REPORT

CLEAR
ACOUSTIC DESIGN

34 Chester Terrace, NW1 4ND

Noise Impact Assessment

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Compiled By: Nathan Matthews BSc(Hons)

Issued by: Stefan Hannan BSc(Hons) PGDip MIOA

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CLEAR
ACOUSTIC DESIGN

Clear Acoustic Design Ltd
Tel: 0330 043 5493
Email: info@clearacousticdesign.com
Web: www.clearacousticdesign.com

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1.0 Introduction

Clear Acoustic Design has been appointed to carry out a noise impact assessment in relation to the proposed mechanical plant installation at 34 Chester Terrace, London, NW1 4ND.

As part of the proposal, the existing air conditioning unit will be relocated from within the basement vaults to an external location within the external basement lightwell area at the front of the property. The unit will be situated within an acoustic enclosure which provides 15dB of attenuation.

A noise impact assessment has been requested in order to safeguard the amenity of the surrounding noise sensitive receptors. The noise impact assessment has been conducted in line with BS 4142: 2014 + A1: 2019 *Methods for Rating and Assessing Industrial and Commercial Sound*. These criteria are seen to be appropriate in assessing and mitigating noise impact from this source.

The assessment will show that installation of the proposed unit will meet the requirements of the local authority and the criteria of BS 4142: 2014, with an impact consistent with No Observed Effect Level (NOEL) at the worst-affected receptor.

2.0 Legislative and Policy Framework

2.1 Local Authority Requirements

Camden Council's Local Plan 2017 states that for assessing industrial and commercial noise sources "it is expected that British Standard 4142:2014 *'Methods for rating and assessing industrial and commercial sound'* (BS 4142) will be used. For such cases a 'Rating Level' of 10dB below background (15dB if tonal components are present) should be considered as the design criterion)".

The noise from the proposal should therefore not exceed 10dB below the existing background noise level, which represents a noise level in line with the Lowest Observed Adverse Effect Level (LOAEL) as described by the Noise Policy Statement for England (NPSE) as below.

2.1 Noise Policy Statement for England (NPSE)

The NPPF refers to the Noise Policy Statement for England (NPSE), which applies to most forms of noise including environmental noise. The NPSE sets out the long-term vision of Government policy which is to "Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.". It aims that "Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- Avoid significant adverse impacts on health and quality of life;
- Mitigate and minimise adverse impacts on health and quality of life; and
- Where possible, contribute to the improvement of health and quality of life."

The use of the terms "significant adverse" and "adverse" are key phrases within the NPSE. The guidance establishes the concept of how the level of adverse effect on health and quality of life can be referenced including:

- NOEL – No Observed Effect Level - This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.

- LOAEL – Lowest Observed Adverse Effect Level - This is the level above which *adverse* effects on health and quality of life can be detected.

- SOAEL – Significant Observed Adverse Effect Level - This is the level above which *significant adverse* effects on health and quality of life occur.

Under the first aim of the NPSE ("avoid significant adverse impacts on health and quality of life"), an impact in line with SOAEL should be avoided. Under the second aim ("mitigate and minimise adverse impacts on health and quality of life"), where the impact lies somewhere between LOAEL and SOAEL, requiring that all reasonable steps are taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding

principles of sustainable development, but does not mean that such adverse effects cannot occur.

2.2 Planning Practice Guidance on Noise (PPG-N)

The Planning Practice Guidance on Noise (PPG-N) is part of government guidance intended to support the implementation of the policies in the NPSE. It aids in expanding on the definitions form the NPSE of NOEL, LOAEL and SOAEL, by linking these terms to 'examples of outcomes', i.e. changes in behaviour and/or attitude to noise. The table below summarises the guidance from PPG-N in this regard.

Perception	Examples of outcomes	Increasing effect level	Action
NOEL - No Observed Effect Level [1]			
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
LOAEL - Lowest Observed Adverse Effect Level			
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up the volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
SOAEL - Significant Observed Adverse Effect Level			
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening, and difficulty in getting back to sleep. Quality of life diminished due to a change in the acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate the effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent
[1] This line is an assumption of the adverse effect level and is not explicitly referenced by PPG-N, though this appears to be a safe assumption.			

