

REPORT REFERENCE:

SA – 6685 GL01

ENVIRONMENTAL NOISE IMPACT ASSESSMENT

External Glazing Report

British Standard 8233: 2014

World Health Organisation (WHO)

Planning Condition 12

CLIENT:

HG Construction

SITE:

The Hale

Tottenham Hale

London

N17 9JZ

SURVEY DATES:

15th – 17th December 2020

Report By



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1	EXECUTIVE SUMMARY	4
1.1	INSTRUCTION	4
1.2	SCOPE OF REPORT.....	4
1.3	SUMMARY OF RESULTS	4
1.3.1	<i>Background Noise Levels.....</i>	4
1.4	PLANNING CONDITION 12	4
1.5	CONCLUSION.....	5
2	INTRODUCTION.....	6
2.1	BRITISH STANDARD 8233: 2014.....	6
3	SITE LOCATION.....	7
3.1	PROPOSED DEVELOPMENT.....	8
3.1.1	<i>Proposed Example Floor Plan.....</i>	8
4	PROCEDURE	9
5	APPARATUS	10
5.1	POSITION 1.....	10
5.2	POSITION 2.....	10
6	RESULTS	11
6.1	MEASURED BACKGROUND NOISE LEVEL RESULTS ASSESSMENT POSITION	11
6.1.1	<i>07:00 – 07:00 15th – 16th December 2020 – Position1</i>	11
6.1.2	<i>07:00 – 07:00 16th – 17th December 2020 – Position 1.....</i>	11
6.1.3	<i>07:00 – 07:00 15th – 16th December 2020 – Position 2.....</i>	11
6.1.4	<i>07:00 – 07:00 16th – 17th December 2020 – Position 2.....</i>	11
7	INTERNAL NOISE LEVEL GUIDELINES	12
7.1	DISCUSSION OF RESULTS	12
7.2	RECOMMENDATIONS.....	12
7.3	CALCULATION PROCEDURE TO BS 8233: 2014.....	13
7.4	MID FLOOR – LIVING ROOM	13
7.5	MID FLOOR - BEDROOM	14
7.6	TOP FLOOR – LIVING ROOM	15
7.7	TOP FLOOR - BEDROOM.....	16
7.8	GLAZING (R_{w1}).....	17
7.9	WALLS (R_{ew}).....	17
7.10	ROOF (R_{rr}).....	17
7.11	GLAZING & VENTILATION ASSESSMENT	17
7.12	OVERHEATING.....	18
7.13	NIGHT NOISE GUIDELINES EUROPE 2009	19
8	CONCLUSION	21
8.1	BACKGROUND NOISE LEVELS.....	21
8.1.1	<i>Background Noise Levels.....</i>	21
8.2	PLANNING CONDITION 12	21
8.3	CONCLUSION.....	21

9	APPENDIX A - RESULTS.....	22
9.1	15 TH – 16 TH DECEMBER 2020 – POSITION1.....	22
9.2	16 TH – 17 TH DECEMBER 2020 – POSITION 1.....	23
9.3	15 TH – 16 TH DECEMBER 2020 – POSITION 2.....	24
9.4	16 TH – 17 TH DECEMBER 2020 – POSITION 2.....	25
10	APPENDIX B - ENVIRONMENTAL CONDITIONS	26

1 EXECUTIVE SUMMARY

1.1 Instruction

Sound Advice Acoustics Ltd have been instructed by H G Construction to undertake a background noise survey to British Standard 8233: 2014 to determine the impact of the proposed glazing on the proposed accommodation scheme at The Hale, Tottenham Hale, London, N17 9JZ.

1.2 Scope of Report

The measurements will be undertaken in accordance with ISO 1996 – Part 2: 2017 to determine the existing background noise levels and British Standard 8233: 2014 will be used to determine the impact of existing traffic on the internal noise environment within the proposed student accommodation rooms. This report aims to establish the following:

- Existing background noise levels within the area;
- Assess the potential internal noise levels on the proposed rooms;
- Provide specifications for the ventilation and window glazing with the proposed rooms.
- Discharge Planning Condition 12.

1.3 Summary of Results

1.3.1 Background Noise Levels

A 48 hour background noise survey was undertaken from the 15th – 17th December 2020 at two positions on the site in order to establish the underlying background noise levels. The maximum recorded levels are as follows:

Assessment Position	Date Start	Date Finish	Daytime LAeq	Night Time LAeq
Position 1	15/12/2020	17/12/2020	72.0	63.0
Position 2	15/12/2020	17/12/2020	67.0	55.0

1.4 Planning Condition 12

Planning permission has been granted for this site and the following condition needs to be discharged.

All residential premises hereby approved shall be designed in accordance with BS8233:2014 „Guidance on sound insulation and noise reduction for buildings” and meet the following noise levels;

Time	Area	Average Noise level
Daytime Noise 7am – 11pm	Living rooms & Bedrooms	35dB(A) (LAeq,16hour)
	Dining Room Area	40dB(A) (LAeq,16hour)
Night Time Noise 11pm - 7am	Bedrooms	30dB(A) (LAeq,8hour)

With individual noise events not to exceed 45dB LAmax (measured with F time weighting) more than 10-15 times in bedrooms between 23.00hrs – 07.00hrs.

1.5 CONCLUSION

Calculations have been carried out in order for the client to select glazing for this site. The calculations have demonstrated that the proposed glazing will be acceptable in regard to the acoustics. A Guardian TGU_T1 for the Living Rooms and a Guardian TGU_T2 for the bedrooms. A suitable mechanical ventilation to suit the requirements of Approved Document F, to address background and purge ventilation will be required to all rooms to ensure the internal noise levels are acceptable in terms of the assessment to British Standard 8233: 2014.

Levels have been recorded and assessments made in accordance with the relevant standards. Internal criteria's have been set and calculations made in order to determine the minimum construction details required in order to meet the desired level within the proposed rooms and satisfy the local council's requirements and to discharge Planning Condition 12.

2 INTRODUCTION

Sound Advice Acoustics Ltd have been instructed by H G Construction to undertake a background noise survey to British Standard 8233: 2014 to determine the impact of the proposed glazing on the proposed accommodation scheme at The Hale, Tottenham Hale, London, N17 9JZ.

Ambient noise levels were measured between the 15th – 17th December 2020. This report by Sound Advice Acoustics Ltd gives the results of these measurements and an assessment in accordance with government planning guidelines and relevant standards together with mitigation measures as required.

With regards to external ambient noise, environmental noise levels are to be monitored at the site in accordance with British Standard 7445: 2003 'Description and measurement of environmental noise assessments and assessments made in-line with PROPG: Planning and Noise.

2.1 British Standard 8233: 2014

Calculations are to be made in accordance with BS 8233: 2014 Sound Insulation and Noise Reduction for Buildings Code of Practice.

BS 8233: 2014 set the following parameters as target levels that should be designed to within rooms such as Living Rooms and Bedrooms.

Indoor ambient noise levels in spaces when they are unoccupied and privacy is also important		
Objective	Typical situations	Design Range L _{Aeq,t} dB
Typical noise levels for acoustic privacy in shared spaces	Living room	35 – 40
NOTE: See Noise control in building services [28] and BS EN ISO 3382.		

Indoor ambient noise levels for dwellings			
Activity	Location	07:00 – 23:00	23:00 – 07:00
Resting	Living Room	35 dB L _{Aeq} 16 HOUR	--
Dining	Dining Room / Area	40 dB L _{Aeq} 16 HOUR	--
Sleeping (daytime resting)	Bedroom	35 dB L _{Aeq} 16 HOUR	30 dB L _{Aeq} 8 HOUR

Calculations and assessments are therefore to be carried out in order to satisfy the above requirements of BS8233: 2014.

