Plant Noise Assessment

New City College

Hornchurch

Stroma Built Environment Ltd.

SBE Ref: OP-A621 – NC 1v1

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I. Revision History

Revision	Date	Description	
v1	02/02/2024	First Issue	
		Compiled By	**Authorised By**
		Andrew Gibson MIOA Principal Acoustic Consultant	Ben Reed Senior Acoustic Consultant

II. Contents

1. Introduction

1.1 Stroma Built Environment (SBE) has been appointed by Jerram Falkus Construction Limited to undertake acoustic consultancy services for a proposed extension to New City College, Wingletye Lane, Hornchurch, RM11 3TB.

1.2 The purpose of this assessment is to consider the noise impact associated with any new or relocated mechanical plant that forms part of the proposed development. The assessment will consider the potential noise impact at nearby noise sensitive receptors due to the proposed scheme for the purposes of Planning and BREEAM compliance.

1.3 This document has been prepared for the sole use, benefit and information of the client for the purposes set out in the document or instructions commissioning the works. The liability of SBE in respect of the information contained herein will not extend to any third party.

1.4 This report is limited to addressing the specific acoustic issues contained herein and is based on information and drawings provided by the client.

1.5 Whilst every effort has been made to ensure that this report is easy to understand, it is technical in nature. A glossary of terminology is included in Appendix III.

2. Site Description

2.1 The proposed extension is located on the site of existing New City College, Wingletye Lane, Hornchurch, RM11 3TB. The location of the new extension is indicated by the red boundary in Figure 1. The plant associated with the development is to be located on an existing roof as also indicated in Figure 1.

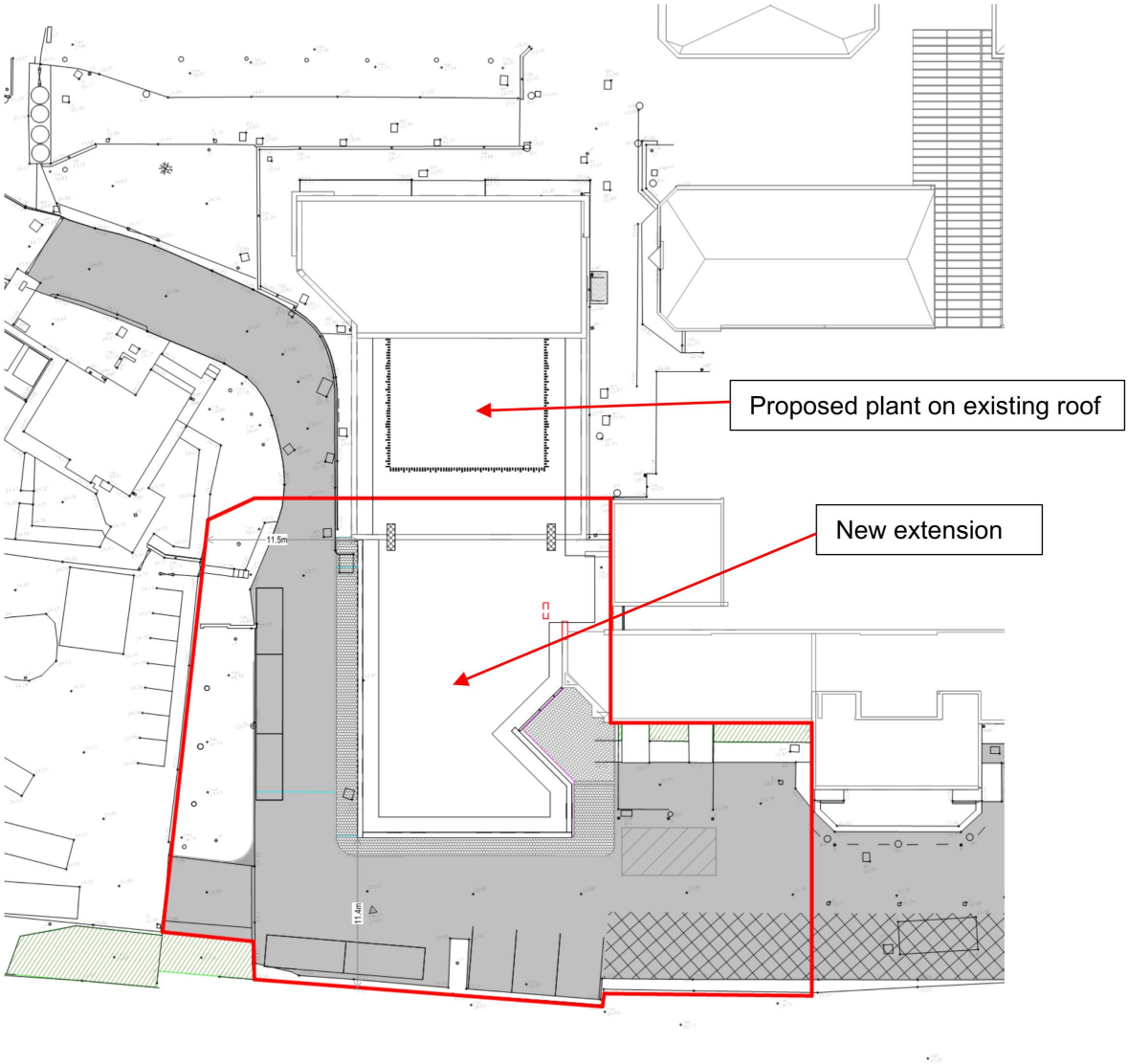


Figure 1: Proposed site location and plant area

2.2 The closest Noise Sensitive Receptor (NSR) to the site is identified as a residential building on the college site to the west of the development identified as NSR A in Figure 2. There are also further residential houses to the west on Wingletye Lane and to the south on Upminster Road identified as NSR B and NSR C in Figure 2 respectively. There are also residential apartments to the south on Upminster Road identified as NSR D in Figure 2.

