ACOUSTIC CONSULTANTS LTD

Noise Impact Assessment

First Avenue House, High Holborn
London WC1V 6NP

Reference: 10765/AW

Client:
GallifordTry

Document Control

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The report has been prepared in good faith, with all reasonable skill and care, based on information provided or available at the time of its preparation and within the scope of work agreement with the Client. We disclaim any responsibility to the Client and others in respect of any matters outside the scope of the above. The report is provided for the sole use of the named Client and is confidential to them and their professional advisors. No responsibility is accepted to other parties.

The report limits itself to addressing solely on the noise aspects as included in this report. We provide advice only in relation to noise and acoustics. It is recommended that appropriate expert advice is sought on all the ramifications (e.g. CDM, structural, condensation, fire, legal, etc.) associated with any proposals in this report or as advised and concerning the appointment. It should be noted that noise predictions are based on the current information as we understand it and on the performances noted in this report. Any modification to these parameters can alter the predicted level. All predictions are in any event subject to a degree of tolerance of normally plus or minus three decibels. If this tolerance is not acceptable, then it would be necessary to consider further measures.

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1. Introduction

Galliford Try appointed Acoustic Consultants Ltd to undertake a noise impact assessment for the proposed chillers at First Avenue House, High Holborn, London, WC1V 6NP.

This report provides a noise assessment of the proposed replacement chillers on the nearby noise sensitive residential receivers around the site, and the noise sensitive rooms at First Avenue House.

A noise impact assessment has been undertaken in accordance with the guidance in the National Planning Policy Framework (NPPF), Noise Policy Statement for England (NPSE), Planning Practice Guidance (PPG), British Standard 4142:2014 (BS4142), , British Standard 8233:2014 (BS8233), and the Ministry of Justice Court and Tribunal Design Guide.

The author of this report is an Associate Member of the Institute of Acoustics (MIOA) with over three years of experience within the field of noise and acoustics. This report has been reviewed by a Member of the Institute of Acoustics (MIOA) with over seven years' experience in the industry.

2. The Site & Proposals

The proposal is for the replacement the 3no. air cooled chillers located on the rooftop of First Avenue House, High Holborn.

First Avenue House is used as the Central Family Court and Court of Protection.

The proposal is to install 3no. chillers in the same location as the existing. The plant is proposed to run at the same times as the existing chillers, between 07:00 to 17:00 hours.

The nearest residential noise sensitive receiver (NSR) to the chillers is a block of the flats approximately 50 metres to the north-east, along Warwick Court.

The site lies within a mainly commercial use area. The noise climate at the NSR consists of road traffic, air traffic, and fixed plant noise from the surrounding buildings.

The google satellite image below shows the location of the chillers to be replaced and the NSR:

Figure 1: Plant and NSR locations

3. Planning and Noise

3.1. **National Planning Policy Framework**

The National Planning Policy Framework (NPPF) was published in March 2012 and revised in December 2023. Section 15 entitled 'Conserving and enhancing the natural environment' addresses noise as a requirement of planning. Paragraph 180 states:

"180. Planning policies and decisions should contribute to and enhance the natural and local environment by:

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and f) remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate."

Paragraph 191 states:

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

a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life
b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and
c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation. "

The document does not prescribe any assessment methodology or criteria to assess the adverse effect of noise and refers you to the NPSE.

3.2. **Noise Policy Statement for England**

The NPPF refers to the Noise Policy Statement for England (NPSE). This was published in March 2010 and aims to provide clarity regarding current policies and practices to enable noise management decisions to be made within the wider context, at the most appropriate level, in a cost-effective manner and in a timely fashion and applies to all forms of noise including environmental noise, neighbour noise and neighbourhood noise.

The NPSE sets out the long term vision of Government noise policy. This long term vision is supported by three noise policy aims as follows:

"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."*

The NPSE introduces the concept of "Significant adverse" and "Adverse" impacts of noise which relate to the noise policy aims. These are applied as follows:

NOEL – No Observed Effect Level

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

LOAEL – Lowest Observed Adverse Effect Level

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

SOAEL – Significant Observed Adverse Effect Level

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

The Noise Policy Statement for England (NPSE) states that noise levels above the Lowest Observed Adverse Effect Level are acceptable in planning where reduced to a minimum.

With regard to where there is potential for noise impact it states the following in relation to the second noise policy aim:

"The second aim of the NPSE refers to the situation where the impact lies somewhere between LOAEL and SOAEL. It requires that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development (paragraph 1.8). This does not mean that such adverse effects cannot occur."

The NPSE does not provide any assessment criteria for the noted effect levels and each case must be considered on its merits.

The NPSE does, however, emphasise that in dealing with noise Local Planning Authorities are required to take a balanced approach in considering the benefits of development as against any adverse effects which arise. Paragraph 2.18 of the NPSE is particularly relevant in this respect and states:

"There is a need to integrate consideration of the economic and social benefits of the activity or policy under examination with proper consideration of the adverse environmental effects, including the impact of noise on health and quality of life. This should avoid noise being treated in isolation in any particular situation, i.e. not focusing solely on the noise impact without taking into account other related factors."

The planning need is outside the scope of noise and acoustics and will need to be addressed by others.

3.3. **Planning Practice Guidance, Noise**

The Planning Practice Guidance (PPG) on noise referred to here is based on the current version (January 2019) as provided on the Planning Guidance Website. It states that, *"Noise needs to be considered when new developments may create additional noise and when new developments would be sensitive to the prevailing acoustic environment."*

It provides generic guidance on how to determine the noise impact and what factors could be a concern.

It includes the option types to mitigate any adverse effects of noise stating that there are four broad types of mitigation. These are engineering, layout, using planning conditions or obligations and noise insulation.

