

Sound Advice

A C O U S T I C S L T D

REPORT REFERENCE:

SA – 7513/Rev1

ENVIRONMENTAL NOISE IMPACT ASSESSMENT

Planning Conditions 22, 24 & 39

British Standard 8233: 2014

British Standard 4142: 2014+A1: 2019

CLIENT:

KS4 Consulting

SITE:

81 – 88 Beresford Street

London

SE18 6BG

SURVEY DATES:

27th – 31st July 2023

Report By



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1	EXECUTIVE SUMMARY	5
1.1	INSTRUCTION	5
1.2	SCOPE OF REPORT.....	5
1.3	SUMMARY OF RESULTS	5
1.3.1	Background Noise Levels.....	5
1.4	GLAZING & VENTILATION SPECIFICATION.....	6
1.5	WHO GUIDELINES FOR COMMUNITY NOISE	6
1.6	PROPOSED PLANT	6
1.7	ASSESSMENT AND MITIGATION OF PLANT NOISE	6
1.7.1	Daytime (07:00 – 23:00) Assessment of Plant on the 11 th Floor, without attenuation.....	6
1.7.2	Night time (23:00 – 07:00) Assessment of Plant on the 11 th Floor, without attenuation.	7
1.7.3	Mitigation Measures Required	7
1.7.4	Daytime (07:00 – 23:00) Assessment of Plant on the 11 th Floor, with Attenuation.....	7
1.7.5	Night time (23:00 – 07:00) Assessment of Plant on the 11 th Floor, with Attenuation.	8
1.8	CONCLUSION	9
1.8.1	Overview	9
1.8.2	Planning Condition 22	9
1.8.3	Planning Condition 39	9
1.8.4	Planning Condition 24	9
1.8.5	Conclusion	9
2	INTRODUCTION.....	10
2.1	PLANNING CONDITIONS	10
2.1.1	Planning Condition 22 - Sound attenuation & Environmental Noise Assessment.....	10
2.1.2	Planning Condition 24 - Plant Noise.....	11
2.1.3	Planning Condition 39 – External Amenity Area	11
2.2	BRITISH STANDARD 8233: 2014.....	12
2.3	BS 4142: 2014+A1: 2019.....	12
2.4	NATIONAL PLANNING POLICY FRAMEWORK 2023(NPPF) AND NOISE POLICY STATEMENT FOR ENGLAND 2010 (NPSE).....	13
2.5	WORLD HEALTH ORGANISATION ‘GUIDELINES FOR COMMUNITY NOISE’	13
3	SITE LOCATION.....	14
3.1	PROPOSED DEVELOPMENT.....	15
4	PROCEDURE	24
5	APPARATUS	25
5.1	RION NL-52 NOISE METER S/N 00242696.....	25
5.2	140 NOISE METER S/N 1403140	25
6	RESULTS.....	26
6.1	DOWNLOADED RESULTS, AND AVERAGES.	26
6.2	07:00 – 07:00 27 TH – 28 TH JULY 2023, POSITION 1	26
6.3	07:00 – 07:00 28 TH – 29 TH JULY 2023, POSITION 1	26
6.4	07:00 – 07:00 29 TH – 30 TH JULY 2023, POSITION 1	26
6.5	07:00 – 07:00 30 TH – 31 ST JULY 2023, POSITION 1.....	26
6.6	07:00 – 07:00 27 TH – 28 TH JULY 2023, POSITION 2	27
6.7	07:00 – 07:00 28 TH – 29 TH JULY 2023, POSITION 2	27
6.8	07:00 – 07:00 29 TH – 30 TH JULY 2023, POSITION 2	27
6.9	07:00 – 07:00 30 TH – 31 ST JULY 2023, POSITION 2.....	27
7	INTERNAL NOISE LEVEL GUIDELINES	28
7.1	DISCUSSION OF RESULTS	28

7.2	EXISTING NOISE LEVELS – DAYTIME (07:00 – 23:00)	28
7.3	EXISTING NOISE LEVELS – NIGHT TIME (23:00 – 07:00)	28
7.4	PROPOSED NOISE LEVELS – DAYTIME (07:00 – 23:00)	29
7.5	PROPOSED NOISE LEVELS – NIGHT TIME (23:00 – 07:00)	29
7.6	RECOMMENDATIONS	30
7.7	CALCULATION PROCEDURE TO BS 8233: 2014	31
7.8	TYPICAL MID FLOOR BEDROOM – SOUTH WEST & SOUTH EAST ELEVATION	31
7.9	TYPICAL TOP FLOOR BEDROOM - SOUTH WEST & SOUTH EAST ELEVATION	32
7.10	TYPICAL BEDROOM - NORTH WEST ELEVATION	33
7.11	TYPICAL BEDROOM – NORTH EAST ELEVATION	34
7.12	VENTILATION (DNE)	35
7.13	GLAZING (R_{wv})	35
7.14	WALLS (NON-GLAZED ELEMENTS) (R_{ew})	35
7.15	ROOF (R_{rr})	35
7.16	GLAZING & VENTILATION ASSESSMENT	36
8	OVERHEATING	37
9	LAMAX DB NOISE LEVEL ASSESSMENT	40
9.1	CRITERIA	40
9.1.1	Night Noise Guidelines Europe 2009	40
9.1.2	Professional Practice Guidance on Planning & Noise	40
9.1.3	World Health Organisations ‘Guidelines for Community Noise’	41
9.1.4	LAFmax dB Noise Levels – Night Time 23:00 – 07:00 (1 Minute Data)	41
10	EXTERNAL AMENITY AREA NOISE ASSESSMENT	42
10.1	OUTDOOR LIVING AREAS	42
11	CALCULATIONS	44
11.1	PROPOSED PLANT LAYOUT 11 TH FLOOR	44
11.2	PROPOSED PLANT	44
11.3	INPUTTED NOISE LEVELS PRIOR TO RECOMMENDATIONS	45
11.4	CALCULATED FAÇADE LEVELS PRIOR TO RECOMMENDATIONS	45
11.4.1	Mitigation Measures Required	46
11.5	INPUTTED NOISE LEVELS POST RECOMMENDATIONS	46
11.6	CALCULATED FAÇADE LEVELS POST RECOMMENDATIONS	47
12	BS 4142:2014+A1:2019 NOISE ASSESSMENT	48
12.1	SCOPE OF BRITISH STANDARD 4142: 2014+A1:2019	48
12.2	TERMS AND DEFINITIONS	48
12.3	ASSESSMENT POSITION	48
12.4	CALCULATIONS	48
12.5	EQUIVALENT POSITION	49
12.6	RATING LEVELS (CHARACTER CORRECTION)	49
12.7	SUBJECTIVE METHOD	49
12.8	ASSESSMENT CRITERION	50
12.9	NOISE METER FLOOR	50
12.10	BS 4142:2014+A1:2019 PENALTIES	50
12.11	ASSESSMENTS	51
12.11.1	Daytime (07:00 – 23:00) Assessment of Plant on the 11 th Floor, without attenuation	51
12.11.2	Night time (23:00 – 07:00) Assessment of Plant on the 11 th Floor, without attenuation	52
12.12	TONAL PENALTY	52
12.13	INTERMITTENCY PENALTY	52
12.14	ASSESSMENT CONCLUSION	52
12.14.1	Daytime (07:00 – 23:00) Assessment of Plant on the 11 th Floor, with attenuation	53
12.14.2	Night time (23:00 – 07:00) Assessment of Plant on the 11 th Floor, with attenuation	54
12.15	TONAL PENALTY	54

12.16	IMPULSIVITY PENALTY	54
12.17	ASSESSMENT CONCLUSION	54
13	THE NATIONAL PLANNING POLICY FRAMEWORK 2023(NPPF)	55
14	CONCLUSION	56
14.1	BACKGROUND NOISE LEVELS.....	56
14.2	GLAZING & VENTILATION SPECIFICATION.....	56
14.3	WHO GUIDELINES FOR COMMUNITY NOISE	56
14.4	PROPOSED PLANT	56
14.5	ASSESSMENT AND MITIGATION OF PLANT NOISE	57
14.5.1	Daytime (07:00 – 23:00) Assessment of Plant on the 11 th Floor, without attenuation.....	57
14.5.2	Night time (23:00 – 07:00) Assessment of Plant on the 11 th Floor, without attenuation.	57
14.5.3	Mitigation Measures Required	57
14.5.4	Daytime (07:00 – 23:00) Assessment of Plant on the 11 th Floor, with Attenuation.....	58
14.5.5	Night time (23:00 – 07:00) Assessment of Plant on the 11 th Floor, with Attenuation.	58
14.6	CONCLUSION	59
14.6.1	Overview	59
14.6.2	Planning Condition 22.....	59
14.6.3	Planning Condition 39.....	59
14.6.4	Planning Condition 24.....	59
14.6.5	Conclusion.....	59
15	APPENDIX A - RESULTS.....	60
15.1	27 TH – 28 TH JULY 2023, POSITION 1	60
15.2	28 TH – 29 TH JULY 2023, POSITION 1	61
15.3	29 TH – 30 TH JULY 2023, POSITION 1	62
15.4	30 TH – 31 ST JULY 2023, POSITION 1.....	63
15.5	27 TH – 28 TH JULY 2023, POSITION 2	64
15.6	28 TH – 29 TH JULY 2023, POSITION 2	65
15.7	29 TH – 30 TH JULY 2023, POSITION 2	66
15.8	30 TH – 31 ST JULY 2023, POSITION 2.....	67
16	APPENDIX B – UNCERTAINTY BUDGET	68
16.1	SCOPE	68
16.2	UNCERTAINTY OF MEASURED VALUES.....	68
16.3	UNCERTAINTY IN CALCULATIONS.....	69
16.4	UNCERTAINTY FROM OTHER FACTORS.....	69
16.5	COMBINED REPORTED EXPANDED UNCERTAINTY	69
17	APPENDIX C – BS 4142:2019+A1:2019 INFORMATION.....	70
17.1	PROFESSIONAL COMPETENCE	70
17.2	SITE STATUS.....	70
17.3	MEASUREMENT INFORMATION – LOCATION 1	70
18	APPENDIX D - ENVIRONMENTAL CONDITIONS	71

1 EXECUTIVE SUMMARY

1.1 Instruction

Sound Advice Acoustics Ltd have been instructed by KS4 Consulting to undertake a background noise survey to British Standard 8233: 2014 and British Standard 4142: 2014+A1:2019 to determine the impact of existing externally generated noise sources on the proposed student accommodation scheme at 81 – 88 Beresford Street, London, SE18 6BG.

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 units. 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.
- Noise levels from the Proposed Plant (L_{Aeq});
- Mitigation Levels if Required
- Review Planning Conditions 22, 24 & 39.

1.3 Summary of Results

1.3.1 Background Noise Levels

A 96 hour background noise survey was undertaken from 27th – 31st July 2023 at two positions at the front and rear of the site in order to establish the underlying background noise levels. The maximum day time levels were found to be $L_{Aeq, 16 \text{ hour}}$ 71.9 dB and the maximum night time levels were found to be $L_{Aeq, 8 \text{ hours}}$ 67.8 dB at position 1. The maximum day time levels were found to be $L_{Aeq, 16 \text{ hour}}$ 56.6 dB and the maximum night time levels were found to be $L_{Aeq, 8 \text{ hours}}$ 53.8 dB at position 2. The background noise level was established as L_{A90} 49.0 dB for daytime and L_{A90} 46.0 dB at position 2 at the rear of the development.

Assessment Position	Date Start	Date Finish	Daytime LAeq	Night Time LAeq
Position 1 Front	27/07/2023	31/07/2023	71.9	67.8
Position 2 Rear	27/07/2023	31/07/2023	56.6	53.8

Assessment Position	Date Start	Date Finish	Daytime LA90	Night time LA90
Position 2 Rear	27/07/2023	31/07/2023	49.0	46.0

1.4 Glazing & Ventilation Specification

The new student accommodation should be designed as follows to ensure the internal noise levels are acceptable in terms of the assessment to British Standard 8233: 2014.

Façade	Glazing Specification	Ventilation Specification
Southwest	10.8mm glass / 24mm Argon air gap / 16.8mm Pilkington Optiphon glass	Ryton LookRyt Acoustic Aircore Vent
Southeast	10.8mm glass / 24mm Argon air gap / 16.8mm Pilkington Optiphon glass	Ryton LookRyt Acoustic Aircore Vent
Northwest	6mm glass / 16mm Argon air gap / 8.8mm Pilkington Optiphon glass	Ryton LookRyt Acoustic Aircore Vent
Northeast	4mm glass / 16mm air gap / 4mm glass	Ryton LookRyt Acoustic Aircore Vent

1.5 WHO Guidelines for Community Noise

The guideline has been considered acceptable criteria for this assessment given the sites geographical location and proximity to a major trunk road. The layout has been designed in order to allow for acoustics and minimise the noise levels within the external amenity space at 9th floor level. The calculation set out within this report demonstrates the communal rooftop terrace is likely to see noise levels below the upper guideline of 55 dB.

1.6 Proposed Plant

The following plant is to be located externally, generally as detailed on the drawing within this report. The plant has the following sound power data supplied by the manufacturer.

Make & Model	Number of Units	Location	Sound Power Level dB (SWL)
ASHP Omicron REV S4 HE	2	11 th Floor Plant Area	87.0
Chiller – AquaSnap 30RB-080R	1	11 th Floor Plant Area	88.5
Mitsubishi MUZ HR60VF	2	11 th Floor Plant Area	68.0
Mitsubishi PURY EP250YNW-A	2	11 th Floor Plant Area	80.0

1.7 Assessment and Mitigation of Plant Noise

1.7.1 Daytime (07:00 – 23:00) Assessment of Plant on the 11th Floor, without attenuation.

Rating Level	50 dB	9.1	The acoustic feature correction is added to the specific noise level
Background Noise Level $L_{A90,1 \text{ hour}}$	49 dB	8.1	Modal Background Noise Level (07:00 – 23:00)
Assessment Level	+1 dB	11	The background level is subtracted from the rating level.
Conclusion BS 4142:2014+A1:2019 [1]	+10 dB Significant Adverse Effects, +5 dB Adverse Effects, +0 dB Low Impact		
Assessment	+1 dB		
Conclusion	The assessment level is 'Low Impact'		

Council Criteria	Specific Level -10 dB Below Background – Not Achieved
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1.7.2 Night time (23:00 – 07:00) Assessment of Plant on the 11th Floor, without attenuation.

Rating Level	50 dB	9.1	The acoustic feature correction is added to the specific noise level
Background Noise Level L _{A90,1 hour}	46 dB	8.1	Modal Background Noise Level (23:00 – 07:00)
Assessment Level	+4 dB	11	The background level is subtracted from the rating level.
Conclusion BS 4142:2014+A1:2019 [1]	+10 dB Significant Adverse Effects, +5 dB Adverse Effects, +0 dB Low Impact		
Assessment	+4 dB		
Conclusion	The assessment level is 'Low Impact'		
Council Criteria	Specific Level -10 dB Below Background – Not Achieved		

1.7.3 Mitigation Measures Required

Based on the above assessment it will be necessary to install an acoustic enclosure around the plant, with the exception of the 2 x Comms Room units. This should be designed to have the following minimum attenuation values:-

ACOUSTIC PERFORMANCE (dB) - CENTRE BAND FREQUENCY								
Frequency	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
Acoustic Panels	6	8	9	18	24	26	26	27

1.7.4 Daytime (07:00 – 23:00) Assessment of Plant on the 11th Floor, with Attenuation.

Rating Level	40 dB	9.1	The acoustic feature correction is added to the specific noise level
Background Noise Level L _{A90,1 hour}	49 dB	8.1	Modal Background Noise Level (07:00 – 23:00)
Assessment Level	-9 dB	11	The background level is subtracted from the rating level.
Conclusion BS 4142:2014+A1:2019 [1]	+10 dB Significant Adverse Effects, +5 dB Adverse Effects, +0 dB Low Impact		
Assessment	-9 dB		
Conclusion	The assessment level is 'Low Impact'		
Council Criteria	Specific Level -10 dB Below Background – Achieved		

1.7.5 Night time (23:00 – 07:00) Assessment of Plant on the 11th Floor, with Attenuation.

Rating Level	40 dB	9.1	The acoustic feature correction is added to the specific noise level
Background Noise Level LA90,1 hour	46 dB	8.1	Modal Background Noise Level (23:00 – 07:00)
Assessment Level	-6 dB	11	The background level is subtracted from the rating level.
Conclusion BS 4142:2014+A1:2019 [1]	+10 dB Significant Adverse Effects, +5 dB Adverse Effects, +0 dB Low Impact		
Assessment	-6 dB		
Conclusion	The assessment level is 'Low Impact'		
Council Criteria	Specific Level -10 dB Below Background –Achieved		

1.8 Conclusion

1.8.1 Overview

Levels have been recorded and assessments made in accordance with the relevant standards. Internal criterias 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 student accommodation and satisfy the local Council's requirements.

1.8.2 Planning Condition 22

With the glazing / ventilation specifications achieved within this report, the development can be implemented within the guidelines of this technical report and ensure a conclusion of NOEL – No Observed Effect Level. This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise and Planning Condition 22 can be discharged accordingly.

1.8.3 Planning Condition 39

For the external noise levels, the guideline has been considered acceptable criteria for this assessment given the sites geographical location and proximity to a dual carriageway and that Planning Condition 39 can be discharged accordingly.

1.8.4 Planning Condition 24

The operation of any proposed plant has been assessed to establish if the development will have a demonstrable adverse effect in terms of noise that outweigh the benefits of the development. Measurements have been undertaken in accordance with British Standard 4142: 2014 +A1:2019 and ISO 1996 – Part 2: 2017. This report has established the existing background noise levels at the closest residential façade to the site and the assessment of the impact of the site operation on nearby residential properties. The resulting emissions from the site running on a worst case scenario show no conflict with 'low impact' criteria and give a strong indication that complaint and impact on the local amenity is unlikely, provided the recommended acoustic works are implemented as detailed within this report and that Planning Condition 24 can be discharged accordingly.

1.8.5 Conclusion

Based on the calculations and assessments made within this report it is the professional opinion of Sound Advice Acoustics Ltd that the proposed development can demonstrate compliance with the National Planning Policy Framework 2023, NPPF & NPSE.

2 INTRODUCTION

Sound Advice Acoustics Ltd have been instructed by KS4 Consulting to undertake a background noise survey to British Standard 8233: 2014 and British Standard 4142: 2014+A1:2019 to determine the impact of existing noise sources on the proposed accommodation scheme at 81 – 88 Beresford Street, London, SE18 6BG. Rather than relying on the data from the 2021 Environmental Noise Assessment from IDOM. It was felt that it was best to have the most up-to-date information of the existing baseline condition.

Ambient noise levels were measured between 27th – 31st July 2023. 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 have been monitored at the site in accordance with British Standard 7445: 2003 'Description and measurement of environmental noise assessments and assessments made to ensure planning conditions 22, 24 & 39 as detailed below can be discharged accordingly.

2.1 Planning Conditions

2.1.1 Planning Condition 22 - Sound Attenuation & Environmental Noise Assessment

a) Prior to the commencement of above ground works (excluding demolition), details of the sound attenuation, to protect against externally generated (environmental) noise sources including road and aircraft traffic shall be submitted to, and approved in writing by, the Local Planning Authority. The details shall demonstrate that the internal ambient noise levels detailed in World Health Organisation (WHO) Community Guidelines for Community Noise can be achieved.

b) The approved works under a) above are to be completed prior to the first occupation of the development and retained for the lifetime of the development as well as the recommendations of the Environmental Noise Assessment prepared by IDOM and dated 15th March 2021 shall be implemented in their entirety, prior to occupation and thereafter permanently retained and maintained.

Reason 22 - To ensure that the future residents of the development hereby approved experience a high standard of living in accordance with Policy H5 of the Royal Greenwich Local Plan: Core Strategy with Detailed Policies.

2.1.2 Planning Condition 24 - Plant Noise

A) Prior to the installation of plant and equipment, an acoustic report shall be submitted to and approved in writing by the Local Planning Authority. The noise from any plant or equipment such as air handling units, boilers, lifts, mechanical ventilation etc. which forms part of the development shall not cause the existing background noise level to increase when measured at one metre from the façade of the nearest noise sensitive premises. In order to achieve this, the plant shall be designed/selected, or the noise from the plant should be attenuated, so that it is 10dB below the existing background level (LA90 15min). The approved scheme shall be implemented prior to occupation of the development and shall be permanently maintained thereafter.

B) The developer shall certify to the Local Planning Authority that the noise mitigation measures agreed have been installed.

Reason 24 - To safeguard the amenity of neighbouring occupiers and the surrounding area generally in accordance with Policy E(a) of the Royal Greenwich Local Plan: Core Strategy with Detailed Policies (2014).

2.1.3 Planning Condition 39 – External Amenity Area

Notwithstanding the conclusions within the Environmental Noise Assessment prepared by IDOM and dated 15th March 2021 on the consideration of rooftop amenity space, the external amenity area shall not be used until mitigation measures from the use of the external amenity area have been submitted to and approved in writing by the Local Planning Authority. Details shall include:

- Any proposed noise screening;
- Hours of use

The measures and use of the external amenity area shall be incorporated and carried out (in full) in accordance with the approved details for the lifetime of the development.

Reason 39 - In order to safeguard the amenities of residential properties and ensure compliance with Policy D14 of the London Plan (2021) and Policies DH(b) and E(a) of the Royal Greenwich Local Plan: Core Strategy with Detailed Policies (2014).

Therefore, this assessment and report has been undertaken to mitigate and discharge Planning Conditions 22, 24 & 39 accordingly.

2.2 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.

2.3 BS 4142: 2014+A1: 2019

British Standard 4142: 2014 +A1:2019 is to be adopted for the basis of this background noise level assessment. A BS 4142: 2014 +A1:2019 noise assessment will be carried out in order to demonstrate the existing acoustic impact the external plant could have on the nearest affected residential and make suitable recommendations in order to demonstrate that these units will not have a significant and demonstrable adverse impact on the nearest noise sensitive premises in accordance with the National Planning Policy Framework, once remedial works are completed.

2.4 National Planning Policy Framework 2023(NPPF) and Noise Policy Statement for England 2010 (NPSE).

References and evaluations are to be made to the National Planning Policy Framework 2023(NPPF) and the Noise Policy Statement for England 2010 (NPSE). The purpose of this document is to include all aspects of environmental noise within assessments i.e. environmental noise, neighbour noise and neighbourhood noise. Noise is to be considered alongside other relevant issues relating to the site and should not be considered in isolation, according to the NPSE.

There are several key phrases within the NPSE aims and these are discussed below.

“Significant adverse” and “adverse”

There are two established concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organisation. They are:

NOEL – No Observed Effect Level

This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.

LOAEL – Lowest Observed Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected.

Extending these concepts for the purpose of this NPSE leads to the concept of a significant observed adverse effect level.

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur.

It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available.

2.5 World Health Organisation ‘Guidelines for Community Noise’

In addition, calculations are to be made for the predicted daytime noise levels on the external rooftop terrace and assessments made against the recommended levels within the World Health Organisation’s ‘Guidelines for Community Noise’. In order to evaluate these levels accurately, the 3D modelling software CADNA A is to be adopted for the purpose of this assessment.

Finally, assessments and references are to be made to the World Health Organisation Night Time Noise Guidance 2009.

3 SITE LOCATION

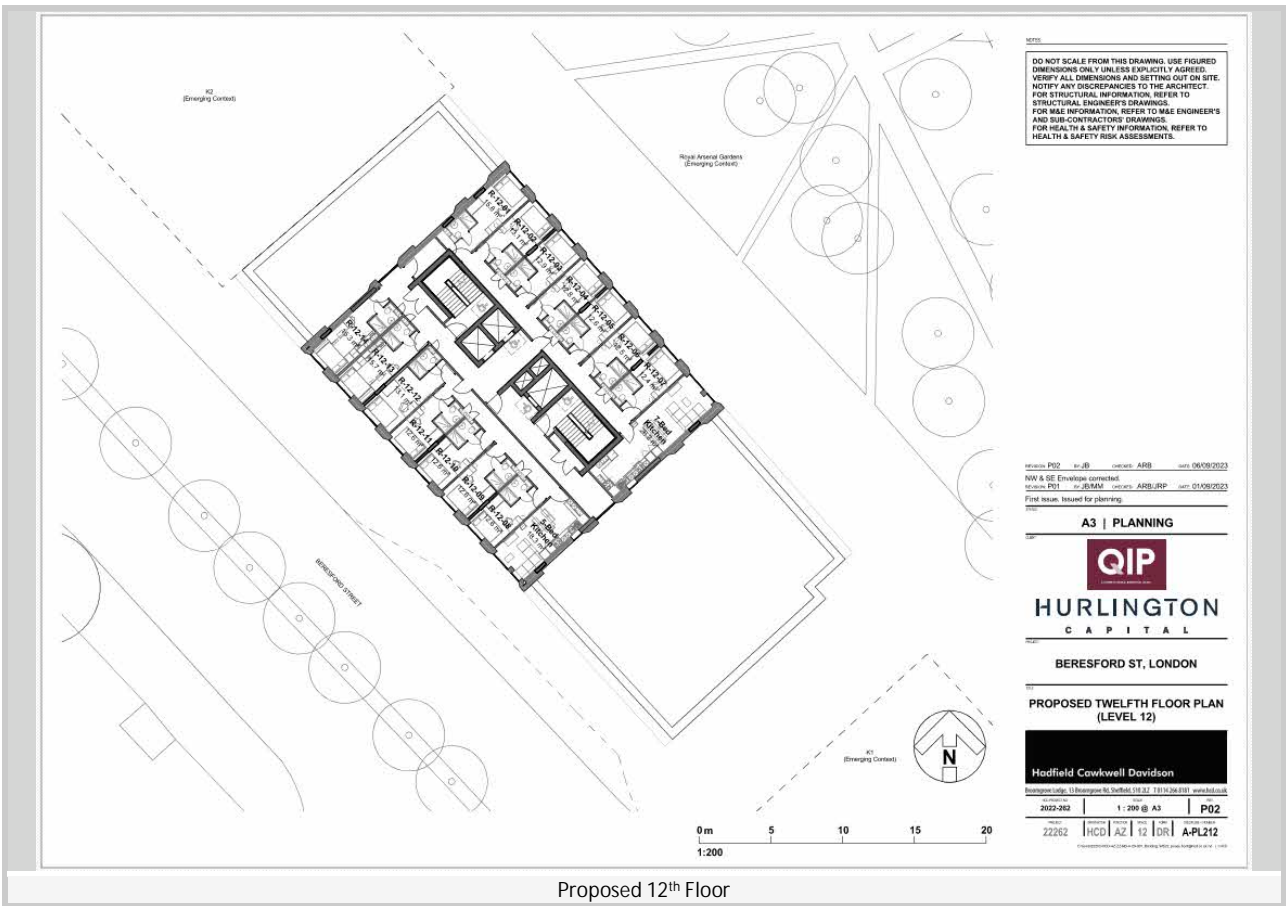
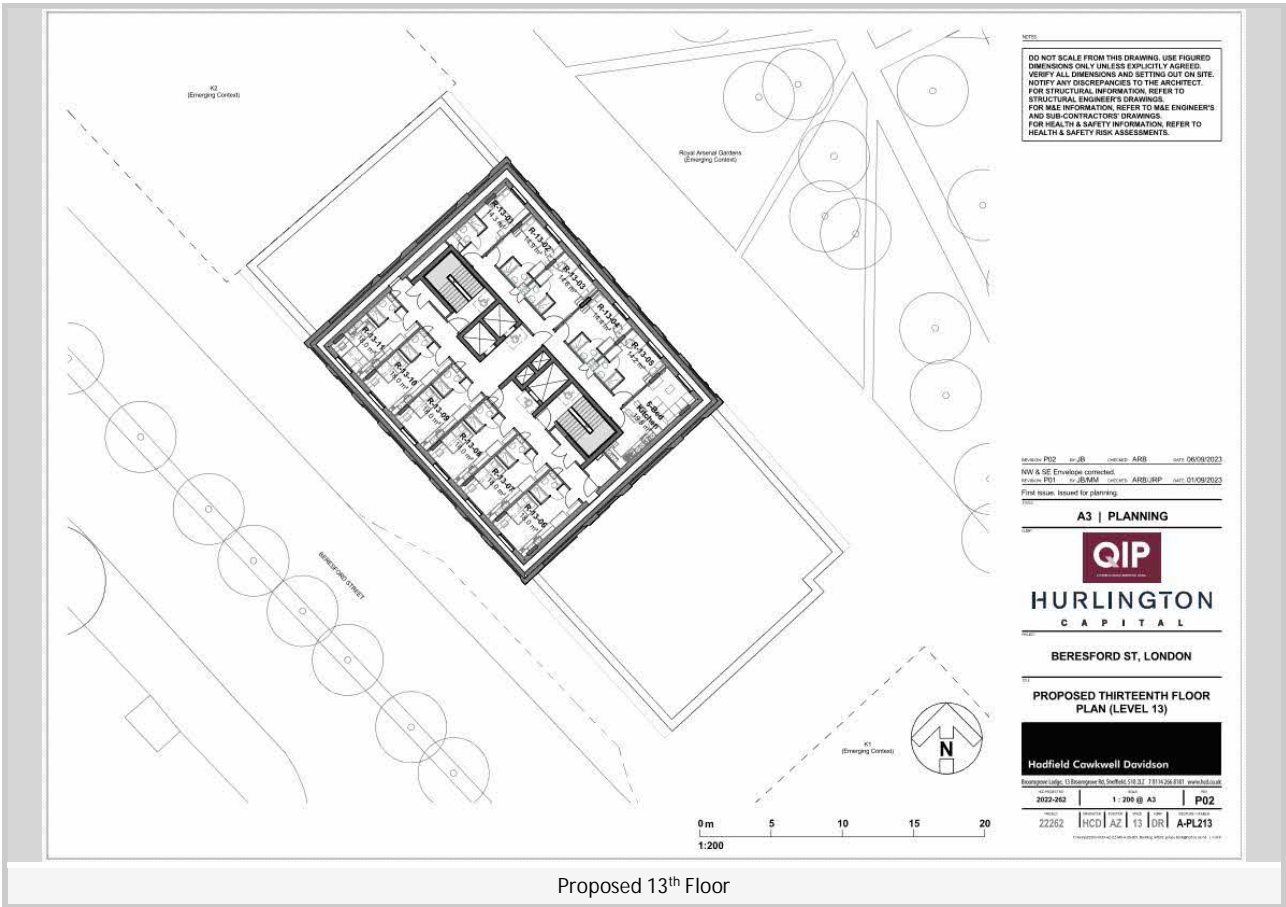
Position of Site in Wider Area

