Acoustic assessment of proposed new mechanical services equipment

22 Priory Terrace, Camden, London NW6 4DH

Client: Mr & Mrs Perlman

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0. SUMMARY

0.1. ACA Acoustics Limited has been commissioned to assess the acoustic impact of a proposed new air conditioning condenser unit to be installed within the rear garden of the private dwelling located at 22 Priory Terrace, 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 requirements of London Borough of Camden Council.

0.3. A sound level survey was carried out to establish the representative background level at the adjoining property. The background sound levels measured LAF90 44dB during the daytime and LAF90 38dB during the most sensitive time of the night period.

0.4. Calculations using manufacturer's sound level data for the new air conditioning condenser unit confirm that the rating level of the new equipment to the most sensitive receptors will be LAr 26dB during the day and LAr 28dB during the night, when assessed in accordance with BS 4142:2014+A1:2019. This is at least 10dBA below the lowest measured background sound level. The calculation includes benefit of acoustic treatment at set out in this report.

0.5. Noise from the proposed new equipment will not be disturbing or detrimental to the amenity of any nearby residential occupants and no further mitigation measures would be necessary.

1. INTRODUCTION

A new air conditioning condenser unit is to be installed within the rear garden of the private dwelling located at 22 Priory Terrace, London.

ACA Acoustics Limited has been commissioned to carry out an assessment of noise emissions from the proposed mechanical plant and, where necessary, make recommendation to reduce sound levels to ensure that the amenity of nearby noise-sensitive properties is not compromised.

This report presents results of the assessment.

2. ACOUSTIC CRITERIA

Table C in Appendix 3 of Camden Council's Local Plan states that the rating level from proposed industrial and commercial developments (including plant and machinery) should not exceed 10dBA below the existing background level during both the day and the night, to achieve the 'green' criteria. In addition, at night there should be no noise events exceeding 57dBA, when assessed in accordance with British Standard BS 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 obtrusive to obtain a rating level. This rating level is compared against the prevailing background noise outside the noise-sensitive property. Section 11 provides a commentary of the assessment result and advises that:

a) *Typically the greater this difference* [between the rating level and 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.

As discussed above, it is understood that London Borough of Camden Council will require the rating level of the new equipment to be at least 10dBA below the prevailing background sound level. This is significantly more stringent than required by the Standard and will ensure there is no adverse impacts on nearby occupants.

3. REVIEW OF SITE LOCATION

A new air conditioning condenser unit is to be installed within the rear garden of a private dwelling located at 22 Priory Terrace, London.

Figure 1 below shows the location of the proposed equipment and closest residential properties, taken from Google Maps.

Figure 1: Aerial photograph showing site location and closest residential properties (Available at www.google.com/maps)

The most-affected noise-sensitive receptor has been identified as the garden (daytime – R1) and 1st floor windows (night-time – R2) to the rear façade of the adjacent residential property on Priory Terrace, overlooking the proposed equipment. The daytime receptor is around 5m from the plant

with acoustic screening provided by the intervening garden fence. The night-time receptor is around 12m from the plant with direct line of sight.

Proposed operating times of the equipment is understood to be 24 hours.

4. SOUND LEVEL SURVEY

To assess sound levels from the new mechanical equipment it is necessary to establish existing background sound levels in the vicinity. Details of the sound level survey carried out by ACA Acoustics are provided below.

An unattended sound level survey was carried out over a 24-hour period on Monday 16th November to Tuesday 17th November 2020 by Sam Message of ACA Acoustics Limited. The survey was conducted following procedures set out in BS 4142:2014+A1:2019. The background sound level survey measurement position was selected to be representative of the daytime and night-time receptors of the neighbouring residential property and is indicated in Figure 1 above.

The following equipment was used during the survey; the sound level meter was calibrated before the survey and checked after with no deviation noted.

Equipment	**Serial Number**
Svantek Class 1 sound level meter type SVAN971, complete with MOLES weatherproof and lockable outdoor environmental kit	28263
Svantek calibrator type SV33B. Compliant to IEC 60942-1:2003	10436

Table 1: Equipment used for the sound level survey

Weather conditions at the time of setting up the survey consisted of a temperature of 14°C, partly cloudy with a light breeze and dry ground conditions. Weather conditions have been reviewed at www.worldweatheronline.com, using the closest available commercial weather station and meteorological conditions are not considered to have adversely impacted the outcome of the assessment.

