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FINCHWOOD PARCEL 10
PLANT NOISE ASSESSMENT

Technical Report: R10959-1 Rev 0

Date: 31st January 2025

For: Vistry Thames Valley
550 Oracle Parkway,
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Reading,
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24 Acoustics Document Control Sheet

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Report Ref: R10959-1 Rev 0

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1.0 INTRODUCTION

- 1.1 24 Acoustics Ltd has been instructed by Vistry Thames Valley to carry out a noise assessment in relation to a planning condition for their residential development site at Finchwood Park, Parcel 10.
- 1.2 Condition 14 of the planning consent requires an assessment of the noise impact from plant, including air source heat pumps (ASHP), which will serve individual houses across the site.
- 1.3 This report presents the results of the noise assessment, which is undertaken in line with the requirements of condition 14.
- 1.4 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: 20 μ Pa.

2.0 PLANNING CONDITION 14

- 2.1 Condition 14 of the planning consent (Reading BC Planning Reference 240422) states:

"14. Prior to above-ground construction of the development hereby approved, a Noise Assessment in accordance with BS4142 shall be submitted to and approved in writing by the Local Planning Authority. The assessment shall:

a) be carried out by a suitably qualified acoustic consultant/engineer and shall identify all noise sources (including air source heat pumps) affecting both internal and external areas of the development hereby approved;

b) ensure that all noise implications are mitigated so that internal ambient noise levels for dwellings shall not exceed 35 dB LAeq (16 hour) 07:00-23:00 during the daytime and 30 dB LAeq (8 hour) 23:00-07:00 during the night assuming full road traffic flows at the outset;

c) identify design and/or insulation measures required to ensure that ambient internal noise levels and the noise levels within usable external spaces for the dwellings meet the BS8233 sound insulation and noise reduction for buildings design range 'good' for living accommodation.

The approved mitigation measures shall be implemented prior to first occupation of the dwelling to which they relate and be permanently retained and maintained thereafter."

- 2.2 An acoustic report was submitted by others in response to condition 14 in February 2024 (Auricle reference R/NA/1/240212). Chris Christofis, Environmental Protection Officer for Reading Borough Council, responded with the following comments on 20th February 2024:

"On review of the noise assessment provided in support of this application by Auricle Acoustic Consulting, I can see that a base for the assessment has been provided with a prediction that if the proposed ASHP are at least 3m from nearby windows compliance should be achieved. Naturally I cannot agree to discharge of the condition until we have the full schematic and can see where all of the ASHP are in fact going to be installed, the distance to the windows of the property of installation are also significant."

- 2.3 It is understood from the above correspondence that the assessment of road traffic noise submitted in February 2024 has been accepted and so further information is only required in relation to the proposed air source heat pumps.
- 2.4 Two air source heat pump models will be used on this site, depending on the house size:
- 1 and 2 bed houses Daikin EDLA4EV3 (58 dBA L_w)
 - 3 and 4 bed houses Daikin EDLA6EV3 (60 dBA L_w)
- 2.5 This assessment focusses on plant noise levels affecting plots within the part of the site where the greatest density of ASHPs occurs. Site layout plans for these dwellings are shown in Figure 1.

3.0 CRITERIA

BS 4142: 2014+A1:2019 - Methods for Rating Industrial and Commercial Sound

- 3.1 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.
- 3.2 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).

3.3 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.

3.4 With the introduction of permitted development rights in 2011, noise from individual heat pumps, as proposed, are more typically assessed under the Microgeneration Certification Scheme Planning Standards (MCS 020), as discussed in the following sections.

Permitted Development Rights for Air Source Heat Pumps

3.5 MCS 020 Planning Standards for Permitted Development Installations of Wind Turbines and Air Source Heat Pumps on Domestic Premises presents a simple methodology for assessing the noise impact from air source heat pumps. It determines the overall noise level at an assessment point 1 m from the centre of a window / door at a neighbouring property to where the ASHP is located.

3.6 To calculate the sound pressure from the ASHP the method takes into account the following parameters:

- Manufacturer's stated sound power level for the air source heat pump;
- Directivity in relation to where the heat pump is located relative to nearby reflective surfaces,
- Distance from the pump to the assessment location.

3.7 The method then logarithmically adds an assumed ambient noise level of 40 dB to the predicted ASHP noise level. This overall level is deemed a 'Pass' if it does not exceed 42 dBA.

