



Armstrong House
3 Basset Avenue
Southampton
SO16 7DP
T: 02381 555000

**PROPOSED HOUSING DEVELOPMENT
READING GOLF CLUB SITE**

ASHP NOISE IMPACT ASSESSMENT

Technical Report: R10003-1 Rev 0

Date: 27th April 2023

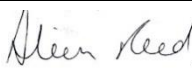
For: Vistry Thames Valley
550 Oracle Parkway,
Thames Valley Park,
Reading,
RG6 1PT

24 Acoustics Document Control Sheet

Project Title: Proposed Housing Development Reading Golf Club –
ASHP Impact Noise Assessment

Report Ref: R10003-1 Rev 0

Date: 27th April 2023

	Name	Position	Signature	Date
Prepared by	Aileen Reed BEng MIOA	Principal Consultant		27/04/2023
Reviewed by	Reuben Peckham BEng MPhil CEng MIOA	Principal Consultant		27/04/2023
Approved by	Reuben Peckham BEng MPhil CEng MIOA	Principal Consultant		27/04/2023
For and on behalf of 24 Acoustics Ltd				

Document Status and Approval Schedule

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0	Approved for issue	Aileen Reed	Reuben Peckham	Reuben Peckham

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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 Reading Golf Club.
- 1.2 Condition 23 of the planning consent requires an assessment of the noise impact from air source heat pumps (ASHP) which will be utilised in some parts of the site.
- 1.3 This report presents the results of the assessment undertaken in April 2023.
- 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 SITE DESCRIPTION & PLANNING CONDITION

- 2.1 Condition 23 of the planning consent (Reading BC Planning Reference 211843) states the following:

"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 demonstrate, with details of mitigation as necessary, that the L_{Aeq} noise from the plant as measured at a point 1 metre external to the nearest noise-sensitive façade shall not exceed 42 dB when all plant/equipment (or any part of it) located within the immediate vicinity is in operation at any time in line with MCS Planning Standards for Permitted Development Installations of Wind Turbines and Air Source Heat Pumps on Domestic Premises."

- 2.2 This assessment focusses on plots within the part of the site where the greatest density of ASHP occurs and a site layout plan for this part of the site is shown in Figure 1.
- 2.3 The air source heat pump proposed for use at this site is the 4 kw Daikin Monobloc LT (EDLA04EV3).

3.0 NOISE ASSESSMENT

MCS 020

3.1 MCS Planning Standards for Permitted Development Installations of Wind Turbines and Air Source Heat Pumps on Domestic Premises, [Reference 1] 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. To calculate the sound pressure from the ASHP it 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.

3.2 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.

3.3 The method is significantly cruder than the methods we would normally use to assess noise impacting residential properties. In particular it takes no account of directivity from the fan of the ASHP itself (which is the variation in noise level at different directions away from the noise source).

3.4 Acoustic Noise Measurements of Air Source Heat Pumps (EE0124, Department of Energy & Climate Change) [Reference 2] provides details of noise surveys undertaken on a variety of ASHPs in a number of different environments. From this document, for ASHPs similar to the type proposed for use here, typical directivity values of -2 to -5 dB have been determined to the top and sides of the ASHP relative to a position in front of the fan. On that basis, for the purposes of this assessment, a directivity factor of -3 dB has been assumed.

Noise Assessment

3.5 The site layout has been reviewed and plots at greater risk of noise from neighbouring ASHP have been identified. These have included:

- Plot 218 in the terrace of town houses to the east of the site: an ASHP is located immediately adjacent to the boundary garden fence on both sides of this plot;

- Plot 217 in the terrace of town houses to the east of the site: one ASHP located immediately adjacent to the boundary garden fence and the other on the far side of the neighbouring plot;
- Plot 205 – a mid-terrace house: one ASHP located immediately adjacent to the boundary garden fence and the other on the far side of the neighbouring plot;
- Atkins type semi-detached houses which occur at various plots including Plots 10 – 13 & Plots 19 - 22;
- Blackthorn type semi-detached houses which occur at Plots 6 & 7.

