

Acoustic Assessment of Proposed New Mechanical Services Equipment

31 South Hill Park, London NW3 2ST



Client: Mark Sutcliffe

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0. SUMMARY

- 0.1. ACA Acoustics Limited has been commissioned to assess the acoustic impact of proposed new mechanical services equipment to be installed at 31 South Hill Park, 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 27dB at the monitoring position. Based on the London Borough of Camden Council's criteria, noise from the new plant should not exceed a rating level of 32dBA outside the closest noise-sensitive windows to achieve a 'Amber' sound rating level.
- 0.4. The most noise-sensitive residential receptor (NSR) has been assessed as the rear, ground floor windows of 29 South Hill Park.
- 0.5. Calculations using manufacturers' 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. This achieves the 'Amber' noise category level as defined by local authority guidelines.
- 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 the London Borough of Camden Council.

1. INTRODUCTION

New mechanical services equipment is to be installed at 31 South Hill Park, London as part of a residential AC system.

ACA Acoustics Limited has been commissioned by Mark Sutcliffe 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. Specifically, due to the low background levels in the area, the

author considers that a criterion of 5dB below the representative background level will be sufficient to protect the amenity of neighbouring residents.

3. REVIEW OF SITE LOCATION

New mechanical equipment, comprising of one air source heat pump (ASHP), is being installed with a condenser in the rear courtyard area at high ground floor level.

The most noise-sensitive residential receptor (NSR) has been assessed as the rear, first floor windows of 29 South Hill Park, 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](https://www.google.com/maps))

Proposed operating times of the equipment are understood 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 Message of ACA Acoustics and conducted between the 12th and 13th September 2024.

The microphone was positioned in the rear courtyard of the site, adjacent to both the receptor and the condenser location.

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

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
Svantek Class 1 sound level meter type SVAN 971 with weatherproof outdoor environmental kit	28263
Svantek calibrator type SV33B. Compliant to IEC 60942-1:2003	10436

Table 2: Equipment used for the sound level survey

Weather conditions at the time of setting up the survey were cloudy and warm with light winds and dry ground conditions. 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.