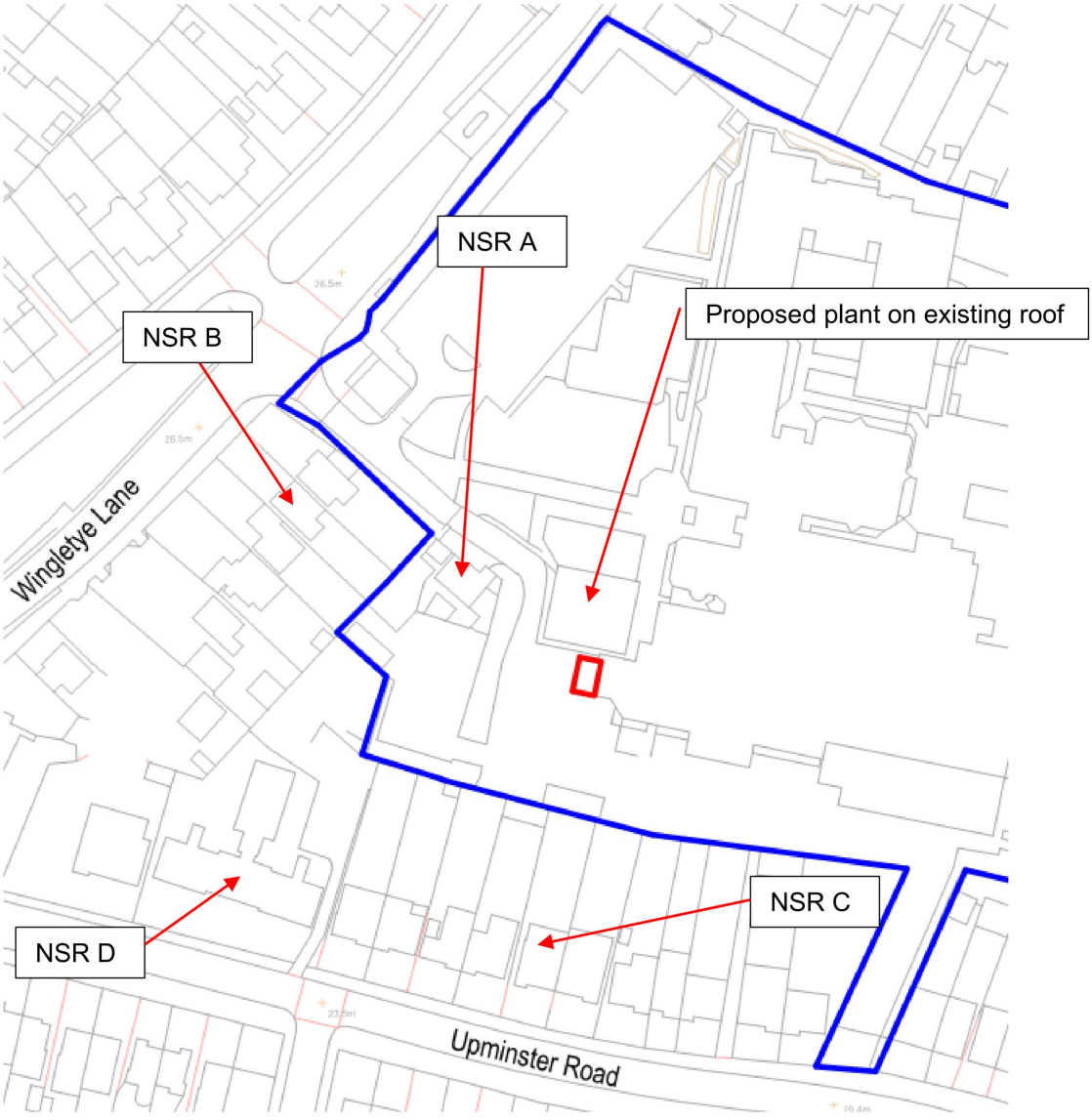


Figure 2: Location of Noise Sensitive Receptors and background measurement position

3. Relevant Acoustic Guidance

National Planning Policy Framework

3.1 The current planning guidance for the assessment of the potential environmental noise impact is outlined in the National Planning Policy Framework 2023 (NPPF). Whilst the NPPF does not set criteria that must be achieved, the NPPF states the following in relation to the appropriate control of potential noise impacts (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; […]"

3.2 Therefore, the policy requires that new developments are not affected to an unacceptable degree by environmental noise and existing development is not put at an unacceptable risk from noise due to adjacent new development.

Noise Policy Statement for England

3.3 The Noise Policy Statement for England (NPSE) provides further guidance on the Government's policy with regard to the potential impacts of noise. The NPSE states the aims of Government policy relating to noise are:

"Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- *avoid significant adverse impacts on health and quality of life;*
- *mitigate and minimise adverse impacts on health and quality of life; and*
- *where possible, contribute to the improvement of health and quality of life"*

3.4 The Explanatory Note to the NPSE provides further guidance on how significant noise effects should be determined. The concepts of No Observed Effect Level (NOEL), Lowest Observed Adverse Effect Level (LOAEL – the lowest noise level at which an adverse effect can be observed) and Significant Observed Adverse Effect Level (SOAEL – the noise level above which significant adverse effects on health and quality of life can be observed) are introduced, however the NPSE also states that:

"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."

BS 4142:2014+A1: 2019 'Methods for rating and assessing industrial and commercial sound'

3.5 BS 4142 describes a method for assessing the adverse impact from noise sources that are of an industrial nature (e.g. fans, pumps, chillers, air handling units etc.). The assessment methodology is based upon determining a 'rating level' for the equipment being assessed, which is the level of noise from the item or items of plant being assessed (measured as an L_{Aeq}).

3.6 The rating level is then compared with the underlying background noise level (measured as L_{A90}) in the absence of noise from the item or items of plant being assessed.

- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
- The lower the rating level is relative to the measured background sound 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, depending on the context.

