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31 THE GREEN

RICHMOND

PLANT NOISE ASSESSMENT

Technical Report: R10242-1 Rev 0

Date: 23rd November 2023

For: Justyn Bailey and Richard Posner
31 The Green
Richmond
TW9 1LX

24 Acoustics Document Control Sheet

Project Title: 31 The Green, Richmond – Plant Noise Assessment

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1.0 INTRODUCTION

1.1 24 Acoustics Ltd has been instructed by Michael Jones Architects, on behalf of Justyn Bailey and Richard Posner, to undertake an assessment of noise from a proposed air source heat pump unit at 31 The Green, Twickenham.

1.2 This report presents the results of the assessment, following site visits and a background noise survey undertaken between 4th and 10th October 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 Planning permission is sought to install a new air source heat pump (ASHP) unit, to be located within the flat roof of the building.

2.2 The nearest noise sensitive property to the proposed ASHP is the neighbouring residential building, 30 the Green to the east as shown in Figure 1. The neighbouring building to the west, 32 The Green, is a commercial property.

2.3 It is understood that the ASHP will operate on demand at any time of day or night. Therefore, this assessment will consider the specific noise level against daytime (07:00 to 23:00 hours) and night-time (23:00 to 07:00 hours) background noise levels.

2.4 An aerial view of the site and the measurement location is shown in Figure 1. The approximate proposed plant location is shown in Figure 2.

3.0 RELEVANT CRITERIA

National Planning Policy Framework and Noise Policy Statement for England

3.1 Paragraph 180 of the National Planning Policy Framework (NPPF) [Reference 1] states that planning policies and decisions 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.

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 plant 24 Acoustics considers that the spirit of the requirements of the NPPF and NPSE will be complied with if criteria from British Standard 4142:2014 [Reference 3] are adopted.

BS 4142:2014 Methods for Rating Industrial and Commercial Sound

3.5 BS 4142:2014 provides a method for rating the effects of industrial and commercial sound on residential receptors.

3.6 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.

3.7 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, 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).

3.8 BS 4142 requires the noise impact to be assessed depending on the context. In relation to situations where background noise levels are low, the standard 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.".

Local Authority Requirements

3.9 Richmond Borough Council's Supplementary Planning Documents and Guidance includes the document "Development Control for Noise Generating and Noise Sensitive Development", which states that BS 4142 assessment levels that are equal to or below background noise levels "may be acceptable from a noise perspective but will be more context dependant". BS 4142 assessment levels of up to 5 dBA above background noise levels are "less likely to be acceptable from a noise perspective and will be context dependant".

3.10 The document also recognises that internal noise levels in nearby dwellings are also necessary to consider in some cases, e.g. for steady continuous noise without specific character internal noise levels from BS 8233: 2014 may be relevant.

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

4.0 NOISE MEASUREMENTS

Background Noise Survey

4.1 A noise survey was undertaken between 4th and 10th October 2023 to assess the existing background noise levels, using the following equipment:

- Rion precision sound level meter Type NL-32
- Brüel & Kjær acoustic calibrator Type 4231

4.2 The noise monitoring equipment was located on the flat roof of the property at a height of 1.5m above roof level. This location is considered representative of the noise climate at nearby noise sensitive properties.

4.3 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 4].

4.4 The instrumentations' 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.

4.5 The instrumentation was fitted with environmental weather shields during the surveys. Weather conditions during the surveys were variable with some periods of rainfall. Measurements affected by adverse meteorological conditions have been removed from the assessment.

4.6 The results of the background noise surveys are shown graphically in Appendix B and are summarised in Table 1.

Date (May 2022)	Typical Background Noise Level	
	Daytime dB $L_{A90,\ 1\ hour}$ (07:00 - 23:00)	Night-Time dB $L_{A90,15\ min}$ (23:00 - 07:00)
Wednesday 4/10/2023	48*	36
Thursday 5/10/2023	49	37
Friday 6/10/2023	51	39
Saturday 7/10/2023	51	38
Sunday 8/10/2023	48	41
Monday 9/10/2023	48	41
Tuesday 10/10/2023	49*	--
Representative Level	**48**	**37**

Table 1: Summary of Measured Noise Levels. * incomplete measurement period

4.7 24 Acoustics determines the typical background noise level to be the average minus one standard deviation.

5.0 PLANT NOISE ASSESSMENT

Plant Noise Data

5.1 It is proposed to install one ASHP located on the flat roof property as indicated in Figure 2. At this stage the exact ASHP model has not been selected, therefore an example ASHP has been used (Mitsubishi PUZ-WM60VAA) for the purposes of this noise assessment as agreed with the Energy Consultant.

5.2 The manufacturer's data for this unit states a sound pressure level of 45 dBA at 1m.

5.3 The plant is not expected to contain tones or intermittent noise sufficient to attract attention.

5.4 The nearest residential windows to the proposed ASHP are the neighbouring building, 30 The Green. At this stage the exact plant location has not been confirmed, therefore a minimum distance of approximately 5 m to the nearest residential window has been assumed for the purposes of this noise assessment.

BS 4142:2014 Assessment

5.5 A BS 4142 assessment for the proposed plant unit has been undertaken and is shown in . The proposed ASHP is not considered to contain tonal or other distinctive characteristics.