3 SITE LOCATION

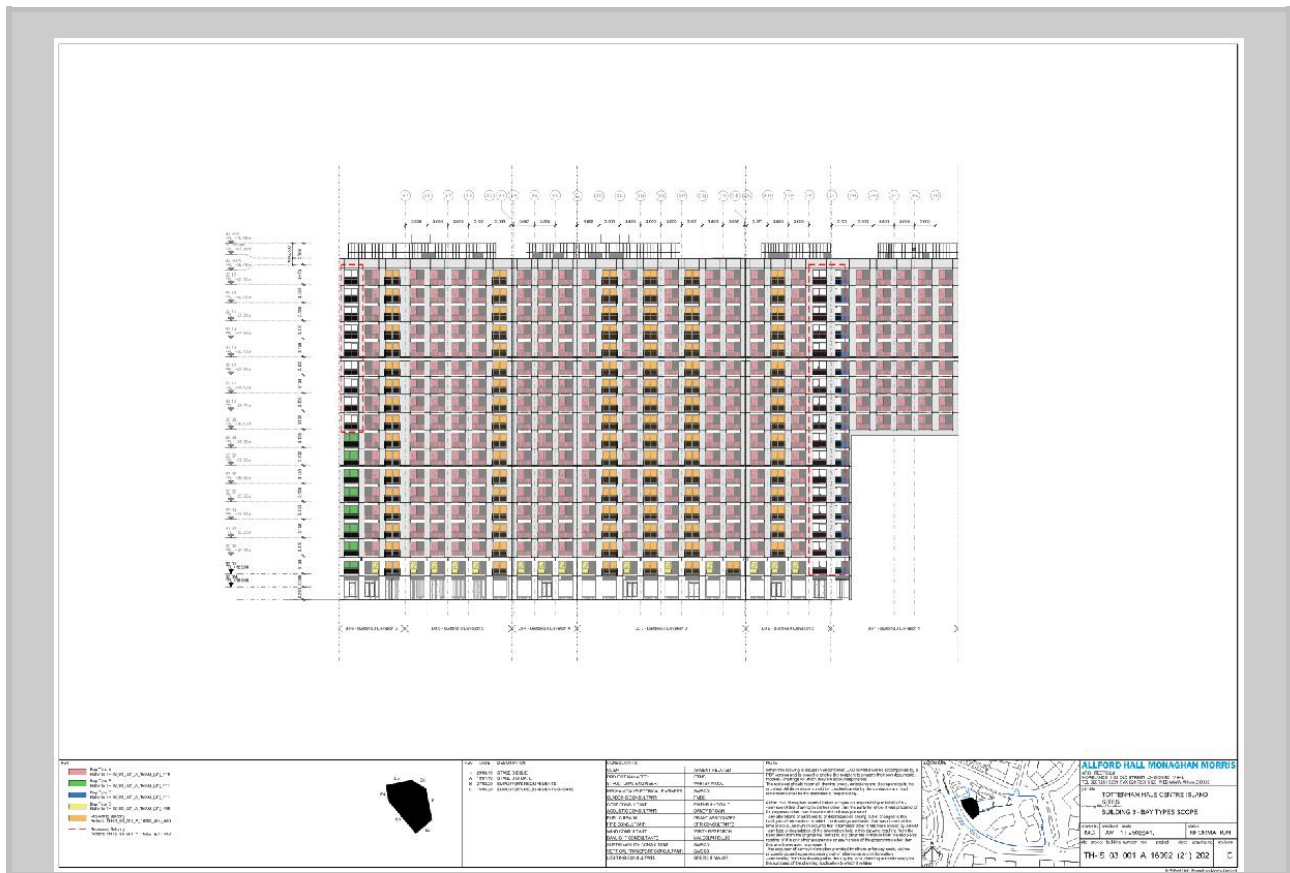
Position of Site in Wider Area

The site is located in Tottenham Hale, London. The dominant noise source is road traffic noise.



3.1 Proposed Development

The proposed development is shown below.



3.1.1 Proposed Example Floor Plan



4 PROCEDURE

External noise levels were recorded over a typical period and analysis date extrapolated between 07:00 hrs 15th December 2020 and 07:00 hrs on 17th December 2020 at 2 positions as detailed within this report.

Position 1 was located at the front of the site in order to capture noise levels associated with The Hale, while position 2 was located at the rear of the site to capture any minor noise levels associated with this location. Sample measurements were recorded over continuous 15 minute samples and from this data the hourly LAeq daytime values have been evaluated. Sound Pressure Levels were recorded on the following setting along with a full octave band frequency analysis measured simultaneously and between 31.5 Hz and 16.0 kHz.

<u>Daytime 07:00 – 23:00</u>		<u>Night Time 23:00 – 07:00</u>	
LAeq 1 HOUR dB	LA10 1 HOUR dB	LAeq 15 MINUTES dB	LA10 15 MINUTES dB
LAMAX 1 HOUR dB	LA50 1 HOUR dB	LAMAX 15 MINUTES dB	LA50 15 MINUTES dB
LAMIN 1 HOUR dB	LA90 1 HOUR dB	LAMIN 15 MINUTES dB	LA90 15 MINUTES dB

Calculations have been made in accordance with BS 8233: 2014 'Sound Insulation and Reduction of Buildings - Code of Practice'. Recommendations were made for any additional acoustics measures to conform to these standards.

From the downloaded recorded results, the daytime and night time periods were assessed and used within the above calculations as LAeq 16 HOUR dB levels for daytime and LAeq 8 HOUR dB levels for night time. These are detailed within this report. All data averaged throughout the day has been done so on a logarithmic basis to give accurate LAeq 16 Hour dB daytime and LAeq 8 Hour dB night time noise levels.

Finally, it should be noted that calculations are carried out with façade levels corrected from the recorded noise levels to the calculated façade levels.

5 APPARATUS

The equipment was calibrated using a sound pressure level of 114.0 dB at an octave band centre frequency of 1000Hz with reference to $2 \times 10^{-5} \text{ Nm}^{-2}$ before and after the tests and the equipment set to have no inaccuracy greater than 0.2dB.

All the following equipment was calibrated in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service (UKAS) on the following dates. Calibration schedules are implemented within Sound Advice Acoustics Ltd in accordance with UKAS directive LAB 23.

5.1 Position 1

Description	Make	Type	Serial No.	Calibration Intervals	Last Calibrated	Next Due Calibration
Integrated Sound Level Meter	Norsonic	140	1403140	2 YEARS	06.04.2019	06.04.2021
12.5mm Microphone (with windshield)	Norsonic	1225	413206	2 YEARS	06.04.2019	06.04.2021
Microphone Pre – Amplifier	Norsonic	1209	12245	2 YEARS	06.04.2019	06.04.2021

5.2 Position 2

Description	Make	Type	Serial No.	Calibration Intervals	Last Calibrated	Next Due Calibration
Integrated Sound Level Meter	Norsonic	140	1402941	2 YEARS	08.07.2020	08.07.2022
12.5mm Microphone (with windshield)	Norsonic	GRAS 40AF	179711	2 YEARS	08.07.2020	08.07.2022
Microphone Pre – Amplifier	Norsonic	1209	30479	2 YEARS	08.07.2020	08.07.2022

The noise meter was calibrated before and after the assessment period and found to be within the tolerance of the manufacturer's guidance. Full Calibration certificates are available upon request.

6 RESULTS

6.1 Measured Background Noise Level Results Assessment Position

6.1.1 07:00 – 07:00 15th – 16th December 2020 – Position1

NOISE LEVEL SUMMARY ASSESSMENT			Octave Band Centre Frequency (Hz)									
Date / Time	LAeq	LA90	31.5	63	125	250	500	1.0k	2.0k	4.0k	8.0k	16.0k
DAYTIME 07:00 - 23:00 LA90 1 HOUR & Corresponding LAeq 1 HOUR	70.0	67.0	74.0	73.0	69.0	68.0	66.0	63.0	62.0	63.0	50.0	37.0
NIGHT TIME 23:00 - 07:00 LA90 15 MIN & Corresponding LAeq 15 MIN	61.0	52.0	69.0	68.0	61.0	57.0	54.0	55.0	54.0	54.0	38.0	25.0

6.1.2 07:00 – 07:00 16th – 17th December 2020 – Position 1

NOISE LEVEL SUMMARY ASSESSMENT			Octave Band Centre Frequency (Hz)									
Date / Time	LAeq	LA90	31.5	63	125	250	500	1.0k	2.0k	4.0k	8.0k	16.0k
DAYTIME 07:00 - 23:00 LA90 1 HOUR & Corresponding LAeq 1 HOUR	72.0	65.0	80.0	77.0	71.0	68.0	64.0	64.0	66.0	67.0	51.0	35.0
NIGHT TIME 23:00 - 07:00 LA90 15 MIN & Corresponding LAeq 15 MIN	63.0	51.0	66.0	66.0	60.0	61.0	53.0	55.0	56.0	58.0	41.0	33.0

6.1.3 07:00 – 07:00 15th – 16th December 2020 – Position 2

NOISE LEVEL SUMMARY ASSESSMENT			Octave Band Centre Frequency (Hz)									
Date / Time	LAeq	LA90	31.5	63	125	250	500	1.0k	2.0k	4.0k	8.0k	16.0k
DAYTIME 07:00 - 23:00 LA90 1 HOUR & Corresponding LAeq 1 HOUR	67.0	63.0	83.0	84.0	71.0	66.0	64.0	62.0	50.0	55.0	48.0	33.0
NIGHT TIME 23:00 - 07:00 LA90 15 MIN & Corresponding LAeq 15 MIN	53.0	49.0	63.0	59.0	54.0	50.0	48.0	49.0	46.0	33.0	25.0	12.0

6.1.4 07:00 – 07:00 16th – 17th December 2020 – Position 2

NOISE LEVEL SUMMARY ASSESSMENT			Octave Band Centre Frequency (Hz)									
Date / Time	LAeq	LA90	31.5	63	125	250	500	1.0k	2.0k	4.0k	8.0k	16.0k
DAYTIME 07:00 - 23:00 LAeq 1 HOUR & Corresponding LAeq 1 HOUR	67.0	64.0	69.0	85.0	74.0	66.0	63.0	60.0	57.0	52.0	47.0	33.0
NIGHT TIME 23:00 - 07:00 LA90 15 MIN & Corresponding LAeq 15 MIN	55.0	47.0	66.0	62.0	55.0	52.0	49.0	50.0	50.0	36.0	30.0	15.0

The following noise levels have been corrected for the highest recorded façade levels and used within the BS 8233: 2014 calculations

NOISE LEVEL SUMMARY ASSESSMENT			Octave Band Centre Frequency (Hz)									
Date / Time	LAeq	L _{Amax}	LA90	63	125	250	500	1.0k	2.0k	4.0k	8.0k	16.0k
DAYTIME 07:00 - 23:00 LAeq 16 HOUR & Corresponding L_{Amax} 16 HOUR	72.0	65.0	80.0	77.0	71.0	68.0	64.0	64.0	66.0	67.0	51.0	35.0
NIGHT TIME 23:00 - 07:00 LAeq 8 HOUR & Corresponding L_{Amax} 8 HOUR	63.0	51.0	66.0	66.0	60.0	61.0	53.0	55.0	56.0	58.0	41.0	33.0

7 INTERNAL NOISE LEVEL GUIDELINES

7.1 Discussion of Results

It can be seen from the attached graph and downloaded results that the external noise levels have followed the expected path and remained fairly constant throughout the day. The levels then gradually dropped off as the evening progressed and began to rise when morning traffic levels increased.

