Acoustic Assessment of Proposed Mechanical Equipment

45 Flask Walk, London NW3 1HH

Client: Osman Ozsan

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-	03/05/2023	Samuel Thorpe BA (Hons)	Rob Cant MIOA MIEnvSc

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Head Office
12 Sheep Street
Highworth
Wiltshire
SN6 7AA

Tel: 01793 766 324

London
3 Shortlands
Hammersmith
London
W6 8DA

Tel: 0203 609 8733

Manchester
Colony
5 Piccadilly Place
Manchester
M1 3BR

Tel: 0161 327 1681

Email: info@aca-acoustics.co.uk

Website: www.aca-acoustics.co.uk

Registered in England & Wales No: 08228154

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0. SUMMARY

0.1. ACA Acoustics Limited has been commissioned to assess the acoustic impact of a proposed new air source heat pump to be installed at 45 Flask Walk, London.

0.2. The assessment is required to provide evidence that noise emissions from the equipment will not be detrimental to the amenity of nearby noise-sensitive properties and complies with the Local Authority's requirements.

0.3. A survey has been carried out in the vicinity to establish existing background sound levels. The background sound levels during the most sensitive time of the proposed operating hours are LA90 38dB at the monitoring position. Based on London Borough of Camden Council's criteria, noise from the new plant should not exceed a rating level of 28dBA outside the closest noise-sensitive windows.

0.4. The most noise-sensitive residential receptor (NSR) has been assessed as the rear, first floor windows of 43 Flask Walk, London.

0.5. Calculations using manufacturer's sound level data for the new equipment, allowing for the recommendations as set out in this report, confirm that the sound level from the new equipment at the receptor is LAr 27dB at the receptor.

0.6. Noise from the proposed equipment will not be disturbing or detrimental to the amenity of any nearby residential or other noise-sensitive receptors and complies with the planning requirements of London Borough of Camden Council.

1. INTRODUCTION

A new external air source heat pump is to be installed at 45 Flask Walk, London.

ACA Acoustics Limited has been commissioned by Osman Ozsan to carry out an assessment of noise emissions from the proposed mechanical plant and, where necessary, to make recommendations for a mitigation scheme to ensure that the amenity of nearby noise-sensitive properties is not compromised.

This report presents results of the sound level survey, computer modelling, and assessment.

2. ACOUSTIC CRITERIA

London Borough of Camden Council's policies relating to noise are set out in Appendix 3 of the Local Plan, which provides detailed noise thresholds to determine the potential acoustic impact of new developments.

In Summary, London Borough of Camden requires an assessment to be carried out in accordance with British Standard 4142:2014+A1:2019.

The scope of BS 4142:2014+A1:2019 advises that "*this British Standard describes methods for rating and assessing sound of an industrial and/or commercial nature … to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident*". BS 4142:2014+A1:2019 is commonly used to assess the potential for loss of amenity due to noise from mechanical services equipment and is considered appropriate for this application.

The assessment method of BS 4142:2014+A1:2019 corrects the specific sound level from the source under investigation to account for characteristics that could make the sound more intrusive to obtain a rating level. This rating level is compared against the prevailing background sound level outside the noise-sensitive property. Section 11 of BS 4142:2014+A1:2019 provides a commentary of the assessment result and advises that:

a) *Typically, the greater this difference* [between the rating level and the background sound level]*, the greater the magnitude of the impact.*
b) *A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.*
c) *A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context.*
d) *The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact.*

Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

Rather than use the assessment of the impacts from the Standard, Camden requires that the calculated rating level is compared against noise-related conditions set out in Table C of the Appendix, as shown in Table 1 below:

Existing Noise Sensitive Receptor	Assessment Location	Design Period	LOAEL (Green)	LOAEL to SOAEL (Amber)	SOAEL (Red)
Dwellings	Garden used for main amenity (free field) and outside living or dining or bedroom window (façade)	Day	Rating level 10dB below background	Rating level between 9dB below and 5dB above background	Rating level greater than 5dB above background
Dwellings	Outside bedroom window (façade)	Night	Rating level 10dB below background and no events exceeding 57dB LAmax	Rating level between 9dB below and 5dB above background or noise events between 57dB and 88dB LAmax	Rating level greater than 5dB above background and/or events exceeding 88dB LAmax

Table 1: London Borough of Camden Noise Limits

The terms "LOAEL" and "SOAEL" are defined as the "Lowest Observed Adverse Effect Level" and "Significant Observed Adverse Effect Level" in the Planning Practice Guidance – Noise (PPG-N) and Noise Policy Statement for England (NPSE). The NPSE and PPG-N both require that significant adverse impacts are avoided and that where the impact lies somewhere between the LOAEL and SOAEL all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life, whilst considering the guiding principles of sustainable development as set out in the National Planning Policy Framework.