Table 3.1: Noise exposure hierarchy based on the likely average response – adapted from PPG-N

2.3 BS 4142: 2014 + A1: 2019

BS 4142: 2014 + A1: 2019 *Methods for Rating and Assessing Industrial and Commercial Sound* is a method of assessing the noise impact of sources of industrial and/or commercial noise on sensitive receptors such as residential buildings. This is done by comparing the rating level of the industrial noise ($L_{A,rT}$) against the existing level of background noise (L_{A90}).

BS 4142: 2014 suggests that sources of noise (rating noise level) should not exceed the existing background noise level, depending on the context. If this is achieved, it is a positive indication that the noise impact will be low. Camden Council require a noise level that is 10dB below this existing background noise level.

3.0 Environmental Noise Survey

In order to assess the noise impact of the proposed mechanical plant installation, an environmental noise survey has been undertaken by Clear Acoustic Design at a location representative of the nearest noise sensitive receptors.

The unit is to be installed in the basement lightwell, which is located to the front of the property. The worst affected receptor location is seen to be the residential façade of the nearest first floor window at 33 Chester Terrace. This receptor is seen to be approximately 7 metres away from the installation site. The installation site and receptor can be seen in Appendix B, Figures 1 and 2.

Noise measurements were taken using a sound level meter positioned on a tripod at the first floor balcony of 34 Chester Terrace. The sound level meter was at least 2.5 metres from the façade. This location is seen to be representative of the nearest noise-sensitive receptor to the proposed installation site.

Due to distances and screening, compliance at the worst affected receptor location guarantees compliance at all other receptor locations.

The environmental noise survey has provided background noise levels representative of the receptor location, which will form the basis of the assessment in line with BS 4142: 2014. Ambient and background noise levels were measured over a 24 hour period between 05/02/24 and 06/02/24 using a single fixed noise monitor (referred to as F1).

3.1 Measurement Equipment and Environmental Conditions

The weather was witnessed to be overcast and dry for the duration of the survey with light wind speeds. The following measurement equipment was used for the survey.

Equipment	Serial Number	Calibration Date
Svantek SV 971A Type 1 Sound Level Meter	113218	15/09/23
Svantek SV 18A Preamplifier	113711	15/09/23
ACO 7152 Microphone	80617	15/09/23

Table 2.1 Measuring Equipment Used for Survey

3.2 Fixed Noise Monitoring Graph – F1

Figure 2.2 below provides a graph of the measured noise levels at Location F1. The ambient (L_{Aeq}) and background (L_{A90}) noise levels are shown.

