

Hertfordshire Constabulary Headquarters Redevelopment

External Noise Survey Report

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Quality information

Prepared by

Lawrence Norman BSc (Hons) AMIOA
Acoustic Engineer

Checked by

Roslyn Andrews BSc (Hons) MIOA
Associate Director, Acoustics

Verified by

Roslyn Andrews BSc (Hons) MIOA
Associate Director, Acoustics

Approved by

Yuyou Liu PhD MEng BSc CEng FIOA
Regional Director, Acoustics

Revision History

Revision	Revision date	Details	Authorized	Name	Position

Prepared for:

Hertfordshire Constabulary

Prepared by:

Lawrence Norman BSc (Hons) AMIOA
Acoustic Engineer

T: 01763 505005

M: [REDACTED]

E: [REDACTED]

AECOM Limited
AECOM House
63-77 Victoria Street
St Albans
Hertfordshire AL1 3ER
United Kingdom

T: + [REDACTED]
aecom.com

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1. Introduction

An external noise survey has been undertaken at the existing Hertfordshire Constabulary Headquarters (HQ) site located in Welwyn Garden City as part of the proposed redevelopment works. The redevelopment project includes the demolition of a number of existing buildings on the site, construction of a new building in place of the existing buildings, as well as a temporary decant building for occupants of the existing buildings.

The following sections of the report detail the methodology and findings of an external survey that was undertaken at the Hertfordshire Constabulary HQ site. The results of this survey have been used to determine the typical background noise levels currently experienced in the vicinity of the site, as well as the façade incident noise levels that will be experienced at the proposed development.

In addition, internal spot measurements were undertaken within a number of spaces across the site that are considered to be noise sensitive and will remain in operation during the construction period.

A glossary of acoustic terminology used in this report is presented in Appendix A.

The full noise results are presented in Appendices B.

All noise levels are, unless stated otherwise, sound pressure levels in dB referenced to a pressure of 20 µPa.

2. Site Description

The site is the existing Hertfordshire Constabulary HQ located in Welwyn Garden City. It is bounded to the north by a leisure centre complex, to the east by the Great Northern and Thameslink railway line with trains passing approximately 8 times per hour. The site is bounded to the south by Stanborough Park and to the north west by Stanborough Lane (A6129).

A number of residential developments are located to the east of the site, on the opposite side of the railway line on Burrowfield. Further residential developments and a secondary school are located to north west of the site on the opposite side of Stanborough Lane (A6129) on Stanborough Green and Lemsford Lane. The residential developments and school are considered to be the nearest noise sensitive receptors (NNSRs) for plant noise emission, the location of NSR's are shown in Figure 2.1.

The noise climate around the existing office buildings is dominated by road noise from Stanborough Lane, along with some contribution from railway pass-byes. Maximum noise levels across the site were caused by operational movements within the site, largely caused by vehicles on access roads.

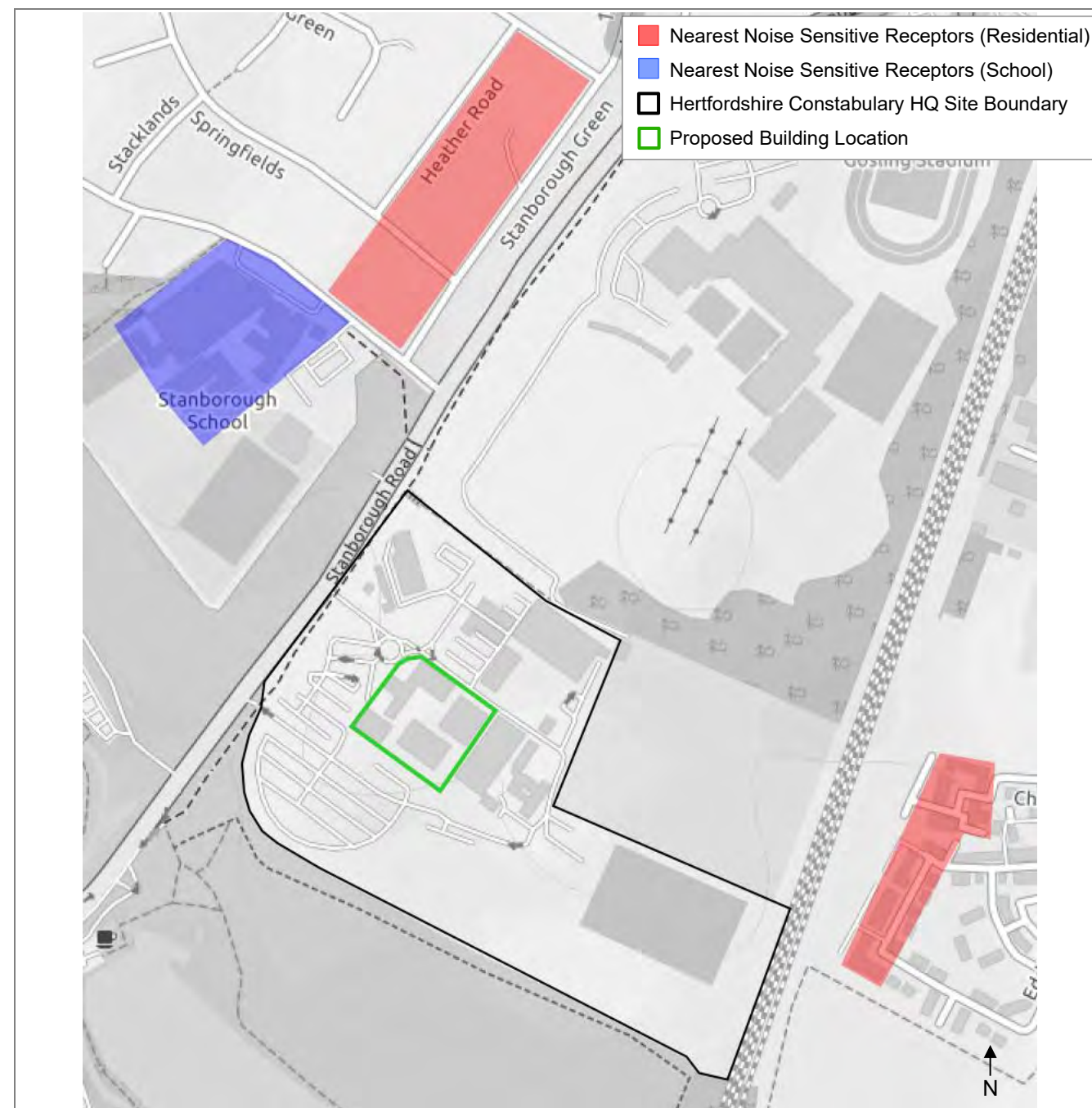


Figure 2.1. Noise Sensitive Receptors

3. External Noise Survey

3.1 Measurement Methodology

Unattended measurements were undertaken from the 15th April 2021 at 12:30 to 20th April 2021 at 13:30 at two locations to collect noise data representative of the future façade incident noise levels and the lowest background noise levels at the nearest noise sensitive receptors.