Assessment result criteria shown within Appendix A of Camden's Local Plan are more stringent than those set out in the British Standard and can therefore be taken to ensure a robust assessment. Compliance with the "Green" criteria or lower half of the "Amber" range will generally ensure no loss of amenity to nearby residents.

In this assessment, a criterion of rating level 10dB below the representative background level will be used.

3. REVIEW OF SITE LOCATION

New mechanical equipment, comprising of an air source heat pump is being installed at the far end of the rear garden of 45 Flask Walk, facing the property.

The most noise-sensitive residential receptor (NSR) has been assessed as the rear, first floor windows of 43 Flask Walk, which overlook the garden in which the equipment will be installed, indicated by the NSR1 label below.

A marked-up aerial image is included in Figure 1, identifying the location of the proposed equipment and sound level survey measurement position.

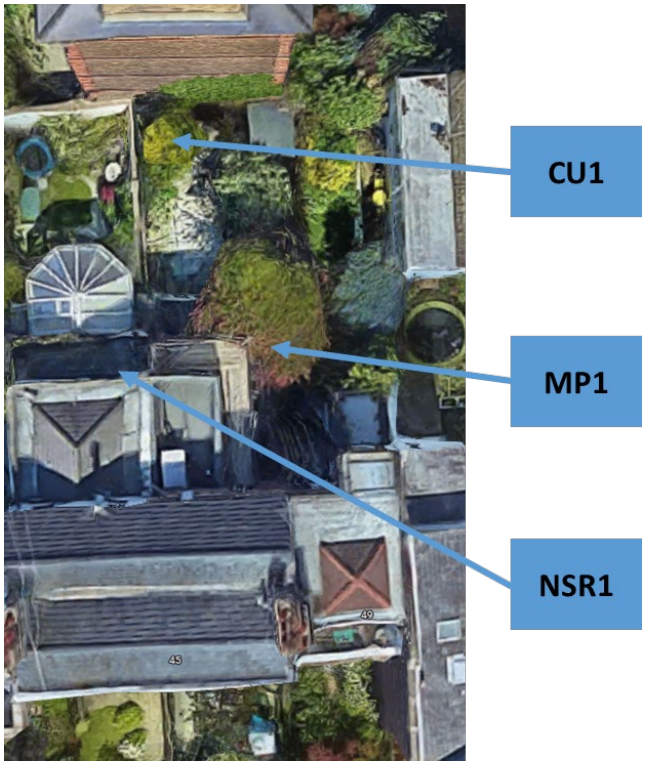

Figure 1: Equipment location, measurement position, and closest receptor (available at google.com/maps)

Proposed operating times of the equipment are presumed to be potentially 24 hours a day.

4. SOUND LEVEL SURVEY

To assess sound levels from the new mechanical equipment, it is necessary to establish representative background sound levels in the vicinity during the proposed plant operating times.

The background sound level was measured via an unattended survey at the position indicated in Figure 1. This position was considered as being representative of the NSR1 receptor. The survey was set up by Sam Thorpe of ACA Acoustics and conducted between the 30th and 31st March 2023.

The microphone was set up in the rear garden. This will provide a comparable amount of screening from road noise as can be expected at NSR1.

During the survey, the soundscape in the vicinity was influenced predominantly by local and distant road traffic.

The following equipment was used during the survey. An on-site calibration check was conducted on the sound level meter prior to the survey and repeated after with no deviation noted.

Equipment	**Serial Number**
Rion Class 1 sound level meter type NL-52, complete with weatherproof and lockable outdoor environmental kit	00564867
Svantek calibrator type SV33B. Compliant to IEC 60942-1:2003	83826

Table 2: Equipment used for the sound level survey

Weather conditions at the time of setting up the survey were warm, still and dry and were dry overnight. Some rain was noted when collecting the survey, however due to the most sensitive period of operation being identified at 23:00-07:00, this is not expected to have impacted the data used in this assessment. Weather conditions have been reviewed at www.worldweatheronline.com, using the closest available commercial weather station. Weather conditions remained predominantly calm and dry with wind speeds below recommended limits during the proposed equipment operation times. Meteorological conditions are considered acceptable and will not have adversely impacted the survey results.