3.7 BS 4142 states that a penalty should be added for any plant which gives rise to noise features that may increase disturbance such as tonal, impulsive, or intermittent characteristics. With respect to the acoustic feature correction, BS 4142 states:

"Certain acoustic features can increase the significance of impact over that expected from a basic comparison between the specific sound level and the background sound level. Where such features are present at the assessment location, add a character correction to the specific sound level to obtain the rating level."

3.8 Generally, a rating penalty for a sound should be based on a subjective assessment of its characteristics.

Planning

3.9 An initial assessment of plant noise impact associated with the development, including a background noise survey has been conducted by a third party consultant Acoustic Consultants Limited (ACL) as detailed in their report '*Plant Noise Assessment, New City College, Ardleigh Green, Hornchurch, Reference: 10457/PJW, First Issue 09/11/23*'

3.10 Within this report the background noise level considered to be representative of the daytime and night noise at the noise sensitive receptors has been determined based on long term noise measurements. The background noise level presented within this report have been reproduced in Table 1.

3.11 The report further suggests that any new plant or relocated plant as a result of the development should be designed such that the rated noise level at the noise sensitive receptors is less than or equal to the background noise level when assessed in accordance with BS 4142 +A1: 2019. This would be an indication of a 'low impact' according to the standard. The proposed rating level on this basis is shown in Table 1.

Table 1: Proposed plant noise limits for Planning

Period	Representative background noise level, L_{A90} (dB)	Proposed planning BS 4142 Rating level Limit $L_{Ar,Tr}$ (dB)
Daytime (07:00-23:00)	44	≤ 44
Night time (23:00-07:00)	31	≤ 31

BREEAM Pol 05

3.12 It is understood that the development is seeking BREEAM certification. BREEAM Pol 05 provides one design credit with the aim, 'To reduce the likelihood of noise arising from fixed installation on the new development affecting noise sensitive buildings.'

3.13 The criteria for the one credit available under Pol 05 is shown in Table 2.

Table 2: BREEAM 2018 Pol 05 requirements

Credit 1 – Reduction of noise pollution	
Criteria	The noise level from the assessed building, as measured in the locality of the nearest or most exposed noise-sensitive development, must be at least 5 dB lower than the background noise throughout the day and night when assessed in accordance with BS 4142:2014.

3.14 The requirements for achieving the BREEAM credit are more onerous that the those proposed for Planning and as such seeking this credit will improve the associated noise impact of the proposed development on noise sensitive receptors.

3.15 The required rating level to achieve the Pol 05 credit is shown in Table 3.

Table 3: Plant noise limits required for BREEAM Pol 05 credit

Period	Representative background noise level, L_{A90} (dB)	Required BREEAM Pol 05 BS 4142 Rating level Limit $L_{Ar,Tr}$ (dB)
Daytime (07:00-23:00)	44	≤ 39
Night time (23:00-07:00)	31	≤ 26

4. Noise Impact Assessment

Mechanical Plant

4.1 The proposed new plant or existing relocated plant as part of the development is indicated in Table 1.

Table 4: Assessed mechanical plant

Plant Make and Model	No.
Mitsubishi MEHP-iS-G07 0082 (new)	1
Mitsubishi PUZ-ZM35VKA (new)	1
Toshiba MMY-MAP1001HT8-E (relocated)	3

4.2 The location of the proposed mechanical plant has been taken from the mechanical engineers' drawings as indicated in Appendix I.

4.3 The proposed units along with the associated manufacturer's noise data used to inform this assessment is provided in Appendix II.

4.4 It should be noted that any existing plant that is to be retained and has not changed location does not form part of the assessment.

4.5 The assumption during daytime time operation (07.00 – 23:00) is that all plant will operate simultaneously and at maximum duty representing a worst case condition.

4.6 During the night time (23:00 – 07:00) only the Mitsubishi PUZ-ZM35VKA unit serving the IT Server room is understood to be operational.

4.7 On the basis of the proposed plant location, noise data, and operating times, the noise level at the noise sensitive receptors are calculated according to ISO 9613-2:1996 using Cadna-A noise modelling software to determine the noise rating level in accordance with BS 4142.

4.8 Within the noise model, the following assumptions and parameters are used:

- Ground absorption set to 0 for hard ground;
- Buildings and barrier have a reflection loss of 2 dB;
- Order of reflections set to three;
- Barrier surrounding plant area is solid and at 3 metres in height.

4.9 A 3D view of the noise model created within the noise modelling software is shown in Figure 3. The small blue crosses represent each noise source and the black and white circles are the noise sensitive receptors.