Paragraph 5 of the PPG provides a table identifying the effect level and examples of effect relating to the impact effect levels provided in the NPSE. The table is duplicated below:

Table 1: PPG Noise – Perception of Effect Levels

Perception	Examples of Outcomes	Increasing Effect Level	Action
No Observed Effect Level			
Not present	No Effect	No Observed Effect	No specific measures required
No Observed Adverse Effect Level			
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

The table does not provide any objective assessment which equates to the noted effect levels. However, the PPG identifies that where noise is audible, it is not necessarily intrusive. The effect and impact on people are based primarily on the level of noise.

4. Assessment Criteria

4.1. **Camden Local Plan**

Appendix 3 of the Camden Local Plan states:

"The significance of noise impact varies dependent on the different noise sources, receptors and times of operation presented for consideration within a planning application. Therefore, Camden's thresholds for noise and vibration evaluate noise impact in terms of various 'effect levels' described in the National Planning Policy Framework and Planning Practice Guidance:

- *NOEL – No Observed Effect Level*
- *LOAEL – Lowest Observed Adverse Effect Level*
- *SOAEL – Significant Observed Adverse Effect Level*

Three basic design criteria have been set for proposed developments, these being aimed at guiding applicants as to the degree of detailed consideration needed to be given to noise in any planning application. The design criteria outlined below are defined in the corresponding noise tables. The values will vary depending on the context, type of noise and sensitivity of the receptor:

- *Green – where noise is considered to be at an acceptable level.*
- *Amber – where noise is observed to have an adverse effect level, but which may be considered acceptable when assessed in the context of other merits of the development.*
- *Red – where noise is observed to have a significant adverse effect."*

It provides the following table of noise level criteria:

Table C: Noise levels applicable to proposed industrial and commercial developments (including plant and machinery)

Existing Noise sensitive receptor	Assessment Location	Design Period	LOAEL (Green)	LOAEL to SOAEL (Amber)	SOAL (Red)
Dwellings**	Garden used for main amenity (free field) and Outside living or dining or bedroom window (façade)	Day	'Rating level' 10dB* below background	'Rating level' between 9dB below and 5dB above background	'Rating level' greater than 5dB above background
Dwellings**	Outside bedroom window (façade)	Night	'Rating level' 10dB* below background and no events exceeding 57dBL_{Amax}	'Rating level' between 9dB below and 5dB above background or noise events between 57dB and 88dB L_{Amax}	'Rating level' greater than 5dB above background and/or events exceeding 88dBL_{Amax}

*10dB should be increased to 15dB if the noise contains audible tonal elements. (day and night). However, if it can be demonstrated that there is no significant difference in the character of the residual background noise and the specific noise from the proposed development then this reduction may not be required. In addition, a frequency analysis (to include, the use of Noise Rating (NR) curves or other criteria curves) for the assessment of tonal or low frequency noise may be required.

4.2. **British Standard 4142:2014+A:2019**

The methods described in the British Standard use outdoor sound levels to assess the likely effects of sound upon people who might be inside or outside a dwelling or other premises used for residential purposes.

The initial estimate principle is that of establishing the 'difference' between the 'rating level' and the 'background sound level'. The 'rating level' is the 'specific sound level' of the source over a period of one hour during the day (07:00 to 23:00 hours) and over a period of 15 minutes during the night (23:00 to 07:00 hours). Clause 9 entitled 'Rating Level' 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."

An acoustic character correction should be added to the 'specific sound level' if it exhibits any tonality, impulsivity, other specific characteristics and/or intermittency at the assessment location. The value of the character correction varies, dependent on the prominence of the character of the sound source at the assessment location. In Clause 11 of the Standard, entitled 'Assessment of the Impacts', it states:

"Obtain an initial estimate of the impact of the specific sound by subtracting the measured background sound level (see Clause 8) from the rating level (see Clause 9), and consider the following.

- *Typically, the greater this difference, the greater the magnitude of the impact.*
- *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."*

Based on the initial assessment outcomes of BS4142, and depending on context, it is our opinion that the NOEL, LOAEL and SOAEL levels stated in the Noise Policy Statement for England would generally fall within the following categories when considered in conjunction with the effect levels of the PPG Noise.

Table 2: BS4142 Difference in Relation to Effect Levels

BS4142 Assessment Difference	Corresponding Effect Level*	Action*
≤-10 dB	No Observed Effect	No specific measures required
-9.9 dB to 0 dB	No Observed Adverse Effect	No specific measures required
	Lowest Observed Adverse Effect Level	
0.1 dB to 5 dB	Observed Adverse Effect	Mitigate and reduce to a minimum
	Significant Observed Adverse Effect Level	
5.1 dB to 10 dB	Significant Observed Adverse Effect	Avoid
≥10.1 dB	Unacceptable Adverse Effect	Prevent

* BS4142 states that "where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration". Therefore, the assessment levels and effect levels above are not definitive and can be modified due to context.

It should be noted that the numerical outcome only represents the initial estimate of impact, as stated in the first paragraph of Clause 11, and that contextual matters should be considered before determining what the potential impact is. This paragraph states:

> *The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs. An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context.*
>
> *Obtain an initial estimate of the impact of the specific sound by subtracting the measured background sound level (see Clause 8) from the rating level (see Clause 9).*
>
> *NOTE 1 More than one assessment might be appropriate.*

The second part of Clause 11 sets out three contextual matters that should be taken into account once the initial numerical estimate has been determined. It is important to note that the three listed is not exhaustive and all pertinent factors should be considered.

5. Noise Monitoring

A baseline noise survey was undertaken between Friday the 8th of March 2024 and Tuesday the 12th of March 2024 in a location representative of the nearest noise sensitive receptors.

5.1. **Equipment**

Sound Pressure Levels were measured using three Class 1 sound level meters with half-inch condenser microphones, using the 'fast' setting. The equipment is checked regularly using a Quality System meeting the requirements of British Standard EN ISO/IEC 17025:2017 "General requirements for the competence of testing and calibration laboratories"; in accordance with British Standard EN 10012:2003 "Measurement management systems. Requirements for measurement processes and measuring equipment"; and traceable to the National Standards.