Results of the survey are shown in graphical form in Figure 2 below.

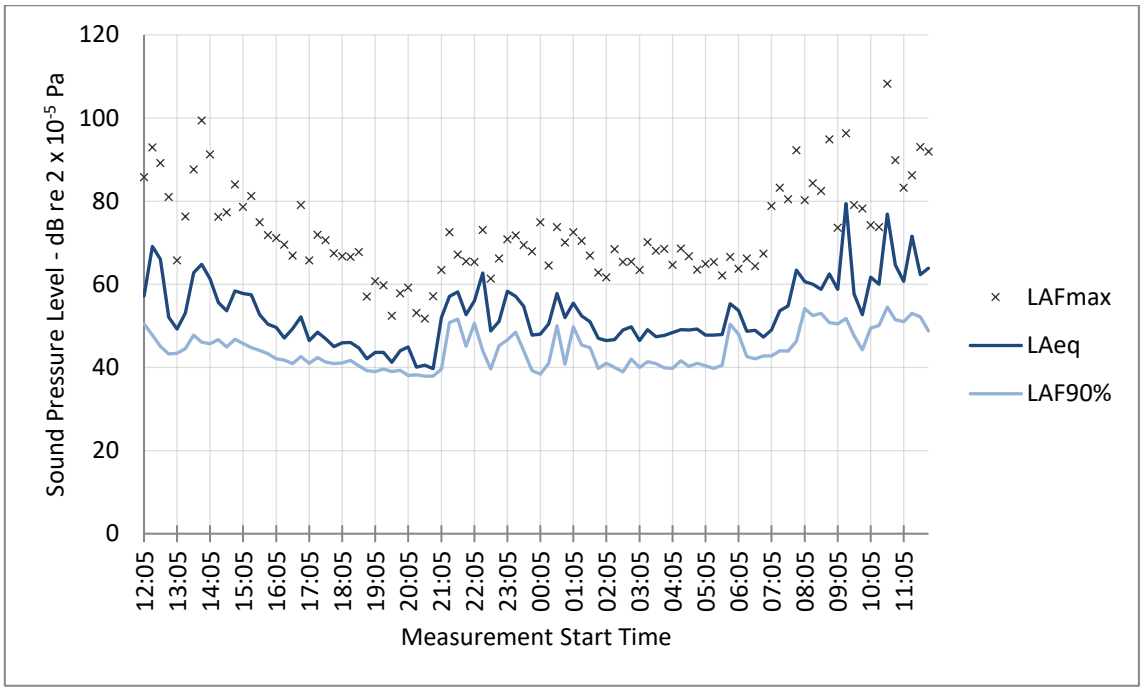

Figure 2: Sound level survey results – 30th – 31st March 2023

In accordance with the methodology set out in BS 4142:2014+A1:2019, the background sound level is not necessarily the lowest recorded value. Instead, the background sound level should be a level which is representative of the underlying soundscape at the receptor location.

A statistical analysis of the measured LA90 results during the most sensitive proposed operating times of the equipment is shown in Figure 3 below, following guidance set out in the Standard.