3.6 Manufacturer's noise data for the ASHP in has been obtained and is summarised in Table 1 below.

	Sound Power Level (dB) re 10 ⁻¹² W, dBA
Standard Model	
Maximum Day	60
Maximum Night	54
Low Noise Model	
Maximum Day	59
Maximum Night	52

Table 1 - Sound Power Levels for EDLA04EV3 Air Source Heat Pump

3.7 Figures 2 – 6 show the arrangement of neighbouring ASHPs relative to the rear of each plot considered along with a summary of the MCS 020 calculation. The calculations take into account the 1.8m high boundary garden fences which will be utilised between plots.

3.8 The calculations indicate that the low noise model ASHP will be required in the following circumstances:

- At any terraced or semi-detached property where there are two immediately adjacent neighbouring ASHPs such as Plot 205 and Plot 218;
- For semi-detached properties with a single neighbouring ASHP where the horizontal distance between the ASHP and the assessment position is less than 3 m such as Atkins type semi-detached houses.

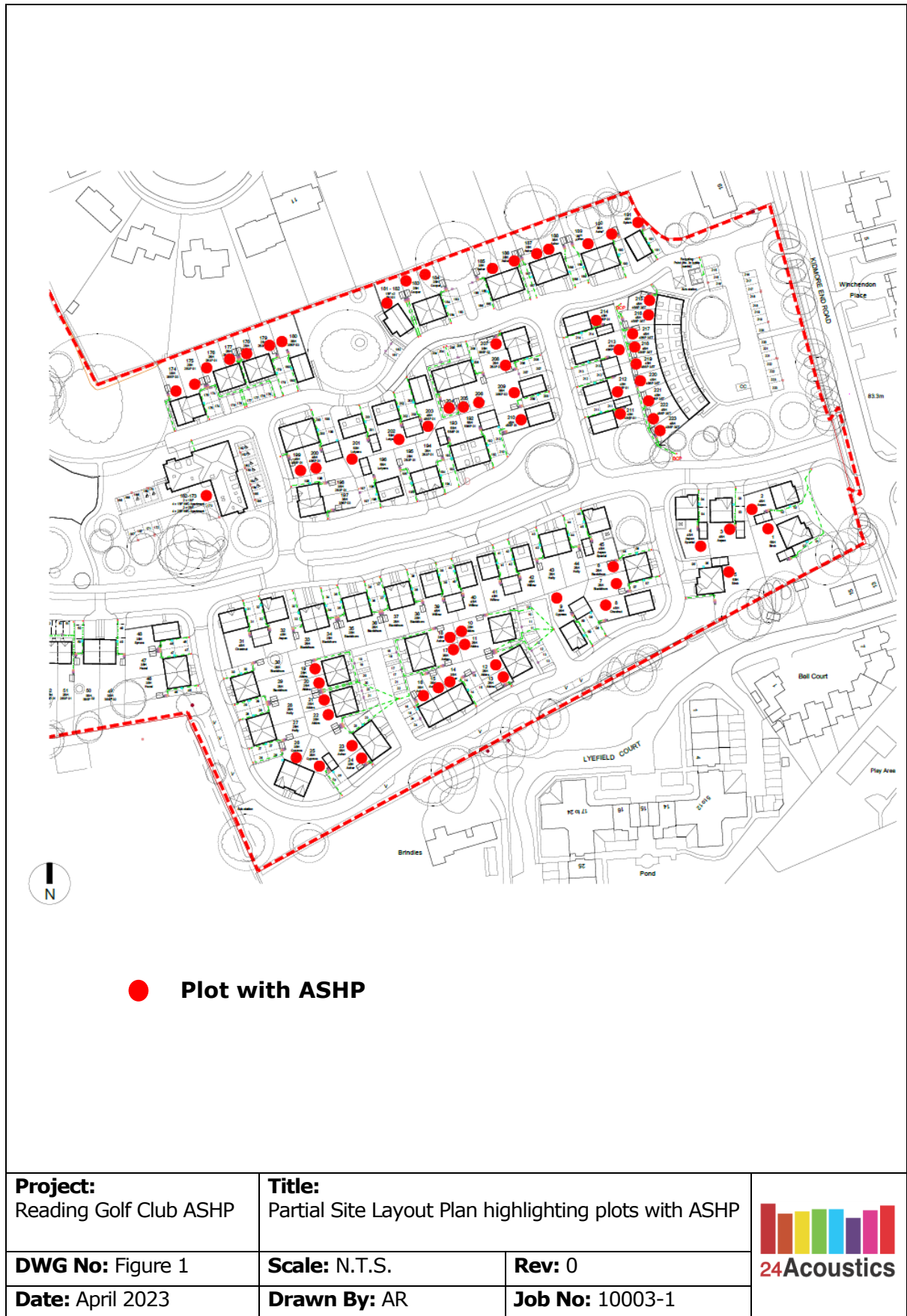
3.9 For semi-detached houses where the horizontal distance between the ASHP and the assessment position is 3 m or greater and for all detached properties, the standard model ASHP is appropriate for use.