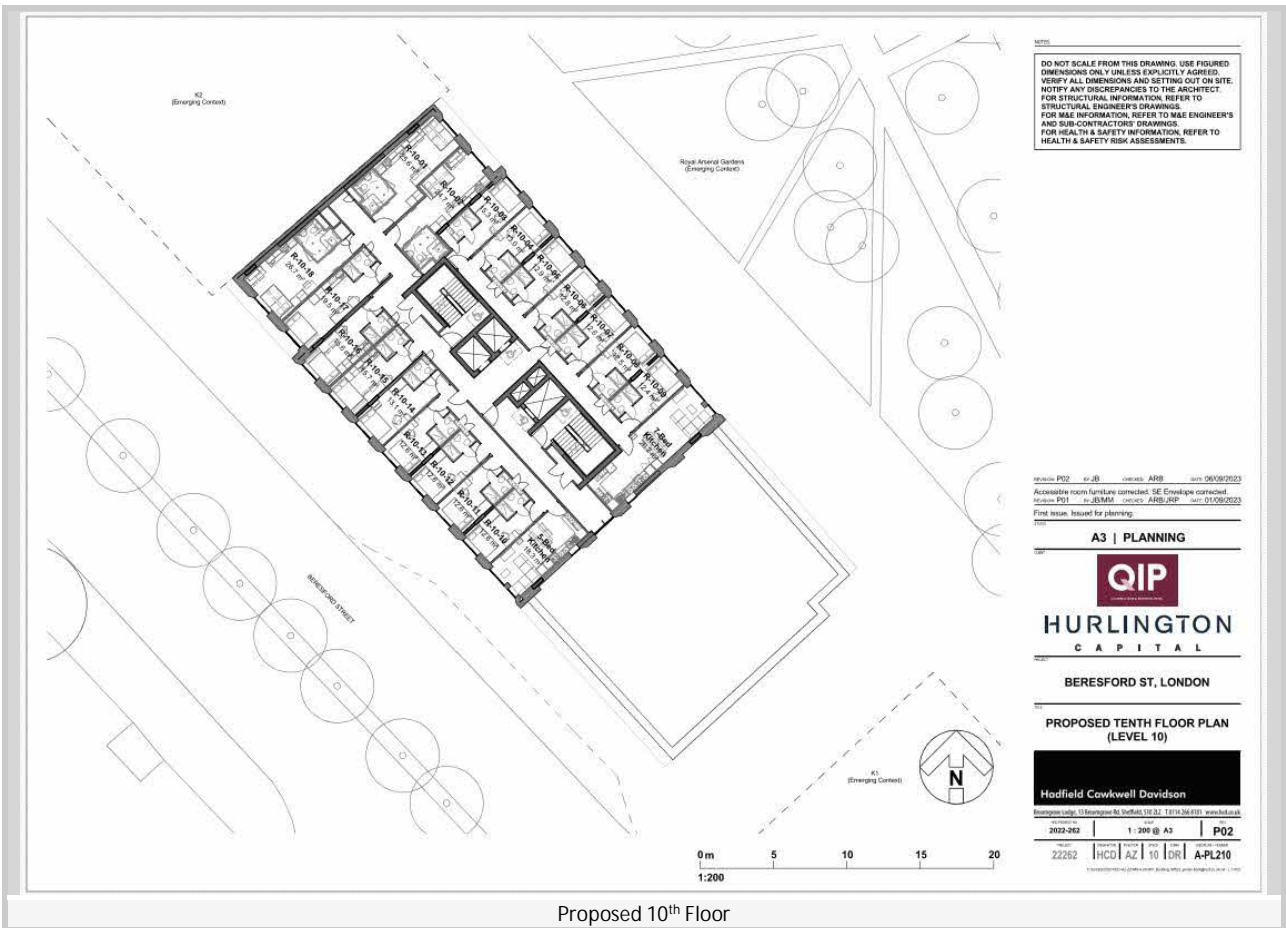
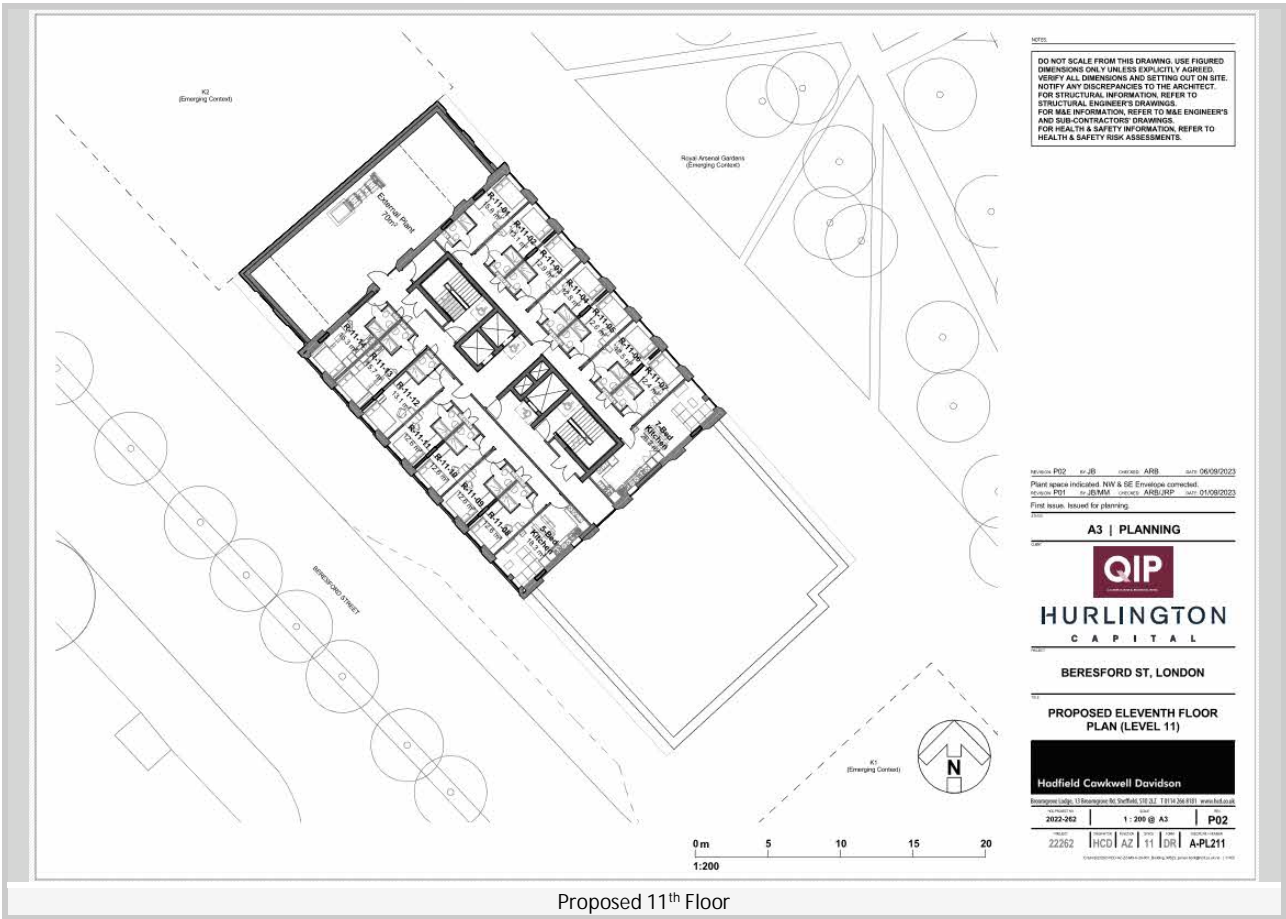
The site is located in Woolwich, London. The dominant noise source is road traffic noise from the A206 (Beresford Street).



3.1 Proposed Development

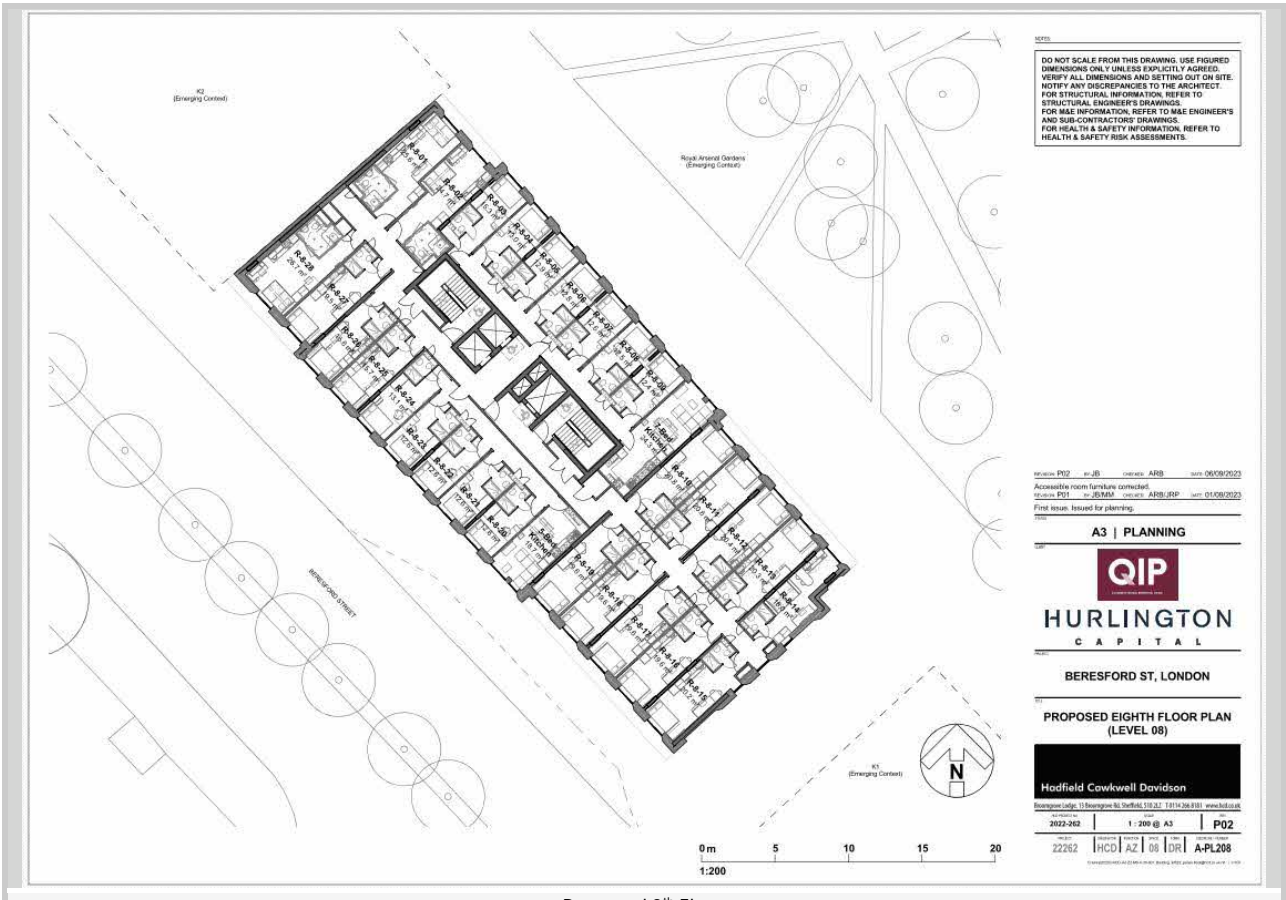
The proposed development is shown below.



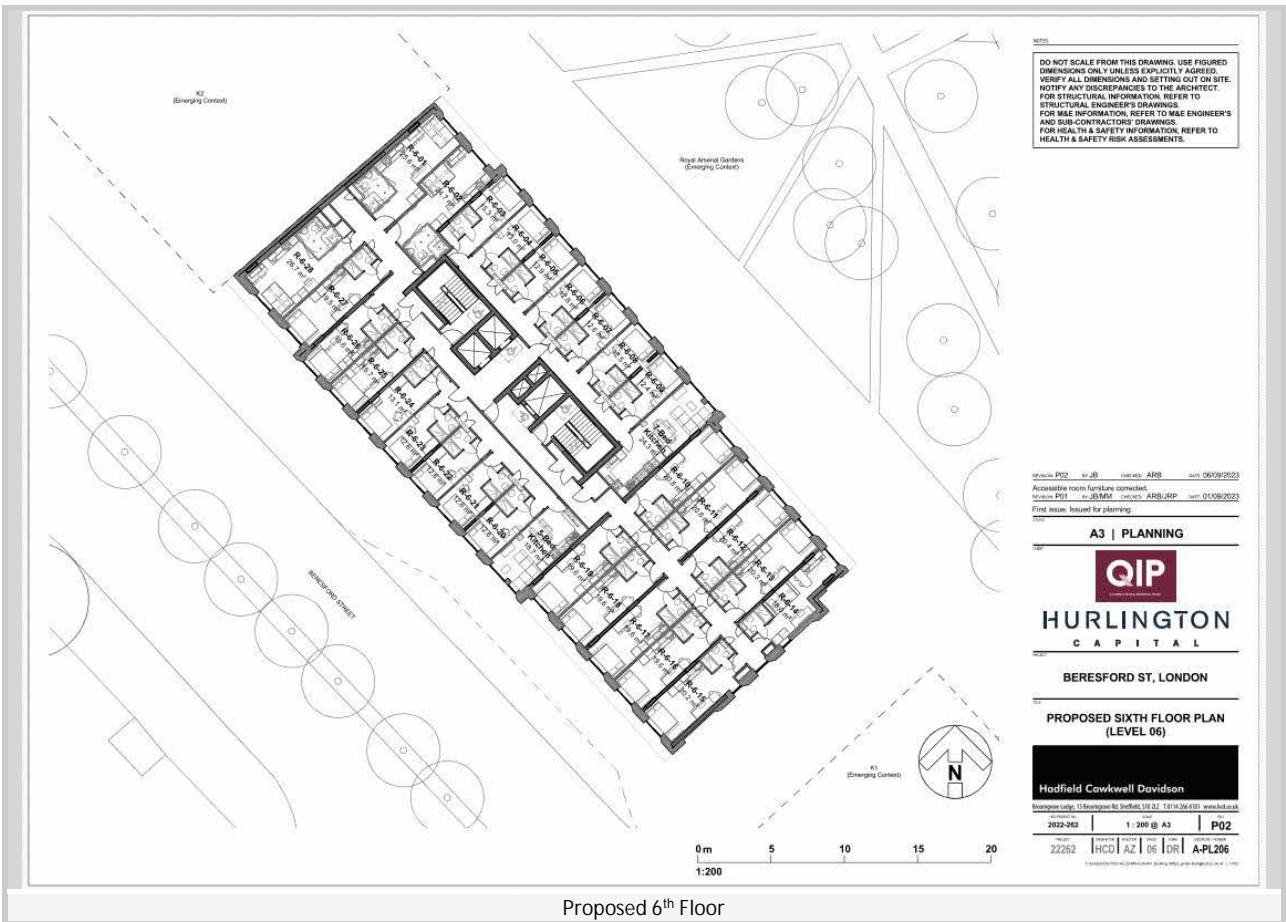
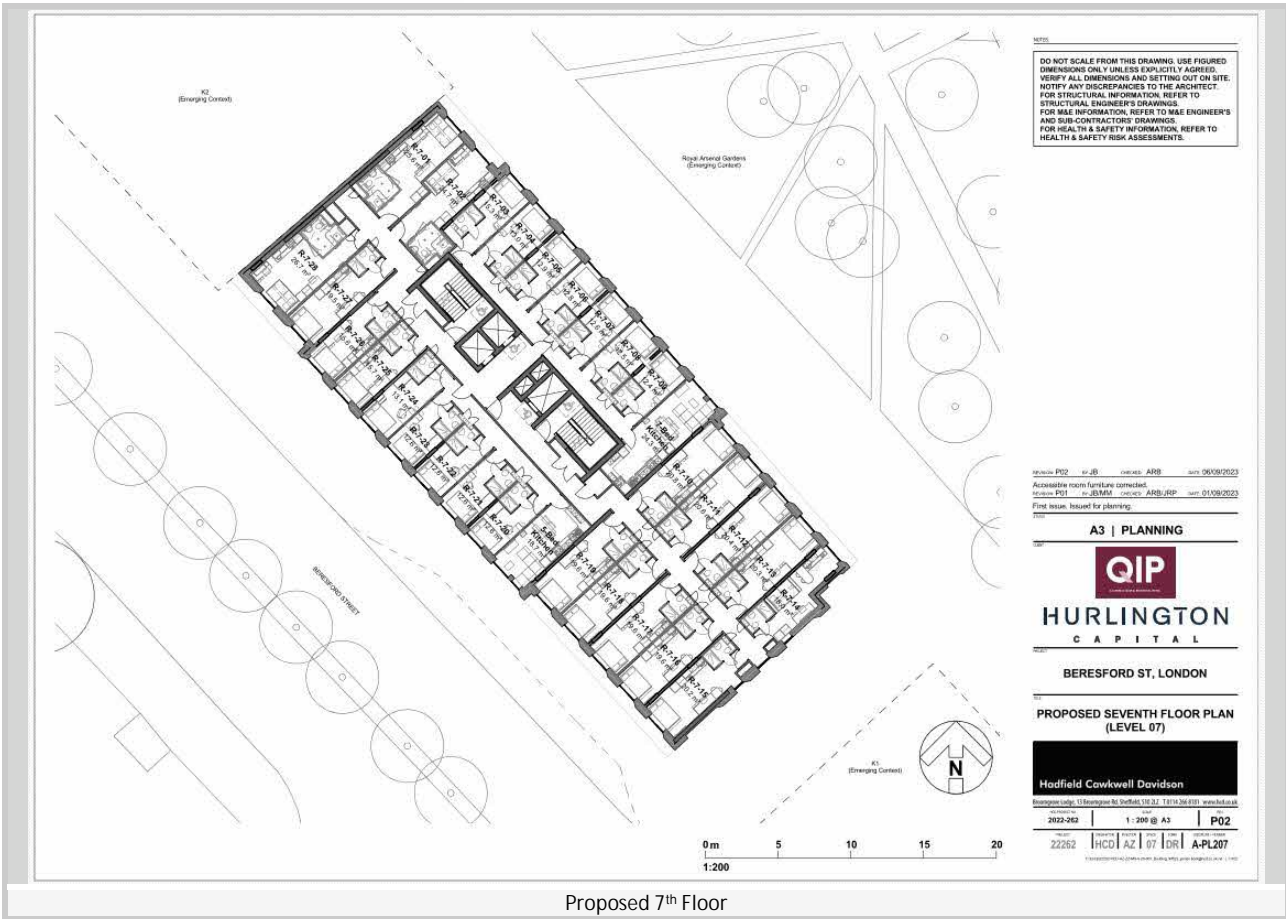


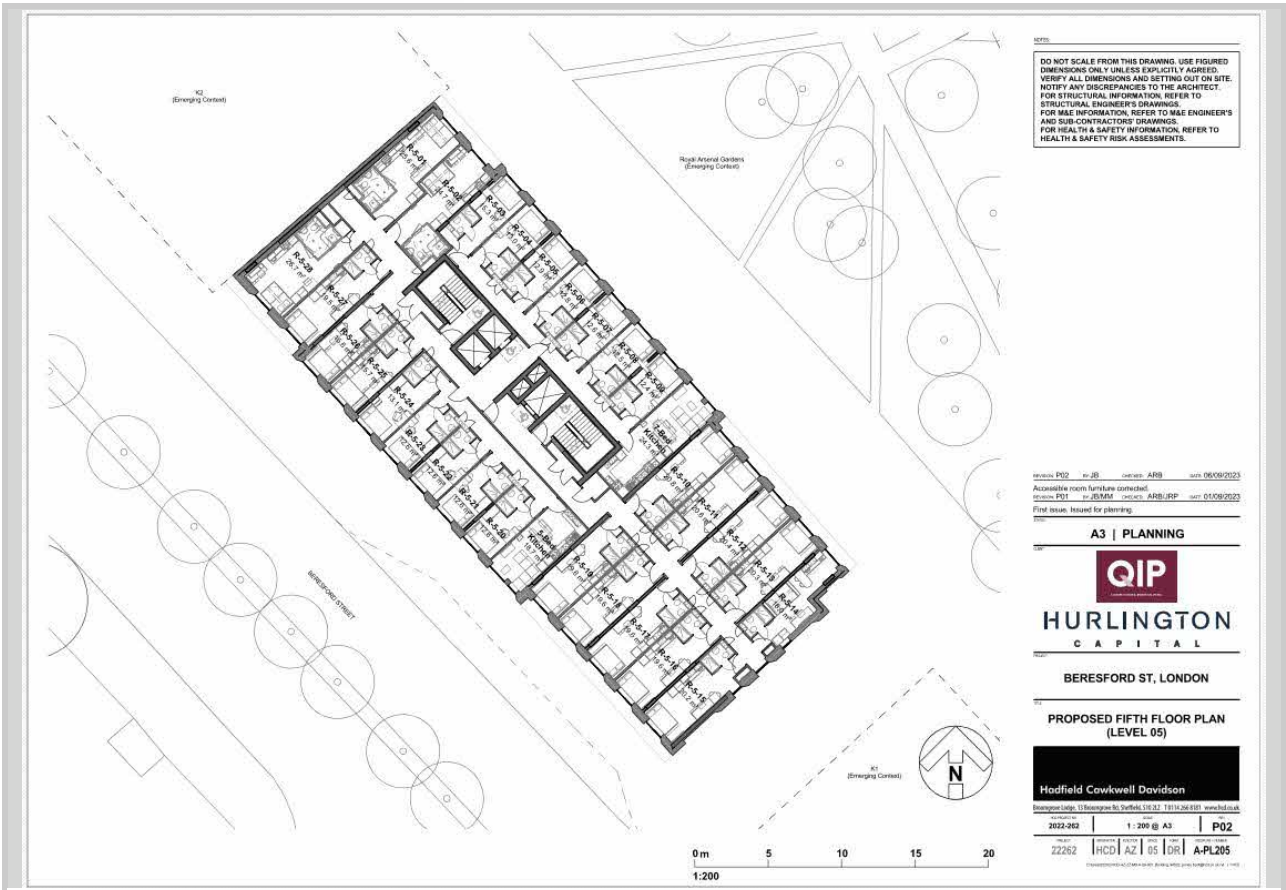


Proposed 9th Floor

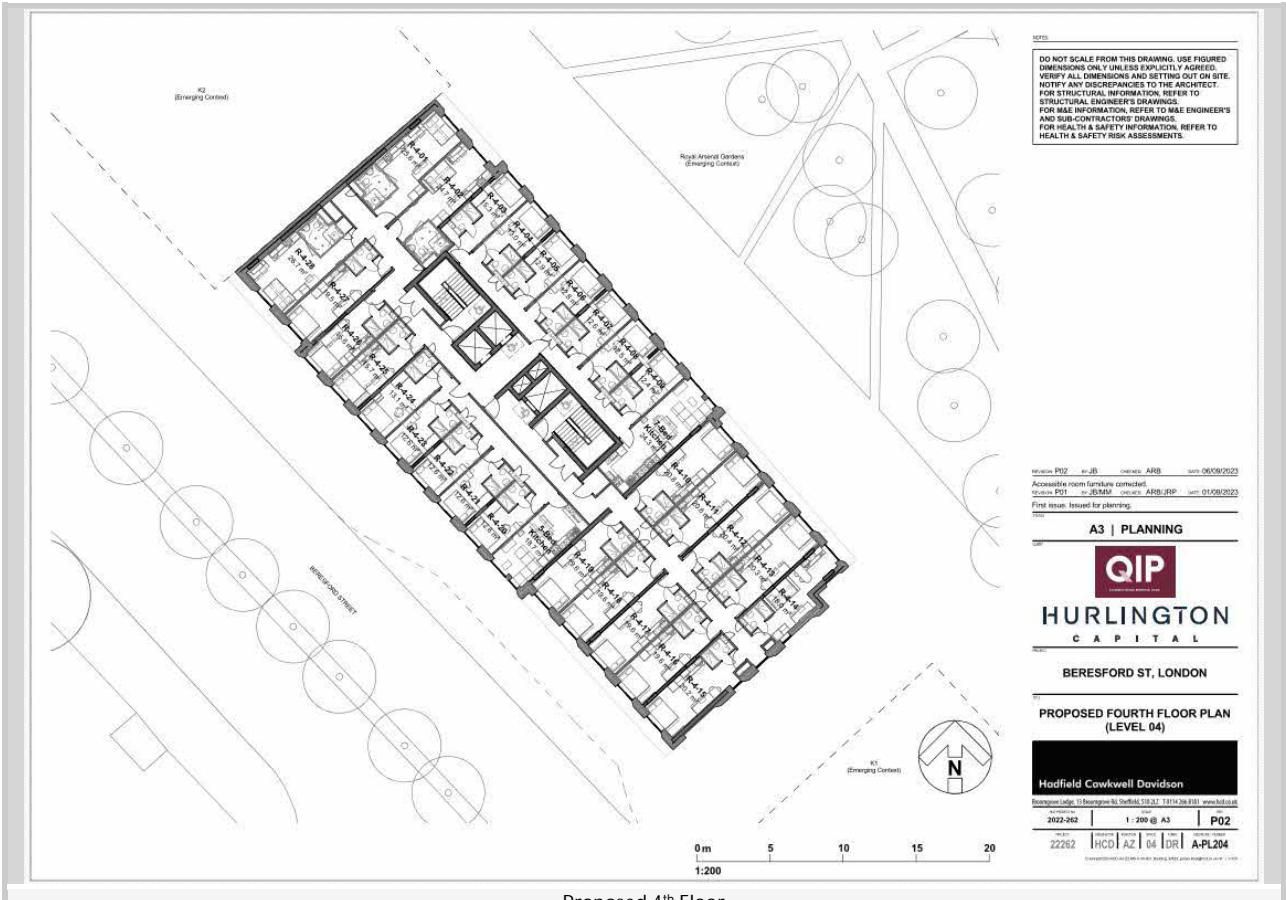


Proposed 8th Floor

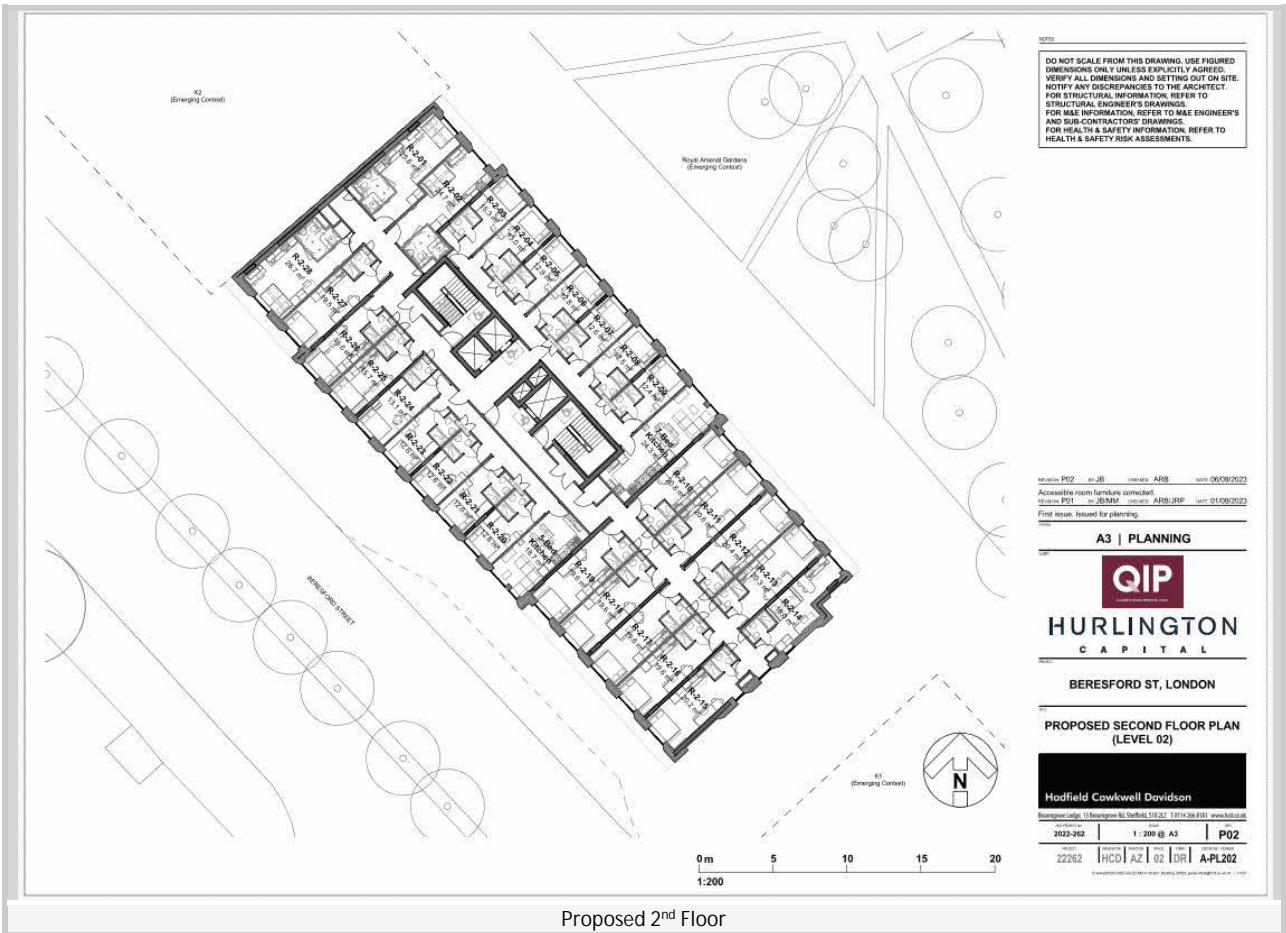
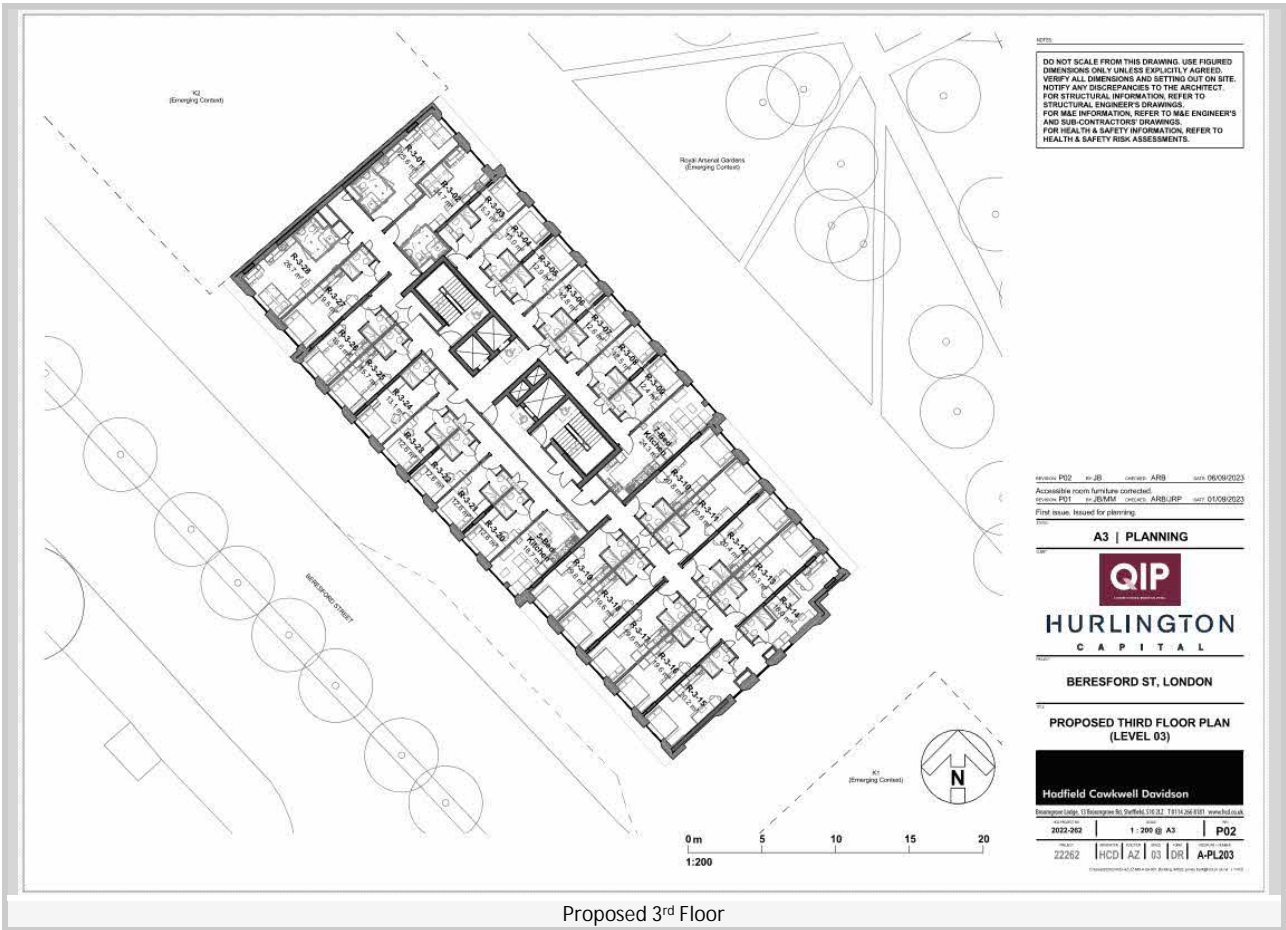