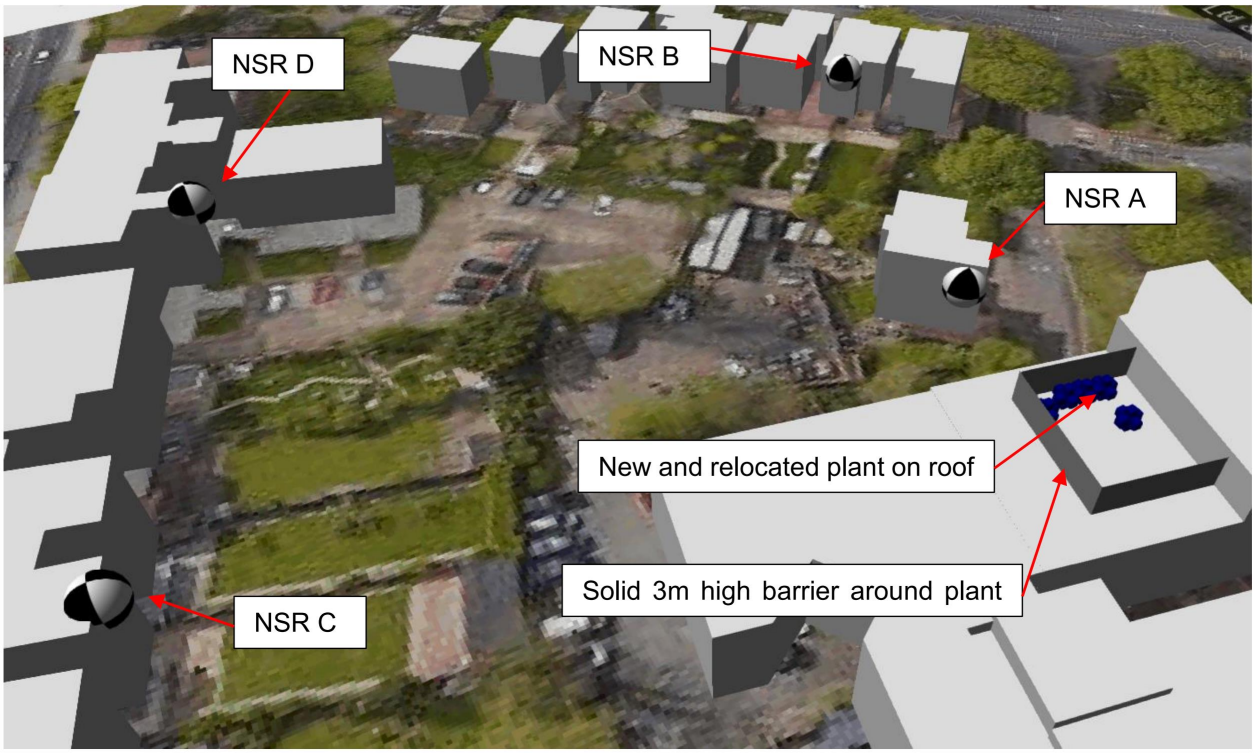


Figure 3: 3D view of noise model

4.10 A plan view of the noise model showing the specific noise impact from the mechanical plant during the daytime and night time is shown in Figure 4 and Figure 5 respectively.

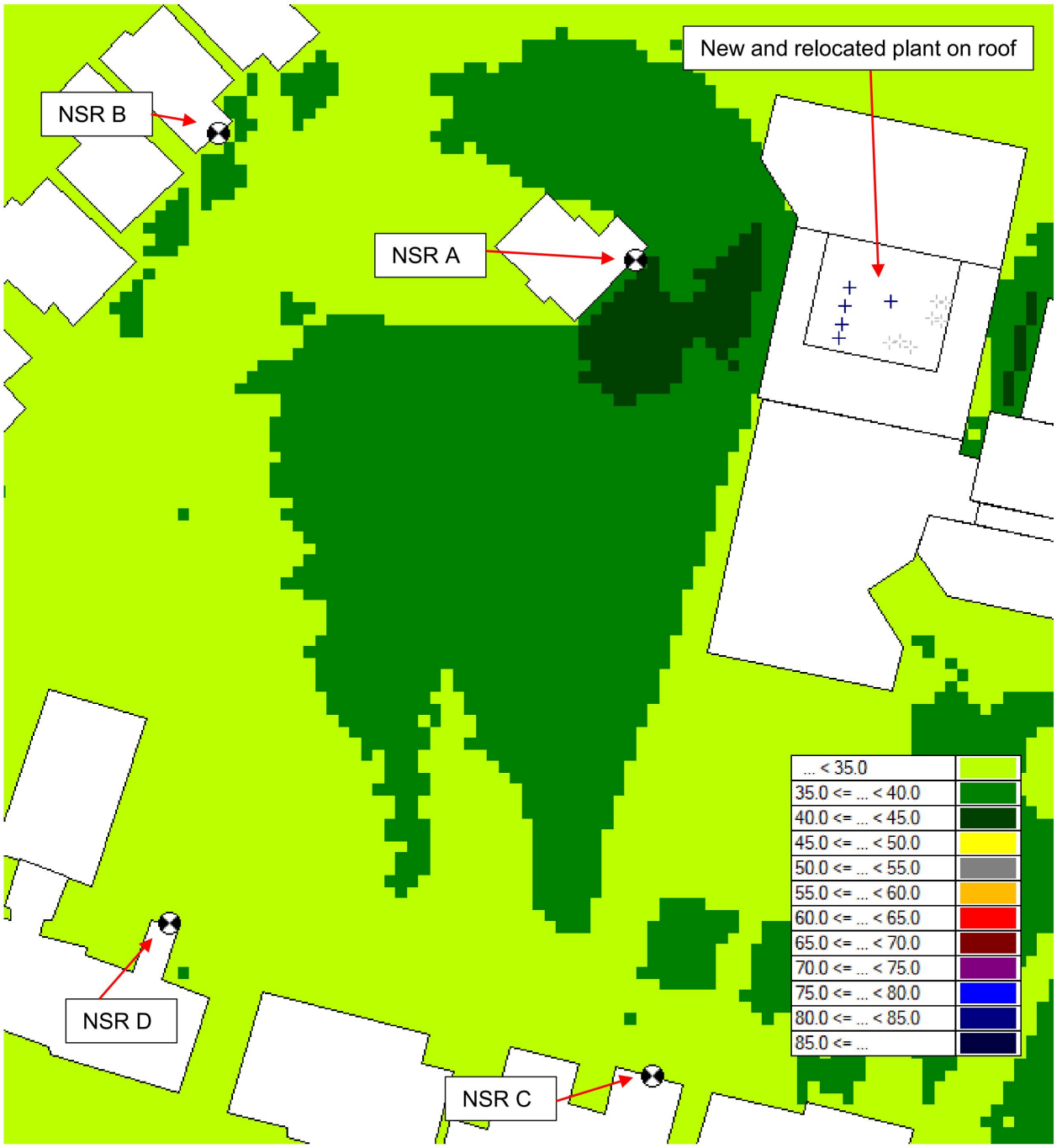


Figure 4: Noise contours at 5.5 m high showing the specific noise level $L_{Aeq,T}$ during the daytime