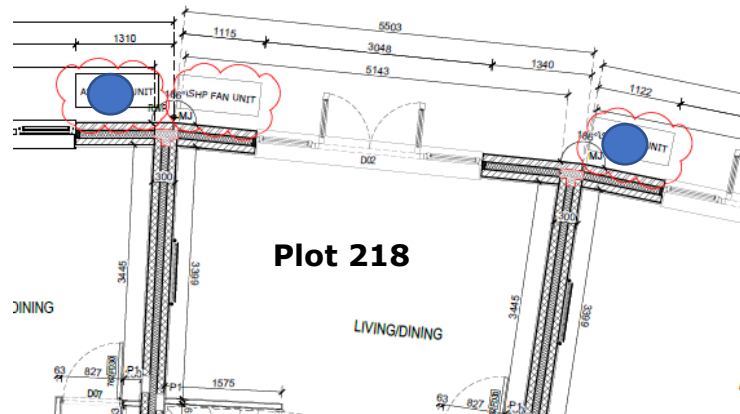
4.0 CONCLUSIONS

- 4.1 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 Reading Golf Club.
- 4.2 Condition 23 of the planning consent requires an assessment of noise from air source heat pumps which will be utilised in some parts of the site.
- 4.3 The calculations indicate that the low noise model ASHP will be required in the following circumstances:
- At any terraced or semi-detached property where there are two immediately adjacent neighbouring ASHPs such as Plot 205 and Plot 218;
 - For semi-detached properties with a single neighbouring ASHP where the horizontal distance between the ASHP and the assessment position is less than 3 m such as Atkins type semi-detached houses.
- 4.4 For semi-detached houses where the horizontal distance between the ASHP and the assessment position is 3 m or greater and for all detached properties, the standard model ASHP is appropriate for use.
- 4.5 On the basis of the above, the development will comply with Condition 23 of the planning consent (Reading BC Planning Reference 211843).

REFERENCES

1. MCS 020, MCS Planning Standards for Permitted Development Installations of Wind Turbines and Air Source Heat Pumps on Domestic Premises, Issue 1.3
2. DEFRA. Noise Policy Statement for England, 2010.