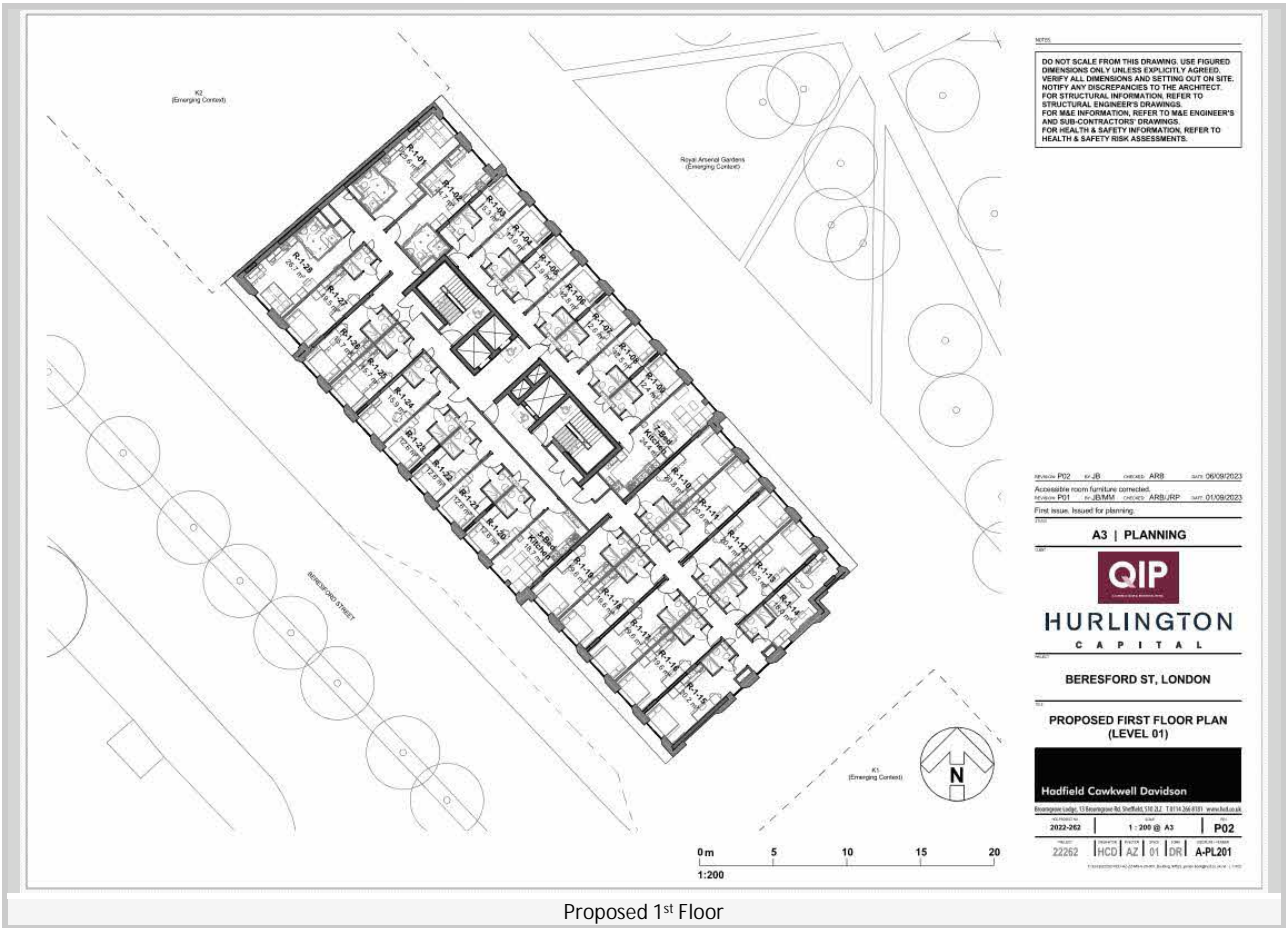


Proposed 5th Floor

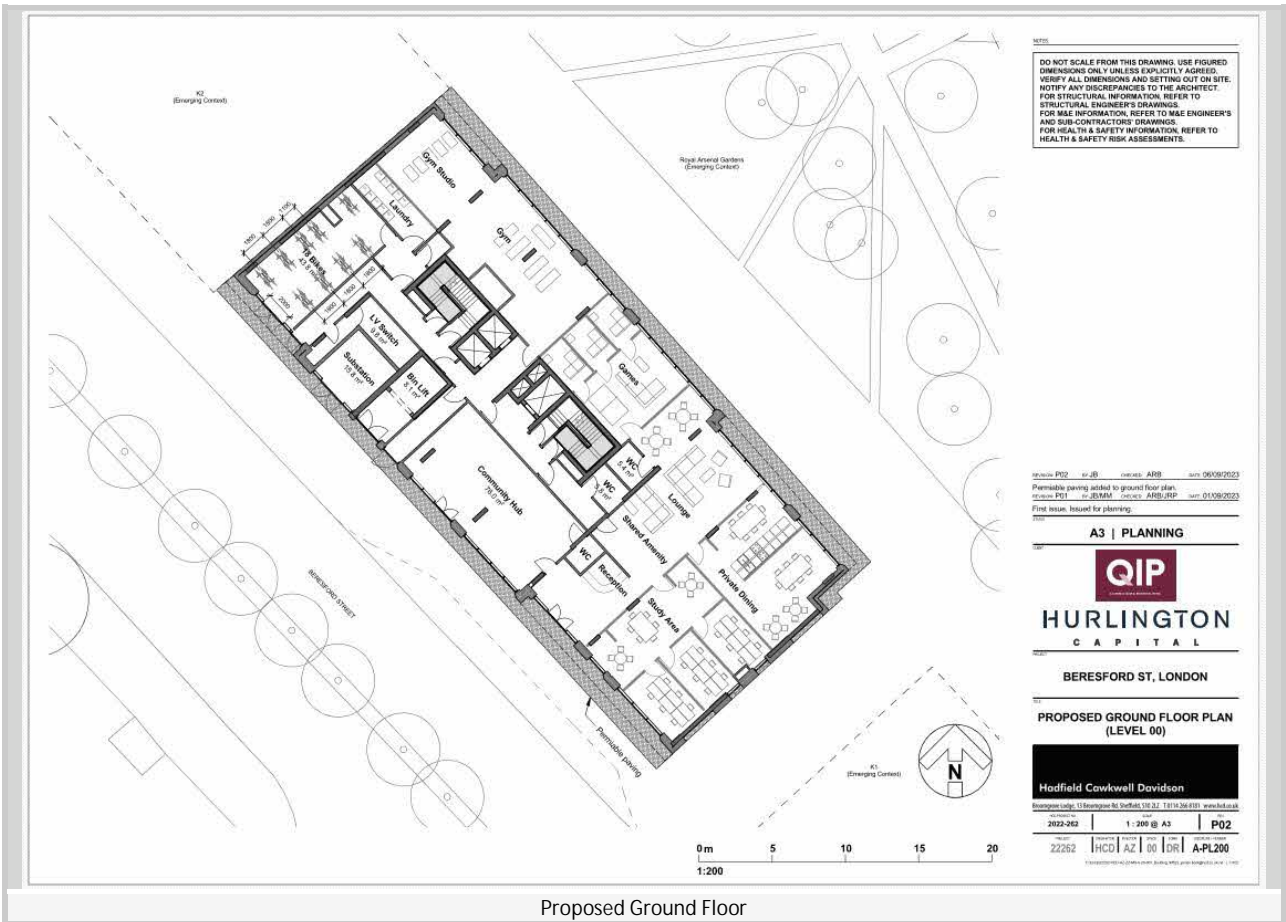


Proposed 4th Floor

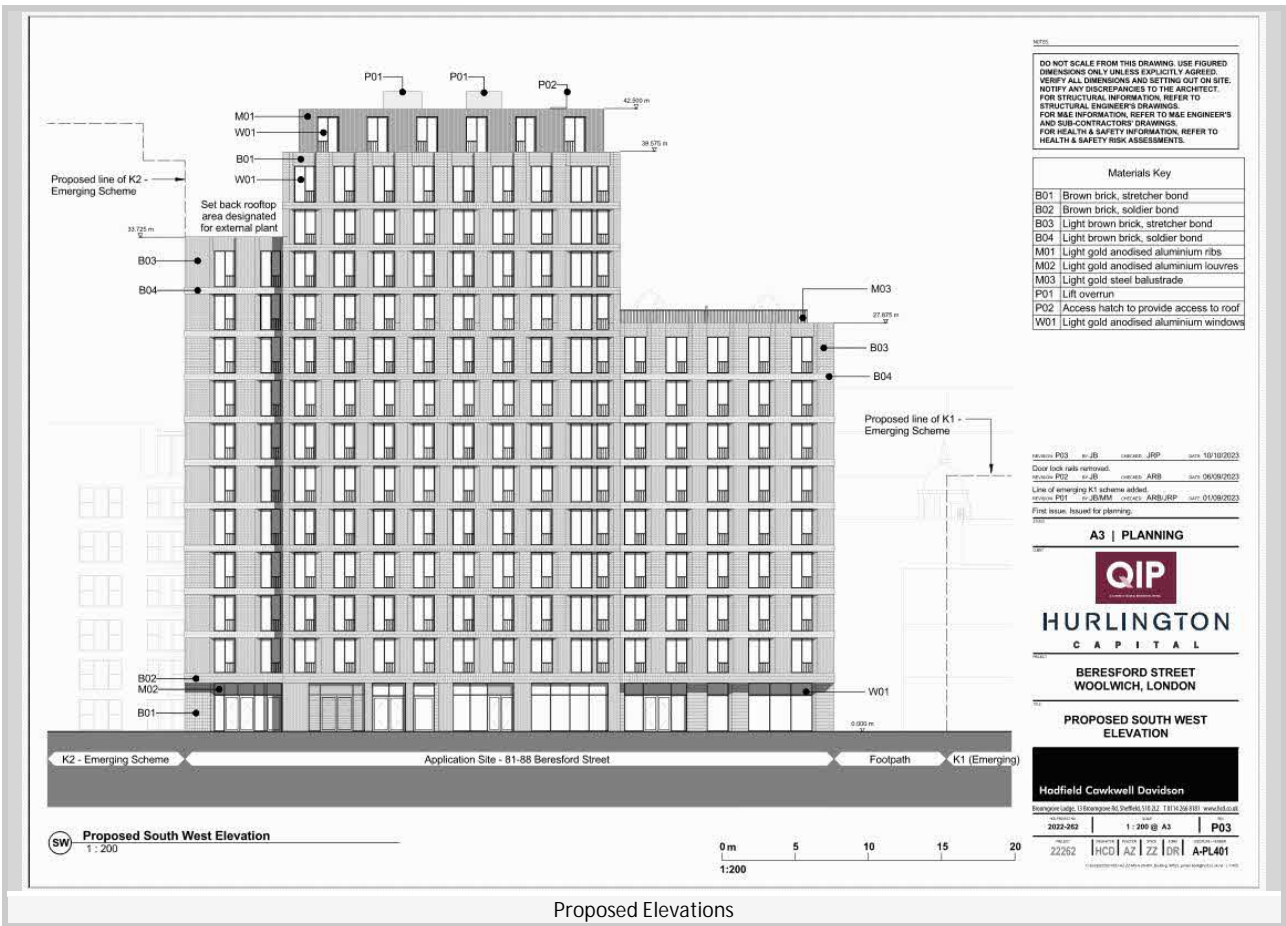




Proposed 1st Floor



Proposed Ground Floor



Proposed Elevations

4 PROCEDURE

External noise levels were recorded over a typical period and analysis date extrapolated between 07:00 hrs 27th July and 07:00 hrs on 31st July 2023 at positions 1 & 2 as detailed within this report.

Position 1 was located at the front façade to capture the noise levels associated with the Beresford Street and position 2 was located at the rear façade of the site in order to capture the noise levels associated with the background. Sample measurements were recorded over continuous 1 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 RION NL-52 noise meter s/n 00242696

Description	Make	Type	Serial No.	Calibration Intervals	Last Calibrated	Next Due Calibration
Integrated Sound Level Meter	Rion	Nl-52	00242696	2 Years	23.06.2023	23.06.2025
12.5mm Microphone (with windshield)	Rion	Uc-59	06178	2 Years	23.06.2023	23.06.2025
Microphone Pre – Amplifier	Rion	Nh-25	32724	2 Years	23.06.2023	23.06.2025

5.2 140 noise meter s/n 1403140

Description	Make	Type	Serial No.	Calibration Intervals	Last Calibrated	Next Due Calibration
Integrated Sound Level Meter	Norsonic	140	1403140	2 YEARS	12.04.2023	12.04.2025
12.5mm Microphone (with windshield)	Norsonic	1225	413206	2 YEARS	12.04.2023	12.04.2025
Microphone Pre – Amplifier	Norsonic	1209	12245	2 YEARS	12.04.2023	12.04.2025

Full calibration certificates are available upon request.

6 RESULTS

6.1 Downloaded results, and averages.

6.2 07:00 – 07:00 27th – 28th July 2023, Position 1

NOISE LEVEL SUMMARY ASSESSMENT				Octave Band Centre Frequency (Hz)								
Date / Time	L _{Aeq}	L _{Amax}	L _{A90}	63	125	250	500	1.0k	2.0k	4.0k	8.0k	16.0k
DAYTIME 07:00 - 23:00 <small>L_{A90} 1 HOUR & Corresponding L_{Aeq} 1 HOUR</small>	71.9	107.3	63.0	77.0	74.9	69.8	65.0	66.4	66.2	61.4	57.5	43.6
NIGHT TIME 23:00 - 07:00 <small>L_{A90} 15 MIN & Corresponding L_{Aeq} 15 MIN</small>	66.5	99.4	55.0	72.2	69.7	65.5	61.7	61.7	59.2	54.9	49.9	35.9

6.3 07:00 – 07:00 28th – 29th July 2023, Position 1

NOISE LEVEL SUMMARY ASSESSMENT				Octave Band Centre Frequency (Hz)								
Date / Time	L _{Aeq}	L _{Amax}	L _{A90}	63	125	250	500	1.0k	2.0k	4.0k	8.0k	16.0k
DAYTIME 07:00 - 23:00 <small>L_{A90} 1 HOUR & Corresponding L_{Aeq} 1 HOUR</small>	71.3	104.4	62.0	76.4	74.0	69.7	65.4	66.0	64.8	60.9	55.2	40.5
NIGHT TIME 23:00 - 07:00 <small>L_{A90} 15 MIN & Corresponding L_{Aeq} 15 MIN</small>	67.8	101.9	60.0	72.0	68.8	65.1	61.3	63.2	62.0	55.9	49.5	34.3

6.4 07:00 – 07:00 29th – 30th July 2023, Position 1

NOISE LEVEL SUMMARY ASSESSMENT				Octave Band Centre Frequency (Hz)								
Date / Time	L _{Aeq}	L _{Amax}	L _{A90}	63	125	250	500	1.0k	2.0k	4.0k	8.0k	16.0k
DAYTIME 07:00 - 23:00 <small>L_{A90} 1 HOUR & Corresponding L_{Aeq} 1 HOUR</small>	70.0	104.7	62.0	75.5	72.8	68.2	63.7	65.0	63.7	59.3	55.2	40.2
NIGHT TIME 23:00 - 07:00 <small>L_{A90} 15 MIN & Corresponding L_{Aeq} 15 MIN</small>	67.2	100.3	57.0	71.9	68.3	64.5	61.4	62.3	60.8	56.9	53.1	38.2

6.5 07:00 – 07:00 30th – 31st July 2023, Position 1

NOISE LEVEL SUMMARY ASSESSMENT				Octave Band Centre Frequency (Hz)								
Date / Time	L _{Aeq}	L _{Amax}	L _{A90}	63	125	250	500	1.0k	2.0k	4.0k	8.0k	16.0k
DAYTIME 07:00 - 23:00 <small>L_{A90} 1 HOUR & Corresponding L_{Aeq} 1 HOUR</small>	70.3	104.7	62.0	76.4	73.6	68.8	64.5	65.1	63.9	58.8	54.5	40.9
NIGHT TIME 23:00 - 07:00 <small>L_{A90} 15 MIN & Corresponding L_{Aeq} 15 MIN</small>	66.4	100.1	52.0	71.6	67.5	63.7	60.5	62.5	59.7	54.5	48.7	34.1

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

NOISE LEVEL SUMMARY ASSESSMENT				Octave Band Centre Frequency (Hz)								
Date / Time	L _{Aeq}	L _{Amax}	L _{A90}	63	125	250	500	1.0k	2.0k	4.0k	8.0k	16.0k
DAYTIME 07:00 - 23:00 <small>L_{A90} 1 HOUR & Corresponding L_{Aeq} 1 HOUR</small>	71.9	107.3	63.0	77.0	74.9	69.8	65.0	66.4	66.2	61.4	57.5	43.6
NIGHT TIME 23:00 - 07:00 <small>L_{A90} 15 MIN & Corresponding L_{Aeq} 15 MIN</small>	67.8	101.9	60.0	72.0	68.8	65.1	61.3	63.2	62.0	55.9	49.5	34.3

6.6 07:00 – 07:00 27th – 28th July 2023, Position 2

NOISE LEVEL SUMMARY ASSESSMENT				Octave Band Centre Frequency (Hz)								
Date / Time	LAeq	LAmaz	LA90	63	125	250	500	1.0k	2.0k	4.0k	8.0k	16.0k
DAYTIME 07:00 - 23:00 <small>LA90 1 HOUR & Corresponding LAeq 1 HOUR</small>	55.9	78.0	51.0	63.3	56.6	54.2	51.4	51.8	48.3	43.4	34.4	14.4
NIGHT TIME 23:00 - 07:00 <small>LA90 15 MIN & Corresponding LAeq 15 MIN</small>	52.6	77.9	46.0	59.8	51.4	50.0	47.6	49.1	45.2	39.7	29.7	13.6

6.7 07:00 – 07:00 28th – 29th July 2023, Position 2

NOISE LEVEL SUMMARY ASSESSMENT				Octave Band Centre Frequency (Hz)								
Date / Time	LAeq	LAmaz	LA90	63	125	250	500	1.0k	2.0k	4.0k	8.0k	16.0k
DAYTIME 07:00 - 23:00 <small>LA90 1 HOUR & Corresponding LAeq 1 HOUR</small>	56.2	81.7	50.0	63.1	56.4	54.0	51.3	51.8	49.6	43.8	36.6	16.7
NIGHT TIME 23:00 - 07:00 <small>LA90 15 MIN & Corresponding LAeq 15 MIN</small>	52.9	80.0	46.0	59.3	52.1	50.5	48.1	49.5	45.4	38.7	29.7	14.4

6.8 07:00 – 07:00 29th – 30th July 2023, Position 2

NOISE LEVEL SUMMARY ASSESSMENT				Octave Band Centre Frequency (Hz)								
Date / Time	LAeq	LAmaz	LA90	63	125	250	500	1.0k	2.0k	4.0k	8.0k	16.0k
DAYTIME 07:00 - 23:00 <small>LA90 1 HOUR & Corresponding LAeq 1 HOUR</small>	55.1	75.6	49.0	62.1	55.6	53.3	50.2	51.1	47.6	43.1	33.7	14.0
NIGHT TIME 23:00 - 07:00 <small>LA90 15 MIN & Corresponding LAeq 15 MIN</small>	52.6	83.9	49.0	57.6	51.2	49.6	47.2	49.6	45.0	37.6	28.1	11.1

6.9 07:00 – 07:00 30th – 31st July 2023, Position 2

NOISE LEVEL SUMMARY ASSESSMENT				Octave Band Centre Frequency (Hz)								
Date / Time	LAeq	LAmaz	LA90	63	125	250	500	1.0k	2.0k	4.0k	8.0k	16.0k
DAYTIME 07:00 - 23:00 <small>LA90 1 HOUR & Corresponding LAeq 1 HOUR</small>	56.6	82.0	50.0	61.9	56.3	54.3	50.8	51.4	49.2	48.2	44.3	28.6
NIGHT TIME 23:00 - 07:00 <small>LA90 15 MIN & Corresponding LAeq 15 MIN</small>	53.8	74.9	49.0	58.4	51.9	50.3	48.1	49.9	46.9	43.0	34.7	16.5

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

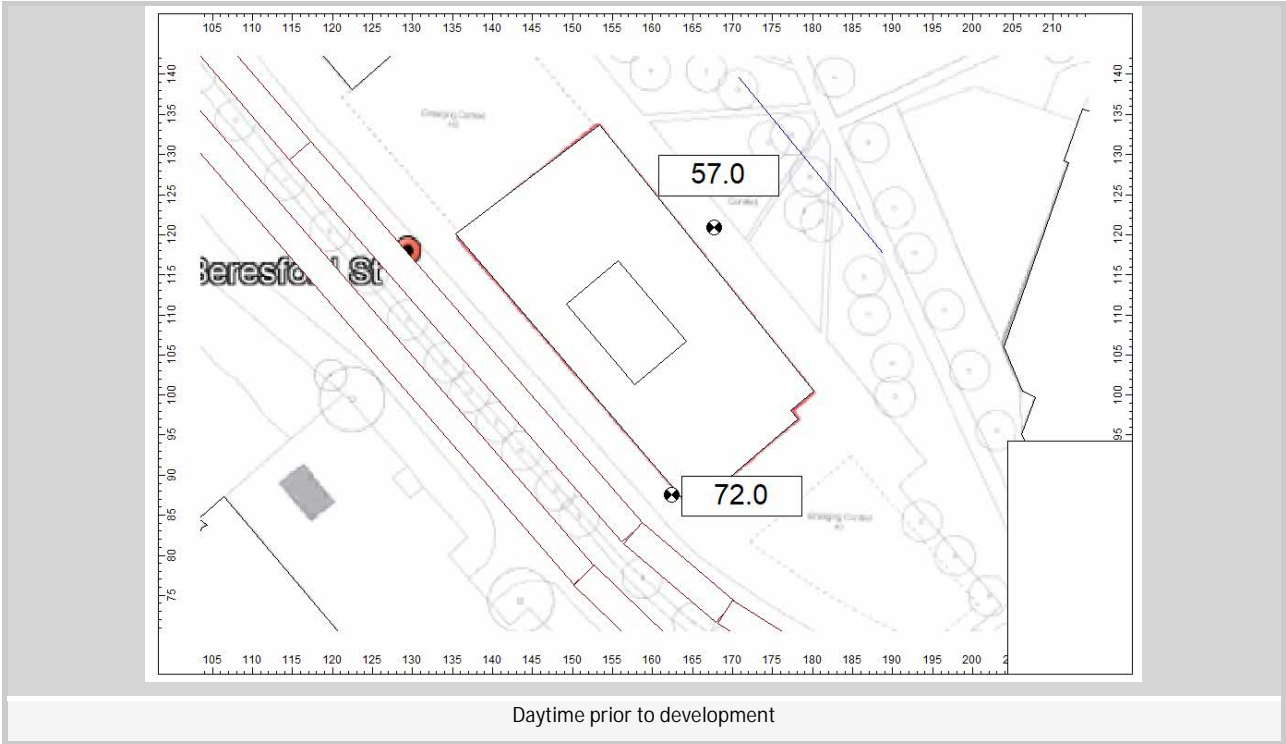
NOISE LEVEL SUMMARY ASSESSMENT				Octave Band Centre Frequency (Hz)								
Date / Time	LAeq	LAmaz	LA90	63	125	250	500	1.0k	2.0k	4.0k	8.0k	16.0k
DAYTIME 07:00 - 23:00 <small>LA90 1 HOUR & Corresponding LAeq 1 HOUR</small>	56.6	82.0	50.0	61.9	56.3	54.3	50.8	51.4	49.2	48.2	44.3	28.6
NIGHT TIME 23:00 - 07:00 <small>A90 15 MIN & Corresponding LAeq 15 MIN</small>	53.8	74.9	49.0	58.4	51.9	50.3	48.1	49.9	46.9	43.0	34.7	16.5

7 INTERNAL NOISE LEVEL GUIDELINES

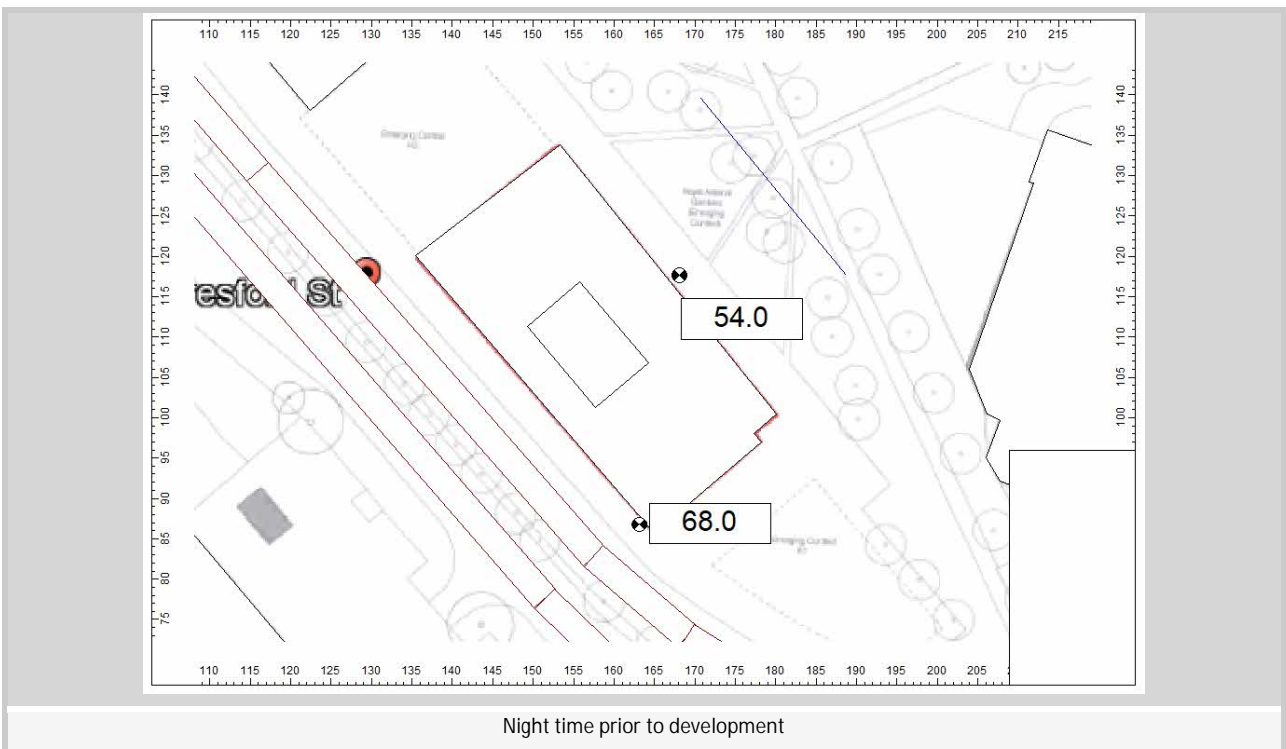
7.1 Discussion of Results

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.

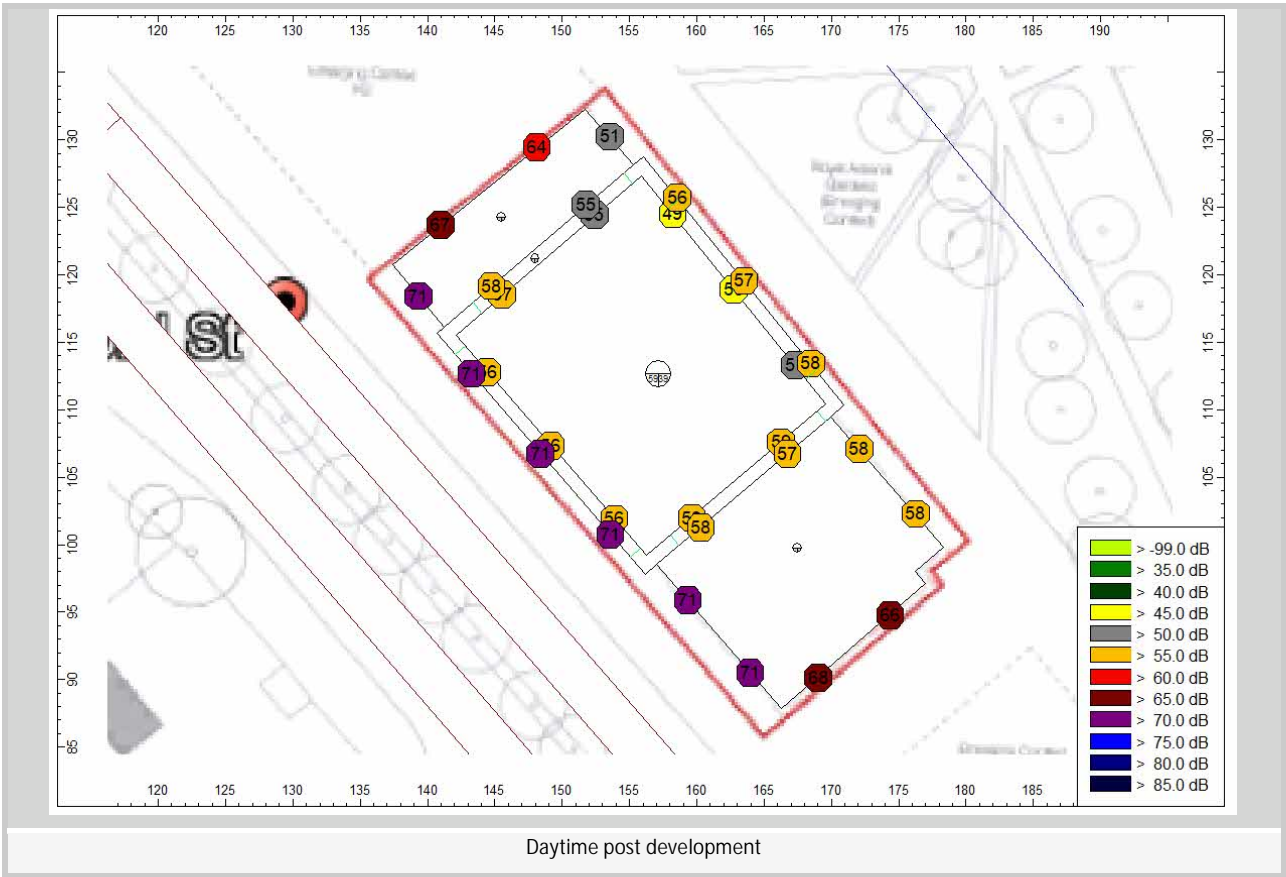
7.2 Existing Noise Levels – Daytime (07:00 – 23:00)



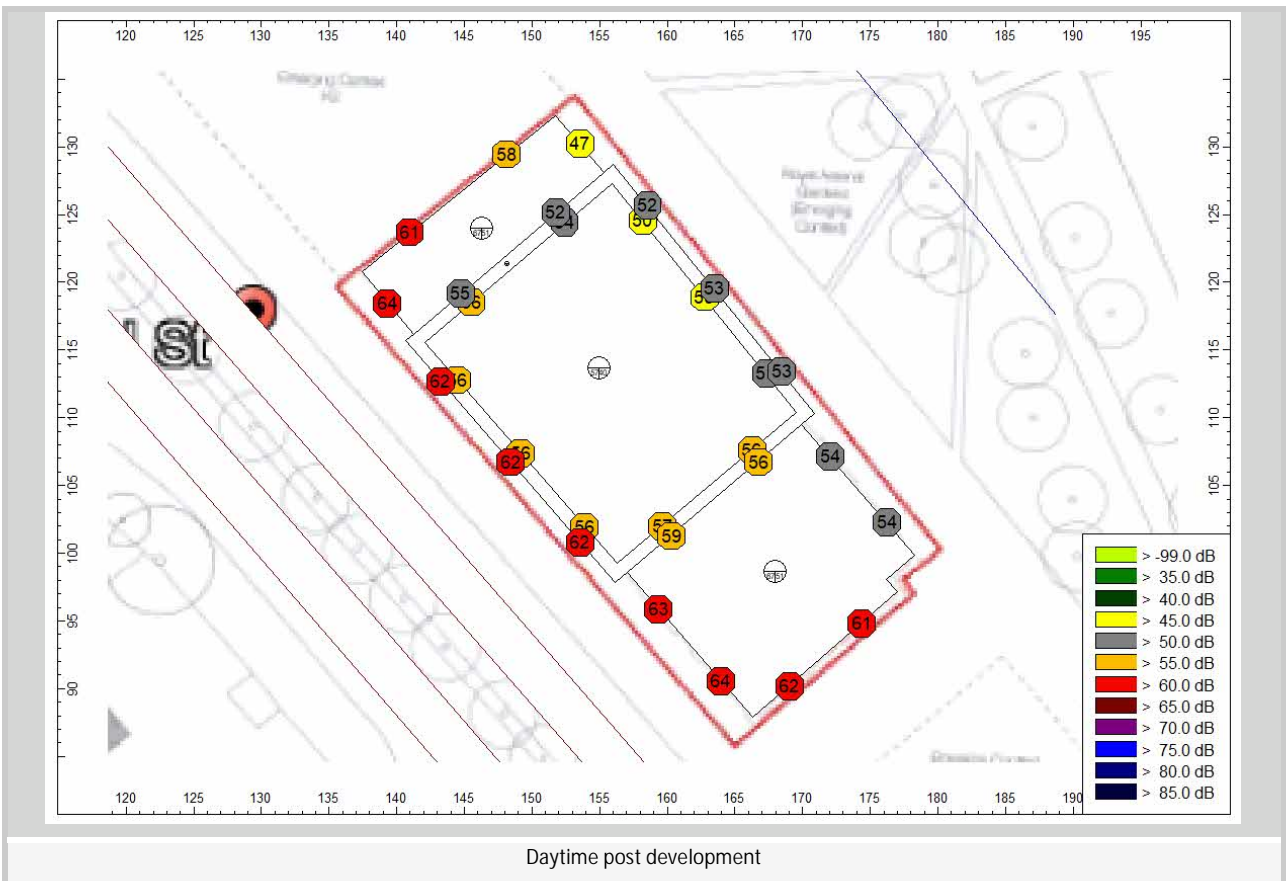
7.3 Existing Noise Levels – Night Time (23:00 – 07:00)



7.4 Proposed Noise levels – Daytime (07:00 – 23:00)



7.5 Proposed Noise levels – Night Time (23:00 – 07:00)



7.6 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.