Table 3: Monitoring Equipment

Equipment Description / Manufacturer / Type	Serial Number	Date of Calibration	Calibration Certification Number
SLM, Sonitus, EM2030	00757	24/07/2023	44913
Pre-Amp, Sonitus	59239	24/07/2023	44913
Microphone, Sonitus, 378B02	310182	24/07/2023	44912

The measuring systems were checked for calibration before and after the tests and no significant drift exceeding was detected.

5.2. **Weather Conditions**

During the measurement the weather was mixed, with adverse weather conditions including rain and high winds on Sunday the 10th of March and on the morning of Tuesday the 12th of March. The measurements during these periods have been excluded from our assessments.

During the remainder of the survey period, the weather conditions were calm and dry. The wind speed did not exceed 5 m/s and was in a predominantly north-easterly direction. The air temperature ranged between 4 and 14 degrees Celsius. These weather conditions are not expected to have adversely affected the measured noise data.

5.3. **Monitoring Procedure**

The survey was conducted to determine the typical background sound levels at the nearest noise sensitive receptors to the proposals.

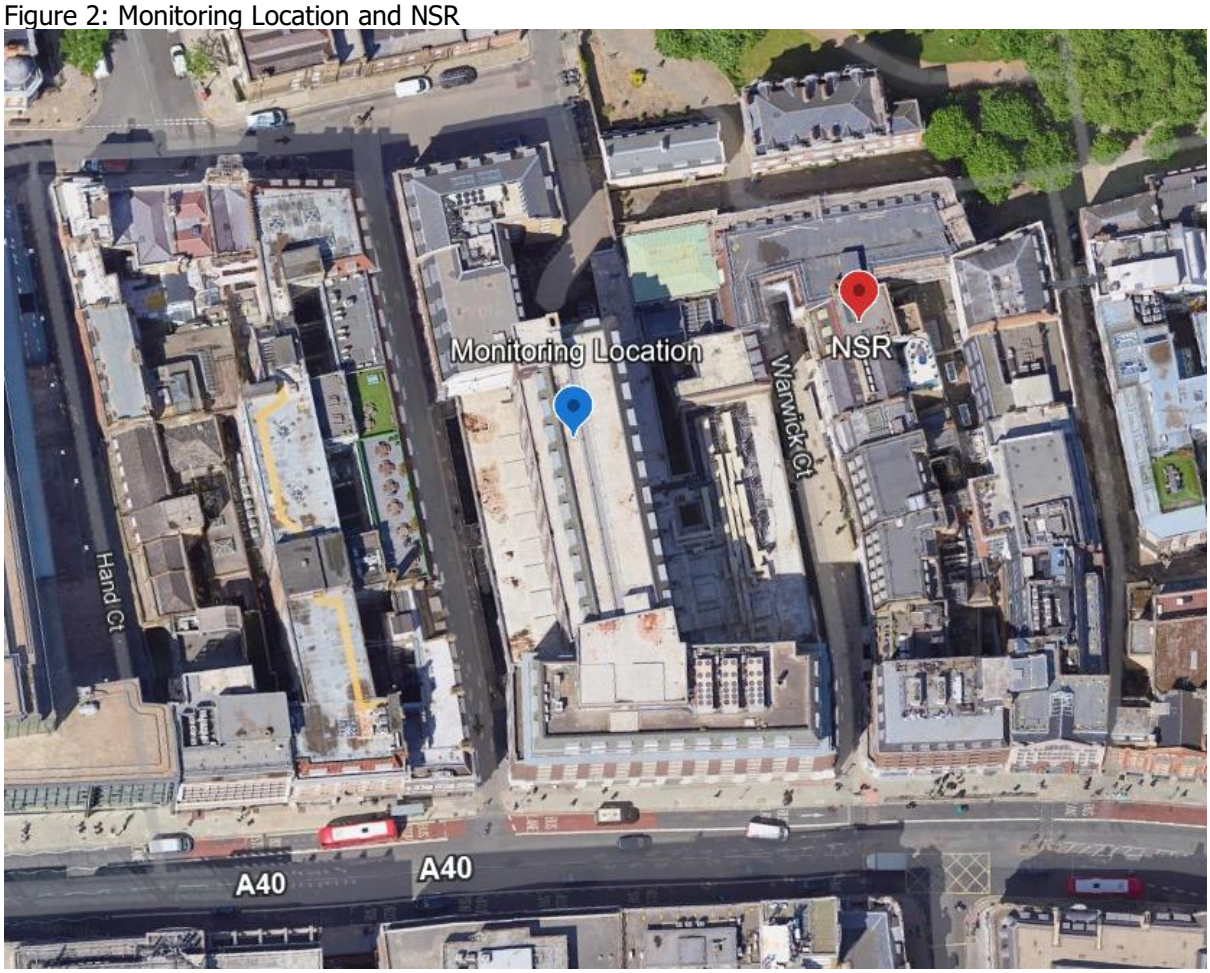
During the noise survey the existing chillers were not operational.

The sound level meter was positioned on the roof top of First Avenue House, on a tripod 1.5m above the roof and in a free-field position. The noise climate at the monitoring location was determined to be representative of the noise climate at the surrounding noise sensitive receptors.

The noise climate consisted predominantly of road traffic, air traffic and plant noise from the surrounding buildings.