IOA Heat Pumps Professional Advice Note

3.8 The Heat Pumps Professional Advice Note published by the Institute of Acoustics in 2022, recognises the risk of permitted development rights (the MCS scheme) not avoiding the creation of significant adverse effects from noise and vibration.

3.9 The document states that where it is practical to do so, it is recommended that the Rating Level (reference BS 4142), does not exceed 35 dB at one metre from any noise sensitive façade of neighbouring residential premises.

3.10 The document goes on to say:

"If it can be demonstrated that it is not practical to achieve this value, and the local context supports a relaxation, then a higher criterion may be suitable. Under those circumstances it is recommended that the reasons for the relaxation are fully set out and justified. Nevertheless, it is recommended that the sound rating level should not exceed 40dB."

BS 8233: 2014

3.11 Planning condition also refers to BS 8233:2014, which provides design guidance for dwelling houses, flats and rooms in residential use and recommends that internal noise levels in dwellings do not exceed 35 dB $L_{Aeq,16 \text{ hour}}$ in living rooms and bedrooms during the day and 30 dB $L_{Aeq,8 \text{ hour}}$ in bedrooms at night. These criteria typically apply for anonymous steady external noise sources.

3.12 Of relevance to the wording of condition 14, BS 8233 advises that:

"If partially open windows were relied upon for background ventilation, the insulation [of the façade] would be reduced to approximately 15 dB"

4.0 NOISE ASSESSMENT

4.1 The site layout has been reviewed and two example plots at the greatest density of neighbouring ASHPs have been identified (see Figure 1):

- Terraced plot 720 (3 bed): The ASHPs are located adjacent to the boundary garden fences
- Semi-Detached plot 595 (2 bed): The ASHP for the neighbouring plot is at the boundary fence

4.2 These two plots represent the worst-case scenarios for both ASHP types. All other plots will be subject to levels that are equal to or lower than those experienced by these two examples.

4.3 The boundary fences are close-board or larch lap in construction and will provide acoustic screening between the heat pumps and nearest windows (at a minimum distance of 2.6m).

4.4 Calculations have been undertaken to establish the cumulative plant noise levels anticipated outside the most affected properties and take into account reflections, distance loss and acoustic screening.

- 4.5 The results are described below with indicative internal noise levels, assuming 10 to 15 dBA loss for an open window:

Plot No.	Predicted Plant Noise Level	
	Outside	Inside
720	40 dB $L_{Aeq, T}$	25 to 30 dB $L_{Aeq, T}$
595	38 dB $L_{Aeq, T}$	23 to 28 dB $L_{Aeq, T}$

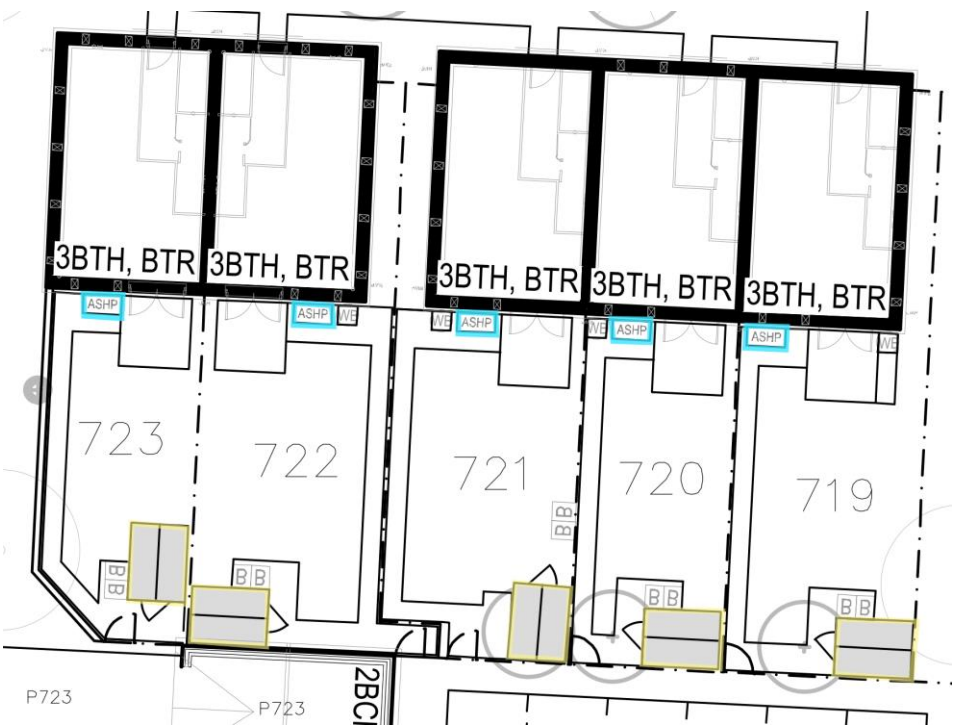
Table 1 - ASHP Predicted Noise Levels at the Nearest Window