Results of the survey are shown in Figure 2 below.

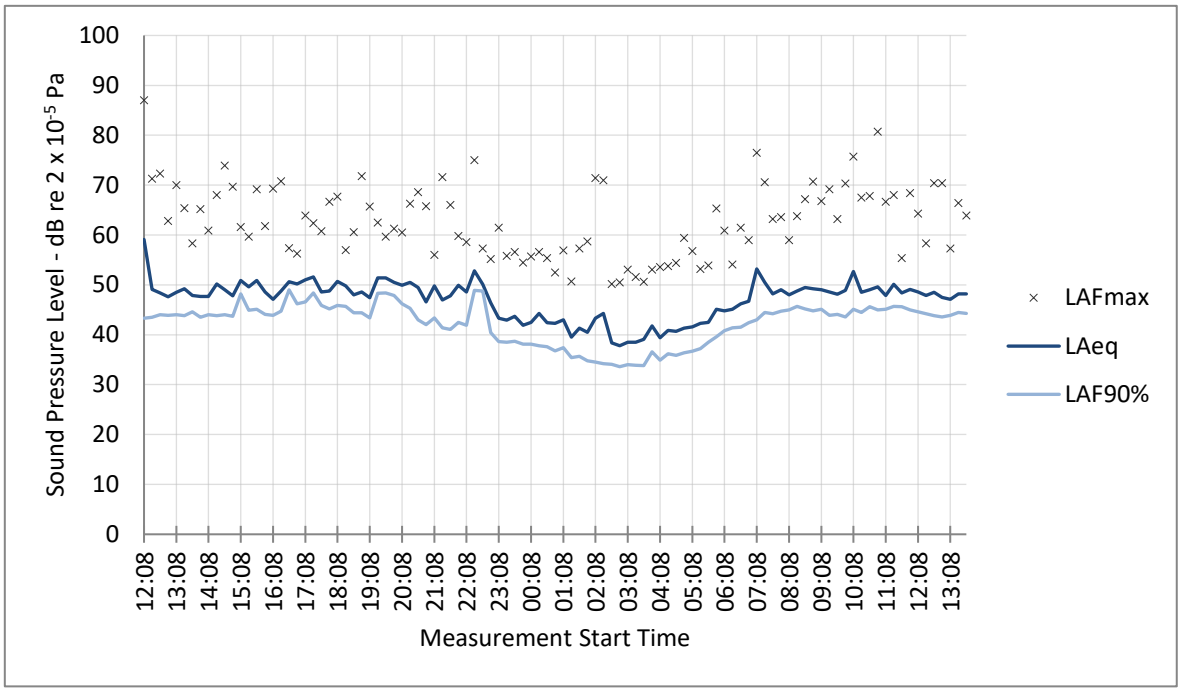


Figure 2: Sound level survey results - 16th – 17th November 2020

In accordance with BS 4142:2014+A1:2019 the prevailing background sound level is not necessarily taken to be the lowest recorded values, but rather the level that best represents the typical background sound level in the area over a defined period. A statistical analysis of the measured background sound levels over the evening has been carried out, generally following suggested guidance contained in Section 8 of the Standard. Distribution of the measured LA90 sound levels during anticipated operating times of the new equipment are shown in Figure 3 & 4 below.