Additional attended short-term noise measurements were undertaken at 6 locations around the existing office buildings to better establish the noise climate across the site. Figure 3.1 presents the site plan showing the measurement locations.

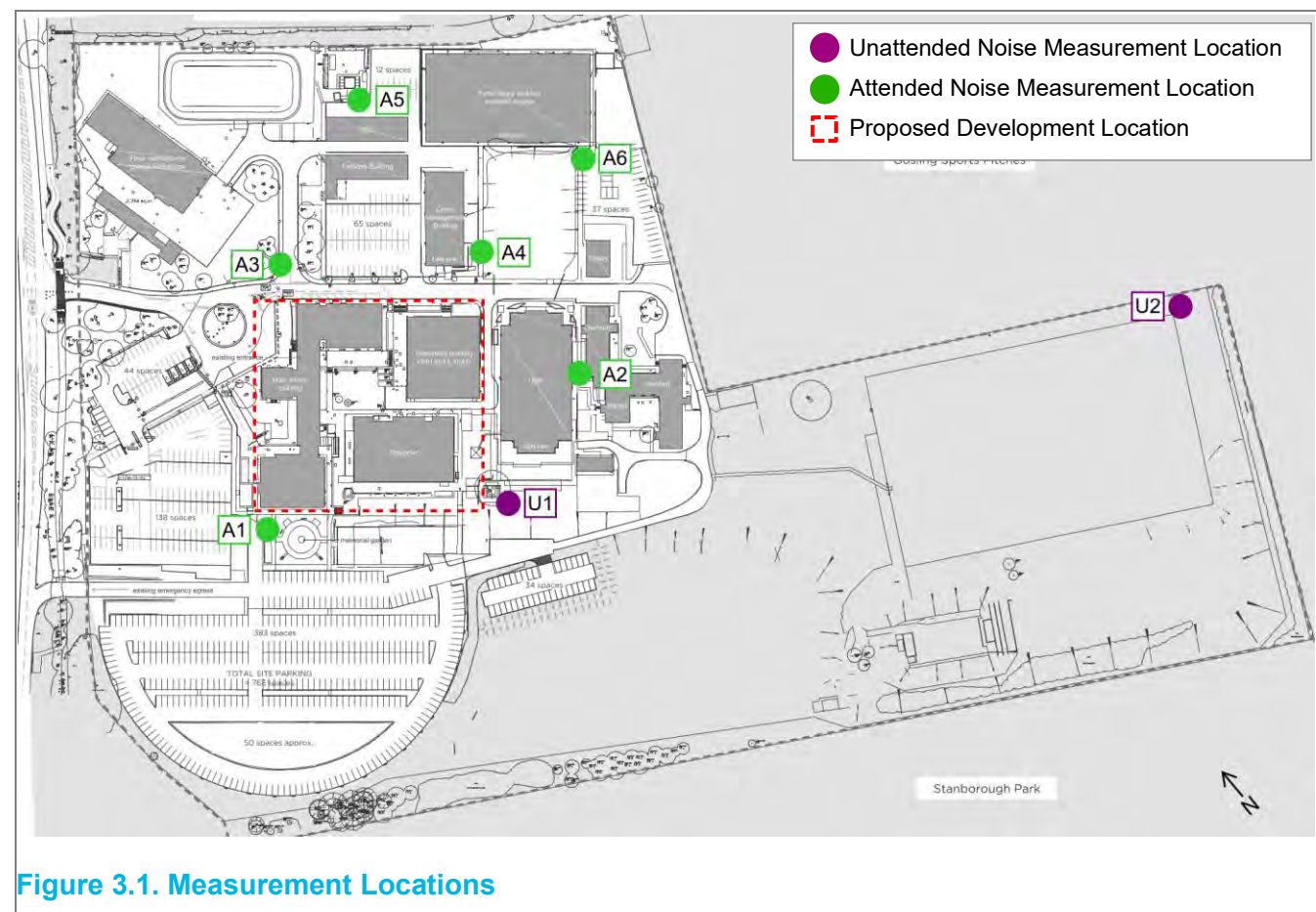


Figure 3.1. Measurement Locations

A summary of the purpose of each measurement location is given below.

The noise levels measured at:

- Location U1 are considered to be representative of the likely lowest background noise levels at the NSR's to the west of the development on the opposite side of Stanborough Lane as the measurement location is approximately equal distance from Stanborough Lane. Noise levels measured at location U1 are also considered to be representative of the likely façade incident noise levels on the southern façade of the development.
- Location U2 are considered to be representative of the likely lowest background noise levels at the NSR's located to the east of the development on the opposite side of the railway.
- Location A1 are considered to be representative of the likely façade incident noise levels on the western façade of the development overlooking the carpark.
- Location A3 are considered to be representative of the likely façade incident noise levels on the northern façade of the development overlooking the central access road to the site.

- Location A4 are considered to be representative of the likely façade incident noise levels on the eastern façade of the development overlooking the existing OSB building.
- Locations A1 - A6 will be used to better establish the noise climate across the site and may be used to calibrate a construction noise model.

At unattended Locations, U1 and U2, the equipment was set up to record ambient (dB L_{Aeq}), maximum (dB L_{Amax}) and background (dB L_{A90}) noise levels in 15-minute samples with the microphone located at approximately 2m above the local ground height. Figure 3.2 shows the equipment installation at Location U1.

At attended Locations, A1-6, the equipment was set up to record ambient (dB L_{Aeq}), maximum (dB L_{Amax}) and background (dB L_{A90}) noise levels in 5-minute samples with the microphone located at approximately 1.5 m above local ground height. The measurement data has then been combined in order to give an equivalent 15-minute period. Figure 3.3 shows the equipment installation at Location A1.



Figure 3.2. Location U1 - Unattended Measurement Equipment



Figure 3.3. Location A1 - Attended Measurement Equipment

The equipment used to undertake the measurements is presented in Table 3.1 below.

Table 3.1. Noise Measurement Equipment

Location	Equipment	Type	Serial Number
U1	Integrating Sound Level Meter	Norsonic 140	1402919
	Weatherproof Microphone Enclosure	Norsonic 1212	N/A
U2	Integrating Sound Level Meter	Norsonic 140	1404740
	Weatherproof Microphone Enclosure	Norsonic 1212	N/A
A1-6	Integrating Sound Level Meter	Norsonic 140	1403078
All	Calibrator	Norsonic 1251	30896

The noise analysers and associated microphones were checked against the calibrator at the beginning and end of each measurement period, in accordance with recommended practice. No significant drift in calibration was observed. The accuracy of the calibrator can be traced to the National Physical Laboratory Standards.