7.7 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.

7.8 Typical Mid Floor Bedroom – South West & South East Elevation

Proposed Window Configuration		10.8 / 24 Argon / 16.8mm Pilkington Optiphon with a Ryton LookRyt Acoustic Aircore Vent				
Façade corrected to daytime 72 dB & night time 68 dB						
Leqff	<i>The equivalent continuous sound pressure level outside the room elements under consideration</i>					
A0	<i>The reference absorption area of 10m2 and is independent of frequency</i>					
Sf	<i>The total façade area of the room in question</i>					
Swi	<i>The area of the windows in the room</i>					
Sew	<i>The area of the external wall of the room</i>					
Srr	<i>The area of the ceiling of the room (if applicable)</i>					
S	<i>The total area of the elements through which sound enters the room</i>					
Dne	<i>The insulation value of the trickle ventilator (if applicable)</i>					
Rwi	<i>The sound reduction index of the window</i>					
Rew	<i>The sound reduction index of the external wall</i>					
Rrr	<i>The sound reduction index of the ceiling/roof (if applicable)</i>					
A	<i>The equivalent absorption area of the receiving room where $A=0.163VT$</i>					
Formula	$Leq2=Leqff+10\log[A0/S*10^{(-Dne/10)}+Swi/S*10^{(-Rwi/10)}+Sew/10*10^{(-Rew/10)}+Srr/S*10^{(-Rrr/10)}]+10\log(S/A)+3$					
Octave Band Centre Frequency (Hz)						
	125	250	500	1000	2000	4000
Sf	6	6	6	6	6	6
Sr	0	0	0	0	0	0
Swi	3	3	3	3	3	3
Sew	3	3	3	3	3	3
Srr	0	0	0	0	0	0
S	6	6	6	6	6	6
A0	10	10	10	10	10	10
V	22	22	22	22	22	22
T (BS8233)	0.50	0.50	0.50	0.50	0.50	0.50
A	11.0	14.0	16.0	16.0	15.0	14.0
Daytime Leqff	74.9	69.8	65.0	66.4	66.2	61.4
Night time Leqff	68.8	65.1	61.3	63.2	62.0	55.9
Dne	42.9	36.3	39.6	54.8	62.6	70.9
Rwi	35.0	41.0	48.0	53.0	55.0	65.0
Rew	40.0	44.0	45.0	51.0	56.0	56.0
Rrr	28.0	34.0	40.0	45.0	49.0	49.0
Predicted dB(A) Level Within The Above Room During Daytime Hours (07:00-23:00)		$L_{Aeq\ 16\ HOUR}$		30.1		dB(A)
Predicted dB(A) Level Within The Above Room During Night Time Hours (23:00-07:00)		$L_{Aeq\ 8\ HOUR}$		25.4		dB(A)

7.9 Typical Top Floor Bedroom - South West & South East Elevation

Proposed Window Configuration		10.8 / 24 Argon / 16.8mm Pilkington Optiphon with a Ryton LookRyt Acoustic Aircore Vent				
Façade corrected to daytime 72 dB & night time 68 dB						
Leqff	The equivalent continuous sound pressure level outside the room elements under consideration					
A0	The reference absorption area of 10m ² and is independent of frequency					
Sf	The total façade area of the room in question					
Swi	The area of the windows in the room					
Sew	The area of the external wall of the room					
Srr	The area of the ceiling of the room (if applicable)					
S	The total area of the elements through which sound enters the room					
Dne	The insulation value of the trickle ventilator (if applicable)					
Rwi	The sound reduction index of the window					
Rew	The sound reduction index of the external wall					
Rrr	The sound reduction index of the ceiling/roof (if applicable)					
A	The equivalent absorption area of the receiving room where $A=0.163VT$					
Formula	$Leq2=Leqff+10\log[A0/S*10^{-(Dne/10)+Swi/S*10^{-(Rwi/10)+Sew/10*10^{-(Rew/10)+Srr/S*10^{-(Rrr/10)}}]+10\log(S/A) +3$					
	Octave Band Centre Frequency (Hz)					
	125	250	500	1000	2000	4000
Sf	6	6	6	6	6	6
Sr	9	9	9	9	9	9
Swi	3	3	3	3	3	3
Sew	3	3	3	3	3	3
Srr	9	9	9	9	9	9
S	15	15	15	15	15	15
A0	10	10	10	10	10	10
V	22	22	22	22	22	22
T (BS8233)	0.50	0.50	0.50	0.50	0.50	0.50
A	11.0	14.0	16.0	16.0	15.0	14.0
Daytime Leqff	74.9	69.8	65.0	66.4	66.2	61.4
Night time Leqff	68.8	65.1	61.3	63.2	62.0	55.9
Dne	43	36	40	55	63	71
Rwi	35.0	41.0	48.0	53.0	55.0	65.0
Rew	40.0	44.0	45.0	51.0	56.0	56.0
Rrr	44.0	51.0	57.0	61.0	58.0	63.0
Predicted dB(A) Level Within The Above Room During Daytime Hours (07:00-23:00)		L _{Aeq} 16 HOUR		30.4		dB(A)
Predicted dB(A) Level Within The Above Room During Night Time Hours (23:00-07:00)		L _{Aeq} 8 HOUR		25.7		dB(A)

7.10 Typical Bedroom - North West Elevation

Proposed Window Configuration		6 / 16mm / 10mm Laminated with a Ryton LookRyt Acoustic Aircore Vent				
Façade corrected to daytime 67 dB & night time 63 dB						
Leqff	The equivalent continuous sound pressure level outside the room elements under consideration					
A0	The reference absorption area of 10m ² and is independent of frequency					
Sf	The total façade area of the room in question					
Swi	The area of the windows in the room					
Sew	The area of the external wall of the room					
Srr	The area of the ceiling of the room (if applicable)					
S	The total area of the elements through which sound enters the room					
Dne	The insulation value of the trickle ventilator (if applicable)					
Rwi	The sound reduction index of the window					
Rew	The sound reduction index of the external wall					
Rrr	The sound reduction index of the ceiling/roof (if applicable)					
A	The equivalent absorption area of the receiving room where A=0.163V/T					
Formula	$Leq2=Leqff+10\log[A0/S*10^{-(Dne/10)+Swi/S*10^{-(Rwi/10)+Sew/10*10^{-(Rew/10)+Srr/S*10^{-(Rrr/10)}}]}]+10\log(S/A) +3$					
Octave Band Centre Frequency (Hz)						
	125	250	500	1000	2000	4000
Sf	6	6	6	6	6	6
Sr	9	9	9	9	9	9
Swi	3	3	3	3	3	3
Sew	3	3	3	3	3	3
Srr	9	9	9	9	9	9
S	15	15	15	15	15	15
A0	10	10	10	10	10	10
V	22	22	22	22	22	22
T (BS8233)	0.50	0.50	0.50	0.50	0.50	0.50
A	11.0	14.0	16.0	16.0	15.0	14.0
Daytime Leqff	70.0	64.9	60.1	61.5	61.3	56.5
Night time Leqff	64.0	60.3	56.5	58.4	57.2	51.1
Dne	42.9	36.3	39.6	54.8	62.6	70.9
Rwi	25.0	27.0	38.0	48.0	47.0	55.0
Rew	40.0	44.0	45.0	51.0	56.0	56.0
Rrr	44.0	51.0	57.0	61.0	58.0	63.0
Predicted dB(A) Level Within The Above Room During Daytime Hours (07:00-23:00)		L _{Aeq} 16 HOUR		30.4		dB(A)
Predicted dB(A) Level Within The Above Room During Night Time Hours (23:00-07:00)		L _{Aeq} 8 HOUR		25.4		dB(A)

7.11 Typical Bedroom – North East Elevation

Proposed Window Configuration		4mm / 16mm / 4mm with a Ryton LookRyt Acoustic Aircore Vent				
Façade corrected to daytime 58 dB & night time 55 dB						
Leqff	<i>The equivalent continuous sound pressure level outside the room elements under consideration</i>					
A0	<i>The reference absorption area of 10m² and is independent of frequency</i>					
Sf	<i>The total façade area of the room in question</i>					
Swi	<i>The area of the windows in the room</i>					
Sew	<i>The area of the external wall of the room</i>					
Srr	<i>The area of the ceiling of the room (if applicable)</i>					
S	<i>The total area of the elements through which sound enters the room</i>					
Dne	<i>The insulation value of the trickle ventilator (if applicable)</i>					
Rwi	<i>The sound reduction index of the window</i>					
Rew	<i>The sound reduction index of the external wall</i>					
Rrr	<i>The sound reduction index of the ceiling/roof (if applicable)</i>					
A	<i>The equivalent absorption area of the receiving room where A=0.163V/T</i>					
Formula	$Leq2=Leqff+10\log[A0/S*10^{-(Dne/10)+Swi/S*10^{-(Rwi/10)+Sew/10*10^{-(Rew/10)+Srr/S*10^{-(Rrr/10)}}]}]+10\log(S/A)+3$					
Octave Band Centre Frequency (Hz)						
	125	250	500	1000	2000	4000
Sf	6	6	6	6	6	6
Sr	9	9	9	9	9	9
Swi	3	3	3	3	3	3
Sew	3	3	3	3	3	3
Srr	9	9	9	9	9	9
S	15	15	15	15	15	15
A0	10	10	10	10	10	10
V	22	22	22	22	22	22
T (BS8233)	0.50	0.50	0.50	0.50	0.50	0.50
A	11.0	14.0	16.0	16.0	15.0	14.0
Daytime Leqff	61.0	55.9	51.1	52.5	52.3	47.5
Night time Leqff	56.0	52.3	48.5	50.4	49.2	43.1
Dne	42.9	36.3	39.6	54.8	62.6	70.9
Rwi	21.0	17.0	25.0	35.0	37.0	31.0
Rew	40.0	44.0	45.0	51.0	56.0	56.0
Rrr	44.0	51.0	57.0	61.0	58.0	63.0
Predicted dB(A) Level Within The Above Room During Daytime Hours (07:00-23:00)		L _{Aeq} 16 HOUR		28.6		dB(A)
Predicted dB(A) Level Within The Above Room During Night Time Hours (23:00-07:00)		L _{Aeq} 8 HOUR		25.0		dB(A)

7.12 Ventilation (D_{ne})

Octave Band Frequency	125	250	500	1000	2000	4000	D _{n,e,w}
Ryton LookRyt Acoustic Aircore Vent	43.0	36.0	40.0	55.0	63.0	71.0	45.0

7.13 Glazing (R_{wi})

Octave Band Frequency	125	250	500	1000	2000	4000	R _{w(c,ctr)}
10.8mm glass / 24mm Argon air gap / 16.8mm Pilkington Optiphon glass	35.0	41.0	48.0	53.0	55.0	65.0	52.0 (-2,-6)
6mm / 16mm Argon / 8.8mm Pilkington Optiphon	25.0	27.0	38.0	48.0	47.0	55.0	41.0 (-2,-6)
4mm glass / 16mm air gap / 4mm glass	21.0	17.0	25.0	35.0	37.0	31.0	29.0 (-1,-4)

7.14 Walls (Non-Glazed Elements) (R_{ew})

Octave Band Frequency	125	250	500	1000	2000	4000	R _w
Minimum External Wall Attenuation	40.0	44.0	45.0	51.0	56.0	56.0	50.0

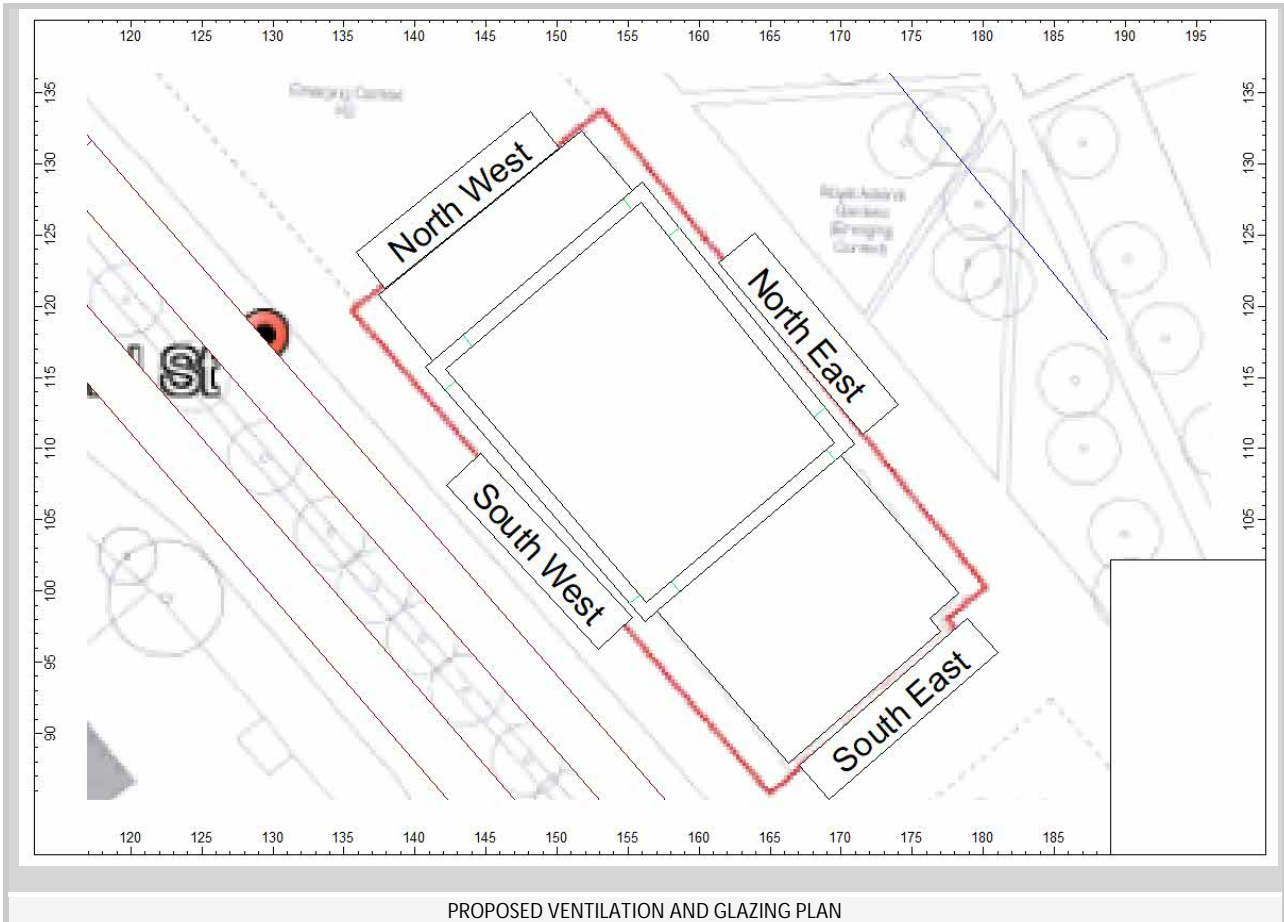
7.15 Roof (R_{rr})

Octave Band Frequency	125	250	500	1000	2000	4000	R _w
Minimum Value	44.0	51.0	57.0	61.0	58.0	63.0	59.0

NOTE:

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.

7.16 Glazing & Ventilation Assessment



The new student accommodation should be designed as follows to ensure the internal noise levels are acceptable in terms of the assessment to British Standard 8233: 2014.

Façade	Glazing Specification	Ventilation Specification
Southwest	10.8mm glass / 24mm Argon air gap / 16.8mm Pilkington Optiphon glass	Ryton LookRyt Acoustic Aircore Vent
Southeast	10.8mm glass / 24mm Argon air gap / 16.8mm Pilkington Optiphon glass	Ryton LookRyt Acoustic Aircore Vent
Northwest	6mm glass / 16mm Argon air gap / 8..8mm Pilkington Optiphon glass	Ryton LookRyt Acoustic Aircore Vent
Northeast	4mm glass / 16mm air gap / 4mm glass	Ryton LookRyt Acoustic Aircore Vent

8 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 $L_{Aeq, 16 \text{ HOUR}}$ 35 dB and Night Time $L_{Aeq, 8 \text{ HOUR}}$ 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 these criteria based on the assumption that the windows are closed.

References and assessments are to be made to the Association of Noise Consultants ‘Acoustic Ventilation & Overheating – Residential Design Guide’ 2020. The calculations carried out within this report have identified an acoustic requirement for System 1 & 2 and therefore guidelines values from Table 4 of BS 8233: 2014 are to be adopted.

This document takes a Level 1 and Level 2 approach to an acoustic overheating assessment and depending on the outcome of Level 1, further determines the need or necessity for a Level 2 assessment.

Table 3.1 ‘Indoor Ambient Noise Levels resulting from transport noise sources – ADF ventilation condition’

Ventilation condition	Operational condition of System	Desirable internal ambient noise level from transport noise sources
Part F - Whole dwelling ventilation	Systems 1 & 2: Background (‘trickle’) ventilators open to provide whole dwelling ventilation in the winter period. Additional ventilation required at other times of the year – windows are assumed to be ajar for assessment ^[Note 2] .	Guideline values from Table 4 of BS 8233:2014.
	System 3: Continuous mechanical extract with background (‘trickle’) ventilators open ^[Note 2] .	
	System 4: Continuous mechanical supply and extract with heat recovery (MVHR) – no trickle vents required.	
Part F – Purge Ventilation ^[Note 1]	Option 1: Opening external window(s) meeting requirements described in Appendix B of Part F.	No specific acoustic criterion needs to be met in a room using purge ventilation for the purpose of rapidly diluting indoor pollutants.
	Option 2: Manually controlled fan extracting 4 air changes per hour.	

Figure 3.2, detailed below has identified a ‘High Risk’ based on the calculated façade levels of the proposed development.

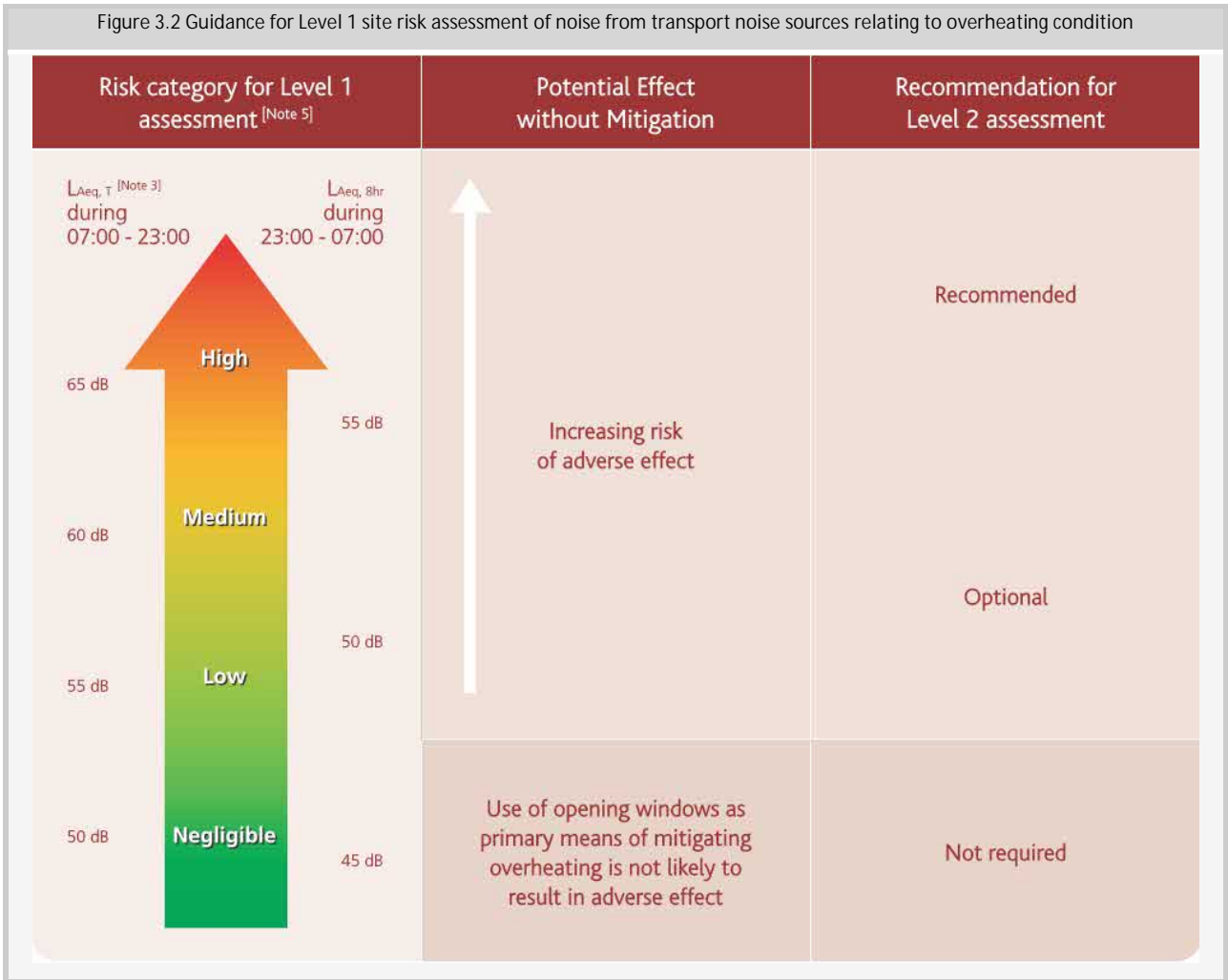
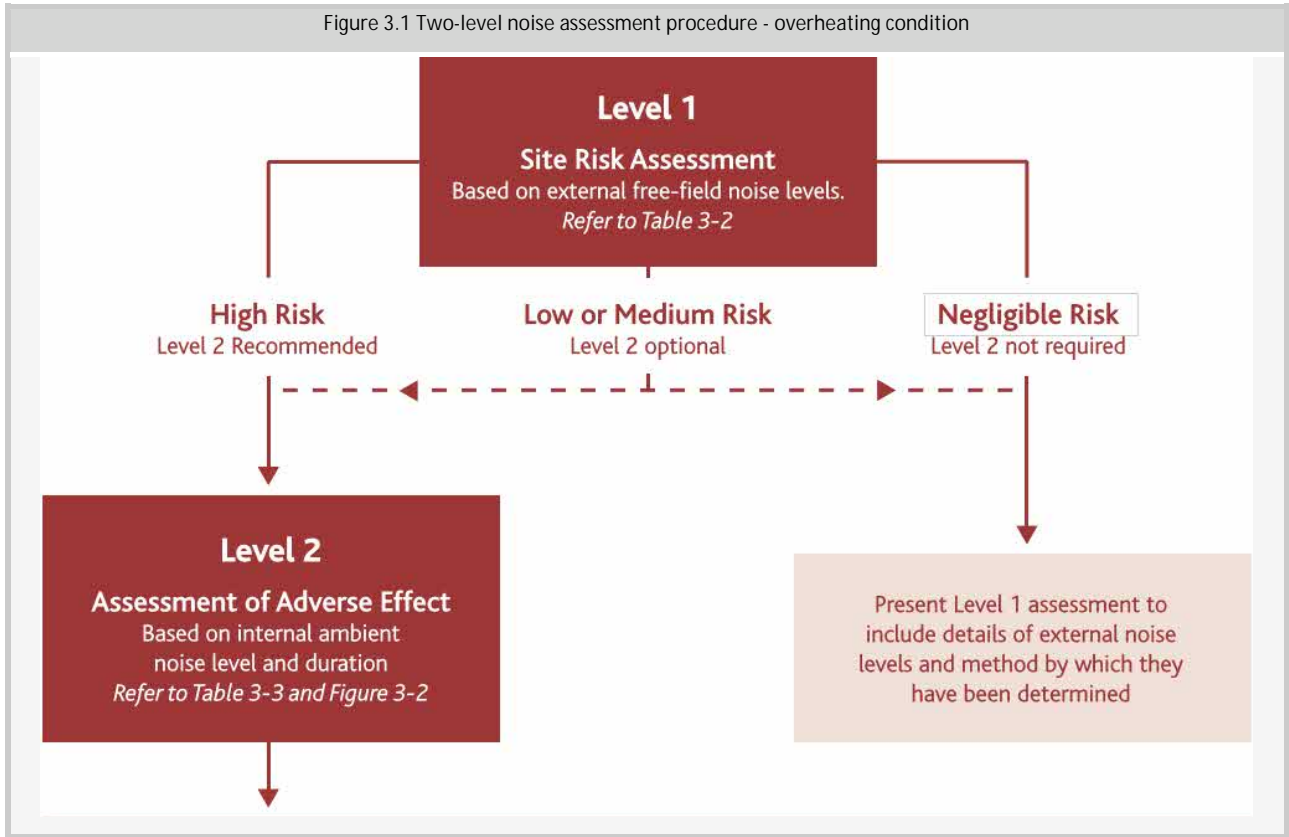


Figure 3.1, detailed below suggests a Level 2 Assessment to be recommended and given that this is a student accommodation scheme, an assessment of ‘High Risk ‘Level 2 recommended’ has been concluded and should be adopted.



Based on the above assessments, it is concluded that a detailed TM59 assessment is recommended for this site and that it is proposed to install a full MVHR system to the student accommodation.

9 L_{Amax} dB NOISE LEVEL ASSESSMENT

9.1 Criteria

9.1.1 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.

9.1.2 Professional Practice Guidance on Planning & Noise.

PRoPG: 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 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).

9.1.3 World Health Organisations ‘Guidelines for Community Noise’.

The WHO Guideline for Community Noise suggests that levels of L_{AFmax} 45 dB should not exceed more than 10 events within any one night time period 23:00 – 07:00. Therefore, calculations and assessments are to be made against these criteria to ascertain if the proposed glazing and ventilation specification will be suitable to achieve that of the assessed 11th highest recorded L_{AFmax} dB level.

L _{AFmax} dB Noise Levels >80 dB						L _{AFmax} dB Noise Levels >85 dB					
L _{AFmax} dB	99.4	101.9	100.3	100.1	89.6	L _{AFmax} dB	99.4	101.9	100.3	100.1	89.6
Time	Fig 1	Fig 2	Fig 3	Fig 4	Fig 5	Time	Fig 1	Fig 2	Fig 3	Fig 4	Fig 5
	39	47	45	30	2		16	15	11	10	1

9.1.4 L_{AFmax} dB Noise Levels – Night Time 23:00 – 07:00 (1 Minute Data)

1 Minute Event No.	Recorded L _{AFmax} dB Noise Levels	Façade Corrected L _{AFmax} dB Noise Levels
1	101.9	101.9
2	100.2	100.2
3	99.8	99.8
4	98.0	98.0
5	95.9	95.9
6	92.2	92.2
7	91.2	91.2
8	90.5	90.5
9	89.9	89.9
10	87.9	87.9
11	86.5	86.5

The following table demonstrate the results and the evaluated 11th highest L_{Amax} dB level. 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	67.8	Recorded Noise Level at the Monitoring Position
2	Calculated Highest Façade Level	67.8	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	-42.1	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	L _{Amax} 45 dB Criteria	45.0	L _{Amax} 45 dB Criteria taken from WHO Guidelines. BS 8233 does not reference L _{Amax} dB noise level criteria.
6	Calculated Façade Level Outside	87.1	Addition of Items 4 and 5 to give a resultant target level for the 11 th Recorded L _{Amax}
7	11 th Recorded L _{Amax}	86.5	11 th Recorded L _{Amax}
8	L _{Amax} 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 and ventilation will result in the internal L_{Amax} 45 dB criteria being achieved.