- 4.6 The calculation results conclude that external noise levels from ASHPs will not exceed 40 dB $L_{Aeq, T}$ and is therefore in line with the guidance set out in the Heat Pumps Professional Advice Note published by the Institute of Acoustics.

5.0 CONCLUSIONS

- 5.1 24 Acoustics Ltd has been instructed by Vistry Thames Valley to carry out a noise assessment in relation to a planning condition for their residential development site at Finchwood Park, Parcel 10.
- 5.2 Condition 14 of the planning consent requires an assessment of internal noise levels from air source heat pumps, which will serve individual houses across the site.
- 5.3 The results of plant noise calculations demonstrate that the proposed units will be acceptable, with no further mitigation measures required.
- 5.4 On the basis of the above, the development complies with Condition 14 of the planning consent (Reading BC Planning Reference 240422).

Plot 720



Plot 595



Project: Finchwood Park, Parcel 10		Title: Site Plan (Plots 720 and 595)		 24Acoustics
DWG No: Figure 1	Scale: N.T.S.	Rev: -		
Date: January 2025	Drawn By: NM	Job No: 10959		

APPENDIX A – SOUND INSULATION TERMINOLOGY

The Decibel, dB

The unit used to describe the magnitude of sound is the decibel (dB) and the quantity measured is the sound pressure level. The decibel scale is logarithmic and, as such, it ascribes equal values to proportional changes in sound pressure, which is a characteristic of the ear. Use of a logarithmic scale has the added advantage that it compresses the very wide range of sound pressures to which the ear may typically be exposed (0.0002Pa to 20Pa) to a more manageable range of numbers. The threshold of hearing occurs at approximately 0dB and the threshold of pain is around 120dB.

Airborne Sound Insulation

Voices, hi-fi systems, television and radio sound and musical instruments are all sources of airborne sound. They excite the air around them and the vibration in the air is transmitted to surrounding surfaces, such as walls, ceilings and floors. This sets these constructions into vibration and this vibration is re-radiated in neighbouring rooms as sound. Energy is lost in the transmission path and this is referred to as transmission loss or more generally, airborne sound insulation. The most simple measure of sound insulation between two rooms is the sound level difference, D , which is the arithmetic difference between the sound level, in dB, in the source room and the sound level in the receiving room.

Other measures of sound insulation include the sound reduction index (R , obtained by laboratory test), the apparent sound reduction index (R' , obtained in field tests) and the standardised level difference (D_{nT} , used mainly in the sound insulation of rooms in dwellings and other cellular rooms). The relevant test procedures are laid down in BS EN ISO 140. The results are obtained over a range of frequencies. A single-figure “weighted” result can be obtained from one-third octave band results measured over the frequency range 100 - 3150Hz by using a curve-fitting procedure laid down in BS EN ISO 717. The subscript “w” is added to the descriptors above, for example; $D_{nT,w}$. The C_{tr} value is a correction factor (normally negative) which takes additional account of low frequency performance of the structure tested.

Impact Sound Isolation

In the case of impact sound, the building construction is caused to vibrate as a result of a physical impact. Footsteps on floors are the most obvious example. The vibration is radiated as sound in neighbouring rooms. Impact insulation is measured using a standard tapping machine, which drops weights cyclically onto a floor. The sound pressure level is measured in the receiving room below and the result is known as the impact level, L_i . This test is used in the evaluation of domestic separating floors. As with airborne sound, the test procedures are set out in BS EN ISO 140 and the single-figure weighting of the results is described in BS EN ISO 717. The descriptor for the final result of a field test is $L'_{nT,w}$.

Reverberation time

The reverberation time is a measure of the rate of decay of sound in a room and this influences the sound pressure level of noise in that room. It is defined as the time taken, in seconds, for the level of sound in a room to decrease by 60 dB (a millionth of its original energy value) after the discontinuation of a sound. A reverberation time of 0.5s is used to standardise sound insulation test results in dwellings. Reverberation time is measured in accordance with the requirements of BS EN ISO 140.