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NOISE IMPACT ASSESSMENT REPORT – AIR CONDITIONING UNITS

42 QUEEN'S GROVE, LONDON NW8 6HH

FOR

VTS LIMITED

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1. EXECUTIVE SUMMARY

The Client intends to seek planning approval (retrospective) for the installation of two (2 No.) air conditioning units to service the premises at 42 Queen's Grove, London NW8 6HH.

Sound Licensing has undertaken an environmental noise survey at the site in order to determine prevailing background noise levels that are representative of the nearest noise sensitive properties, which have been identified as the residential premises at 43 Queen's Grove, NW8.

The results of the noise survey are considered reasonable given the location of the measurement position and the existing noise sources in the local vicinity.

Noise calculations of the mechanical plant have been undertaken using all available details and plans provided by the client and obtaining manufacturers' specifications wherever possible. The data and information form the basis of the assessment.

Noise break-out limits for the mechanical plant have been proposed based on the methodologies of British Standard (BS) 4142:2014 and in accordance to Local Authority policy. A robust, worst-case assessment of the noise levels associated to the proposed mechanical plant has been undertaken.

In accordance with BS 4142:2014 guidance, the predicted noise impact due to the operation of the mechanical plant ***"is an indication of the specific sound source having a low impact"***. The predicted noise level of the mechanical plant at the nearest noise sensitive properties is considered to comply with the London Borough of Camden Council's policy.

2. INTRODUCTION

The client has installed two (2 No.) air conditioning units in the rear garden of 42 Queen's Grove, London NW8 6HH, the noise from which could have the potential to affect existing noise sensitive properties nearby.

The purposes of this report are:

- To determine prevailing environmental noise levels affecting surrounding properties due to nearby noise sources (e.g. road traffic, aircraft etc);
- Based on the above, to present noise emission limits in accordance with the requirements of BS 4142:2014 and Local Authority policy, and
- To undertake an assessment to demonstrate compliance with the Local Authority noise requirements.

3. SITE DESCRIPTION

Planning permission (retrospective) is being sought for the installation of two (2 No.) air conditioning units in the rear garden of 42 Queen's Grove, London NW8 6HH (hereafter referred to as 'the site'). The property is a traditionally built three-storey detached building in the London Borough of Camden. It is located in an exclusively residential area.

The nearest sensitive residential receptors were noted to be the first-floor windows located on the rear façade of 43 Queen's Grove at approximate distances of 23 and 24 metres from the air conditioning units.

The nearest sensitive receptors are identified in figure 3.1. If the noise impact assessment details that there is an indication of the specific sound source having a low impact at these premises then it can be safely assumed it will be met at other properties of equal distance and/or those further away.

Figure 3.1 shows the site highlighted in **blue** with the nearest noise sensitive premises highlighted in **red**.

