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27 ELIZABETH MEWS, LONDON

PLANT NOISE ASSESSMENT

Technical Report: R10066-1 Rev 0

Date: 31st May 2023

For: Charlton Brown Architects Ltd.,
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2 Back Lane,
Hampstead,
London,
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For and on behalf of 24 Acoustics Ltd				

Document Status and Approval Schedule

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0	Approved for issue	Joshua Large	Stephen Gosling

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1.0 INTRODUCTION

1.1 24 Acoustics Ltd has been appointed by Charlton Brown Architects Ltd, to undertake an assessment of the potential noise impact from proposed service plant, comprising a single sir source heat pump, at 27 Elizabeth Mews, London.

1.2 This report presents the results of the assessment following site visits and background noise measurements, between the 11th and 16th May 2023.

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 The site is located at 27 Elizabeth Mews in the London borough of Camden, and is situated adjacent to the intersection joining Elizabeth Mews with Primrose Gardens. The site is located in a mixed-use area, with residences on Elizabeth Mews and Primrose Gardens, and restaurants and commercial units on England's Lane, to the rear of the site.

2.2 The existing site comprises offices at ground and first floor levels. Planning permission is sought to develop the site, to include a new two-storey residence. The office space at first floor level will be converted to one storey of the residence, with a further storey being built above at second floor. As part of the development, it is proposed to install an air source heat pump at second floor level.

2.3 A site overview is shown in Figure 1.

3.0 CRITERIA

National Planning Policy Framework and Noise Policy Statement for England

3.1 The National Planning Policy Framework (NPPF), revised in July 2021 [Reference 1], states in relation to noise 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 the 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.

(paragraph 185)

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.

(paragraph 1.7)

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'. The following guidance is provided within the NPSE:

> *"It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available."*

(paragraph 2.22)

Local Authority Guidance and BS 4142:2014

3.4 The London Borough of Camden published a local plan in 2017 [Reference 3], which sets out guidance on assessing noise from plant in Appendix 3. Camden advocates that plant noise be assessed in line with BS 4142:2014 [Reference 4], which provides a method for rating the effects of industrial and commercial sound on residential areas.

3.5 The standard advocates a comparison between the representative 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 should be applied.

3.6 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, also 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).

3.7 The standard also states:

> *"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."*

3.8 Camden expands upon and the concept of SOAEL (together with Lowest Observable Adverse Effect Level, LOAEL) as introduced in the NPSE, and provides design criteria with regards to plant noise rating levels at the nearest noise-sensitive receptors, relative to background noise level. These criteria are summarised in Table 1 below.

Design Period	**Plant Noise Rating Level ($L_{Aeq,T}$), relative to background noise level**		
	LOAEL (green)	**LOAEL to SOAEL (amber)**	**SOAEL**
Daytime (07:00-23:00 hours)	10 dBA below	Between 9 dBA below, and 5 dBA above	Greater than 5 dBA above
Night-time (23:00-07:00 hours)	10 dBA below, and no events exceeding 57 dB L_{Amax}	Between 9 dBA below, and 5 dBA above background noise level, or noise events between 57 and 88 dB L_{Amax}	Greater than 5 dBA above background noise level, and/or events exceeding 88 dB L_{Amax}

Table 1 - Design criteria for plant noise, outside habitable windows

Assessment Methodology

3.9 The London Borough of Camden recommends a design target for the rating level to be 10 dBA below the representative background noise level will be targeted for proposed plant. It should be noted, however, that where circumstances permit, a higher level will be permitted.

3.10 If the noise emissions are tonal or contain other noticeable characteristics, a suitable correction is applicable, in accordance with BS 4142.

4.0 ENVIRONMENTAL NOISE MEASUREMENTS

4.1 Environmental noise measurements were undertaken to determine the prevailing noise levels at the site. Measurements were undertaken using the following equipment:

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

4.2 The equipment was located externally at first floor level, on the north-western boundary of site. The measurement location is shown in Figure 1.

4.3 Noise measurements were undertaken in 5 minute samples and included octave-band and free-field A-weighted L_{eq}, L_{90} and $L_{max,f}$ parameters. 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 5].

4.4 The instrument calibration was verified before and after the survey in accordance with the manufacturer's instructions and no variation in calibration level was recorded. Calibration of 24 Acoustics' equipment is traceable to National Standards.

4.5 All instrumentation was fitted with environmental weather shields during the survey. Weather conditions during the noise measurement period were dry.

4.6 A summary of the measured noise levels is shown in Table 2.

Date	**Daytime 07:00 – 23:00 hours dB $L_{A90, 1hour}$**	**Night-time 23:00 – 07:00 hours dB $L_{A90, 15min}$**
Thursday 11th May	39	33
Friday 12th May	41	32
Saturday 13th May	38	28
Sunday 14th May	37	29
Monday 15th May	37	29
Tuesday 16th May	43 *	-
Representative Value	37	29

Table 2 - Summary of measured background noise levels

* incomplete measurement period

Plant Noise Limits

4.7 Based on the assessment methodology set out in Section 3, the following maximum external plant noise levels are given for daytime and night-time operational periods, to be achieved by the plant at the nearest noise-sensitive property.

