10

 APPENDIX A: Measurement Procedure and Equipment Details.....11

 APPENDIX B: NEW EDF TRANSFORMER – LOCATION12

 APPENDIX C EDF Transformer Noise13

 APPENDIX E: GLOSSARY OF ACOUSTIC TERMS20

1.0 Summary

A new three-storey building, the New East Building, is to be built in place of the Old Morturay, the Old Swimming Pool and the Boiler Room. Plant is proposed to be located on the roof of the New East Building.

A new EDF transformer house is to be constructed along the common wall to Goodenough House in the garden, by Mecklenburgh Square entrance (see Appendix B).

EDF have given a provisional noise level for this which has allowed us to specify a 50dB builderswork construction with acoustic doors and attenuated natural vents. When the transformer is finally specified, the acoustic enclosure will be specified so that background levels at the west façade of Goodenough House will not be affected.

An acoustic survey of background noise levels at the nearest residential building, at the Goodenough House on Mecklenburgh Square, at the third floor of the West Building overlooking the Coram Campus was carried out between Wednesday 5th and Thursday 6th May 2010. Measurements were carried out according to the procedures set out in BS4142 and results of the survey are given in 5 minute background noise samples (LA90), in the Appendix. Weather conditions and wind speed were both noted.

The resultant survey data gives values that are to be expected for this area.

The measurement position is shown in Figure 1. Position 1 was located 1m from the façade (Figure 2).

The results at position 1 show that the lowest $L_{A90,5min}$ background noise level is 37.4dBA at 2am and 3am.

A limit of background noise level minus 10dB from the proposed plant at the closest residential property will be considered at all times. The west building façade of Goodenough House is some 15m away from the proposed plant.

Plant will be screened to limit noise breakout. Plant inlets/outlets will be appropriately attenuated to meet the above limit. Calculations will be available on request when plant has been selected.

FIGURES

Figure 1 View and survey location (Position 1)

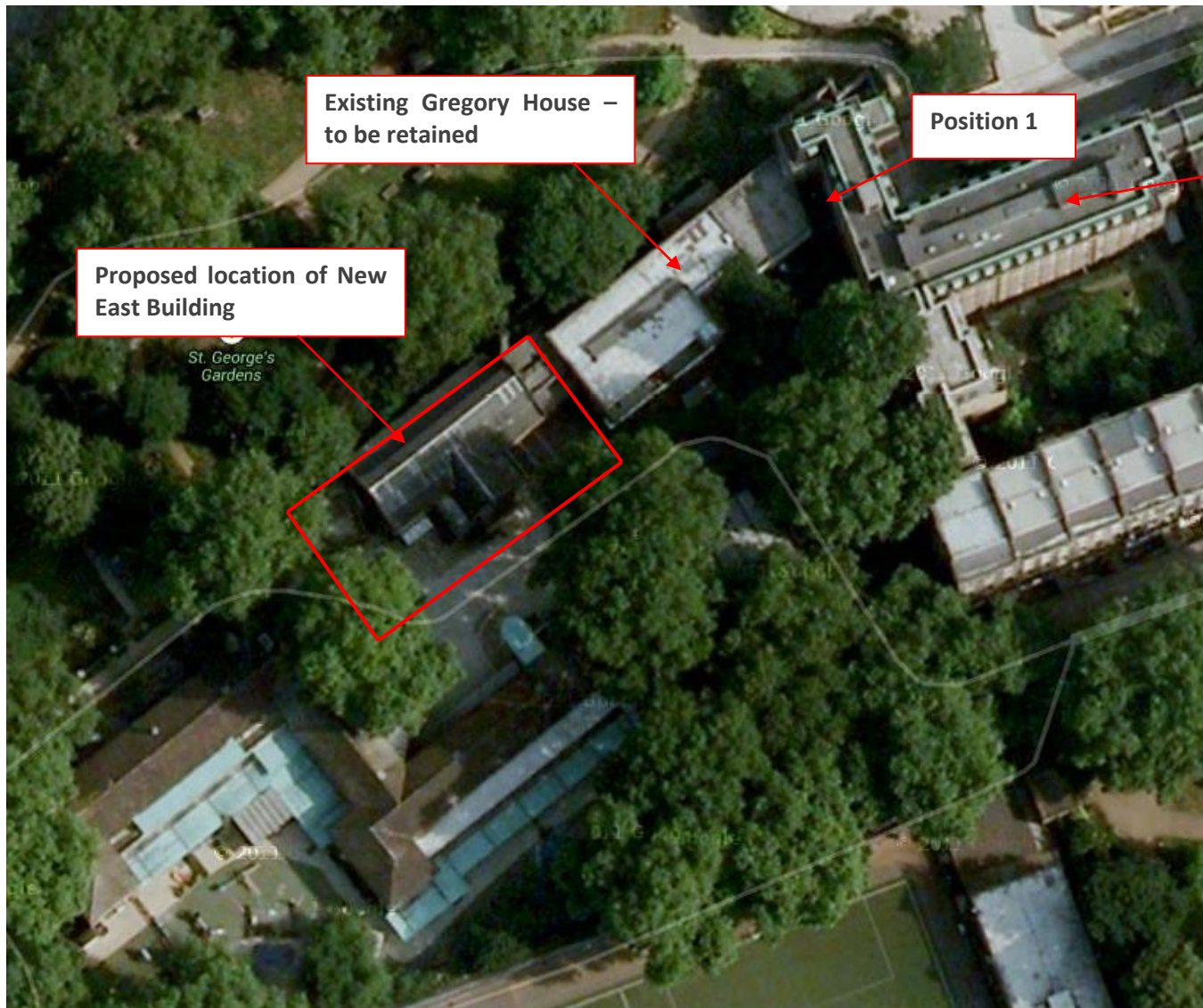


Figure 2: Photo showing microphone Position 1



Figure 3: Site Plan showing proposed New East Building and New Electrical Sub Station