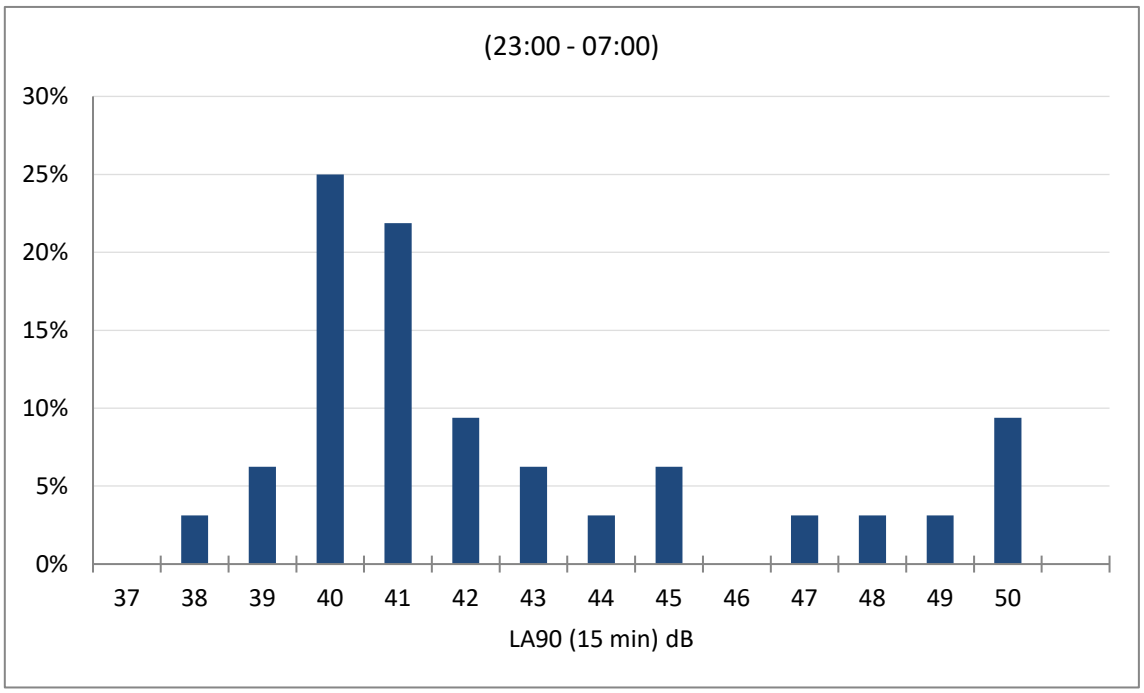

Figure 3: Statistical analysis of measured LA90 sound levels during the assessment period

Based on the statistical analysis of the survey results, the author considers a level of LA90 40dB is representative of the background sound level in the vicinity.

However, the graph suggests that mechanical equipment or other unidentified sources switch on around 21:00 hours and continue for much of the night-time period. As the survey was unattended it is not possible to identify the source of the noise. Because this noise source cannot be confirmed, it could be atypical and so the lowest measured value over the measured period will be used to inform the criterion, rather than the representative value. The lowest measured background sound level over the survey was LA90 38dB, meaning a criterion of LAr 28dB will be targeted.

Summary results of the survey are provided in Table 3 below.

Receptor	Period	Background Sound Level During Operating Period LA90
NSR1	23:00 – 07:00	38dB

Table 3: Summary sound level survey results

5. ACOUSTIC ASSESSMENT

The development includes the installation of a new air source heat pump. Confirmation of the equipment model used in the assessment is provided in Table 4 below.

Description	Equipment Model	Sound Level (LwA)	Quantity
ASHP1	Aermec BHP120	68dB	1

Table 4: Proposed new mechanical equipment used in the assessment

A computer model has been used to calculate the noise contribution from the proposed plant to outside nearest noise-sensitive windows, using manufacturer's published sound data for the proposed new plant. Environmental corrections have been calculated in accordance with ISO 9613-2.

The assessment has been undertaken using drawing reference *22024/MSK/101 HP*, as provided by the client.

Mitigation recommendations outlined in Section 6 of this report are included in the computer model.

The cumulative calculated specific sound level to outside the most sensitive receptors with all equipment operating is shown in Table 5 below. Summary printouts from the calculation models are included in Appendix A.

Receptor Location	Calculated Equipment Sound Level (All Plant Operating)
NSR1	27dBA

Table 5: Calculated cumulative equipment sound levels at 1m outside noise-sensitive windows

Assessment of the calculated rating levels in accordance with BS 4142:2014+A1:2019 is provided in Table 6 below.

Description	NSR1 Receptor (All Plant)	Relevant Clause	Commentary
Calculated specific sound level to receptor	LAeq 27dB	7.1 7.3.6	New equipment operating. Refer to calculation sheets in Appendix A.
Background sound level	LA90 38dB	8.1.3 8.3	Measured lowest background sound level.
Acoustic feature correction	0dB	9.2	The calculated specific sound levels do not indicate any distinctive component and the equipment will be significantly below the background and residual sound levels.
Rating level	LAr 27dB	9.2	
Excess of rating level over background sound level	-11dB	11	Assessment indicates negligible likelihood of adverse impact

Table 6: Assessment of results in accordance with BS 4142:2014+A1:2019

Table 6 shows the rating level of the proposed new equipment will be at least 10dB below the background LA90 sound level to outside the closest noise-sensitive properties.