- Daytime operation: 27 dB $L_{Aeq, 1hr}$
- Night-time operation: 25 dB $L_{Aeq, 15min}$

5.0 ASSESSMENT

5.1 It is proposed to install an air source heat pump (ASHP) at second floor level of the new dwelling. The proposed plant location is indicated in Figure 2.

5.2 The nearest noise-sensitive receptor is located at 28 England's Lane, approximately five metres from the ASHP.

5.3 Details for the ASHP have not yet been finalised, therefore the following noise assessment references an overall source sound power level of 55 dBA (taken from 24 Acoustics' library database). Noise from the equipment is not expected to contain tones or temporal characteristics that are sufficiently perceptible at the nearest residential properties.

5.4 Calculations have been undertaken to determine the plant noise rating level at the nearest noise-sensitive windows at 28 England's Lane. Corrections have been made for spreading, reflections and distance from plant to receiver.

5.5 An overall plant noise rating level of 36 dBA was calculated at the nearest noise-sensitive receptor. To meet Camden's noise guidance, noise mitigation measures are therefore necessary.

Mitigation – Enclosure

5.6 The ASHP shall be installed in a louvred acoustic enclosure. Table 3 specifies the reduction in octave-band sound pressure level that should be achieved by the enclosure.

Minimum sound pressure level attenuation (dB) at octave-band centre frequency (Hz)							
63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
7	7	10	15	28	30	26	21

Table 3 - ASHP enclosure – acoustic performance specification

Predicted Plant Noise Levels

5.7 The predicted plant noise levels from the attenuated equipment are as shown for daytime and night-time.

Operation period	Sound Pressure Level (dBA)		
	Background Noise Level L_{A90}	Calculated plant noise level (with attenuation) L_{Aeq}	Plant noise level relative to background noise level
Daytime (07:00 – 23:00 hours)	37	23	-14
Night-time (23:00 – 07:00 hours)	29	23	-6

Table 4 - Calculated plant noise levels outside window of 28 England's Lane

5.8 The results in Table 4 demonstrate that with the mitigation measures described above, noise from the proposed plant would achieve the established plant noise criteria.

6.0 CONCLUSIONS

6.1 24 Acoustics Ltd has been appointed by Charlton Brown Architects Ltd, to undertake an assessment of the potential noise impact from proposed service plant at 27 Elizabeth Mews, London.

6.2 Environmental noise measurements have been undertaken at the site to determine existing noise levels during daytime and night-time periods, and plant noise limits have been established in line with guidance from the London Borough of Camden.

6.3 Calculations have been undertaken in accordance with BS 4142, to determine plant noise levels at the nearest noise-sensitive receptors. Mitigation measures have been established to ensure that the proposed plant will achieve the established plant noise limits.