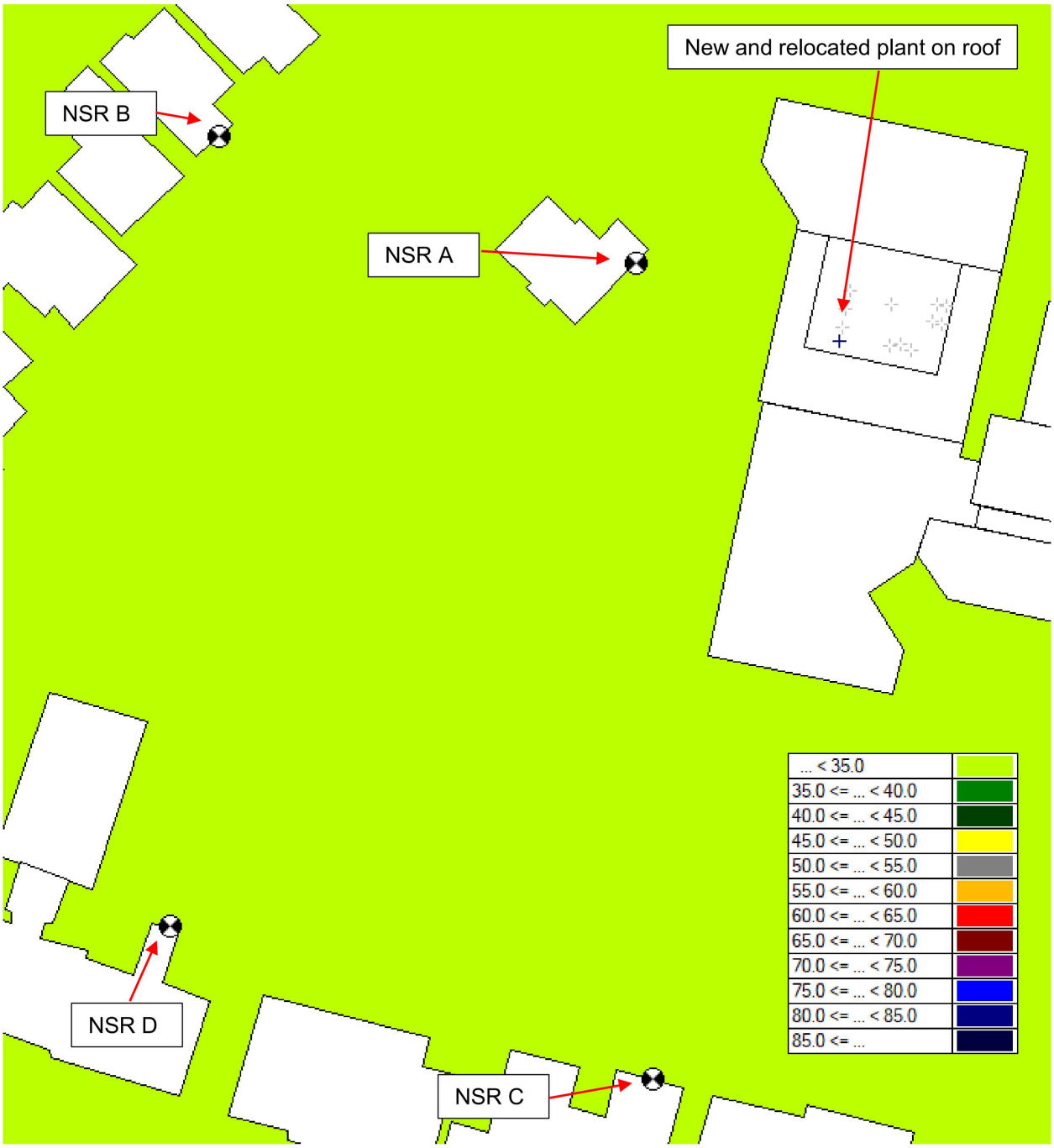


Figure 5: Noise contours at 5.5 m high showing the specific noise level $L_{Aeq,T}$ during the night time

4.11 The overall noise is not considered to have any acoustic features such that penalties to the specific noise level in accordance with BS 4142:2014+A1: 2019 are not considered applicable.

4.12 The assessment of the noise impact shows that the rated noise level achieves the level defined for Planning and BREEAM during both the day and night, as shown in Table 5.

Table 5: Calculated noise levels from mechanical plant at noise sensitive receptors

Location	Period	Representative Background $L_{A90,T}$	Calculated BS 4142 Rating Level (dB $L_{Ar,Tr}$)	Excess over background
NSR A	Daytime (07:00-23:00)	≤ 44	38	-6
	Night (23:00-07:00)	≤ 31	4	-27
NSR B	Daytime (07:00-23:00)	≤ 44	34	-10
	Night (23:00-07:00)	≤ 31	-1	-32
NSR C	Daytime (07:00-23:00)	≤ 44	34	-10
	Night (23:00-07:00)	≤ 31	-1	-32
NSR D	Daytime (07:00-23:00)	≤ 44	33	-11
	Night (23:00-07:00)	≤ 31	-2	-33

Estimate of Calculation Uncertainty

4.13 An assessment of uncertainty in measurement and calculation is undertaken following guidance in University of Salford document '*A good practice guide on the sources and magnitude of uncertainty arising in the practical measurement of environmental noise*' (2007).

4.14 Assessment is undertaken against measured site background sound level measurements. The uncertainty of noise survey measurements is expected to be ± 1 dB based on the allowable uncertainty for a calibrated Class 1 precision integrating sound level meter, quoted by BS 61672-11:2003 as ±1.1 dB at 1kHz.

4.15 Sound data for plant equipment has been taken from manufacturer quoted noise. In accordance with BS EN ISO 3740:2001 the uncertainty of source measurement is expected to be ± 1 dB in each octave band.

