# Noise Impact Assessment

# Plot 5000 Hatfield Business Park

# Mosquito Way, Hatfield

# AL10 9AZ

# Kier Construction - Rickmansworth

# SBE Ref: 05-19-76158 N1 – AC - 1v1

# I. Revision History

| Revision | Date | Description | | |
|---|---|---|---|---|
| 1v1 | 25/07/2019 | First Issue | | |
| | | **Compiled By** | **Authorised By** | |
| | | Richard Whitfield MSc<br>Acoustic Consultant | Tom Chaffer MSc MIOA<br>Principal Acoustic Consultant | |

# II. Executive Summary

Stroma Built Environment (SBE) has been commissioned to undertake a noise impact assessment of fixed plant associated with a new development located at Plot 5000 Hatfield Business Park, Mosquito Way, Hatfield, AL10 9AZ.

The purpose of this report is to assess noise emission from items of fixed plant installed at the western façade of the development, having regard to the requirements of Planning Condition 3 (iii) which states:

> 3. No development shall take place until:
>
> (i) There has been submitted to and approved in writing by the Local Planning Authority, an operations strategy including details of the internal and external activities proposed at the site, the hours of operation of these activities as well as details of sound insulation and attenuation measures to be undertaken to insulate from noise associated with these activities;
>
> (ii) Upon first occupation, the approved sound insulation and attenuation scheme shall be implemented;
>
> (iii) Following implementation of the scheme, a further report detailing the performance of that scheme shall be submitted within 6 months to the Local Planning Authority following occupation and approved in writing by the Local Planning Authority;

Noise levels have been predicted at the façade of the closest noise sensitive receptors located on Dragon Road and Fillingham Way, plus external teaching areas at the nearby Howe Dell School having regard to the methodology outlined in British Standard 4142 '*Methods for rating and assessing industrial and commercial sound'* (BS 4142).

The calculations indicate that noise levels at the nearest noise sensitive receptors will be more than 10 dB below the pre-development representative background sound levels, which relates to a BS 4142:2014 assessment of 'low noise impact'. It is therefore understood that the noise levels from new sources of building services plant associated with the Plot 5000 Hatfield Business Park development are within the rating limits outlined by the local authority in line with the requirements of Planning Condition 3 (i).

Based on the assessment outcome of low noise impact no additional noise mitigation measures are considered to be necessary.

# III. Contents

# 1. Introduction

1.1 Stroma Built Environment (SBE – formerly HRS Services Ltd) has been commissioned by Kier Construction to undertake a noise impact assessment of fixed plant associated with a new development located at Plot 5000 Hatfield Business Park, Mosquito Way, Hatfield, AL10 9AZ.

1.2 Planning permission for the development was granted by Welwyn Hatfield Borough Council in October 2017 subject to Planning Conditions. Of relevance to this report is Planning Condition 3 which states:

> 3. No development shall take place until:
>
> (i) There has been submitted to and approved in writing by the Local Planning Authority, an operations strategy including details of the internal and external activities proposed at the site, the hours of operation of these activities as well as details of sound insulation and attenuation measures to be undertaken to insulate from noise associated with these activities;
>
> (ii) Upon first occupation, the approved sound insulation and attenuation scheme shall be implemented;
>
> (iii) Following implementation of the scheme, a further report detailing the performance of that scheme shall be submitted within 6 months to the Local Planning Authority following occupation and approved in writing by the Local Planning Authority;
>
> (iv) Should the report submitted under (iii) not be approved, or if the internal and/or external activities at the premises should change, the process from (i) above shall be repeated until a satisfactory level of noise attenuation is achieved. Any further report submitted under this part shall be within 6 months of either the decision of the Local Planning Authority or within 6 months of internal and/or external activities changing.
>
> The development shall not be carried out other than in accordance with the approved scheme.
>
> REASON: To protect the residential amenity of nearby occupiers in accordance with Policies R19 & D1 of the Welwyn Hatfield District Plan 2005.

