Post Installation Commissioning Noise Impact Assessment of Installed Heat Pump Units with Acoustic Enclosures

24-26 Redington Gardens, London NW3 7RX

26 August 2021

Report prepared for:
MY Construction Ltd

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Document Information

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Client	MY Construction Ltd
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Summary

Three new residential townhouses at 24-26 Redington Gardens, London NW3 7RX have been developed. There are three external Air Conditioning Heat Pump (ACHP) units are housed inside acoustic enclosures to the rear garden terrace area at basement level of each property.

Climate Acoustics has been appointed to complete a commissioning noise survey, noise impact assessment and technical acoustic report to show the noise impact from the ACHP units on the neighbouring noise sensitive residential premises. Section 2 of this report shows the noise survey was carried out on Saturday 17th July 2021 to Tuesday 20th July 2021.

Camden Borough Council has specified noise emission criteria and based on the measured noise levels at the site Climate Acoustics will assess the increase in noise level due to the operation of the ACHP units, and if required, suggest further appropriate mitigation measures to reduce noise emissions.

The ACHP operation is 24-hours, Monday to Sunday. *Note: typically, the plant would be more noticeable during the late evening/ night when the background noise is lower.*

Post Installation Commissioning Noise Impact Assessment of ACHP Fixed Plant Noise on Residents

The post installation commissioning noise impact assessment detailed in Section 3 of this report shows that the measured daytime and night-time rating noise level from the ACHP fixed plant serving 24-26 Redington Gardens to 1 metre from the nearest residents' windows are equal or below Camden Borough Councils noise rating limits (noise criteria detailed in Section 2.7) in accordance with British Standard BS 4142:2014:

- **Daytime ACHP Fixed Plant Noise Emission Levels:** The daytime rating noise level is equal or below Camden Borough Councils noise rating limit (**31 dB $L_{Ar,Tr,1\text{-}hour}$**), with a **rating noise level between 0 to 12 decibels below the limit**.
- **Night-time ACHP Fixed Plant Noise Emission Levels:** The night-time rating noise level is equal or below Camden Borough Councils noise rating limit (**26 dB $L_{Ar,Tr,15\text{-}min}$**), with a **rating noise level between 0 to 12 decibels below the limit**.

As per British Standard BS 4142:2014 (Section C3.1 of this report) guidance, this gives ***"an indication of the specific sound source having a low impact"*** at the nearest noise-sensitive residential receptor window.

Based on the above, complaints are unlikely and preoccupation approval of sound insulation measures for ACHP plant (Condition 7 & 5) listed below has, therefore, be achieved.

- ***House 24RG: Condition 7* – requires preoccupation approval of sound insulation measures for plant.**
- ***House 25&26RG: Condition 5* – requires preoccupation approval of sound insulation measures for plant.**

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Table of Contents

1 Introduction

Three new residential townhouses at 24-26 Redington Gardens, London NW3 7RX have been developed. There are three external Air Conditioning Heat Pump (ACHP) units are housed inside acoustic enclosures to the rear garden terrace area at basement level of each property.

Climate Acoustics has been appointed to complete a commissioning noise survey, noise impact assessment and technical acoustic report to show the noise impact from the ACHP units on the neighbouring noise sensitive residential premises.

Camden Borough Council has specified noise emission criteria and based on the measured noise levels at the site Climate Acoustics will assess the increase in noise level due to the operation of the ACHP units, and if required, suggest further appropriate mitigation measures to reduce noise emissions.

1.1. Site Description

Figure 1 shows the residents' boundary (highlighted in **green**) where the 24-26 Redington Gardens is located next door to the north boundary. The newly installed ACHP plant is located to the rear garden terrace area at basement level of each property., highlighted in **red**.

Figure 1 –Google Earth™ image showing the site description

The site's dominant noise sources include distant road traffic noise, along with occasional passing traffic on Redington Gardens and aircraft were dominant. Note: on Sunday (18/07/2021), there was no construction work taking place during the daytime.

2 Existing Noise Climate

2.1. Survey Details

2.1.1. Personnel present

Alex Hancock – Climate Acoustics

2.1.2. Instrumentation and Calibration

Cirrus CR:811C & Svantek 971 – Sound Level Meters (**calibration certificates available upon request.)*.

Larson Davis CAL200 – Calibrator (**calibration certificates available upon request.)*.

Climate Acoustics Calibrated Equipment	
Unattended Noise Meter (Cirrus CR:811C)	
Class 1 Sound Level Meter	Cirrus CR811C – Serial Number D21386FD (Date of Calibration: 13/07/2020*)
Microphone	Cirrus UK224 – Serial Number 20043419 (Date of Calibration: 13/07/2020*)
Preamplifier	Cirrus MV200D – Serial Number 1474 (Date of Calibration: 13/07/2020*)
Unattended Noise Meter (Svantek 971)	
Class 1 Sound Level Meter	Svantek 971 – Serial Number 34390 (Date of Calibration: 03/10/2019*)
Microphone	ACO 7052E – Serial Number 54420 (Date of Calibration: 03/10/2019*)
Preamplifier	Svantek SV18 – Serial Number 32165 (Date of Calibration: 03/10/2019*)
Calibrator (Larson Davis CAL200)	
Calibrator	Larson Davis – CAL200 - Serial Number 6003 (Date of Calibration: 16/10/2020*)

2.1.3. Equipment operation, including the time and date

12:20 pm on Saturday 17th July 2021 to 1 pm Tuesday 20th July 2021.

2.1.4. Weather conditions

Weather conditions during the operation of noise monitoring equipment.

