

Memorandum

To: Steve Mathews - HCC, Robert Shrimplin - Shrimplin Planning & Development
From: Chris McConnell – 24 Acoustics Ltd
Date: 18th July 2023
Job: 8987-4 Rev 0
Ref: Hexham Road, Reading – Plant Noise Planning Condition

Following our recent review of the draft noise-related planning conditions , please see below summary.

Draft Planning Condition (Ref 230279)

The application has been submitted to Reading Borough Council (RBC) and is currently in the consultation period. The Environmental Health Officer has recommended the following draft planning condition :

"No mechanical plant shall be installed until a noise assessment of the proposed mechanical plant has been submitted and approved by the Local Planning Authority. The assessment shall be carried out for in accordance with BS4142:2014+A1:2019 methodology. The predicted specific sound level ($L_{Aeq,TR}$) (with reference to BS:4142) as measured at a point 1 metre external to the nearest noise-sensitive facade shall be at least 10dB below the pre-existing background sound level, $LA_{90,T}$ when all plant/equipment (or any part of it) is in operation. The predicted rating level, $L_{Ar,Tr}$ (specific sound level plus any adjustment for the characteristic features of the sound) as measured at a point 1 metre external to the nearest noise-sensitive façade (habitable window of a dwelling) shall not exceed the pre-existing background sound level, $LA_{90,T}$ when all plant/equipment (or any part of it) is in operation. The plant shall thereafter only be installed in accordance with the assessment and shall thereafter be maintained so that it operates to the same standard.

REASON: To safeguard the amenities of the adjoining premises and the area generally, in accordance with Policy CC8 and EN17 of the Reading Borough Local Plan 2019."

Preliminary Plant Noise Assessment

Measured background sound levels are presented in 24 Acoustics' noise assessment report submitted with the application (Ref R8987-2 Rev 2). The measured background sound levels at night are low (30 dB $L_{A90,T}$), therefore RBC's criterion of 10 dB below the background level would require a specific sound level of 20 dB $L_{Aeq,T}$. This is a very low external sound level, and is lower than typical standards for internal sound levels (e.g. BS 8233: 2014 requires 30 dB $L_{Aeq,T}$ within bedrooms at night).

The proposed plant is likely to comprise 2No. air source heat pumps, in the location indicated in Figure 1, as well as a plant room and substation. As the air source heat pumps are likely to be the primary source of noise, a preliminary calculation has been undertaken based on the indicative plant selection (Daikin Altherma EPRA14/16/18DAV3/W1). The manufacturer's datasheet is shown in Appendix A, stating a sound pressure level of 48 dBA at 1m.

The calculations indicate that, in order to achieve RBC's criterion of 10 dB below the background sound level, the air source heat pumps will require a high-performance acoustic enclosure which includes a roof. These significant noise attenuation measures would likely conflict with other design factors including airflow requirements to the plant.

Review of Draft Condition

BS 4142: 2014 + A1: 2019 requires the noise impact to be assessed depending on the context. Attention is drawn to Section 11 (1) of BS 4142 which states the following:

"Where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration, including the following:

- 1) *The absolute level of sound. For a given difference between the rating level and the background sound level, the magnitude of the overall impact might be greater for an acoustic environment where the residual sound level is high than for an acoustic environment where the residual sound level is low.*

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..."

Reading's policy EN17 refers to 'background creep' which is a term used to describe the potential increase in background sound level due to the cumulative effects of noise from new plant. The Hexham Road site is in a predominantly residential area away from the town centre, with no commercial noise sources in the vicinity. There is, therefore, no risk of background creep at this location.

As the measured background sound levels at night are low, considering the context in accordance with BS 4142:2014, a target specific sound level of 25 dB $L_{Aeq, 15 \text{ min}}$ (5 dB below the background sound level) is considered appropriate for night-time operation at this site. Resultant internal sound levels within nearby properties, assuming 10 dB loss for an open windows, would be in the order of 15 dB $L_{Aeq, 15 \text{ min}}$, which is significantly below the BS 8233: 2014 criterion of 30 dB $L_{Aeq,T}$ for bedrooms at night.

It is therefore requested that the draft condition be re-worded, taking into account context under BS 4142: 2014, with a target specific sound level of 25 dB $L_{Aeq, 15 \text{ min}}$ for night-time operation at this site.

FIGURE 1 – PROPOSED PLANT LOCATION

APPENDIX A – MANUFACTURER’S DATASHEET FOR AIR SOURCE HEAT PUMPS



Outdoor Unit			Single Phase			3 Phase		
			EPRA14DV3	EPRA16DV3	EPRA18DV3	EPRA14DW1	EPRA16DW1	EPRA18DW1
Description			14kW	16kW	18kW	14kW	16kW	18kW
Dimensions ^[1]	Height x Width x Depth	mm	990 x 1270 x 460					
Weight		kg	146			151		
Nominal capacity	Heating ^(a/b)	kW	10.17 / 10.12	11.57 / 11.51	12.11 / 12.04	10.39 / 10.26	11.82 / 11.67	12.37 / 12.21
	Cooling ^(c/d)	kW	10.55 / 6.90	11.51 / 7.88	12.46 / 8.86	10.55 / 6.90	11.51 / 7.88	12.46 / 8.86
Seasonal space heating efficiency (Heating only indoor unit)	Space heating (Average climate) 35°C	Class				A+++		
		Efficiency	177			186		
		SCOP	4.51			4.71		
	Space heating (Average climate) 55°C	Class				A++		
		Efficiency				140		
		SCOP	3.58			3.57		
Seasonal space heating efficiency (Reversible indoor unit)	Space heating (Average climate) 35°C	Class				A+++		
		Efficiency				180		
		SCOP				4.57		
	Space heating (Average climate) 55°C	Class				A++		
		Efficiency				142		
		SCOP	3.62			3.63		
COP	Heating ^(e/f)		4.86 / 3.70			4.50 / 3.56		
EER	Cooling ^(c/d)		4.13 / 2.70	4.11 / 2.69	4.09 / 2.68	4.13 / 2.70	4.11 / 2.69	4.09 / 2.68
Operation range	Heating	°C	-28 to +35					
	Cooling	°C	+10 to +43					
	Hot water	°C	-28 to +35					
Sound pressure / power level	Heating	dBA	43 / 54		48 / 54	43 / 54		48 / 54
	Cooling	dBA	43 / 54		48 / 54	43 / 54		48 / 54
Refrigerant charge	R-32	kg	4.2					
Water connections (Diameter)			1" (Male)					
Max piping length OU to IU ^[2]		m	10 ^[2]					
Power supply			1-phase / 230V / 50Hz			3-phase / 400V / 50Hz		
Recommended fuses	A		32			16		

Notes: Nominal capacity and nominal input tested according to EN 14511
 Heating (a): Ambient air temperature -2°CDB and leaving water temperature 55°C (A-2/W55). Heating (b): Ambient air temperature -2°CDB and leaving water temperature 65°C (A-2/W65)
 Cooling (c): Ambient air temperature 35°C and leaving water temperature 18°C (A35/W18). Cooling (d): Ambient air temperature 35°C and leaving water temperature 7°C (A35/W7)
 Heating (e): Ambient air temperature 7°CDB and leaving water temperature 35°C (A7/W35). Heating (f): Ambient air temperature 7°CDB and leaving water temperature 45°C (A7/W45)
 Sound pressure / power measured according to EN 12102 under conditions of EN 14825
^[1] Excludes aesthetic grill
^[2] Spare pump capacity can be utilised to extend the interconnecting pipe length using the Daikin pipe sizing tool.