The weather conditions during the measurement period are presented in Table 3.2 below.

Table 3.2. Weather Conditions

Date	Wind Speed (m/s)	Temperature (°C)	Description
15/04/2021	0.6	12	Overcast / Light Drizzle
16/04/2021	3.5	11	Sunny / Overcast

Date	Wind Speed (m/s)	Temperature (°C)	Description
17/04/2021	3.0	13	Sunny / Clear
18/04/2021	2.5	15	Sunny / Clear
19/04/2021	2.0	18	Sunny / Clear
20/04/2021	0.4	15	Sunny / Clear

3.2 Measurement Results

The following table presents the typical background noise levels measured during the unattended measurements at Locations U1 and U2. These values have been selected based on the lowest noise levels measured for the daytime (07:00-23:00) and night-time (23:00-07:00) periods.

At Location U1 the data from 8:30 onwards on the 20th April has been omitted, as piling works were noted to be undertaken in close proximity to the measurement location and therefore such measurements are not considered to be representative of the typical background noise levels.

It should be noted that due to a fault with the measurement equipment at location U2, some of the data that was collected contains abnormal results. As such these measurements have also been omitted from the assessment.

Full statistical measurement results can be found in Appendix B, along with details of the omitted measurement results.

Table 3.3. Typical Lowest Background Noise Levels at each Unattended Measurement Location

Measurement Location	Index	Daytime (07:00-23:00)	Night-time (23:00-07:00)
U1	dB L _{A90(15min)}	49	50
U2	dB L _{A90(15min)}	38	40

The typical ambient and maximum noise levels measured on site are presented in Table 3.4.

Table 3.4. Typical Ambient and Maximum Noise Levels

Location	Time Period	Index	Octave Band Centre frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
U1	Daytime (07:00-23:00)	dB L _{eq}	60	52	53	52	53	46	35	25	56
		dB L _{max}	76	73	63	64	67	66	58	56	71
	Night-time (23:00-07:00)	dB L _{eq}	57	51	50	52	56	46	39	31	57
		dB L _{max}	65	61	66	63	66	59	47	32	68
U2	Daytime (07:00-23:00)	dB L _{eq}	81	58	55	57	59	57	55	54	64
		dB L _{max}	80	71	69	73	78	78	70	62	82
	Night-time (23:00-07:00)	dB L _{eq}	67	55	55	58	60	58	55	48	64
		dB L _{max}	77	69	65	73	72	78	77	67	82
A1	Daytime (07:00-23:00)*	dB L _{eq}	60	52	46	45	49	42	34	30	51
		dB L _{max}	73	63	61	54	59	62	58	57	66
A2	Daytime (07:00-23:00)*	dB L _{eq}	69	56	47	45	44	40	33	23	49
		dB L _{max}	75	66	59	58	56	58	50	45	71
A3	Daytime (07:00-23:00)*	dB L _{eq}	63	56	52	50	51	48	44	37	55
		dB L _{max}	73	67	65	67	67	66	64	55	71

Location	Time Period	Index	Octave Band Centre frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
A4	Daytime (07:00-23:00)*	dB L_{eq}	61	52	48	46	46	41	34	27	50
		dB L_{max}	76	66	63	62	68	65	57	50	70
A5	Daytime (07:00-23:00)*	dB L_{eq}	60	49	44	43	43	39	34	28	47
		dB L_{max}	69	59	57	54	57	61	57	54	65
A6	Daytime (07:00-23:00)*	dB L_{eq}	56	48	42	42	42	38	33	28	46
		dB L_{max}	71	71	69	64	61	56	51	56	66

Note*: Noise levels have been based on a representative sample period of 15mins between the 13:00 and 15:00

3.3 Commentary

As can be seen from the ambient noise levels presented in Table 3.4, the noise levels measured in close proximity to the existing buildings are consistently around 46-51dB L_{Aeq} depending on the proximity to Stanborough Road and the site access roads. This is as anticipated as the main noise sources within the site are as a result of operational noise sources such as traffic through the site.

The noise levels were noted to be slightly higher at location U1, due to influence of noise produced by the plant within the compound to the south of the OSB building.

As mentioned previously, the noise levels measured in close proximity to the existing buildings will be used to inform the construction noise modelling and may be used to inform the façade design of the new development, if required.

4. Plant Noise Assessment

4.1 Criteria

4.1.1 BS 4142:2014+A1:2019

British Standard BS 4142: 2014 'Methods for rating and assessing industrial and commercial sound' provides a methodology for assessing whether noise from industrial and commercial activities is likely to give rise to complaints from nearby noise-sensitive premises. This method compares the noise level from the source in question (called the 'specific noise level') with the background noise level in the absence of the noise source, taking into account the character and type of noise. Unusual acoustic features associated with tonality, impulsivity, intermittency, and other sound characteristics (where present) are accounted for under BS 4142 by the addition of a rating penalty to the specific sound level. The corrected specific sound level is the 'rating level'.

The Standard notes that the lower the rating noise level is relative to the measured background level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact. A difference of around +5 dB is likely to be an indication of an adverse impact whilst a difference of around +10 dB is likely to be an indication of a significant adverse impact.

4.1.2 Environmental Protection Act 1990

Under the provisions of the Environmental Protection Act, occupants of neighbouring properties could take direct action if they believe they have been subjected to a noise nuisance. Achievement of a BS 4142 Rating Level of between 5 and 10 dB below the lowest background noise level at the façade of the nearest neighbouring noise sensitive development is considered a robust approach to minimising the risk of such action being upheld.

4.1.3 Local Authority Guidance: Welwyn Hatfield Borough Council

Although no specific guidance relating to noise emission is given by the local authority, it is considered that meeting the recommendations given in BS 4142 will be suitable to reduce the impact of plant items of neighbouring properties.

The Local Authority's local plan, Welwyn Hatfield District Plan 2005, provides the following planning policy relating to noise emission from new developments.

Policy R19 - Noise and Vibration Pollution

Proposals will be refused if the development is likely:

- i. To generate unacceptable noise or vibration for other land uses; or*
- ii. To be affected by unacceptable noise or vibration from other land uses. Planning permission will be granted where appropriate conditions may be imposed to ensure either:*
- iii. An adequate level of protection against noise or vibration; or*
- iv. That the level of noise emitted can be controlled. Proposals should be in accordance with the Supplementary Design Guidance.*

In addition to the currently adopted District Plan, the Local Authority's "Draft Local Plan Proposed Submission – August 2016" provides the following policy relating to noise.

Draft Local Plan - Policy SADM 18

A Noise and Vibration Impact Assessment will be required for proposals with the potential to cause disturbance to people or the natural environment due to noise and/or vibration and for proposals that are considered to be sensitive to noise and/or vibration.