Date	Temperature (°C)	Weather Conditions	Wind
Saturday 17th July 2021	21° to 26°C	Warm, dry with fair with approx. 0%-50% cloud cover	Light air (<5m/s)
Sunday 18th July 2021	16° to 31°C	Warm, dry with fair with approx. 0%-50% cloud cover	Light air (<5m/s)
Monday 19th July 2021	18° to 30°C	Warm, dry, cloudy with approx. 50%-100% cloud cover	Light air (<5m/s)
Tuesday 20th July 2021	18° to 27°C	Warm, dry with fair with approx. 0%-50% cloud cover	Light air (<5m/s)

2.2. Location of Noise Monitoring Equipment

Figure 2 – Noise Measurement Location (Source: Google Earth™)

2.3. Methodology

Noise Monitoring at Location U1:

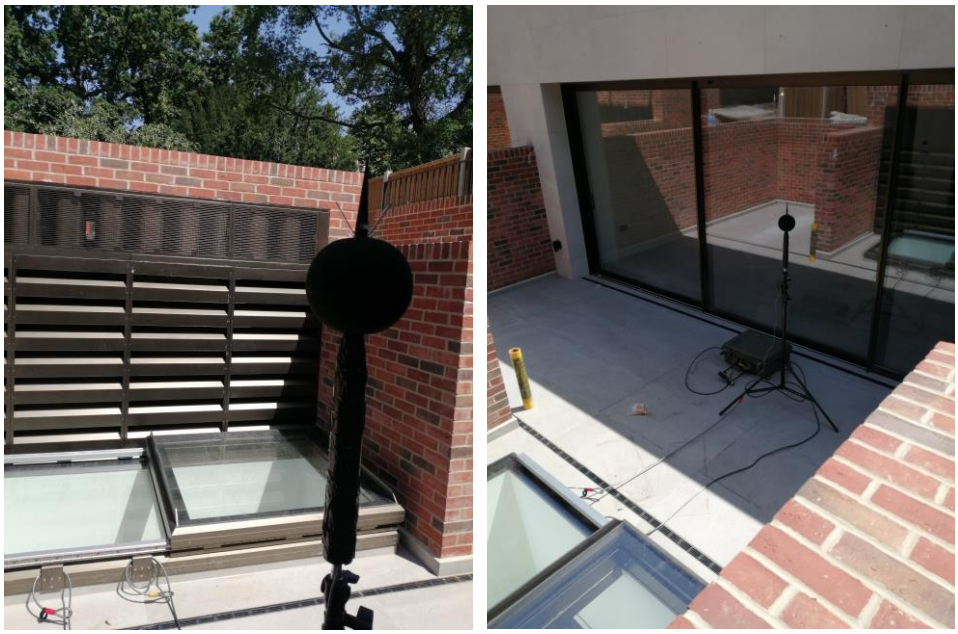
Figure 3 shows the sound level meter microphone at Location U1 was set up on a tripod at 1.7-metres height to the rear garden terrace area at basement level of No.26 Redington Gardens. The position is 3 metres from the heat pump acoustic louvre and is considered 'near-field'.

Figure 3 – Noise Measurement Location U1 (Photos)

Noise Monitoring at Location U2:

Figure 4 shows the sound level meter microphone at Location U2 was set up on a tripod at 1.7-metres height to the rear garden terrace area at basement level of No.25 Redington Gardens. The position is 3 metres from the heat pump acoustic louvre and is considered 'near-field'.

Figure 4 – Noise Measurement Location U2 (Photos)



Calibration Procedure:

The calibration procedure before and after the noise survey, the Svantek 971 and Cirrus CR:811C sound level meter was calibrated using the Larson Davis CAL200, and no significant drift was measured (accuracy within ±0.3 dB).

2.4. Uncertainty

For accurate measurements, the noise monitoring equipment is calibrated by traceable lab calibration:

- a Class 1 sound level meter and microphone are calibrated once every two years
- a Class 1 calibrator is calibrated once every year.

Note: all measurements were taken by a Class 1 sound level meter, a margin of uncertainty of +/- 1.1 decibels, typically applies because of the equipment's tolerances.

The uncertainty with the noise prediction calculations is limited, as using our experience and factors including distance, direct line of sight and reflections have been considered. The manufacturer's octave band noise datasheets are assumed to be reliable and correct, and in this instance, have been included in the predicted noise level calculations, including noise levels with reflection from the ground.

2.5. Noise Climate

When attending the site, the current noise climate was dominated by distant road traffic noise. It was also noted that occasional passing traffic on Redington Gardens and aircraft were dominant. On Sunday (18/07/2021), there was no construction work taking place during the daytime.

The newly installed external ACHP units with acoustic enclosure to the rear garden terrace area at basement level of each property was audible at close proximity to the unit. Note: the installed ACHP units are expected to operate 24-hours with PUMY P200 ACHP units set at Low Noise Mode during the night.

The background noise levels used for this post-installation commissioning test were taken from the previous acoustic reports issued in 2015 and 2020 when the external plant is switched off.

2.6. Historic Background Noise Assessment Details

The historic background noise readings from the previous acoustic report issued in 2015 can be used as the baseline noise levels for the nearest noise sensitive residential dwellings with no plant running.

2.6.1. Background Noise Levels – Cundall Assessment in 2015

The table below details the lowest measured external background noise levels at the garden of 26 Redington Gardens without any plant operating before any plant was installed (see Acoustic report reference 1012407-RPT-AS0001, dated 11th November 2015 (submitted in February 2016).

Author	Year of Assessment	Planning Application Property	Period	Lowest Measured Background Noise Level, L_{A90}, dB
Cundall	2015	24-26 Redington Gdns	Day	**36**
			Night	**31**

Note: the above background noise levels are also detailed in a recent acoustic report issued in 2020 due to restrictions caused by Covid 19 restrictions (see Acoustic report reference CSGA-C1722-T1, dated 22nd June 2020).

2.7. Noise Criteria

The adopted criteria have been used during the design phase of this proposal. Therefore, if the installed items of plant meet the noise limits set out in the table below, the noise requirements of Camden Borough Council will be achieved, and preoccupation approval of sound insulation measures for ACHP plant (Condition 7 & 5) will be achieved.

The average measured background noise level during the daytime equals 36 dB $L_{A90,1\text{-hour}}$ at the nearest noise sensitive premises and during the night equals 31 dB $L_{A90,15\text{-mins}}$ at the nearest noise sensitive premises. Therefore, the existing plant will need to achieve a rating noise criteria level equal or below the following levels in the table below:

Period	Proposed Noise Limit, $L_{Ar,Tr}$, dB
Day	**31**
Night	**26**

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2.8. Measured Existing Outdoor ACHP Units

There are x3 No. existing ACHP units with acoustic enclosures located to the rear garden terrace area at basement level of each property at 24-26 Redington Gardens, London NW3 7RX.