The monitoring location and the NSR are indicated on the figure below:

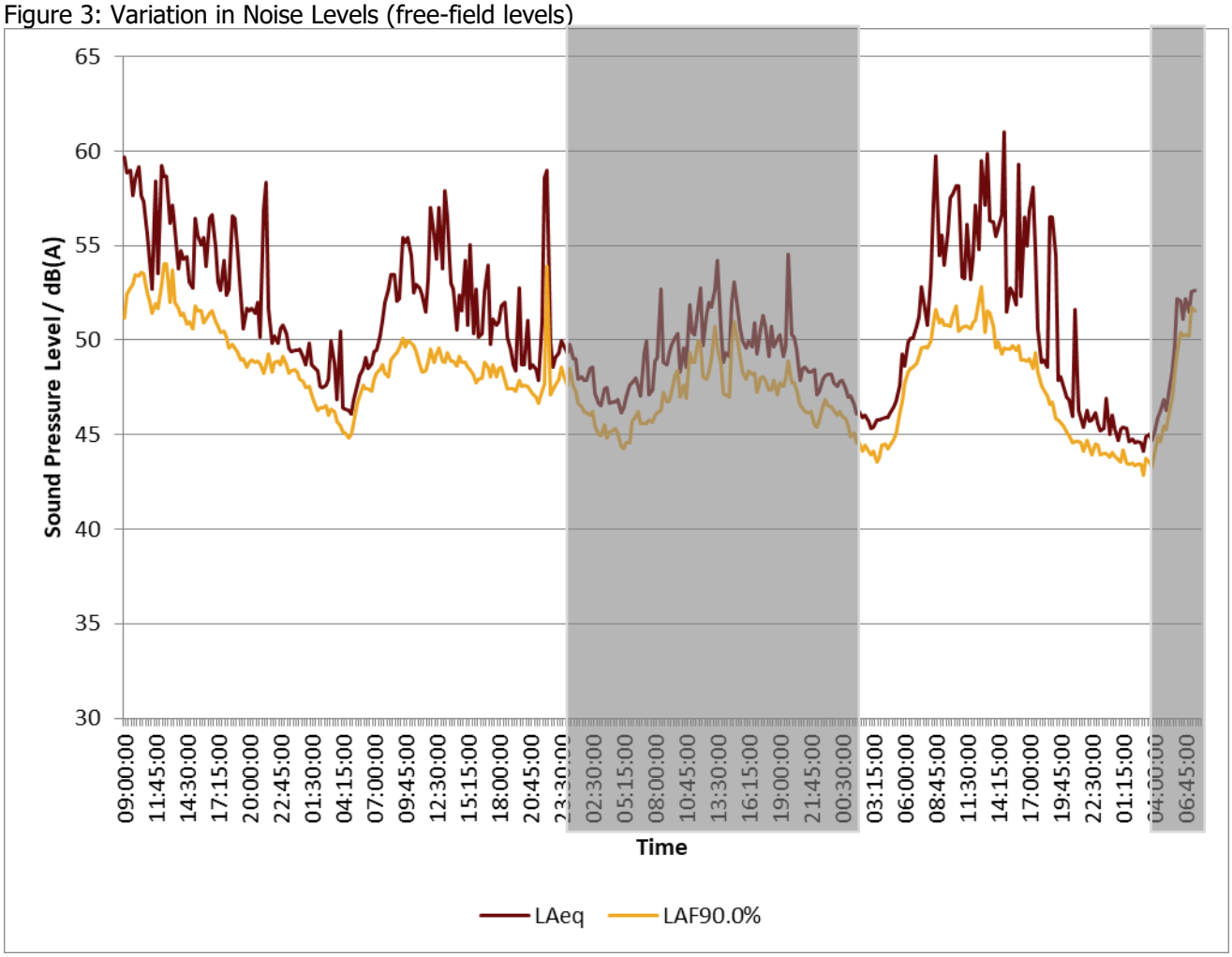
Figure 2: Monitoring Location and NSR



5.4. **Measured Baseline Noise Levels**

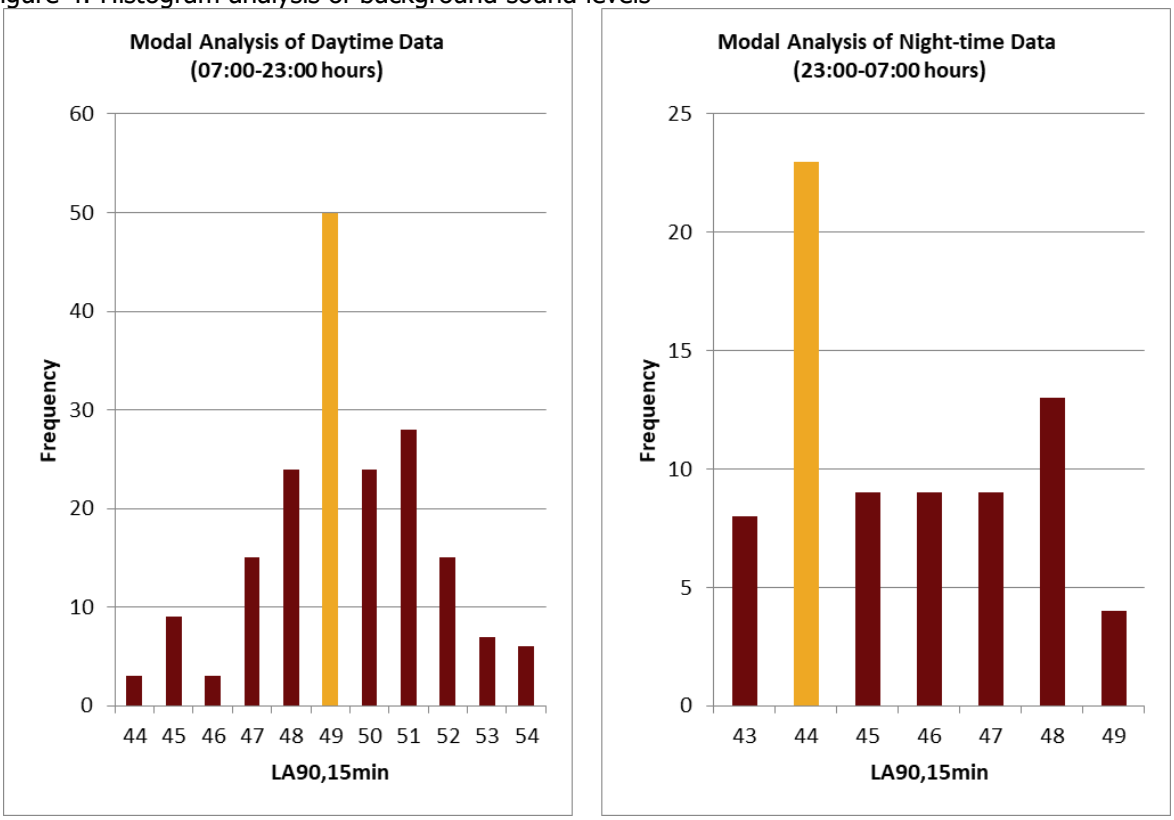
The 15-minute A-weighted baseline background sound levels and equivalent noise levels are provided in the chart below. The 'grey' areas have been removed from our assessments due to poor weather conditions during these periods.