10 EXTERNAL AMENITY AREA NOISE ASSESSMENT

10.1 Outdoor Living Areas

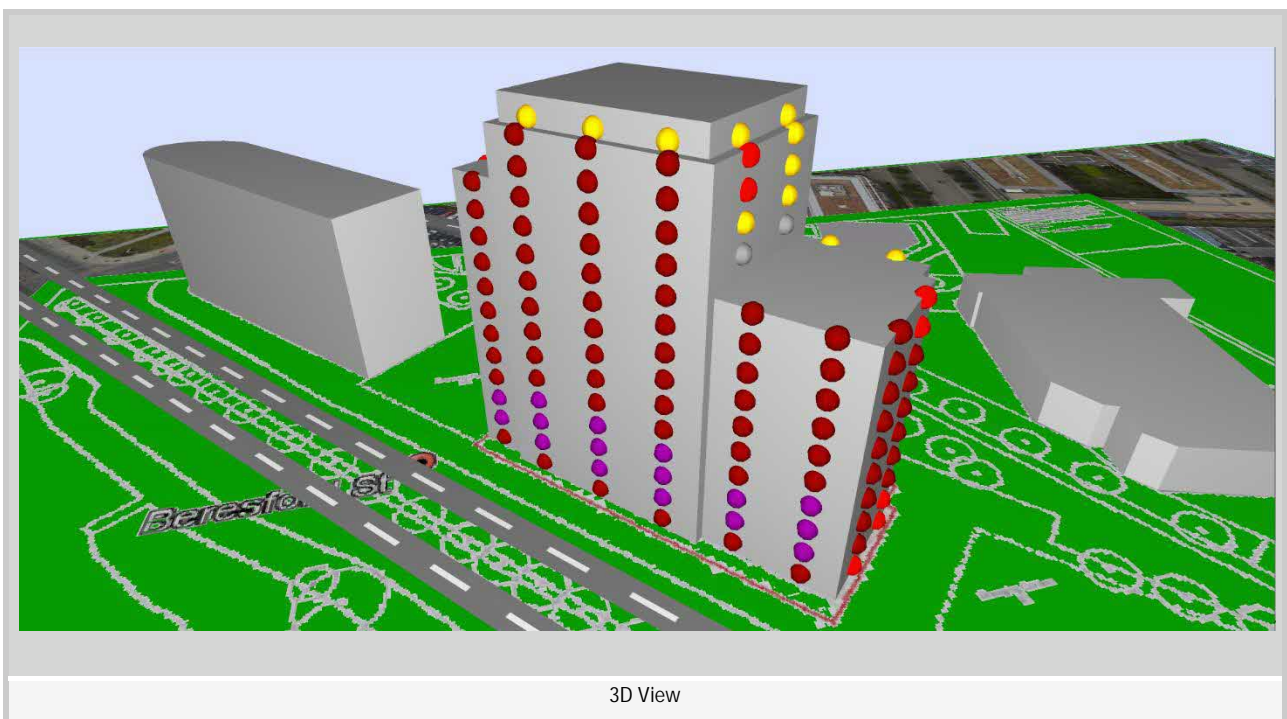
The World Health Organisation ‘Guidelines for Community Noise gives guidance as to desirable noise levels that should be achieved within outdoor living areas such as gardens, patios and verandas etc.

Table 1: Guideline values for community noise in specific environments, details the desirable target noise levels within various areas.

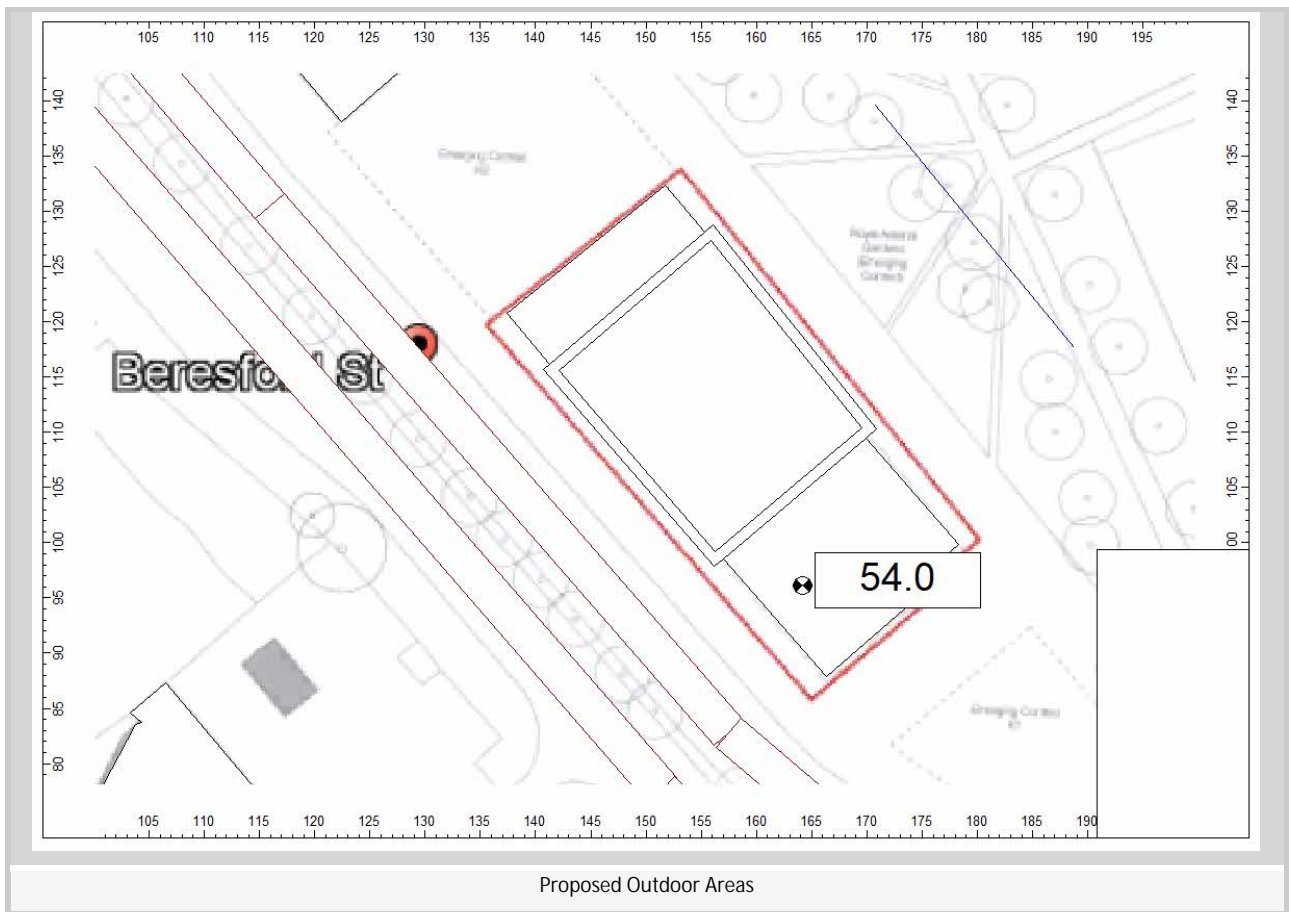
Outdoor Living Area	
Serious Annoyance, daytime and evening	$L_{Aeq\ 16\ HOUR}$ 55 dB
Moderate Annoyance, daytime and evening	$L_{Aeq\ 16\ HOUR}$ 50 dB

In order to evaluate the external noise levels within the proposed development, and to correctly and accurately select the precise required minimum screen heights, the 3D modelling software CADNA A is to be used. Initially, the site plan is to be overlaid onto Google Earth and then imported directly into CADNA A using the geometric co-ordinates.

From this, the monitoring positions and noise sources such as roads are added. The output noise levels from the roads are then increased until the monitored noise levels are achieved at the monitoring position. This model is then saved and used as a working 3D acoustic model of the site. The proposed buildings are then constructed on a 3D basis and receptors placed within the terrace garden areas. The calculation software is then run to evaluate the garden levels within sample plots across the development. The following CADNA A screen shots demonstrate the existing sites working 3D model. The levels at the measurement position correlate with the measured daytime average levels detailed within this report.



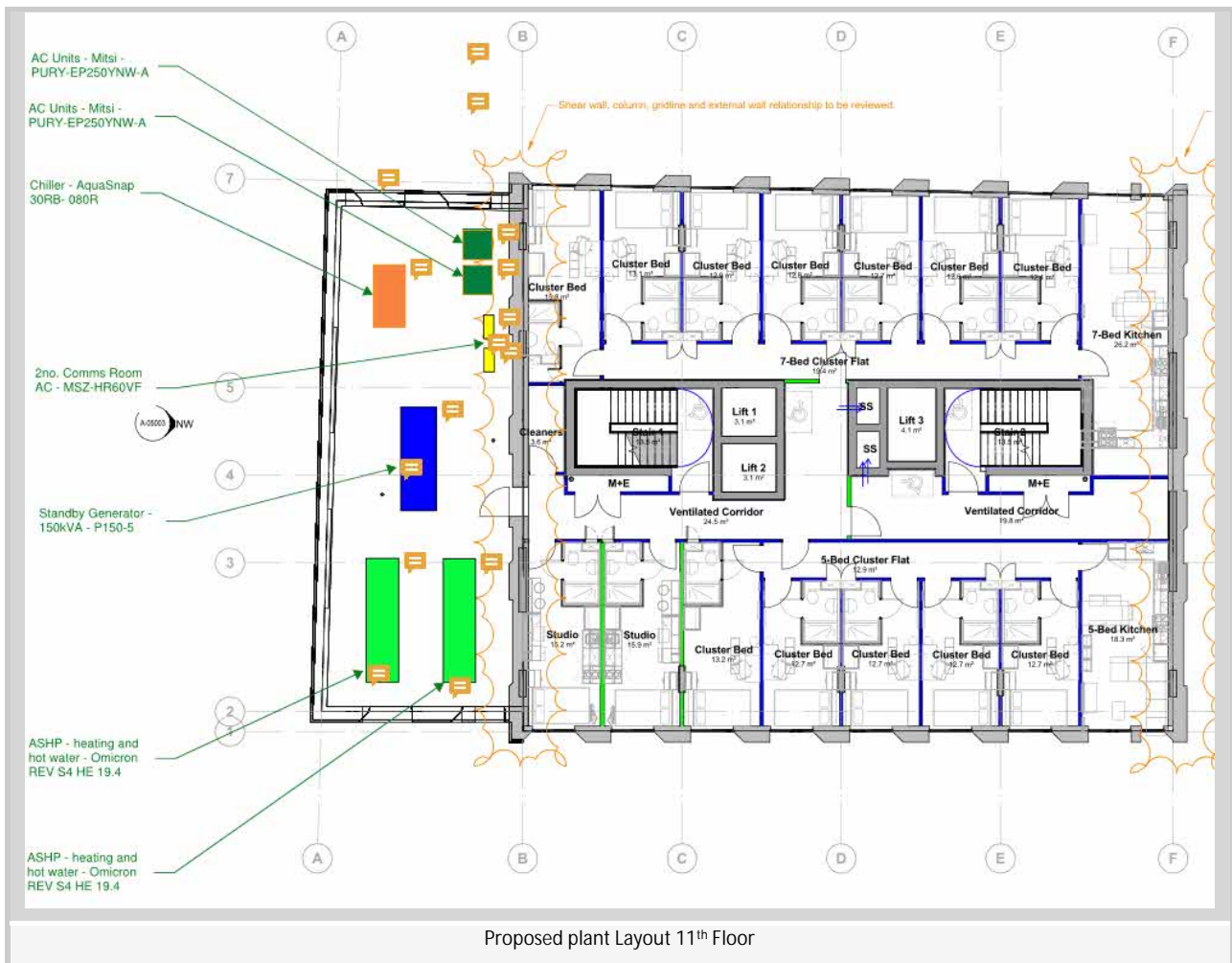
The development has a communal external roof terrace at the 9th floor level of the development and therefore this criteria / guideline would be appropriately considered within the proposed amenity area.



The guideline has been considered acceptable criteria for this assessment given the site’s geographical location and proximity to a major trunk road. The layout has been designed in order to allow for acoustics and minimise the noise levels within these outdoor living spaces. The calculation demonstrates the amenity space is likely to see noise levels below the upper guideline of 55 dB.

11 CALCULATIONS

11.1 Proposed Plant Layout 11th Floor



11.2 Proposed Plant

The following plant is to be located externally, generally as detailed on the drawing within this report. The plant has the following sound power data supplied by the manufacturer.

Make & Model	Number of Units	Location	Sound Power Level dB (SWL)
ASHP Omicron REV S4 HE	2	11 th Floor Plant Area	87.0
Chiller – AquaSnap 30RB-080R	1	11 th Floor Plant Area	88.5
Mitsubishi MUZ HR60VF	2	11 th Floor Plant Area	68.0
Mitsubishi PURY EP250YNW-A	2	11 th Floor Plant Area	80.0

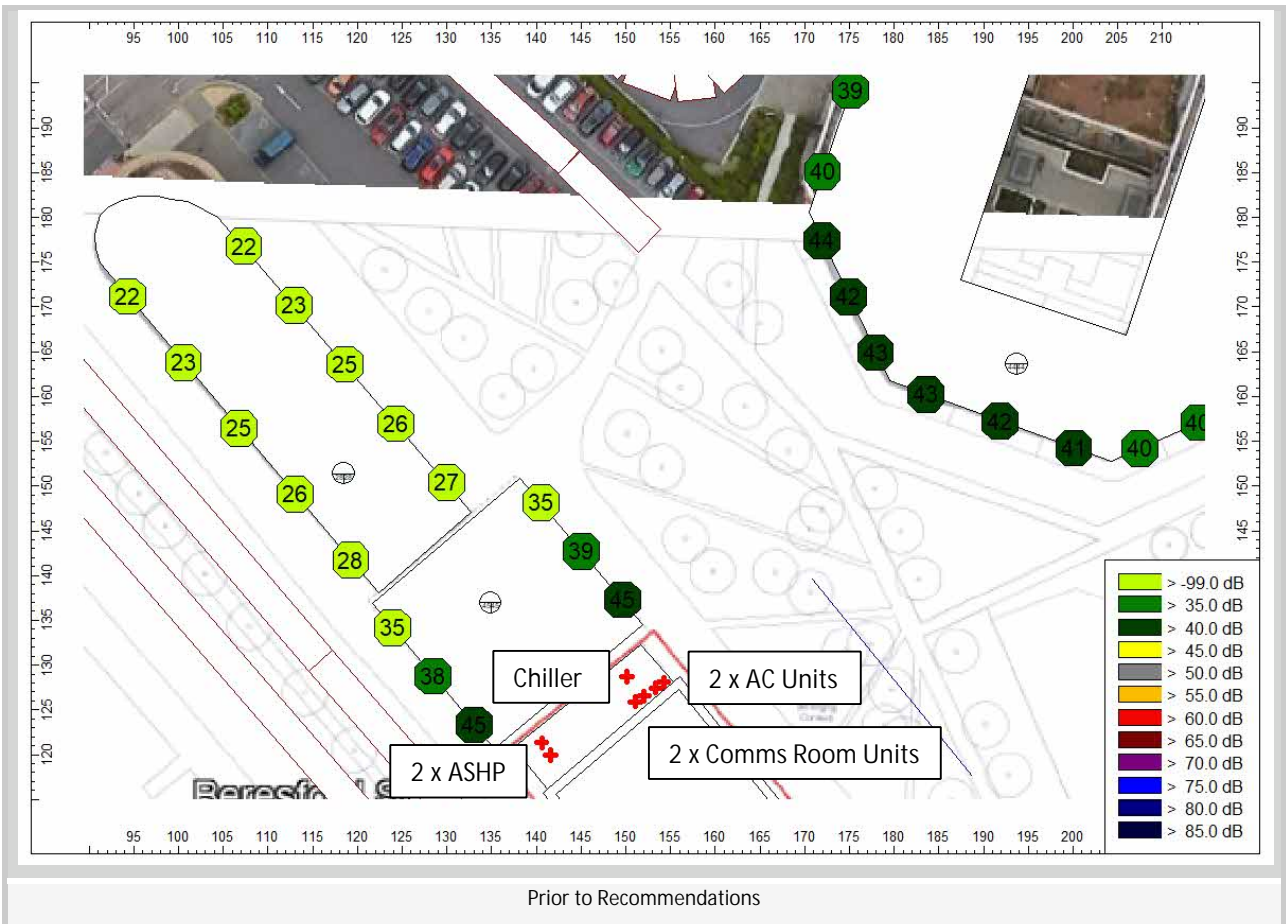
11.3 Inputted Noise Levels Prior to Recommendations

Based on the above noise levels, the following values have been inputted into the CADNA A 3D modelling software.

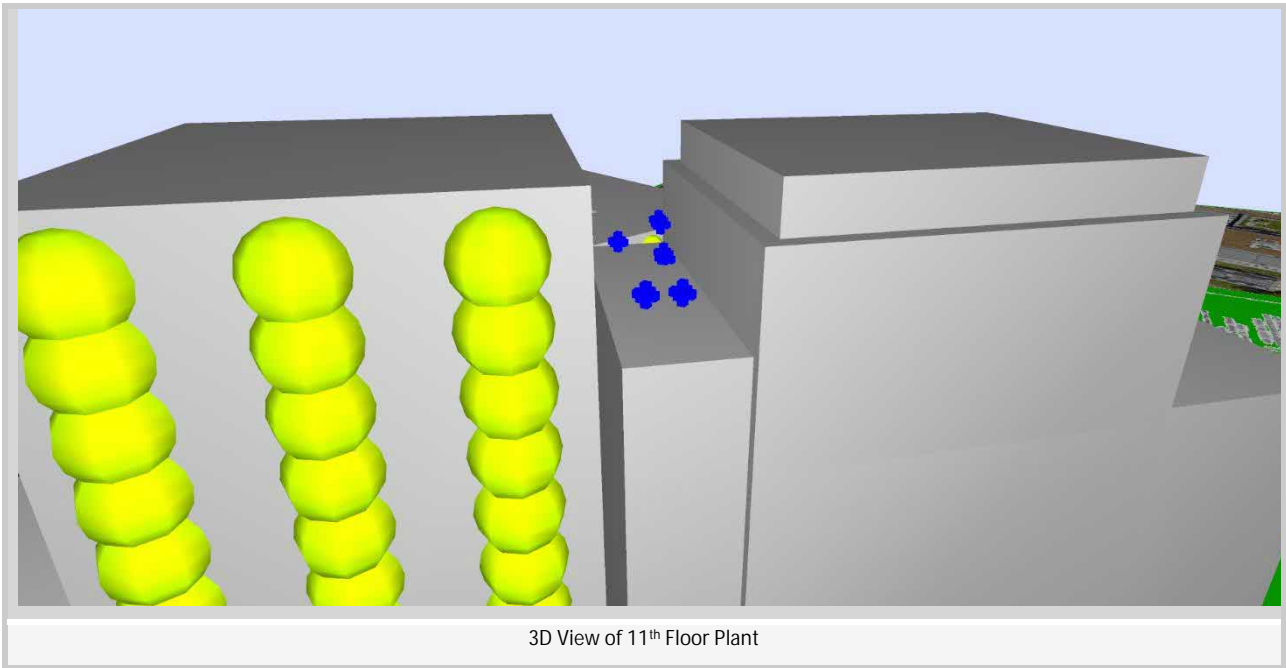
Point Source																					
Name	M. ID	Result. PWL			Lw / Li		Correction			Sound Reduction		Attenuation			Operating Time			K0	Freq.	Direct.	Heigh
		Day (dBA)	Evening (dBA)	Night (dBA)	Type	Value	norm.	Day (dB(A))	Evening (dB(A))	Night (dB(A))	R	Area (m²)	Day (min)	Special (min)	Night (min)	(dB)	(Hz)				
ASHP		87.0	87.0	87.0	Lw	87		0.0	0.0	0.0						0.0	1000	(none)	2.30		
ASHP		87.0	87.0	87.0	Lw	87		0.0	0.0	0.0						0.0	1000	(none)	2.30		
AC Unit		80.0	80.0	80.0	Lw	80		0.0	0.0	0.0						0.0	1000	(none)	1.80		
AC Unit		80.0	80.0	80.0	Lw	80		0.0	0.0	0.0						0.0	1000	(none)	1.80		
Comms Room		68.0	68.0	68.0	Lw	68		0.0	0.0	0.0						0.0	1000	(none)	0.35		
Comms Room		68.0	68.0	68.0	Lw	68		0.0	0.0	0.0						0.0	1000	(none)	0.35		
Chiller		88.5	88.5	88.5	Lw	88.5		0.0	0.0	0.0						0.0	1000	(none)	1.30		

INPUTTED NOISE LEVELS

11.4 Calculated Façade Levels Prior to Recommendations



Prior to Recommendations



11.4.1 Mitigation Measures Required

Based on the above assessment it will be necessary to install an acoustic enclosure around the plant, with the exception of the 2 x Comms Room units. This should be designed to have the following minimum attenuation values:-

ACOUSTIC PERFORMANCE (dB) - CENTRE BAND FREQUENCY								
Frequency	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
Acoustic Panels	6	8	9	18	24	26	26	27

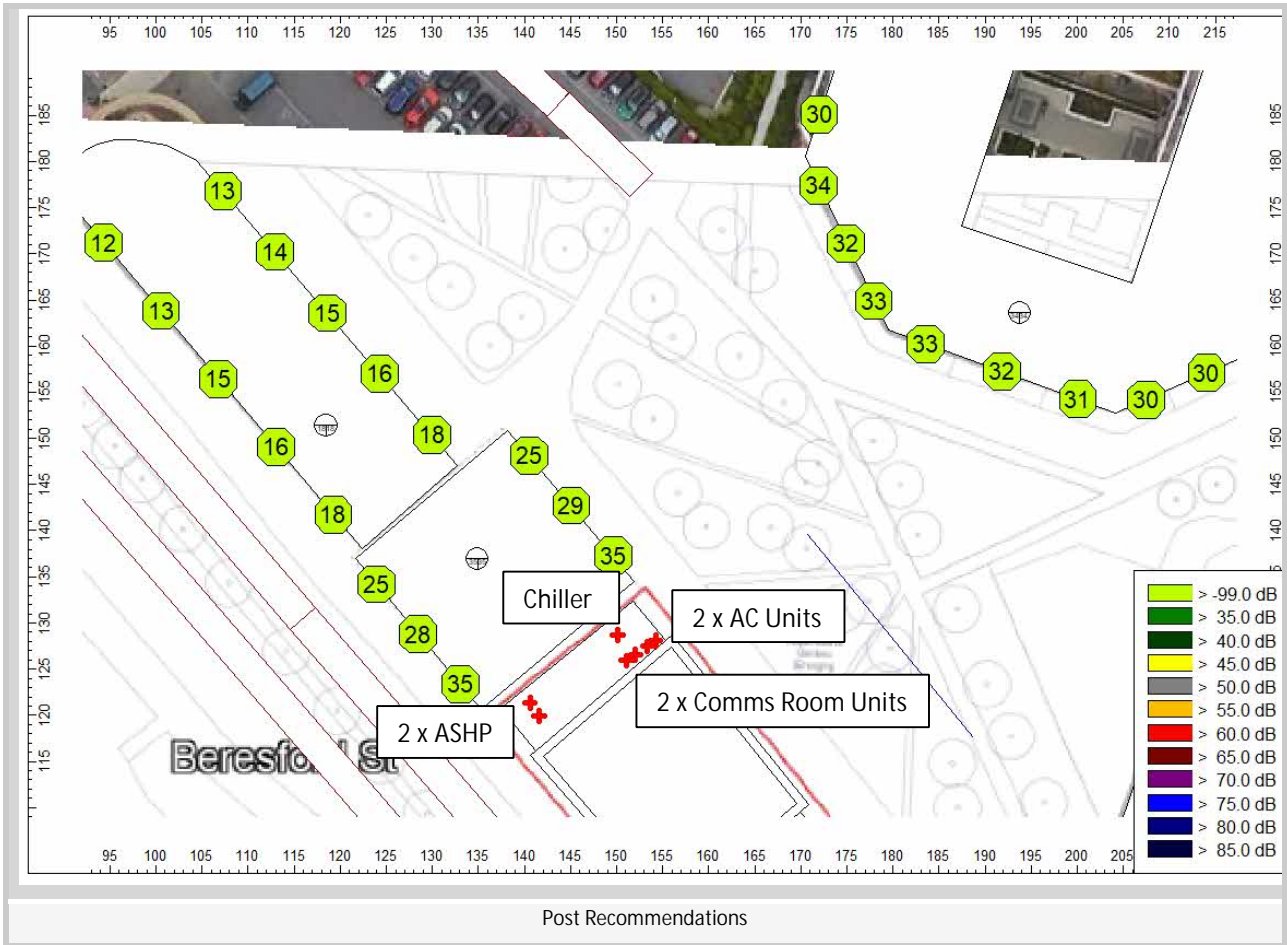
11.5 Inputted Noise Levels Post Recommendations

Based on the above noise levels, the following values have been inputted into the CADNA A 3D modelling software.

Point Source																						
Name	M. ID	Result. PWL			Lw / Li		Correction			Sound Reduction		Attenuation			Operating Time			K0	Freq.	Direct.	Height	
		Day	Evening	Night	Type	Value	norm.	Day	Evening	Night	R	Area	Day	Special	Night	(min)	(min)					(min)
ASHP		77.0	77.0	77.0	Lw	77		0.0	0.0	0.0								0.0	1000	(none)	2.30	g
ASHP		77.0	77.0	77.0	Lw	77		0.0	0.0	0.0								0.0	1000	(none)	2.30	g
AC Unit		70.0	70.0	70.0	Lw	70		0.0	0.0	0.0								0.0	1000	(none)	1.80	g
AC Unit		70.0	70.0	70.0	Lw	70		0.0	0.0	0.0								0.0	1000	(none)	1.80	g
Comms Room		68.0	68.0	68.0	Lw	68		0.0	0.0	0.0								0.0	1000	(none)	0.35	g
Comms Room		68.0	68.0	68.0	Lw	68		0.0	0.0	0.0								0.0	1000	(none)	0.35	g
Chiller		78.5	78.5	78.5	Lw	78.5		0.0	0.0	0.0								0.0	1000	(none)	1.30	g

INPUTTED NOISE LEVELS

11.6 Calculated Façade Levels Post Recommendations



Based on these recommendations, the following assessments can be made:-

12 BS 4142:2014+A1:2019 NOISE ASSESSMENT

12.1 Scope of British Standard 4142: 2014+A1:2019

In the assessment of the existing surrounding commercial premises, consideration has been given to the scope of British Standard 4142:2014+A1:2019, which in section 1, details applicability of this standard to rating assessing sound of an industrial and/or commercial nature. It is considered appropriate that both the background noise levels and the rating noise levels obtained fall within the scope of British Standard 4142:2014+A1:2019 by using outdoor sound levels to assess the effect of sound on local residents.

12.2 Terms and Definitions

Symbol	Term	Definition
AP	Assessment Position	Position externally at the façade property under investigation at which the assessment is undertaken which is usually 1m from the 1 st floor bedroom window.
EP	Equivalent Position	Position at which the background noise levels are measured if there is no access to the assessment position or if source under investigation is audible.
$L_s = L_{Aeq, T}$	Specific Level	The average continuous equivalent sound pressure level of the source at the assessment position.
$L_{Ar, Tr}$	Rating Level	The average continuous equivalent sound pressure level of the source at the assessment position with a correction to account for the characteristic features.
$L_r = L_{Aeq, T}$	Residual Level	The average continuous equivalent sound pressure level at the assessment position without the source operating.
$L_{A90, T}$	Background Level	The sound pressure level that is not exceeded 90% of the time at the assessment position.
$L_a = L_{Aeq, T}$	Ambient Level	The totally encompassing sound at the assessment position including the residual and specific noise.

12.3 Assessment Position

The assessment position 1 was established as the residential accommodation adjacent and no closer than 2m from the roof mounted plant.

12.4 Calculations

The specific noise levels are calculated at the assessment position located at the residential property adjacent to 81 – 88 Beresford Street using the calculations detailed within ISO 9613 Part 1 and 2: 1996. These calculations take the manufacturers sound power levels into account for a variety of factors including source directivity, distance, atmospheric absorption, ground absorption and the effects of any barriers and determine the resultant noise levels at the assessment position.

12.5 Equivalent Position

The background noise levels were measured at the equivalent position, chosen as it most represented the closest noise sensitive façade, located within the existing garden area between 07:00 on 27th July and 07:00 on 31st July 2023.

12.6 Rating Levels (Character Correction)

It is appropriate to add a character correction where there is a new source that cannot be measured in line with BS 4142:2014+A1:2019. There are 3 methods for approaching this.

- a) Subjective method
- b) Objective method (for tonality)
- c) Reference method

12.7 Subjective Method

The subjective method establishes a rating penalty that is added to the specific noise level if any of the following is present at the assessment position. If a tone is expected to be present a character correction of 0 dB to 6 dB is added depending on how perceptible it is at noise sensitive locations.

BS 4142:2014+A1:2019 – Section 9.2 Subjective Method	Perceptibility to noise sensitive facades	Correction
Tonality Ranging from not tonal to prominently tonal	Not tonal	+0
	Just perceptible	+2
	Clearly perceptible	+4
	Highly perceptible	+6

If the source is expected to be impulsive a character correction of 0 dB to 9 dB is added depending on how perceptible it is at noise sensitive locations.

BS 4142:2014+A1:2019 – Section 9.2 Subjective Method	Perceptibility to noise sensitive facades	Correction
Impulsivity Considering both the rapidity and any overall change in sound levels	Not impulsive	+0
	Just perceptible	+3
	Clearly perceptible	+6
	Highly perceptible	+9

When the sound features are neither tonal nor impulsive, a character correction of +3 is added for the readily distinctive quality against the acoustic environment or for the intermittency of the source.

BS 4142:2014+A1:2019 – Section 9.2 Subjective Method	Perceptibility to noise sensitive facades	Correction
Readily Distinctive	Is not present	+0
	Is present	+3
Intermittency	Is not present	+0
	Is present	+3

12.8 Assessment Criterion

The significance of the resulting noise on the residential property depends on the margin by which it exceeds the background noise levels. British Standard 4142:2014+A1:2019 provides the following guidance within section 11.

Difference	Assessment of Impact
+10 dB	Indication of a significant adverse impact
+5 dB	Indication of an adverse impact
+0 dB	Indication of low impact

12.9 Noise Meter Floor

BS 4142:2014+A1:2019 suggests that care is necessary in circumstances where background sound levels are low to ensure that self-generated and electrical noise within the measurement system does not unduly influence reported values, which might be the case if the measured background sound levels are less than 10 dB above the noise floor of the measuring system. The floor of a typical class 1 noise meter is in the region of 14 dB(A) and therefore measurements of less than 24 dB(A) should be assessed with care.

12.10 BS 4142:2014+A1:2019 Penalties

Whilst BS 4142:2014+A1:2019 allows receptor assessments to be made to achieve levels equal to prevailing background noise levels, it also ensures that appropriate and more stringent penalties are applied to the specific noise level to ensure the correct level of protection for the local residents.

12.11 Assessments

12.11.1 Daytime (07:00 – 23:00) Assessment of Plant on the 11th Floor, without attenuation.

Rating Industrial Noise affecting Mixed Industrial and Residential Areas			British Standard 4142:2014+A1:2019 Daytime (07:00 to 23:00)
Assessment Position			Residential property directly Adjacent.
Background Position			At the assessment position
Item	Calculation	Clause	Commentary
Specific Noise Level $L_{Aeq,1\text{ hour}}$	45 dB	7	Calculated using ISO 9613:1996 ^[3] .
Tonality	+2 dB	8.1	Tonality Characteristic
Impulsivity	+3 dB	8.1	Impulsive Characteristic
Rating Level	50 dB	9.1	The acoustic feature correction is added to the specific noise level
Background Noise Level $L_{A90,1\text{ hour}}$	49 dB	8.1	Modal Background Noise Level (07:00 – 23:00)
Assessment Level	+1 dB	11	The background level is subtracted from the rating level.
Conclusion BS 4142:2014+A1:2019 ^[1]	+10 dB Significant Adverse Effects, +5 dB Adverse Effects, +0 dB Low Impact		
Assessment	+1 dB		
Conclusion	The assessment level is 'Low Impact'		
Council Criteria	Specific Level -10 dB Below Background – Not Achieved		

12.11.2 Night time (23:00 – 07:00) Assessment of Plant on the 11th Floor, without attenuation.

Rating Industrial Noise affecting Mixed Industrial and Residential Areas			British Standard 4142:2014+A1:2019 Night time (23:00 to 07:00)
Assessment Position			Residential property directly Adjacent.
Background Position			At the assessment position
Item	Calculation	Clause	Commentary
Specific Noise Level $L_{Aeq,1\text{ hour}}$	45dB	7	Calculated using ISO 9613:1996 _[3] .
Tonality	+2 dB	8.1	Tonality Characteristic
Impulsivity	+3 dB	8.1	Impulsive Characteristic
Rating Level	50 dB	9.1	The acoustic feature correction is added to the specific noise level
Background Noise Level $L_{A90,1\text{ hour}}$	46 dB	8.1	Modal Background Noise Level (23:00 – 07:00)
Assessment Level	+4 dB	11	The background level is subtracted from the rating level.
Conclusion BS 4142:2014+A1:2019 _[1]	+10 dB Significant Adverse Effects, +5 dB Adverse Effects, +0 dB Low Impact		
Assessment	+4 dB		
Conclusion	The assessment level is 'Low Impact'		
Council Criteria	Specific Level -10 dB Below Background – Not Achieved		

12.12 Tonal Penalty

A +2 dB penalty has been applied to the specific noise level to allow for any minor tonal elements that may be present from the proposed plant.