The noise survey measurements taken in July 2021 of the ACHP plant confirmed that the operation of a ACHP units during the summer months (i.e. highest possible noise levels) to equalise the temperature in the residential properties at 24-26 Redington Gardens, London NW3 7RX.

2.8.1. Unattended Noise Monitoring Results (Locations U1 & U2):

The unattended measured day and night ambient noise level $L_{Aeq,16hour\ (Day)}$, $L_{Aeq,8hour\ (Night)}$ and the typical background noise $L_{A90,1hour\ (Day)}$, $L_{A90,15min\ (Night)}$ near the ACHP units at the rear of No.25 and No.26 Redington Gardens during the 24-hour plant operation is summarised in the table below:

A summary of the unattended noise data is presented in graph format in Appendix A1 and Appendix A2.

Measured Sound Pressure Levels of Air Conditioning Heat Pump (ACHP) Units Only

	Day 07:00 to 23:00 ($L_{Aeq,16hr}$)	Night 23:00 to 07:00 ($L_{Aeq,8hr}$)	Day 07:00 to 23:00 ($L_{A90,T}$)	Night 23:00 to 07:00 ($L_{A90,T}$)
Location U1 (Rear Façade, No.26 Redington Gardens):	39*	34*	37	32
Location U2 (Rear Façade, No.25 Redington Gardens):	39*	34*	38	33

** Note the noise output from the Heat Pump Unit Louvre was barely perceptible during the day and was measured at location U1 and U2. The noise floor was consistent during the survey period, therefore, the $L_{Aeq,T}$ levels provided were 'heat pump only' noise level outputs.*

3 Post Installation Commissioning Plant Noise Impact Assessment

3.1. Post Installation Commissioning Noise Impact Assessment of Proposed Plant Noise Sources to Nearest Residents

3.1.1. Measured Existing Fixed ACHP Plant with Acoustic Enclosures

Figure 5 shows the installed ACHP plant which is located to the rear garden terrace area at basement level of each property, highlighted in **red**. The nearest residential premises are highlighted in **purple**.

Figure 5 –Google Earth™ image showing the location of ACHP units and nearest residents

The plant to the rear garden will operate 24-hours with PUMY P200 ACHP units set at *'Low Noise Mode'* during the night-time. The client proposing the mechanical plant confirmed that the selected equipment will be as follows:

Air Conditioning Heat Pump Plant with Acoustic Enclosure – Garden

- **24 Redington Gardens – Air Conditioning Heat Pumps x3 No.** – *'x2 No. Mitsubishi air conditioning heat pumps, Model No. PUMY-P200YKM2R1, and x1 No. Mitsubishi air conditioning heat pumps, Model No. PUZ-ZM35VKA,* housed inside acoustic enclosure in garden.
- **25 Redington Gardens – Air Conditioning Heat Pumps x3 No.** – *'x2 No. Mitsubishi air conditioning heat pumps, Model No. PUMY-P200YKM2R1, and x1 No. Mitsubishi air conditioning heat pumps, Model No. PUZ-ZM35VKA,* housed inside acoustic enclosure in garden.

- **26 Redington Gardens – Air Conditioning Heat Pumps x3 No.** – *'x2 No. Mitsubishi air conditioning heat pumps, Model No. PUMY-P200YKM2R1, and x1 No. Mitsubishi air conditioning heat pumps, Model No. PUZ-ZM35VKA,* housed inside acoustic enclosure in garden.

The table below shows the measured octave band sound pressure level noise data from the selected air conditioning heat pump acoustic enclosure louvre at 3-metres.

Measured Octave Band Sound Pressure Levels of Air Conditioning Heat Pump Units

Plant	Noise Source	Sound Pressure Level, L_p at 3 metres from Louvre								
		Frequency, Hz								L_p dB(A)
		L_{ZFeq} 63	L_{ZFeq} 125	L_{ZFeq} 250	L_{ZFeq} 500	L_{ZFeq} 1000	L_{ZFeq} 2000	L_{ZFeq} 4000	L_{ZFeq} 8000	
Existing Outdoor Air Conditioning Heat Pump Housed Inside Acoustic Enclosure	Heat Pump Louvre **(Daytime)**	60	50	43	35	27	21	20	19	**39**
	Heat Pump Louvre **(Night-Time)**	57	44	38	30	26	19	18	19	**34**

3.1.2. Plant Noise Impact Assessment Parameters

To assess the noise impact from the fixed plant on the nearest residents premises an environmental noise model was completed using **NoiseMap ® Five** noise modelling software. All noise sources detailed in Section 3.1.1 of this report have been given sound pressure levels (L_p) based on noise monitoring near to the items of plant.

Calculations predicted to the nearest noise-sensitive receptors consider the following:

- **British Standard BS 4142: 2014 and British Standard BS 8233: 2014** – British Standards BS 4142:2014 is considered in calculations given in Section 3.2 and Appendix B of this report.
- **BS 4142 Penalty for Noise Characteristics** – Following British Standard BS 4142:2014, no noise penalty was applied for tonality, as the outdoor heat pump's octave band noise data does not contain tonal elements. These types of units generally do not create impulsive features or intermittency as the operation is such that it is similar in nature to not attract attention at the nearest noise sensitive window. Therefore, no 'penalty' was added to the calculations for impulsive or intermittent features or other characteristics.
  - **Therefore, no noise penalty was applied to all the heat pump plant.**
- **Reflections** –Additions have been applied for reflection to the plant.
- **Calculation Format** – Calculated using Tables in Section 3.1.1 of this report and daytime and night-time noise impact calculations are detailed in Appendix B of this report.