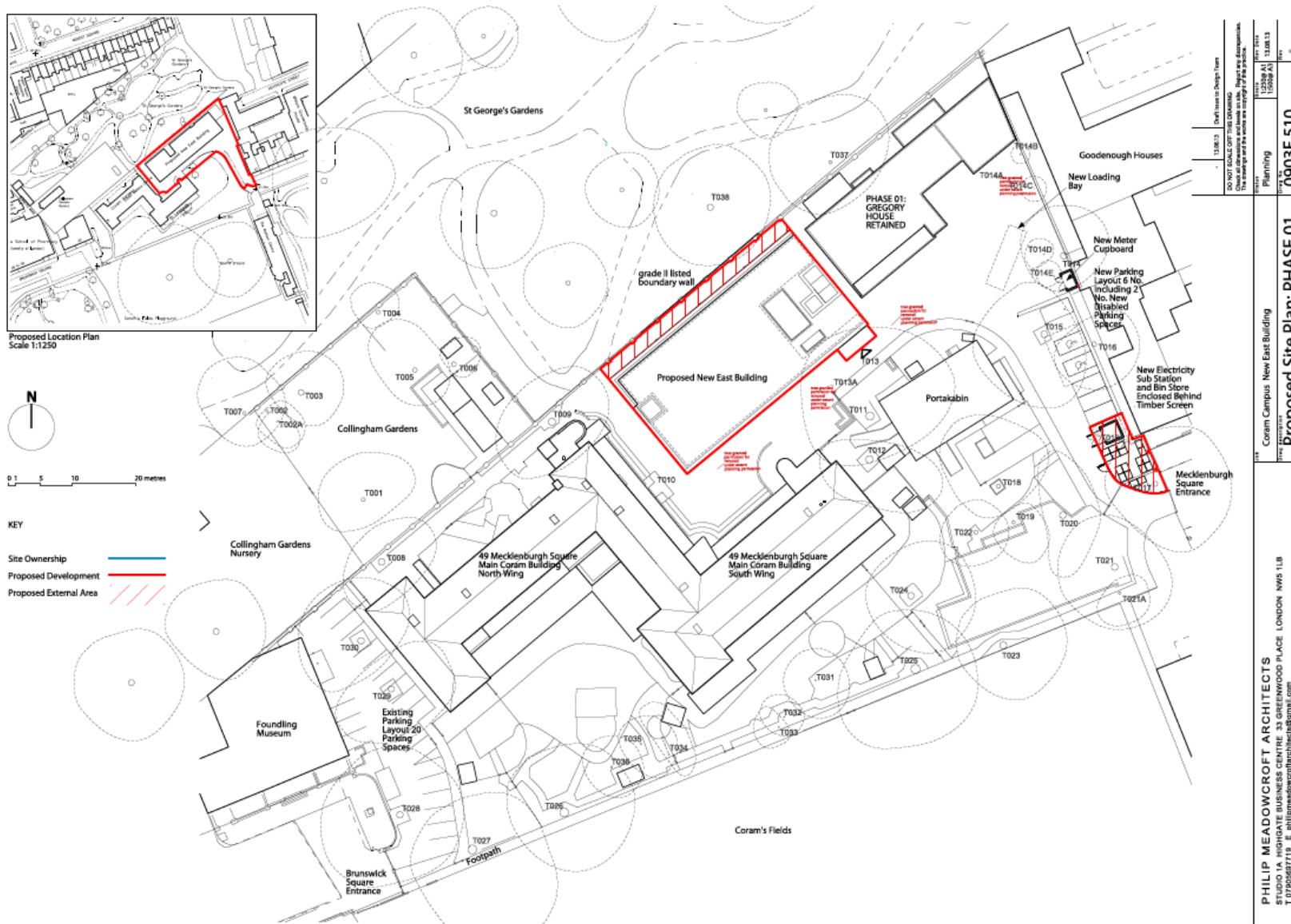
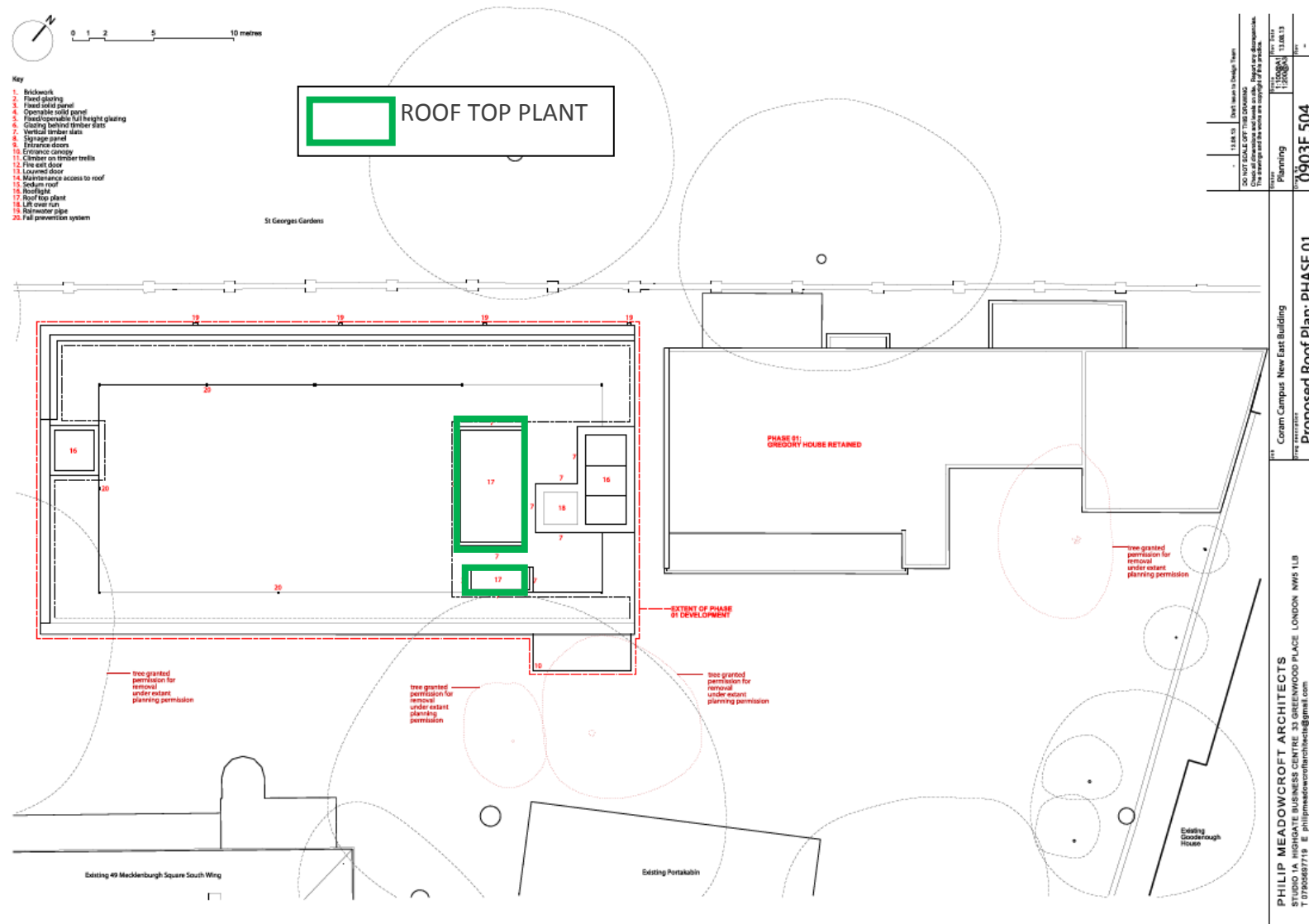


Figure 4: Proposed Roof Plan showing proposed plant location



Key Plan

Key

1. Brickwork
2. Fixed glazing
3. Fixed solid panel
4. Operable solid panel
5. Fixed/operable full height glazing
6. Glazing behind timber slats
7. Vertical timber slats
8. Signage panel
9. Entrance canopy
10. Clamber on timber walls
11. Fire exit door
12. Leaved door
13. Maintenance access to roof
14. Sedum roof
15. Rooflight
16. Timber clad roof top plant
17. Timber clad lift over-run

ROOF TOP PLANT

0 1 2 5 10 meters

Proposed South West Elevation in Context

PHASE 01: PROPOSED NEW EAST WING

Existing 4th Middleburgh Square Main Green Building North Wing

[illegible]

APPENDICES

APPENDIX A: Measurement Procedure and Equipment Details

Measurement Position 1

Date: 5th and 6th May 2010

Time: 12.20pm onward

Conditions: Dry and sunny

Wind: low wind 0.4m/s - 350 degrees

Equipment:

