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319 RICHMOND ROAD, TWICKENHAM

PLANT NOISE ASSESSMENT

Technical Report: R10933-1 Rev 0

Date: 20th December 2024

For: Lara James
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Twickenham
TW1 2PB

24 Acoustics Document Control Sheet

Project Title: 319 Richmond Road, Twickenham – Plant Noise Assessment

Report Ref: R10933-1 Rev 0

Date: 20th December 2024

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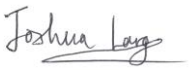
Prepared by	Joshua Large MEng AMIOA	Consultant		20/12/2024
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For and on behalf of 24 Acoustics Ltd				

Document Status and Approval Schedule

Revision	Description	Prepared By	Reviewed By	Approved By
0	Approved for issue	Joshua Large	Neil McLeod	Stephen Gosling

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1.0 INTRODUCTION

1.1 24 Acoustics Ltd has been appointed by Lara James to undertake a plant noise assessment in conjunction with the proposed development at 319 Richmond Road, Twickenham. Proposals include the provision of an air source heat pump at the front of the building.

1.2 This report presents the results of the assessment, following site visits and environmental noise measurements undertaken between 12th and 16th December 2024.

1.3 An explanation of acoustical terms used in this report is provided in Appendix A. All sound pressure levels in this report are given in dB re: 20µPa.

2.0 SITE DESCRIPTION AND PROPOSALS

2.1 Permission is sought from the London Borough of Richmond, to install an air source heat pump (ASHP) in the front lightwell of the property.

2.2 The property is semi-detached and the area surrounding the site is residential. A visual overview is shown in Figure 1.

3.0 NOISE 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'. 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."*

3.4 The NPPF and NPSE documents do not refer to specific noise criteria. When considering the impact of noise from new building services plant, 24 Acoustics considers that the requirements of the NPPF and NPSE will be complied with if criteria from the local planning authority are adopted.

Local Planning Guidance and BS 4142: 2014

3.5 The site falls under the jurisdiction of the London Borough of Richmond, who adopted its supplementary planning document (SPD) 'Development Control for Noise Generating and Noise Sensitive Development' in September 2018 [Reference 3]. Section 6 provides technical requirements for the assessment of noise from new industrial and commercial development, including building services plant, stating that an assessment shall be undertaken in line with guidance from BS 4142: 2014.

3.6 BS 4142: 2014 [Reference 4] 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 Table 2 of Richmond's SPD states:

- Where the rating level of noise is below the background noise level by at least 5dB, this indicates that the proposed development is likely to be acceptable from a noise perspective.
- Where the rating level of noise is equal to, or below the background noise level by up to 5dB, this indicates that the proposed development may be acceptable from a noise perspective but will be more context dependent, i.e. extent and effect on noise sensitive receivers (externally and internally).
- Where the rating level of noise is equal to, or above the background noise level by up to 5dB, this indicates that the proposed development is less likely to be acceptable from a noise perspective and will be context dependent, i.e. extent and effect on noise sensitive receivers (externally and internally).

3.9 Based on the requirements of Richmond Borough Council and BS 4142 , a plant noise rating level of 5 dB below the typical background noise level will be targeted at the nearest noise sensitive façades, at all times of day and night.

4.0 NOISE SURVEY EQUIPMENT AND METHODOLOGY

4.1 Environmental noise measurements were undertaken between the 12th and 16th December 2024, in order to determine the existing ambient and background noise levels at the site.

4.2 Noise measurements were undertaken in the front garden of the property, in line with the front façade of the nearest and most affected noise-sensitive receptor (317 Richmond Road). The measurement location is shown in Figure 1.

4.3 Noise measurements were undertaken with the following instrumentation:

- Svan 958 Class 1 accuracy sound level meter;
- Brüel and Kjær Type 4231 Class 1 accuracy acoustic calibrator.

4.4 Noise measurements were undertaken in 1-minute samples, in terms of free-field A-weighted and linear octave-band 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].

4.5 The instrumentation's calibration was verified before and after the survey in accordance with the manufacturer's instructions. No significant drift in calibration was recorded. The microphone was fitted with an environmental weather shield during the measurement periods.

Results

4.6 The measured noise levels are summarised in Table 1 and shown graphically in Appendix B. 24 Acoustics considers the typical background noise level to be the average background noise level less one standard deviation.