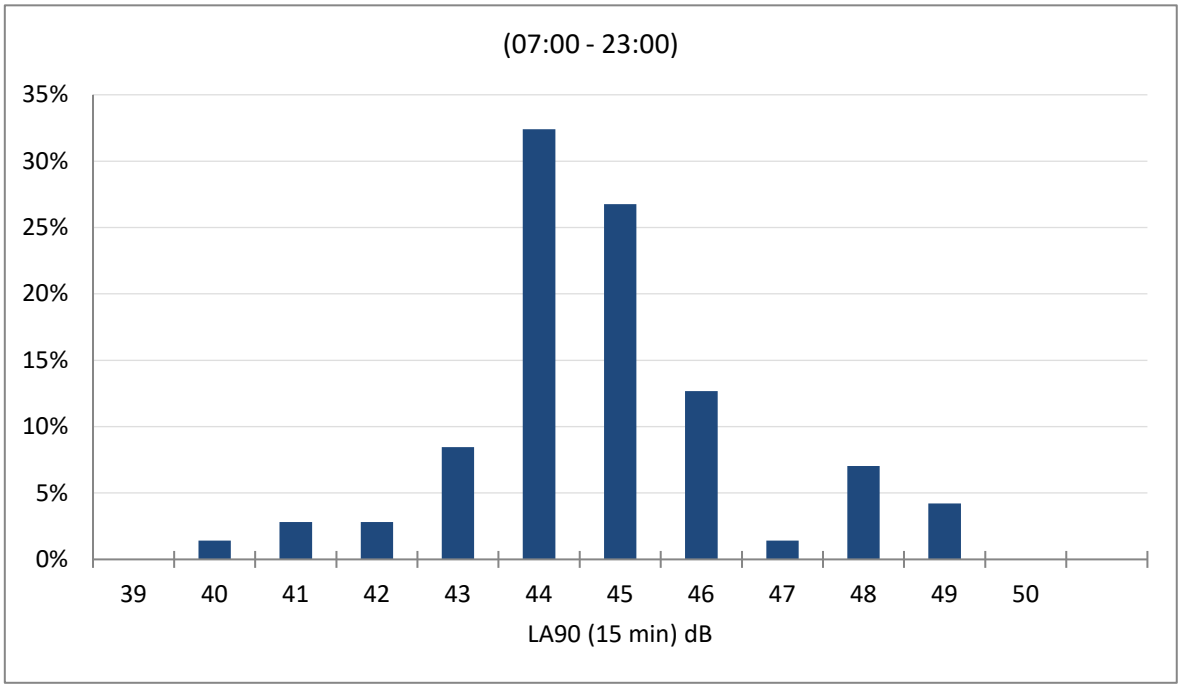


Figure 3: Statistical analysis of measured daytime LA90 sound levels

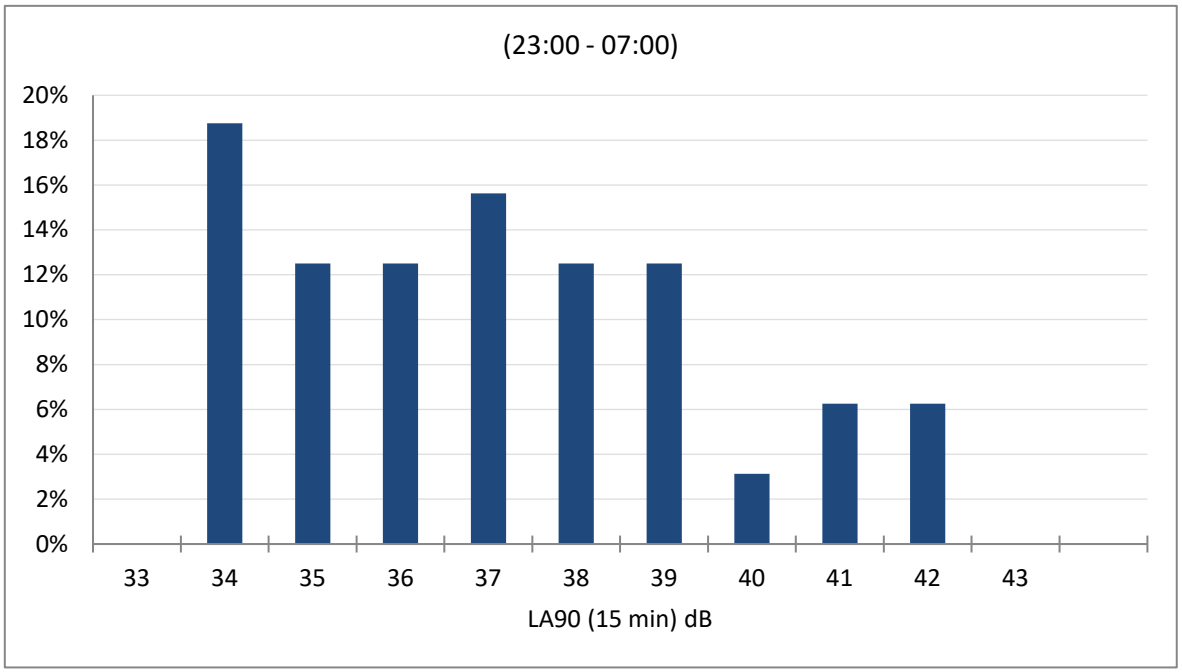


Figure 4: Statistical analysis of measured night-time LA90 sound levels

As part of the contextual assessment it is important to note the background sound levels during the most sensitive times, i.e., in this case just before people go to bed and/or wake-up. For example, the background level at 3am may be the lowest, but is not likely to be representative of the most sensitive times.