Norsonics 118 Real Time Analyser

Norsonics 1251Calibrator

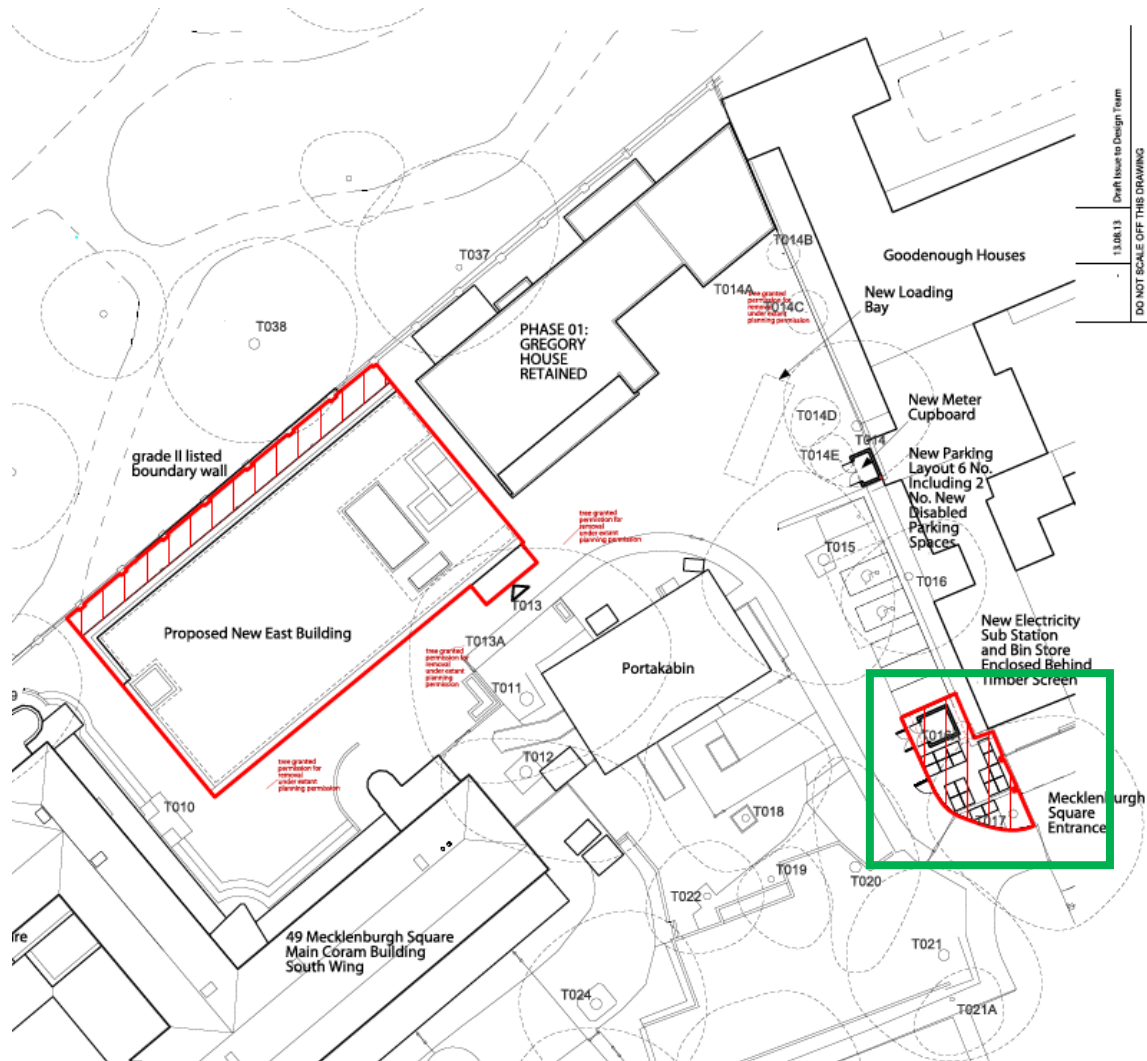
GRAS environmental microphone

Autohelm Fluxgate Compass

After calibration,

NOR118 was set to measure L90, 5 min samples of noise, with octave bands 63Hz – 8 kHz.

APPENDIX B: NEW EDF TRANSFORMER – LOCATION



Draft Issue to Design Team
13.08.13
DO NOT SCALE OFF THIS DRAWING
Check all dimensions and levels on site. Report any discrepancies.
The information and the work are intended for the use of the client.

 LOCATION OF NEW ELECTRICAL SUB STATION

APPENDIX C EDF Transformer Noise

Breakout sound pressure level 72dB.

72dB is mostly at 100Hz, so, say 10dB loss to nearest window is 62dB. Max allowed at window is 42-10dB = 32 - 5dB (tonal noise) = 27dB at window.

Enclosure insulation at 100Hz will therefore be 35dB in the 125Hz octave band, 50dB average = 225mm brick with 250mm R/C roof. Doors will be Rw42 dB metal acoustic, e,g, from Industrial Acoustics Limited. Natural ventilation will need to be attenuated (inlet and outlet).

APPENDIX D: Survey Data

Date	LA90	63 Hz	125 Hz	250 Hz	500 Hz	1.0 k	2.0 k	4.0 k	8.0 k
(2010/05/05 12:10:02.00)	114.6	52.3	49.1	43	92.4	114.6	90	61.2	41.5
(2010/05/05 12:20:00.00)	47.5	54.8	48.9	45.5	44.3	42.4	37.3	28.8	20.8
(2010/05/05 12:25:00.00)	47.6	56.8	49.8	46	44.4	42.5	37.5	28.9	20.4
(2010/05/05 12:30:00.00)	47.6	56	49.2	45.7	44	42.9	38	29.2	20.5
(2010/05/05 12:35:00.00)	48.1	55.6	49	45.7	44.4	43.5	38.9	31.1	23.3
(2010/05/05 12:40:00.00)	49	55.8	48.6	46.4	45.9	44.2	39	32.3	25.1
(2010/05/05 12:45:00.00)	48.4	55.3	48	45.7	45	43.8	38.8	31.1	23.2
(2010/05/05 12:50:00.00)	50.2	57.5	50.3	47.7	47.3	45.3	40.1	33	25.1
(2010/05/05 12:55:00.00)	50.7	57.1	49.2	47.6	47.5	45.5	41	34.5	26.8
(2010/05/05 13:00:00.00)	49.3	55	47.2	46.7	46.2	44.6	39.4	33	24.8
(2010/05/05 13:05:00.00)	50.7	55.4	47.6	46.8	46.6	45.8	40.7	34	24.7
(2010/05/05 13:10:00.00)	50.4	55	47.9	46.4	46.2	45.8	41.2	34.5	23.2
(2010/05/05 13:15:00.00)	49	54.4	47.4	45.6	45.1	44.5	40	31.2	21.1
(2010/05/05 13:20:00.00)	48.7	55	47.7	45.3	44.8	44.2	40	32.2	21.5
(2010/05/05 13:25:00.00)	49.2	55.2	48.1	44.5	44.8	44.9	40.9	32.8	20.9
(2010/05/05 13:30:00.00)	48	54.8	48.3	44.8	44.1	43.5	39	31.4	21.1
(2010/05/05 13:35:00.00)	48.3	55.4	48.1	44.7	44.1	43.8	39.3	32	21.6
(2010/05/05 13:40:00.00)	48.3	55.3	48.1	44.9	44.4	43.9	39.2	31.3	20.2
(2010/05/05 13:45:00.00)	48.2	54.7	47.3	44.6	44.5	43.9	39.6	31.3	19.8
(2010/05/05 13:50:00.00)	48.5	55	47.9	44.7	44.5	44.5	40.1	31.1	19.1
(2010/05/05 13:55:00.00)	48.2	55.4	48.5	44.4	44.4	43.7	39.3	30.7	20.1
(2010/05/05 14:00:00.00)	47.7	55.8	48.8	45.1	44.2	43.3	38.5	29.6	19
(2010/05/05 14:05:00.00)	48.3	55.8	49	45.9	44.6	43.6	38.6	30.3	20.2
(2010/05/05 14:10:00.00)	48	55.2	48	45.3	44.3	43.5	38.8	30.1	20.8
(2010/05/05 14:15:00.00)	48.2	53.9	47.3	44.5	44.5	43.8	39.3	30.4	19.5
(2010/05/05 14:20:00.00)	48.2	55.9	48.7	45.1	44.3	43.5	38.9	30	18.9
(2010/05/05 14:25:00.00)	48	55.2	48.9	45.3	44.1	43.5	38.7	29.8	18.6
(2010/05/05 14:30:00.00)	47.9	54.7	48.3	45.7	44.1	43.3	38.5	29.7	20
(2010/05/05 14:35:00.00)	48.2	55.1	47.6	45	44.2	43.5	38.7	30.5	20.2
(2010/05/05 14:40:00.00)	48	55	48.1	45.5	44.4	43.8	38.5	29.6	20
(2010/05/05 14:45:00.00)	47.7	55	48.2	45	44.4	43.6	38.4	28.9	19.4
(2010/05/05 14:50:00.00)	48.2	54.9	48.3	45.5	44.7	43.9	38.9	29.7	20.1
(2010/05/05 14:55:00.00)	47.9	55.3	48.6	45.4	44.4	43.7	38.6	27.8	18.2
(2010/05/05 15:00:00.00)	48.9	55.2	48.5	45.4	44.5	43.7	38.5	29.3	20.1
(2010/05/05 15:05:00.00)	49.2	56.2	49.4	46.5	45.4	44.6	39.8	31.9	23.6
(2010/05/05 15:10:00.00)	49.1	55.9	49.7	46.3	44.7	44.6	39.7	31	21.3
(2010/05/05 15:15:00.00)	48.5	54.8	48.1	45.3	44.9	44.2	39.4	31.9	24.2
(2010/05/05 15:20:00.00)	48.1	54.9	48.3	45.2	44.9	43.5	38.8	30.6	21.7
(2010/05/05 15:25:00.00)	48.3	56.1	48.8	46	45	43.9	38.6	29.5	20
(2010/05/05 15:30:00.00)	48.9	55.6	49	45.4	45.1	44.9	39.6	31.1	22
(2010/05/05 15:35:00.00)	47.8	54.1	47.6	45.2	44.1	43.3	38.1	29.9	22.5
(2010/05/05 15:40:00.00)	48	54.6	48.2	45.9	44.1	43.3	38.4	29.9	21.6
(2010/05/05 15:45:00.00)	48	54.2	47.5	45.4	44.3	43.6	38.7	30.2	22.1
(2010/05/05 15:50:00.00)	47.9	53.8	48.2	45.7	44.2	43.2	38.5	29.8	20.8
(2010/05/05 15:55:00.00)	49.8	55.3	49.1	46.9	46	45.4	40.3	31.9	22.7
(2010/05/05 16:00:00.00)	49	54.7	48.8	46.7	45.7	44.8	39.7	30.6	21.2
(2010/05/05 16:05:00.00)	49.7	55.1	49	47.2	46	45.3	41	32.6	22.5
(2010/05/05 16:10:00.00)	50.4	54.1	48.9	48.2	46.3	45.8	41.3	32.7	23.2
(2010/05/05 16:15:00.00)	50.9	55.1	48.8	46.5	46.7	46.2	41	33.8	32.9
(2010/05/05 16:20:00.00)	51	54.4	48.3	45.8	45.7	45.5	40.6	33.5	34.3
(2010/05/05 16:25:00.00)	49.3	54.3	48.7	46.3	45.3	44.6	39.3	31.4	28.6
(2010/05/05 16:30:00.00)	50.5	54.8	49.9	47.3	45.9	45.6	40.6	32.4	26.2
(2010/05/05 16:35:00.00)	50.1	54.7	49.2	46.4	46	46	40.9	31.3	21
(2010/05/05 16:40:00.00)	49.2	54.5	48.7	46.1	45.3	45.1	39.9	30.1	19.4
(2010/05/05 16:45:00.00)	48.9	54.4	48.3	45.5	44.7	44.8	39.6	29.5	19.1
(2010/05/05 16:50:00.00)	49.1	54.7	49.5	46.1	45.2	44.8	39.6	30.4	20.8
(2010/05/05 16:55:00.00)	48.5	53.4	48.1	45.6	44.5	44.4	39.1	30	20.6