7.2 Recommendations

For the purpose of this assessment, the corresponding façade levels will be used within the BS 8233: 2014 calculations in order to evaluate the worst case scenario and select the correct window specification.

Therefore, in order to achieve the required noise levels of $L_{Aeq\ 16\ HOUR}$ 35 dB for habitable rooms daytime and $L_{Aeq\ 8\ HOUR}$ 30 dB for Bedroom at night within the proposed, the following additional acoustic measures have been calculated.

It should be noted that the calculations have been made with the proposed windows closed. Additional calculations were made for the top floor due to the influence of sound transmission into the various rooms via the roof / ceiling i.e. an increased impeding façade. Inputted levels into the calculation sheets have been corrected for distance attenuation and free field in accordance with the aforementioned British Standard.

7.3 Calculation Procedure to BS 8233: 2014

The following calculations have been carried out in order to determine the required window and ventilation specification in order to meet the requirements of BS 8233: 2014.

7.4 Mid Floor – Living Room

Recorded Site Data (Corrected for Free Field)	Octave Band Centre Frequency (Hz)					
	125	250	500	1000	2000	4000
Daytime Leqff	71.0	68.0	64.0	64.0	66.0	67.0
Night time Leqff	60.0	61.0	53.0	55.0	56.0	58.0
Room Data	Sf	Sr	Swi	Sew	Srr	Volume
Area m²	8	0	6	2	0	62
Specification Summary	Site Specific Specification			Attenuation Required		
Glazing Specification	Guardian Glass TGU_T1			Rw(C; Ctr)	44 (-2, -5) dB	
Ventilation Strategy	MVHR			Dne'w	54	
Wall Specification	THNI Combined			Rw	54	
Roof Specification	Standard Pitched Roof			Rw	57 dB	
Detailed Specification	Octave Band Centre Frequency (Hz)					
	125	250	500	1000	2000	4000
Glazing Specification (Rwi)	26.0	38.0	43.0	45.0	48.0	65.0
Ventilation Strategy (Dne)	31.0	42	47	50	52	63
Wall Specification (Rew)	31.0	42	47	50	52	63
Roof Specification (Rrr)	39.0	48.0	55.0	60.0	59.0	61.0
Calculation Results						
Daytime Hours (07:00-23:00)			L _{Aeq} 16 HOUR	32.8	dB(A)	
Night Time Hours (23:00-07:00)			L _{Aeq} 8 HOUR	22.6	dB(A)	
Formula	$Leq2=Leqff+10\log[A0/S*10^{(-Dne/10)}+Swi/S*10^{(-Rwi/10)}+Sew/10*10^{(-Rew/10)}+Srr/S*10^{(-Rrr/10)}]+10\log(S/A)+3$					
Note	The expected precision of this calculation is ±2 dB.					

7.5 Mid Floor - Bedroom

Recorded Site Data (Corrected for Free Field)	Octave Band Centre Frequency (Hz)					
	125	250	500	1000	2000	4000
Daytime Leqff	71.0	68.0	64.0	64.0	66.0	67.0
Night time Leqff	60.0	61.0	53.0	55.0	56.0	58.0
Room Data	Sf	Sr	Swi	Sew	Srr	Volume
Area m²	7.5	0	2	5.5	0	30
Specification Summary	Site Specific Specification			Attenuation Required		
Glazing Specification	Guardian Glass TGU_T2			Rw(C; Ctr)	44 (-2, -5) dB	
Ventilation Strategy	MVHR			Dne'w	54	
Wall Specification	THNI Combined			Rw	54	
Roof Specification	Standard Pitched Roof			Rw	57 dB	
Detailed Specification	Octave Band Centre Frequency (Hz)					
	125	250	500	1000	2000	4000
Glazing Specification (Rwi)	25.0	38.0	43.0	46.0	48.0	66.0
Ventilation Strategy (Dne)	31.0	42	47	50	52	63
Wall Specification (Rew)	31.0	42	47	50	52	63
Roof Specification (Rrr)	39.0	48.0	55.0	60.0	59.0	61.0
Calculation Results						
Daytime Hours (07:00-23:00)			L _{Aeq} 16 HOUR	31.6	dB(A)	
Night Time Hours (23:00-07:00)			L _{Aeq} 8 HOUR	21.4	dB(A)	
Formula	$Leq2=Leqff+10\log[A0/S*10^{(-Dne/10)}+Swi/S*10^{(-Rwi/10)}+Sew/10*10^{(-Rew/10)}+Srr/S*10^{(-Rrr/10)}]+10\log(S/A)+3$					
Note	The expected precision of this calculation is ±2 dB.					

7.6 Top Floor – Living Room

Recorded Site Data (Corrected for Free Field)	Octave Band Centre Frequency (Hz)					
	125	250	500	1000	2000	4000
Daytime Leqff	71.0	68.0	64.0	64.0	66.0	67.0
Night time Leqff	60.0	61.0	53.0	55.0	56.0	58.0
Room Data	Sf	Sr	Swi	Sew	Srr	Volume
Area m²	8	26	6	2	26	62
Specification Summary	Site Specific Specification			Attenuation Required		
Glazing Specification	Guardian Glass TGU_T1			Rw(C; Ctr)	44 (-2, -5) dB	
Ventilation Strategy	MVHR			Dne'w	54	
Wall Specification	THNI Combined			Rw	54	
Roof Specification	Standard Pitched Roof			Rw	57 dB	
Detailed Specification	Octave Band Centre Frequency (Hz)					
	125	250	500	1000	2000	4000
Glazing Specification (Rwi)	26.0	38.0	43.0	45.0	48.0	65.0
Ventilation Strategy (Dne)	31.0	42	47	50	52	63
Wall Specification (Rew)	31.0	42	47	50	52	63
Roof Specification (Rrr)	39.0	48.0	55.0	60.0	59.0	61.0
Calculation Results						
Daytime Hours (07:00-23:00)			L _{Aeq} 16 HOUR	33.4	dB(A)	
Night Time Hours (23:00-07:00)			L _{Aeq} 8 HOUR	23.3	dB(A)	
Formula	$Leq2=Leqff+10\log[A0/S*10^{(-Dne/10)}+Swi/S*10^{(-Rwi/10)}+Sew/10*10^{(-Rew/10)}+Srr/S*10^{(-Rrr/10)}]+10\log(S/A)+3$					
Note	The expected precision of this calculation is ±2 dB.					

7.7 Top Floor - Bedroom

Recorded Site Data (Corrected for Free Field)	Octave Band Centre Frequency (Hz)					
	125	250	500	1000	2000	4000
Daytime Leqff	71.0	68.0	64.0	64.0	66.0	67.0
Night time Leqff	60.0	61.0	53.0	55.0	56.0	58.0
Room Data	Sf	Sr	Swi	Sew	Srr	Volume
Area m²	7.5	12	2	5.5	12	30
Specification Summary	Site Specific Specification			Attenuation Required		
Glazing Specification	Guardian Glass TGU_T2			Rw(C; Ctr)	44 (-2, -5) dB	
Ventilation Strategy	MVHR			Dne'w	54	
Wall Specification	THNI Combined			Rw	54	
Roof Specification	Standard Pitched Roof			Rw	57 dB	
Detailed Specification	Octave Band Centre Frequency (Hz)					
	125	250	500	1000	2000	4000
Glazing Specification (Rwi)	25.0	38.0	43.0	46.0	48.0	66.0
Ventilation Strategy (Dne)	31.0	42	47	50	52	63
Wall Specification (Rew)	31.0	42	47	50	52	63
Roof Specification (Rrr)	39.0	48.0	55.0	60.0	59.0	61.0
Calculation Results						
Daytime Hours (07:00-23:00)			L _{Aeq} 16 HOUR	32.0	dB(A)	
Night Time Hours (23:00-07:00)			L _{Aeq} 8 HOUR	21.8	dB(A)	
Formula	Leq2=Leqff+10log[A0/S*10^(-Dne/10)+Swi/S*10^(-Rwi/10)+Sew/10*10^(-Rew/10)+Srr/S*10^(-Rrr/10)] +10log(S/A) +3					

7.8 Glazing (R_{wi})

Octave Band Frequency	125	250	500	1000	2000	4000	R_{w} (C: Ctr)
Guardian Glass TGU_T1	26.0	38.0	43.0	45.0	48.0	65.0	44(-2: -5)
Guardian Glass TGU_T2	25.0	38.0	43.0	46.0	48.0	66.0	44(-2: -5)

7.9 Walls (R_{ew})

Octave Band Frequency	125	250	500	1000	2000	4000	R_w
Brick and SFS	31.0	42.0	47.0	50.0	52.0	63.0	54.0

7.10 Roof (R_{rr})

Octave Band Frequency	125	250	500	1000	2000	4000	R_w
Minimum Value	39.0	48.0	55.0	60.0	59.0	61.0	57.0

The above are minimum construction attenuation values and should alternative methods be selected; these should be equal to or greater than the above corresponding values. Calculations carried out have indicated the following specifications should be installed for this site.

7.11 Glazing & Ventilation Assessment

Calculations have been carried out in order for the client to select glazing for this site. The calculations have demonstrated that the proposed glazing will be acceptable in regard to the acoustics. A Guardian TGU_T1 for the Living Rooms and a Guardian TGU_T2 for the bedrooms. A suitable mechanical ventilation to suit the requirements of Approved Document F, to address background and purge ventilation will be required to all rooms to ensure the internal noise levels are acceptable in terms of the assessment to British Standard 8233: 2014.

7.12 Overheating

With regards to potential overheating at the proposed development and any TM59 assessment that may be required for this site, we would like to confirm that having opening windows to dissipate excessive summer heat vs the internal acoustics is always a fine balancing act. With regards to the internal acoustic criteria of Daytime LAeq 16 HOUR 35 dB and Night Time LAeq 8 HOUR 30 dB, this is a planning requirement under BS 8233: 2014 to which this report and calculations have been carried out to and is based on.