12.13 Intermittency Penalty

A +3 dB penalty has been applied to the specific noise level to allow for any intermittent elements that may be present from the proposed plant.

12.14 Assessment Conclusion

It can be seen from the above assessments that with the proposed new plant on the 11th floor operational, an assessment conclusion of Low Impact could be expected. However, it does not meet Planning Condition 24, therefore, the following assessments demonstrate the effects of installing the proposed remedial acoustic works during the daytime and night time.

12.14.1 Daytime (07:00 – 23:00) Assessment of Plant on the 11th Floor, with attenuation.

Rating Industrial Noise affecting Mixed Industrial and Residential Areas			British Standard 4142:2014+A1:2019 Daytime (07:00 to 23:00)
Assessment Position			Residential property directly Adjacent.
Background Position			At the assessment position
Item	Calculation	Clause	Commentary
Specific Noise Level $L_{Aeq,1\text{ hour}}$	35dB	7	Calculated using ISO 9613:1996 ^[3] .
Tonality	+2 dB	8.1	Tonality Characteristic
Impulsivity	+3 dB	8.1	Impulsive Characteristic
Rating Level	40 dB	9.1	The acoustic feature correction is added to the specific noise level
Background Noise Level $L_{A90,1\text{ hour}}$	49 dB	8.1	Modal Background Noise Level (07:00 – 23:00)
Assessment Level	-9 dB	11	The background level is subtracted from the rating level.
Conclusion BS 4142:2014+A1:2019 ^[1]	+10 dB Significant Adverse Effects, +5 dB Adverse Effects, +0 dB Low Impact		
Assessment	-9 dB		
Conclusion	The assessment level is 'Low Impact'		
Council Criteria	Specific Level -10 dB Below Background – Achieved		

12.14.2 Night time (23:00 – 07:00) Assessment of Plant on the 11th Floor, with attenuation.

Rating Industrial Noise affecting Mixed Industrial and Residential Areas			British Standard 4142:2014+A1:2019 Night time (23:00 to 07:00)
Assessment Position			Residential property directly Adjacent.
Background Position			At the assessment position
Item	Calculation	Clause	Commentary
Specific Noise Level $L_{Aeq,1\text{ hour}}$	35 dB	7	Calculated using ISO 9613:1996 ^[3] .
Tonality	+2 dB	8.1	Tonality Characteristic
Impulsivity	+3 dB	8.1	Impulsive Characteristic
Rating Level	40 dB	9.1	The acoustic feature correction is added to the specific noise level
Background Noise Level $L_{A90,1\text{ hour}}$	46 dB	8.1	Modal Background Noise Level (23:00 – 07:00)
Assessment Level	-6 dB	11	The background level is subtracted from the rating level.
Conclusion BS 4142:2014+A1:2019 ^[1]	+10 dB Significant Adverse Effects, +5 dB Adverse Effects, +0 dB Low Impact		
Assessment	-6 dB		
Conclusion	The assessment level is 'Low Impact'		
Council Criteria	Specific Level -10 dB Below Background – Achieved		

12.15 Tonal Penalty

A +2 dB penalty has been applied to the specific noise level to allow for any minor tonal elements that may be present from the proposed plant.

12.16 Impulsivity Penalty

A +3 dB penalty has been applied to the specific noise level to allow for any minor impulsive elements that may be present from the proposed plant.

12.17 Assessment Conclusion

It can be seen from the above assessments that with the proposed new plant on the 11th floor and associated acoustic works incorporated within the design, an assessment conclusion of Low Impact could be expected and Planning Condition 24 could be discharged.

13 The National Planning Policy Framework 2023(NPPF)

The National Planning Policy Framework 2023(NPPF) and assessments to the Noise Policy Statement for England 2010 (NPSE) should be made in conjunction with each other. Paragraphs 185 - 188 of the National Planning Policy Framework 2023(NPPF) states the following:

Paragraph 185 Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

- a) Mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life.
- b) Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

Paragraph 186 Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications.

Paragraph 187 Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or ‘agent of change’) should be required to provide suitable mitigation before the development has been completed.

Paragraph 188 The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities.

The Noise Policy Statement for England gives various levels of effect as detailed within this report.

With the glazing / ventilation specifications achieved within this report, the development can be implemented within the guidelines of the aforementioned documents and ensure a conclusion of NOEL – No Observed Effect Level. This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise and planning condition 32 can be discharged accordingly.

14 CONCLUSION

14.1 Background Noise Levels

A 96 hour background noise survey was undertaken from 27th – 31st July 2023 at two positions at the front and rear of the site in order to establish the underlying background noise levels. The maximum day time levels were found to be $L_{Aeq, 16 \text{ hour}}$ 71.9 dB and the maximum night time levels were found to be $L_{Aeq, 8 \text{ hours}}$ 67.8 dB at position 1. The maximum day time levels were found to be $L_{Aeq, 16 \text{ hour}}$ 56.6 dB and the maximum night time levels were found to be $L_{Aeq, 8 \text{ hours}}$ 53.8 dB at position 2. The background noise level was established as L_{A90} 49.0 dB for daytime and L_{A90} 46.0 dB at position 2 at the rear of the development.

Assessment Position	Date Start	Date Finish	Daytime LAeq	Night Time LAeq
Position 1 Front	27/07/2023	31/07/2023	71.9	67.8
Position 2 Rear	27/07/2023	31/07/2023	56.6	53.8

Assessment Position	Date Start	Date Finish	Daytime LA90	Night time LA90
Position 2 Rear	27/07/2023	31/07/2023	49.0	46.0

14.2 Glazing & Ventilation Specification

The new student accommodation should be designed as follows to ensure the internal noise levels are acceptable in terms of the assessment to British Standard 8233: 2014.

Façade	Glazing Specification	Ventilation Specification
Southwest	10.8mm glass / 24mm Argon air gap / 16.8mm Pilkington Optiphon glass	Ryton LookRyt Acoustic Aircore Vent
Southeast	10.8mm glass / 24mm Argon air gap / 16.8mm Pilkington Optiphon glass	Ryton LookRyt Acoustic Aircore Vent
Northwest	6mm glass / 16mm Argon air gap / 8.8mm Pilkington Optiphon glass	Ryton LookRyt Acoustic Aircore Vent
Northeast	4mm glass / 16mm air gap / 4mm glass	Ryton LookRyt Acoustic Aircore Vent

14.3 WHO Guidelines for Community Noise

The guideline has been considered acceptable criteria for this assessment given the sites geographical location and proximity to a major trunk road. The layout has been designed in order to allow for acoustics and minimise the noise levels within the external amenity space at 9th floor level. The calculation set out within this report demonstrates the communal rooftop terrace is likely to see noise levels below the upper guideline of 55 dB.

14.4 Proposed Plant

The following plant is to be located externally, generally as detailed on the drawing within this report. The plant has the following sound power data supplied by the manufacturer.

Make & Model	Number of Units	Location	Sound Power Level dB (SWL)
ASHP Omicron REV S4 HE	2	11 th Floor Plant Area	87.0
Chiller – AquaSnap 30RB-080R	1	11 th Floor Plant Area	88.5
Mitsubishi MUZ HR60VF	2	11 th Floor Plant Area	68.0
Mitsubishi PURY EP250YNW-A	2	11 th Floor Plant Area	80.0

14.5 Assessment and Mitigation of Plant Noise

14.5.1 Daytime (07:00 – 23:00) Assessment of Plant on the 11th Floor, without attenuation.

Rating Level	50 dB	9.1	The acoustic feature correction is added to the specific noise level
Background Noise Level L _{A90,1 hour}	49 dB	8.1	Modal Background Noise Level (07:00 – 23:00)
Assessment Level	+1 dB	11	The background level is subtracted from the rating level.
Conclusion BS 4142:2014+A1:2019 [1]	+10 dB Significant Adverse Effects, +5 dB Adverse Effects, +0 dB Low Impact		
Assessment	+1 dB		
Conclusion	The assessment level is 'Low Impact'		
Council Criteria	Specific Level -10 dB Below Background – Not Achieved		

14.5.2 Night time (23:00 – 07:00) Assessment of Plant on the 11th Floor, without attenuation.

Rating Level	50 dB	9.1	The acoustic feature correction is added to the specific noise level
Background Noise Level L _{A90,1 hour}	46 dB	8.1	Modal Background Noise Level (23:00 – 07:00)
Assessment Level	+4 dB	11	The background level is subtracted from the rating level.
Conclusion BS 4142:2014+A1:2019 [1]	+10 dB Significant Adverse Effects, +5 dB Adverse Effects, +0 dB Low Impact		
Assessment	+4 dB		
Conclusion	The assessment level is 'Low Impact'		
Council Criteria	Specific Level -10 dB Below Background – Not Achieved		

14.5.3 Mitigation Measures Required

Based on the above assessment it will be necessary to install an acoustic enclosure around the plant, with the exception of the 2 x Comms Room units. This should be designed to have the following minimum attenuation values:-

ACOUSTIC PERFORMANCE (dB) - CENTRE BAND FREQUENCY								
Frequency	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
Acoustic Panels	6	8	9	18	24	26	26	27

14.5.4 Daytime (07:00 – 23:00) Assessment of Plant on the 11th Floor, with Attenuation.

Rating Level	40 dB	9.1	The acoustic feature correction is added to the specific noise level
Background Noise Level $L_{A90,1 \text{ hour}}$	49 dB	8.1	Modal Background Noise Level (07:00 – 23:00)
Assessment Level	-9 dB	11	The background level is subtracted from the rating level.
Conclusion BS 4142:2014+A1:2019 [1]	+10 dB Significant Adverse Effects, +5 dB Adverse Effects, +0 dB Low Impact		
Assessment	-9 dB		
Conclusion	The assessment level is 'Low Impact'		
Council Criteria	Specific Level -10 dB Below Background –Achieved		

14.5.5 Night time (23:00 – 07:00) Assessment of Plant on the 11th Floor, with Attenuation.

Rating Level	40 dB	9.1	The acoustic feature correction is added to the specific noise level
Background Noise Level $L_{A90,1 \text{ hour}}$	46 dB	8.1	Modal Background Noise Level (23:00 – 07:00)
Assessment Level	-6 dB	11	The background level is subtracted from the rating level.
Conclusion BS 4142:2014+A1:2019 [1]	+10 dB Significant Adverse Effects, +5 dB Adverse Effects, +0 dB Low Impact		
Assessment	-6 dB		
Conclusion	The assessment level is 'Low Impact'		
Council Criteria	Specific Level -10 dB Below Background –Achieved		

14.6 Conclusion

14.6.1 Overview

Levels have been recorded and assessments made in accordance with the relevant standards. Internal criterias 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 student accommodation and satisfy the local Council's requirements.

14.6.2 Planning Condition 22

With the glazing / ventilation specifications achieved within this report, the development can be implemented within the guidelines of this technical report and ensure a conclusion of NOEL – No Observed Effect Level. This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise and Planning Condition 22 can be discharged accordingly.

14.6.3 Planning Condition 39

For the external noise levels, the guideline has been considered acceptable criteria for this assessment given the sites geographical location and proximity to a dual carriageway and that Planning Condition 39 can be discharged accordingly.

14.6.4 Planning Condition 24

The operation of any proposed plant has been assessed to establish if the development will have a demonstrable adverse effect in terms of noise that outweigh the benefits of the development. Measurements have been undertaken in accordance with British Standard 4142: 2014 +A1:2019 and ISO 1996 – Part 2: 2017. This report has established the existing background noise levels at the closest residential façade to the site and the assessment of the impact of the site operation on nearby residential properties. The resulting emissions from the site running on a worst case scenario show no conflict with 'low impact' criteria and give a strong indication that complaint and impact on the local amenity is unlikely, provided the recommended acoustic works are implemented as detailed within this report and that Planning Condition 24 can be discharged accordingly.

14.6.5 Conclusion

Based on the calculations and assessments made within this report it is the professional opinion of Sound Advice Acoustics Ltd that the proposed development can demonstrate compliance with the National Planning Policy Framework 2023, NPPF & NPSE.

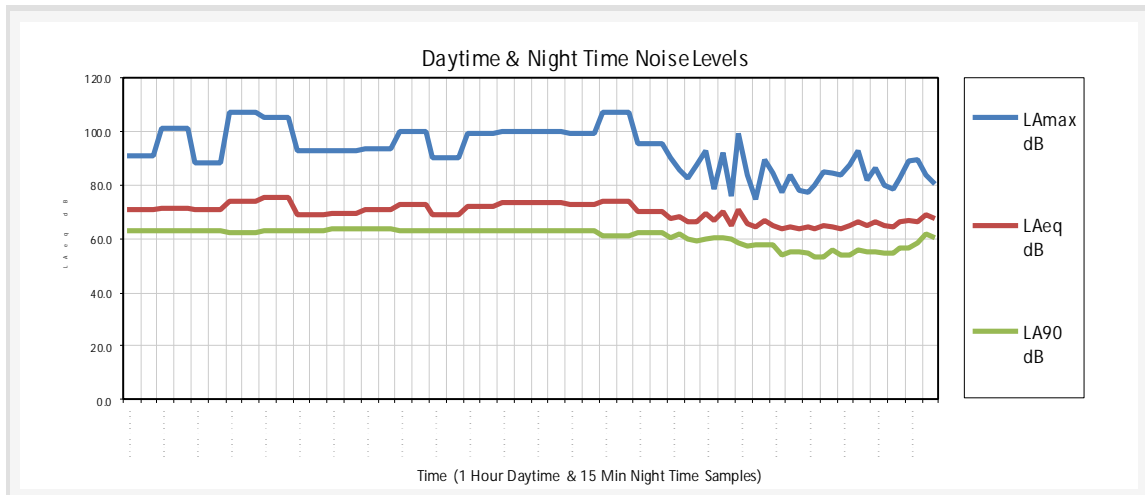
15 APPENDIX A - RESULTS

15.1 27th – 28th July 2023, Position 1

NOISE LEVEL SUMMARY ASSESSMENT				Octave Band Centre Frequency (Hz)								
Date / Time	LAeq	LAmx	LA90	63	125	250	500	1.0k	2.0k	4.0k	8.0k	16.0k
DAYTIME 07:00 - 23:00 <small>LAeq 16 HOUR & Corr responding LAmx 16 HOUR</small>	71.9	107.3	63.0	77.0	74.9	69.8	65.0	66.4	66.2	61.4	57.5	43.6
NIGHT TIME 23:00 - 07:00 <small>LAeq 8 HOUR & Corr responding LAmx 8 HOUR</small>	66.5	99.4	55.0	72.2	69.7	65.5	61.7	61.7	59.2	54.9	49.9	35.9

DAYTIME NOISE LEVELS 07:00 - 23:00 1 HOUR SAMPLES												
Date / Time	LAeq	LAmx	LA90	Octave Band Centre Frequency (Hz)								
				63	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
07:00 - 08:00	70.4	69.5	63.0	77.9	76.2	71.0	66.0	65.1	62.7	58.0	54.1	40.4
08:00 - 09:00	71.7	101.0	62.9	77.5	75.3	69.5	64.8	66.5	65.0	62.0	59.0	44.0
09:00 - 10:00	70.9	88.0	63.1	78.2	74.1	69.0	64.3	64.2	62.7	63.8	61.9	48.7
10:00 - 11:00	74.3	107.3	62.4	76.4	73.8	68.2	64.4	68.6	69.8	64.1	61.2	47.9
11:00 - 12:00	75.2	105.1	63.3	76.9	74.4	69.4	64.6	69.9	71.2	61.4	56.8	41.8
12:00 - 13:00	69.0	92.5	62.8	76.9	72.9	67.7	64.1	63.8	61.8	58.3	54.4	44.0
13:00 - 14:00	69.4	92.5	63.5	77.6	75.1	69.2	64.9	64.2	61.8	57.2	53.9	40.5
14:00 - 15:00	70.5	93.3	63.7	77.5	74.5	68.6	64.8	65.5	63.2	60.3	55.7	42.0
15:00 - 16:00	72.5	99.9	63.0	76.7	75.2	70.1	64.3	66.8	66.1	64.7	58.2	43.6
16:00 - 17:00	69.0	90.4	63.2	77.3	75.3	70.5	65.3	62.6	60.4	56.9	54.4	41.7
17:00 - 18:00	72.1	99.5	62.7	76.7	73.7	69.5	64.6	67.2	66.1	62.2	56.7	42.3
18:00 - 19:00	73.1	100.0	62.9	77.9	76.8	71.9	66.2	67.9	66.8	62.6	59.0	43.3
19:00 - 20:00	72.4	99.2	62.8	76.7	75.2	70.3	64.8	67.1	66.4	62.6	58.6	42.8
20:00 - 21:00	74.0	107.2	60.9	76.1	74.5	70.7	66.0	67.7	70.1	60.9	56.1	40.4
21:00 - 22:00	70.1	95.1	62.2	76.0	77.2	70.9	66.0	64.2	61.5	57.8	53.8	40.2
22:00 - 23:00	69.0	96.1	61.4	74.4	71.1	67.4	64.0	64.0	62.1	58.8	53.0	39.9

NIGHT TIME NOISE LEVELS 23:00 - 07:00 15 MINUTE SAMPLES												
Date / Time	LAeq	LAmx	LA90	Octave Band Centre Frequency (Hz)								
				63	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
23:00 - 23:15	67.2	90.3	60.1	74.2	69.1	65.5	63.3	62.6	59.3	56.6	49.6	36.3
23:15 - 23:30	67.9	85.4	61.6	74.1	73.2	66.4	63.5	63.3	60.3	55.2	50.4	36.2
23:30 - 23:45	66.4	82.2	59.9	73.8	68.1	64.6	62.5	62.2	58.8	53.3	48.5	34.2
23:45 - 00:00	66.4	87.4	59.4	73.7	68.6	63.6	61.1	61.9	58.9	56.8	49.3	35.7
00:00 - 00:15	69.7	92.8	59.4	73.7	72.3	70.8	64.7	64.7	61.5	58.0	52.3	36.1
00:15 - 00:30	67.0	78.5	60.7	74.7	69.8	65.3	62.5	62.6	59.6	54.4	50.4	36.8
00:30 - 00:45	70.1	91.8	60.7	75.1	77.8	74.6	66.7	63.1	59.1	53.4	49.3	37.6
00:45 - 01:00	65.1	76.1	59.5	71.8	66.0	62.6	60.2	61.4	57.9	51.5	46.7	32.6
01:00 - 01:15	71.0	99.4	58.3	70.6	65.9	62.0	60.6	63.6	66.4	64.3	56.2	40.2
01:15 - 01:30	65.5	83.5	57.3	70.1	67.4	62.6	60.6	61.6	58.2	52.6	49.3	37.1
01:30 - 01:45	64.6	74.9	57.7	70.5	64.5	61.4	59.5	61.0	57.4	50.9	47.3	32.1
01:45 - 02:00	66.8	89.4	58.0	70.0	65.2	62.0	60.1	62.5	60.8	56.8	49.6	34.1
02:00 - 02:15	64.7	84.1	57.9	68.6	64.7	62.6	59.5	60.8	57.9	51.6	46.5	32.1
02:15 - 02:30	63.4	76.9	54.0	70.7	65.9	61.4	58.7	59.6	55.9	49.3	45.2	30.1
02:30 - 02:45	64.4	83.9	54.9	69.4	64.7	61.8	59.2	60.7	57.1	50.2	45.3	30.3
02:45 - 03:00	63.4	78.1	55.0	69.7	64.0	61.1	58.3	59.5	56.2	49.9	46.6	31.1
03:00 - 03:15	64.5	77.4	54.5	73.6	69.9	62.5	59.7	60.1	56.9	51.3	47.2	36.4
03:15 - 03:30	63.5	79.6	53.0	68.1	62.7	60.1	58.3	59.8	56.4	50.7	46.8	30.9
03:30 - 03:45	64.6	85.1	53.3	71.0	71.9	64.7	59.7	59.9	56.4	49.5	44.6	31.1
03:45 - 04:00	64.4	84.1	56.1	70.1	65.6	62.8	59.6	60.5	57.0	50.5	45.1	29.5
04:00 - 04:15	63.8	83.4	53.6	69.1	67.1	61.3	58.8	59.7	56.6	51.6	47.3	35.7
04:15 - 04:30	65.1	87.8	53.8	70.9	67.0	63.5	59.9	61.0	58.1	52.6	48.8	33.9
04:30 - 04:45	66.4	92.9	55.6	70.7	64.8	64.0	65.6	61.4	57.3	51.2	47.3	30.1
04:45 - 05:00	64.7	81.5	55.5	68.3	64.0	60.5	59.6	60.7	57.7	52.7	49.1	34.2
05:00 - 05:15	66.0	86.1	55.0	71.3	73.3	64.6	60.8	61.3	57.9	52.3	47.7	32.2
05:15 - 05:30	64.8	79.8	54.7	71.9	69.2	63.4	59.7	60.3	57.4	51.7	47.0	31.4
05:30 - 05:45	64.4	78.7	54.6	73.2	67.9	61.8	60.0	60.0	57.1	52.2	48.6	36.2
05:45 - 06:00	66.5	82.4	56.8	74.0	71.0	66.5	61.5	61.8	58.8	53.2	49.6	36.4
06:00 - 06:15	66.9	88.8	56.4	70.7	71.5	66.5	62.6	62.2	59.7	53.5	48.9	32.4
06:15 - 06:30	66.3	89.6	58.5	72.3	68.5	64.3	60.9	62.2	59.4	54.1	48.9	34.0
06:30 - 06:45	68.8	83.4	61.5	74.2	70.5	67.5	63.9	63.9	61.1	58.0	56.9	44.6
06:45 - 07:00	67.7	80.7	60.6	74.9	68.8	66.2	63.5	63.1	60.4	55.9	52.7	37.8

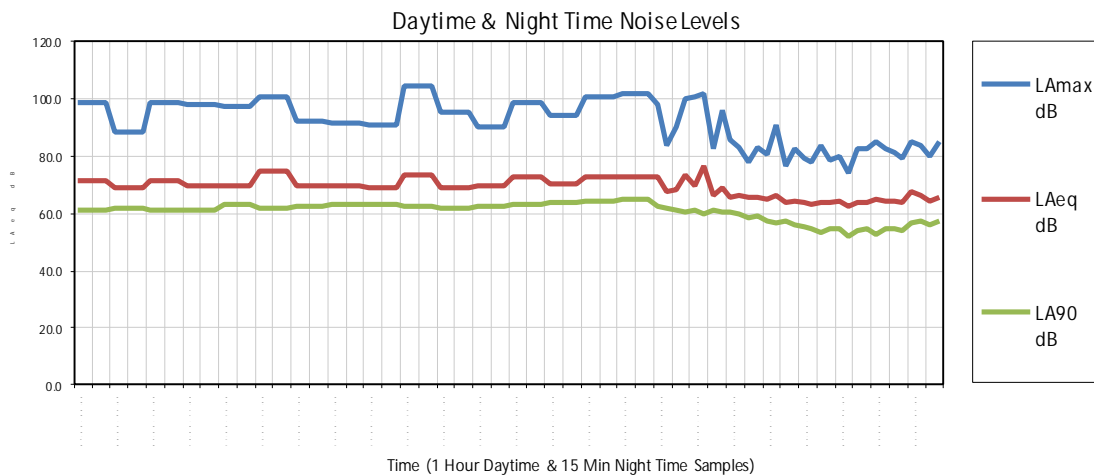


15.2 28th – 29th July 2023, Position 1

NOISE LEVEL SUMMARY ASSESSMENT				Octave Band Centre Frequency (Hz)								
Date / Time	LAeq	LAmx	LA90	63	125	250	500	1.0k	2.0k	4.0k	8.0k	16.0k
DAYTIME 07:00 - 23:00 <small>LAeq 16 HOUR & Cor r esponding LAmx 16 HOUR</small>	71.3	104.4	62.0	76.4	74.0	69.7	65.4	66.0	64.8	60.9	55.2	40.5
NIGHT TIME 23:00 - 07:00 <small>LAeq 8 HOUR & Cor r esponding LAmx 8 HOUR</small>	67.8	101.9	60.0	72.0	68.8	65.1	61.3	63.2	62.0	55.9	49.5	34.3

DAYTIME NOISE LEVELS 07:00 - 23:00 1 HOUR SAMPLES												
Date / Time	LAeq	LAmx	LA90	Octave Band Centre Frequency (Hz)								
				63	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
07:00 - 08:00	71.3	98.7	60.7	75.6	73.6	70.2	64.3	65.3	65.4	61.9	57.5	41.2
08:00 - 09:00	68.5	88.1	61.6	77.2	73.1	68.7	64.2	63.5	60.7	55.5	52.0	37.3
09:00 - 10:00	71.6	98.7	61.2	75.7	73.2	71.5	65.3	66.6	65.2	61.0	53.0	39.0
10:00 - 11:00	69.7	98.0	61.2	75.7	73.7	68.1	63.6	64.5	63.2	59.0	53.2	39.5
11:00 - 12:00	69.5	97.4	63.3	79.2	77.5	71.0	64.7	62.7	61.1	58.5	54.3	40.9
12:00 - 13:00	74.8	100.3	61.9	75.9	73.2	71.9	65.6	68.7	69.6	66.4	59.4	43.3
13:00 - 14:00	69.4	91.8	62.4	77.2	74.8	69.2	64.8	63.8	61.9	58.0	51.9	40.7
14:00 - 15:00	69.3	91.2	62.8	76.3	72.6	68.6	64.6	63.7	61.9	58.8	56.3	41.5
15:00 - 16:00	69.1	90.6	62.8	76.3	73.3	68.2	64.7	63.8	61.8	57.5	52.8	41.6
16:00 - 17:00	73.0	104.4	62.3	76.5	75.2	70.2	65.5	69.5	66.4	57.8	54.1	37.3
17:00 - 18:00	69.0	95.4	62.0	76.3	74.4	69.4	65.5	63.9	60.7	55.4	50.1	36.7
18:00 - 19:00	69.4	89.9	62.3	76.5	75.6	70.7	66.1	63.8	60.6	55.8	51.1	37.2
19:00 - 20:00	72.8	98.5	62.8	75.9	73.2	69.2	66.2	67.5	67.5	61.9	55.7	40.1
20:00 - 21:00	69.9	94.2	63.9	74.9	71.0	66.2	65.9	65.2	62.8	58.7	51.6	36.9
21:00 - 22:00	73.0	100.6	64.0	75.0	73.6	68.0	66.2	67.6	66.8	64.5	59.1	43.4
22:00 - 23:00	73.0	101.7	64.9	75.0	72.9	70.7	67.1	68.0	66.4	63.3	56.4	42.0

NIGHT TIME NOISE LEVELS 23:00 - 07:00 15 MINUTE SAMPLES												
Date / Time	LAeq	LAmx	LA90	Octave Band Centre Frequency (Hz)								
				63	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
23:00 - 23:15	72.8	98.0	62.6	74.6	71.8	73.7	67.4	68.4	65.6	61.0	53.4	36.9
23:15 - 23:30	67.3	83.8	62.0	75.0	69.0	64.8	63.2	63.0	60.0	54.2	50.4	36.4
23:30 - 23:45	67.9	89.9	60.9	74.2	69.9	65.0	63.1	64.2	60.0	55.9	49.2	34.2
23:45 - 00:00	73.6	99.8	60.2	73.7	70.8	68.7	63.1	66.0	68.5	67.2	58.6	39.3
00:00 - 00:15	69.3	100.2	60.9	73.1	69.6	66.0	64.5	66.3	60.4	56.1	51.6	37.1
00:15 - 00:30	76.5	101.9	60.0	74.2	68.7	64.3	62.2	71.7	73.1	58.1	51.0	36.9
00:30 - 00:45	66.4	82.5	61.1	72.6	68.1	64.0	62.3	62.2	59.0	53.4	48.2	32.3
00:45 - 01:00	69.0	95.9	60.5	74.2	69.3	64.5	62.1	63.4	64.5	57.7	51.5	36.4
01:00 - 01:15	65.9	85.5	60.2	72.1	66.9	63.3	60.8	61.8	58.4	54.6	48.6	34.7
01:15 - 01:30	66.4	83.2	59.8	72.6	71.0	65.1	61.9	62.1	58.6	52.8	48.3	35.3
01:30 - 01:45	65.7	77.9	58.6	73.6	70.1	64.4	60.8	61.7	58.0	52.0	47.5	33.0
01:45 - 02:00	65.6	83.0	58.9	72.1	69.3	64.5	60.2	61.2	58.1	53.2	48.6	33.2
02:00 - 02:15	64.9	80.5	57.2	70.8	68.2	62.6	60.1	60.9	57.9	51.9	46.7	32.0
02:15 - 02:30	66.4	90.5	56.5	71.0	68.7	65.2	62.8	61.4	58.8	54.7	51.5	36.5
02:30 - 02:45	63.6	76.5	56.9	67.9	64.1	60.6	58.4	60.3	56.2	48.8	44.6	32.7
02:45 - 03:00	64.5	82.6	55.6	69.6	65.2	63.3	60.0	60.6	56.9	50.3	45.1	31.8
03:00 - 03:15	63.7	79.4	55.2	70.0	68.1	62.8	58.6	59.8	56.1	48.8	43.9	27.9
03:15 - 03:30	62.8	77.9	54.5	69.4	63.9	60.2	57.7	59.1	55.8	49.3	44.4	32.5
03:30 - 03:45	63.6	83.7	53.4	68.0	66.8	64.9	58.8	59.5	55.3	49.2	44.9	33.6
03:45 - 04:00	63.4	78.8	54.6	68.6	65.0	63.3	58.7	59.6	55.8	48.5	43.7	31.6
04:00 - 04:15	64.0	79.9	54.7	70.2	68.8	64.1	58.0	59.9	56.3	49.9	46.3	31.1
04:15 - 04:30	62.2	74.1	52.1	66.7	64.2	59.3	56.8	58.7	54.7	48.2	45.2	30.5
04:30 - 04:45	63.7	82.1	53.7	68.0	64.5	59.9	58.5	59.9	56.6	51.3	46.8	33.0