1.3 A report was previously prepared by HRS Services to support the discharge of Planning Condition 3 (i) (report reference: 125626 AC 1v1 Planning Stage Noise Impact Assessment Report). Noise limits were established according to the following local authority requirement:

> *"Prior to the commencement of the development of any plot hereby permitted, details relating to noise from the use or from any plant or equipment to be installed on that plot with evidence in the form of an acoustic report showing that noise emissions from the use or plant or equipment will be 10dB (LAeq) below the background noise level (LA90) at the nearest residential property (using the methodology outlined within BS4142:2014) must be submitted to and approved in writing by the Local Planning Authority. Thereafter, the development must not be carried out other than in accordance with the approved scheme."*

1.4 The purpose of this report is to demonstrate that the in-situ fixed plant equipment performance satisfies the rating noise limits previously established in the planning noise assessment to support the discharge of Planning Condition 3 (iii).

1.5 This document has been prepared for the sole use, benefit and information of the Client for the purposes set out. The liability of SBE in respect of the information contained herein shall not extend to any third party.

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

1.7 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 II.

# 2. Relevant Acoustic Standards

## BS 4142:2014 'Methods for rating and assessing industrial and commercial sound'

2.1 British Standard BS 4142:2014 '*Methods for rating and assessing industrial and commercial sound'* (BS 4142), describes a method for assessing the likelihood of complaints 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' ($L_{Ar,Tr}$) for the equipment being assessed, which is the level of noise from the item or items of plant being assessed (measured as an $L_{Aeq,T}$) plus any corrections or penalties required by BS 4142.

2.2 The rating level is then compared with the underlying background noise level (measured as a $L_{A90,T}$) 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.

2.3 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:

2.4 "*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."*

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

# 3. Baseline Noise Conditions

## Site Description

3.1 The development site is situated on land off Mosquito Way in Hatfield, part of the Hatfield Business Park and is centred on ordnance survey grid reference: 521590,208340. The surrounding area is mixed industrial / residential in character. The Howe Dell Primary School is located adjacent to the western site boundary. Residential properties are located on Dragon Road and Fillingham Way to the west and north-west respectively. The surrounding area to the north, south and east of site comprise commercial / office buildings. It is understood that normal hours of operation of the development are typically 08:00 - 17:30, with the potential for the warehouse to be operable by a small team of up to 8 staff until midnight.

3.2 The closest residential noise sensitive receptors to the site are considered to be properties on Dragon Road and Fillingham Way, located approximately 75m to the west and 70m north-west respectively. Howe Dell School has also been considered and assessed as a noise sensitive receptor during daytime hours (07:00 – 23:00).

3.3 Although Howe Dell School adjoins the western site boundary, there is an area of hedgerow separating the playing fields from the site. Therefore, the boundary of the playground has been taken as representative of the closest external teaching area. This is located approximately 20m west of the site boundary. It should also be noted that a wind turbine is located within the south eastern corner of the school playing fields which may increase background noise levels when in operation.