This assessment has detailed the glazing and ventilation requirements required in order to achieve this criteria based on the assumption that the windows are closed. We would recommend that the council are approached with the facts from any TM59 overheating assessment and this noise report and try and get them to take a pragmatic approach that the windows will be required to be opened for overheating for only a select calculated number of days a year and that the acoustic criteria should be relaxed during these times. i.e. 2-3 days a year of overheating with windows open to mitigate the heat build-up is unlikely to affect the overall annual internal noise levels when considered as an accumulative impact.

7.13 Night Noise Guidelines Europe 2009

The Night Noise Guidelines 2009 make direct reference to the World Health Organisations Guidelines for Community Noise 1999 with recommended guideline criteria of L_{Aeq} 30 dB indoors for continuous noise. The document goes on to explain that sleep disturbance correlates best with L_{Amax} and effects have been observed at 45 dB or less. This is particularly true if the background noise level is low. Noise events exceeding 45 dB(A) should therefore be limited.

Pro PG: Planning and Noise Appendix A 'Dealing with Noise Events' A.17 states that:-

Various studies have linked the L_{Amax} from individual noise events to behavioural awakenings. For example one study found that the "Probability of sleep stage changes to wake/S1 from railway noise increased significantly from 6.5% at 35 dB(A) to 20.5% at 80 dB(A) $L_{Amax,F}$ whilst another study concluded that "noise disturbance of sleep may be expected to become significant once the outdoor L_{Aeq} exceeds 55 dB provided peak noise levels do not exceed 75 to 80 dB. Higher L_{Aeq} values up to 60 dB may be allowed providing the peak levels do not exceed 85 dB, and the number of such events is less than about 20 per night". Based on these studies it can be concluded that at night (2300 - 0700 hrs) a significant effect on sleep disturbance e.g. behavioural awakening, is likely to occur where the maximum sound level at the façade of a building with partially open windows is above:

85 dB $L_{Amax,F}$ (where the number of events exceeding this value is ≤ 20);

or

80 dB $L_{Amax,F}$ (where the number of events exceeding this value is > 20).

Pro PG: Planning and Noise Appendix A 'Dealing with Noise Events' A.18 goes on to explain that:-

A.18 The main body of sleep research is consistent with a careful interpretation of the viewpoint set out in the World Health Organisation Guidelines which for the ordinary population is that:

- ✓ *Impacts on sleep can be detected from relatively low level maximum noise events, however the degree of resulting harm may not be significant.*
- ✓ *'Effects' on sleep (such as EEG awakenings and sleep stage changes) occur spontaneously in the general population many times per night regardless of any impacts due to noise.*
- ✓ *The smaller the number of noise events, the louder the maximum noise level that can be tolerated without adverse effects upon sleep; subject to an upper limit.*
- ✓ *At relatively low levels e.g. around 45 dB $L_{Amax,F}$ when sufficient number of such events take place during the night the adverse effects of individual noise events are likely to be limited to sleep disturbance in the form of changes in sleep state or perhaps some EEG awakenings.*
- ✓ *It normally requires noise levels higher than 45 dB $L_{Amax,F}$ before significant adverse effects such as behavioural awakenings, difficulty getting to sleep, premature awakening or difficulty getting back to sleep generally occur and the latest field research on and aircraft noise suggest that it requires internal L_{Amax} noise levels of around 65 dB before noise induced awakenings become distinguishable from spontaneous awakenings).*

With the proposed glazing and ventilation strategies implemented on this site, the following calculated internal levels have been evaluated accordingly:-

Item		Night Time (23:00-07:00)	Description
1	Recorded External Noise Level	63.0	Recorded Noise Level at the Monitoring Position
2	Calculated Highest Façade Level	63.0	Highest recorded façade level of the proposed development closest to the above associated monitoring position.
3	Façade Correction	0.0	Difference between Recorded and Calculated (Item 1 and 2)
4	Calculated Façade Attenuation	-41.2	Calculated façade attenuation taken from the highest recorded LAeq 8 HOUR dB night time noise level, minus the highest calculated internal noise level taken from the BS 8233 calculations.
5	LMax 45 dB Criteria	45.0	LMax 45 dB Criteria taken from WHO Guidelines. BS 8233 does not reference LMax dB noise level criteria.
6	Calculated Façade Level Outside	86.2	Addition of Items 4 and 5 to give a resultant target level for the 11th Recorded LMax
7	11 th Recorded LMax	84.1	11th Recorded LMax
8	LMax Criteria Achieved	YES	If Item 7 is less than 6, then the site is likely to be compliant. If not, further calculations are required

The above table demonstrates that the upgraded glazing will result in the internal LMax 45 dB criteria being achieved.

8 CONCLUSION

8.1 Background Noise Levels

8.1.1 Background Noise Levels

A 48 hour background noise survey was undertaken from the 15th – 17th December 2020 at two positions on the site in order to establish the underlying background noise levels. The maximum recorded levels are as follows:

Assessment Position	Date Start	Date Finish	Daytime LAeq	Night Time LAeq
Position 1	15/12/2020	17/12/2020	72.0	63.0
Position 2	15/12/2020	17/12/2020	67.0	55.0

8.2 Planning Condition 12

Planning permission has been granted for this site and the following condition is required to be discharged.

All residential premises hereby approved shall be designed in accordance with BS8233:2014 „Guidance on sound insulation and noise reduction for buildings“ and meet the following noise levels;

Time	Area	Average Noise level
Daytime Noise 7am – 11pm	Living rooms & Bedrooms	35dB(A) (LAeq,16hour)
	Dining Room Area	40dB(A) (LAeq,16hour)
Night Time Noise 11pm - 7am	Bedrooms	30dB(A) (LAeq,8hour)

With individual noise events not to exceed 45dB LAmax (measured with F time weighting) more than 10-15 times in bedrooms between 23.00hrs – 07.00hrs.

8.3 CONCLUSION

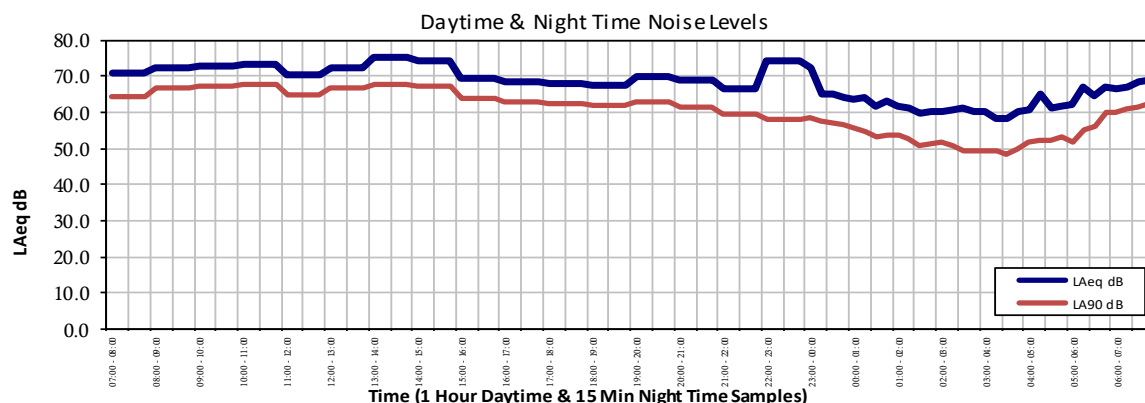
Calculations have been carried out in order for the client to select glazing for this site. The calculations have demonstrated that the proposed glazing will be acceptable in regard to the acoustics. A Guardian TGU_T1 for the Living Rooms and a Guardian TGU_T2 for the bedrooms. A suitable mechanical ventilation to suit the requirements of Approved Document F, to address background and purge ventilation will be required to all rooms to ensure the internal noise levels are acceptable in terms of the assessment to British Standard 8233: 2014.

Levels have been recorded and assessments made in accordance with the relevant standards. Internal criteria's have been set and calculations made in order to determine the minimum construction details required in order to meet the desired level within the proposed rooms and satisfy the local council's requirements and to discharge Planning Condition 12.