Figure 3.1 Site Location and Surrounding Land Use

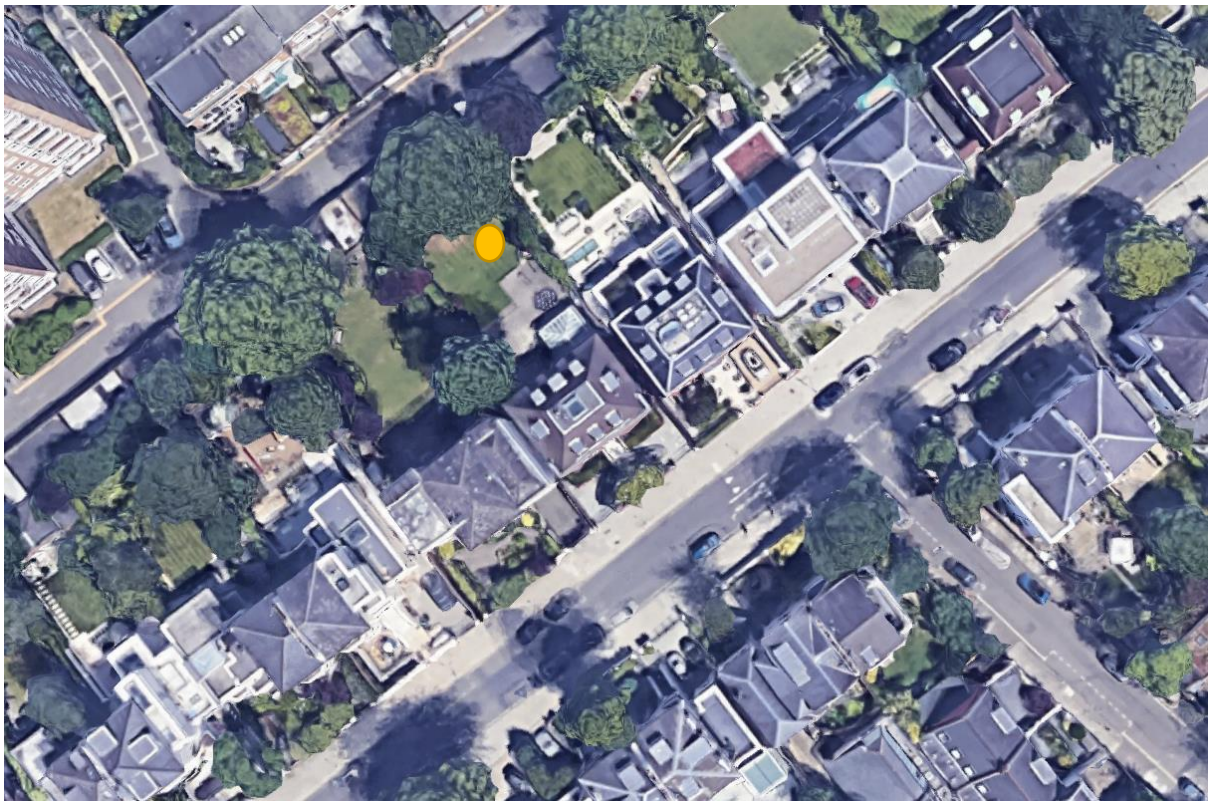
Source: Google Maps

4. ENVIRONMENTAL NOISE SURVEY METHODOLOGY

An unmanned environmental noise survey was undertaken at a single measurement location at ground floor level to the rear of the site. The survey was undertaken between 12:00 hours on the 16th February and 12:00 hours on the 17th February 2021. A survey at this time covers the most sensitive period of time in which the mechanical plant may be operational.

Ambient, background and maximum noise levels (L_{Aeq}, L_{A90} and L_{Amax} respectively) were measured throughout the noise survey in continuous 15-minute periods. The approximate measurement position is indicated in **orange** on Figure 4.1 below.

Figure 4.1 Site Plan Showing Approximate Location of Measurement Position



Source: Google Maps

The sound level meter microphone was positioned on a tripod at a height of 1.5 metres in the middle of the rear garden. The position is considered to be in free-field and therefore no façade correction will be applied. The monitoring position is considered representative of background noise levels at the nearest identified noise sensitive properties. The monitoring position was chosen for equipment security reasons also.

The equipment used for the noise survey is summarised in Table 4.1.

Table 4.1 Description of Equipment used for Noise Survey

Equipment	Description	Quantity	Serial Number
Larson Davis Sound Expert LxT	Type 1 automated logging sound level meter	1	0004702
Larson Davis 377B02	½" microphone	1	159519
Larson Davis	Pre-amplifier	1	042610
Larson Davis CAL200	Class 1 Calibrator	1	11706

The noise survey and measurements were conducted in accordance with BS7445-1:2003 '*Description and measurement of environmental noise. Guide to quantities and procedures'*.

Weather conditions throughout the entire noise survey period were noted to be cool (approx. 7-11° Celsius), broken clouds (30 to 70% cloud cover approximately) with a light wind (<5m/s). These weather conditions were checked against and confirmed by the use of the Met Office mobile application available on smart phone technology. These conditions were maintained throughout the majority of the survey period and are considered reasonable for undertaking environmental noise measurements.

The noise monitoring equipment was field calibrated before and after the noise survey period. No significant drift was recorded (±0.3 dB). Equipment calibration certificates can be provided upon request.