3.4 The identified NSR's are presented in Figure , and described in Table 1 below.

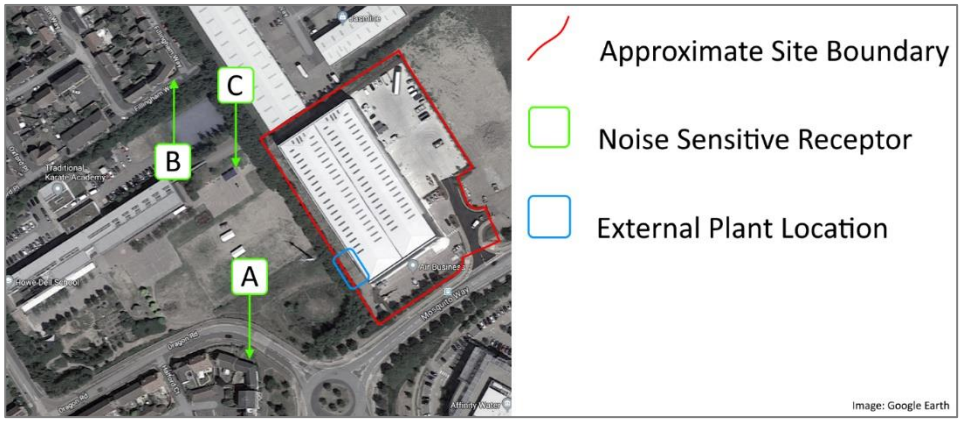


**Figure 1: Noise sensitive receptor location**

**Table 1: Identified noise sensitive receptors**

| NSR | Description | Distance to site boundary (m) |
|---|---|---|
| A | Dwellings along Dragon Road | 75 |
| B | Dwellings along Fillingham Way | 70 |
| C | Howe Dell School Playground | 20 |

3.5 A background noise survey was undertaken by HRS Services Ltd between Wednesday 15th – Tuesday 21st March 2017. Full details of the noise survey can be found in HRS report reference: 125626 – AC - 1v1.

3.6 The prevailing noise climate at the site is controlled by local road traffic noise from Mosquito Way and the A1(M) motorway to the east. Frequent aircraft noise was audible including from light aircraft / private planes. School teaching and playing activities were at times dominant at residential receptors during school hours. Local road traffic and distant road noise from the A1(M) were observed to dictate the baseline background noise level during the evening and night periods.

3.7 Background sound levels ($L_{A90,T}$) measured during this period have been used to determine rating noise limits, having regard to the guidance outlined in BS 4142. Requirements are outlined in Table 2 to provide a noise rating level 10 dB below the representative site background sound level. These requirements are drawn from Table 2 in HRS planning report ref: 125626 AC 1v1, and relate to the noise sensitive receptors identified in Figure 1.

**Table 2: Noise limits for new sources of building services plant**

| NSR Location | | Daytime rating noise limit 07:00-23:00 (dB $L_{Ar,Tr}$) | Night time rating noise limit 23:00-07:00 (dB $L_{Ar,Tr}$) |
|---|---|---|---|
| A | Residential Property – Dragon Road | ≤ 33 | ≤ 30 |
| B | Residential Property – Fillingham Way | ≤ 34 | ≤ 31 |
| C[1] | Howe Dell School | ≤ 33 | n/a |

Notes to Table 2: [1] Rating noise limit based on levels measured at NSR A.

3.1 Noise Impact Assessment**Error! Reference source not found.**To satisfy the requirements of Planning Condition 3 (iii), an updated noise assessment has been undertaken to demonstrate that the plant rating noise limits proposed in the HRS report would be satisfied at all NSR's.

## Noise Survey

3.2 To inform the assessment, a noise survey has been undertaken by SBE at the site on the morning of 18th June 2019. Plant noise measurements were taken using a Class 1 sound level meter mounted on a tripod at 1.5m above ground level. The sound level meter was field calibrated at the start and end of the monitoring session, with no discernible drift detected.

3.3 External building services plant associated with the Plot 5000 scheme is formed of eleven external condenser units located in an external plant compound. The approximate location of the external plant area is indicated on Figure A1 in Appendix I.

**Table 3: Summary of assessed external plant**

| Plant Type | Number of units |
|---|---|
| Daikin RXYQ12 VRF Condenser Unit | 2 |
| Daikin RXYQ18 VRF Condenser Unit | 2 |
| Daikin RZAG140 DX Condenser Unit | 3 |
| Daikin RZAG125 DX Condenser Unit | 2 |
| Daikin RZAG71 DX Condenser Unit | 2 |

3.4 A series of short-term noise measurements were undertaken in the vicinity of the existing plant items which were operating at the time, at a distance of approximately 1m. It is understood that each item of plant operates on demand and may not run continuously. During the survey period all plant was understood to be operating at normal duty levels.

