11 Orchard Road
Onslow Village
Guildford
GU2 7QY

Planning Noise Assessment

On behalf of

Eric de Oude

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1	30th June 2022	Amendment to text	AQ	DMB
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3	5th July 2022	Client requested amendments	AQ	DMB

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1.0 Introduction

1.1. Noise Solutions Ltd (NSL) has been commissioned to undertake a noise assessment to support the retrospective planning application for existing plant serving 11 Orchard Road, located in Onslow Village, Guildford.

1.2. NSL has attended site to undertake measurements to establish noise emissions from the existing plant equipment. Measured levels have been extrapolated to determine likely internal noise levels within the nearest noise sensitive receptors. Predicted levels have been assessed using the emissions criteria provided by Guildford Borough Council's Environmental Health Department.

1.3. A glossary of acoustic terminology is given in **Appendix A**. An in-depth glossary of acoustic terms can be viewed online at www.acoustic-glossary.co.uk.

2.0 Site layout

2.1. 11 Orchard Road is a detached residential property located on the south side of Orchard Road, Onslow Village.

2.2. Plant serving the property is located along its eastern elevation. The plant is separated from the neighbouring property (9 Orchard Road) by a wooden fence. The existing external plant items are:

- 1no. Heat pump – LG/HM121M U33

2.3. The plant may operate at any time to meet the heating requirements of 11 Orchard Road, although it should be noted that demand is generally expected to be reduced at night.

3.0 Nearest noise sensitive receptors

3.1. The area surrounding property consists predominantly of residential dwellings, with the exception of a school and a small parade of shops to the south west.

3.2. The nearest noise sensitive property is the residential property located immediately west of 11 Orchard Road (9 Orchard Road - Reference R1), approximately 3m from the closest item of plant.

3.3. There are further residential premises located in the surrounding area. These premises are substantially further away from the plant than Receptor R1.

3.4. An aerial photograph showing the site and surrounding area, the nearest noise sensitive property, and noise monitoring locations used in this assessment is presented in **Appendix B**.

4.0 Plant noise design criteria

Guildford Borough Council

4.1. With regards to the installation of the air source heat pump (ASHP) at 11 Orchard Road, Ian Croll, Environmental Health Officer for Guildford Borough Council provided the following guidance on the 29th October 2021;

> *"Prior to approval, I would request a noise assessment be undertaken to assess the impact of noise from the Air Source Heat Pump on the neighbouring property. This shall have regard to the day and night time noise recommendations as advised in BS8233:2014 and WHO guidance."*

BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings

4.2. This standard provides recommended guideline values for internal noise levels within dwellings which are similar in scope to the guideline values contained within the World Health Organisation (WHO) document, Guidelines for Community Noise (1999). These guideline noise levels are shown in Table 1, below.

Table 1 BS 8233 Desirable Internal Ambient Noise Levels for Dwellings

Activity	Location	07:00 to 23:00 hours	23:00 to 07:00 hours
Resting	Living room	35 dB $L_{Aeq,16h}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16h}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16h}$	30 dB $L_{Aeq,8h}$

4.3. BS 8233:2014 advises that: *"regular individual noise events…can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$ depending on the character and number of events per night. Sporadic noise events could require separate values."*

Proposed criteria

4.4. In accordance with the guidance provided by Guildford Borough Council, it is proposed that internal plant noise levels inside nearby noise sensitive premises should not exceed the desirable limits provided in BS 8233:2014, as is outlined in Table 1.

5.0 Plant noise survey

Methodology

5.1. A plant noise survey was undertaken between 10:15 hours and 11:00 hours on 24th June 2022 in order to establish the noise emitted from the ASHP serving 11 Orchard Road.

5.2. Measurements of sound pressure levels were undertaken with the microphone positioned at 1.5m from the ground. Measurements were taken over short durations (approximately one minute in length) to minimise the influence of extraneous sources. Both broadband and one-third octave band frequency data was measured. Measurements were also taken with the equipment switched off.

5.3. Details of the noise monitoring equipment used during the survey are detailed in the following table.

Table 2 Details of noise monitoring equipment

Description	Model / serial no.	Calibration date	Calibration certificate no.
Class 1 Sound level meter	Svantek 977/ 69747	20/08/2020	14015672
Condenser microphone	ACO Pacific 7052E / 70829		
Preamplifier	Svantek SV12L / 73687		
Calibrator	Svantek SV 40A / 10843	29/07/2021	1500732-1

5.4. Measurements were taken at a single position along the eastern boundary of the 11 Orchard Road. The attended measurement position is indicated in **Appendix B**. Measurements were taken with the plant switched on and off.

5.5. The temperature during the plant survey was 19°C with a light breeze measuring 1m/s. Road surfaces in the surrounding area were dry. Weather conditions were unlikely to have affected the results of the plant noise survey.

6.0 Noise impact assessment

BS 8233:2014

6.1. The results of the plant noise measurements are summarised in Table 3. The measured levels have been corrected to take residual sound levels into account in order to determine the specific plant noise level, and a correction made for the distance to the most affected noise sensitive facade.