5. NOISE SURVEY RESULTS AND OBSERVATIONS

5.1 Results

A summary of the measured ambient and background noise levels during the proposed operational hours are shown in Table 5.1 below (full monitoring data can be found in Appendix C).

Table 5.1 Measured ambient and typical background sound pressure levels

Date / Period (hours)	Ambient Sound Pressure Level, dB $L_{Aeq,T}$	Typical Background Sound Pressure Level, dB $L_{A90,T}$
16/02/2021(12:00 to 23:00)	**43-56**	**44**
16/02/2021 – 17/02/2021 (23:00 to 07:00)	**36-50**	**36**
17/02/2021(07:00 to 12:00)	**48-53**	**46**

Day Time 1-hour measurements and Night-Time 15-minute measurements

The lowest typical background noise level at the measurement position during the survey, at the time in which the plant could be operational, is **36dB** $L_{A90,15min}$.

5.2 Observations

Given that the noise survey was unmanned, noise sources could not be identified. However, at the beginning and end of the survey background noise was dominated by noise from the vehicles on the local road network and nearby construction work. After analysis of the data no significant abnormal noise source(s) were identifiable. It is considered that the measured noise levels are reasonable given the location of the measurement position.

6. EXTERNAL NOISE EMISSION LIMITS

6.1 Local Authority Requirements

The site lies within the jurisdiction of the Local Authority, Camden Borough Council. The following requirements for commercial plant have previously been requested by the Local Authority:

"Where appropriate and within the scope of the document 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 10 dB below background (15dB if tonal components are present) should be considered as the design criterion."

For the purposes of this report, an assessment has been undertaken in line with BS 4142:2014. A design criterion of achieving a minimum 10dB(A) below the background noise level has been adopted in line with the Local Authorities policy. Taking the noise monitoring data in Section 5 and Local Authority requirements above, the following design target has been adopted for mechanical plant as provided in Table 6.1.

Table 6.1 Maximum noise emission design target at residential premises

Date / Period (hours)	Typical Background Sound Pressure Level, dB $L_{A90,15min}$	Rating noise level at nearest residential facade, dB $L_{Aeq,T}$
16/02/2021 – 17/02/2021 (23:00 to 07:00)	**36**	**26**

6.2 BS 4142:2014

BS 4142:2014 "Methods for rating and assessing industrial and commercial sound" presents a method for assessing the significance and possible adverse impact due to an industrial noise source, based on a comparison of the source noise levels and the background noise levels, both of which are measured or predicted at a noise sensitive receiver e.g. a residential property.

The specific noise level due to the source is determined, with a series of corrections for tonality, impulsivity, intermittency or other unusual characteristic. The rating level is then compared to the background noise level and the significance of the new noise source likelihood of any adverse impact is determined in accordance with the following 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 occur. 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."

7. AIR CONDITIONING UNITS AND ASSOCIATED NOISE LEVELS

The following items of plant are installed at the rear of the premises.

Table 7.0 Air Conditioning Units

External Plant Item	Make	Model	Reference Noise Level* $L_{P(A)}$
Air Conditioning Unit	Daikin	RYYQ18U7Y1B	62dB
Air Conditioning Unit	Daikin	RXYSCQ5TMV1B	52dB

*Reference sound pressure levels at 1m. Manufacturer's specifications are provided in Appendix B.

In reference to section 6 of this report, a penalty addition (+3dB) has been applied for intermittency as the units will automatically switch on & off as required. Penalty additions have not been applied for tonality as manufacturers' data shows no significant characteristics, or for impulsiveness as it is considered that these characteristics will not be perceptible sufficient to attract attention at the noise receptors. Penalty additions have not been applied for any other sound characteristics as mechanical plant of this type generally do not demonstrate such features.

7.1 Plant Enclosure

A permanent partial plant enclosure will be fitted around the installed air conditioning units. The enclosure will be fitted on all sides except the roof. Due to the enclosure, there will be no line of sight to any residential windows, therefore attenuation due to barrier loss has also been considered (calculations are provided in Appendix D).