Following guidance in BS 4142:2014+A1:2019, the statistical analysis of Figures 2, 3, and 4 confirms that the representative background sound levels in the vicinity of the receptor is LA90 44dB during the daytime and LA90 38dB during the night-time. In accordance with Camden Council's 'green' criteria, noise from the new plant shall be designed to not exceed a level of LAr 34dB during the daytime and LAr 28dB during the night.

The pertinent results of the survey are summarised in Table 2 below.

Receptor	**Period**	**Representative background sound level LA90**	**Criteria LAr**
R1	07:00 – 23:00	44dB	34dB
R2	23:00 – 07:00	38dB	28dB

Table 2: Summary sound level survey results

5. ACOUSTIC ASSESSMENT

The development includes the installation of a new air conditioning condenser unit. Confirmation of the equipment model used in the assessment is provided in Table 3 below.

Description	Equipment Model	Quantity
AC Condenser	Toshiba MCY-MHP0506HT-E1	1

Table 3: Proposed new mechanical equipment used in the assessment

Sound emissions from the mechanical equipment can be determined from manufacturer's published data. Data is available as a single-figure sound power level. Octave band spectra for an equivalent unit, corrected pro-rata to equate to the same single-figure value, has been used in the computer model.

A computer model has been used to calculate the noise contribution from the proposed plant to outside nearest noise-sensitive windows. Environmental corrections are calculated using the assessment method of ISO 9613-2:1996.

The calculated specific sound level from the condenser to outside nearby residential windows is shown in Table 4. Summary print outs from the calculation model is included in Appendix A.

Receptor Location	Calculated Equipment Sound Level
R1	26dBA
R2	28dBA

Table 4: Calculated cumulative equipment sound levels at 1m outside noise-sensitive windows

The sound level is slightly lower for the daytime receptor, as although it is closer to the unit, it benefits from more acoustic screening provided by the intervening garden fence. The assessment includes the acoustic attenuation provided by the mitigation recommendations outlined in Section 6.

Assessment of the calculated Rating Levels in accordance with BS 4142:2014+A1:2019 is provided in Table 5 on the following page.

Description	R1 Receptor	R2 Receptor	Relevant Clause	Commentary
Calculated specific sound level to receptor	LAeq 26dB	LAeq 28dB	7.1 7.3.6	New plant operating. Refer calculation sheets in Appendix A
Background sound level	LA90 44dB	LA90 38dB	8.1.3 8.3	Measured representative background sound level
Acoustic feature correction	+0dB	+0dB	9.2	The calculated specific sound levels do not indicate any tonal component, the equipment will be 10dBA below the background sound level therefore no acoustic characteristics will be audible.
Rating level	LAr 26dB	LAr 28dB	9.2	
Excess of rating level over background sound level	**-18dB**	**-10dB**	**11**	**Assessment indicates negligible likelihood of adverse impact**

Table 5: BS 4142:2014+A1:2019 Assessment

Table 5 shows the rating level of the proposed new equipment will be at least 10dBA below the representative 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, rather than simply 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 13dBA. 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. Mitigation

The calculations include the acoustic attenuation provided by an acoustic louvred enclosure or similar, to be provided and designed by a third-party supplier.

The mitigation measures are required to provide at least 13dBA attenuation.

7. CONCLUSION

A planning application is to be submitted for the installation of a new air conditioning condenser unit at 22 Priory Terrace, London.

ACA Acoustics have conducted a sound level survey to determine the background sound level and assessed noise from the proposed equipment using manufacturer's published acoustic data.

The calculated rating level for the new plant is at least 10dBA below the measured representative background sound level, allowing for the mitigation as detailed in this report. This achieves criteria as specified by London Borough of Camden Council.

It is the author's assessment that the proposed new mechanical services equipment will not be detrimental to the amenity of nearby residential occupants and no further mitigation measures would be required.