Figure 3: Variation in Noise Levels (free-field levels)



Below is a histogram analysis of the measured background sound levels, with the periods of rain removed as indicated on the chart above:

Figure 4: Histogram analysis of background sound levels



The table below provides a summary of the measured noise levels:

Table 4: Measured Noise Levels (free-field levels)

Period	$L_{A90,15min}$		$L_{Aeq,15min}$	
	Mode	Range	Mode	Range
Daytime (07:00 - 23:00)	49	44 - 54	53	45 - 61
Night (23:00 - 07:00)	44	43 - 49	45	44 - 51
Operational Hours (07:00 to 17:00)	49	48 - 54	53	49 - 61

As seen above, the modal background sound level during the proposed operational hours (07:00 to 17:00) is the same as during the entire day-time period (07:00 to 23:00)

From the measured data we have determined the representative background sound level at the noise sensitive receivers to be 49 dB $L_{A90,1hour}$ during the day, and 44 dB $L_{A90,15minute}$ during the night.

6. Proposed Plant

The proposal is to replace the 3no chillers on the roof top with 3no. new chillers in the same location. The proposed operational hours are also the same as previously with the existing chillers. The existing chillers are Trane R22-R134a. The final selection of the new chillers has not been confirmed, however, we have been advised by the M&E consultant that the sound power levels will not exceed the sound levels on the table below.

The following table shows the manufacturer's octave band sound power levels for the existing and new chillers:

Table 5: Plant Noise Data

Plant	Sound Power Level (dB) per Octave Band (Hz)								dB L_{WA}
	63	125	250	500	1k	2k	4k	8k	
Existing	95	97	96	96	89	81	75	72	96
New	-	90	92	89	90	80	78	75	92

As can be seen above, the new chillers are 4 dBA quieter than the existing.

7. Noise Modelling

The plant noise emission has been modelled in the noise modelling software Cadna:A by DataKustik. The modelling software calculates sound levels based on the inputted sound emission values, source and receiver locations, and primarily distance, barrier and ground attenuation. Calculations are undertaken using the General Method of Calculation from ISO 9613. The parameters within the Cadna:A model are as follows and are considered reasonable assumptions:

- Building heights are based on site and google earth observations.
- The order of reflections is 3, and all buildings are reflective.
- The ground across the site and surrounding area is considered hard and reflective.
- The predictions are based on the plant noise data for the new chillers provided above.
- The predictions are based on all plant operating continuously.
- The predicted noise map is at 12m high.
- The NSR is coloured orange.
- The building evaluation level at the NSR is showing the maximum level at the façade.
- A 1m high parapet has been modelled around the roof- to the south, as observed during site attendance.

A noise map of the specific sound levels with the new plant is provided below for the proposed operational hours:

Figure 5: Predicted Specific Sound Level of New chillers $L_{Aeq(T)}$ dB (NSR in orange)

The highest predicted specific sound level of the new chillers at the NSR is 46 dB $L_{Aeq,T}$.

8. Plant Noise Assessment

8.1. BS4142 Assessment

A British Standard 4142:2014+A1:2019 assessment has been undertaken at the sensitive receivers on the site.

8.1.1. Background Sound Level

From the measured data it has been determined that the representative background sound level during the proposed operational hours is 49 dB $L_{A90,\ 1hour}$.

8.1.2. Predicted Specific Sound Level

The cumulative specific sound level at the proposed worst-case residential receiver is 46 dB $L_{Aeq,T}$. This is the level determined at the noise sensitive receivers without any character corrections applied.

8.1.3. Character Corrections

Character corrections should be added to the 'specific sound level' if it exhibits any *tonality, impulsivity, other specific characteristics and/or intermittency* at the assessment location. Based on our site visit and knowledge of such heating units, corrections to be applied are as follows:

- *Tonality* – We do not expect tonality from this plant to be distinguishable at the noise-sensitive receivers in the area based on the residual noise climate., However, the supplier and installer should ensure that tonality is not distinguishable at the noise sensitive receivers.
- *Impulsivity* – Plant such as this is not normally impulsive.
- *Intermittency* – We do not expect that the intermittency of the plant will be distinguishable at the sensitive receiver over the residual noise climate and we have not applied correction for intermittency. We have also assumed all plant is running continuously within our noise model.
- *Other Sound Characteristics* – We do not believe any correction is due to other characteristics.

8.1.4. **Initial Estimate**

Therefore, the BS4142 initial estimate at the most sensitive location is as follows:

Table 6: BS4142 initial estimate for NSR

Parameter	Operational Hours (07:00 to 17:00)
Background Sound Level, $L_{A90, 1hour}$	49 dB
Specific Sound Level, $L_{Aeq, 1hour}$	46 dB
Character Correction	+0 dB
Rating Level, $L_{Ar, 1hour}$	46 dB
Excess of rating over background level	-3 dB

This is an indication that the plant rating noise level will have a low impact on the nearest noise sensitive receiver when assessed to British Standard 4142:2014+A1:2019.