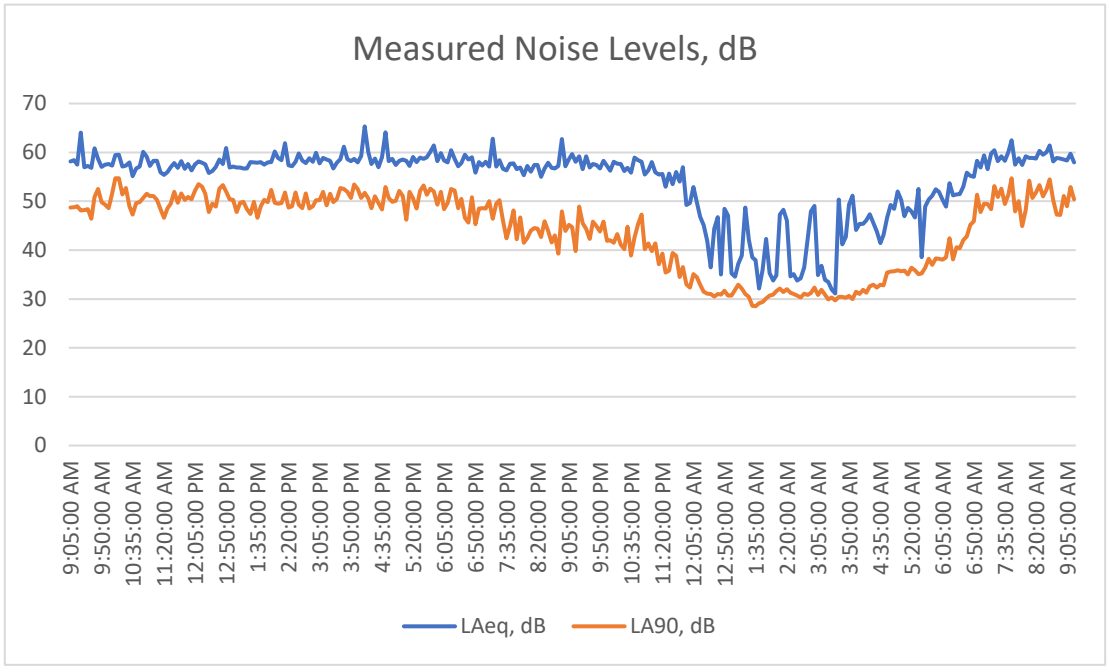

Figure 2.2 Long Term Measurement Graph – F1

3.3 Assessment Background Noise Level

To conduct an assessment in line with BS 4142: 2014, it is necessary to extrapolate the representative background noise levels from the long-term survey data. These background daytime and night-time noise levels are presented in Table 2.3 below.

The proposed unit will likely operate during the day and night, therefore the background noise level at night of 31dBA will be used in this assessment as it is the lower of these background noise levels.

Time period	Assessment Background Noise Level, L_{A90} dB,
Day (07:00-23:00)	50 dBA
Night (23:00-07:00)	31 dBA

Table 2.3: Assessment Background Noise Levels

4.0 Noise Impact Assessment

4.1 Noise from the Proposed Mechanical Plant

The proposed installation is of one Daikin RXYSQ-P8V1B condenser unit. The sound pressure levels which form the basis of the assessment are presented in Table 3.1 below and are based on the manufacturer datasheet. The data sheet can be seen in Appendix A, Figure 2.

The sound pressure level is assumed to be measured at 1 metre from the unit in free field, as is standard practice for measuring sound pressure levels of such noise sources.

The noise from the proposed unit is not seen to be tonal or impulsive in nature and so no penalty rating need be applied to the final rating level, according to BS 4142: 2014.

Type	63 Hz	125 Hz	250 Hz	500 Hz	1 KHz	2 KHz	4 KHz	dBA @ 1m
Daikin RXYSQ-P8V1B	59	58	56	53	50	45	39	55

Table 3.1: Noise Source, Sound Pressure Levels, dB

4.2 Assessment Outcome

Calculations have been undertaken to understand the noise level at the receptor while the unit is operating at full capacity. These calculations can be seen in Appendix A, Figure 1 and show that the proposed unit will meet the local authority's noise level requirement. An explanation of the resulting noise level and calculations can be found in sections 4.2.1 and 4.2.2 below.

4.2.1 Source Directivity, Screening Loss, Acoustic Enclosure, and Distance Calculations

As the unit is to be installed against the wall and floor of the basement lightwell, the noise will radiate in a hemispherical pattern. To account for this type of acoustic propagation, a source directivity correction of 6dB has been added to the final calculations.

The receptor is seen to be 7 metres from the installation site. The receptor is not seen to have a direct line of sight with the unit once installed. A further screening correction of -10dB can also be applied to the calculation should the unit be installed out of direct line of sight of the nearest receptor. The proposed installation site is seen to fulfil this criterion.

The unit is also to be situated in an acoustic enclosure which will provide 15dB of attenuation to the resulting noise level. A correction of -15dB has therefore been applied to the final calculation.

4.2.2 Resulting Noise Levels

Calculations of the noise level at the nearest receptor can be seen in Appendix A, Figure 1.

The resulting noise level from the unit at the façade of the receptor will be 19.1dBA. This is 11.9dBA below the background noise level at night and 30.9dB below the background noise level during the day, when the proposed unit is operating at full capacity.