4.16 The uncertainty in a distance attenuation calculation is quoted by ISO 9613-2:1996 as ± 3 dB.

4.17 A change of around ±3 dB at the noise sensitive receptor is likely to be only just perceivable and as such the uncertainty associated with calculation is not considered to fundamentally change the assessment outcome.

5. Conclusions

5.1 Stroma Built Environment (SBE) has been appointed by Jerram Falkus Construction Limited to undertake acoustic consultancy services for a proposed extension to New City College, Wingletye Lane, Hornchurch, RM11 3TB.

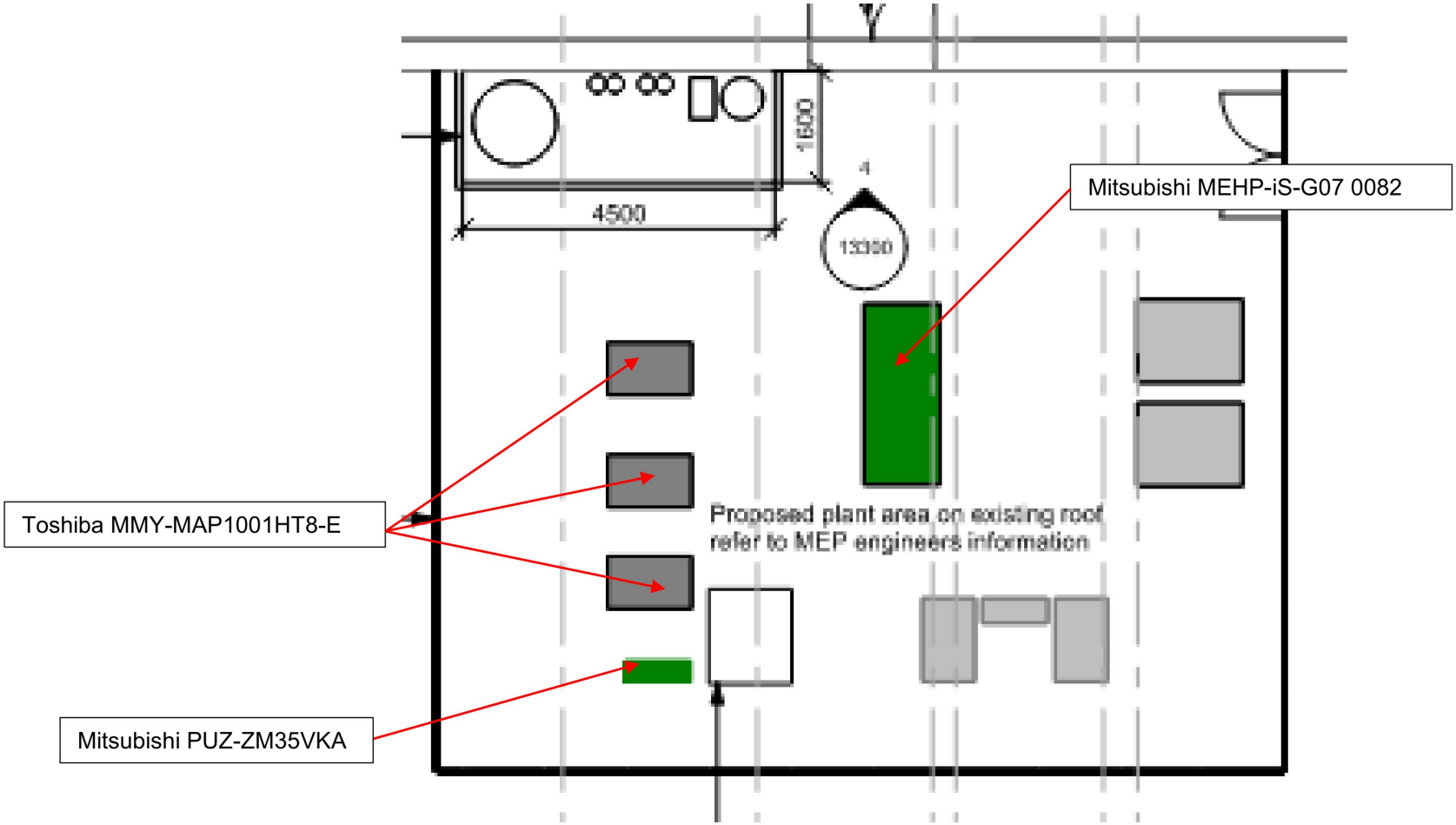
5.2 The purpose of this assessment is to consider the noise impact associated with any new or relocated mechanical plant that forms part of the proposed development with respect to demonstrating compliance with Planning and the BREEAM Pol 05 credit.

5.3 On the basis of the details provided and calculations detailed in this report it is determined that the rated noise impact from the mechanical plant when assessed in accordance with BS 4142:2014+A1: 2019 is at least 6 dB below the background noise level.

5.4 The noise impact is therefore considered as a 'low impact' according to BS 4142:2014+A1: 2019 and as such the proposals are considered to achieve the aim of the National Planning Policy Framework (NPPF).

5.5 The rated noise level from the plant is also in compliance with the BREEAM Pol 05 criteria and the proposed planning noise limits, as such it is considered that the BREEAM credit can be awarded for the development.

Appendix I. Plant Layout



Appendix II. Plant Noise Data

Mitsubishi MEHP-iS-G07 0082

SOUND POWER LEVEL IN COOLING									
SIZE	Octave band [Hz]								Total sound level dB(A)
	63	125	250	500	1000	2000	4000	8000	
	Sound power level dB								
0051	84	77	76	74	72	69	64	60	**77**
0061	85	78	77	75	73	70	65	61	**78**
0071	87	80	79	77	75	72	67	63	**80**
0082	87	80	79	77	75	72	67	63	**80**
0092	88	81	80	78	76	73	68	64	**81**
0102	89	82	81	79	77	74	69	65	**82**
0112	89	82	81	79	77	74	69	65	**82**

Working conditions
Plant (side) cooling exchanger water (in/out) 12,00°C/7,00°C; Source (side) heat exchanger air (in) 35,0°C.
Sound power on the basis of measurements taken in compliance with ISO 9614.
Such certification refers specifically to the sound Power Level in dB(A). This is therefore the only acoustic data to be considered as binding.
Sound power level in cooling, outdoors.