3.2. Post Installation Commissioning Plant Noise Assessment

3.2.1. Daytime Plant Noise Model

The daytime NoiseMap ® Five noise model shown in Appendix B1 of this report shows the daytime noise levels at the nearest noise sensitive residential premises detailed in Figure 5 are as follows:

Position	Description	NoiseMap® Predicted L_{Aeq} dB from Noise Sources	Predicted Rating Noise Level, $L_{Ar,Tr}$, dB	Comparison to Daytime Rating Noise Level Criteria (31 dB $L_{Ar,Tr,1\text{-hour}}$)
Receiver 1 (R1)	24 Redington Gardens, Residential	31	**31**	**0**
Receiver 2 (R2)	25 Redington Gardens, Residential	31	**31**	**0**
Receiver 3 (R3)	26 Redington Gardens, Residential	31	**31**	**0**
Receiver 4 (R4)	27 Redington Gardens, Residential	22	**22**	**-9**
Receiver 5 (R5)	23 Redington Gardens, Residential	19	**19**	**-12**
Receiver 6 (R6)	Redington Road, Residential	19	**19**	**-12**

The daytime rating noise level from the ACHP fixed plant serving 24-26 Redington Gardens to the nearest residents is summarised in the table above showing that the measured rating noise level is equal or below Camden Borough Councils noise rating limit (31 dB $L_{Ar,Tr,1\text{-hour}}$, i.e. 5 dB below lowest background noise level), with a **rating noise level between 0 to 12 decibels below the limit**, which ***"is an indication of the specific sound source having a low impact"*** under British Standard BS 4142:2014.

3.2.2. Night Plant Noise Model

The night-time NoiseMap ® Five noise model shown in Appendix B2 of this report shows the daytime noise levels at the nearest noise sensitive residential premises detailed in Figure 5 are as follows:

Position	Description	NoiseMap® Predicted L_{Aeq} dB from Noise Sources	Predicted Rating Noise Level, $L_{Ar,Tr}$, dB	Comparison to Night Rating Noise Level Criteria (26 dB $L_{Ar,Tr,15\text{-mins}}$)
Receiver 1 (R1)	24 Redington Gardens, Residential	26	**26**	**0**
Receiver 2 (R2)	25 Redington Gardens, Residential	26	**26**	**0**

Position	Description	NoiseMap® Predicted L_{Aeq} dB from Noise Sources	Predicted Rating Noise Level, $L_{Ar,Tr}$, dB	Comparison to Night Rating Noise Level Criteria (26 dB $L_{Ar,Tr,15\text{-}mins}$)
Receiver 3 (R3)	26 Redington Gardens, Residential	26	**26**	**0**
Receiver 4 (R4)	27 Redington Gardens, Residential	17	**17**	**-9**
Receiver 5 (R5)	23 Redington Gardens, Residential	14	**14**	**-12**
Receiver 6 (R6)	Redington Road, Residential	14	**14**	**-12**

The night-time rating noise level from the ACHP fixed plant serving 24-26 Redington Gardens to the nearest residents is summarised in the table above showing that the measured rating noise level is equal or below Camden Borough Councils noise rating limit (26 dB $L_{Ar,Tr,15\text{-}mins}$, i.e. 5 dB below lowest background noise level), with a **rating noise level between 0 to 12 decibels below the limit**, which ***"is an indication of the specific sound source having a low impact"*** under British Standard BS 4142:2014.

4 Conclusion

Post Installation Commissioning Noise Impact Assessment of ACHP Fixed Plant Noise on Residents

The post installation commissioning noise impact assessment detailed in Section 3 of this report shows that the measured daytime and night-time rating noise level from the ACHP fixed plant serving 24-26 Redington Gardens to 1 metre from the nearest residents' windows are equal or below Camden Borough Councils noise rating limits (noise criteria detailed in Section 2.7) in accordance with British Standard BS 4142:2014:

- **Daytime ACHP Fixed Plant Noise Emission Levels:** The daytime rating noise level is equal or below Camden Borough Councils noise rating limit (**31 dB $L_{Ar,Tr,1\text{-}hour}$**), with a **rating noise level between 0 to 12 decibels below the limit**.
- **Night-time ACHP Fixed Plant Noise Emission Levels:** The night-time rating noise level is equal or below Camden Borough Councils noise rating limit (**26 dB $L_{Ar,Tr,15\text{-}min}$**), with a **rating noise level between 0 to 12 decibels below the limit**.

As per British Standard BS 4142:2014 (Section C3.1 of this report) guidance, this gives ***"an indication of the specific sound source having a low impact"*** at the nearest noise-sensitive residential receptor window.

Based on the above, complaints are unlikely and preoccupation approval of sound insulation measures for ACHP plant (Condition 7 & 5) listed below has, therefore, be achieved.

- ***House 24RG: Condition 7* – requires preoccupation approval of sound insulation measures for plant.**
- ***House 25&26RG: Condition 5* – requires preoccupation approval of sound insulation measures for plant.**