	30 The Green	
	Daytime (07:00 to 23:00 hours)	**Night-Time (23:00 to 07:00 hours)**
Representative Background Noise Level	48 dB $L_{A90,\ 1\ hour}$	37 dB $L_{A90,15\ min}$
Specific Source Noise Level	31 dB $L_{Aeq,\ 1\ hour}$	31 dB $L_{Aeq,\ 15\ min}$
Rating Correction	0 dB	0 dB
Rating Noise Level	31 dBA	31 dBA
BS 4142 Assessment Level	-17 dBA	-6 dBA

Table 3: BS 4142 Assessments at 30 The Green.

5.6 Table 3 shows that the BS 4142 rating levels at both receptor locations will be at least 5 dB lower than the background noise level during daytime and night-time periods. This is considered a low noise impact based on Richmond Borough Council's guidance and BS 4142: 2014.

5.7 The above assessment demonstrates that noise levels at nearby sensitive receptors will be in line with the guidance of Richmond Borough Council and BS 4142: 2014 and hence acceptable.

6.0 CONCLUSIONS

6.1 24 Acoustics Ltd has been instructed by Michael Jones Architects, on behalf of Justyn Bailey and Richard Posner, to undertake an assessment of noise from a proposed air source heat pump unit at 31 The Green, 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 manufacturer's noise data, to determine the plant noise levels at the nearest noise sensitive windows.

6.4 The assessment demonstrates that noise from proposed plant at the most affected noise sensitive windows will be below the typical background noise level during all periods and in line with the guidance of Richmond Borough Council and BS 4142. Therefore, noise from the proposed new plant is acceptable.

REFERENCES

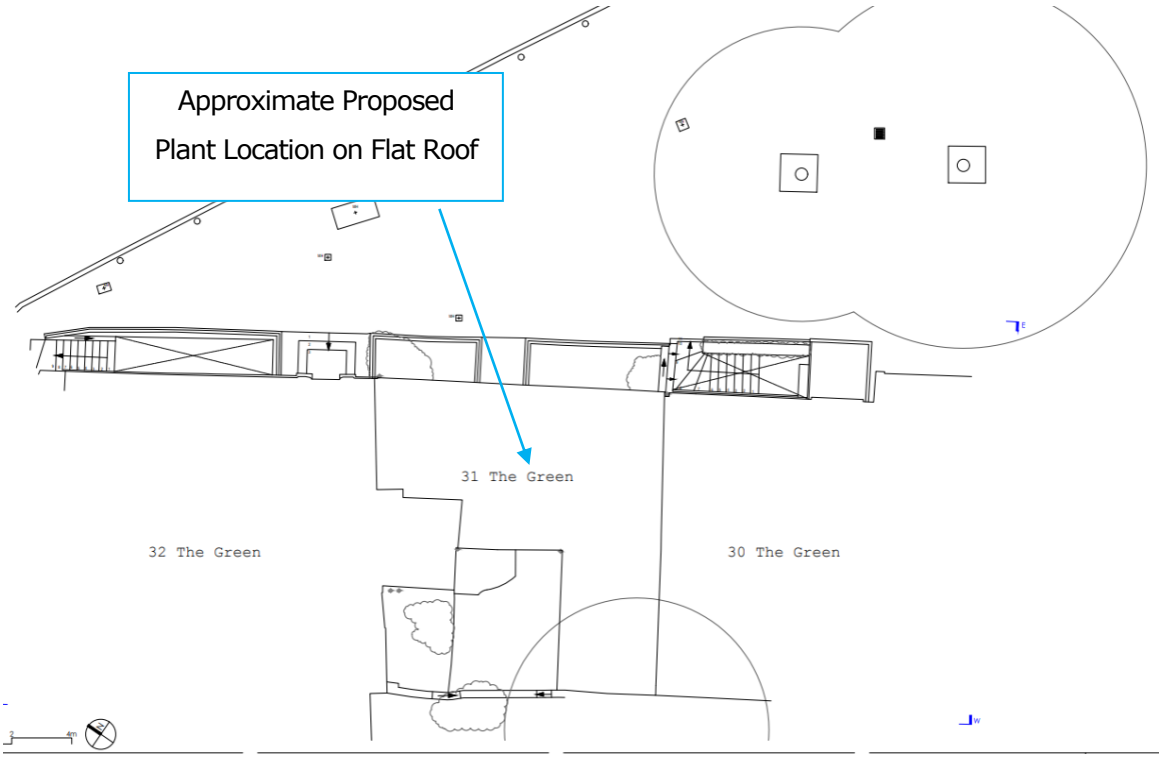
1. Department for Levelling Up, Housing & Communities. National Planning Policy Framework, 2023.

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

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

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

Project: 31 The Green, Richmond	**Title**: Aerial view, survey location, and nearest receptor.	
DWG No: Figure 1	**Scale:** N.T.S.	**Rev**: 0
Date: November 2023	**Drawn By:** AP	**Job No**: 10242



Project: 31 The Green, Richmond	**Title**: Proposed Plant Location	
DWG No: Figure 2	**Scale:** N.T.S.	**Rev**: 0
Date: November 2023	**Drawn By:** AP	**Job No**: 10242

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 – AMBIENT NOISE SURVEY RESULTS