As the difference of the specific sound level to the background sound level is -3dB, this would fall within the 'Amber' range of the Camden Local Plant noise thresholds, and we would consider it to fall within the Lowest Observed Adverse Effect category.

As per the Camden Local Plan, the 'Amber' category is where noise is observed to have an adverse effect level, but which may be considered acceptable when assessed in the context of other merits of the development.

8.1.5. **Context**

Comparison with Existing Chillers

The existing chillers are being replaced by new chiller sin the same locations. The new chillers have the same operational hours as the existing. The new chillers are 4 dBA quieter than the existing.

This results in a reduction in noise from the site at the NSR, which shows a beneficial impact of the proposed development. As such, we would consider the proposed replacement of the chillers to have no observed adverse effect on the NSR.

Absolute Levels

With regard to context, British standard 4142:2014 states:

"Where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration, including the following".

"1) Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night. Where residual sound levels are very high, the residual sound might itself result in adverse impacts or significant adverse impacts, and the margin by which the rating level exceeds the background might simply be an

indication of the extent to which the specific sound source is likely to make those impacts worse."

With regard to 'absolute levels', the most relevant guidance is British Standard 8233:2014. Section 7.7.2 Table 4 of the British Standard provides internal ambient noise levels for dwellings from noise sources 'without a specific character' and are based on existing guidelines issued by the World Health Organisation in 1999. We would advise the rating level is considered to allow for the character of the source. Internally to a dwelling during the day, the internal ambient noise levels should not exceed 35 dB LAeq(16hr).

The internal level is approximately 15 dB quieter than the external free-field level (as stated by the BS8233:2014 and WHO 1999) allowing for the attenuation of a partially open window. Therefore, based on the predicted rating levels noted above, the internal absolute levels are as follows.

Table 7: Assessment of impact against BS8233/WHO Internal Noise Criteria

Period	Predicted External Level dB $L_{Ar(T)}$	Open Window Correction dB(A)	Predicted Internal Level dB(A)	Within Criteria?
07:00 to 17:00	46	-15	31	YES

As can be seen from the above table, the internal rating sound level is 4 dBA below the British standard 8233:2014 criteria for day-time hours.

We would therefore consider the plant noise to be of a low impact when absolute levels are considered.

Residual Levels

BS4142 also states:

"2. The character and level of the residual sound compared to the character and level of the specific sound. Consider whether it would be beneficial to compare the frequency spectrum and temporal variation of the specific sound with that of the ambient or residual sound, to assess the degree to which the specific sound source is likely to be distinguishable and will represent an incongruous sound by comparison to the acoustic environment that would occur in the absence of the specific sound. Any sound parameters, sampling periods and averaging time periods used to undertake character comparisons should reflect the way in which sound of an industrial and/or commercial nature is likely to be perceived and how people react to it."

We have compared the residual noise climate, i.e. *the ambient sound at the assessment location when the specific sound source* (plant equipment) *is suppressed to such a degree that it does not contribute to the ambient sound,* to the specific sound level (plant). This is summarised below:

Table 8: Residual Noise Climate

Parameter	07:00 to 23:00
Lowest Residual Sound Level $L_{Aeq(15\ minutes)}$	49 dB
Rating Sound Level $L_{Ar(1hour)}$	46 dB
Difference	0 dB

As can be seen, the rating sound level (with character) is the 3 dBA below the lowest residual sound level during the proposed operational hours.

We would consider the noise source would not be dominant over the residual noise climate. Therefore, we would consider plant noise to be of a low impact at the existing noise-sensitive receivers when compared to the residual noise climate during the proposed operational hours.

8.2. **Summary of Assessment**

As can be seen above, it is clear that the plant noise from the replacement chillers will be acceptable and of a low impact during the proposed operational hours (07:00 to 17:00 hours) when assessed to British Standard 4142:2014+A1:2019.

The predicted Rating Level of the new chillers falls within the 'Amber' category of the Camden Local Plan criteria. Once contextual matters are considered, it is clear that the proposals are acceptable, and would result in an improvement on the nose impact from the site at the NSR.

On this basis, we would consider the noise impact of the proposed plant to fall in the No Observed Adverse Effect Level (NOEL) of the NPSE and PPG and achieves the aims of National Planning Policy Framework (NPPF).

We consider that noise should not be considered a material constraint in determining the plant noise aspects of the planning application.

9. Plant Noise Impact to First Avenue House

The top floor of First Avenue House is used for plant rooms. The new chillers should be positioned on anti-vibration mounts to control structure borne noise affecting the rooms on the seventh floor.

On the 7th floor are a mixture of offices and a court room.

Table 5.2 of the Ministry of Justice Court and Tribunal Design Guide provides the following maximum internal noise levels within each room type:

Figure 6: Ministry of Justice Noise Rating Level criteria

Table 5.2 Noise Control

Location	NR[1] Level
Hearing Rooms	30
Judicial Rooms	35
Consultation Rooms	35
Sound Lobby	35
Common shared offices/meeting rooms	35
Offices: Cellular	35
Offices: Open Plan	40
Public Waiting	40
Reception	40
Custody Area	40
Toilets	45
Kitchen	45
Lounge / Refreshment Areas	45
Managed Circulation Space	40
Video-Conferencing Rooms	25
Other non-critical spaces	40 to 45

As shown above, the maximum internal noise rating levels are NR30 within court rooms, and NR35 within offices. This is the cumulative noise level of building services and external noise ingress.

We have been advised that the rooms do not rely on open windows for ventilation but are ventilated via mechanical systems.