3.5 Table 4 presents a summary of the survey results.

**Table 4: Fixed plant noise measurements**

| Unit Measured | Measurement Start time | Measurement distance | Duration | Measured sound pressure level (dB) | |
|---|---|---|---|---|---|
| | | | | $L_{Aeq,\,T}$ | $L_{A90,T}$ |
| Daikin RXYQ12 VRF Condenser | 10:00 | 1m | 00:05:00 | 55 | 54 |
| Daikin RXYQ18 VRF Condenser | 10:07 | 1m | 00:05:00 | 59 | 58 |
| Daikin RXYQ12 VRF Condenser | 10:14 | 1m | 00:05:00 | 56 | 55 |
| Daikin RXYQ18 VRF Condenser | 10:20 | 1m | 00:05:00 | 55 | 55 |
| Daikin RZAG140 DX Condenser | 10:26 | 1m | 00:05:00 | 57 | 56 |

3.6 At the time of the survey RZAG125 and RZAG71 units were not operational. It is understood from manufacturers data that these units have a lower total noise output than the RZAG140 Condenser. Therefore the noise from the seven DX condenser units has been calculated based on the measurement of the RZAG140 DX unit.

3.7 Based on the results presented in Table 4, the specific sound level from each individual item of plant is has been taken as the source measurement at 1m from the unit. No corrections have been made to the rating level as the fixed plant was not considered subjectively tonal, intermittent, or possessing any other acoustic character which could increase the subjective prominence of the fixed plant.

3.8 Third octave band data for source measurements has been reviewed and does not indicate tonality based on BS 4142:2014 guidance.

3.9 To inform the assessment it has been assumed that all plant may operating concurrently. Based on the individual unit measurements the calculated total specific sound level with all units operating simultaneously is calculated by the logarithmic addition of the induvial measured noise level from each condenser, calculated to be 67 dB $L_{Aeq,T}$/

3.10 In reality, noise levels would be expected to be lower than those presented as this correction does not account for the spatial distribution of the plant items within the plant area.

## Fixed plant noise assessment

3.11 In order to determine the rating noise level at each receptor, an indicative calculation has been undertaken assuming that all items of fixed plant are operating concurrently. No corrections have been applied for screening by intervening structures or local topography. The calculations assume broadband noise

emission from each item of fixed plant. Noise levels have been calculated based on the minimum distance from the plant area to the receptor. For NSR's A & B details have been presented for the night time assessment, on the basis that this is the most onerous noise limit. Assessment at NSR C has been undertaken for the daytime only.

3.12 Tables 5, 6 and 7 below present a summary of the assessment results for the three identified noise sensitive receptors.

**Table 5: Fixed plant noise assessment (NSR A)**

| | | |
|---|---|---|
| **Maximum Specific sound level at Position 1** | $L_{Aeq,5\ mins}$ = 67 dB | Highest measured Specific noise level |
| **Maximum Specific sound level at NSR** | $L_{s,5\ mins}$ = 24 dB | Calculated Specific noise level at NSR at a distance of 145m |
| **BS 4142 Rating level** | $L_{Ar,Tr}$ = 24 dB | No acoustic feature correction has been deemed necessary for tonality, impulsivity or intermittency. |
| **Representative night time Background sound level** | $L_{A90,15min}$ = 40dB | Ref Table 2 |
| **Excess of rating over background sound level** | -16 dB | An indication of low noise impact |

**Table 6: Fixed plant noise assessment NSR B**

| | | |
|---|---|---|
| **Maximum Specific sound level at Position 1** | $L_{Aeq,5\ mins}$ = 67 dB | Highest measured Specific noise level |
| **Maximum Specific sound level at NSR** | $L_{s,5\ mins}$ = 28 dB | Calculated Specific noise level at NSR at a distance of 85m |
| **BS 4142 Rating level** | $L_{Ar,Tr}$ = 28 dB | No acoustic feature correction has been deemed necessary for tonality, impulsivity or intermittency. |
| **Representative night time Background sound level** | $L_{A90,15min}$ = 41dB | Ref Table 2 |
| **Excess of rating over background sound level** | -13 dB | An indication of low noise impact |