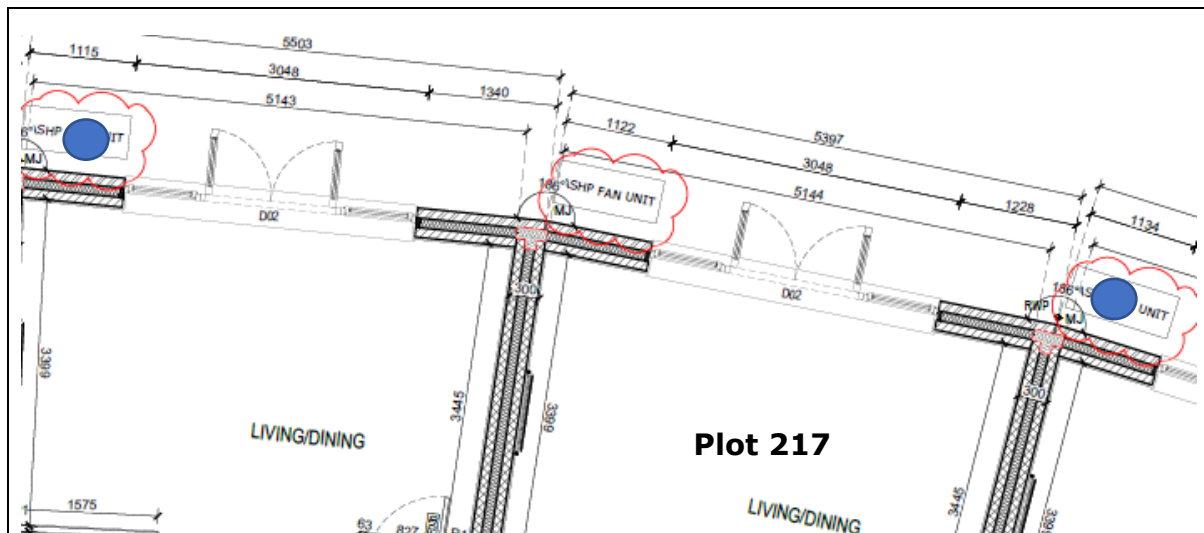


Plot 218		
ASHP 1	Day	Night
Sound Power Level (dB)	59	52
Sound Pressure Level (dB)	Q8 - 3 reflective surfaces	Q8 - 3 reflective surfaces
Distance from heat pump, m	3	4
dB Distance Reduction	-11	-14
Barriers	Barrier (no view)	Barrier (partial view)
Directivity of heat pump	-3	-3
SPL @ assessment position	35	30
ASHP 2		
Sound Power Level (dB)	59	52
Sound Pressure Level (dB)	Q8 - 3 reflective surfaces	Q8 - 3 reflective surfaces
Distance from heat pump to as	3	4
dB Distance Reduction	-11	-14
Barriers	Barrier (no view)	Barrier (no view)
Directivity of heat pump	-3	-3
SPL @ assessment position	35	30
Total both ASHP	38	33
Background noise level (dB)	40	40
Final Result Both ASHP, dB	42	41
	PASS	PASS
	LOW NOISE MODEL REQUIRED	



Neighbouring ASHPs

Project: Reading Golf Club ASHP	Title: Plot 218 ASHP noise assessment		 24Acoustics
DWG No: Figure 2	Scale: N.T.S.	Rev: 0	
Date: April 2023	Drawn By: AR	Job No: 10003-1	