BS 4142:2014+A1:2019 requires an assessment to consider the context of the development, in addition to adhering to numerical values. Considering the calculated numerical value of the specific sound, allowing a reduction through partially open windows of 15dBA, as recommended in BS 8233:2014, sound levels inside the neighbouring dwellings due to the proposed new equipment will be approximately 12dBA (27dBA – 15dBA). This is significantly below guideline levels for sleeping in bedrooms of LAeq 30dB, set out in BS 8233:2014 and is further confirmation that sound levels from

the new mechanical equipment should not be detrimental to the amenity of any noise-sensitive receptors in the vicinity.

The author considers that the context of the assessment does not alter the initial estimate of the impact, and that sound levels from the new mechanical equipment should not be detrimental to the amenity of any residential occupiers in the vicinity.

6. ACOUSTIC MITIGATION TREATMENTS

As discussed in Section 5, the calculations include the benefit of noise control treatments. Details of suitable noise mitigation measures are included below.

6.1. Acoustic Louvred Enclosure

It is advised that the ASHP is installed in an acoustic louvred enclosure. A suitable louvred enclosure would typically be formed from 150mm deep acoustic louvres such as Allaway Acoustic's AL1515 model or equivalent. Minimum insertion loss performance for the enclosure is shown on the schedule in Appendix B.

Structural supports/steelwork and access panels or doors may be required and should be determined by the successful supplier accordingly.

7. CONCLUSION

A planning application is to be submitted for the installation of new mechanical plant and equipment at 45 Flask Walk, London.

ACA Acoustics have undertaken an assessment of noise from the proposed equipment using manufacturer's published acoustic data. Calculated rating sound levels for the plant is at least 10dB below the background sound level during proposed operating times of the equipment when assessed at 1m from the closest noise-sensitive windows of residential receptors.

The author considers that allowing for the proposed mitigation scheme in this report, the proposed equipment achieve the Local Authority's planning requirements for this development and will not be detrimental to the amenity of nearby noise-sensitive occupants.

Appendix A

Acoustic Calculations

Calculation Sheet

ASHP1 to NSR1

	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Noise Source								
Noise Source - ASHP1								
Noise Levels	**76.0**	**72.0**	**68.0**	**68.0**	**59.0**	**57.0**	**55.0**	**53.0**
Noise Control Treatments								
Treatment - Louvred Enclosure								
	-4.0	*-4.0*	*-5.0*	*-8.0*	*-12.0*	*-16.0*	*-15.0*	*-13.0*
Dc - Condenser Directivity								
	3.0	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*
Adiv - Geometrical Divergance								
	-31.4	*-31.4*	*-31.4*	*-31.4*	*-31.4*	*-31.4*	*-31.4*	*-31.4*
Aatm - Atmospheric Absorption								
	0.0	*0.0*	*0.0*	*0.0*	*0.0*	*-0.1*	*-0.3*	*-1.2*
Agr - Ground Attenuation								
	3.0	*1.4*	*0.1*	*-0.1*	*1.1*	*1.5*	*1.5*	*1.5*
Abar - Barrier Attenuation								
	-7.8	*-6.2*	*-4.9*	*-4.7*	*-6.1*	*-6.6*	*-6.9*	*-7.4*
External Receiver								
External Receiver - NSR1								
Sound Pressure, Lp:	**38.8**	**34.8**	**29.8**	**26.8**	**13.7**	**7.4**	**5.9**	**4.5**

ACA Acoustics Limited
Head Office: 12 Sheep Street, Highworth, Wiltshire, SN6 7AA Tel: 01793 766 324
London Office: 3 Shortlands, Hammersmith, London, W6 8DA Tel: 0203 609 8733
Manchester Office: Colony, 5 Piccadilly Place, Manchester, M1 3BR Tel: 0161 327 1681
w: www.aca-acoustics.co.uk

Appendix B

Noise Control Treatments

45 Flask Walk, London

Schedule of Noise Control Treatments

Reference	Location	Description	Insertion Losses (dB)							
			63	125	250	500	1k	2k	4k	8k
Louvred Enclosure	ASHP1	AL1515	4	4	5	8	12	16	15	13

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Head Office: 12 Sheep Street, Highworth, Wiltshire, SN6 7AA
London Office: 3 Shortlands, Hammersmith, London, W6 8DA
w: www.aca-acoustics.co.uk

Tel: 01793 766 324
Tel: 0203 609 8733