Proposals that would result in or be subject to noise pollution and/or vibration that is:

- i. Very disruptive and would have an unacceptable adverse effect on human health or the natural environment will not be permitted.*
- ii. Disruptive and would have a significant adverse effect on human health or the natural environment will be refused unless the need for, and benefits of, the development significantly outweigh the harm and all feasible solutions to avoid and mitigate that harm have been fully implemented.*
- iii. Intrusive and would have an adverse effect on human health or the natural environment will be resisted unless the need for, and benefits of, the development outweigh the harm and all feasible solutions to avoid and mitigate that harm have been fully implemented.*

4.1.4 BREEAM 2018

BREEAM provides the following guidance, which should be followed in line with good practice. One credit is available for BREEAM POL 05. The requirements for this are as follows:

- 4 The noise level from the proposed site or building, as measured in the locality of the nearest or most exposed noise-sensitive development, is a difference to the background noise of at least -5dB throughout the day and night.*
- 5 Where the noise sources from the proposed site or building is greater than the levels described in criterion 4, measures have been installed to attenuate the noise at its source to a level where it will comply with the criterion.*

4.1.5 Recommended Noise Emission Limits

It is considered that a suitable way of demonstrating compliance with the recommendations given by BS 4142:2014, Environmental Protection Act and the Local Authority is to control noise emission limits to 10dB below the existing background noise level at a location of 1m from the façade of the NNSR's, as detailed in the following section.

These limits should be reviewed if any noise-related Local Authority planning conditions are later imposed on the development.

4.2 Noise Emission Limits

Based on the typical lowest background noise levels and the guidance above, it is recommended that the following noise limits of 5 dB below the existing background levels be adopted.

Table 4.1. Plant Noise Emission Limit at 1m from the Façade of the Nearest Noise Sensitive Receptors

NSR Location	Index	Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
Burrowfield	dB L_{Ar}	33	35
Stanborough Green	dB L_{Ar}	44	45

The above limits set should be met with all plant operating simultaneously.

In line with guidance within BS 4142 all sources should be controlled such that they do not produce any “distinguishable, discrete or continuous note (whine, hiss, screech, hum, etc.) or distinct impulses (bangs, clicks, clatters or thumps)” at any noise sensitive façade, where they do contain such features reduced rating level limits as defined in BS 4142 will apply.

By meeting the plant noise emission limits at 1m from the façade of the nearest noise sensitive receptor it is anticipated that noise emission from building services plant will be in-line with the Local Authority's expectations and will suitably reduce the likelihood of noise complaints from occupants of the neighbouring residential premises and school.

4.2.1 Emergency Plant Noise Emission Limits

It is recommended that a relaxation to the plant noise emission limits be requested from the Local Authority for emergency plant operation and essential testing to 10 dB above the lowest existing background noise levels at 1 meter from the nearest noise sensitive receptor (NNSR). Typically, testing of emergency plant is permitted by the Local Authority to be carried out for up to 1 hour per calendar month during typical working hours 09.00-17.00 Monday- Friday.

The resultant emergency plant noise emission limits are presented in the Table below.

Table 4.2. Emergency Building Services Plant Noise Emission Limits

Location	Index	Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
Burrowfield	dB L_{Ar}	48	50
Stanborough Green	dB L_{Ar}	59	60

Once new plant selections have been developed further, we recommend that a plant noise assessment is undertaken to set upper limits for each external termination of the individual mechanical systems (and any other external plant) such that plant noise is suitably controlled to achieve the noise emission limits at neighbouring properties.

Appendix A Glossary of Acoustic Terminology

Sound	This is a description of the physical phenomena of the transmission of energy through gaseous or liquid media via rapid fluctuations in pressure.
Noise	Unwanted sound.
Frequency (Hz)	The number of cycles per second (i.e., the number of vibrations that occur in one second); subjectively this is perceived as pitch.
Frequency Spectrum	The relative frequency contributions that make up a noise.
"A" Weighting (dB(A))	The human ear does not respond uniformly across the audible frequency range. The "A" weighting is commonly used to simulate the frequency response of the ear.
Decibel (dB)	The decibel is a logarithmic ratio of two values of a variable. The range of audible sound pressures is approximately 2×10^{-5} Pa to 200 Pa. Using decibel notation presents this range in a more manageable form, 0 dB to 140 dB.
Sound Pressure Level (SPL, L_p)	<p>This is the basic measure of how much sound there is at a given location. It is a measure of the size of the pressure fluctuations in the air that we perceive as sound.</p> <p>Equal to 20 times the logarithm to the base 10 of the ratio of the root mean squared (RMS) sound pressure to the reference sound pressure. In air the reference sound pressure is 2×10^{-5} Pa.</p> <p>Mathematically: Sound Pressure Level (dB) = $20 \log_{10} \{p(t) / P_0\}$ Where $P_0 = 2 \times 10^{-5}$ Pa</p>
Sound Power Level (SWL, L_w)	<p>This is the total amount of sound produced by a source. It cannot be measured directly but it can be calculated from Sound Pressure Level measurements in known conditions. It can be used to predict the Sound Pressure Level at any point.</p> <p>Equal to 10 times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power. In air the reference sound power is 1×10^{-12} Pa.</p> <p>Mathematically: Sound Power Level (dB) = $10 \log_{10} \{W / W_0\}$ Where $W_0 = 1 \times 10^{-12}$ Pa</p>
$L_{eq,T}$	The equivalent continuous sound level. It is the steady sound level which would produce the same energy over a given time period T as a specified time varying sound.
Ambient Noise Level, $L_{Aeq,T}$	The equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time that is usually composed of sound from many sources near and far.
Background Noise Level $L_{A90,T}$	The A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90% of a given time interval, T, measured using the fast time weighting, F, and

quoted to the nearest whole number.

Maximum Noise Level, L_{max}	The (A-weighted) maximum instantaneous sound pressure level (L_{Amax}).
Reference Time Interval, T_r	The specified interval over which an equivalent continuous A-weighted sound pressure level is determined.
Specific Noise Level, L_{Aeq,T_r}	The equivalent continuous A-weighted sound pressure level at the assessment position produced by the specific noise source over a given reference time interval.
Weighted Sound Reduction Index R_w	Single number quantity which characterizes the airborne sound insulating properties of a material or building element over a range of frequencies.
Percentiles	To describe the time-varying character of environmental noise, statistical noise descriptors were developed: L_{A10} is the A-weighted sound level equalled or exceeded during only 10% of the measurement time. The L_{A10} provides a good measure of the maximum sound levels caused by intermittent or intrusive noise. L_{A50} is the A-weighted sound level that is equalled or exceeded 50% of the measurement time period; it represents the median sound level. L_{A90} is the A-weighted sound level equalled or exceeded 90% of the time. Since this represents 'most' of the time, L_{A90} generally has been adopted as a good measure of the ambient baseline noise of the measurement site. Therefore, the baseline noise is defined as L_{A90} of the overall background noise.
L_{Ar}	Plant rating level as defined under British Standard BS4142:2014. This is the specific sound level generated by the plant items inclusive of any adjustment for the characteristic features of the source.