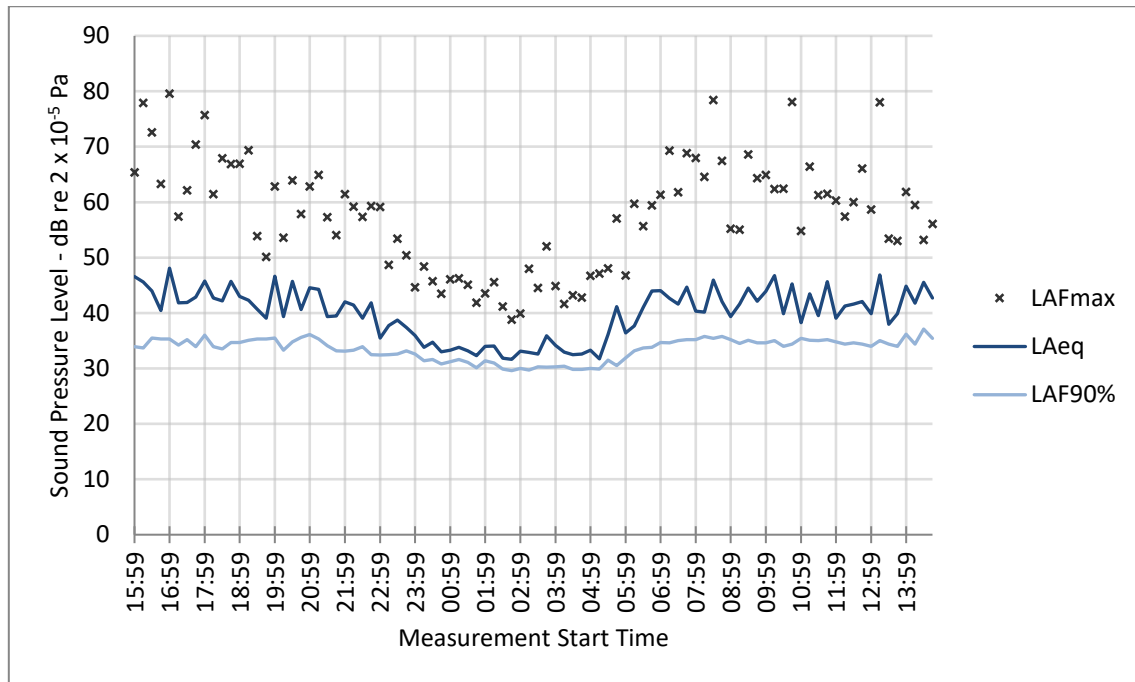


Figure 2: Sound level survey results – 12th to 13th September 2024

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.

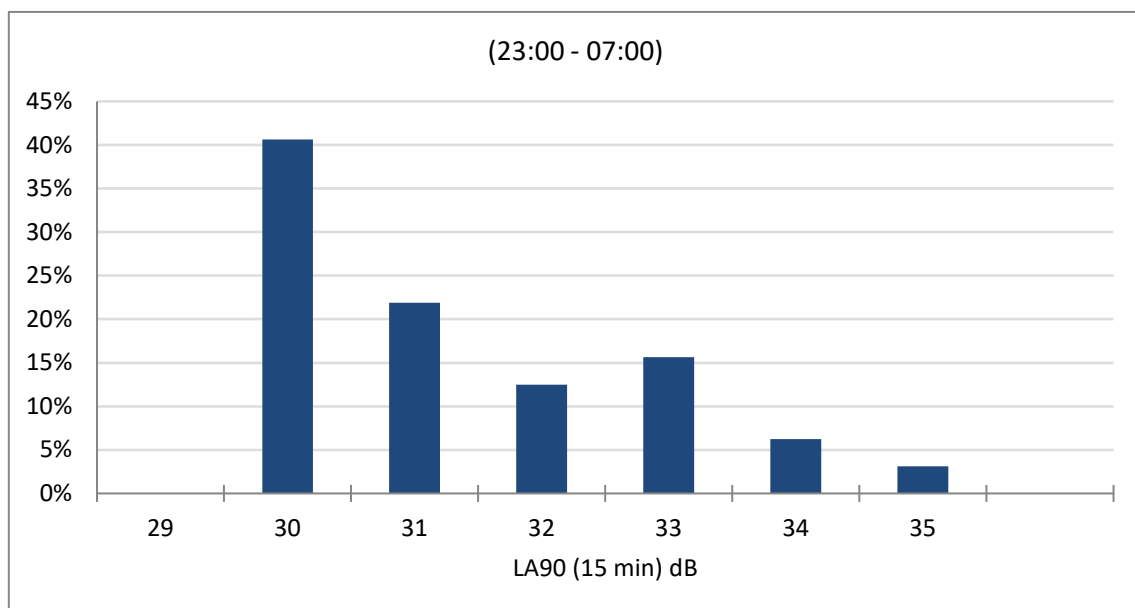


Figure 3: Statistical analysis of measured LA90 sound levels during the assessment period

The raw data shown above was measured at 1m from the façade of a building and, as such, should be subject to a -3dB penalty in order to account for the accumulation of reflections from the façade, as suggested in BS 4142:2014+A1:2019.

Based on the statistical analysis of the survey results, the author considers a level of LA90 27dB is representative of the background sound level in the vicinity.

Summary results of the survey are provided in Table 2 below.

Receptor	Period	Background Sound Level During Operating Period - LA90
NSR1	24 hours	27dB

Table 3: Summary sound level survey results

5. ACOUSTIC ASSESSMENT

The development includes the installation of new extract and supply fans. Confirmation of the equipment models used in the assessment is provided in Table 3 below.

Description	Equipment Model	Sound Level (LwA)	Quantity
ASHP	Daikin Altherma 3 ASHP - EDLA14D3V3	62dB	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 information provided by the client and measurements taken on site.

