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ROSSLYN HILL CHAPEL, HAMPSTEAD

PLANT NOISE ASSESSMENT

Technical Report: R10896-1 Rev 0

Date: 14th January 2025

For: Chris Reading Associates Limited
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Project Title: Rosslyn Hill Chapel, Hampstead – Plant Noise Assessment

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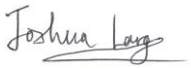
Prepared by	Joshua Large MEng AMIOA	Consultant		14/01/2025
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For and on behalf of 24 Acoustics Ltd				

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1.0 INTRODUCTION

1.1 24 Acoustics Ltd has been appointed by Chris Reading Associates Ltd, to undertake a plant noise assessment in conjunction with the proposed air source heat pumps at Rosslyn Hill Chapel, Hampstead.

1.2 This report presents the results of the assessment following site visits and background noise measurements undertaken between the 3rd and 10th January 2025.

1.3 All sound pressure levels quoted in this report are in dB relative to 20 µPa. A glossary of the acoustic terminology used in this report is provided in Appendix A.

2.0 SITE DESCRIPTION

2.1 Rosslyn Hill Chapel is situated on Pilgrim's Place in Hampstead. The chapel is in use throughout the week, as a church meeting place, and to serve a local school. The building is used by the school throughout the daytime on weekdays, and there are church services on weekends and weekday evenings. The site features a car park to the north of the chapel building, with vehicular access from Kemplay Road.

2.2 The area surrounding the site is mixed-use, with residential properties on Kemplay Road to the north, east and west of site and at Rosslyn Mews to the south. There are commercial units and restaurants to the south of site on Pilgrim's Place. A site overview is shown in Figure 1.

3.0 CRITERIA

National Planning Policy Framework & Noise Policy Statement for England

3.1 The National Planning Policy Framework (NPPF) [Reference 1] states that planning policies and decisions should aim to:

- 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 quality of life.
- Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

3.2 The NPPF also refers to the Noise Policy Statement for England (NPSE) [Reference 2] which is intended to apply to all forms of noise, including environmental noise, neighbour noise and neighbourhood noise. The NPSE sets out the Government's long-term vision to 'promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development' which is supported by the following aims.

- Avoid significant adverse impacts on health and quality of life;
- Mitigate and minimise adverse impacts on health and quality of life.

3.3 The NPSE defines the concept of a 'significant observed adverse effect level' (SOAEL) as 'the level above which significant adverse effects on health and quality of life occur'.

3.4 The Planning Practice Guidance (PPG) [Reference 3] is written to support the NPPF with more specific planning guidance. The PPG reflects the NPSE and 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 also states that opportunities should be taken, where practicable, to achieve improvements to the acoustic environment. The NPPG states that noise can over-ride other planning concerns but should not be considered in isolation from the other economic, social and environmental dimensions of the proposed development.

London Borough of Camden and British Standard 4142: 2014

3.5 The site falls under the jurisdiction of the London Borough of Camden, who published its Local Plan in 2017 [Reference 4]. Appendix 3 of the Local Plan provides design guidance for local developments, and states that an assessment shall be undertaken in line with British Standard 4142: 2014 [Reference 5] when considering industrial or commercial noise sources.

3.6 BS 4142: 2014+A1:2019 provides a method for rating the effects of industrial and commercial sound on residential areas. The standard advocates a comparison between the typical measured L_{A90} background noise level and L_{Aeq} noise level from the source being considered. For rating purposes if the noise source is tonal, intermittent or otherwise distinctive in character, a rating correction of up to 15 dBA is applied.

3.7 The standard states that a difference between the rating level and the background level of around +10 dBA is an indication of a significant adverse impact, depending on the context and a difference of around +5 dBA is likely to be an indication of an adverse impact again depending on the context. Where the rating level does not exceed the background noise level, this is an indication of the specific sound source having a low impact (depending upon the context).

3.8 Camden's Local Plan expands on the previously described SOAEL, with 'Lower observed adverse effect level' (LOAEL). A criterion is given for each of these in the local plan, with reference to BS 4142: 2014. These criteria are summarised in Table 1 below, applicable outside habitable windows of the nearest noise-sensitive receptors to the development, at all times of day.

LOAEL	LOAEL to SOAEL	SOAEL
'Rating level' 10dB* below background	'Rating level' between 9dB below and 5dB above background	'Rating level' greater than 5dB above background

Table 1 - Summary of Camden's criteria for industrial and commercial noise

3.9 Following the above, and considering the guidance of BS 4142 (i.e. site context), a plant noise rating level of 5 dBA below the existing background noise level at the nearest receptor location is considered suitable for this location.