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

Sound Pressure Level in dB L_A for Common Situations

Typical Noise Level, dB L_A	Example
0	Threshold of hearing
30	Rural area at night, still air
40	Public library Refrigerator humming at 2 m
50	Quiet office, no machinery Boiling kettle at 0.5 m
60	Normal conversation
70	Telephone ringing at 2 m Vacuum cleaner at 3 m
80	General factory noise level
90	Heavy goods vehicle from pavement Powered lawnmower, operator's ear
100	Pneumatic drill at 5 m
120	Discotheque – 1 m in front of loudspeaker
140	Threshold of pain

Appendix B Noise Survey Measurement Results

Table B1. Noise Levels Measured at Attended Location U1

Noise levels omitted from the assessment are shown in red.

Date	Time	L _{Aeq} (dB)	L _{AFmax} (dB)	L _{A90} (dB)
15/04/2021	12:30	63	92	51
	12:45	52	60	51
	13:00	54	64	52
	13:15	53	62	51
	13:30	52	58	51
	13:45	52	60	51
	14:00	52	57	51
	14:15	52	63	51
	14:30	52	61	51
	14:45	52	62	51
	15:00	52	58	51
	15:15	52	70	51
	15:30	53	64	51
	15:45	52	60	52
	16:00	52	66	51
	16:15	52	59	51
	16:30	52	65	51
	16:45	52	59	51
	17:00	52	59	51
	17:15	53	61	52
	17:30	52	58	51
	17:45	52	56	51
	18:00	53	60	51
	18:15	52	56	51
	18:30	53	74	51
	18:45	52	62	51
	19:00	52	60	51
	19:15	52	61	51
	19:30	52	57	51
	19:45	52	56	51
	20:00	52	60	51
	20:15	52	64	50
	20:30	52	56	50
	20:45	51	54	50
	21:00	51	55	50
	21:15	52	57	50
	21:30	52	61	51
	21:45	52	58	52
	22:00	55	61	52
	22:15	54	66	53

Date	Time	L _{Aeq} (dB)	L _{AFmax} (dB)	L _{A90} (dB)
	22:30	54	57	53
	22:45	54	58	53
	23:00	54	68	53
	23:15	54	60	54
	23:30	54	57	53
	23:45	55	74	53
16/04/2021	00:00	54	56	53
	00:15	54	56	53
	00:30	54	55	53
	00:45	54	56	53
	01:00	53	55	52
	01:15	53	59	53
	01:30	53	55	52
	01:45	53	55	52
	02:00	53	59	52
	02:15	53	56	52
	02:30	53	56	52
	02:45	53	57	52
	03:00	53	57	52
	03:15	53	58	52
	03:30	54	57	53
	03:45	54	59	53
	04:00	54	58	52
	04:15	55	59	53
	04:30	54	60	53
	04:45	56	59	54
	05:00	56	63	54
	05:15	57	64	55
	05:30	57	68	56
	05:45	58	70	57
	06:00	59	62	58
	06:15	59	65	58
	06:30	58	66	57
	06:45	57	62	55
	07:00	58	68	56
	07:15	56	65	55
	07:30	56	59	55
	07:45	55	63	54
	08:00	55	63	54
	08:15	55	61	54
	08:30	56	70	55
	08:45	55	63	54

Date	Time	L _{Aeq} (dB)	L _{AFmax} (dB)	L _{A90} (dB)
	09:00	55	60	54
	09:15	55	60	54
	09:30	55	59	55
	09:45	56	76	55
	10:00	55	59	54
	10:15	55	70	54
	10:30	55	65	52
	10:45	52	59	51
	11:00	53	64	51
	11:15	53	66	51
	11:30	51	56	50
	11:45	52	62	50
	12:00	56	70	51
	12:15	54	67	51
	12:30	52	64	51
	12:45	52	60	50
	13:00	53	60	51
	13:15	53	63	50
	13:30	54	70	50
	13:45	62	87	51
	14:00	52	61	51
	14:15	51	58	50
	14:30	51	62	50
	14:45	51	63	50
	15:00	52	57	50
	15:15	52	58	50
	15:30	52	68	50
	15:45	52	57	50
	16:00	52	62	50
	16:15	52	64	50
	16:30	52	63	51
	16:45	51	63	50
	17:00	52	61	51
	17:15	52	62	51
	17:30	52	58	50
	17:45	51	66	50
	18:00	51	60	50
	18:15	52	65	50
	18:30	52	62	50
	18:45	52	57	51
	19:00	52	60	50
	19:15	52	56	51

Date	Time	L _{Aeq} (dB)	L _{AFmax} (dB)	L _{A90} (dB)
	19:30	52	56	50
	19:45	52	60	51
	20:00	53	63	51
	20:15	53	68	51
	20:30	53	62	51
	20:45	53	59	51
	21:00	53	60	51
	21:15	54	59	53
	21:30	55	69	53
	21:45	55	58	54
	22:00	56	69	54
	22:15	56	61	54
	22:30	56	60	54
	22:45	57	62	55
	23:00	55	63	54
	23:15	55	61	54
	23:30	55	61	54
	23:45	55	66	54
17/04/2021	00:00	55	64	53
	00:15	55	63	53
	00:30	55	67	53
	00:45	55	59	53
	01:00	54	58	53
	01:15	54	62	53
	01:30	54	58	53
	01:45	54	61	52
	02:00	54	58	53
	02:15	55	60	53
	02:30	55	60	53
	02:45	55	62	53
	03:00	55	61	53
	03:15	55	65	53
	03:30	54	60	53
	03:45	55	64	53
	04:00	55	63	53
	04:15	55	61	53
	04:30	54	59	53
	04:45	54	70	53
	05:00	55	71	53
	05:15	55	60	54
	05:30	56	61	54
	05:45	56	64	55
	06:00	57	68	56
	06:15	57	65	56
	06:30	57	62	56

Date	Time	L _{Aeq} (dB)	L _{AFmax} (dB)	L _{A90} (dB)
	06:45	57	63	56
	07:00	57	60	56
	07:15	57	60	56
	07:30	57	76	56
	07:45	59	79	56
	08:00	56	62	55
	08:15	55	61	54
	08:30	55	67	55
	08:45	55	67	54
	09:00	53	56	51
	09:15	52	56	51
	09:30	53	68	51
	09:45	52	60	51
	10:00	52	57	50
	10:15	52	56	51
	10:30	52	62	51
	10:45	52	64	50
	11:00	52	63	50
	11:15	52	59	51
	11:30	52	69	50
	11:45	53	66	51
	12:00	53	64	51
	12:15	52	61	51
	12:30	52	57	51
	12:45	52	61	51
	13:00	52	61	50
	13:15	52	65	51
	13:30	52	63	50
	13:45	52	65	50
	14:00	53	70	51
	14:15	52	63	51
	14:30	52	67	50
	14:45	51	58	50
	15:00	52	63	50
	15:15	52	63	50
	15:30	52	59	50
	15:45	52	59	50
	16:00	52	62	50
	16:15	53	61	51
	16:30	52	60	51
	16:45	52	60	51
	17:00	52	60	50
	17:15	51	59	50
	17:30	51	56	50
	17:45	52	57	50