8. NOISE IMPACT ASSESSMENT

This section presents calculations to predict the noise impact of the air conditioning units, located at the site, at the nearest noise sensitive properties.

8.1 Proposed Operational Hours and Background Noise Levels

The air conditioning units will operate as required 24 hours-a-day, 7 days-a-week.

The lowest typical background noise level at the measurement position during the survey is **36dB** $L_{A90,15min}$. The design range is **26dB** $L_{Aeq,T}$ at the façade of the nearest residential premises.

8.2 Nearest Noise Sensitive Properties

The nearest sensitive residential receptors were noted to be the first-floor windows located on the rear façade of 43 Queen's Grove at approximate distances of 23 and 24 metres from the air conditioning units.

8.3 Description of Calculation Process

In accordance with the methodologies of BS 4142:2014, calculations have been undertaken to predict noise levels in which the air conditioning units could be operational at their maximum level. Given the distances between the noise sources and the noise sensitive receptors, point source calculations have been used.

8.4 Noise Level Predictions

Calculations to predict the noise of the air conditioning units operating at the facade of the residential property are given below. Full calculations are provided in Appendix D.

The rating noise level at the 1st floor windows, with the mechanical plant operating, is predicted to be **14dB $L_{Aeq,T}$** which is **22dB(A) below** the typical background noise level (36dB $L_{A90,\ 15min}$).

In accordance with BS 4142:2014 guidance, noise from the mechanical plant ***"is an indication of the specific sound source having a low impact"***. *The lower the rating level is relative to the measured background level, the less likely it is that the specific sound source will have an adverse impact.*

8.5 Vibration

In addition to the control of airborne noise transfer, it is important to consider the transfer of noise as vibration to adjacent properties as well as any sensitive areas of the same building. Vibration from the plant is not expected, however, as a precaution plant should wherever possible be installed on suitable type isolators.

Uncertainty

The levels of uncertainty in the data and calculations are considered to be low given the robust exercise undertaken in noise monitoring and the confidence in the data statistical analysis. Manufacturers' data for the plant is highly likely to be robust. Detailed calculations and resultant noise levels at the residential location are considered to be confidently predicted.

9. CONCLUSION

Sound Licensing has undertaken an environmental noise survey at the site in order to determine prevailing background noise levels that are representative of the nearest noise sensitive properties. The operation of the air conditioning units, in accordance with BS 4142:2014 guidance, indicates to creating a low impact. All worst-case scenarios have been applied to the assessment. The predicted cumulative operating noise level of the air conditioning units is demonstrated to comply with the London Borough of Camden Council's policy.