(2010/05/05 17:00:00.00)	48.9	54.3	48.7	46.2	45	44.6	39.8	30.2	19.4
(2010/05/05 17:05:00.00)	48	53.9	47.7	45.4	44.4	44	38.4	28.3	18.1
(2010/05/05 17:10:00.00)	49.3	54.5	48.9	45.6	45.6	45.2	39.8	30.3	19.8
(2010/05/05 17:15:00.00)	49.1	54.6	48.2	45.5	45.1	45	39.8	30.6	20
(2010/05/05 17:20:00.00)	50.2	54.6	49.1	46.1	46.4	45.9	40.7	31.5	20.2
(2010/05/05 17:25:00.00)	50.1	54.1	48.2	46	46	46	40.4	31.7	21.5
(2010/05/05 17:30:00.00)	51	53.5	48.4	45.9	46.7	47.4	41.7	32.9	23.1
(2010/05/05 17:35:00.00)	48.2	54.6	48.8	45.7	45	43.9	38.4	29.3	19.5
(2010/05/05 17:40:00.00)	47.5	53.3	46.9	45	44.5	43.2	37.7	28.2	19.3
(2010/05/05 17:45:00.00)	48.6	54.2	48.7	46.4	45.6	43.9	37.9	29	20.3
(2010/05/05 17:50:00.00)	48.5	54.2	48.7	45.9	45.3	44	38.1	29.1	20.5
(2010/05/05 17:55:00.00)	47.5	54.5	48.5	45.4	44.4	43	37.2	27.8	19.5
(2010/05/05 18:00:00.00)	48.2	54.2	47.8	45.4	45.2	44.2	37.8	28.2	18.6
(2010/05/05 18:05:00.00)	48.3	53.7	47.1	44.6	44.5	44.2	38.7	28.5	19.8
(2010/05/05 18:10:00.00)	48	53.6	47.3	44.9	44.5	43.2	37.7	29.5	20.5
(2010/05/05 18:15:00.00)	47.7	54	48.1	45.4	44.5	43.1	37.4	28.6	19.7
(2010/05/05 18:20:00.00)	48.5	54.9	48.4	45.2	44.9	44	38.6	28.6	19.5
(2010/05/05 18:25:00.00)	47.7	53.5	48.2	45.4	44.5	43.3	37.3	27.8	19.3
(2010/05/05 18:30:00.00)	47.8	53.6	47.1	44.8	44.3	43.8	38.3	28.8	18.8
(2010/05/05 18:35:00.00)	48.4	54	47	44.6	44.2	43.7	38.7	30.2	20.6
(2010/05/05 18:40:00.00)	48.7	54.6	47.9	44.9	44.9	44.2	38.5	30.2	20.9
(2010/05/05 18:45:00.00)	48.6	53.1	47	44.8	44.8	44.5	39	29.9	21.7
(2010/05/05 18:50:00.00)	48	53	47.2	45.2	44.3	43.1	37.7	28.7	23.3
(2010/05/05 18:55:00.00)	47.4	53	46.9	44.7	43.7	42.6	37.6	29.5	24.3
(2010/05/05 19:00:00.00)	47.1	54	47.5	44.7	43.3	42.4	37.5	28.4	21.6
(2010/05/05 19:05:00.00)	47.5	54	47.9	44.8	44.4	43	37.7	29	21
(2010/05/05 19:10:00.00)	47.5	52.8	47.1	44.2	44.1	42.5	37.8	29.9	21
(2010/05/05 19:15:00.00)	46.9	53.2	46.7	44.1	43.6	42.1	36.7	28.2	20.2
(2010/05/05 19:20:00.00)	46.1	53.2	47.2	44.1	42.9	41.5	36.1	27.6	20.6
(2010/05/05 19:25:00.00)	47.2	53.3	47.9	45.1	43.5	41.7	36.9	28.7	20.2
(2010/05/05 19:30:00.00)	46.5	52.9	47.9	44.5	43	41.6	36.2	28.2	20.7
(2010/05/05 19:35:00.00)	46.9	53	47.1	44.5	43.3	41.9	37	29.3	21.8
(2010/05/05 19:40:00.00)	47.3	52.8	46.8	44.2	43.3	42.3	37.2	28	20.8
(2010/05/05 19:45:00.00)	46.5	53.7	47.1	44.1	42.9	41.6	36.3	27.6	19.9
(2010/05/05 19:50:00.00)	46.3	53.3	46.6	43.9	42.6	41.3	36.4	27.9	21
(2010/05/05 19:55:00.00)	46.2	52.9	47.6	44.6	42.8	41	36.1	27.4	19.5
(2010/05/05 20:00:00.00)	44.8	51.4	46	43.2	41.4	40	35.4	26	17.6
(2010/05/05 20:05:00.00)	46	52.6	46.6	43.9	42.5	40.9	36.4	27	16.8
(2010/05/05 20:10:00.00)	46.2	51.6	46.4	44	42.6	41	36.8	28	19.3
(2010/05/05 20:15:00.00)	46.1	50.9	46.1	43.6	42.5	41.2	36.7	27.8	22.6
(2010/05/05 20:20:00.00)	46.1	51.8	46.9	43.9	42.7	41.5	36.9	26.9	17
(2010/05/05 20:25:00.00)	46.2	51.5	45.9	43.5	42.2	41.1	36.3	28	17.6
(2010/05/05 20:30:00.00)	46.6	51.2	45.8	43.6	42.9	41.6	36.4	28.3	18.8
(2010/05/05 20:35:00.00)	46	51.2	45.9	43.3	42.3	41.2	36.4	27.8	16.7
(2010/05/05 20:40:00.00)	45.5	50.5	46.5	43.5	42.3	41.1	35.4	25.3	15.8
(2010/05/05 20:45:00.00)	45.5	52.2	46.7	43.9	42.3	41.1	34.9	24.7	14.7
(2010/05/05 20:50:00.00)	45.5	51.3	46.3	43.5	42.3	41	34.8	26.2	14.7
(2010/05/05 20:55:00.00)	45.3	51.1	46.3	43.2	42.2	40.2	33.9	24.4	14.6
(2010/05/05 21:00:00.00)	43.4	51.8	47.1	43.1	40.3	38.5	32	21	14.1
(2010/05/05 21:05:00.00)	43	50.8	45.3	43.2	40.4	38.7	31.8	20	14
(2010/05/05 21:10:00.00)	43.3	51.1	46.4	43.2	40.3	38.4	32.5	20.3	14.1
(2010/05/05 21:15:00.00)	43.7	50.9	45.8	43.6	41.1	39.4	32.8	21	13.8
(2010/05/05 21:20:00.00)	43	50.5	45.2	43	40.2	38.5	31.9	21.4	15.4
(2010/05/05 21:25:00.00)	41.9	50.5	44.8	42.1	39.3	37.3	30.7	19.9	13.9
(2010/05/05 21:30:00.00)	41.9	50.3	44.7	42	39.5	37.3	30.8	19.8	13.8
(2010/05/05 21:35:00.00)	42.5	51.4	46.2	43.3	39.9	37.5	30.8	19.7	13.8
(2010/05/05 21:40:00.00)	42.6	50.8	45.9	42.6	39.8	38.2	31.5	19.2	13.2
(2010/05/05 21:45:00.00)	42.9	50.3	45.2	43.1	40.2	38	31.5	19.3	13.3
(2010/05/05 21:50:00.00)	42.8	50.9	45.3	43.2	40.1	38.1	31.2	19.9	13.6
(2010/05/05 21:55:00.00)	42.6	50.3	45.1	42.9	40	38.1	31.1	18.4	13.2
(2010/05/05 22:00:00.00)	43.5	51.6	46.1	43.6	40.6	38.7	32.3	20	14.1
(2010/05/05 22:05:00.00)	42.6	51.3	45.3	42.7	39.8	38.2	32.1	20.8	14.7