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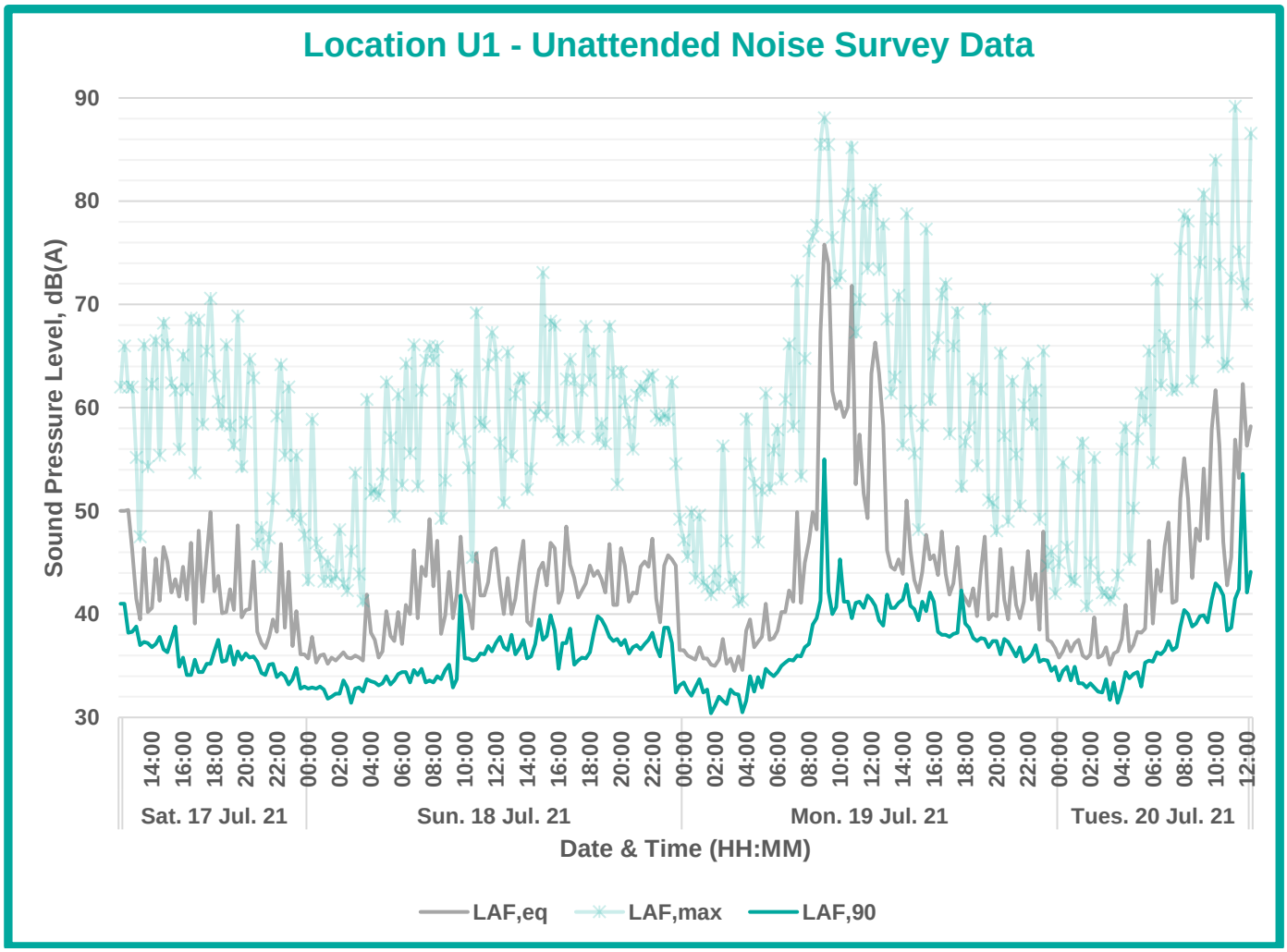
Appendix A – Noise Measurement Graph and Tables

Appendix A1 – Position U1 - Unattended Noise Survey Graphs – Rear Garden Terrace (No.26 Redington Gardens)



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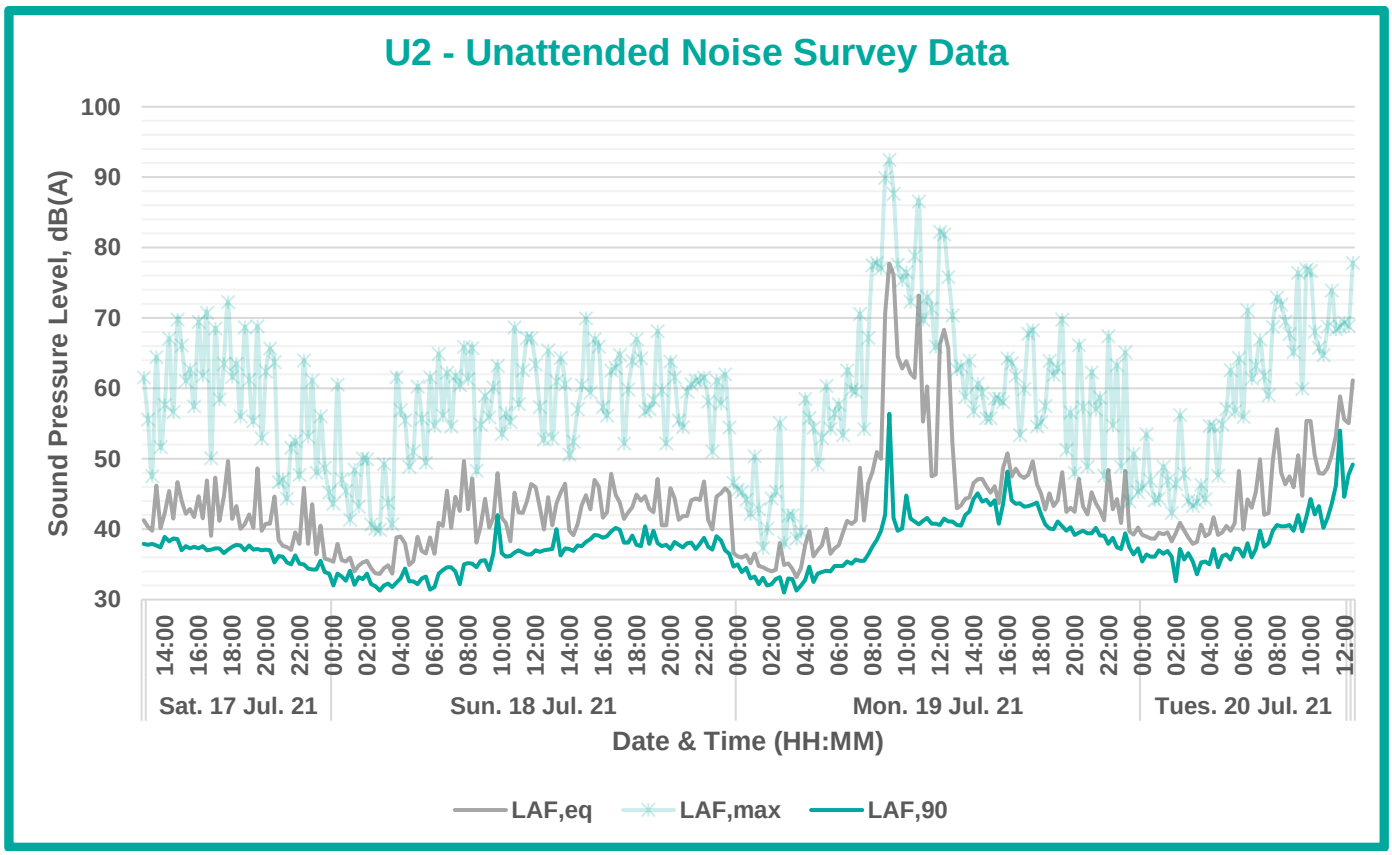
Appendix A2 – Position U2 - Unattended Noise Survey Graphs – Rear Garden Terrace (No.25 Redington Gardens)