Date (December 2024)	**Background Noise Level (dB)**	
	Daytime (07:00 to 23:00 hours) $L_{A90, 1hr}$	**Night-time (23:00 to 07:00 hours) $L_{A90, 15\ min}$**
Thursday 12th	48	28
Friday 13th	49	34
Saturday 14th	49	37
Sunday 15th	47	34
Monday 16th	50	-
Representative Level	**49**	**30**

Table 1 - Measured background noise levels

5.0 PLANT NOISE ASSESSMENT

5.1 It is proposed to install one ASHP unit in the front lightwell of the property. The make and model of the proposed ASHP have not yet been confirmed, therefore a representative unit has been selected, based on conversations with Ms James.

5.2 For this assessment, the proposed ASHP unit is a single Mitsubishi PUZ-HWM140VHA, with a manufacturer's stated sound pressure level of 53 dBA at 1m. Octave-band sound pressure levels are provided by the manufacturer, as described in Table 2.

Unweighted Sound Pressure Level (dB) at 1m per Octave-Band Centre Frequency (Hz)							
63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
57	58	54	50	48	43	39	35

Table 2 - Manufacturer's octave-band noise data

5.3 The nearest noise-sensitive receptors are located at 317 Richmond Road. Two receptors have been defined as follows:

- Receptor 1: 317 Richmond Road, ground floor window, approximately 5.5m from the proposed plant location.
- Receptor 2: 317 Richmond Road, first floor window, approximately 8.5m from the proposed plant location.

5.4 An existing wall is in place at the boundary between 317 and 319 Richmond Road, which will provide acoustic screening from the ASHP to Receptor 1. Receptor 2 will not be acoustically screened from the ASHP.

5.5 Calculations have been undertaken to determine the level of noise from the proposed plant at the nearest noise-sensitive windows, including corrections for distance, reflections and screening, where applicable.

Noise Mitigation Measures

5.6 Mitigation measures will be necessary to meet the London Borough of Richmond's plant noise requirements.

5.7 The ASHP shall be placed in a ventilated acoustic enclosure that achieves the minimum specification given in Table 2, to achieve an overall reduction of at least 15 dBA.

Minimum attenuation (dB) per Octave-Band Centre Frequency (Hz)							
63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
5	7	12	23	31	24	21	13

Table 3 - Minimum Performance of Acoustic Enclosure

5.8 The values described in Table are commensurate with a 540mm double bank louvre (eg, Noico G540) and may also be achieved by a suitably selected in-line attenuator. The enclosure shall be designed by others to ensure the heat pump is provided with sufficient airflow, with consideration given to recirculation and local space constraints.

Predicted Plant Noise Levels

5.9 With the attenuation measures described above, the plant is not expected to contain tones or intermittent noise sufficient to attract attention at the nearest noise-sensitive receptors. The predicted plant noise rating levels are shown in Table 4.

Receptor	**Period**	**Sound Pressure Level, dB**		
		Background noise level (L_{A90})	**Calculated plant noise rating level ($L_{Ar, Tr}$)**	**Level Difference**
No. 317 Ground Floor (Receptor 1)	Daytime	49	24	-25
	Night-time	30	24	-6
No. 317 First Floor (Receptor 2)	Daytime	49	25	-24
	Night-time	30	25	-5

Table 4 - Plant Noise calculations

5.10 The results in Table 4 demonstrate that, with the proposed ASHP and acoustic enclosure, associated noise levels would be at least 5 dBA below the measured typical background noise level, at all times of day and night. The proposed plant would therefore comply with the plant noise criteria set out by The London Borough of Richmond.

6.0 CONCLUSIONS

6.1 24 Acoustics Ltd has been appointed by Lara James, to undertake an assessment of noise from proposed new plant at 319 Richmond Road, Twickenham.

6.2 An environmental noise survey has been undertaken to determine the existing background noise levels representative of nearby residential properties.

6.3 Calculations have been undertaken, based on manufacturers' noise data, to determine the plant noise levels at the nearest noise-sensitive receptors.

6.4 The assessment demonstrates that, with the recommended acoustic attenuation in place, noise from the proposed plant would achieve the plant noise criteria set out by The London Borough of Richmond.

REFERENCES

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

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

3. London Borough of Richmond Upon Thames, Development Control for Noise Generating and Noise Sensitive Development, September 2018.

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

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

Project: 319 Richmond Road, Twickenham	**Title:** Site overview and Measurement Location	
DWG No: Figure 1	**Scale:** N.T.S.	**Rev: -**
Date: December 2024	**Drawn By:** JL	**Job No:** 10933

Project: 319 Richmond Road, Twickenham	**Title:** Basement plan, with approximate ASHP location		
DWG No: Figure 2	**Scale:** N.T.S.	**Rev: -**	
Date: December 2024	**Drawn By:** JL	**Job No:** 10933	

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