Table 3 Summary of measured plant noise emission levels

Operating plant	Sound pressure level, L_{A90} (dB)			
	Ambient noise level at MP1	Residual noise level at MP1	Specific noise level at MP1[1]	Specific at receptor (R1)[2]
Heat Pump – LG/HM121M U33	54 (1m from plant)	43	54	44

Note 1: Levels corrected to take into account residual sound.
Note 2: Levels corrected to account for additional distance to Receptor R1 (i.e. 3m)

6.2. If partially open windows were relied upon for background ventilation, the insulation would be reduced to approximately 15dB according to BS 8233:2014. Therefore internal noise levels can be approximated by subtracting 15dB from the calculated specific level external to the façade of the receptor as shown in Table 4.

Table 4 Summary of predicted internal noise levels

Operating plant	Sound pressure level, L_{A90} (dB)		
	Specific at receptor (R1)	Sound reduction of a partially open window	Internal noise level
Heat Pump – LG/HM121M U33	44	-15	29

6.3. The following table assesses the calculated internal noise level of the plant against the desirable internal ambient noise levels for dwellings as detailed BS 8233:2014. It furthermore assumes that the plant will not run for more than 80% of the time.

Table 5 Assessment of time corrected internal plant noise emissions levels

Operating plant	Sound pressure level, L_{A90} (dB)			
	Calculated Internal noise level	Time variance correction	BS 8233:2014 Guidance noise levels	Difference over criterion
Heat Pump – LG/HM121M U33	29	-1	Sleeping (daytime resting) 35	**-7**
			Sleeping 30	**-2**

Discussion of results

6.4. The estimated impact must be considered within the context of the site and the surrounding acoustic environment. The following must, therefore, also be taken into consideration when determining the potential impact that may be experienced:

- The above assessment has been made inside the nearest noise sensitive property (i.e. within a ground floor room located to the west of the premises).
- The assessment was undertaken with the heat pump operating at maximum duty.

6.5. Where possible uncertainty in this assessment has been minimised by taking the following steps:

- All sound level meters and calibrators used have a traceable laboratory calibration and were field calibrated before and after the measurements.
- Uncertainty in the calculated impact has been reduced by the use of a well-established method.

7.0 Summary

7.1. Noise Solutions Ltd (NSL) has been commissioned to undertake a noise assessment to support the retrospective planning application for existing plant serving 11 Orchard Road, located in Onslow Village, Guildford.

7.2. NSL has attended site to undertake measurements to establish noise emissions from the existing plant equipment. Measured levels have been extrapolated to determine likely internal noise levels within the nearest noise sensitive receptors. Predicted levels have been assessed using the emissions criteria provided by Guildford Borough Council's Environmental Health Department.

7.3. Guildford Borough Council's Environmental Health department has stated that:

> *"Prior to approval, I would request a noise assessment be undertaken to assess the impact of noise from the Air Source Heat Pump on the neighbouring property. This shall have regard to the day and night time noise recommendations as advised in BS8233:2014 and WHO guidance."*

7.4. The assessment has determined that plant noise levels do not exceed the daytime or night-time desirable internal noise levels given in BS 8233:2014, inside the nearest noise sensitive receptors. By extension the day and night-time indoor dwelling guideline values found within WHO Guidelines For Community Noise have also been met.

Appendix A Acoustic terminology

Parameter	Description
Ambient Noise Level	The totally encompassing sound in a given situation at a given time, usually composed of a sound from many sources both distant and near ($L_{Aeq,T}$).
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s1 and s2 is given by 20 $\log_{10}$ (s1/s2). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20μPa. The threshold of normal hearing is in the region of 0 dB and 140 dB is the threshold of pain. A change of 1 dB is only perceptible under controlled conditions.
dB(A), L_{Ax}	Decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB(A) broadly agree with people's assessment of loudness. A change of 3 dB(A) is the minimum perceptible under normal conditions, and a change of 10 dB(A) corresponds roughly to halving or doubling the loudness of a sound. The background noise in a living room may be about 30 dB(A); normal conversation about 60 dB(A) at 1 metre; heavy road traffic about 80 dB(A) at 10 metres; the level near a pneumatic drill about 100 dB(A).
Fast Time Weighting	Setting on sound level meter, denoted by a subscript F, that determines the speed at which the instrument responds to changes in the amplitude of any measured signal. The fast time weighting can lead to higher values than the slow time weighting when rapidly changing signals are measured. The average time constant for the fast response setting is 0.125 (1/8) seconds.
Free-field	Sound pressure level measured outside, far away from reflecting surfaces (except the ground), usually taken to mean at least 3.5 metres
Façade	Sound pressure level measured at a distance of 1 metre in front of a large sound reflecting object such as a building façade.
$L_{Aeq,T}$	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{max,T}$	A noise level index defined as the maximum noise level recorded during a noise event with a period T. L_{max} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
$L_{10,T}$	A noise level index. The noise level exceeded for 10% of the time over the period T. L_{10} can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise. $L_{A10,18h}$ is the A –weighted arithmetic average of the 18 hourly $L_{A10,1h}$ values from 06:00-24:00.
$L_{90,T}$	A noise level index. The noise level that is exceeded for 90% of the measurement time interval, T. It gives an indication of the lower levels of fluctuating noise. It is often used to describe the background noise level and can be considered to be the "average minimum" noise level and is a term used to describe the level to which non-specific noise falls during quiet spells, when there is lull in passing traffic for example.

Appendix B Photograph of site showing areas of interest