REFERENCES

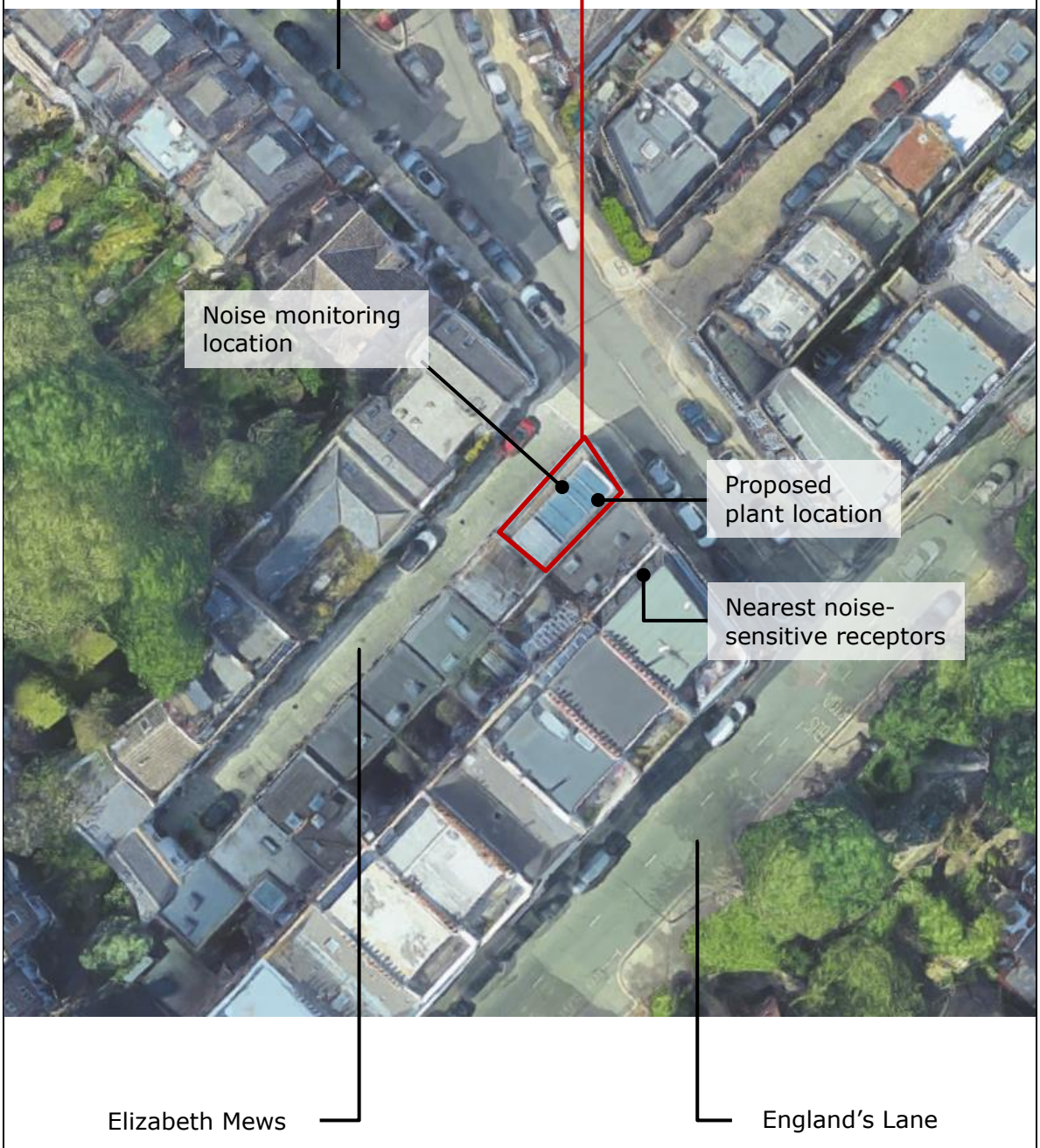
1. Department for Communities and Local Government. National Planning Policy Framework, revised 2021.

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

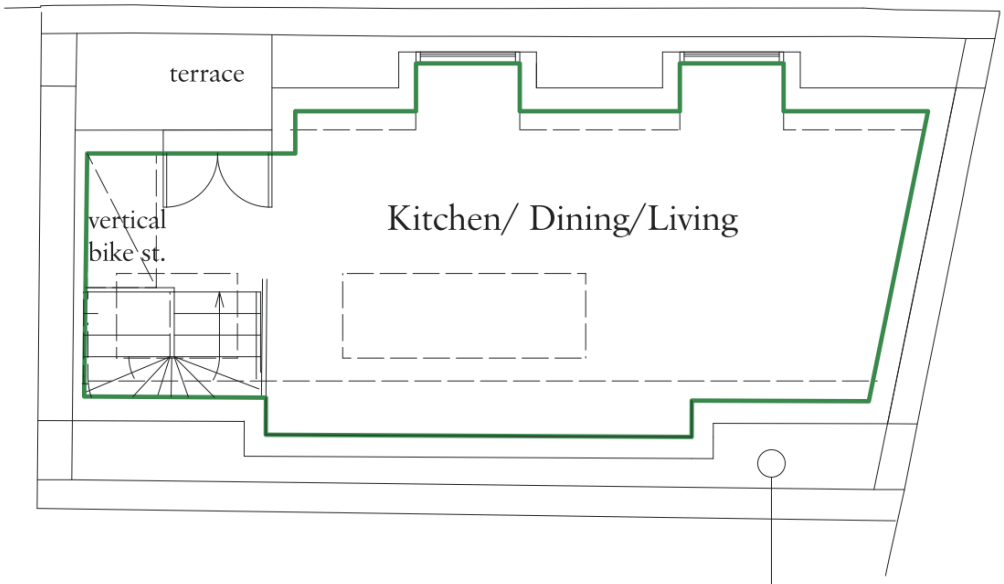
3. Camden Local Plan, 2017

4. British Standards Institution. British Standard 4142. Methods for Rating Industrial and Commercial Sound, 2014.

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



Project: 27 Elizabeth Mews, London	**Title:** Site overview		
DWG No: Figure 1	**Scale:** N.T.S.	**Rev: -**	
Date: May 2023	**Drawn By:** JL	**Job No:** 10066	



Proposed Residential Second Floor Plan
33.6 sqm.

Project: 27 Elizabeth Mews, London	**Title:** Proposed development		
DWG No: Figure 2	**Scale:** N.T.S.	**Rev: -**	
Date: May 2023	**Drawn By:** JL	**Job No:** 10066	

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