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 4 below. Summary printouts from the calculation models are included in Appendix A.

Receptor Location	Calculated Equipment Sound Level
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 5 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 27dB	8.1.3 8.3	Measured representative 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	0dB	11	Assessment indicates negligible likelihood of adverse impact

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

Table 5 shows the rating level of the proposed new equipment will be equivalent to the background LA90 sound level to outside the closest noise-sensitive properties. **This achieves the ‘Amber’ noise category level as defined in Table 1.**

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, noise control treatments have been included in the calculation model. Acoustic specification for the mitigation scheme is provided below.

6.1. Acoustic Enclosure

It is advised that an acoustic louvre is applied surrounding the condensing unit. A suitable louvred enclosure would typically be formed from 300mm deep acoustic louvres such as Allaway Acoustic's AL3015 model or equivalent. Minimum insertion loss performance for the louvres 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.

6.2. Vibration Isolators

To control the potential for structure-borne noise and vibration from the mechanical equipment affecting adjoining residential and commercial occupants, it is recommended that the plant is installed on vibration isolators.

Suitable vibration isolators for the condensers are typically rubber or neoprene turret type mounts or pads, providing minimum 8mm deflection at the working load. The isolator supplier should ensure their selection is suitable allowing for the condenser operating speed, point load, and installation location.

7. CONCLUSION

A planning application is to be submitted for the installation of new mechanical plant and equipment at 31 South Hill Park, London.

ACA Acoustics have undertaken an assessment of noise from the proposed equipment using manufacturers' published acoustic data. Calculated rating sound levels for the plant are equivalent

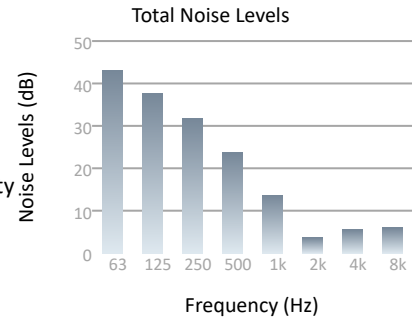
to the background sound level during proposed operating times of the equipment when assessed at 1m from the closest noise-sensitive windows of residential receptors. This achieves the 'Amber' noise category level as defined by local authority guidelines.

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

Project Name	31 South Hill Park, Hampstead
Project Reference	240901
Reference	NSR1
Description	Ground Floor Windows of neighbouring property
Noise Limit	27
Calculated Cumulative dBA	27.3



Calculated Lp at Receptor

Reference	Qty	Noise Levels (dB)								dBA
		63	125	250	500	1k	2k	4k	8k	
ASHP	1	43.1	37.6	31.7	23.7	13.7	3.7	5.5	6.0	

240901-1

Calculation Sheet

ASHP to NSR1

	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Noise Source								
Noise Source - ASHP								
Sound Power Levels	69.0	67.0	64.0	59.0	56.0	53.0	50.0	47.0
Noise Control Treatments								
Treatment - LE1								
	-5.0	-6.0	-8.0	-11.0	-18.0	-25.0	-20.0	-16.0
Dc - Condenser Directivity								
	3.4	0.9	0.0	0.0	0.0	0.0	0.0	0.0
Adiv - Geometrical Divergence								
	-27.3	-27.3	-27.3	-27.3	-27.3	-27.3	-27.3	-27.3
Aatm - Atmospheric Absorption								
	0.0	0.0	0.0	0.0	0.0	-0.1	-0.2	-0.8
Agr - Ground Attenuation								
	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Abar - Barrier Attenuation								
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
External Receiver								
External Receiver - NSR1								
Sound Pressure, Lp:	43.1	37.6	31.7	23.7	13.7	3.7	5.5	6.0

Appendix B

Noise Control Treatments

Schedule of Noise Control Treatments

Reference	Location	Description	Insertion Losses (dB)							
			63	125	250	500	1k	2k	4k	8k
LE1		AL3015	5	6	8	11	18	25	20	16