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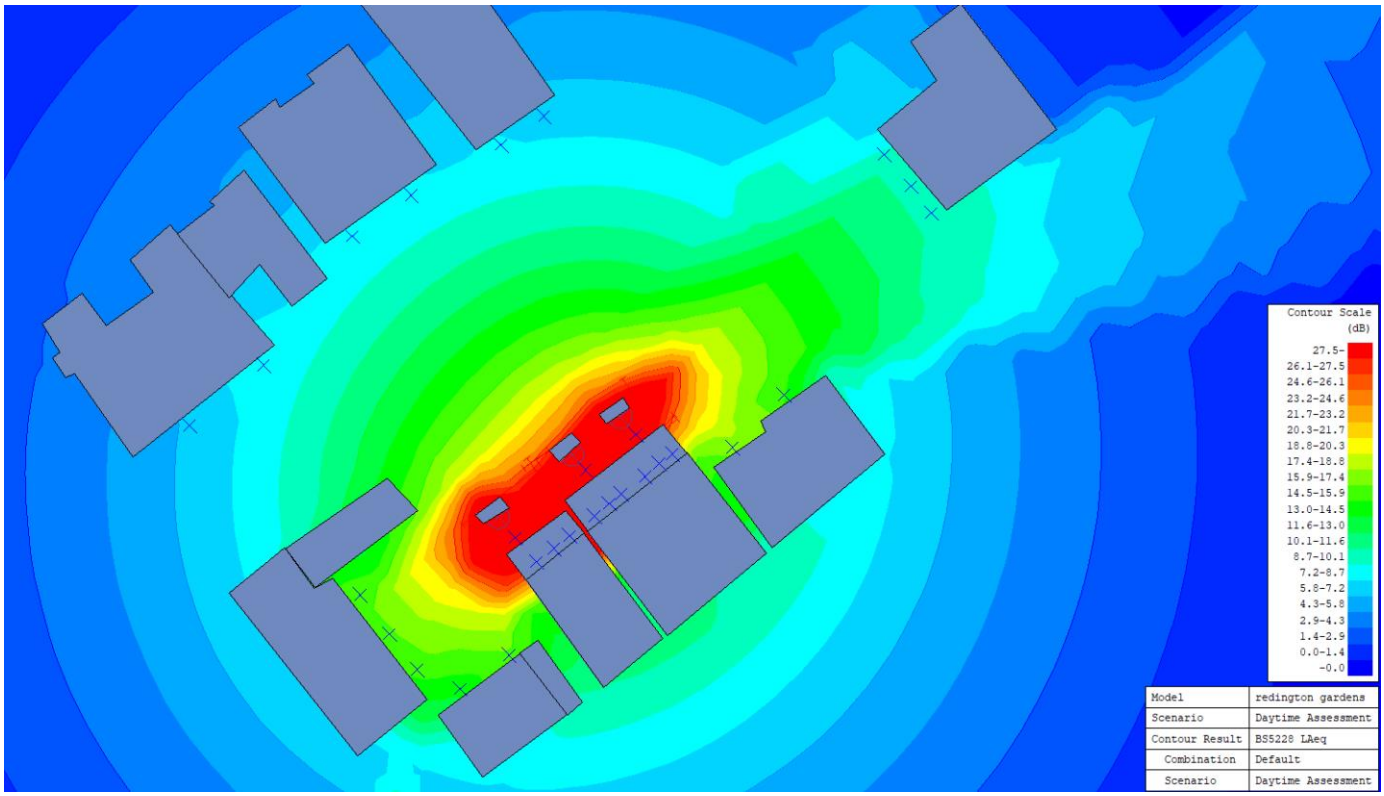
Appendix B – BS 4142: 2014 Noise Impact Calculations

Appendix B1 – Daytime Plant Noise Calculation from Plant Noise Sources to the Nearest Noise Sensitive Residential Receptors



Note 1: NoiseMap ® Five Noise Model contour shown at 4 metres height above ground, as per Environmental Noise Directive.

Note 2: The contour scale key on the right-hand side is between 0 dB to >27.5 dB.