Date	Time	L _{Aeq} (dB)	L _{AFmax} (dB)	L _{A90} (dB)
	18:00	52	67	50
	18:15	52	64	50
	18:30	51	60	50
	18:45	52	58	51
	19:00	52	71	50
	19:15	52	63	51
	19:30	54	66	51
	19:45	55	73	52
	20:00	55	67	52
	20:15	55	63	52
	20:30	53	62	52
	20:45	52	58	51
	21:00	52	60	51
	21:15	53	63	52
	21:30	53	60	52
	21:45	53	62	51
	22:00	52	62	51
	22:15	52	58	51
	22:30	52	57	51
	22:45	53	61	52
	23:00	53	60	52
	23:15	53	58	52
	23:30	55	60	53
	23:45	57	66	56
18/04/2021	00:00	57	62	55
	00:15	57	61	55
	00:30	57	61	55
	00:45	56	62	54
	01:00	55	60	54
	01:15	56	72	54
	01:30	56	75	53
	01:45	54	59	53
	02:00	54	63	53
	02:15	54	62	53
	02:30	54	58	53
	02:45	54	58	53
	03:00	54	60	53
	03:15	54	61	53
	03:30	54	60	53
	03:45	54	61	53
	04:00	55	65	53
	04:15	55	61	53
	04:30	55	61	53
	04:45	56	68	54
	05:00	55	69	54

Date	Time	L _{Aeq} (dB)	L _{AFmax} (dB)	L _{A90} (dB)
	05:15	56	62	55
	05:30	56	61	55
	05:45	56	64	55
	06:00	57	69	55
	06:15	58	75	56
	06:30	57	72	56
	06:45	57	64	56
	07:00	56	68	55
	07:15	55	59	54
	07:30	55	64	54
	07:45	55	60	54
	08:00	54	62	54
	08:15	54	58	54
	08:30	55	60	54
	08:45	54	65	54
	09:00	52	63	51
	09:15	51	56	50
	09:30	51	58	50
	09:45	52	67	49
	10:00	50	54	49
	10:15	51	58	49
	10:30	51	70	49
	10:45	52	61	50
	11:00	52	67	50
	11:15	51	61	49
	11:30	53	74	50
	11:45	51	61	49
	12:00	50	60	49
	12:15	51	60	49
	12:30	50	55	49
	12:45	51	65	49
	13:00	52	62	49
	13:15	50	59	48
	13:30	51	64	49
	13:45	51	69	49
	14:00	50	59	49
	14:15	50	63	49
	14:30	50	61	49
	14:45	51	61	49
	15:00	50	62	48
	15:15	49	61	48
	15:30	51	61	49
	15:45	50	59	48
	16:00	51	64	48
	16:15	50	57	48

Date	Time	L _{Aeq} (dB)	L _{AFmax} (dB)	L _{A90} (dB)
	16:30	50	63	48
	16:45	51	72	50
	17:00	51	67	49
	17:15	53	66	51
	17:30	51	59	49
	17:45	49	55	48
	18:00	50	61	48
	18:15	50	60	48
	18:30	50	54	48
	18:45	50	56	49
	19:00	50	54	48
	19:15	50	56	49
	19:30	51	60	50
	19:45	52	63	51
	20:00	51	64	50
	20:15	51	61	50
	20:30	51	56	49
	20:45	51	58	49
	21:00	51	62	49
	21:15	51	58	49
	21:30	51	56	49
	21:45	51	59	49
	22:00	51	65	49
	22:15	50	55	49
	22:30	50	58	49
	22:45	50	60	49
	23:00	51	62	49
	23:15	50	61	49
	23:30	51	59	49
	23:45	50	54	49
19/04/2021	00:00	50	65	49
	00:15	50	53	49
	00:30	51	54	50
	00:45	51	58	49
	01:00	53	59	51
	01:15	54	58	52
	01:30	53	57	52
	01:45	52	57	50
	02:00	51	56	50
	02:15	52	54	50
	02:30	51	57	50
	02:45	52	56	51
	03:00	52	59	51
	03:15	52	59	51
	03:30	52	56	51

Date	Time	L _{Aeq} (dB)	L _{AFmax} (dB)	L _{A90} (dB)
	03:45	54	66	52
	04:00	54	62	52
	04:15	55	60	53
	04:30	54	62	53
	04:45	54	69	52
	05:00	54	68	53
	05:15	55	72	53
	05:30	56	68	55
	05:45	57	64	56
	06:00	58	66	56
	06:15	60	67	58
	06:30	59	68	58
	06:45	59	68	57
	07:00	59	63	58
	07:15	60	72	59
	07:30	60	64	58
	07:45	58	64	56
	08:00	56	62	54
	08:15	55	66	53
	08:30	56	67	54
	08:45	54	58	54
	09:00	54	61	54
	09:15	55	60	54
	09:30	54	64	52
	09:45	52	64	50
	10:00	52	60	50
	10:15	52	59	50
	10:30	52	61	50
	10:45	52	62	50
	11:00	51	55	50
	11:15	53	84	49
	11:30	52	72	50
	11:45	51	63	50
	12:00	52	74	49
	12:15	56	80	50
	12:30	57	85	50
	12:45	54	68	50
	13:00	52	77	50
	13:15	52	75	50
	13:30	51	68	50
	13:45	52	69	51
	14:00	55	72	50
	14:15	52	59	50
	14:30	52	73	50
	14:45	53	71	51

Date	Time	L _{Aeq} (dB)	L _{AFmax} (dB)	L _{A90} (dB)
	15:00	53	71	51
	15:15	52	72	50
	15:30	51	76	49
	15:45	57	66	51
	16:00	58	84	53
	16:15	55	80	51
	16:30	52	70	50
	16:45	58	77	52
	17:00	54	76	49
	17:15	51	60	49
	17:30	56	80	51
	17:45	52	67	50
	18:00	53	74	51
	18:15	54	63	52
	18:30	54	60	52
	18:45	54	65	53
	19:00	54	66	52
	19:15	55	67	53
	19:30	55	63	53
	19:45	55	61	53
	20:00	55	64	54
	20:15	55	62	53
	20:30	55	61	53
	20:45	54	61	53
	21:00	54	60	52
	21:15	54	67	51
	21:30	53	68	52
	21:45	54	60	52
	22:00	52	68	50
	22:15	52	59	50
	22:30	52	57	51
	22:45	53	64	51
	23:00	52	68	50
	23:15	51	57	49
	23:30	52	62	50
	23:45	52	64	50
20/04/2021	00:00	51	62	50
	00:15	51	56	50
	00:30	51	56	50
	00:45	52	59	50
	01:00	52	58	51
	01:15	52	58	50
	01:30	51	56	50
	01:45	52	62	50
	02:00	53	61	51