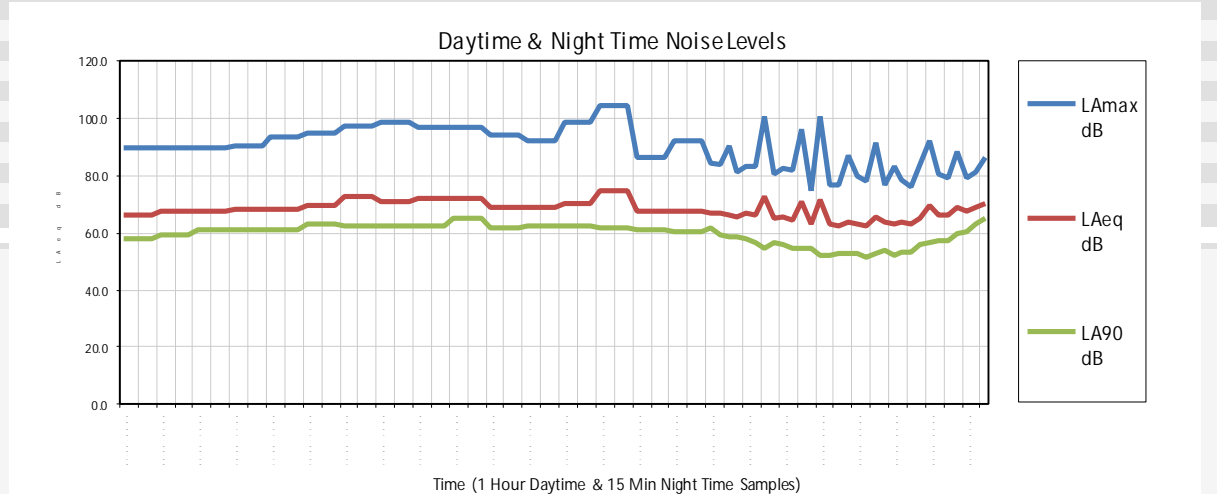


15.3 29th – 30th July 2023, Position 1

NOISE LEVEL SUMMARY ASSESSMENT				Octave Band Centre Frequency (Hz)								
Date / Time	LAeq	LAmx	LA90	63	125	250	500	1.0k	2.0k	4.0k	8.0k	16.0k
DAYTIME 07:00 - 23:00 <small>LAeq 16 HOUR & Cor r esponding LAmx 16 HOUR</small>	70.0	104.7	62.0	75.5	72.8	68.2	63.7	65.0	63.7	59.3	55.2	40.2
NIGHT TIME 23:00 - 07:00 <small>LAeq 8 HOUR & Cor r esponding LAmx 8 HOUR</small>	67.2	100.3	57.0	71.9	68.3	64.5	61.4	62.3	60.8	56.9	53.1	38.2

DAYTIME NOISE LEVELS 07:00 - 23:00 1 HOUR SAMPLES												
Date / Time	LAeq	LAmx	LA90	Octave Band Centre Frequency (Hz)								
				63	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
07:00 - 08:00	66.2	89.2	58.1	72.1	70.4	65.9	61.6	61.5	58.1	54.0	52.0	39.5
08:00 - 09:00	67.3	89.8	59.4	75.5	74.6	67.8	62.9	62.4	58.9	53.5	49.2	35.4
09:00 - 10:00	67.3	89.3	60.8	75.6	73.3	66.7	62.3	62.8	59.5	54.4	49.5	35.2
10:00 - 11:00	67.9	89.9	61.3	75.7	72.9	68.7	63.5	62.9	59.7	54.3	50.0	36.4
11:00 - 12:00	68.0	93.3	60.9	75.7	72.1	66.5	62.6	63.9	60.9	54.0	49.1	36.2
12:00 - 13:00	69.5	95.0	63.1	76.9	74.5	70.8	64.8	63.9	61.8	57.3	53.2	37.6
13:00 - 14:00	72.4	97.5	62.4	75.2	72.1	69.4	64.5	67.4	66.4	63.5	59.7	44.2
14:00 - 15:00	70.5	98.3	62.2	76.0	73.1	68.6	65.1	65.6	63.6	60.2	54.5	38.3
15:00 - 16:00	72.0	96.6	62.4	76.1	73.5	70.4	65.3	66.9	65.7	61.7	57.8	42.5
16:00 - 17:00	71.8	96.5	64.7	75.9	72.1	66.9	63.4	65.5	65.9	64.3	61.0	45.0
17:00 - 18:00	68.7	94.1	62.0	75.2	71.5	65.6	62.6	63.6	61.9	59.6	54.3	40.5
18:00 - 19:00	68.9	92.4	62.2	76.6	74.2	68.6	64.1	64.2	61.2	55.8	51.2	37.2
19:00 - 20:00	70.3	98.9	62.1	75.9	72.3	69.0	63.9	64.9	63.9	60.4	55.5	41.9
20:00 - 21:00	74.5	104.7	61.6	75.8	73.4	68.9	64.6	69.6	70.1	61.4	57.0	41.7
21:00 - 22:00	67.8	86.1	60.8	74.5	71.9	67.5	63.6	63.1	60.0	54.5	50.1	36.3
22:00 - 23:00	67.5	92.3	60.1	74.4	70.3	66.2	63.0	63.1	60.1	54.5	50.2	36.8

NIGHT TIME NOISE LEVELS 23:00 - 07:00 15 MINUTE SAMPLES												
Date / Time	LAeq	LAmx	LA90	Octave Band Centre Frequency (Hz)								
				63	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
23:00 - 23:15	67.0	84.2	61.4	74.4	69.5	64.7	61.9	63.1	59.8	53.8	49.6	35.9
23:15 - 23:30	66.6	83.5	59.1	73.3	68.8	63.9	62.0	62.3	59.4	53.6	49.4	35.4
23:30 - 23:45	66.4	90.2	58.6	72.5	71.1	64.7	61.0	62.4	58.7	52.0	47.5	33.6
23:45 - 00:00	65.5	80.9	58.4	70.7	69.2	62.9	60.4	61.6	58.0	51.9	47.4	34.9
00:00 - 00:15	66.6	83.0	57.9	73.2	69.5	63.9	61.3	62.2	59.7	54.1	50.3	36.5
00:15 - 00:30	66.0	83.1	56.8	70.0	67.9	64.7	62.2	61.8	58.5	52.6	48.2	33.6
00:30 - 00:45	72.8	100.3	54.6	70.2	65.3	61.5	60.1	65.0	68.7	65.5	61.8	45.7
00:45 - 01:00	65.1	80.3	56.7	70.9	66.5	62.5	60.4	61.1	57.8	52.9	47.7	33.4
01:00 - 01:15	65.8	82.1	55.7	71.3	71.9	65.8	61.9	61.0	57.6	51.8	47.7	32.7
01:15 - 01:30	64.5	81.7	54.8	70.1	65.3	61.7	59.9	60.5	57.3	51.7	47.2	33.9
01:30 - 01:45	70.6	95.8	54.7	68.1	61.6	59.0	57.5	64.6	64.6	63.8	61.7	45.0
01:45 - 02:00	63.0	74.6	54.5	69.5	64.3	60.7	58.0	59.3	55.7	49.2	44.5	29.1
02:00 - 02:15	71.5	100.3	52.1	70.3	67.6	64.0	59.6	65.0	67.1	63.3	55.1	40.3
02:15 - 02:30	62.7	76.8	52.2	68.8	62.3	60.0	57.9	58.9	55.6	49.5	44.6	31.4
02:30 - 02:45	62.4	76.4	52.5	66.6	61.8	58.2	57.3	59.0	55.2	49.2	44.4	31.0
02:45 - 03:00	63.4	87.0	52.5	70.7	65.9	61.6	58.4	58.9	55.8	53.1	48.3	35.6
03:00 - 03:15	63.2	79.7	52.9	70.0	65.8	60.0	58.8	59.2	55.9	50.0	45.4	29.8
03:15 - 03:30	62.0	77.9	51.5	68.3	64.2	59.7	57.1	58.4	54.6	47.9	45.1	27.7
03:30 - 03:45	65.4	91.5	52.5	66.5	61.9	58.1	57.2	60.8	60.2	55.6	48.6	30.2
03:45 - 04:00	63.6	76.4	54.1	69.8	63.2	60.4	58.3	59.8	56.6	51.4	46.9	30.8
04:00 - 04:15	63.0	83.3	52.1	66.6	61.4	59.0	58.5	59.2	56.1	50.2	44.1	29.5

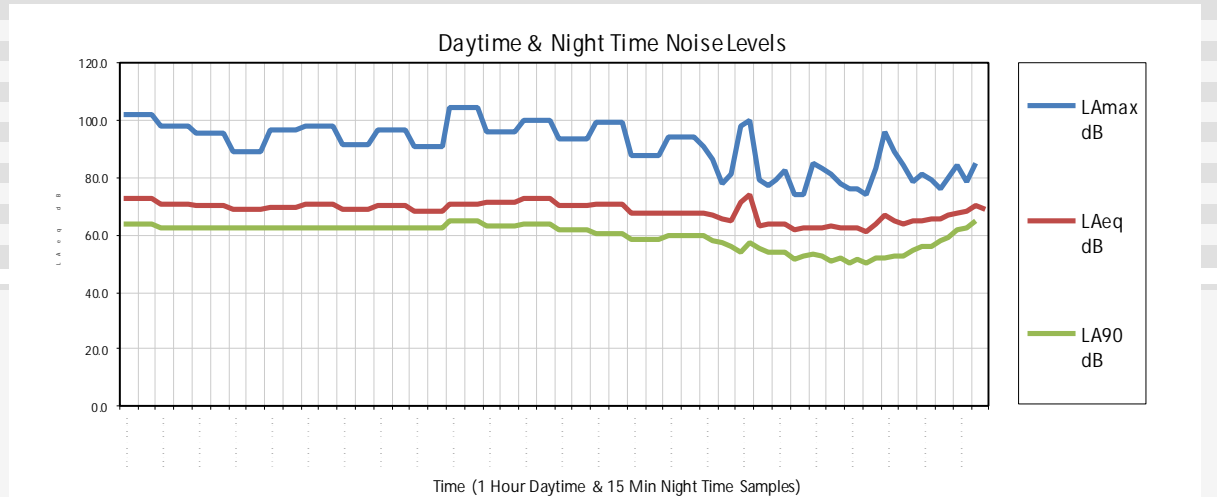


15.4 30th – 31st July 2023, Position 1

NOISE LEVEL SUMMARY ASSESSMENT				Octave Band Centre Frequency (Hz)								
Date / Time	LAeq	LAmx	LA90	63	125	250	500	1.0k	2.0k	4.0k	8.0k	16.0k
DAYTIME 07:00 - 23:00 <small>LAeq 16 HOUR & Cor r esponding LAmx 16 HOUR</small>	70.3	104.7	62.0	76.4	73.6	68.8	64.5	65.1	63.9	58.8	54.5	40.9
NIGHT TIME 23:00 - 07:00 <small>LAeq 8 HOUR & Cor r esponding LAmx 8 HOUR</small>	66.4	100.1	52.0	71.6	67.5	63.7	60.5	62.5	59.7	54.5	48.7	34.1

DAYTIME NOISE LEVELS 07:00 - 23:00 1 HOUR SAMPLES												
Date / Time	LAeq	LAmx	LA90	63	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
07:00 - 08:00	72.5	101.6	63.4	77.4	75.7	71.3	65.8	67.1	67.4	58.0	54.4	40.5
08:00 - 09:00	70.9	97.9	62.4	77.0	74.1	68.5	64.5	66.2	65.2	57.5	53.0	40.0
09:00 - 10:00	70.4	95.2	62.6	76.5	72.2	67.0	63.9	65.4	64.6	59.9	56.3	41.9
10:00 - 11:00	69.0	88.9	62.4	76.9	73.1	68.2	64.3	64.0	61.5	57.7	53.2	38.8
11:00 - 12:00	69.7	96.5	62.2	76.6	72.5	66.6	63.8	65.7	62.9	56.5	52.0	39.1
12:00 - 13:00	70.7	98.0	62.2	76.3	71.7	66.9	63.8	65.7	64.6	61.3	56.9	41.3
13:00 - 14:00	68.6	91.2	62.2	76.2	73.2	68.5	64.6	63.5	60.8	56.3	52.1	39.8
14:00 - 15:00	70.2	96.6	62.1	76.1	71.7	67.1	64.0	64.4	64.5	60.0	54.5	40.9
15:00 - 16:00	68.3	90.7	62.5	76.0	73.6	68.9	64.3	62.4	60.2	56.3	53.4	42.6
16:00 - 17:00	70.6	104.7	64.6	77.9	75.4	71.8	65.3	64.0	63.0	60.7	56.6	42.8
17:00 - 18:00	71.1	95.7	63.2	76.3	73.3	67.4	63.1	66.0	65.0	62.0	57.6	44.1
18:00 - 19:00	72.4	100.0	63.4	77.9	76.5	70.7	64.7	67.5	66.8	58.8	53.4	41.0
19:00 - 20:00	69.8	93.5	61.9	75.8	74.2	69.0	65.0	64.7	62.8	57.9	53.3	40.4
20:00 - 21:00	71.0	99.2	60.4	75.4	73.4	70.2	66.9	65.5	64.0	60.2	56.6	41.2
21:00 - 22:00	67.2	87.3	58.7	74.6	71.3	67.0	62.6	62.5	59.6	54.3	49.9	35.6
22:00 - 23:00	67.4	94.0	59.8	73.9	71.5	66.4	63.1	62.8	60.1	54.1	50.7	35.8

NIGHT TIME NOISE LEVELS 23:00 - 07:00 15 MINUTE SAMPLES												
Date / Time	LAeq	LAmx	LA90	63	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
23:00 - 23:15	67.3	90.6	59.7	73.0	70.6	67.2	64.2	62.4	59.2	53.9	49.2	34.2
23:15 - 23:30	66.6	86.2	58.0	73.8	71.7	67.2	61.8	61.8	58.9	53.3	48.0	33.6
23:30 - 23:45	65.3	77.7	57.5	72.2	66.3	62.5	60.4	61.4	58.2	52.1	47.5	33.4
23:45 - 00:00	65.0	81.3	55.9	72.4	67.0	62.2	60.0	60.8	57.9	53.2	48.6	35.5
00:00 - 00:15	71.1	98.1	54.2	70.6	66.1	61.6	59.8	65.5	65.7	64.1	54.3	37.1
00:15 - 00:30	74.2	100.1	57.4	72.3	67.1	64.1	62.6	71.9	68.4	56.8	49.1	34.5
00:30 - 00:45	62.9	79.1	55.5	68.1	62.8	59.6	57.6	59.3	55.9	49.3	44.4	28.8
00:45 - 01:00	63.9	77.5	54.1	70.7	64.5	61.0	59.1	60.0	56.6	50.6	46.7	32.5
01:00 - 01:15	63.5	79.3	53.8	70.5	64.2	60.3	58.5	59.5	56.6	51.0	46.1	30.2
01:15 - 01:30	63.8	82.1	54.1	70.6	66.0	61.6	58.8	59.7	56.6	50.8	44.6	29.8
01:30 - 01:45	61.8	73.9	51.4	68.0	63.8	58.4	56.5	57.8	54.9	49.1	44.1	30.1
01:45 - 02:00	62.3	73.8	52.9	68.4	64.1	60.3	56.9	58.7	55.0	48.4	43.8	28.7
02:00 - 02:15	62.5	84.7	53.2	69.3	63.4	61.0	58.2	58.4	55.0	48.9	44.2	27.8
02:15 - 02:30	62.6	82.9	52.8	69.4	63.1	59.0	56.7	59.0	55.6	50.7	44.2	31.4
02:30 - 02:45	62.8	81.0	50.6	68.4	64.2	58.7	57.6	58.8	56.0	50.8	47.5	33.6
02:45 - 03:00	62.4	78.1	52.0	68.1	62.7	59.4	58.2	58.5	55.0	49.1	45.0	30.3
03:00 - 03:15	62.3	75.7	50.0	69.1	63.2	58.3	56.9	58.7	55.3	48.9	43.5	30.9
03:15 - 03:30	62.3	76.2	51.6	69.3	62.8	58.9	57.0	58.6	55.3	49.1	42.6	27.3
03:30 - 03:45	61.1	73.8	50.3	67.3	60.8	57.4	55.8	57.5	54.2	47.3	42.8	27.5

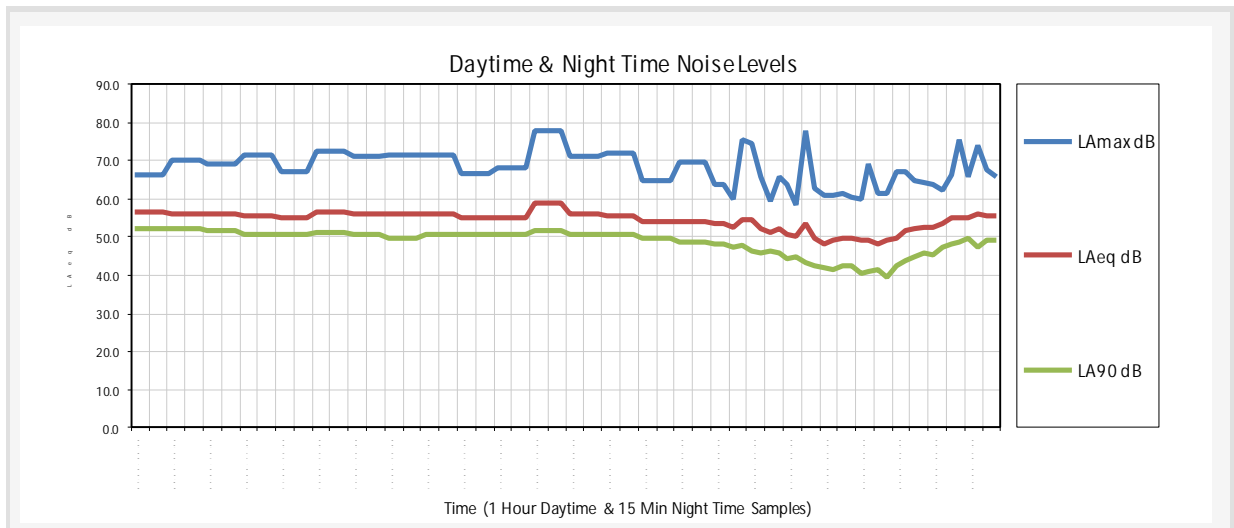


15.5 27th – 28th July 2023, Position 2

NOISE LEVEL SUMMARY ASSESSMENT				Octave Band Centre Frequency (Hz)								
Date / Time	LAeq	LAmx	LA90	63	125	250	500	1.0k	2.0k	4.0k	8.0k	16.0k
DAYTIME 07:00 - 23:00 <small>LAeq 16 HOUR & Corr responding LAmx 16 HOUR</small>	55.9	78.0	51.0	63.3	56.6	54.2	51.4	51.8	48.3	43.4	34.4	14.4
NIGHT TIME 23:00 - 07:00 <small>LAeq 8 HOUR & Corr responding LAmx 8 HOUR</small>	52.6	77.9	46.0	59.8	51.4	50.0	47.6	49.1	45.2	39.7	29.7	13.6

DAYTIME NOISE LEVELS 07:00 - 23:00 1 HOUR SAMPLES												
Date / Time	LAeq	LAmx	LA90	63	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
07:00 - 08:00	56.4	66.2	52.0	63.8	57.7	55.1	52.4	52.2	48.7	43.4	34.4	12.7
08:00 - 09:00	56.1	70.1	52.0	63.9	57.3	54.6	52.0	52.0	48.2	43.1	33.8	13.0
09:00 - 10:00	55.8	68.9	52.0	64.0	57.0	54.6	52.2	51.7	47.8	42.6	34.3	15.0
10:00 - 11:00	55.7	71.5	51.0	63.3	56.1	53.9	51.3	51.7	47.9	43.2	34.6	13.9
11:00 - 12:00	55.0	67.0	51.0	63.5	55.7	53.3	51.0	50.9	46.9	42.7	34.2	13.7
12:00 - 13:00	56.4	72.5	51.0	64.4	56.7	55.1	52.6	52.0	48.5	44.4	37.2	14.7
13:00 - 14:00	56.0	71.1	51.0	64.4	56.8	54.0	51.3	51.7	48.7	44.9	34.4	12.7
14:00 - 15:00	56.1	71.5	50.0	62.9	56.7	54.1	51.2	52.2	49.0	42.2	33.8	13.4
15:00 - 16:00	55.9	71.6	51.0	63.8	57.9	54.8	52.5	51.7	47.8	42.2	33.9	14.2
16:00 - 17:00	55.1	66.5	51.0	63.2	56.3	53.8	51.0	51.2	47.2	41.7	33.3	13.0
17:00 - 18:00	55.2	68.1	51.0	63.6	56.8	54.2	50.9	51.2	47.2	42.0	33.5	12.7
18:00 - 19:00	58.7	78.0	51.0	63.3	57.8	55.5	52.0	54.7	52.0	47.4	35.9	14.0
19:00 - 20:00	55.8	70.9	51.0	62.9	57.0	54.4	51.2	51.7	48.3	43.0	32.4	13.0
20:00 - 21:00	55.7	72.2	51.0	62.0	55.3	54.0	50.8	51.4	48.3	44.9	35.6	13.1
21:00 - 22:00	54.1	64.9	49.0	61.4	54.4	52.3	49.9	50.4	46.2	39.3	31.3	17.4
22:00 - 23:00	54.1	69.6	49.0	61.9	53.7	51.3	49.0	50.2	47.0	42.2	33.5	18.4

NIGHT TIME NOISE LEVELS 23:00 - 07:00 15 MINUTE SAMPLES												
Date / Time	LAeq	LAmx	LA90	63	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
23:00 - 23:15	53.4	63.7	48.0	60.9	53.6	51.4	48.0	49.9	45.9	39.2	31.4	18.1
23:15 - 23:30	53.4	63.5	48.0	61.1	54.5	51.6	48.5	50.0	45.6	38.4	30.1	17.3
23:30 - 23:45	52.7	60.1	47.0	61.1	51.7	49.7	47.5	49.4	45.1	38.1	30.2	17.7
23:45 - 00:00	54.6	75.3	48.0	61.8	51.1	49.2	47.6	50.0	47.7	47.0	34.3	17.4
00:00 - 00:15	54.3	74.2	46.0	60.8	51.9	49.7	47.7	51.0	48.1	39.7	30.9	17.3
00:15 - 00:30	52.1	65.9	46.0	59.3	50.5	48.2	46.2	48.6	45.3	39.9	30.5	16.8
00:30 - 00:45	51.2	59.2	46.0	59.2	49.8	47.9	45.8	48.1	43.7	36.1	28.7	17.4
00:45 - 01:00	51.9	65.6	46.0	59.1	51.7	51.0	47.2	48.3	44.0	37.5	29.7	16.1
01:00 - 01:15	50.6	63.9	45.0	57.4	47.9	47.5	45.3	47.4	43.0	36.6	25.0	10.0
01:15 - 01:30	50.3	58.4	45.0	56.7	47.3	46.9	44.8	47.3	42.8	34.9	24.5	10.0
01:30 - 01:45	53.7	77.9	43.0	55.9	46.5	46.0	44.5	49.9	47.4	44.9	32.9	10.9
01:45 - 02:00	49.9	62.8	42.0	58.0	47.1	46.0	44.9	46.8	42.1	35.2	25.1	10.0
02:00 - 02:15	48.1	60.6	42.0	56.4	45.1	44.3	42.6	45.3	40.5	32.5	22.8	9.8
02:15 - 02:30	49.0	60.7	41.0	55.8	46.2	45.5	43.9	46.0	41.2	33.1	23.0	9.9
02:30 - 02:45	49.5	61.4	42.0	57.1	48.4	46.2	44.8	46.2	42.1	34.9	25.8	10.1
02:45 - 03:00	49.9	60.5	43.0	56.9	48.3	46.4	45.9	46.7	42.1	34.1	24.1	12.2
03:00 - 03:15	49.4	59.8	40.0	57.7	47.5	46.1	44.8	46.2	41.6	34.2	24.1	9.9
03:15 - 03:30	49.3	68.9	41.0	56.7	46.0	44.8	43.9	46.2	41.9	35.7	25.5	10.0
03:30 - 03:45	48.3	61.1	42.0	54.8	44.9	44.5	42.8	45.6	40.6	32.4	22.5	9.8
03:45 - 04:00	49.2	61.1	40.0	57.5	46.1	45.2	44.0	46.2	41.6	34.3	25.2	10.0
04:00 - 04:15	49.9	67.3	42.0	57.6	46.4	45.7	44.4	46.7	42.5	37.6	26.1	10.1
04:15 - 04:30	51.4	67.2	44.0	57.3	49.2	47.7	46.1	48.3	43.7	38.0	27.2	10.1
04:30 - 04:45	52.1	64.5	45.0	59.3	53.5	51.4	47.0	48.3	44.2	38.4	27.9	11.4
04:45 - 05:00	52.7	64.3	46.0	60.1	51.1	49.7	47.6	49.3	45.1	38.6	29.1	10.5
05:00 - 05:15	52.5	63.6	45.0	59.1	51.1	49.5	47.6	49.2	44.9	37.9	27.8	10.2
05:15 - 05:30	53.6	62.5	47.0	60.2	52.8	50.8	48.6	50.4	45.9	38.7	29.2	10.7
05:30 - 05:45	54.9	66.4	48.0	61.4	55.1	53.3	50.4	51.3	47.4	40.3	31.4	13.2
05:45 - 06:00	55.1	75.5	49.0	60.7	52.3	51.0	49.1	52.0	47.7	42.6	32.0	12.2
06:00 - 06:15	54.8	65.7	50.0	62.4	54.8	52.4	50.0	51.3	47.2	41.0	32.0	13.0
06:15 - 06:30	56.1	73.7	47.0	62.2	54.8	57.0	52.9	51.6	47.4	42.0	33.1	11.5
06:30 - 06:45	55.6	67.7	49.0	63.0	54.5	52.7	51.2	51.9	48.1	43.1	33.8	12.4
06:45 - 07:00	55.5	65.8	49.0	64.7	55.8	53.2	51.3	51.7	47.6	42.0	33.1	12.3

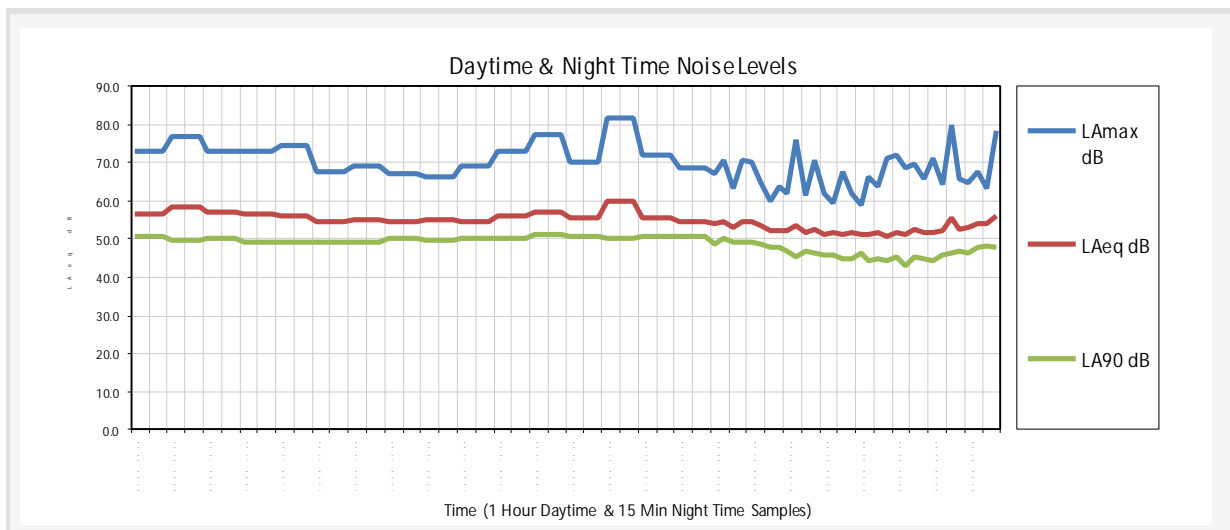


15.6 28th – 29th July 2023, Position 2

NOISE LEVEL SUMMARY ASSESSMENT				Octave Band Centre Frequency (Hz)								
Date / Time	LAeq	LAmx	LA90	63	125	250	500	1.0k	2.0k	4.0k	8.0k	16.0k
DAYTIME 07:00 - 23:00 <small>LAeq 16 HOUR & Corr responding LAmx 16 HOUR</small>	56.2	81.7	50.0	63.1	56.4	54.0	51.3	51.8	49.6	43.8	36.6	16.7
NIGHT TIME 23:00 - 07:00 <small>LAeq 8 HOUR & Corr responding LAmx 8 HOUR</small>	52.9	80.0	46.0	59.3	52.1	50.5	48.1	49.5	45.4	38.7	29.7	14.4

DAYTIME NOISE LEVELS 07:00 - 23:00 1 HOUR SAMPLES												
Date / Time	LAeq	LAmx	LA90	Octave Band Centre Frequency (Hz)								
				63	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
07:00 - 08:00	56.2	72.9	51.0	63.6	56.7	54.0	51.6	51.9	48.8	45.3	37.0	14.6
08:00 - 09:00	58.3	77.0	50.0	62.4	54.6	52.7	50.5	53.6	53.9	44.6	37.9	16.7
09:00 - 10:00	57.0	73.2	50.0	63.0	56.1	53.4	51.9	52.3	49.4	48.1	41.3	17.4
10:00 - 11:00	56.5	73.2	49.0	62.8	55.3	53.2	51.3	51.4	48.8	48.0	43.5	22.6
11:00 - 12:00	56.1	74.4	49.0	62.8	56.8	54.6	53.1	51.4	47.9	44.1	34.8	13.2
12:00 - 13:00	54.5	67.4	49.0	62.9	54.7	52.5	50.2	50.6	46.7	41.8	33.1	12.3
13:00 - 14:00	55.0	69.1	49.0	63.4	56.0	53.8	51.8	50.9	46.8	41.0	32.5	12.2
14:00 - 15:00	54.7	66.9	50.0	63.2	56.7	53.9	50.9	50.6	46.5	41.5	33.1	13.8
15:00 - 16:00	54.8	66.1	50.0	63.6	56.5	54.2	50.8	50.7	46.5	41.1	32.9	13.1
16:00 - 17:00	54.7	68.9	50.0	63.5	57.0	54.7	50.9	50.4	46.4	40.6	31.8	12.2
17:00 - 18:00	55.8	73.1	50.0	63.0	56.4	53.4	50.5	51.9	49.2	41.3	32.3	13.0
18:00 - 19:00	56.9	77.3	51.0	64.1	57.6	54.7	51.4	52.7	50.1	45.1	35.8	14.3
19:00 - 20:00	55.3	70.1	50.0	64.1	57.3	55.3	51.3	51.1	46.9	41.0	33.2	15.7
20:00 - 21:00	59.7	81.7	50.0	62.7	57.3	54.8	51.8	55.2	55.3	41.8	31.4	14.6
21:00 - 22:00	55.4	72.1	51.0	62.2	56.6	54.2	51.4	51.1	47.7	42.3	33.8	19.3
22:00 - 23:00	54.4	68.4	51.0	61.5	54.8	52.9	50.4	50.4	46.2	41.8	34.9	20.8