9 APPENDIX A - RESULTS

9.1 15th – 16th December 2020 – Position1

NOISE LEVEL SUMMARY ASSESSMENT						Octave Band Centre Frequency (Hz)						
Date / Time	L _{Aeq}	L _{A90}	31.5	63	125	250	500	1.0k	2.0k	4.0k	8.0k	16.0k
DAYTIME 07:00 - 23:00 L_{A90} 1 HOUR & Cor r esponding L_{Aeq} 1 HOUR	70.0	67.0	74.0	73.0	69.0	68.0	66.0	63.0	62.0	63.0	50.0	37.0
NIGHT TIME 23:00 - 07:00 L_{A90} 15 MIN & Cor r esponding L_{Aeq} 15 MIN	61.0	52.0	69.0	68.0	61.0	57.0	54.0	55.0	54.0	54.0	38.0	25.0
DAYTIME NOISE LEVELS 07:00 - 23:00 1 HOUR SAMPLES												
Date / Time	L _{Aeq}	L _{A90}	Octave Band Centre Frequency (Hz)									
			315	63	125	250	500	10 k	2.0 k	4.0 k	8.0 k	16.0 k
07:00 - 08:00	70.7	64.3	72.8	73.2	67.7	66.4	62.4	63.1	63.9	65.8	48.6	36.2
08:00 - 09:00	72.5	66.9	72.8	75.5	69.3	68.9	64.7	64.9	65.6	67.5	50.2	37.2
09:00 - 10:00	72.6	67.3	74.1	75.8	69.0	68.3	65.3	65.2	65.8	67.3	49.9	37.4
10:00 - 11:00	73.2	67.6	77.0	75.6	69.2	69.3	65.6	65.5	66.4	68.0	50.7	37.3
11:00 - 12:00	70.2	65.0	74.1	75.1	67.6	66.5	63.1	63.3	63.5	64.6	46.8	34.1
12:00 - 13:00	72.1	66.7	74.8	75.4	69.3	68.3	64.9	64.8	65.2	66.8	49.0	35.3
13:00 - 14:00	75.1	67.6	74.5	76.3	69.9	70.2	66.4	66.9	68.3	70.6	53.4	39.7
14:00 - 15:00	74.1	67.2	75.5	78.6	70.0	70.6	66.5	67.7	67.8	67.8	50.3	39.1
15:00 - 16:00	69.4	63.8	75.2	74.4	69.1	67.2	62.9	62.5	62.4	63.4	46.3	34.5
16:00 - 17:00	68.4	62.8	74.0	73.1	67.0	64.2	60.7	61.7	61.7	62.5	45.9	37.0
17:00 - 18:00	68.1	62.2	73.6	73.0	66.8	64.2	61.0	61.7	61.2	62.3	44.1	33.0
18:00 - 19:00	67.2	61.8	72.6	72.2	66.0	63.3	59.7	61.4	60.6	60.5	43.4	33.7
19:00 - 20:00	70.0	62.8	72.0	73.6	68.6	67.6	65.8	63.5	62.4	63.3	46.5	36.4
20:00 - 21:00	69.0	61.1	71.5	71.7	66.9	67.1	63.0	62.1	62.2	62.7	45.4	35.0
21:00 - 22:00	66.4	59.5	71.8	70.5	65.5	64.1	60.4	60.8	59.5	58.9	41.5	32.5
22:00 - 23:00	74.0	58.0	69.3	69.1	63.5	60.6	57.8	63.5	66.7	70.9	54.7	40.6
NIGHT TIME NOISE LEVELS 23:00 - 07:00 15 MINUTE SAMPLES												
Date / Time	L _{Aeq}	L _{A90}	Octave Band Centre Frequency (Hz)									
			315	63	125	250	500	10 k	2.0 k	4.0 k	8.0 k	16.0 k
23:00 - 23:15	72.5	58.7	69.5	69.5	64.7	61.8	59.7	63.0	66.1	68.5	49.3	38.0
23:15 - 23:30	65.1	57.4	70.2	68.7	64.6	61.2	57.6	59.5	58.6	58.1	40.8	29.3
23:30 - 23:45	64.8	56.8	68.7	68.8	63.9	60.6	57.4	59.5	58.4	57.6	39.3	28.9
23:45 - 00:00	63.9	56.3	68.2	68.0	60.8	58.5	56.1	58.7	57.5	56.9	39.7	27.6
00:00 - 00:15	63.7	55.7	69.0	67.9	60.9	59.8	56.0	58.6	57.2	56.3	38.1	26.2
00:15 - 00:30	64.2	54.8	70.0	66.3	61.0	66.3	57.7	58.2	56.7	55.5	38.0	25.8
00:30 - 00:45	61.5	53.1	67.9	64.9	57.8	56.6	53.8	56.5	55.2	54.0	36.0	24.5
00:45 - 01:00	62.9	53.5	69.4	71.1	63.7	58.6	55.3	57.0	56.2	56.5	38.5	27.1
01:00 - 01:15	61.8	53.7	67.6	64.2	57.6	57.2	55.3	56.9	55.3	53.8	36.5	25.1
01:15 - 01:30	61.2	52.8	69.3	66.4	58.7	55.7	53.4	56.1	54.9	53.8	36.2	24.2
01:30 - 01:45	59.9	50.8	70.7	66.1	61.7	56.5	52.9	54.8	53.5	51.7	33.9	24.2
01:45 - 02:00	60.3	51.2	69.2	66.2	57.3	54.8	52.3	55.1	53.9	53.3	35.6	22.2
02:00 - 02:15	60.2	51.8	68.6	64.2	58.0	56.7	53.7	55.3	53.6	52.3	34.5	25.0
02:15 - 02:30	60.6	50.9	69.9	64.1	64.2	61.1	54.7	54.6	53.0	52.2	34.0	22.4
02:30 - 02:45	60.9	49.1	69.5	65.0	62.3	59.3	55.4	54.7	53.7	53.7	35.8	23.4
02:45 - 03:00	60.1	49.2	68.8	65.4	60.9	57.1	54.0	54.4	53.0	53.1	35.0	22.8
03:00 - 03:15	60.4	49.1	68.4	67.3	58.6	56.2	52.7	54.6	53.8	53.7	36.3	25.1
03:15 - 03:30	58.1	49.5	65.6	65.8	53.8	52.8	50.5	53.1	51.6	50.7	32.3	21.2
03:30 - 03:45	58.1	48.3	68.0	63.2	55.2	53.7	50.8	53.3	51.8	50.3	31.6	19.8
03:45 - 04:00	60.4	49.7	70.3	64.8	56.2	54.3	51.7	54.7	54.3	53.9	38.1	27.9
04:00 - 04:15	60.7	51.5	72.4	67.6	58.3	54.9	52.7	55.2	54.4	54.0	36.8	26.3
04:15 - 04:30	64.8	52.1	72.9	67.7	61.9	64.3	63.4	57.7	56.6	55.9	40.7	29.7
04:30 - 04:45	61.0	52.0	73.3	68.3	59.7	55.3	53.0	55.2	54.4	54.7	38.1	25.2
04:45 - 05:00	61.7	53.0	73.6	70.5	60.1	57.1	54.4	56.3	55.3	54.6	37.9	24.9
05:00 - 05:15	62.1	51.6	75.1	69.1	60.1	56.4	54.1	56.5	55.7	55.5	38.6	28.1
05:15 - 05:30	66.9	55.3	74.8	69.1	61.2	58.3	56.2	59.2	61.1	61.9	44.2	29.6
05:30 - 05:45	64.6	56.2	80.0	75.1	66.2	59.7	57.1	58.8	58.0	57.8	40.6	28.0
05:45 - 06:00	66.8	60.0	80.5	75.3	67.5	61.9	59.2	60.9	60.6	60.1	42.8	30.7
06:00 - 06:15	66.3	59.9	78.2	74.0	66.4	61.5	58.7	60.3	60.0	59.7	42.2	30.4
06:15 - 06:30	67.1	60.9	82.0	77.1	70.8	63.1	59.6	60.7	60.3	60.7	43.4	31.0
06:30 - 06:45	68.3	61.6	82.6	78.1	70.3	65.8	61.5	61.7	61.1	62.0	44.3	32.4
06:45 - 07:00	68.7	62.5	80.4	76.6	70.0	64.4	60.5	61.8	61.8	63.1	44.5	31.7



9.2 16th – 17th December 2020 – Position 1

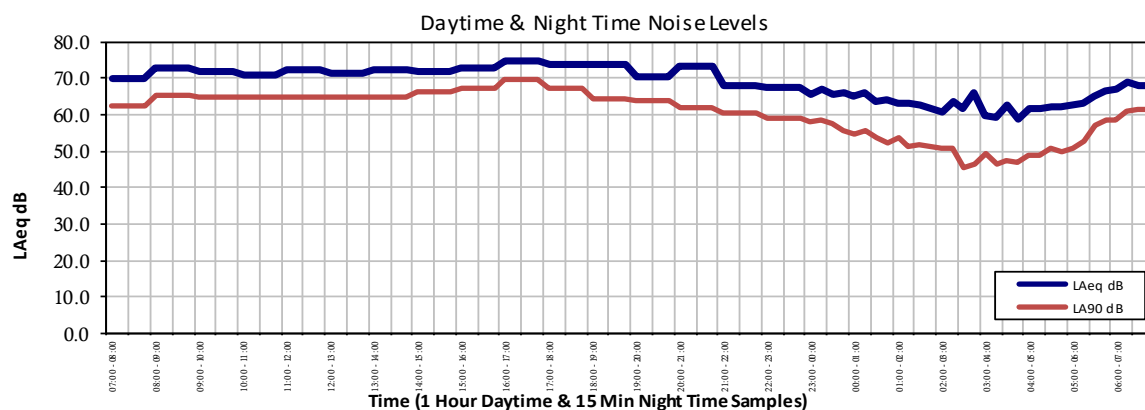
NOISE LEVEL SUMMARY ASSESSMENT		Octave Band Centre Frequency (Hz)										
Date / Time	L _{Aeq}	L _{A90}	31.5	63	125	250	500	1.0k	2.0k	4.0k	8.0k	16.0k
DAYTIME 07:00 - 23:00 L_{A90} 1 HOUR & Corresponding L_{Aeq} 1 HOUR	72.0	65.0	80.0	77.0	71.0	68.0	64.0	64.0	66.0	67.0	51.0	35.0
NIGHT TIME 23:00 - 07:00 L_{A90} 15 MIN & Corresponding L_{Aeq} 15 MIN	63.0	51.0	66.0	66.0	60.0	61.0	53.0	55.0	56.0	58.0	41.0	33.0