Date	Time	L _{Aeq} (dB)	L _{AFmax} (dB)	L _{A90} (dB)
	02:15	53	57	52
	02:30	54	58	52
	02:45	54	58	53
	03:00	53	59	52
	03:15	53	56	52
	03:30	53	56	52
	03:45	53	57	51
	04:00	53	71	52
	04:15	54	68	53
	04:30	55	59	54
	04:45	55	60	54
	05:00	56	61	54
	05:15	56	60	55
	05:30	57	67	55
	05:45	58	62	57
	06:00	60	64	59
	06:15	61	63	60
	06:30	62	65	61
	06:45	62	70	61
	07:00	61	67	60
	07:15	60	65	59
	07:30	59	65	58
	07:45	58	71	57
	08:00	58	73	57
	08:15	59	65	57
	08:30	72	82	58
	08:45	63	85	55
	09:00	76	84	53
	09:15	54	72	52
	09:30	60	86	53
	09:45	73	85	58
	10:00	61	84	49

Table B2. Noise Levels Measured at Attended Location U2

Noise levels omitted from the assessment are shown in red.

Date	Time	L _{Aeq} (dB)	L _{AFmax} (dB)	L _{A90} (dB)
17/04/2021	13:15	70	86	42
	13:30	60	79	41
	13:45	71	86	40
	14:00	58	78	41
	14:15	61	78	41
	14:30	59	79	40
	14:45	62	78	41
	15:00	61	78	41
	15:15	61	79	40
	15:30	60	78	39
	15:45	62	79	40
	16:00	60	78	40
	16:15	62	82	40
	16:30	61	82	39
	16:45	63	82	41
	17:00	62	79	40
	17:15	84	86	56
	17:30	68	85	40
	17:45	84	86	44
	18:00	86	87	86
	18:15	86	87	86
	18:30	86	87	86
	18:45	86	87	86
	19:00	86	88	86
	19:15	86	87	86
	19:30	86	86	86
	19:45	86	87	86
	20:00	86	87	86
	20:15	86	87	86
	20:30	87	87	86
	20:45	87	87	86
	21:00	86	87	86
	21:15	87	87	86
	21:30	86	87	85
	21:45	86	90	86
	22:00	82	85	80
	22:15	79	83	45
	22:30	58	77	38
	22:45	84	88	78
	23:00	81	86	43
	23:15	83	85	82
	23:30	84	86	82

Date	Time	L _{Aeq} (dB)	L _{AFmax} (dB)	L _{A90} (dB)
18/04/2021	23:45	84	86	83
	00:00	83	86	81
	00:15	80	88	44
	00:30	86	87	86
	00:45	86	88	86
	01:00	86	88	86
	01:15	87	87	87
	01:30	87	87	87
	01:45	87	88	87
	02:00	86	87	86
	02:15	86	87	86
	02:30	84	86	83
	02:45	80	84	73
	03:00	72	85	41
	03:15	54	70	42
	03:30	47	55	44
	03:45	73	74	72
	04:00	83	86	73
	04:15	86	86	85
	04:30	85	86	83
	04:45	85	89	81
	05:00	50	60	47
	05:15	51	67	48
	05:30	81	86	49
	05:45	85	86	85
	06:00	85	85	85
	06:15	84	85	83
	06:30	86	91	70
	06:45	80	89	79
	07:00	77	86	63
	07:15	78	84	77
	07:30	83	85	82
	07:45	86	86	85
	08:00	86	90	84
	08:15	57	84	35
	08:30	56	77	36
	08:45	56	77	37
	09:00	83	86	38
	09:15	86	86	85
	09:30	86	87	86
	09:45	87	91	86
	10:00	86	87	86
	10:15	87	91	86
	10:30	86	94	86
	10:45	87	90	86

Date	Time	L _{Aeq} (dB)	L _{AFmax} (dB)	L _{A90} (dB)
	11:00	86	86	85
	11:15	85	90	40
	11:30	80	88	40
	11:45	62	81	40
	12:00	59	78	39
	12:15	58	79	40
	12:30	57	77	37
	12:45	60	79	38
	13:00	58	79	39
	13:15	57	78	38
	13:30	58	78	39
	13:45	58	78	40
	14:00	58	77	39
	14:15	59	80	39
	14:30	57	79	38
	14:45	59	78	39
	15:00	60	82	38
	15:15	59	79	39
	15:30	59	79	39
	15:45	61	85	38
	16:00	62	82	38
	16:15	56	78	38
	16:30	58	77	37
	16:45	60	79	38
	17:00	61	79	39
	17:15	58	81	40
	17:30	56	78	39
	17:45	80	86	38
	18:00	59	77	37
	18:15	60	79	36
	18:30	79	86	37
	18:45	86	89	85
	19:00	83	85	56
	19:15	86	89	83
	19:30	86	90	85
	19:45	86	89	86
	20:00	86	87	86
	20:15	88	90	86
	20:30	86	89	86
	20:45	86	87	86
	21:00	86	87	86
	21:15	86	87	86
	21:30	86	87	86
	21:45	87	90	86
	22:00	86	87	86

Date	Time	L _{Aeq} (dB)	L _{AFmax} (dB)	L _{A90} (dB)
	22:15	87	91	85
	22:30	65	82	38
	22:45	58	80	42
	23:00	62	82	43
	23:15	50	76	45
	23:30	61	81	45
	23:45	76	84	42
19/04/2021	00:00	84	84	83
	00:15	83	86	83
	00:30	84	85	84
	00:45	79	85	38
	01:00	73	84	44
	01:15	47	63	43
	01:30	50	73	42
	01:45	43	50	40
	02:00	45	64	40
	02:15	44	50	41
	02:30	67	76	44
	02:45	68	69	67
	03:00	70	72	67
	03:15	58	69	50
	03:30	54	57	53
	03:45	74	80	55
	04:00	72	79	52
	04:15	77	82	72
	04:30	80	83	80
	04:45	82	82	81
	05:00	81	84	81
	05:15	80	83	80
	05:30	79	82	78
	05:45	80	83	79
	06:00	79	84	79
	06:15	78	83	77
	06:30	74	81	55
	06:45	77	82	76
	07:00	82	87	74
	07:15	78	86	72
	07:30	81	89	78
	07:45	80	85	78
	08:00	83	85	82
	08:15	85	87	85
	08:30	85	88	84
	08:45	85	86	84
	09:00	85	86	85
	09:15	85	86	85