(2010/05/05 22:10:00.00)	42.3	50.6	45.4	42.4	39.5	37.5	31.7	19.3	13.3
(2010/05/05 22:15:00.00)	42.1	50	45.1	42.7	39.6	36.9	30.6	19.2	13.6
(2010/05/05 22:20:00.00)	42	49.4	44.8	42.5	39.5	37.3	30.7	20.5	14.5
(2010/05/05 22:25:00.00)	43.2	51.1	46	43.5	40.6	38.6	31.8	20.3	14.1
(2010/05/05 22:30:00.00)	43.2	51.8	46.2	43.7	40.5	38.6	32.4	20.6	14.7
(2010/05/05 22:35:00.00)	42.5	50.6	45.2	42.8	40.1	37.5	31.3	19.3	13.4
(2010/05/05 22:40:00.00)	42	50.2	45.6	42.6	39.6	36.9	30.3	18.6	13.3
(2010/05/05 22:45:00.00)	42.4	51.1	45.8	43.4	39.6	37.2	31	18.8	12.9
(2010/05/05 22:50:00.00)	42	49.5	44.3	42.7	39.6	37.1	30.8	18.7	13
(2010/05/05 22:55:00.00)	42.3	50	44.8	42.8	39.6	37.4	31.1	18.5	13
(2010/05/05 23:00:00.00)	41.4	50.1	44.9	42.7	39	36	29.4	17.6	12.8
(2010/05/05 23:05:00.00)	41.5	49.8	44.9	42.8	39.2	36.3	29.6	18	12.8
(2010/05/05 23:10:00.00)	41.7	49.9	45.2	42.9	39.1	36.4	29.5	16.8	12.7
(2010/05/05 23:15:00.00)	40.4	49.3	43.9	42.4	38.1	34.8	28.4	17.2	12.7
(2010/05/05 23:20:00.00)	40.6	49	44.1	42.3	38.2	35.1	28.6	16.8	12.7
(2010/05/05 23:25:00.00)	41.6	50	44.6	43	39	36.7	30.2	17.1	12.6
(2010/05/05 23:30:00.00)	41.1	49.2	43.7	42.4	38.8	36.1	29.2	17.1	12.7
(2010/05/05 23:35:00.00)	40.3	49.2	43.6	41.8	38.1	34.7	27.9	16.3	12.8
(2010/05/05 23:40:00.00)	41.3	49.6	45.4	42.7	38.8	35.7	29.2	17.4	12.8
(2010/05/05 23:45:00.00)	40.7	49.1	43.7	41.8	38.5	35.8	29	16.8	12.7
(2010/05/05 23:50:00.00)	40.3	48	42.7	41.9	38.2	34.7	28.1	16.6	12.7
(2010/05/05 23:55:00.00)	39.9	47.5	42.7	41.5	37.8	34.3	27.5	16.2	12.7
(2010/05/06 00:00:00.00)	40.7	49.2	43.2	41.6	38.2	35.8	29.2	16.4	12.7
(2010/05/06 00:05:00.00)	40.1	48.1	42.9	41.5	37.7	35.2	28.3	15.8	12.7
(2010/05/06 00:10:00.00)	39.9	48.3	43.8	41.5	37.6	34.5	27.7	15.8	12.7
(2010/05/06 00:15:00.00)	39.8	49	42.8	41.4	37	34.6	27.8	15.6	12.6
(2010/05/06 00:20:00.00)	40	48.4	42.9	41.6	37.3	35	28	16	12.6
(2010/05/06 00:25:00.00)	39.4	48.8	43.4	41.5	37.1	33.5	27	15.6	12.7
(2010/05/06 00:30:00.00)	39.1	47.8	42.3	41	36.7	33.7	26.9	14.9	12.5
(2010/05/06 00:35:00.00)	39.1	47.9	42.7	41	36.8	33	26.2	15.2	12.6
(2010/05/06 00:40:00.00)	38.5	46.7	42.3	41	36.4	32.2	25	14.3	12.5
(2010/05/06 00:45:00.00)	38.8	47.2	42.2	41.2	36.6	32.9	26	14.6	12.5
(2010/05/06 00:50:00.00)	38.3	46.5	41.5	41.3	36.1	31.7	24.7	13.8	12.5
(2010/05/06 00:55:00.00)	41.2	48.4	43.8	43	38.8	35.6	27.9	15	12.5
(2010/05/06 01:00:00.00)	41.5	48.6	43.9	44.6	38.9	34.5	28.1	15.1	12.5
(2010/05/06 01:05:00.00)	38.1	47	43.3	40.6	36.3	31.8	25	14.1	12.5
(2010/05/06 01:10:00.00)	38	46.5	41.6	40.7	35.7	31.1	24.3	13.8	12.6
(2010/05/06 01:15:00.00)	38.8	47.5	42.2	40.8	36.4	32.9	26.3	14.7	12.5
(2010/05/06 01:20:00.00)	38.6	48.2	43.1	40.9	36.3	32.4	26.2	15.2	12.7
(2010/05/06 01:25:00.00)	38.4	46.7	41.8	40.9	36.1	32.1	25.1	14.5	12.5
(2010/05/06 01:30:00.00)	38.1	46.6	41.5	40.7	36.2	31.6	24.5	13.9	12.5
(2010/05/06 01:35:00.00)	38.1	46.3	42.4	41.1	36	31.3	24.3	14.2	12.5
(2010/05/06 01:40:00.00)	38.2	45.9	41.5	40.9	36.1	31.7	25.1	14.7	12.5
(2010/05/06 01:45:00.00)	37.6	46.2	41.8	40.6	35.7	30.7	24.1	14.3	12.6
(2010/05/06 01:50:00.00)	38.2	46.1	41.5	40.7	35.9	31.9	24.9	14.3	12.6
(2010/05/06 01:55:00.00)	37.8	46.5	41.8	40.6	35.7	31.3	24.6	14.7	12.6
(2010/05/06 02:00:00.00)	37.5	45.3	41.3	41.1	35.3	30.4	23.6	13.7	12.5
(2010/05/06 02:05:00.00)	37.7	45.8	41.9	41.1	35.6	30.9	24.1	13.8	12.4
(2010/05/06 02:10:00.00)	38	45.8	41.1	41.2	35.6	31	24.2	14.3	12.5
(2010/05/06 02:15:00.00)	37.4	45.4	40.9	40	35.3	30.9	24.1	14.2	12.6
(2010/05/06 02:20:00.00)	37.4	45.5	41.2	40.3	35.2	31.1	24.2	14.2	12.5
(2010/05/06 02:25:00.00)	37.6	45.4	41.1	40.6	35.5	31.1	24.1	14	12.5
(2010/05/06 02:30:00.00)	40.8	50.1	46	44.8	37.6	32.8	26	14.9	12.6
(2010/05/06 02:35:00.00)	43.4	48.9	44.8	45.5	41.7	38.4	30.7	15.9	12.6
(2010/05/06 02:40:00.00)	37.8	46.7	41.6	40.8	35.3	31.3	24.7	14.1	12.5
(2010/05/06 02:45:00.00)	37.8	45.6	41.7	41.1	35.7	30.9	24	14	12.6
(2010/05/06 02:50:00.00)	38.1	46.3	42.1	41.3	35.8	31.1	24	14.1	12.6
(2010/05/06 02:55:00.00)	37.6	45.8	41.8	40.9	35.4	30.4	23.6	14.2	12.6
(2010/05/06 03:00:00.00)	38.1	46.3	42.3	41.1	35.7	31.3	24.5	13.9	12.5
(2010/05/06 03:05:00.00)	38	46	42	41	35.9	31.4	24.4	14.1	12.5
(2010/05/06 03:10:00.00)	37.4	45.2	41.3	40.3	35.1	30.9	24.5	14.4	12.7
(2010/05/06 03:15:00.00)	37.6	45.1	41.2	40.5	35.3	31.1	24.8	14.3	12.6