DAYTIME NOISE LEVELS 07:00 - 23:00 1 HOUR SAMPLES

Date / Time	L _{Aeq}	L _{A90}	Octave Band Centre Frequency (Hz)									
			31.5	63	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
07:00 - 08:00	69.7	62.4	80.5	76.3	69.8	66.2	62.3	62.6	62.7	64.2	46.8	35.2
08:00 - 09:00	72.6	65.1	80.5	77.4	71.4	67.9	64.0	64.4	65.6	68.1	50.9	38.4
09:00 - 10:00	71.9	64.8	80.4	77.8	69.4	66.8	63.7	64.0	65.2	67.0	49.4	35.0
10:00 - 11:00	70.9	64.6	80.3	77.1	70.6	68.3	64.0	63.5	64.0	65.2	47.8	35.1
11:00 - 12:00	72.3	64.9	82.7	79.0	71.6	68.5	65.4	64.1	65.0	67.4	51.0	37.8
12:00 - 13:00	71.4	64.6	85.5	81.1	73.5	67.8	63.5	63.1	64.2	66.6	50.5	38.3
13:00 - 14:00	72.2	64.7	81.4	77.7	71.1	68.6	64.5	64.0	65.6	67.1	49.9	36.1
14:00 - 15:00	72.0	66.4	83.3	79.6	72.1	67.2	63.5	65.9	64.8	66.5	49.6	37.1
15:00 - 16:00	72.7	67.2	78.0	75.3	68.3	66.3	62.7	63.6	65.6	68.9	52.0	39.3
16:00 - 17:00	74.6	69.6	78.5	75.2	68.4	66.3	63.4	64.6	67.7	71.1	53.9	41.8
17:00 - 18:00	73.8	67.3	73.1	72.7	69.0	63.6	60.3	64.6	66.8	70.2	52.8	40.3
18:00 - 19:00	73.9	64.3	71.8	72.5	65.8	62.6	59.6	63.7	66.1	70.9	53.0	40.4
19:00 - 20:00	70.1	63.7	70.4	71.4	65.7	62.7	59.6	62.0	63.0	66.2	49.2	36.9
20:00 - 21:00	73.4	62.0	70.1	71.6	65.1	63.1	60.3	66.3	67.5	68.6	50.9	39.0
21:00 - 22:00	67.8	60.3	68.5	69.1	63.3	61.8	58.5	60.9	61.0	63.0	46.1	34.0
22:00 - 23:00	67.3	59.1	67.8	68.4	62.1	60.0	57.5	61.6	60.3	62.1	45.4	33.4

NIGHT TIME NOISE LEVELS 23:00 - 07:00 15 MINUTE SAMPLES

Date / Time	L _{Aeq}	L _{A90}	Octave Band Centre Frequency (Hz)									
			31.5	63	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
23:00 - 23:15	65.3	58.0	67.0	65.9	60.3	59.0	55.8	58.9	58.7	60.2	43.5	32.3
23:15 - 23:30	66.9	58.5	65.6	66.0	60.1	58.5	62.6	60.5	59.3	60.7	44.2	33.3
23:30 - 23:45	65.3	57.6	67.0	66.9	59.3	58.0	56.2	59.0	58.5	60.1	43.8	31.6
23:45 - 00:00	66.1	55.7	67.9	69.2	63.8	60.6	56.0	60.0	59.3	61.0	44.7	32.9
00:00 - 00:15	64.9	54.6	65.3	66.3	62.1	60.9	56.9	57.6	57.8	60.0	43.2	30.8
00:15 - 00:30	65.8	55.4	66.3	67.8	61.6	65.5	58.3	58.2	58.4	60.4	43.5	31.1
00:30 - 00:45	63.4	53.6	66.1	66.0	58.5	57.4	53.9	56.4	56.4	58.7	42.2	32.7
00:45 - 01:00	64.0	52.1	65.5	67.6	65.4	60.8	56.7	57.0	57.0	58.5	41.7	29.4
01:00 - 01:15	63.0	53.6	66.1	67.0	61.3	58.4	54.0	56.0	56.0	58.0	41.1	29.2
01:15 - 01:30	63.0	51.3	64.0	65.5	61.8	57.4	53.3	56.2	56.3	58.1	40.8	28.5
01:30 - 01:45	62.8	51.9	64.4	68.1	62.2	57.4	53.8	56.6	56.1	57.3	40.2	27.0
01:45 - 02:00	61.8	51.3	64.1	65.2	60.1	56.5	53.0	55.3	54.9	56.6	39.8	27.5
02:00 - 02:15	60.8	50.9	64.9	62.7	56.2	54.5	52.2	54.0	54.0	55.9	38.8	26.6
02:15 - 02:30	63.7	50.6	64.2	64.7	63.4	60.7	57.2	56.5	56.3	58.3	41.5	30.5
02:30 - 02:45	61.4	45.6	64.3	63.8	59.6	55.4	52.4	54.7	54.6	56.3	40.1	28.6
02:45 - 03:00	66.0	46.2	65.7	67.5	62.8	66.3	63.5	58.4	57.2	58.7	43.0	31.8
03:00 - 03:15	59.9	49.3	62.4	61.3	54.3	52.7	50.7	53.6	53.2	54.9	38.2	25.1
03:15 - 03:30	59.1	46.5	62.9	59.4	53.2	51.9	49.9	53.4	52.9	53.0	36.0	24.7
03:30 - 03:45	62.4	47.4	65.1	65.1	56.6	54.8	53.0	54.6	55.3	58.3	41.2	28.3
03:45 - 04:00	58.5	47.0	61.6	60.1	55.6	51.7	49.4	52.2	52.2	52.9	36.2	23.5
04:00 - 04:15	61.7	48.8	64.9	63.5	56.4	54.9	52.8	55.0	55.0	56.7	39.7	27.4
04:15 - 04:30	61.7	48.7	63.0	69.9	61.4	56.5	53.1	55.3	54.9	56.1	39.2	26.5
04:30 - 04:45	62.2	50.6	64.1	64.5	58.5	55.3	52.9	55.2	55.3	57.5	40.9	29.4
04:45 - 05:00	62.1	50.0	65.7	65.8	57.6	54.5	52.1	54.8	55.6	57.3	39.7	27.0
05:00 - 05:15	62.8	50.6	67.1	64.2	57.5	56.9	53.8	55.9	56.0	57.8	41.1	29.7
05:15 - 05:30	63.1	52.9	65.6	64.5	58.1	57.1	54.3	56.9	56.6	57.7	41.2	29.0
05:30 - 05:45	65.0	56.9	67.5	68.2	61.4	58.0	56.0	58.9	58.5	59.5	43.0	31.1
05:45 - 06:00	66.5	58.6	69.3	71.4	64.9	60.9	57.4	59.8	59.8	61.3	44.6	32.5
06:00 - 06:15	66.9	58.6	70.5	70.4	64.0	61.2	58.2	59.6	60.0	62.1	45.1	33.0
06:15 - 06:30	68.9	60.9	71.9	72.0	69.7	64.3	60.5	61.6	62.2	63.5	46.8	34.2
06:30 - 06:45	67.7	61.6	71.1	70.7	64.1	61.8	59.0	60.7	61.0	62.6	45.6	33.1
06:45 - 07:00	67.7	61.3	70.0	70.7	64.9	61.3	58.7	60.8	61.1	62.7	45.9	33.6



9.3 15th – 16th December 2020 – Position 2

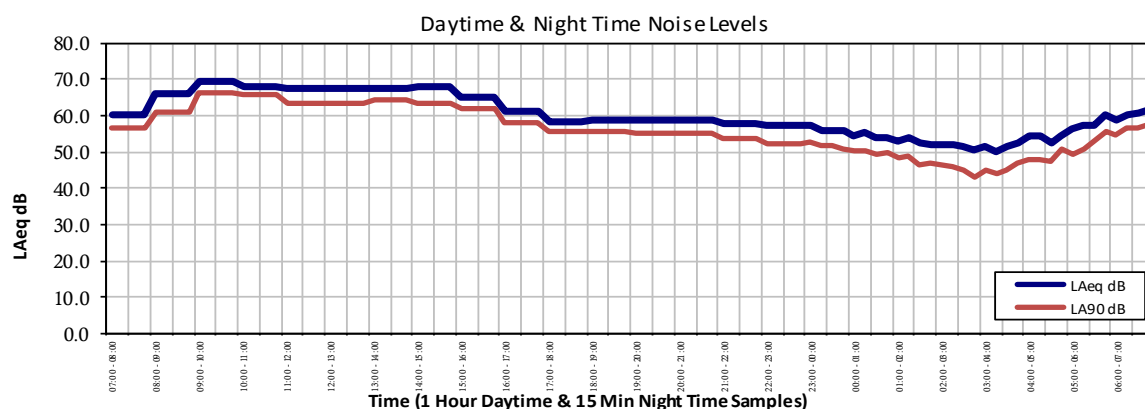
NOISE LEVEL SUMMARY ASSESSMENT												
Date / Time	L _{Aeq}	L _{A90}	31.5	63	125	250	500	1.0k	2.0k	4.0k	8.0k	16.0k
DAYTIME 07:00 - 23:00 L_{A90} 1 HOUR & Cor r esponding L_{Aeq} 1 HOUR	67.0	63.0	83.0	84.0	71.0	66.0	64.0	62.0	50.0	55.0	48.0	33.0
NIGHT TIME 23:00 - 07:00 L_{A90} 15 MIN & Cor r esponding L_{Aeq} 15 MIN	53.0	49.0	63.0	59.0	54.0	50.0	48.0	49.0	46.0	33.0	25.0	12.0