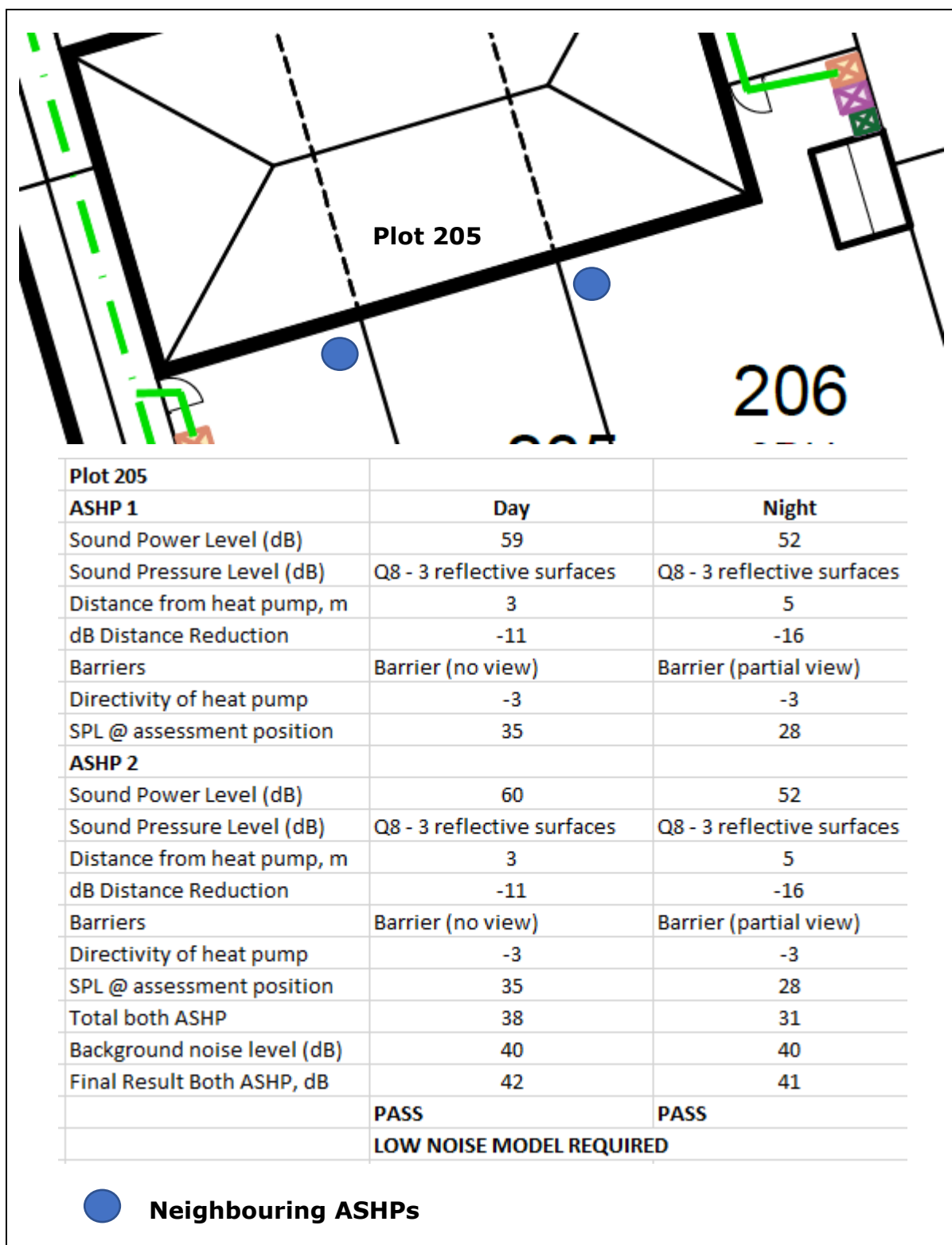


Plot 217		
ASHP 1	Day	Night
Sound Power Level (dB)	60	54
Sound Pressure Level (dB)	Q8 - 3 reflective surfaces	Q8 - 3 reflective surfaces
Distance from heat pump, m	3	5
dB Distance Reduction	-11	-16
Barriers	Barrier (no view)	Barrier (partial view)
Directivity of heat pump	-3	-3
SPL @ assessment position	36	30
ASHP 2		
Sound Power Level (dB)	60	54
Sound Pressure Level (dB)	Q8 - 3 reflective surfaces	Q8 - 3 reflective surfaces
Distance from heat pump to as	8	8
dB Distance Reduction	-20	-20
Barriers	Barrier (no view)	Barrier (partial view)
Directivity of heat pump	-3	-3
SPL @ assessment position	27	26
Total both ASHP	36.5	31.5
Background noise level (dB)	40	40
Final Result Both ASHP, dB	42	41
	PASS	PASS
	STANDARD MODEL REQUIRED	