**Table 7: Fixed plant noise assessment (NSR C)**

| | | |
|---|---|---|
| **Maximum Specific sound level at Position 1** | $L_{Aeq,5\ mins}$ = 67 dB | Highest measured Specific noise level |
| **Maximum Specific sound level at NSR** | $L_{s,5\ mins}$ = 31 dB | Calculated Specific noise level at NSR at a distance of 60m |
| **BS 4142 Rating level** | $L_{Ar,Tr}$ = 31 dB | No acoustic feature correction has been deemed necessary for tonality, impulsivity or intermittency. |
| **Representative daytime Background sound level** | $L_{A90,15min}$ = 43dB | Ref Table 2 |
| **Excess of rating over background sound level** | -11 dB | An indication of low noise impact |

3.13 The results presented in Tables 5, 6 and 7 above indicate that the rating noise level from fixed plant associated with the proposed development would be more than 10 dB below the representative background sound level at all identified noise sensitive receptors. This relates to a BS 4142 assessment of low noise impact.

## Uncertainty

3.14 Measurements were undertaken in accordance with BS 7445:1991 using a UKAS calibrated Class 1 precision integrating sound level meter. Good practice guidance in BS 4142:2014 was followed to reduce uncertainty in noise measurement. For a calibrated Class 1 precision integrating sound level meter, the allowable uncertainty is quoted by BS EN 61672-1:2003 as ±1.1 dB at 1 kHz.

3.15 The uncertainty in a distance attenuation calculation over a distance of <1000 m is quoted by ISO 9613-2 as ±3 dB for ground floor sources (>5 m).

3.16 It is therefore estimated that the total uncertainty in measurement and calculation is ± 3 dB.

3.17 Based on the guidance outlined in BS 4142, where the noise level does not exceed the existing background noise level, this is an indication that the noise would have a low impact. Allowing for noise levels to increase by up to 3 dB, fixed plant noise levels would be a minimum of 8 dB below the background noise level. On this basis, it is considered that uncertainty would not significantly affect the outcome of the noise impact assessment.

# 4. Conclusions

4.1 Stroma Built Environment has been commissioned by Kier Construction - Rickmansworth to undertake a noise impact assessment of external buildings services plant associated with the proposed development at Plot 5000 Hatfield Business Park, Mosquito Way, Hatfield, AL10 9AZ.

4.2 It is understood that planning permission for the development was granted subject to a number of Planning Conditions. Of relevance to this report, Planning Condition 3 relates to noise emission from items of fixed plant.

4.3 This report has been prepared to demonstrate that the requirements of Planning Condition 3 (iii) are satisfied with regards to currently installed fixed plant items.

4.4 A fixed plant noise survey has been undertaken to establish levels of noise emission from existing plant items. Assessment of

4.5 Assessment of the plant noise against the previously established noise limits indicates that noise levels would be more than 10dB below the background noise level at the nearest noise sensitive receptors during both the day and the night without mitigation at the nearest noise sensitive receptor for each period and would therefore satisfy Planning Condition 3 (iii).