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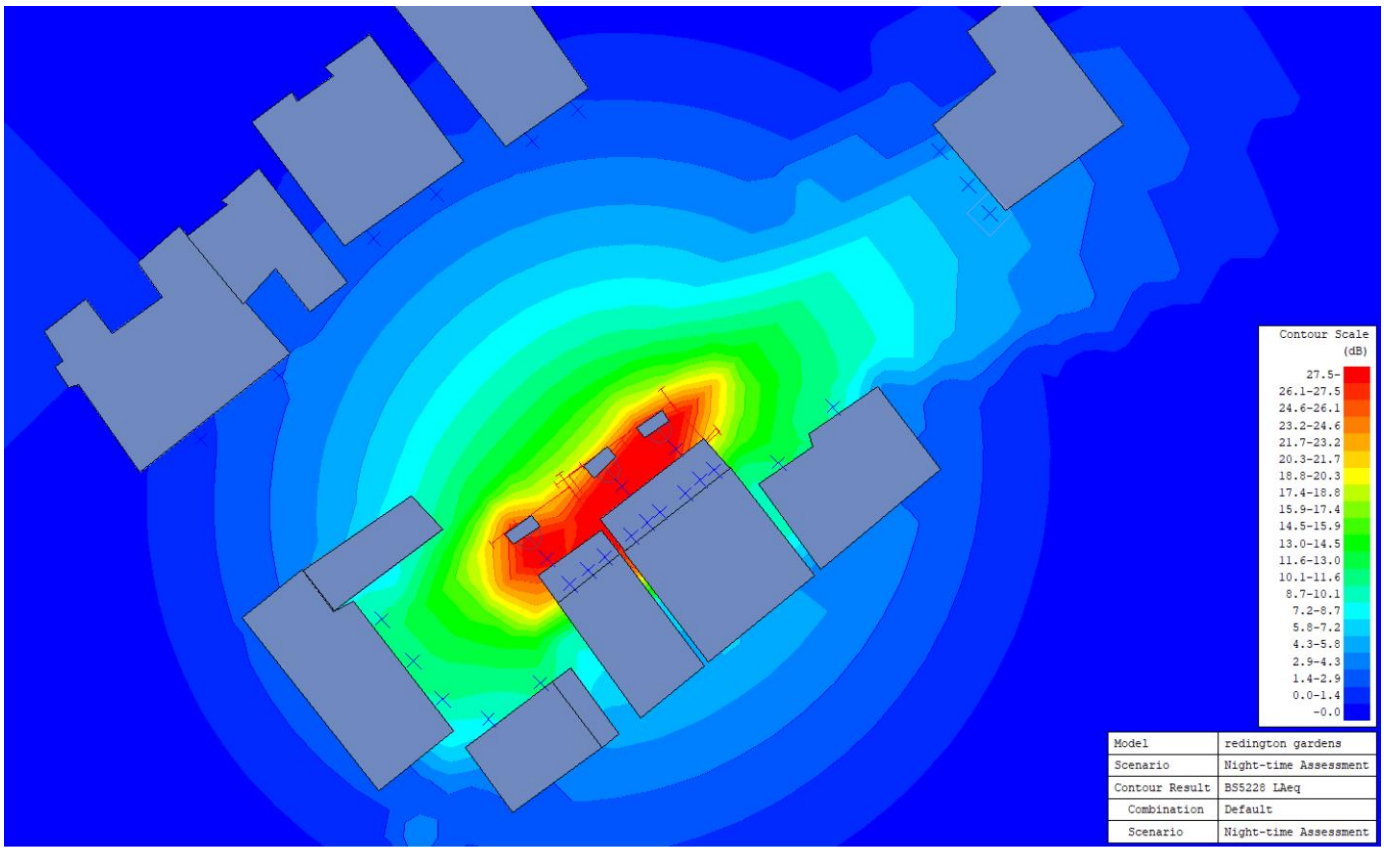
Appendix B2 – Night Plant Noise Calculation from Plant Noise Sources to the Nearest Noise Sensitive Residential Receptors



Note 1: NoiseMap ® Five Noise Model contour shown at 4 metres height above ground, as per Environmental Noise Directive.

Note 2: The contour scale key on the right-hand side is between 0 dB to >27.5 dB.

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Appendix C – Local and National Planning Policy and Criteria

Appendix C1 – Approved Local Planning Policy and Criteria

C1.1. Camden Borough Council's – Planning Conditions 5

Condition 5 (Application Number: 2015/3200/P)

"5 The development hereby permitted shall be carried out in accordance with the following approved plans 1958: A60, A70, A71, A72, A73, A74, A75, A76, A80, A81, A82, A90, A91, A92, A93, A95, A96, A97, A100, A101, A110, A111, A112, A113, A114, A150, A151, A152, A153, A154, A170, A171 and A800.

Supporting documents: Design and access statement (dated May 2015), planning and heritage statement (June 2015), tree report (dated May 2015), ***noise assessment (dated May 2015),*** *Daylight/sunlight assessment (dated May 2015), Draft CMP Pro-forma (dated May 2015), CIL additional information form, GEA desk study & ground investigation report (dated May 2015), historic environment assessment (dated April 2015) and Cundall energy and sustainability report (dated May 2015).*

Reason: For the avoidance of doubt and in the interest of proper planning."

C1.2. Camden Borough Council's – Condition 5 & 7

Our client has confirmed that the following conditions apply to the fixed ACHP plant:

- ***"House 24RG: Condition 7 – requires preoccupation approval of sound insulation measures for plant***
- ***House 25&26RG: Condition 5 – requires preoccupation approval of sound insulation measures for plant"***

C1.3. Camden Borough Council – Camden Development Policies 2010-2025, Local Development Framework

Policy DP28: Noise and Vibration states:

"The Council will seek to ensure that noise and vibration is controlled and managed and will not grant planning permission for:

a. development likely to generate unacceptable noise pollution; or

b. development sensitive to noise in locations with noise pollution, unless appropriate attenuation measures are provided.

Development that exceeds Camden's Noise and Vibration Thresholds will not be permitted.

The Council will only grant permission for plant or machinery if it can be operated without cause harm to amenity and does not exceed our noise thresholds. The Council will seek to minimise the impact on local amenity from the demolition and construction phases of development. Where these phases are likely to cause harm, conditions and planning obligations may be used to minimise the impact."

Policy DP28 sets out the following noise limits which are relevant for this development:

Table A: Noise levels on residential sites adjoining railways and roads at which planning permission will not be granted

Noise description and location of measurement	Period	Time	Sites adjoining railways	Sites adjoining roads
Noise at 1 metre external to a sensitive façade	Day	0700-1900	74 dB L_{Aeq},12h	72 dB L_{Aeq},12h
Noise at 1 metre external to a sensitive façade	Evening	1900-2300	74 dB L_{Aeq},4h	72 dB L_{Aeq},4h
Noise at 1 metre external to a sensitive façade	Night	2300-0700	66 dB L_{Aeq},8h	66 dB L_{Aeq},8h

Table B: Noise levels on residential streets adjoining railways and roads at and above which attenuation measures will be required

Noise description and location of measurement	Period	Time	Sites adjoining railways	Sites adjoining roads
Noise at 1 metre external to a sensitive façade	Day	0700-1900	65 dB L_{Aeq},12h	62 dB L_{Aeq},12h
Noise at 1 metre external to a sensitive façade	Evening	1900-2300	60 dB L_{Aeq},4h	57 dB L_{Aeq},4h
Noise at 1 metre external to a sensitive façade	Night	2300-0700	55 dB L_{Aeq},1h	52 dB L_{Aeq},1h
Individual noise events several times an hour	Night	2300-0700	>82 dB L_{Amax} (S time weighting)	>82 dB L_{AMAX} (S time weighting)

Table E: Noise levels from plant and machinery at which planning permission will not be granted