With the 2m high acoustic barrier as described above, the highest predicted specific sound levels at the windows of the most noise affected rooms of each room type are as follows:

Table 9: Predicted Specific Sound Levels with 2m barrier

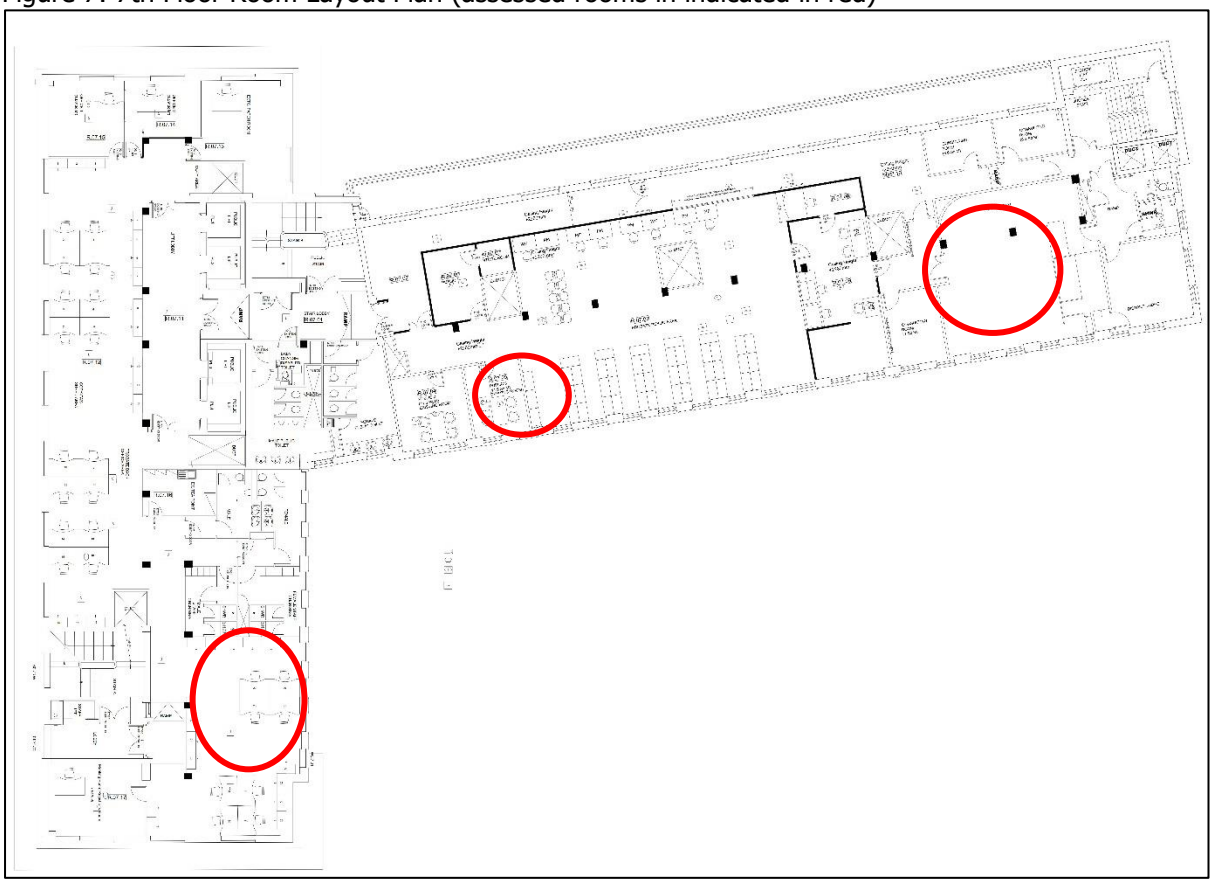
Room Type	Specific Sound level at Window dB $L_{Aeq,T}$
Hearing Room	52 dB
Cellular Office	53 dB
Open Plan Office	49 dB

The windows to the court rooms and offices are likely single glazing. Noise ingress calculations have been completed, using room dimensions on the proposed floor plans (shown below), and typical building façade constructions. The building façade constructions calculations and their sound reduction indices used for our calculations are as follows:

Table 10: Sound reduction index of building facade

Element	Sound Reduction Indices (R dB) per Octave Band (Hz)							Rw
	63	125	250	500	2k	2k	4k	
Cavity Masonry Wall	31	38	46	45	55	66	77	52
Single Glazed window	15	20	22	25	28	27	27	27

Figure 7: 7th Floor Room Layout Plan (assessed rooms in indicated in red)



The predicted internal noise levels from the new chillers within the most noise affected court room and office spaces are shown on the table below:

Table 11: Predicted internal noise levels from the proposed chillers

Room	Internal Sound Pressure Level (dB) per Octave Band (Hz)								dBA	Noise Rating
	63	125	250	500	1k	2k	4k	8k		
7th Floor Court Room	29	24	25	20	18	6	3	0	**22**	**NR18**
7th Floor Public Office	33	28	29	24	23	12	8	5	**27**	**NR23**
7th Floor Open Plan Office	28	23	24	19	17	5	3	0	22	**NR17**

As above, the predicted internal noise level from the new chillers is considerably below the internal noise level criteria for offices and court rooms. As such, based on the rooms being ventilated via mechanical means and the windows being closed, the predicted noise impact from the proposed chillers is negligible and therefore considered acceptable, without the need for any additional noise mitigation measures.

Furthermore, it should be noted that the new chillers are 4dBA quieter than the existing chillers, and therefore there would be no increase in noise impact with the proposed chillers.

10. Summary and Conclusions

Galliford Try appointed Acoustic Consultants Ltd to undertake a noise impact assessment for the proposed chillers at First Avenue House, High Holborn, London, WC1V 6NP.

This report provides a noise assessment of the proposed chillers on the nearby noise sensitive residential receivers around the site, and the noise sensitive offices art First Avenue House.