DAYTIME NOISE LEVELS 07:00 - 23:00 1 HOUR SAMPLES

Date / Time	L _{Aeq}	L _{A90}	31.5	63	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
07:00 - 08:00	60.0	56.5	73.7	68.9	62.0	58.1	55.9	56.0	52.5	46.5	37.9	21.5
08:00 - 09:00	65.9	60.7	74.8	72.2	65.6	64.0	62.6	61.0	58.4	54.2	48.0	34.9
09:00 - 10:00	69.2	66.3	82.1	83.4	71.5	67.7	66.3	63.9	61.9	55.0	48.7	33.0
10:00 - 11:00	67.7	65.8	82.6	84.2	71.1	66.4	64.3	62.0	60.5	53.3	47.1	31.4
11:00 - 12:00	67.4	63.1	82.3	81.6	69.5	66.0	63.8	62.3	59.8	55.0	48.0	32.0
12:00 - 13:00	67.2	63.5	83.4	83.8	71.5	66.4	63.7	61.6	58.8	54.6	49.1	33.4
13:00 - 14:00	67.6	64.4	83.6	84.3	71.8	66.7	63.8	62.0	59.3	54.9	48.1	32.5
14:00 - 15:00	67.9	63.3	82.7	82.3	71.1	66.1	64.0	62.8	60.1	56.2	47.9	32.8
15:00 - 16:00	65.0	62.0	81.5	81.1	68.9	63.6	61.1	60.2	56.9	51.3	44.6	29.2
16:00 - 17:00	61.1	57.8	80.0	75.6	66.3	59.3	56.4	56.6	52.8	47.7	42.0	27.9
17:00 - 18:00	58.5	55.7	77.1	70.3	61.6	56.9	54.3	54.8	50.0	41.6	32.6	19.3
18:00 - 19:00	58.5	55.6	75.6	69.3	61.7	57.2	54.1	55.0	50.2	41.4	33.6	21.6
19:00 - 20:00	58.8	55.3	72.8	68.5	60.8	56.4	54.3	55.5	50.8	43.3	34.3	18.2
20:00 - 21:00	58.8	55.0	71.8	66.8	61.3	57.9	55.1	55.2	50.4	41.0	32.3	17.4
21:00 - 22:00	57.6	53.8	71.0	65.2	59.5	56.9	53.9	54.2	48.8	38.5	29.2	16.0
22:00 - 23:00	57.5	52.2	66.3	63.2	58.6	54.3	52.1	54.0	50.2	44.8	37.2	17.3

NIGHT TIME NOISE LEVELS 23:00 - 07:00 15 MINUTE SAMPLES

Date / Time	L _{Aeq}	L _{A90}	31.5	63	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
23:00 - 23:15	57.2	52.5	63.5	63.7	59.7	54.1	53.0	54.0	49.0	41.5	29.7	13.0
23:15 - 23:30	55.9	51.7	64.5	62.1	58.3	53.5	51.5	53.1	47.3	36.9	27.0	12.6
23:30 - 23:45	55.7	51.6	64.0	62.6	57.2	52.7	51.2	52.9	47.2	36.5	26.2	13.1
23:45 - 00:00	55.7	50.8	63.4	61.4	54.9	52.3	52.5	53.0	46.8	35.9	26.6	14.2
00:00 - 00:15	54.5	50.4	64.7	61.9	54.7	51.8	49.8	51.7	46.1	35.4	25.4	12.2
00:15 - 00:30	55.4	50.1	62.9	60.4	55.9	56.6	51.4	51.9	45.9	35.2	26.0	13.4
00:30 - 00:45	54.0	49.2	62.2	59.4	53.2	50.4	49.2	51.4	45.6	34.5	25.3	12.0
00:45 - 01:00	54.0	50.0	64.4	62.0	54.2	51.5	50.2	51.0	45.3	35.0	26.3	12.0
01:00 - 01:15	52.9	48.5	62.6	58.5	52.2	49.9	48.6	50.2	44.4	34.4	24.1	11.8
01:15 - 01:30	53.7	48.6	61.9	59.2	53.8	50.6	49.8	50.9	45.0	34.4	26.0	13.4
01:30 - 01:45	52.3	46.6	61.2	59.6	55.7	50.1	47.7	49.2	43.7	32.6	22.8	12.1
01:45 - 02:00	52.0	47.0	61.4	59.0	51.8	49.2	47.8	49.1	43.6	33.2	24.4	12.3
02:00 - 02:15	52.0	46.5	62.3	58.0	52.3	49.7	48.3	49.0	43.2	33.3	24.1	11.7
02:15 - 02:30	51.9	45.9	60.3	57.0	54.1	51.9	48.0	48.6	42.8	33.4	24.9	14.2
02:30 - 02:45	51.6	44.9	62.4	57.5	53.4	49.9	48.0	48.3	42.7	32.9	23.8	11.8
02:45 - 03:00	50.6	43.2	59.3	58.5	51.6	48.7	46.7	47.6	41.7	31.7	22.7	11.3
03:00 - 03:15	51.6	45.1	61.3	59.8	53.5	50.0	47.8	48.3	42.7	33.2	24.8	11.9
03:15 - 03:30	50.2	43.8	59.7	57.3	49.8	47.5	46.1	47.4	41.7	31.9	22.4	11.6
03:30 - 03:45	51.6	44.7	64.6	59.8	52.6	49.2	47.7	48.6	43.0	32.8	23.4	12.2
03:45 - 04:00	52.3	46.8	71.0	63.1	53.5	49.6	48.2	49.1	43.8	35.1	27.8	16.7
04:00 - 04:15	54.2	47.8	78.3	70.7	60.3	51.8	49.2	50.4	45.0	36.0	29.9	20.2
04:15 - 04:30	54.4	47.9	71.2	63.8	54.7	55.0	52.2	50.1	44.8	35.0	27.7	15.9
04:30 - 04:45	52.5	47.5	62.9	59.2	54.1	49.9	48.1	49.5	44.0	34.2	25.3	13.2
04:45 - 05:00	54.5	50.5	67.2	62.1	54.9	51.9	50.4	51.4	46.1	36.3	29.6	15.1
05:00 - 05:15	56.1	49.2	82.0	74.8	64.4	54.2	50.4	51.3	46.4	38.4	33.1	23.6
05:15 - 05:30	57.1	50.7	74.4	67.6	58.2	52.7	51.0	53.0	50.7	45.2	35.6	19.9
05:30 - 05:45	57.3	53.3	80.5	72.5	62.1	54.1	52.5	53.7	48.8	40.3	35.3	24.8
05:45 - 06:00	60.4	55.5	86.3	79.7	70.2	58.7	53.9	54.9	50.5	42.8	38.6	28.0
06:00 - 06:15	58.9	54.8	81.3	73.7	63.8	56.8	54.1	55.0	50.4	41.9	35.2	24.2
06:15 - 06:30	60.4	56.6	85.9	78.9	68.7	58.4	55.1	55.4	50.9	43.5	38.3	27.8
06:30 - 06:45	60.8	56.5	86.1	79.4	69.9	59.7	55.3	55.6	51.1	44.2	39.7	28.8
06:45 - 07:00	61.5	57.4	86.0	79.6	70.1	59.8	56.6	56.3	51.9	45.2	40.9	29.6



9.4 16th – 17th December 2020 – Position 2

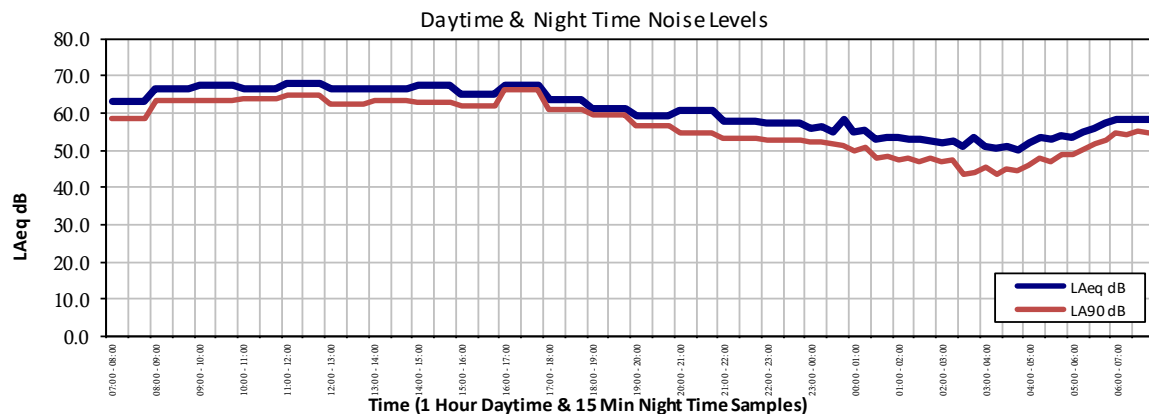
NOISE LEVEL SUMMARY ASSESSMENT		Octave Band Centre Frequency (Hz)										
Date / Time	LAeq	LA90	31.5	63	125	250	500	1.0k	2.0k	4.0k	8.0k	16.0k
DAYTIME 07:00 - 23:00 LA90 1 HOUR & Corresponding LAeq 1 HOUR	67.0	64.0	69.0	85.0	74.0	66.0	63.0	60.0	57.0	52.0	47.0	33.0
NIGHT TIME 23:00 - 07:00 LA90 15 MIN & Corresponding LAeq 15 MIN	55.0	47.0	66.0	62.0	55.0	52.0	49.0	50.0	50.0	36.0	30.0	15.0