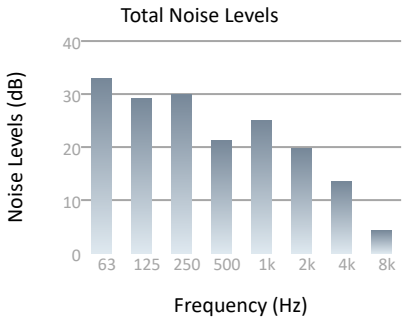
APPENDIX A

Acoustic Calculations

ACA acoustics

22 Priory Terrace, London

Project Name	22 Priory Terrace, London
Project Reference	201101
Reference	Bedroom Window (Night)
Description	Bedroom Window (Night)
Noise Limit	28
dBA	28



Noise Sources

Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
AC Condenser	1	33	29	30	21	25	20	13	4

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Calculation Sheet

AC Condenser to Bedroom Window (Night)

	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Noise Source								
Noise Source - AC Condenser								
Sound Power Levels	**73.0**	**73.0**	**75.0**	**67.0**	**69.0**	**63.0**	**57.0**	**49.0**
Noise Control Treatments								
Treatment - Mitigation								
	-13.0	*-13.0*	*-13.0*	*-13.0*	*-13.0*	*-13.0*	*-13.0*	*-13.0*
Dc - Condenser Directivity								
	3.0	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*
Adiv - Geometrical Divergance								
	-33.2	*-33.2*	*-33.2*	*-33.2*	*-33.2*	*-33.2*	*-33.2*	*-33.2*
Aatm - Atmospheric Absorption								
	0.0	*0.0*	*0.0*	*0.0*	*0.0*	*-0.1*	*-0.4*	*-1.5*
Agr - Ground Attenuation								
	3.0	*-0.7*	*-2.0*	*-2.7*	*-0.9*	*0.0*	*0.0*	*0.0*
Abar - Barrier Attenuation								
	0.0	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
External Receiver								
External Receiver - Bedroom Window (Night)								
Sound Pressure, Lp:	**32.8**	**29.1**	**29.8**	**21.2**	**24.9**	**19.7**	**13.4**	**4.3**

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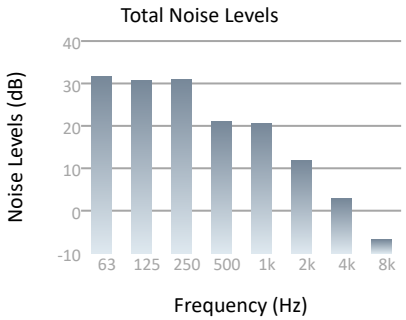
22 Priory Terrace, London

Project Name	22 Priory Terrace, London
Project Reference	201101
Reference	Garden (Daytime)
Description	Garden (Daytime)
Noise Limit	34
dBA	26



Noise Sources

Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
AC Condenser	1	32	31	31	21	20	12	3	-7

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Calculation Sheet

AC Condenser to Garden (Daytime)

	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Noise Source								
Noise Source - AC Condenser								
Sound Power Levels	**73.0**	**73.0**	**75.0**	**67.0**	**69.0**	**63.0**	**57.0**	**49.0**
Noise Control Treatments								
Treatment - Mitigation								
	-13.0	*-13.0*	*-13.0*	*-13.0*	*-13.0*	*-13.0*	*-13.0*	*-13.0*
Dc - Condenser Directivity								
	3.0	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*
Adiv - Geometrical Divergance								
	-25.1	*-25.1*	*-25.1*	*-25.1*	*-25.1*	*-25.1*	*-25.1*	*-25.1*
Aatm - Atmospheric Absorption								
	0.0	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*-0.2*	*-0.6*
Agr - Ground Attenuation								
	3.0	*-0.1*	*-1.5*	*-1.7*	*-0.4*	*0.0*	*0.0*	*0.0*
Abar - Barrier Attenuation								
	-9.2	*-7.2*	*-7.4*	*-9.2*	*-12.9*	*-16.0*	*-18.9*	*-20.0*
External Receiver								
External Receiver - Garden (Daytime)								
Sound Pressure, Lp:	**31.6**	**30.6**	**31.0**	**20.9**	**20.5**	**11.8**	**2.8**	**-6.7**

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