# Appendix I. Pre-Existing Site Plan

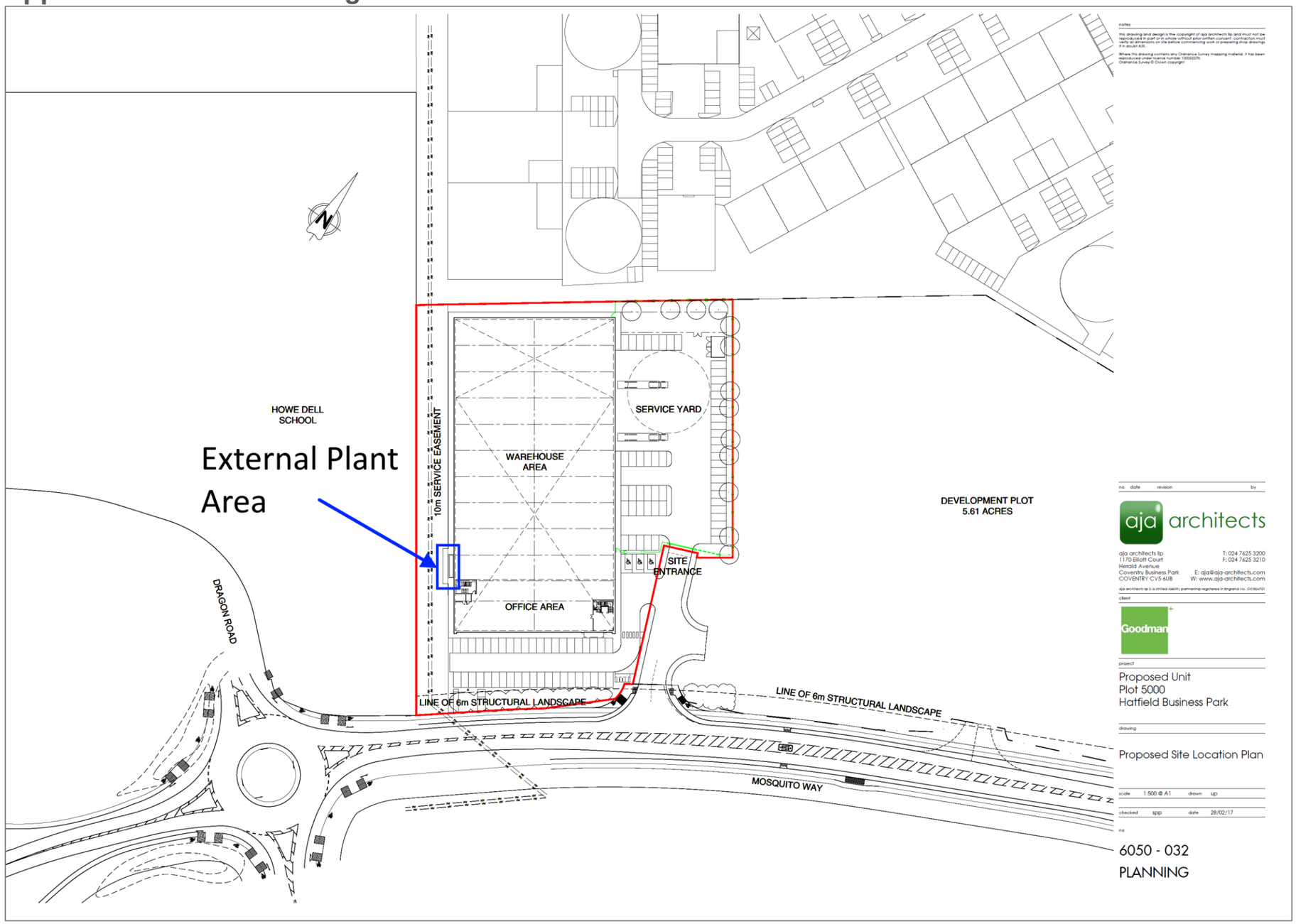


**Figure A1: Site location and layout plan**

# Appendix II. 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:

| | |
|---|---|
| $\boldsymbol{L_{Aeq,T}}$ | The 'A' weighted 'equivalent continuous noise level' which is an average of the total sound energy measured over a specified time period, *T* |
| $\boldsymbol{L_{Amax}}$ | The maximum 'A' weighted noise level that was recorded during the monitoring period. |
| $\boldsymbol{L_{A10}}$ | The 'A' weighted noise level that was recorded for at least 10% of the monitoring period. |
| $\boldsymbol{L_{A90}}$ | 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 III. 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 has been accredited for on-site acoustic testing by United Kingdom Accreditation Service (UKAS) since 2006 (Testing Laboratory Number 2587).
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 authorised by Tom Chaffer, Principal Acoustic Consultant who meets the BREEAM requirements for a suitably qualified acoustician (SQA) as follows;

1. Holds an MSc degree in Audio Acoustics from the University of Salford
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 Corporate Membership of the Institute of Acoustics - MIOA membership.

This report has been read and reviewed by Tom Chaffer 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 IV. 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.*