(2010/05/06 03:20:00.00)	37.7	46.3	41.8	40.4	35.6	31.2	24.8	14.4	12.5
(2010/05/06 03:25:00.00)	38.5	46.8	42.2	41	36.1	31.4	26.5	16.2	12.6
(2010/05/06 03:30:00.00)	38.8	45.8	41.3	40.3	35.4	31.1	27.8	22.7	13.6
(2010/05/06 03:35:00.00)	39.3	45.3	40.5	39.8	35	30.5	28.7	25.4	13.8
(2010/05/06 03:40:00.00)	39.5	46	41.4	40.4	35.4	31	28.5	25.1	14.2
(2010/05/06 03:45:00.00)	39.8	45.9	41.3	40	35.6	31.6	29.6	26.4	14.4
(2010/05/06 03:50:00.00)	40.3	46.6	41.6	40.7	36	31.9	31	26.9	14.8
(2010/05/06 03:55:00.00)	41.2	46.1	42.5	40.7	35.7	31.7	33	29.8	14.4
(2010/05/06 04:00:00.00)	41.4	45.3	41	40.4	35.7	31.9	34.2	31.3	14.6
(2010/05/06 04:05:00.00)	42.1	45.8	41.3	40.7	36.3	32.9	34.5	31	14.4
(2010/05/06 04:10:00.00)	41.7	45.5	40.9	40.4	36.3	34.1	34	30.5	14.4
(2010/05/06 04:15:00.00)	42	47	41.7	40.3	36.5	34.4	34.4	30.8	14.8
(2010/05/06 04:20:00.00)	41.6	45.5	40.9	39.5	36.2	34.4	34.1	30.3	15.2
(2010/05/06 04:25:00.00)	41.5	45.7	41.1	39.6	36.6	34.8	34	30.1	14.7
(2010/05/06 04:30:00.00)	41.9	47.2	42.3	40.5	36.9	35.2	34	29.2	15
(2010/05/06 04:35:00.00)	41.4	46	41.9	40.2	36.4	32.8	33.4	28.7	15.4
(2010/05/06 04:40:00.00)	41.1	46.1	41.8	40.4	36.2	32.7	32.6	27.7	15.4
(2010/05/06 04:45:00.00)	41.3	45.5	41.1	40.4	36	32.6	33.8	28.6	16.2
(2010/05/06 04:50:00.00)	40.7	46	42	40.2	36.3	32.6	32.2	27.2	16.6
(2010/05/06 04:55:00.00)	42.5	47.4	42.5	40.9	36.8	33.5	31.9	30	19.3
(2010/05/06 05:00:00.00)	42.5	46.3	41.8	40.7	36.8	33.4	32.7	31.2	19.1
(2010/05/06 05:05:00.00)	41.3	46	41.6	40.6	36.4	32.8	28.8	31.6	20.6
(2010/05/06 05:10:00.00)	40.9	46	41.5	40	36.7	33.4	28.1	30.8	23
(2010/05/06 05:15:00.00)	41.3	47	42.2	40.4	36.9	33.9	28.6	29.6	23.2
(2010/05/06 05:20:00.00)	41.3	48.3	42.8	40.8	37.5	35.6	29.9	26.2	20.6
(2010/05/06 05:25:00.00)	41.4	47.7	42.5	41.5	38.2	36	30.5	22.7	15.5
(2010/05/06 05:30:00.00)	41.2	47.5	42.3	41.2	37.7	34.9	28.7	23.2	18
(2010/05/06 05:35:00.00)	41.4	48.1	42.6	42.1	38.1	35.1	29.3	24.8	22.4
(2010/05/06 05:40:00.00)	41.6	48.1	42.6	41.9	37.8	35	28.5	23.5	20.6
(2010/05/06 05:45:00.00)	41.3	47.7	43.1	41.3	37.7	34.5	28	22.3	18.7
(2010/05/06 05:50:00.00)	41.1	48	42	40.7	37.2	34.6	28.7	22.8	19.4
(2010/05/06 05:55:00.00)	41.9	48.1	42.6	41.3	37.7	35.3	29.6	25.2	20.7
(2010/05/06 06:00:00.00)	40.9	47.8	42.6	41.2	37.8	35.5	29.2	22.1	18.3
(2010/05/06 06:05:00.00)	42.3	50.3	44	42	38.5	36.8	30.2	25.4	19
(2010/05/06 06:10:00.00)	42.1	49.7	43.4	41.6	38.6	36.9	30.5	22.2	17.6
(2010/05/06 06:15:00.00)	41.8	49.4	43.8	41.6	38.7	36	29.8	21.3	18
(2010/05/06 06:20:00.00)	42.7	49.5	44.7	42.5	39.2	36	29.5	24	20.2
(2010/05/06 06:25:00.00)	42.6	50.3	44.4	42.2	39.5	37.7	31.3	23.9	18.8
(2010/05/06 06:30:00.00)	42	49.7	43.9	41.1	38.7	36.6	30.5	23.3	18.4
(2010/05/06 06:35:00.00)	43.3	49.5	44.5	42.5	39.7	37.9	31.3	25.5	18.9
(2010/05/06 06:40:00.00)	43.5	51	45.1	42.8	39.6	38.4	32.6	26.1	19.6
(2010/05/06 06:45:00.00)	44.3	51	45	42.4	40.1	39.9	34.3	25.8	19.4
(2010/05/06 06:50:00.00)	44.2	51.7	45.4	42.7	40.2	39.5	33.8	24.2	18.6
(2010/05/06 06:55:00.00)	44.5	51.2	45	43	40.4	39.8	34.8	26.6	20.3
(2010/05/06 07:00:00.00)	43.9	51.7	45.8	42.8	40.3	38.7	32.5	23.5	18.7
(2010/05/06 07:05:00.00)	44	52.5	46.2	42.9	40.7	39.3	32.7	24	18.9
(2010/05/06 07:10:00.00)	43.6	51.7	45.6	42.8	40.4	38.8	32.7	23.5	18.8
(2010/05/06 07:15:00.00)	43.2	50.9	44.5	42.7	39.9	38.2	32.1	23.9	18.7
(2010/05/06 07:20:00.00)	43.9	51.9	45.1	42.7	40.5	39.1	32.8	25.4	20.2
(2010/05/06 07:25:00.00)	44.7	52.9	46.1	43	41	40.2	34.3	27.1	24.4
(2010/05/06 07:30:00.00)	44.3	52.5	45.4	42.8	40.7	39.6	34	27.7	21.6
(2010/05/06 07:35:00.00)	45.2	52.4	46.1	43.3	41.5	40.3	34.6	26.9	20.8
(2010/05/06 07:40:00.00)	45	53.8	47.3	43.4	41.3	40.3	34.6	26.1	20
(2010/05/06 07:45:00.00)	44.9	53.2	46.6	43.3	41.4	39.5	33.5	27.3	22.3
(2010/05/06 07:50:00.00)	44.8	53.1	46.6	43.3	41.1	40	34.1	26.2	22.6
(2010/05/06 07:55:00.00)	44.7	53.4	46.5	43.1	41.4	40.2	34.2	26.7	22.6
(2010/05/06 08:00:00.00)	45.1	53.5	47.3	44.1	41.8	40.1	34.2	26	18.9
(2010/05/06 08:05:00.00)	45.3	54.3	47.7	43.9	41.9	40.2	34.8	25.8	19
(2010/05/06 08:10:00.00)	46.4	54.2	47.7	45.2	43.3	41.8	36.1	27.8	20.3
(2010/05/06 08:15:00.00)	46.2	54.4	47.3	44.8	43	41.6	36.1	26.7	20.5
(2010/05/06 08:20:00.00)	46.9	54.4	47.7	45	43.5	42.1	37.5	29.6	20.7
(2010/05/06 08:25:00.00)	47.9	55.1	48.1	45.2	44.3	43.7	38.6	29.8	19.7