4.0 ENVIRONMENTAL NOISE SURVEY

4.1 Environmental noise measurements were undertaken between 3rd and 10th January 2025, to determine the prevailing background noise levels at the site.

4.2 Noise monitoring equipment was installed in one location, representative of the noise climate at the nearest residential windows to the proposed plant. The equipment was situated towards the north of site, at approximately 3m above ground level. This location is shown in Figure 1.

4.3 Ambient noise levels were measured using the following equipment:

- Rion precision sound level meter Type NL-31
- Brüel & Kjær acoustic calibrator Type 4231

4.4 Noise measurements were undertaken in samples of 5 minutes in terms of the overall free-field A-weighted L_{eq}, L_{90} and $L_{max,f}$ noise levels. Measurements were made in accordance with BS 7445:1991 "Description and measurement of environmental noise Part 2 - Acquisition of data pertinent to land use" [Reference 6].

4.5 The instrumentation's calibration was checked before and after the survey in accordance with the manufacturer's instructions. No significant drift in calibration was recorded. Calibration of 24 Acoustics' equipment is traceable to National Standards. All instruments were fitted with environmental weather shields during the surveys.

4.6 Weather conditions during the survey period were mixed, with periods of high winds and rain. Where noise measurements were affected by weather conditions, these samples have been omitted prior to analysis.

4.7 The results of the ambient noise survey are summarised in Table 2 below and shown graphically in Appendix B. 24 Acoustics determines the typical background noise level as the average over the period, less one standard deviation.

Date (January 2025)	**Typical Background Noise Level, dB**	
	Daytime (07:00 to 23:00 hours) $L_{A90,\ 1hr}$	**Night-time (23:00 to 07:00 hours)** $L_{A90,\ 15\ min}$
Friday 3rd	38	32
Saturday 4th	40	41 *
Sunday 5th	44 *	41 *
Monday 6th	40 *	32
Tuesday 7th	40	32
Wednesday 8th	39	33
Thursday 9th	39	31
Representative Level	**39**	**32**

Table 2 - Summary of measured background noise levels

**period affected by weather conditions, and omitted prior to analysis*

4.8 The noise climate at the measurement location is controlled by distant road traffic noise.

5.0 PLANT NOISE ASSESSMENT

5.1 It is proposed to install two new air source heat pumps (ASHPs) at the site, to replace existing internal boilers. Both ASHPs will be located on the eastern boundary of the church building. The proposed plant location is outlined in Figures 1 and 2.

5.2 The proposed ASHPs are Baxi Auriga HP 33T (33kW). The ASHPs can run in different modes, each with a different heating capacity and noise level. The A-weighted sound power level for each mode is summarised as follows, as stated by the manufacturer:

- Nominal: 71 dBA.
- Low noise 1: 67 dBA.
- Low noise 2: 66 dBA.

5.3 To minimise noise output, the ASHPs will operate in the following configurations:

- Daytime, standard operation: both units configured to run on 'Low noise 2'.
- Daytime, peak winter months: both units configured to run on 'Nominal'.
- Night-time: one unit configured to run on 'Low noise 1'.

5.4 To present a worst-case scenario in terms of noise output, the daytime noise assessment will be undertaken for the peak winter months.

5.5 The nearest-affected habitable windows to the plant units are shown in Figure 1, and described as follows:

- Receptor 1 – 5 Kemplay Road, approximately 22m to the north-east of the proposed ASHP units.
- Receptor 2 – 1st floor apartments at Rosslyn Mews, approximately 28m to the south of the proposed ASHP units.

Plant Noise Calculations

5.6 Calculations have been undertaken to determine the plant noise rating level at the nearest-affected habitable receptors, and include losses due to geometrical spreading and distance. Octave-band sound power levels have been provided by the manufacturer for a similar unit, to calculate indicative losses across the frequency spectrum.

5.7 Initial calculations identified that mitigation will be necessary.

5.8 It is recommended to install an attenuated louvre around the boundary of the plant compound, to the extent shown in Figure 2 and of minimum height 500mm above the top of the ASHPs. The louvre shall achieve the minimum octave-band attenuation provided in Table 3.

Minimum Sound Level Reduction (dB) at octave-band centre frequency (Hz)							
63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
4	7	10	12	15	16	13	12

Table 3 - Minimum Louvre Attenuation Specification

5.9 The louvre design shall be confirmed by others to ensure sufficient airflow to the ASHPs. The attenuation specification described in Table 3 would be readily achievable with acoustically treated louvres from a suitable acoustic hardware supplier.

Predicted Plant Noise Levels

5.10 It is not anticipated that any tonal, impulsive or otherwise distinctive noise characteristics will be present from the new plant units.