As the rating level of the proposed mechanical plant is considerably below that of the existing background noise level, this is seen to represent a low impact to the nearest noise sensitive receptor, according to BS 4142: 2014.

Further to this, the proposal is seen to meet the local authority's requirement of 10dB below the existing background noise level at the receptor. This noise level is also seen to be representative of the NOEL, according to Planning Practice Guidance on Noise (PPG-N).

This is seen to be an acceptable outcome.

5.0 Conclusion

Clear Acoustic Design has been appointed to carry out a noise impact assessment in relation to the proposed mechanical plant installation at 34 Chester Terrace, London, NW1 4ND. The existing air conditioning unit will be relocated from within the basement vaults to an external location within the basement lightwell area at the front of the property.

A noise impact assessment has been undertaken to safeguard the amenity of the surrounding noise sensitive receptors in line with BS 4142: 2014 + A1: 2019 *Methods for Rating and Assessing Industrial and Commercial Sound*. These criteria are seen to be appropriate in assessing and mitigating noise impact from this source.

Calculations show that the noise level at the façade of the nearest receptor will likely be 11.9dBA below the background noise level at night and 30.9dB below the background noise level during the day, when the proposed unit is operating at full capacity, based on the proposed installation site.

The rating level of the proposed mechanical plant is below that of the background noise level by more than 10dB. The proposal is seen to have a low impact on the nearest noise sensitive receptor, according to BS 4142: 2014, and meets the requirements of the Camden Council's Local Plan 2017 for industrial or commercial noise proposals. This is seen to be a satisfactory outcome.

Supporting calculations are provided in Appendix A.

Appendix A – Specific Noise Level Calculations

	Octave Band Centre Frequencies, Hz							
	63	125	250	500	1000	2000	4000	dB(A)
SPL Radiating from condenser	59	58	56	53	50	45	39	55.0
Distance measured at source, m	1	1	1	1	1	1	1	
Source Directivity Correction, dB	6	6	6	6	6	6	6	
Louver / breakout losses	15	15	15	15	15	15	15	
Screening losses	10	10	10	10	10	10	10	
Distance to receptor, m	7	7	7	7	7	7	7	
SPL @ Residence	23	22	20	17	14	9	3	19.1

Figure A.1: Noise Levels at Nearest Receptor with Proposed Mechnical Plant Operational

2 Specifications

2-1 Technical Specifications					RXYSQ4P8V1	RXYSQ5P8V1	RXYSQ6P8V1
Fan motor 2	Model				Brushless DC motor		
	Speed	Cooling	Nom.	rpm	815		
		Heating	Nom.	rpm	785	805	
	Drive				Direct drive		
	Output			W	70		
Sound power level	Cooling	Nom.		dBA	66	67	69
Sound pressure level	Cooling	Nom.		dBA	50	51	53
	Heating	Nom.		dBA	52	53	55
Operation range	Cooling	Min.~Max.		°CDB	-5~46		
	Heating	Min.~Max.		°CWB	-20~15.5		
Refrigerant	Type				R-410A		
	Charge			kg	4.0		
	Control				Expansion valve		
	Circuits	Quantity			1		
Refrigerant oil	Type				Daphne FVC68D		
	Charged volume			l	1.5		
Piping connections	Liquid	Type			Flare connection		
		OD		mm	9.52		
	Gas	Type			Flare connection (VRV®) / Braze connection (RA)		Braze connection
		OD		mm	15.9 (6) / 19.1 (7)		19.1
	Drain	Quantity			3		
		OD		mm	26x3		
	Heat insulation				Both liquid and gas pipes		
	Piping length	OU - BP	Total	m	55		
		BP - IU	Max.	m	15		
			Total	m	60	80	90
	Total piping length	System	Actual	m	300 / 115	300 / 135	300 / 145
	Level difference	OU - IU	Outdoor unit in highest position	m	-		
			Indoor unit in highest position	m	-		
Defrost method					Reversed cycle		
Defrost control					Sensor for outdoor heat exchanger temperature		
Safety devices	Item	01			HPS		
		02			Fan motor thermal protection		
		03			Inverter overload protector		
		04			PC board fuse		
PED	Category				Category I		