(2010/05/06 08:30:00.00)	47.4	54.3	48.1	45.3	43.7	42.9	37.5	31.6	20
(2010/05/06 08:35:00.00)	47.7	54.3	48.2	45.3	43.9	42.2	37.4	31.4	23.3
(2010/05/06 08:40:00.00)	46.9	54.2	47.8	44.9	43.6	42.2	37.2	30.1	20.8
(2010/05/06 08:45:00.00)	47.5	54.7	48	45.5	44.1	42.7	38	30.2	20.2
(2010/05/06 08:50:00.00)	47.6	54.1	47.8	45.7	44.3	43	38.2	29.5	19.4
(2010/05/06 08:55:00.00)	47.6	55	49	45.7	44	43.1	37.8	30.1	20.5
(2010/05/06 09:00:00.00)	47.5	55.1	48.4	45.4	44.2	42.8	38.1	31.6	21.2
(2010/05/06 09:05:00.00)	48.4	54.5	47.7	45	43.5	43.2	41.1	36.5	26.2
(2010/05/06 09:10:00.00)	47.5	54	47	44.6	43.1	42.8	38.6	31.2	20.7
(2010/05/06 09:15:00.00)	46.3	55.2	48.2	44.9	43.2	41.6	36.2	27.1	18.3
(2010/05/06 09:20:00.00)	46.9	54.5	48.3	45.3	43.5	41.9	37.1	28.5	20.8
(2010/05/06 09:25:00.00)	48.4	54.6	49	45.6	43.9	43.6	39.1	30.3	21.8
(2010/05/06 09:30:00.00)	47.7	54.5	48.2	45.3	44.2	42.9	38.4	30.9	22.2
(2010/05/06 09:35:00.00)	47.4	54.7	48	45.4	43.8	42.3	37.7	29.7	21.2
(2010/05/06 09:40:00.00)	47.9	54.2	47.8	45.8	44.4	42.8	38.1	30.9	21.6
(2010/05/06 09:45:00.00)	47.7	54.9	48.4	46.4	44.6	42.4	37.6	31.3	22.1
(2010/05/06 09:50:00.00)	47.6	53.9	46.9	45.9	44.3	42.7	38	30.1	23.9
(2010/05/06 09:55:00.00)	47	54.3	48	45.7	43.9	42.1	37.1	28.7	20.2
(2010/05/06 10:00:00.00)	46.3	55	47.8	45.1	43.3	42.1	36.6	26.2	17.7
(2010/05/06 10:05:00.00)	46.2	54.3	47.2	44.5	42.9	42	36.2	26.2	18
(2010/05/06 10:10:00.00)	45.6	54.3	46.8	44.1	42.1	41.3	35.9	26	18.1
(2010/05/06 10:15:00.00)	45.9	53	46	44.1	42.3	41.6	36.1	27.3	19.2
(2010/05/06 10:20:00.00)	47.5	54.3	47.9	45.2	43.8	43.2	38.2	28.5	19.2
(2010/05/06 10:25:00.00)	47.4	54.6	48	45.7	44.4	42.8	38.1	30.4	21.5
(2010/05/06 10:30:00.00)	47.2	55.2	47.9	45.4	43.8	42.8	37.4	28.8	21.4
(2010/05/06 10:35:00.00)	47.1	54.3	47.5	45.1	43.8	42.3	37.4	29.3	21.4
(2010/05/06 10:40:00.00)	47	54.1	47.8	45.3	43.6	42.5	37.6	30.9	25.1
(2010/05/06 10:45:00.00)	46.8	53.9	47.3	44.7	43.6	42.5	37.4	29.5	24.7
(2010/05/06 10:50:00.00)	47.1	53.5	47	45.1	43.7	42.3	36.9	30.3	24.9
(2010/05/06 10:55:00.00)	46.9	53.9	47.3	45.2	44	42.3	36.8	28.5	22.1
(2010/05/06 11:00:00.00)	48.1	54.1	48.3	46	44.9	43.6	38.5	30.5	22.7
(2010/05/06 11:05:00.00)	47.8	54.7	48.2	45.3	43.9	43	38.1	31.6	24.4
(2010/05/06 11:10:00.00)	47.1	53.8	47.2	45	43.4	42.4	36.9	28.5	23.1
(2010/05/06 11:15:00.00)	46.7	53.4	46.8	44.3	43.2	41.8	36.9	29.5	22.9
(2010/05/06 11:20:00.00)	47.1	54.2	47.5	45	43.9	42.6	37.3	28.7	21.4
(2010/05/06 11:25:00.00)	46.5	53.3	46.5	44.7	43.3	42.2	36.7	27.5	19.8
(2010/05/06 11:30:00.00)	46.3	54	47.3	44.9	43.4	42	36.4	28.2	19.8
(2010/05/06 11:35:00.00)	47.6	54.2	48.1	45.8	44.5	43.3	37.6	28.3	21.1
(2010/05/06 11:40:00.00)	46.8	54	47.3	45.1	43.5	42.4	37	29.1	20.4
(2010/05/06 11:45:00.00)	46.5	53.8	47.1	44.8	43.4	42.5	36.6	26.6	19.5
(2010/05/06 11:50:00.00)	46.8	53.7	46.6	44.6	43.5	42.6	37	27.8	21.5
(2010/05/06 11:55:00.00)	47.6	54.3	47.9	45.7	44.4	43.2	37.8	28.5	20.6
(2010/05/06 12:00:00.00)	48.9	54.7	48.8	46.3	45.4	45.1	39.1	29.8	20.9
(2010/05/06 12:05:00.00)	46.9	54.2	47.8	45	43.8	42.4	36.5	27.6	20.3
(2010/05/06 12:10:00.00)	47.3	54.4	47.9	45.1	44.1	43	37.1	26.7	18.1
(2010/05/06 12:15:00.00)	47.9	54.3	48.2	45.6	44.5	43.6	38.1	27.4	18.3
(2010/05/06 12:20:00.00)	48.2	55	49	45.8	44.7	43.6	38.7	30.8	26.5
(2010/05/06 12:25:00.00)	46.7	53.4	46.6	44.5	43.3	42.3	36.7	28.5	21
(2010/05/06 12:30:00.00)	47.3	54.4	47.5	44.8	43.8	42.8	37.1	28.1	20.3
(2010/05/06 12:35:00.00)	47.1	54.5	48.1	45	43.8	42.8	37.4	27.1	17.6
(2010/05/06 12:40:00.00)	47.5	54.5	48.2	44.6	43.6	42.9	37.4	28	18.7
(2010/05/06 12:45:00.00)	47.4	53.4	48	45.2	44.2	43	37.4	29.3	19.6
(2010/05/06 12:50:00.00)	48.8	54.7	47.5	45.4	44.7	44.6	39.3	30.4	21.5
(2010/05/06 12:55:00.00)	48.1	54.9	47.7	45.3	44.5	43.6	38.5	30.1	21.3
(2010/05/06 13:00:00.00)	47.4	54.2	48.3	44.8	44.3	43	37.9	30	22.4
(2010/05/06 13:05:00.00)	48.1	54.4	48	45.3	44.7	43.6	38.5	29.8	20.9
(2010/05/06 13:10:00.00)	50.6	56.8	50.6	47	47.2	46.3	40.6	30.5	20
(2010/05/06 13:15:00.00)	49.6	55	49	46	46.5	45.5	40.1	30.6	19.8
(2010/05/06 13:20:00.00)	49.2	55.3	47.7	45.4	46	45.1	39.3	30.1	19.9
(2010/05/06 13:25:00.00)	48.9	55.2	48	45.5	45.9	44.4	38.9	28.7	17.7
(2010/05/06 13:30:00.00)	49.7	57	48.8	47.1	46.7	45	38.8	28.8	19.5
(2010/05/06 13:35:00.00)	48.8	56.1	47.9	45.6	45.8	44.3	39	29.2	18.5