5.11 With the plant attenuation as recommended, the predicted cumulative plant noise rating levels (in accordance with BS 4142) are shown in Tables 4 and 5 for daytime and night-time, respectively.

Location	**Daytime Noise Level (dB) 07:00 to 23:00 hours**		
	Background Noise Level	**Plant Noise Rating Level**	**Difference between Rating Level and Background**
Receptor 1 5 Kemplay Road	39	33	-6
Receptor 2 Rosslyn Mews		31	-8

Table 4 - BS 4142 Daytime plant noise calculations

Location	Night-time Noise Level (dB) 23:00 to 07:00 hours		
	Background Noise Level	**Plant Noise Rating Level**	**Difference between Rating Level and Background**
Receptor 1 5 Kemplay Road	32	26	-6
Receptor 2 Rosslyn Mews		24	-8

Table 5 - BS 4142 Night-time plant noise calculations

5.12 The results in Tables 4 and 5 demonstrate that, with the proposed mitigation described above, noise from the proposed plant would be at least 5 dB below the measured background noise level at both receptors assessed. This is a low noise impact under BS 4142 and is, therefore, acceptable and in line with the requirements of the London Borough of Camden.

6.0 CONCLUSIONS

6.1 24 Acoustics Ltd has been instructed by Chris Reading Associates Ltd to undertake an assessment of the potential noise impact from new plant at Rosslyn Hill Chapel, Hampstead. Two air source heat pumps are proposed on the eastern boundary of the building.

6.2 A noise assessment has been completed following background noise measurements undertaken at the site between 3rd and 10th January 2025.

6.3 Noise mitigation measures have been recommended, in the form of attenuated louvres and low-noise modes.

6.4 Calculations demonstrate that the proposed plant noise rating level will be at least 5 dB below the background noise level, and hence, is acceptable under BS 4142 and in line with the requirements of the London Borough of Camden.

REFERENCES

1. Ministry of Housing, Communities & Local Government. National Planning Policy Framework, December 2024.

2. DEFRA, Noise Policy Statement for England, March 2010.

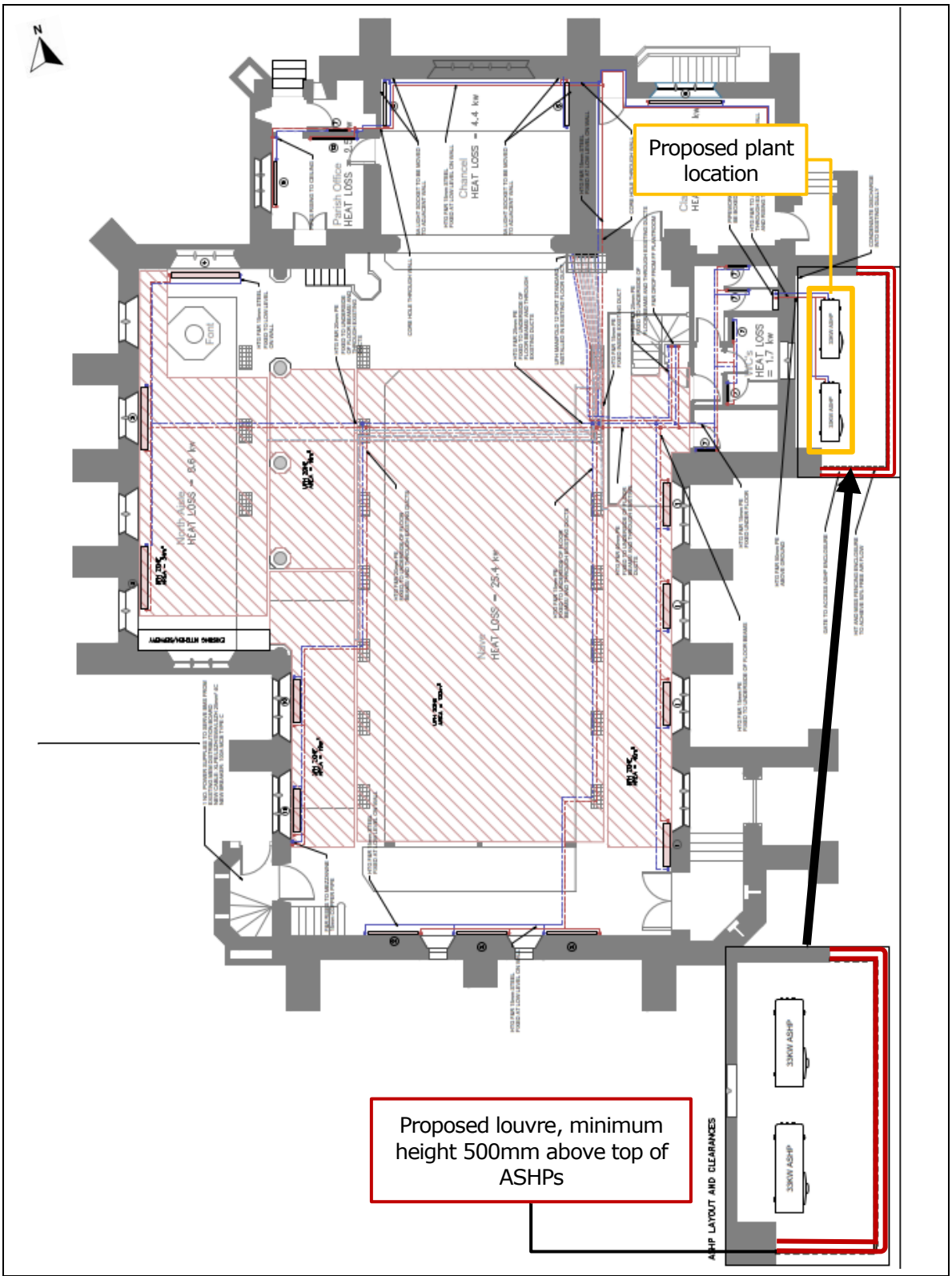
3. Planning Practice Guidance - Noise, Department of Communities and Local Government (revised July 2019).