Standard Accessories : Installation manual; Quantity : 1;
Standard Accessories : Operation manual; Quantity : 1;
Standard Accessories : Connection pipes; Quantity : 3;

2-2 Electrical Specifications				RXYSQ4P8V1	RXYSQ5P8V1	RXYSQ6P8V1
Power supply	Name			V1		
	Phase			1N~		
	Frequency		Hz	50		
	Voltage		V	220-240		
Voltage range	Min.		%	-10		
	Max.		%	10		
Current	Nominal running current (RLA) - 50Hz	Cooling	A	15.9	20.2	22.2

Figure A.2: Datasheet for Condenser Unit

Appendix B – Noise Survey Location and Plans

Figure B.1: 34 Chester Terrace with Receptor (Yellow)

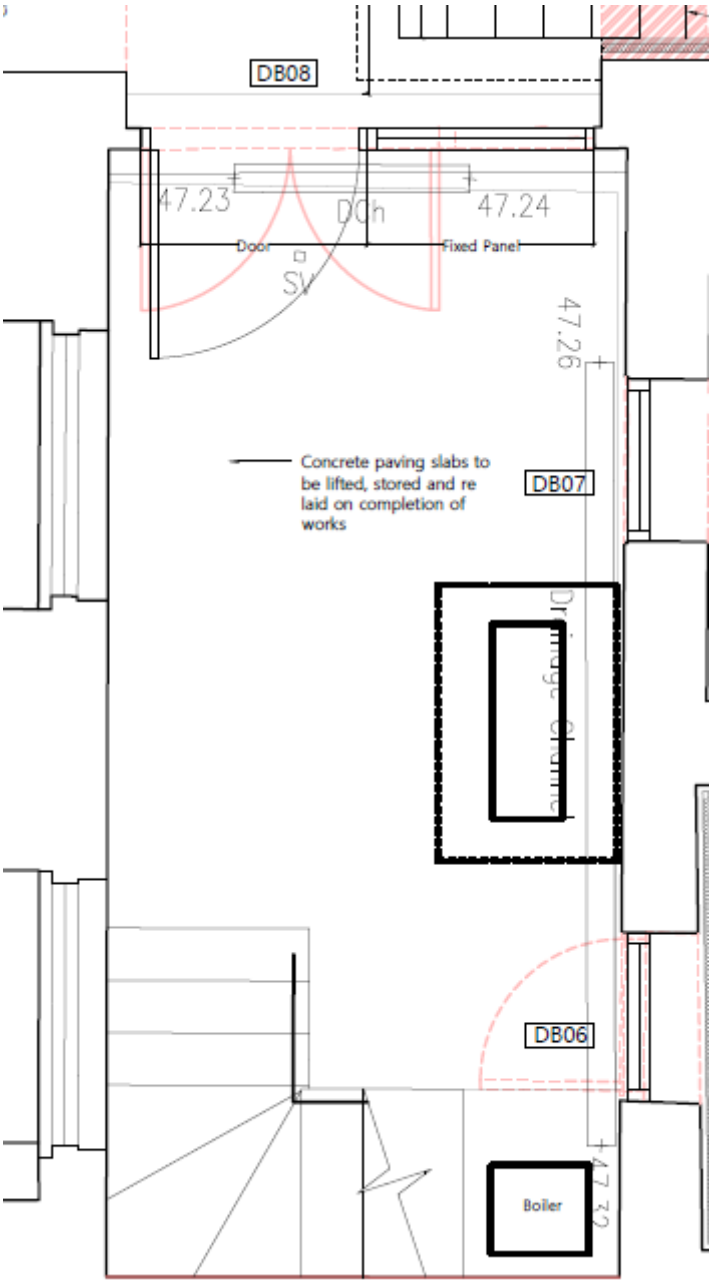

Figure B.2: Proposed Installation Site Plan, Basement Lightwell