APPENDIX A – Acoustic Terminology

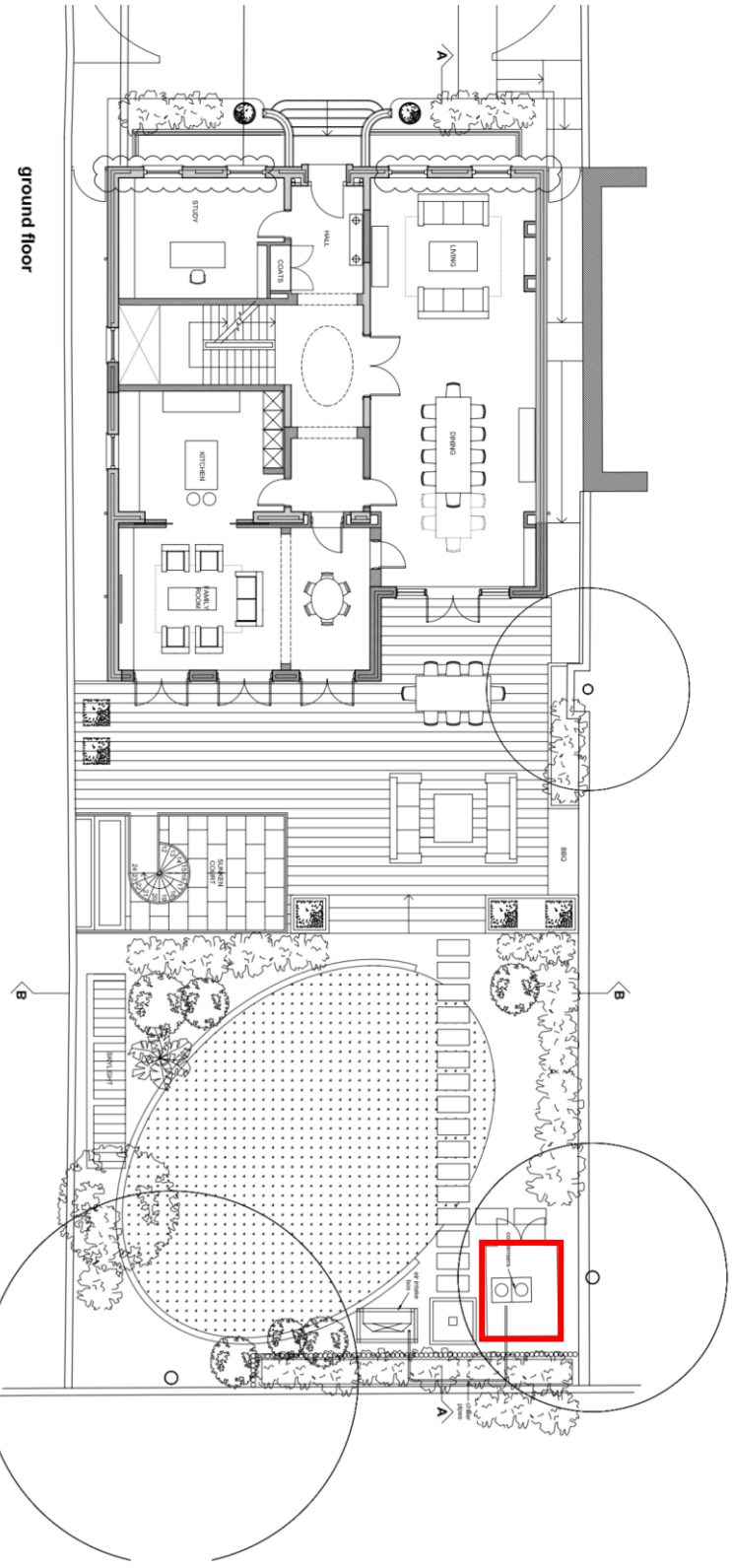
Parameter	Description
Acoustic environment	Sound from all sound sources as modified by the environment
Ambient sound	Totally encompassing sound in a given situation at a given time, usually composed of sound from many sources near and far
Ambient sound level, La = LAeq,T	Equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time, usually from many sources near and far, at the assessment location over a given time interval, T
Background sound level, LA90,T	A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels
Decibel (dB)	A logarithmic scale representing the sound pressure or power level relative to the threshold of hearing ($20x10^{-6}$ Pascals).
Equivalent continuous A-weighted sound pressure level, LAeq,T	Value of the A-weighted sound pressure level in decibels of continuous steady sound that, within a specified time interval, T = t2 – t1, has the same mean-squared sound pressure as a sound that varies with time
Measurement time interval, Tm	Total time over which measurements are taken
Rating level, LAr,Tr	Specific sound level plus any adjustment for the characteristic features of the sound
Reference time interval, Tr	Specified interval over which the specific sound level is determined
Residual sound	Ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound
Residual sound level, Lr = LAeq,T	Equivalent continuous A-weighted sound pressure level of the residual sound at the assessment location over a given time interval, T
Specific sound level, Ls = LAeq,Tr	Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, Tr
Specific sound source	Sound source being assessed

References:

BS 4142:2014 'Methods for rating and assessing industrial and commercial sound'