4. Local Plan. The London Borough of Camden, 2017.

5. British Standards Institution. British Standard 4142: Methods for rating and assessing commercial and industrial sound, 2014. BS 4142:2014+A1:2019

6. British Standards Institution. British Standard 7445: 1991 Description and measurement of environmental noise Part 2 - Acquisition of data pertinent to land use.

Project: Rosslyn Hill Chapel, Hampstead	**Title:** Site overview and noise measurement location		24Acoustics
DWG No: Figure 1	**Scale:** N.T.S.	**Rev: -**	
Date: January 2025	**Drawn By:** JL	**Job No:** 10896	



Project: Rosslyn Hill Chapel, Hampstead	**Title:** Proposed plant location and recommended louvre		
DWG No: Figure 2	**Scale:** N.T.S.	**Rev: -**	
Date: January 2025	**Drawn By:** JL	**Job No:** 10896	

APPENDIX A – ACOUSTIC TERMINOLOGY

Noise is defined as unwanted sound. The range of audible sound is from 0 to 140 dB. The frequency response of the ear is usually taken to be around 18 Hz (number of oscillations per second) to 18000 Hz. The ear does not respond equally to different frequencies at the same level. It is more sensitive in the mid-frequency range than the lower and higher frequencies and because of this, the low and high frequency components of a sound are reduced in importance by applying a weighting (filtering) circuit to the noise measuring instrument. The weighting which is most widely used and which correlates best with subjective response to noise is the dBA weighting. This is an internationally accepted standard for noise measurements.

For variable sources, such as traffic, a difference of 3 dB is just distinguishable. In addition, a doubling of traffic flow will increase the overall noise by 3 dB. The 'loudness' of a noise is a purely subjective parameter, but it is generally accepted that an increase/ decrease of 10 dB corresponds to a doubling/ halving in perceived loudness.

External noise levels are rarely steady, but rise and fall according to activities within an area. In attempt to produce a figure that relates this variable noise level to subjective response, a number of noise indices have been developed. These include:

i) The L_{Amax} noise level

This is the maximum noise level recorded over the measurement period.

ii) The L_{Aeq} noise level

This is "equivalent continuous A-weighted sound pressure level, in decibels" and is defined in British Standard BS 7445 as the "value of the A-weighted sound pressure level of a continuous, steady sound that, within a specified time internal, T, has the same mean square sound pressure as a sound under consideration whose level varies with time".

It is a unit commonly used to describe construction noise and noise from industrial premises and is the most suitable unit for the description of other forms of environmental noise. In more straightforward terms, it is a measure of energy within the varying noise.

iii) The L_{A10} noise level

This is the noise level that is exceeded for 10% of the measurement period and gives an indication of the noisier levels. It is a unit that has been used over many years for the measurement and assessment of road traffic noise.

iv) The L_{A90} noise level

This is the noise level that is exceeded for 90% of the measurement period and gives an indication of the noise level during the quieter periods. It is often referred to as the background noise level and is used in the assessment of disturbance from industrial noise.

APPENDIX B – ENVIRONMENTAL NOISE MEASUREMENTS