(2010/05/06 13:40:00.00)	49.3	54.7	47.5	45.2	45.9	45.6	39.7	28.1	17.7
(2010/05/06 13:45:00.00)	49.6	54.4	49	46.7	46.6	45.2	39.3	29.4	19
(2010/05/06 13:50:00.00)	49	54.7	48.3	46.2	46.1	44.8	39.6	28.5	16.3
(2010/05/06 13:55:00.00)	49.3	54.6	47.8	45.8	46.5	44.9	39.1	29.4	19.7
(2010/05/06 14:00:00.00)	48.5	55.3	47.6	46.2	46	43.8	37.8	29	20.3
(2010/05/06 14:05:00.00)	48.9	55.4	48.2	46.3	45.2	42.9	36.2	32.6	33.2
(2010/05/06 14:10:00.00)	50.5	57.5	51.7	48.9	46.6	44.2	38.1	34	37.3
(2010/05/06 14:15:00.00)	49.7	54.4	49.1	46.5	45.5	43.7	38.8	33.9	36.4
(2010/05/06 14:20:00.00)	48.1	54.4	48.1	45.6	44.7	43.3	37.8	31.8	28.3
(2010/05/06 14:25:00.00)	46.3	54.5	46.6	45	43.1	41.7	35.3	25.6	21.1
(2010/05/06 14:30:00.00)	47	55.3	47.5	44.8	43.5	41.7	36.5	28.2	21.4
(2010/05/06 14:35:00.00)	47.1	54.7	48.1	45.3	43.8	42.8	36.9	27.4	21.5
(2010/05/06 14:40:00.00)	46.9	54.8	48	45.1	43.6	42.5	36.5	26.1	16.7
(2010/05/06 14:45:00.00)	47.9	55.6	48.6	45.9	44.8	43.5	37.7	29.3	24
(2010/05/06 14:50:00.00)	47.9	55.3	48.2	45	44.2	42.7	37.2	29.6	27.7
(2010/05/06 14:55:00.00)	46.6	54.7	47.5	44.2	42.9	41.8	35.6	25.3	17.1
(2010/05/06 15:00:00.00)	46.3	55	47.2	44.5	43.1	42	35.9	25.8	17.2

APPENDIX E: GLOSSARY OF ACOUSTIC TERMS

DECIBEL (dB) - A unit of sound pressure measurement

Sound Pressure Level in dB (Lp) = Measured sound pressure/Reference
sound pressure (ref.pressure = 20microPascals)

dB(A) - The A -weighted sound pressure level, the weighting network reduces low frequency sound in a similar way to the human ear.

REVERBERATION TIME (RT) – decay of sound in rooms

The time taken for a sound, once terminated, to fall through 60dB i.e. to one millionth of its original sound intensity. T30 – RT for first 30dB of decay. RT₅₀₀ - Mid frequency RT.

HERTZ (Hz) - a unit of frequency measurement. The normal range of hearing is from 20Hz to about 15kHz.

ABSORPTION COEFFICIENT – degree to which a material absorbs sound.

The ratio of absorbed to incident sound energy (perfect absorber = 1)

SOUND REDUCTION INDEX (R,dB) – quantity which describes a material's ability to reduce the sound pressure level across it (e.g. a wall or floor)

$$R = L1 - L2 + 10 \log S/A$$

L1 – Average sound pressure level in source room (averaged from 100Hz – 3150Hz)

L2 - receiving

S – Wall Area (m²)

A – Total absorption in receiving room (m² units)

Rw – weighted sound reduction index, usually 2 – 3dB higher

AVERAGE ROOM TO ROOM LEVEL DIFFERENCE – D, dB = L1 – L2, averaged 1/3 octave bands from 100Hz – 3150kHz.

Dw – weighted value of D (usually 2 - 3dB higher)

DnT, w – Dw corrected for reverberation time of receiving room

NOISE RATING CURVES (NR CURVES) – set of curves used to describe optimum background noise levels for different tasks.

L10/90 LEVEL (dB) - The level in dB of a time varying sound pressured level (e.g. traffic) exceeded for 10%/90% of the time of measurement.

L90 is usually called the BACKGROUND NOISE LEVEL.

Leq AVERAGE SOUND PRESSURE LEVEL – level dB of a time varying sound pressure level with equal amounts of energy above and below it, for the time of measurement.

TONAL NOISE – noise which is tonal (single frequency or narrow band of frequencies), audible above the broad band noise background. Noise which is at least 5dB above the average of the 1/3 octave band sound pressure levels immediately on either side of it.