NIGHT TIME NOISE LEVELS 23:00 - 07:00 15 MINUTE SAMPLES												
Date / Time	LAeq	LAmx	LA90	Octave Band Centre Frequency (Hz)								
				63	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
23:00 - 23:15	54.0	67.1	49.0	60.3	53.6	53.4	48.6	50.4	46.2	41.3	34.0	20.0
23:15 - 23:30	54.4	70.3	50.0	61.5	54.0	51.9	48.9	50.7	47.2	41.8	33.1	19.7
23:30 - 23:45	53.2	63.3	49.0	60.8	54.1	51.3	48.5	49.8	45.4	37.9	30.7	19.3
23:45 - 00:00	54.5	70.4	49.0	62.0	54.0	52.4	49.3	50.4	48.2	38.7	32.3	19.4
00:00 - 00:15	54.4	69.9	49.0	59.8	54.7	52.6	50.8	50.7	46.3	38.4	30.6	18.4
00:15 - 00:30	53.4	64.7	49.0	60.0	54.3	51.5	48.8	49.8	45.5	38.8	31.2	17.9
00:30 - 00:45	52.3	60.1	48.0	59.5	50.9	49.1	46.9	49.2	44.8	37.1	28.9	16.6
00:45 - 01:00	52.3	63.6	48.0	58.8	50.3	49.0	46.9	49.4	44.7	36.4	29.0	16.7
01:00 - 01:15	52.2	61.7	47.0	57.0	49.6	49.0	46.9	49.3	44.7	36.0	28.3	15.0
01:15 - 01:30	53.7	75.7	46.0	58.9	57.1	53.8	49.2	49.7	45.4	40.8	31.3	10.4
01:30 - 01:45	51.6	61.3	47.0	57.1	48.2	47.5	45.5	48.8	44.4	35.9	25.6	10.2
01:45 - 02:00	52.5	70.6	47.0	58.2	49.0	48.3	46.6	49.5	45.3	39.0	29.6	10.5
02:00 - 02:15	51.2	61.8	46.0	57.3	48.4	47.3	45.8	48.2	43.7	36.3	27.7	10.9
02:15 - 02:30	51.5	59.3	46.0	57.4	47.9	47.7	46.1	48.7	43.9	35.9	26.3	10.1
02:30 - 02:45	51.0	67.5	45.0	58.3	47.9	47.7	45.3	48.0	43.7	35.9	26.1	10.0
02:45 - 03:00	51.4	61.7	45.0	57.7	49.2	47.2	45.8	48.6	44.0	35.6	26.3	10.1
03:00 - 03:15	51.2	58.7	46.0	58.4	51.6	48.9	45.6	48.2	43.5	34.6	24.5	9.9
03:15 - 03:30	51.2	66.1	44.0	58.3	48.9	48.5	45.9	48.1	43.7	36.0	25.8	10.0
03:30 - 03:45	51.5	63.7	45.0	56.8	48.2	47.5	45.8	48.6	44.1	36.5	26.7	10.2
03:45 - 04:00	50.8	70.8	44.0	56.0	50.3	46.5	44.6	47.3	43.6	40.2	28.3	10.2
04:00 - 04:15	51.6	72.1	45.0	63.4	50.3	47.4	46.3	48.7	44.1	36.2	25.9	10.0
04:15 - 04:30	51.1	68.4	43.0	60.6	48.0	46.5	44.8	47.8	44.1	39.1	27.1	10.5
04:30 - 04:45	52.6	69.7	45.0	58.2	49.8	48.8	47.6	49.0	45.0	41.0	27.1	10.3
04:45 - 05:00	51.5	65.8	45.0	56.5	48.1	47.5	46.1	48.4	44.2	37.4	27.1	10.9
05:00 - 05:15	51.8	70.8	45.0	56.8	50.7	48.5	46.0	48.4	44.9	38.2	29.0	10.4
05:15 - 05:30	52.3	64.3	46.0	58.9	52.5	49.1	46.9	49.3	44.7	37.1	27.7	10.1
05:30 - 05:45	55.6	80.0	46.0	58.0	54.1	54.7	53.8	50.9	46.7	40.6	31.7	11.4
05:45 - 06:00	52.7	65.6	47.0	59.7	53.0	51.3	48.4	49.2	44.7	37.7	29.1	11.2
06:00 - 06:15	53.3	64.5	46.0	58.1	51.8	50.1	47.5	49.9	46.3	39.4	30.2	11.6
06:15 - 06:30	54.2	67.8	48.0	58.9	52.0	50.4	48.3	50.8	47.2	41.4	30.8	11.5
06:30 - 06:45	54.0	63.2	48.0	60.7	52.8	51.5	48.7	50.8	46.5	39.2	30.1	10.9
06:45 - 07:00	56.2	78.3	48.0	60.7	56.1	55.0	52.7	51.7	49.2	42.1	34.0	12.7

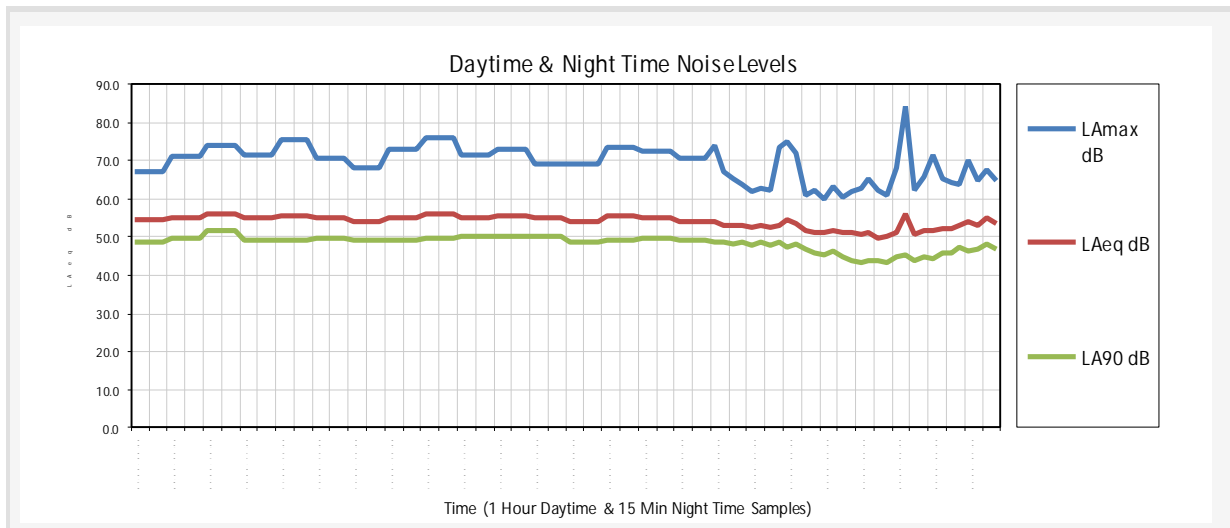


15.7 29th – 30th July 2023, Position 2

NOISE LEVEL SUMMARY ASSESSMENT				Octave Band Centre Frequency (Hz)								
Date / Time	LAeq	LAmx	LA90	63	125	250	500	1.0k	2.0k	4.0k	8.0k	16.0k
DAYTIME 07:00 - 23:00 <small>LAeq 16 HOUR & Corr responding LAmx 16 HOUR</small>	55.1	75.6	49.0	62.1	55.6	53.3	50.2	51.1	47.6	43.1	33.7	14.0
NIGHT TIME 23:00 - 07:00 <small>LAeq 8 HOUR & Corr responding LAmx 8 HOUR</small>	52.6	83.9	49.0	57.6	51.2	49.6	47.2	49.6	45.0	37.6	28.1	11.1

DAYTIME NOISE LEVELS 07:00 - 23:00 1 HOUR SAMPLES												
Date / Time	LAeq	LAmx	LA90	Octave Band Centre Frequency (Hz)								
				63	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
07:00 - 08:00	54.4	67.0	49.0	61.0	54.4	52.2	49.8	50.8	46.7	40.4	32.4	12.4
08:00 - 09:00	55.0	71.3	50.0	61.2	54.7	52.7	50.2	51.1	47.5	43.3	35.2	14.8
09:00 - 10:00	56.2	74.0	52.0	61.4	54.8	52.2	49.6	51.5	49.5	47.7	38.6	17.6
10:00 - 11:00	55.2	71.7	49.0	61.5	54.2	52.1	49.3	51.0	48.1	45.6	36.4	13.9
11:00 - 12:00	55.6	75.2	49.0	62.8	56.3	52.9	49.7	51.6	49.1	42.4	33.4	12.8
12:00 - 13:00	55.0	70.5	50.0	62.4	55.4	53.0	50.8	51.1	47.2	42.2	32.5	12.1
13:00 - 14:00	54.0	68.3	49.0	63.4	55.8	53.2	49.8	50.2	45.8	39.6	31.0	12.2
14:00 - 15:00	55.1	72.8	49.0	63.5	56.1	53.5	50.5	50.8	47.5	43.8	33.2	13.7
15:00 - 16:00	55.8	75.6	50.0	63.0	55.9	53.7	50.8	51.9	48.7	43.2	31.8	12.1
16:00 - 17:00	54.9	71.5	50.0	62.7	55.4	53.2	50.0	50.9	47.1	43.4	33.9	13.5
17:00 - 18:00	55.4	72.8	50.0	62.0	56.5	54.4	50.9	51.6	47.2	42.3	32.5	13.6
18:00 - 19:00	55.0	69.2	50.0	62.3	55.9	53.9	50.5	51.2	47.1	41.2	32.9	13.0
19:00 - 20:00	54.2	68.9	49.0	62.1	55.7	53.4	49.8	50.5	46.2	39.7	30.9	13.4
20:00 - 21:00	55.4	73.7	49.0	61.1	56.2	54.4	50.9	51.3	47.6	43.0	33.1	12.9
21:00 - 22:00	55.0	72.5	49.0	60.8	56.8	54.5	50.4	50.7	47.5	43.2	31.1	16.3
22:00 - 23:00	54.0	70.4	49.0	60.1	54.1	52.2	49.5	50.3	46.5	39.3	29.0	14.3

NIGHT TIME NOISE LEVELS 23:00 - 07:00 15 MINUTE SAMPLES												
Date / Time	LAeq	LAmx	LA90	Octave Band Centre Frequency (Hz)								
				63	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
23:00 - 23:15	53.8	74.1	49.0	60.1	56.2	52.9	49.3	49.8	46.4	40.0	28.9	14.2
23:15 - 23:30	53.3	67.3	49.0	60.3	56.0	52.0	48.5	49.9	45.5	37.6	27.4	12.6
23:30 - 23:45	52.9	65.3	48.0	58.8	51.4	50.3	48.0	49.7	45.3	37.5	27.0	11.0
23:45 - 00:00	52.9	63.8	49.0	59.7	54.4	51.4	48.0	49.6	45.0	37.2	27.6	11.6
00:00 - 00:15	52.8	61.6	48.0	59.0	51.5	49.9	47.7	49.7	45.3	37.1	27.0	12.6
00:15 - 00:30	53.0	62.7	49.0	59.2	51.0	50.2	48.0	49.8	45.2	37.8	28.2	11.0
00:30 - 00:45	52.6	62.1	48.0	58.2	49.9	48.9	46.9	49.7	45.2	36.8	26.2	10.0
00:45 - 01:00	53.3	73.6	49.0	59.8	51.5	50.0	47.7	50.3	45.7	38.6	29.0	10.2
01:00 - 01:15	54.3	75.1	47.0	56.8	49.5	49.0	46.9	50.9	48.7	39.4	26.6	10.6
01:15 - 01:30	53.6	71.9	48.0	56.6	48.8	48.6	47.0	50.8	46.6	39.5	28.9	10.2
01:30 - 01:45	51.7	61.0	47.0	56.5	49.0	48.0	46.2	48.8	44.1	35.9	27.3	10.4
01:45 - 02:00	51.3	62.5	46.0	54.6	50.4	47.7	45.6	48.4	43.8	36.1	26.8	10.1
02:00 - 02:15	51.0	59.7	45.0	56.5	47.6	47.1	45.3	48.3	43.5	34.7	23.9	9.8
02:15 - 02:30	51.5	63.4	46.0	55.4	47.4	47.8	45.7	48.9	43.8	34.8	25.0	9.9
02:30 - 02:45	51.1	60.5	45.0	55.9	47.6	47.1	45.4	48.4	43.5	35.1	26.4	10.3
02:45 - 03:00	51.2	61.9	44.0	55.3	47.5	47.2	45.6	48.6	43.6	35.1	25.1	9.9
03:00 - 03:15	50.4	62.6	43.0	54.6	47.1	46.8	45.0	47.6	42.8	34.2	24.9	9.9
03:15 - 03:30	50.9	65.0	44.0	53.6	46.7	46.5	45.0	48.1	43.4	35.1	26.2	10.1
03:30 - 03:45	49.9	62.3	44.0	54.8	46.3	45.5	43.9	47.2	42.6	34.5	25.8	10.0
03:45 - 04:00	50.0	60.6	43.0	54.9	46.9	46.1	44.3	47.2	42.5	34.2	25.2	9.9
04:00 - 04:15	51.3	68.3	45.0	56.8	46.9	46.2	44.7	48.1	44.1	38.8	30.2	10.8
04:15 - 04:30	56.0	83.9	45.0	62.8	52.0	50.3	47.4	54.4	46.9	38.4	28.7	10.4
04:30 - 04:45	50.7	62.5	44.0	55.2	47.9	47.0	45.3	47.6	43.4	36.4	26.8	10.1
04:45 - 05:00	51.5	65.8	45.0	54.0	49.1	49.7	47.1	48.4	43.3	35.6	24.6	9.9
05:00 - 05:15	51.4	71.3	44.0	56.8	50.6	47.6	45.0	47.9	45.0	36.9	27.6	11.0
05:15 - 05:30	52.3	65.1	46.0	55.5	48.7	48.0	46.4	49.3	45.0	38.6	30.1	11.5
05:30 - 05:45	52.2	64.4	46.0	56.2	48.9	48.2	46.0	49.1	45.1	38.0	28.9	11.2
05:45 - 06:00	53.0	63.5	47.0	57.3	52.9	50.9	48.8	49.5	44.9	37.6	28.4	11.1
06:00 - 06:15	54.1	69.9	46.0	56.2	53.3	52.5	49.5	50.5	46.2	40.9	31.0	11.4
06:15 - 06:30	53.0	64.6	47.0	58.5	51.7	50.2	47.7	49.9	45.5	38.2	29.0	11.2
06:30 - 06:45	54.9	67.5	48.0	57.2	53.7	53.2	50.8	51.3	46.9	41.4	32.5	14.2
06:45 - 07:00	53.5	64.9	47.0	57.5	54.6	52.9	49.5	49.8	45.0	38.6	32.1	11.2

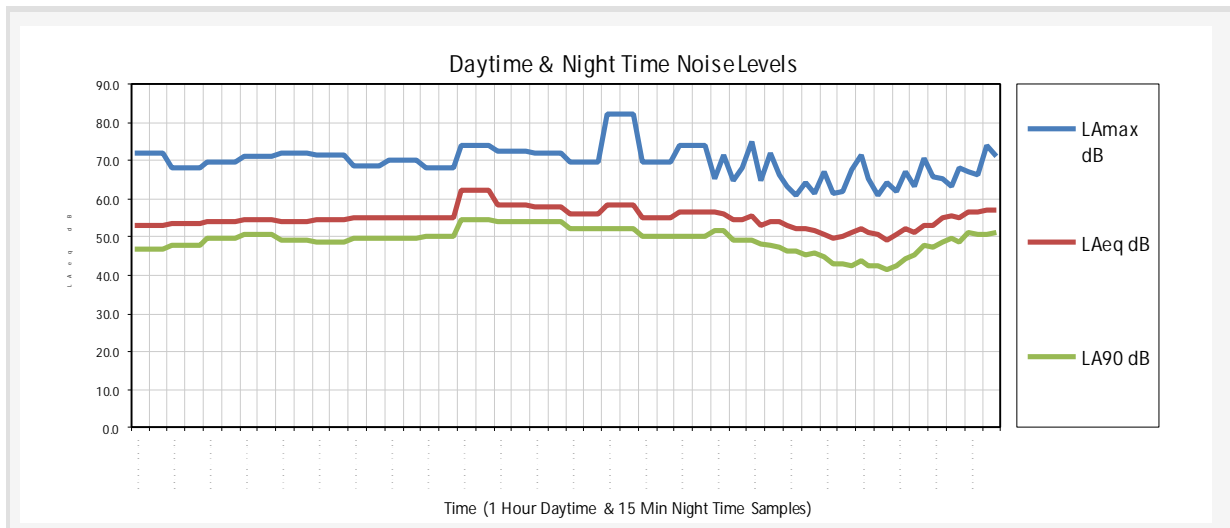


15.8 30th – 31st July 2023, Position 2

NOISE LEVEL SUMMARY ASSESSMENT				Octave Band Centre Frequency (Hz)								
Date / Time	LAeq	LAmx	LA90	63	125	250	500	1.0k	2.0k	4.0k	8.0k	16.0k
DAYTIME 07:00 - 23:00 <small>LAeq 16 HOUR & Corr responding LAmx 16 HOUR</small>	56.6	82.0	50.0	61.9	56.3	54.3	50.8	51.4	49.2	48.2	44.3	28.6
NIGHT TIME 23:00 - 07:00 <small>LAeq 8 HOUR & Corr responding LAmx 8 HOUR</small>	53.8	74.9	49.0	58.4	51.9	50.3	48.1	49.9	46.9	43.0	34.7	16.5

DAYTIME NOISE LEVELS 07:00 - 23:00 1 HOUR SAMPLES												
Date / Time	LAeq	LAmx	LA90	Octave Band Centre Frequency (Hz)								
				63	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
07:00 - 08:00	53.2	72.1	47.0	58.6	52.8	51.2	47.8	49.7	45.7	40.0	31.0	12.3
08:00 - 09:00	53.7	68.1	48.0	61.5	53.1	51.8	49.7	50.0	45.4	40.6	32.6	12.0
09:00 - 10:00	54.1	69.6	50.0	62.2	55.4	52.6	49.6	50.6	45.9	39.9	32.7	14.7
10:00 - 11:00	54.6	71.0	51.0	62.9	56.5	54.3	51.3	50.6	45.6	40.2	32.7	13.8
11:00 - 12:00	53.9	72.0	49.0	62.9	55.3	52.9	49.5	49.9	45.6	41.4	36.4	14.3
12:00 - 13:00	54.6	71.4	49.0	61.9	55.6	53.4	50.3	50.7	46.6	41.3	31.9	13.1
13:00 - 14:00	55.1	68.7	50.0	61.4	56.8	55.3	51.1	51.0	46.6	40.4	32.1	13.1
14:00 - 15:00	55.2	70.2	50.0	61.8	56.3	54.7	50.9	51.2	47.2	41.9	34.0	13.3
15:00 - 16:00	55.1	68.3	50.0	60.7	55.5	53.7	50.1	51.0	47.5	43.6	35.3	15.4
16:00 - 17:00	62.1	73.8	54.0	63.5	57.0	54.5	51.9	52.4	53.6	57.8	55.1	39.8
17:00 - 18:00	58.5	72.6	54.0	63.9	57.9	55.7	52.3	52.2	51.1	51.6	46.7	30.2
18:00 - 19:00	58.1	72.2	54.0	61.6	58.2	56.7	52.6	52.1	50.8	50.1	44.9	27.5
19:00 - 20:00	56.2	69.6	52.0	61.4	56.5	54.6	50.9	51.7	48.9	45.9	37.7	19.4
20:00 - 21:00	58.3	82.0	52.0	61.4	57.0	54.6	51.3	53.7	53.3	43.7	34.8	15.2
21:00 - 22:00	55.0	69.5	50.0	61.0	56.2	53.2	49.7	51.0	48.0	41.5	31.8	12.0
22:00 - 23:00	56.5	73.7	50.0	60.7	57.0	55.3	50.4	52.4	50.2	42.0	32.5	15.8

NIGHT TIME NOISE LEVELS 23:00 - 07:00 15 MINUTE SAMPLES												
Date / Time	LAeq	LAmx	LA90	Octave Band Centre Frequency (Hz)								
				63	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
23:00 - 23:15	56.3	65.0	52.0	58.3	51.8	50.6	48.5	51.1	50.0	48.8	41.1	25.6
23:15 - 23:30	56.2	71.6	52.0	58.7	51.0	49.8	48.1	51.3	50.1	48.3	40.7	23.0
23:30 - 23:45	54.6	64.6	49.0	59.3	53.1	50.3	47.5	50.3	48.1	45.6	37.2	17.6
23:45 - 00:00	54.3	68.3	49.0	60.1	52.9	49.5	47.8	50.2	47.5	44.7	37.6	20.0
00:00 - 00:15	55.7	74.9	49.0	58.8	53.4	50.9	47.7	51.6	49.0	47.2	37.9	19.3
00:15 - 00:30	53.0	64.5	48.0	57.4	49.6	47.9	46.4	49.2	46.5	42.6	33.7	12.2
00:30 - 00:45	54.1	72.1	48.0	57.4	49.8	48.3	47.3	50.9	47.4	42.2	33.7	12.6
00:45 - 01:00	53.8	66.2	47.0	58.4	50.5	48.8	47.8	50.2	46.8	42.9	36.3	18.9
01:00 - 01:15	53.0	63.1	46.0	56.9	48.9	47.7	46.2	49.2	46.3	43.0	34.2	18.5
01:15 - 01:30	52.1	60.8	47.0	55.1	49.3	46.7	44.7	48.1	45.6	42.6	33.7	13.3
01:30 - 01:45	51.9	64.4	45.0	54.6	47.5	46.1	45.1	47.9	45.1	42.7	36.1	18.5
01:45 - 02:00	51.5	61.1	46.0	55.3	49.0	46.0	44.6	47.7	44.9	41.5	33.3	14.8
02:00 - 02:15	50.7	67.1	45.0	53.5	46.2	45.2	43.7	47.1	43.9	40.7	33.8	16.4
02:15 - 02:30	49.5	61.1	43.0	51.6	45.9	44.4	42.8	45.8	42.8	39.3	30.2	11.7
02:30 - 02:45	50.2	61.8	43.0	56.4	47.4	45.2	43.9	46.6	43.5	39.4	30.6	11.0
02:45 - 03:00	51.0	67.7	42.0	52.9	46.2	45.2	43.8	47.7	44.5	38.4	29.1	10.8
03:00 - 03:15	52.1	71.5	44.0	53.8	47.1	46.1	44.7	48.1	46.1	42.0	31.1	10.8
03:15 - 03:30	50.9	65.3	42.0	53.9	45.8	46.2	45.8	47.4	43.7	38.8	29.8	10.8
03:30 - 03:45	50.4	60.6	42.0	53.4	45.9	44.9	43.8	47.2	43.7	37.6	28.9	11.2
03:45 - 04:00	49.3	64.4	41.0	52.6	45.3	44.4	43.0	46.0	42.4	37.8	28.5	10.6
04:00 - 04:15	50.8	61.7	42.0	54.0	47.1	46.9	44.7	47.4	43.9	38.5	29.7	10.6
04:15 - 04:30	52.2	67.2	44.0	56.3	48.9	47.7	45.8	48.7	45.5	40.6	31.1	11.1
04:30 - 04:45	51.3	63.4	45.0	58.4	50.2	47.1	45.4	47.9	44.3	38.9	30.3	12.4
04:45 - 05:00	53.1	70.4	48.0	57.0	51.0	49.8	47.1	49.5	46.1	42.0	32.0	11.2
05:00 - 05:15	53.1	65.9	47.0	57.5	50.3	49.0	47.0	49.7	46.1	40.5	31.1	10.9
05:15 - 05:30	55.0	65.4	49.0	62.1	55.3	52.5	49.6	51.4	47.7	41.9	32.9	13.1
05:30 - 05:45	55.3	63.4	50.0	60.2	53.4	52.1	49.9	52.0	48.1	41.5	32.2	11.4
05:45 - 06:00	55.2	68.0	49.0	61.8	54.0	51.6	49.7	51.9	48.1	41.4	32.2	12.6
06:00 - 06:15	56.4	67.3	51.0	61.7	56.9	54.3	52.0	52.5	48.8	43.1	34.3	13.1
06:15 - 06:30	56.5	66.4	50.0	62.1	56.7	55.2	52.5	52.7	48.6	42.7	34.0	12.3
06:30 - 06:45	57.1	73.7	50.0	62.4	56.2	57.4	54.3	52.5	48.5	42.9	34.0	12.5
06:45 - 07:00	56.8	71.1	51.0	62.1	57.0	54.8	51.8	52.7	49.9	44.5	35.7	12.7



16 APPENDIX B – UNCERTAINTY BUDGET

16.1 Scope

Section 10 of British Standard 4142: 2014 +A1:2019 entitled “Uncertainty” requires the following:

“Consider the level of uncertainty in the data and associated calculations. Where the level of uncertainty could affect the conclusion, take reasonably practicable steps to reduce the level of uncertainty. Report the level and potential effects of uncertainty.

Annex B of British Standard 4142: 2014 +A1:2019 entitled “consideration of uncertainty and good practice for reducing uncertainty” makes reference to the University of Salford publication entitled “A Good Practice Guide on the Source and Magnitude of Uncertainty arising in the Practical Measurement of Environmental Noise” edition 1a dated May 2007.

16.2 Uncertainty of Measured Values

Ref	Source of Uncertainty Section 10.2 British Standard 4142: 2014	Value dB(A)	Distribution (Divisor)	Uncertainty dB(A)
a	Variability and complexity of sound source	0.50	$\sqrt{2}$	0.35
b	Variability and complexity of residual sound	0.00	$\sqrt{3}$	0.00
c	Residual sound present in specific sound	0.00	$\sqrt{3}$	0.00
d	Background noise position selection	0.10	$\sqrt{3}$	0.06
e	Distance between source and receiver	0.15	$\sqrt{2}$	0.11
f	Number of measurements taken (5 Days)	0.10	$\sqrt{3}$	0.06
g	Measurement time interval variation	0.00	$\sqrt{2}$	0.00
h	Range of times measurements taken	0.10	$\sqrt{3}$	0.06
i	Suitable weather conditions during measurements	0.20	$\sqrt{3}$	0.12
j	Application of British Standard 4142: 2014	0.10	$\sqrt{2}$	0.07
k	Rounding of each measurement	0.05	$\sqrt{3}$	0.03
l	Instrumentation – Calibration	1.20	$\sqrt{3}$	0.69
Reported Expanded Uncertainty (95% confidence, convergence k = 2)				1.61

16.3 Uncertainty in Calculations

Ref	Source of Uncertainty Section 10.2 British Standard 4142: 2014	Value dB(A)	Distribution (Divisor)	Uncertainty dB(A)
a	Impact of measured sound level on calculations	0.00	$\sqrt{2}$	0.00
b	Assumption on sound power level of source	0.00	$\sqrt{3}$	0.00
c	Uncertainty of calculation method (ISO 9613)	0.20	$\sqrt{3}$	0.12
d	Model fit against real world conditions	0.10	$\sqrt{3}$	0.06
e	Error in the calculation process	0.15	$\sqrt{2}$	0.11
Reported Expanded Uncertainty (95% confidence, convergence k = 2)				0.33

16.4 Uncertainty from Other Factors

Ref	Source of Uncertainty Section 10.2 British Standard 4142: 2014	Value dB(A)	Distribution (Divisor)	Uncertainty dB(A)
a	Standing waves or interference patterns	0.15	$\sqrt{3}$	0.09
b	Approximation of sound source to a point source	0.10	$\sqrt{3}$	0.06
c	Maintenance and repair of source over 15 years	0.50	$\sqrt{3}$	0.29
Reported Expanded Uncertainty (95% confidence, convergence k = 2)				0.61

16.5 Combined Reported Expanded Uncertainty

Ref	Source of Uncertainty Section 10.2 British Standard 4142: 2014	Value dB(A)	Distribution (Divisor)	Uncertainty dB(A)
a	Section 7.1.2. Uncertainty of measured values	2.7	$\sqrt{2}$	1.14
b	Section 7.1.3. Uncertainty of calculations	2.7	$\sqrt{2}$	0.23
c	Section 7.1.4. Uncertainty from other factors	2.7	$\sqrt{2}$	0.43
Combined Reported Expanded Uncertainty (95% confidence, convergence k = 2)				2.55

It should be noted that the uncertainty calculations have assumed a Type B uncertainty.

17 APPENDIX C – BS 4142:2019+A1:2019 INFORMATION

In accordance with BS 4142:2014:A1:2019, section 12, the following information is provided.

17.1 Professional Competence

Acoustic Consultant	Mr Brian Scrivener <small>MIOA</small>
Qualifications	Member of the Institute of Acoustics (MIOA)
Date Certified	June 2003
Time Operating as an active Noise Consultant	Permanently Since June 2003
Professional Position	Owner of Sound Advice Acoustics Ltd & Sound Advice Engineering Managing Director & Share Holder
Professional Status	Noise Consultant
Professional Statement	
<p>I have been active within the field of noise consultancy and noise control engineering since I joined the company in April 1997. Working my way through the company and gaining experience in this specialist field, I qualified as a noise consultant in June 2003 when I passed my Diploma in Noise Control & Engineering from Epsom College under the tutor of Dr Latha Vesudevan. Subsequently I was awarded the status of 'Member of the Institute of Acoustics (MIOA)'. Since then I have taken over the company and continued to work and develop my professional competence within the field of acoustic consultancy, engineering and noise control.</p>	

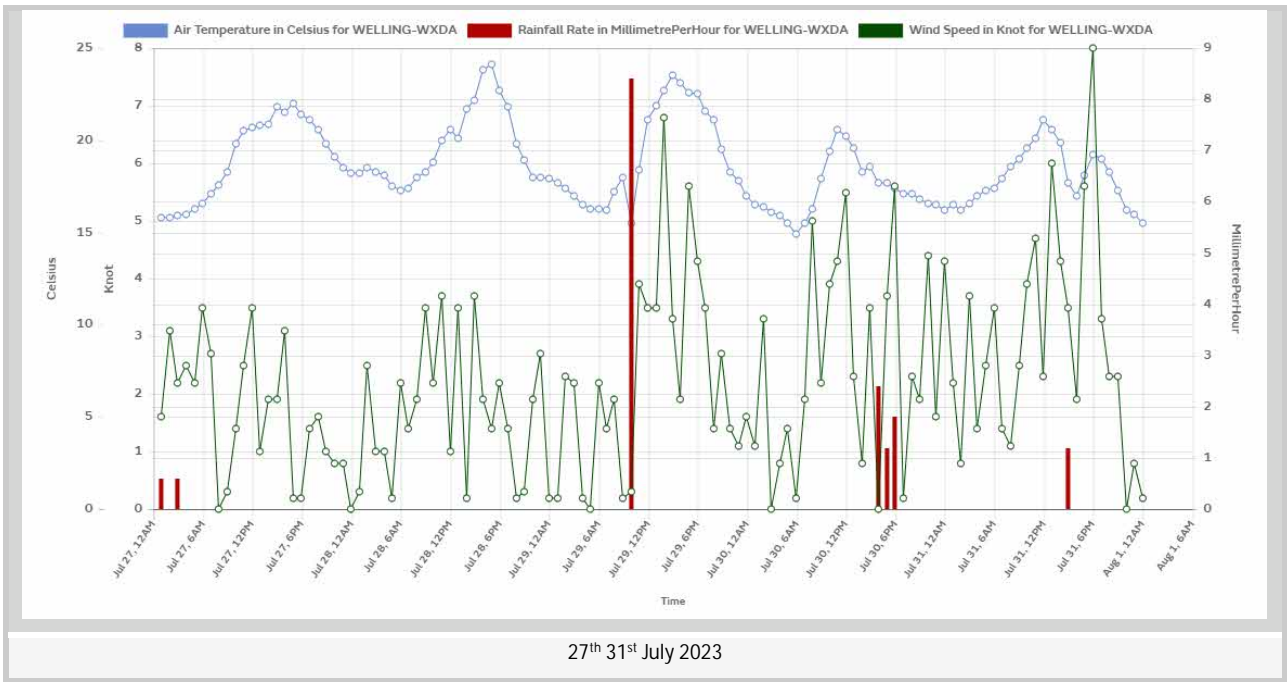
17.2 Site Status

Site Attended By	Mr Brian Scrivener <small>MIOA</small>
Baseline Measurements Conducted by	Mr Brian Scrivener <small>MIOA</small>
Site Source Measurements Conducted By	Mr Brian Scrivener <small>MIOA</small>

17.3 Measurement Information – Location 1

Details & Justification	Measurement position 1 was located at the rear of the existing premises, representative of the Nearest Noise Sensitive Premises
Height from Ground	1.5m
Reflective Surfaces	None (Free Field)
Distance to NSP	4m
Distance to Source	2m
Topographical Change (m)	None
Ground between Source and Receiver	100% Hard surface
Windshield Information	Norsonic Outdoor Microphone Protection Kit Model No: 1212
Distance from Proposed Source to Receiver	2m
NSP* - Noise Sensitive Premises	

18 APPENDIX D - ENVIRONMENTAL CONDITIONS



#END OF REPORT#