Date	Time	L _{Aeq} (dB)	L _{AFmax} (dB)	L _{A90} (dB)
	09:30	85	86	85
	09:45	85	86	85
	10:00	85	88	85
	10:15	85	87	85
	10:30	85	86	85
	10:45	86	87	85
	11:00	85	86	85
	11:15	83	86	42
	11:30	76	86	41
	11:45	55	76	41
	12:00	46	62	41
	12:15	50	68	42
	12:30	55	82	41
	12:45	82	87	80
	13:00	82	84	82
	13:15	82	84	81
	13:30	82	87	80
	13:45	83	85	82
	14:00	82	87	82
	14:15	83	85	82
	14:30	82	85	61
	14:45	84	86	83
	15:00	83	86	82
	15:15	84	86	82
	15:30	84	86	83
	15:45	81	83	79
	16:00	82	84	81
	16:15	83	85	78
	16:30	83	85	82
	16:45	83	86	72
	17:00	81	85	46
	17:15	77	83	44
	17:30	81	84	51
	17:45	79	87	46
	18:00	76	84	44
	18:15	62	82	42
	18:30	64	79	43
	18:45	72	81	44
	19:00	74	87	46
	19:15	60	78	44
	19:30	57	77	45
	19:45	71	82	46
	20:00	70	82	47
	20:15	59	78	46
	20:30	57	75	47

Date	Time	L _{Aeq} (dB)	L _{AFmax} (dB)	L _{A90} (dB)
	20:45	62	78	46
	21:00	61	79	45
	21:15	61	80	44
	21:30	58	79	43
	21:45	61	80	43
	22:00	51	69	40
	22:15	60	78	41
	22:30	57	79	41
	22:45	60	79	42
	23:00	49	64	41
	23:15	61	80	40
	23:30	63	79	40
	23:45	62	85	39
20/04/2021	00:00	51	70	40
	00:15	52	74	38
	00:30	51	73	39
	00:45	44	58	40
	01:00	45	55	40
	01:15	43	54	40
	01:30	42	52	40
	01:45	43	49	39
	02:00	45	54	42
	02:15	44	50	41
	02:30	45	54	41
	02:45	45	55	42
	03:00	44	52	41
	03:15	43	57	40
	03:30	52	63	43
	03:45	58	73	43
	04:00	57	80	44
	04:15	53	74	46
	04:30	52	72	48
	04:45	53	72	47
	05:00	58	80	50
	05:15	63	83	50
	05:30	60	82	50
	05:45	62	83	53
	06:00	63	83	54
	06:15	63	81	56
	06:30	65	84	57
	06:45	64	82	58
	07:00	65	82	57
	07:15	63	82	55
	07:30	62	80	52
	07:45	64	80	52

Date	Time	L_{Aeq} (dB)	L_{AFmax} (dB)	L_{A90} (dB)
	08:00	78	84	53
	08:15	82	84	82
	08:30	82	84	81
	08:45	80	84	70
	09:00	62	80	44
	09:15	62	80	44
	09:30	64	80	45

Table B3. Noise Levels Measured at Attended Location A1

Date	Time	L _{Aeq} (dB)	L _{AFmax} (dB)	L _{A90} (dB)	L _{eq} (dB)								L _{max} (dB)							
					63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
15/04/2021	13:14	51	66	49	59	51	45	45	49	42	34	32	73	63	61	54	59	62	58	57
	13:19	52	56	50	61	52	47	46	50	42	32	28	72	67	52	51	55	47	47	47
	13:24	50	62	48	61	52	47	45	48	42	34	30	71	68	61	55	59	55	52	50

Table B4. Noise Levels Measured at Attended Location A2

Date	Time	L _{Aeq} (dB)	L _{AFmax} (dB)	L _{A90} (dB)	L _{eq} (dB)								L _{max} (dB)							
					63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
15/04/2021	13:34	50	61	49	69	56	48	46	45	41	34	25	75	66	59	58	56	58	50	45
	13:39	49	56	48	69	56	46	43	44	40	32	21	77	66	55	48	50	49	41	34
	13:44	49	58	48	69	56	47	45	44	40	33	22	74	63	60	53	54	52	45	40

Table B5. Noise Levels Measured at Attended Location A3

Date	Time	L _{Aeq} (dB)	L _{AFmax} (dB)	L _{A90} (dB)	L _{eq} (dB)								L _{max} (dB)							
					63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
15/04/2021	14:46	56	70	50	65	57	54	51	52	49	45	38	78	69	66	67	62	64	62	56
	14:51	55	71	50	62	55	52	50	51	48	44	37	73	67	65	67	67	66	64	55
	14:56	54	71	48	61	55	52	50	50	47	44	38	73	70	66	67	66	64	64	58

Table B6. Noise Levels Measured at Attended Location A4

Date	Time	L _{Aeq} (dB)	L _{AFmax} (dB)	L _{A90} (dB)	L _{eq} (dB)								L _{max} (dB)							
					63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
15/04/2021	13:51	48	64	45	61	52	47	45	45	39	32	25	80	73	66	61	59	59	59	54
	13:56	48	67	44	61	52	49	45	44	38	31	24	78	69	65	60	64	63	50	44
	14:01	52	70	43	61	52	48	47	49	44	37	29	76	66	63	62	68	65	57	50

Table B7. Noise Levels Measured at Attended Location A5

Date	Time	L _{Aeq} (dB)	L _{AFmax} (dB)	L _{A90} (dB)	L _{eq} (dB)								L _{max} (dB)							
					63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
15/04/2021	14:28	46	65	42	56	46	43	42	41	37	33	29	69	59	57	54	57	61	57	54
	14:33	48	63	42	63	51	45	44	43	41	35	28	86	71	63	59	58	58	52	47
	14:38	46	64	42	58	48	43	43	43	38	33	27	79	68	59	61	58	59	56	53

Table B8. Noise Levels Measured at Attended Location A6

Date	Time	L _{Aeq} (dB)	L _{AFmax} (dB)	L _{A90} (dB)	L _{eq} (dB)								L _{max} (dB)							
					63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
15/04/2021	14:10	45	65	41	54	47	41	40	41	37	34	27	68	61	54	57	61	59	54	49
	14:15	44	56	40	57	47	41	39	40	35	29	23	70	62	58	51	54	50	50	45
	14:20	48	66	40	56	49	44	44	43	40	34	31	71	71	69	64	61	56	51	56

AECOM
Roslyn Andrews
Associate Director, Acoustics

T [REDACTED]
E [REDACTED]

VINCENT + GORBING
Mark Chandler
Architect Director

T [REDACTED]
E [REDACTED]

AECOM
Dave Brown
Senior Project Manager

T [REDACTED]
E [REDACTED]