A noise impact assessment has been undertaken in accordance with the guidance in the National Planning Policy Framework (NPPF), Noise Policy Statement for England (NPSE), Planning Practice Guidance (PPG), British Standard 4142:2014 (BS4142), IEMA guidelines, British Standard 8233:2014 (BS8233), and the Ministry of Justice Court and Tribunal Design Guide.

It is clear that the plant noise from the replacement chillers will be acceptable and of a low impact during the proposed operational hours (07:00 to 17:00 hours) when assessed to British Standard 4142:2014+A1:2019.

The predicted Rating Level of the new chillers falls within the 'Amber' category of the Camden Local Plan criteria. Once contextual matters are considered, it is clear that the proposals are acceptable, and would result in an improvement on the existing nose impact from the site at the NSR.

On this basis, we would consider the noise impact of the proposed plant to fall in the No Observed Adverse Effect Level (NOEL) of the NPSE and PPG and achieves the aims of National Planning Policy Framework (NPPF).

We consider that noise should not be considered a material constraint in determining the plant noise aspects of the planning application.

The predicted internal noise levels within the nearest court room and most noise affected office are considerably below the Ministry of Justice criteria. As such, based on the existing mechanical ventilation strategy with closed windows, the predicted noise impact from the proposed chillers is negligible and therefore considered acceptable.

11. Appendix 1 – Glossary of Acoustic Terminology

A-weighted sound pressure pA – value of overall sound pressure, measured in pascals (Pa), after the electrical signal derived from a microphone has been passed through an A-weighting network.

A-weighted sound pressure level, L_{pA} - quantity of A-weighted sound pressure given by the following formula in decibels (dBA)

$L_{pA} = 10 \log_{10} (p_A/p_0)^2$

where:

p_A is the A-weighted sound pressure in pascals (Pa);
p_0 is the reference sound pressure (20 µPa)

Background sound level, $L_{A90,T}$– A-weighted sound pressure level that is exceeded by the residual sound assessment location for 90% of a given time interval, T, measured using weighting F and quoted to the nearest whole number of decibels

Break-in - noise transmission into a structure from outside.

Decibel (dB) – The decibel is the unit used to quantify sound pressure levels. The human ear has an approximately logarithmic response to acoustic pressure over a very large dynamic range (typically 20 micro-Pascals to 100 Pascals). Therefore, a logarithmic scale is used to describe sound pressure levels and also sound intensity and power levels. The logarithms are taken to base 10. Hence an increase of 10 dB in sound pressure level is equivalent to an increase by a factor of 10 in the sound pressure level (measured in Pascals). Subjectively, this increase would correspond to a doubling of the perceived loudness of sound.

Equivalent continuous A-weighted sound pressure level, $L_{Aeq,T}$ – value of the A-weighted sound pressure level in decibels of continuous steady sound that, within a specified time interval, T = t2 – t1, has the same mean-squared sound pressure as a sound that varies with time, and is given by the following equation:

$$L_{AeqT} = 10\lg_{10}\left\{(1/T)\int_{t_1}^{t_2}[p_A(t)^2/p_0^2]dt\right\} \quad (1)$$

where:

p_0 is the reference sound pressure (20 µPa); and

$p_A(t)$ is the instantaneous A-weighted sound pressure (Pa) at time t

NOTE The equivalent continuous A-weighted sound pressure level is quoted to the nearest whole number of decibels.

Facade level – sound pressure level 1 m in front of the façade. Facade level measurements of L_{pA} are typically 1 dB to 3 dB higher than corresponding free-field measurements because of the reflection from the facade.

Free-field level – sound pressure level away from reflecting surfaces. Measurements made 1.2 m to 1.5 m above the ground and at least 3.5 m away from other reflecting surfaces are usually regarded as free-field. To minimize the effect of reflections the measuring position has to be at least 3.5 m to the side of the reflecting surface (i.e. not 3.5 m from the reflecting surface in the direction of the source).

Octave and Third Octave Bands – The human ear is sensitive to sound over a range of frequencies between approximately 20 Hz to 20 kHz and is generally more sensitive to medium and high frequencies than to low frequencies within the range. There are many methods of describing the frequency content of a noise. The most common methods split the frequency range into defined bands, in which the mid-frequency is used as the band descriptor and in the case of octave bands is double that of the band lower. For example, two adjacent octave bands are 250 Hz and 500 Hz. Third octave bands provide a fine resolution by dividing each octave band into three bands. For example, third octave bands would be 160 Hz, 250 Hz, 315 Hz for the same 250 Hz octave band.

Sound pressure level – Sound pressure level is stated on many of the charts. It is the amplitude of the acoustic pressure fluctuations in a sound wave, fundamentally measured in Pascals (Pa), typically from 20 micro-Pascals to 100 Pascals, but commonly simplified onto the decibel scale.

Sound reduction index, R – laboratory measure of the sound insulating properties of a material or building element in a stated frequency band.

Specific sound level, $L_s = L_{Aeq,Tr}$ – equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T_r.

Structure-borne noise – audible noise caused by the vibration of elements of a structure, the source of which is within a building or structure with common elements.

Rating level, $L_{Ar,Tr}$ – Specific sound level plus any adjustment for the characteristic features of the sound.

Reverberation Time, T – The reverberation time is defined as the time taken for a noise level in an enclosed space to decay by 60 dB from a steady level once the noise source has stopped. It is measured in seconds. Often a 60 dB decay cannot be measured so the reverberation time is measured over a lesser range and corrected back to the time for a 60 dB drop assuming a constant decay rate. Common parameters are T20 (time taken for a 20 dB decay multiplied by three) and T30 (time taken for a 30 dB decay multiplied by two).

Vibration Dose Value, VDV – measure of the total vibration experienced over a specified period of time.

Estimated Vibration Dose Value, eVDV – estimation of the total vibration experienced over a specified period of time. This is usually based on the number of events and shortened measurement data.

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. The weighted sound reduction index is used to characterize the insulation of a material or product that has been measured in a laboratory (see BS EN ISO 717-1).

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