DAYTIME NOISE LEVELS 07:00 - 23:00 1 HOUR SAMPLES

Date / Time	LAeq	LA90	31.5	63	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
07:00 - 08:00	63.3	58.3	86.2	81.7	70.5	61.6	58.1	57.9	54.1	51.2	46.5	32.6
08:00 - 09:00	66.3	63.1	87.1	84.9	73.3	65.0	61.3	60.3	57.2	54.9	49.4	33.7
09:00 - 10:00	67.4	63.5	88.6	85.0	74.2	66.5	62.8	61.2	58.6	56.3	50.6	37.3
10:00 - 11:00	66.4	63.7	88.7	85.8	74.3	66.5	61.8	60.3	56.8	52.1	47.6	33.0
11:00 - 12:00	67.7	65.0	90.3	85.1	74.7	66.0	63.4	61.7	60.5	52.4	47.6	33.5
12:00 - 13:00	66.6	62.3	91.5	86.2	75.9	65.5	60.4	59.4	57.1	54.6	52.3	36.7
13:00 - 14:00	66.5	63.5	90.9	87.1	75.3	66.2	61.3	59.9	56.5	51.8	46.6	33.4
14:00 - 15:00	67.2	62.9	91.8	86.6	76.1	65.9	61.7	61.1	57.7	52.9	48.0	34.4
15:00 - 16:00	64.8	61.9	86.5	83.9	71.3	63.5	59.8	59.4	56.0	51.3	45.5	30.7
16:00 - 17:00	67.5	66.3	88.1	85.3	72.3	64.9	63.0	61.5	61.0	53.4	47.0	32.3
17:00 - 18:00	63.6	60.7	77.7	78.3	66.3	60.2	57.9	58.9	57.6	49.5	43.4	28.4
18:00 - 19:00	61.2	59.2	68.7	66.7	60.6	57.0	55.4	56.8	55.9	47.2	38.1	19.4
19:00 - 20:00	59.1	56.7	69.5	66.0	59.4	55.5	53.3	55.5	52.9	44.5	36.4	18.5
20:00 - 21:00	60.5	54.7	68.2	65.5	58.9	55.0	53.2	57.0	54.9	46.4	37.3	19.1
21:00 - 22:00	57.6	53.3	65.5	63.6	57.2	55.0	53.6	54.3	49.6	41.1	31.7	14.6
22:00 - 23:00	57.0	52.9	69.4	63.6	57.5	53.6	51.4	54.1	49.7	40.4	31.4	14.9

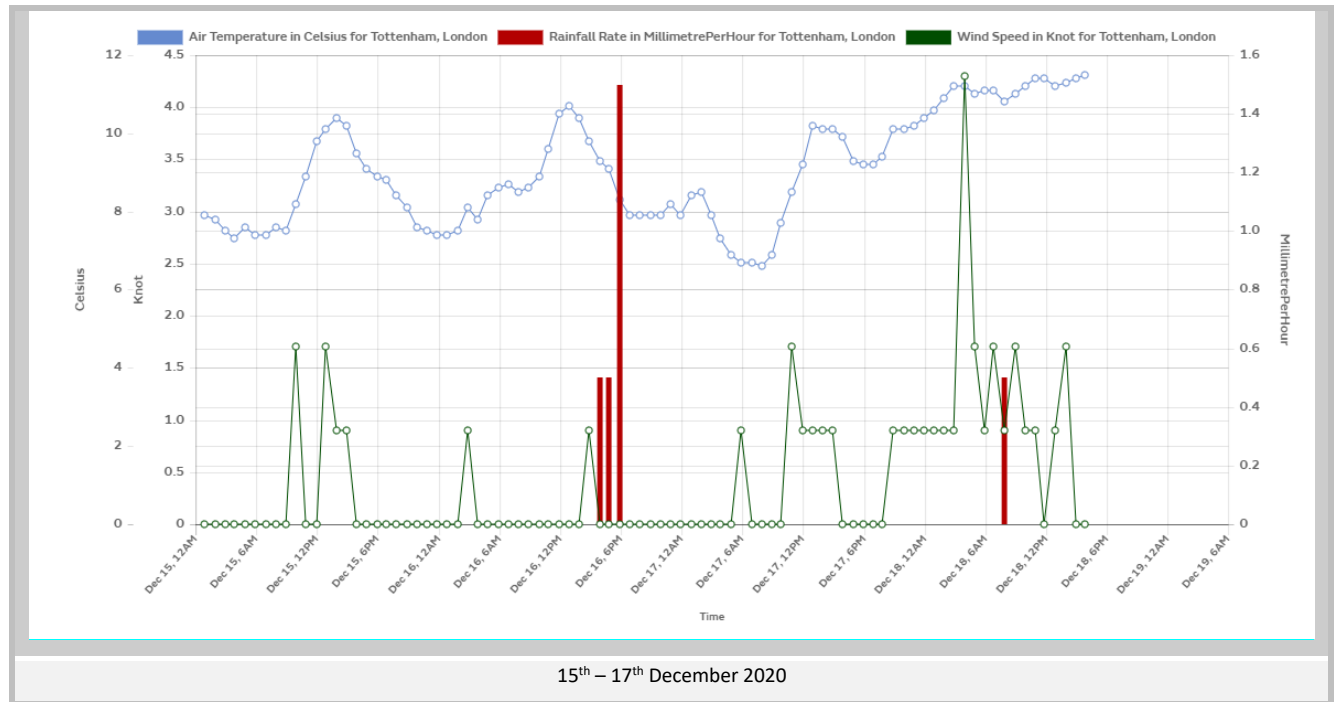
NIGHT TIME NOISE LEVELS 23:00 - 07:00 15 MINUTE SAMPLES

Date / Time	LAeq	LA90	31.5	63	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
23:00 - 23:15	55.6	52.1	73.1	64.3	54.9	52.3	50.0	52.5	48.3	39.5	30.4	15.3
23:15 - 23:30	56.3	52.2	68.9	61.7	54.2	51.4	53.0	52.8	48.0	39.5	29.6	13.7
23:30 - 23:45	55.0	51.5	67.3	61.6	55.3	51.2	49.2	52.1	47.6	38.7	30.2	14.0
23:45 - 00:00	58.1	51.1	65.9	62.6	55.6	51.8	50.6	56.3	49.5	40.8	31.9	15.7
00:00 - 00:15	55.0	49.6	65.2	61.9	56.1	54.5	51.3	51.2	46.5	38.5	29.8	13.5
00:15 - 00:30	55.2	50.7	65.6	62.2	54.6	55.8	50.5	51.4	46.9	38.6	29.8	13.2
00:30 - 00:45	52.8	47.7	63.5	59.7	53.2	50.3	47.8	49.6	45.2	37.2	28.6	13.0
00:45 - 01:00	53.3	48.5	66.2	61.6	56.3	51.1	48.6	49.8	45.5	37.4	28.5	12.8
01:00 - 01:15	53.5	47.2	68.1	62.1	56.4	52.0	49.3	49.8	45.3	37.6	29.1	13.7
01:15 - 01:30	52.9	47.9	65.9	59.9	55.0	50.3	47.6	49.7	45.3	36.4	27.2	12.7
01:30 - 01:45	53.0	46.7	66.3	61.3	54.7	50.3	47.8	49.9	45.2	35.6	25.8	11.8
01:45 - 02:00	52.2	47.6	71.6	63.1	55.1	50.3	47.1	48.6	44.4	36.2	28.4	13.8
02:00 - 02:15	52.1	46.8	74.9	66.1	54.5	50.1	47.0	48.4	44.2	36.2	28.2	15.4
02:15 - 02:30	52.4	47.3	74.7	66.0	55.4	51.6	47.9	48.5	43.8	35.7	27.2	15.1
02:30 - 02:45	51.0	43.3	74.0	65.5	55.2	50.6	45.8	47.0	42.5	34.3	26.9	14.7
02:45 - 03:00	53.5	44.0	69.2	61.1	53.5	55.2	51.3	48.8	44.1	35.3	27.5	14.6
03:00 - 03:15	51.2	45.2	72.4	64.5	54.2	49.1	46.4	47.7	42.9	34.5	26.2	14.0
03:15 - 03:30	50.6	43.7	69.8	59.7	50.7	47.7	45.3	47.6	42.9	32.6	23.6	12.3
03:30 - 03:45	51.2	44.9	68.3	61.0	52.1	48.6	46.7	47.9	43.3	35.9	27.5	12.9
03:45 - 04:00	50.2	44.6	68.4	59.8	51.2	47.9	45.4	47.0	42.4	33.3	25.2	12.7
04:00 - 04:15	52.0	45.8	68.9	61.3	53.1	50.0	47.7	48.7	43.9	35.9	27.1	13.1
04:15 - 04:30	53.3	47.6	73.3	66.0	55.6	52.5	48.9	49.6	45.1	36.6	28.2	14.5
04:30 - 04:45	52.9	46.7	68.9	61.1	56.0	52.7	49.0	49.2	44.2	35.0	26.3	13.3
04:45 - 05:00	53.7	48.9	76.3	68.0	56.8	52.2	48.4	49.9	45.6	37.7	27.3	16.3
05:00 - 05:15	53.4	48.8	71.4	63.4	53.6	50.8	48.6	50.2	45.5	36.2	27.0	13.6
05:15 - 05:30	55.0	50.1	69.8	62.2	56.3	53.1	50.0	51.6	47.6	37.8	30.0	15.2
05:30 - 05:45	55.6	51.6	69.8	63.4	54.6	51.7	50.8	52.6	48.1	38.2	29.1	14.7
05:45 - 06:00	57.2	52.7	73.7	66.7	59.7	54.0	51.4	53.6	50.2	42.2	31.9	15.3
06:00 - 06:15	58.2	54.8	75.5	68.4	60.9	57.2	53.5	54.4	50.4	42.4	33.7	17.9
06:15 - 06:30	58.3	54.3	74.0	67.7	60.0	57.3	54.5	54.5	50.2	42.3	33.8	16.9
06:30 - 06:45	58.4	54.9	73.0	67.4	61.4	57.1	54.2	54.6	50.4	42.9	33.8	17.4
06:45 - 07:00	58.0	54.7	73.4	67.3	61.0	56.2	53.4	54.3	50.2	42.7	33.1	17.0



10 APPENDIX B - ENVIRONMENTAL CONDITIONS

The following weather conditions have been downloaded from the nearest metrological station and data supplied by Met Office Wow.



#END OF REPORT#