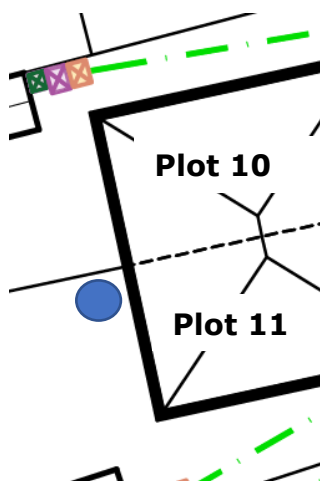


Neighbouring ASHPs

Project: Reading Golf Club ASHP	Title: Plot 217 ASHP noise assessment		 24Acoustics
DWG No: Figure 3	Scale: N.T.S.	Rev: 0	
Date: April 2023	Drawn By: AR	Job No: 10003-1	



Project: Reading Golf Club ASHP	Title: Plot 205 ASHP noise assessment		 24Acoustics
DWG No: Figure 4	Scale: N.T.S.	Rev: 0	
Date: April 2023	Drawn By: AR	Job No: 10003-1	

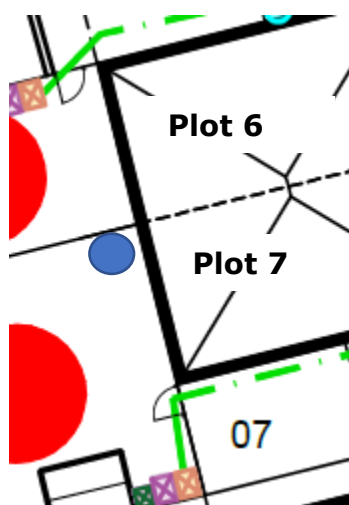


Plot 10 Atkins		
ASHP	Day	Night
Sound Power Level (dB)	59	52
Sound Pressure Level (dB)	Q8 - 3 reflective surfaces	Q8 - 3 reflective surfaces
Distance from heat pump, m	2	5
dB Distance Reduction	-8	-16
Barriers	Barrier (no view)	Barrier (partial view)
Directivity of heat pump	-3	-3
SPL @ assessment position	38	28
Background noise level (dB)	40	40
Final Result, dB	42	40
	PASS	PASS
	LOW NOISE MODEL REQUIRED	



Neighbouring ASHP

Project: Reading Golf Club ASHP	Title: Atkins House-type ASHP noise assessment		 24Acoustics
DWG No: Figure 5	Scale: N.T.S.	Rev: 0	
Date: April 2023	Drawn By: AR	Job No: 10003-1	



Plot 6 Blackthorn		
ASHP	Day	Night
Sound Power Level (dB)	60	54
Sound Pressure Level (dB)	Q8 - 3 reflective surfaces	Q8 - 3 reflective surfaces
Distance from heat pump, m	3	5
dB Distance Reduction	-11	-16
Barriers	Barrier (no view)	Barrier (partial view)
Directivity of heat pump	-3	-3
SPL @ assessment position	36	30
Background noise level (dB)	40	40
Final Result, dB	42	40
	PASS	PASS
	STANDARD MODEL REQUIRED	



Neighbouring ASHP

Project: Reading Golf Club ASHP	Title: Blackthorn House-type ASHP noise assessment		 24Acoustics
DWG No: Figure 6	Scale: N.T.S.	Rev: 0	
Date: April 2023	Drawn By: AR	Job No: 10003-1	

APPENDIX A NOISE 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 dB(A) weighting. This is an internationally accepted standard for noise measurements.

For variable sources, such as traffic, a difference of 3 dB(A) is just distinguishable. In addition, a doubling of traffic flow will increase the overall noise by 3 dB(A). The 'loudness' of a noise is a purely subjective parameter, but it is generally accepted that an increase/ decrease of 10 dB(A) 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 interval, 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.