Noise description and location of measurement	Period	Time	Noise level
Noise at 1 metre external to a sensitive façade	Day, evening and night	0000-2400	5dB(A) <LA90
Noise that has a distinguishable discrete continuous note (whine, hiss, screech, hum) at 1 metre external to a sensitive façade.	Day, evening and night	0000-2400	10dB(A) <LA90
Noise that has distinct impulses (bangs, clicks, clatters, thumps) at 1 metre external to a sensitive façade.	Day, evening and night	0000-2400	10dB(A) <LA90
Noise at 1 metre external to sensitive façade where LA90>60dB	Day, evening and night	0000-2400	55dBL_{Aeq},

Appendix C2 - National Planning Policy

C2.1. The Noise Policy Statement for England (NPSE)

The Noise Policy Statement for England (NPSE) published in March 2010 sets out the Government's policy on noise and introduced the concepts from toxicology currently being applied to noise impacts by the World Health Organisation. These are:

"• NOEL – No Observed Effect Level: This is the level below which no effect can be detected.

• LOAEL – Lowest Observed Adverse Effect Level: This 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.

The first aim of the NPSE is to avoid significant adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

The second aim of the NPSE is to mitigate and minimise adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development. This second aim refers to the situation where the impact lies somewhere between LOAEL and SOAEL. It requires that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life."

C2.2. The National Planning Policy Framework (NPPF)

The relevant version of NPPF (March 2012) sets out the Government's vision for sustainable development through economic, environmental, and social planning policies for England.

Paragraph 123. *"**11. Conserving and enhancing the natural environment:***

123. Planning policies and decisions should aim to:

● avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;

● mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;

● recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and

● identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason."

C2.3. Planning Practice Guidance (PPG)

The Department for Communities and Local Government (DCLG) released a web-based resources at the time of the condenser unit's installation in March 2014 relate to *'Planning Practice Guidance'*. The guidance advises the following:

"How to determine the noise impact?

Local planning authorities' plan-making and decision taking should take account of the acoustic environment and in doing so consider:

- *whether or not a significant adverse effect is occurring or likely to occur;*
- *whether or not an adverse effect is occurring or likely to occur; and*

- *whether or not a good standard of amenity can be achieved.*

In line with the Explanatory note of the noise policy statement for England, this would include identifying whether the overall effect of the noise exposure (including the impact during the construction phase wherever applicable) is, or would be, above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation. As noise is a complex technical issue, it may be appropriate to seek experienced specialist assistance when applying this policy."

"Observed effect levels?

- *Significant observed adverse effect level: This is the level of noise exposure above which significant adverse effects on health and quality of life occur.*
- *Lowest observed adverse effect level: this is the level of noise exposure above which adverse effects on health and quality of life can be detected.*
- *No observed effect level: this is the level of noise exposure below which no effect at all on health or quality of life can be detected.*

See Explanatory note to the noise policy statement for England for further information."

"How to recognise when noise could be a concern?

At the lowest extreme, when noise is not noticeable, there is by definition no effect. As the noise exposure increases, it will cross the no observed effect level as it becomes noticeable. However, the noise has no adverse effect so long as the exposure is such that it does not cause any change in behaviour or attitude. The noise can slightly affect the acoustic character of an area but not to the extent there is a perceived change in quality of life. If the noise exposure is at this level no specific measures are required to manage the acoustic environment.

As the exposure increases further, it crosses the lowest observed adverse effect level boundary above which the noise starts to cause small changes in behaviour and attitude, for example, having to turn up the volume on the television or needing to speak more loudly to be heard. The noise therefore starts to have an adverse effect and consideration needs to be given to mitigating and minimising those effects (taking account of the economic and social benefits being derived from the activity causing the noise).

Increasing noise exposure will at some point cause the significant observed adverse effect level boundary to be crossed. Above this level the noise causes a material change in behaviour such as keeping windows closed for most of the time or avoiding certain activities during periods when the noise is present. If the exposure is above this level the planning process should be used to avoid this effect occurring, by use of appropriate mitigation such as by altering the design and layout. Such decisions must be made taking account of the economic and social benefit of the activity causing the noise, but it is undesirable for such exposure to be caused.

At the highest extreme, noise exposure would cause extensive and sustained changes in behaviour without an ability to mitigate the effect of noise. The impacts on health and quality of life are such that regardless of the benefits of the activity causing the noise, this situation should be prevented from occurring.

This table summarises the noise exposure hierarchy, based on the likely average response."

Perception	Examples of outcomes	Increasing effect level	Action
No Observed Effect Level (NOEL)			
Not noticeable	No Effect	No Observed Effect	No specific measures required

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Perception	Examples of outcomes	Increasing effect level	Action
No Observed Effect Level (NOEL)			
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level (LOAEL)			
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up 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 small actual or perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level (SOAEL)			
Noticeable and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, 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 change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

Appendix C3 - British Standards

C3.1. British Standard BS 4142:2014

British Standard BS 4142:2014 *"Methods for Rating and Assessing Industrial and Commercial Sound"* is used to assess the potential for adverse impact due to an industrial or commercial noise source at the relevant noise-sensitive commercial or residential property. The proposed or existing noise source levels are measured/calculated and compared to the existing background noise level (L_{A90}).

Depending on the noise source characteristics (tonal, intermittent, impulsive, or other), the noise source is given a rating noise level (penalty additions) and compared to the 'lowest' background noise level (during proposed operating hours). The significance of the proposed or existing noise source can then be given a likelihood of adverse impact, which follows British Standard BS 4142:2014 advice:

"The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs.

- ***A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.***
- ***A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context. 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."***

C3.2. British Standard BS 8233:2014

Camden Borough Council has not specifically recommended, but we have referenced British Standard BS 8233:2014 *'Guidance on Sound Insulation and Noise Reduction for Buildings'*, which contains guidance for internal design criteria, as shown in the table below.

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 dB $L_{Aeq,\ 16\text{-}hour}$	-
Dining	Dining room/area	40 dB $L_{Aeq,\ 16\text{-}hour}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,\ 16\text{-}hour}$	30 dB $L_{Aeq,\ 8\text{-}hour}$