Toshiba MMY-MAP1001HT8-E

Model	Sound power level (dBA)		Weight (kg)
	Cooling	Heating	
MMY-MAP0501HT8-E, MMY-MAP0501HT8Z-E, MMY-MAP0501HT8ZG-E	75	75	228
MMY-MAP0601HT8-E, MMY-MAP0601HT8Z-E, MMY-MAP0601HT8ZG-E	76	76	228
MMY-MAP0801HT8-E, MMY-MAP0801HT8Z-E, MMY-MAP0801HT8ZG-E	77	78	258
MMY-MAP1001HT8-E, MMY-MAP1001HT8Z-E, MMY-MAP1001HT8ZG-E	78	79	258
MMY-MAP1201HT8-E, MMY-MAP1201HT8Z-E, MMY-MAP1201HT8ZG-E	79	80	258
MMY-MAP0501T8-E, MMY-MAP0501T8Z-E, MMY-MAP0501T8ZG-E	75	—	227
MMY-MAP0601T8-E, MMY-MAP0601T8Z-E, MMY-MAP0601T8ZG-E	76	—	227
MMY-MAP0801T8-E, MMY-MAP0801T8Z-E, MMY-MAP0801T8ZG-E	77	—	256
MMY-MAP1001T8-E, MMY-MAP1001T8Z-E, MMY-MAP1001T8ZG-E	78	—	256
MMY-MAP1201T8-E, MMY-MAP1201T8Z-E, MMY-MAP1201T8ZG-E	79	—	256

Mitsubishi PUZ-ZM35VKA

Service Ref.				PUZ-ZM35VKA		PUZ-ZM50VKA	
Mode				Cooling	Heating	Cooling	Heating
OUTDOOR UNIT	Power supply (phase, cycle, voltage)		A	Single, 50Hz, 230V			
		Max. current		13		13	
	External finish			Munsell 3Y 7.8/1.1			
	Refrigerant control			Linear Expansion Valve			
	Compressor			Hermetic			
		Model	kW	SVB140FFSM		SVB140FFSM	
		Motor output		0.6		0.9	
		Starter type		Inverter			
		Protection devices		HP switch Comp.shell thermo			
	Crankcase heater		W	—			
	Heat exchanger			Plate fin coil			
	Fan	Fan(drive) × No.		Propeller fan × 1			
		Fan motor output	kW	0.046			
		Airflow	m³/min (CFM)	45 (1,590)			
	Defrost method			Reverse cycle			
	Sound pressure level		dB	44			
		Cooling	dB	46			
	Dimensions	Heating	mm (inch)	809 (31-13/16)			
		W	mm (inch)	300 (11-3/16)			
		D	mm (inch)	630 (24-13/16)			
	Weight	H	kg (lb)	46 (101)		46 (101)	
	Refrigerant			R32			
		Charge	kg (lb)	2.0 (4.4)		2.0 (4.4)	
		Oil (Model)	L	0.35 (FW68S)		0.35 (FW68S)	
REFRIGERANT PIPING	Pipe size O.D.	Liquid	mm (inch)	6.35 (1/4)			
		Gas	mm (inch)	12.7 (1/2)			
	Connection method	Indoor side		Flared			
		Outdoor side		Flared			
	Between the indoor & outdoor unit	Height difference		Maximum 30 m			
		Piping length		Maximum 50 m			

Appendix III. Acoustic Glossary

Sound pressure level and the decibel, dB

A sound wave is a small fluctuation of atmospheric pressure. The human ear responds to these variations in pressure, producing the sensation of hearing. The ear can detect a very wide range of pressure variations. In order to cope with this wide range of pressure variations, a logarithmic scale is used to convert the values into manageable numbers. The decibel is the logarithmic unit used to describe sound (or noise) levels. The usual range of sound pressure levels is from 0 dB (threshold of hearing) to 120 dB (threshold of pain).

Frequency and hertz, Hz

Frequency is a measure of the rate of fluctuation of a sound wave. The unit used is cycles per second, or hertz (Hz). Sometimes large frequency values are written as kilohertz (kHz), where 1 kHz = 1000 Hz. The human range of hearing is commonly accepted to be 20 Hz to 20,000 Hz. Additionally, an octave can be used to describe the interval between a frequency in Hz and either half or double that frequency.

Frequency weighting

Different weighting networks can be applied to a given sound level in each stated octave band by a specified amount, in order to better represent the response of the human ear. The most commonly used weighting network is the 'A' weighting, and the letter 'A' will be included within a descriptor to indicate that the value has been 'A' weighted, e.g. $L_{Aeq,T}$ or L_{A90}. An 'A' weighted noise level may also be written as dB(A). Other weightings less commonly used are 'C' and 'D' weighting.

Noise indices

When a noise level varies with time, the measured 'A' weighted dB level will vary as well. In this case it is therefore not possible to represent the noise climate with a simple 'A' weighted dB value. In order to describe noise where the level is continuously varying, a number of other indices, including statistical parameters, are used. The various indices used are described as below:

$L_{Aeq,T}$	The 'A' weighted 'equivalent continuous noise level' which is an average of the total sound energy measured over a specified time period, T
L_{Amax}	The maximum 'A' weighted noise level that was recorded during the monitoring period.
L_{A10}	The 'A' weighted noise level that was recorded for at least 10% of the monitoring period.
L_{A90}	The 'A' weighted noise level that was recorded for at least 90% of the monitoring period, usually taken as the underlying 'background' noise level.

Sound level difference, *D*

The sound level difference between two internal spaces, or between internal and external spaces. The '*D*' value is used to denote the differences at each third octave or octave band, with a single figure 'weighted' value to describe an overall performance. Note that the '*D*' value will always describe an in-situ or on-site acoustic performance. All values are described using the decibel.

D_w	Single figure weighted sound level difference, simply the measured source noise level minus receiver noise level, not adjusted to reference conditions
$D_{nT,w}$	Weighted normalised sound level difference – a single, weighted sound insulation value, normalised to a reference reverberation time using the measured reverberation time in the receive room
$D_{nT,w} + C_{tr}$	As above, with a spectral adaptation term applied to account for the effects of low frequency noise, and based on urban traffic noise
$D_{nf,w}$	Overall flanking normalised level difference - A parameter that defines the flanking transmission of sound from room to room where a dividing partition or floor construction abuts a flanking building element common to both rooms, such as the building façade or ceiling

Sound reduction index, *R*

This describes the sound transmitted through a material or building element, such as a wall, door or window. It is measured in a laboratory with suppressed flanking transmission. The '*R*' value is used to denote the differences at each third octave or octave band, with a single figure 'weighted' value to describe an overall performance. All values are described using the decibel.

R_w	Weighted single figure sound reduction index
$R_w + C_{tr}$	As above, with a spectral adaptation term applied to account for the effects of low frequency noise, and based on urban traffic noise
R'_w	The 'apparent sound reduction index', a field measurement to obtain the sound reduction index of a material or element, with all effects of site installation accepted.

Standardised impact sound pressure level, $L'_{nT,w}$

$L'_{nT,w}$ is the single figure used to characterise the impact sound pressure level in a receiving room, normalised to a reference reverberation time. Impact noise can be classified as (but is not limited to) the result of footfall impact on a separating floor to a habitable space below. All values are described using the decibel.

Reverberation time, *T* and T_{mf}

The reverberation time of a space is a measure of the rate at which sound decays, measured in seconds. It is defined as the time taken for the sound pressure level to reduce by 60 dB from its original impulse level. Reverberation time is commonly quoted in terms of the mid-frequency reverberation time, T_{mf}, the arithmetic average of the reverberation times in the 500 Hz, 1 kHz and 2 kHz octave bands.

Absorption Coefficient

The acoustic absorption provided by a surface is defined as the sound absorption coefficient α, which denotes the fraction of sound energy absorbed between 0 (no absorption) and 1 (no reflection). The absorption coefficient of a material varies with the frequency of incident sound waves, therefore is considered for different frequencies.

Absorption Class

Based on the absorption coefficients, the overall sound absorption of a material is classified from Class A to Class E as defined in BS EN ISO 11654:1997, with Class A providing the highest level of acoustic absorption.

Noise rating, NR

The noise rating or NR system is commonly used in the design of noise emitted by internal building services systems. The system is frequency dependent, and was empirically derived to prevent disturbance to occupants in habitable or working areas from building services noise that exhibits 'tonal' elements, e.g. rumbles, whines, whistles etc. There is no direct relationship between the average 'A' weighted noise level in dB and the NR. However, as a guide, and assuming the absence of strong low frequency content in a given noise, the NR could generally be said to be 6 dB less than the average 'A' weighted dB value.

Privacy

Privacy is the addition of the level of sound insulation between two rooms and the background noise within a receiving room. It can be used to assess the level of privacy afforded in the 'receiving room' for speech from the 'source room'. The 'privacy factor' is a unit-less value that is the combination of the average 'A' weighted background noise level in dB and the weighted sound level difference (D_w) in dB.

Appendix IV. SBE Acoustic Credentials

SBE have specialised in providing the UK Construction Industry with a range of acoustics services since 2006. Specialising in Building Acoustics, all SBE acousticians are members of the Institute of Acoustics.

SBE is accredited for on-site acoustic testing by United Kingdom Accreditation Service (UKAS) (Testing Laboratory Number 2731).
SBE meet the relevant acoustic requirements typically required in the UK, including for sound insulation testing as defined in Approved Document E for the purposes of testing for Part E to the Building Regulations 2010.

This report has been prepared by Andrew Gibson, Principal Acoustic Consultant who meets the BREEAM requirements for a suitably qualified acoustician (SQA) as follows;

1. Holds an MEng degree in Electronic and Electrical Engineering from the University of Birmingham
2. Has been an Acoustic Consultant for more than three year's (within the last five years). This experience includes a practical understanding of factors affecting acoustics in relation to construction and the built environment; including, acting in an advisory capacity to provide recommendations for suitable acoustic performance levels and mitigation measures.
3. Holds Membership of the Institute of Acoustics - MIOA membership.

This report has been read and reviewed by Ben Reed and has been found to;

1. Represent sound industry practice
2. Be appropriate given the building being assessed and scope of works proposed
3. Avoid invalid, biased and exaggerated recommendations.

Appendix V. Report Conditions

This document has been prepared for the sole use, benefit and information of the Client. The liability of Stroma Built Environment Ltd. in respect of the information contained herein will not extend to any third party unless prior agreement is obtained in writing from Stroma Built Environment Ltd.

This report is limited to addressing the specific acoustic issues contained herein. Advice has been provided for acoustic reasons only and it is recommended that appropriate expert advice be sought on all the ramifications, e.g. safety, fire, structural, CDM etc., associated with any proposals contained herein.

The in-situ performance of acoustic measures is influenced to a large extent by the quality of workmanship and compliance with the specifications on-site during construction, as such, Stroma Built Environment Ltd. accepts no liability for issues with acoustic performance arising from such factors.

Acoustic survey and testing work carried out for the project is representative of the prevailing conditions at the time of the work. Conditions can vary and no warranty is given as to the possibility of changes in the environment of the site and surrounding area at differing times.

In particular, it should be noted that where calculations are carried out that are based on assumptions regarding certain aspects where information has not been supplied, these are provided for indicative purposes only and should be treated as such.