APPENDIX B – Figures and Data Sheets

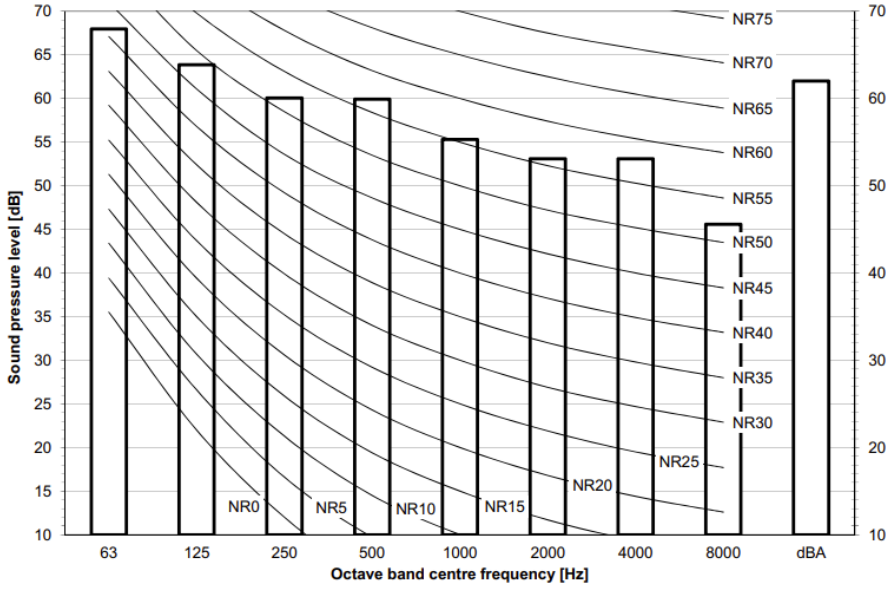
Proposed Ground Floor Plan



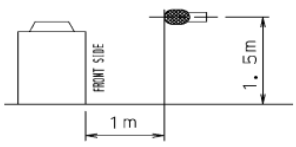
Daikin RYYQ18U7Y1B

DAIKIN

Acoustic Data



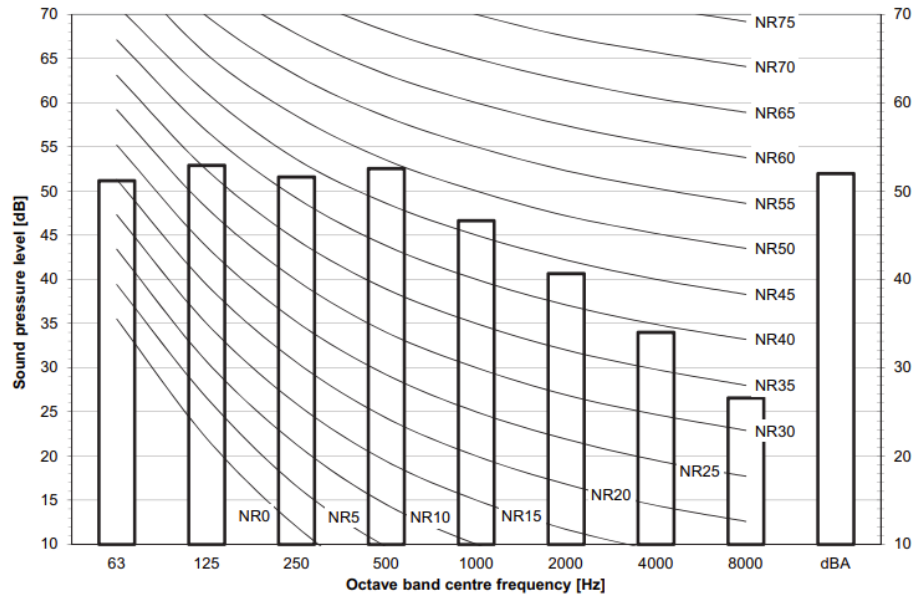
Notes
Data is valid at free field condition.
Data is valid at nominal operation condition.
dBA = A-weighted sound pressure level (A scale according to IEC).
Reference acoustic pressure 0 dB = 20 µPa



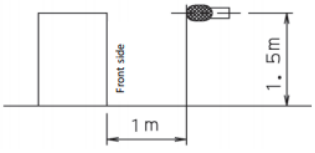
Daikin RXYSCQ5TMV1B

> RXYSCQ4TMV1B
> RXYSCQ5TMV1B

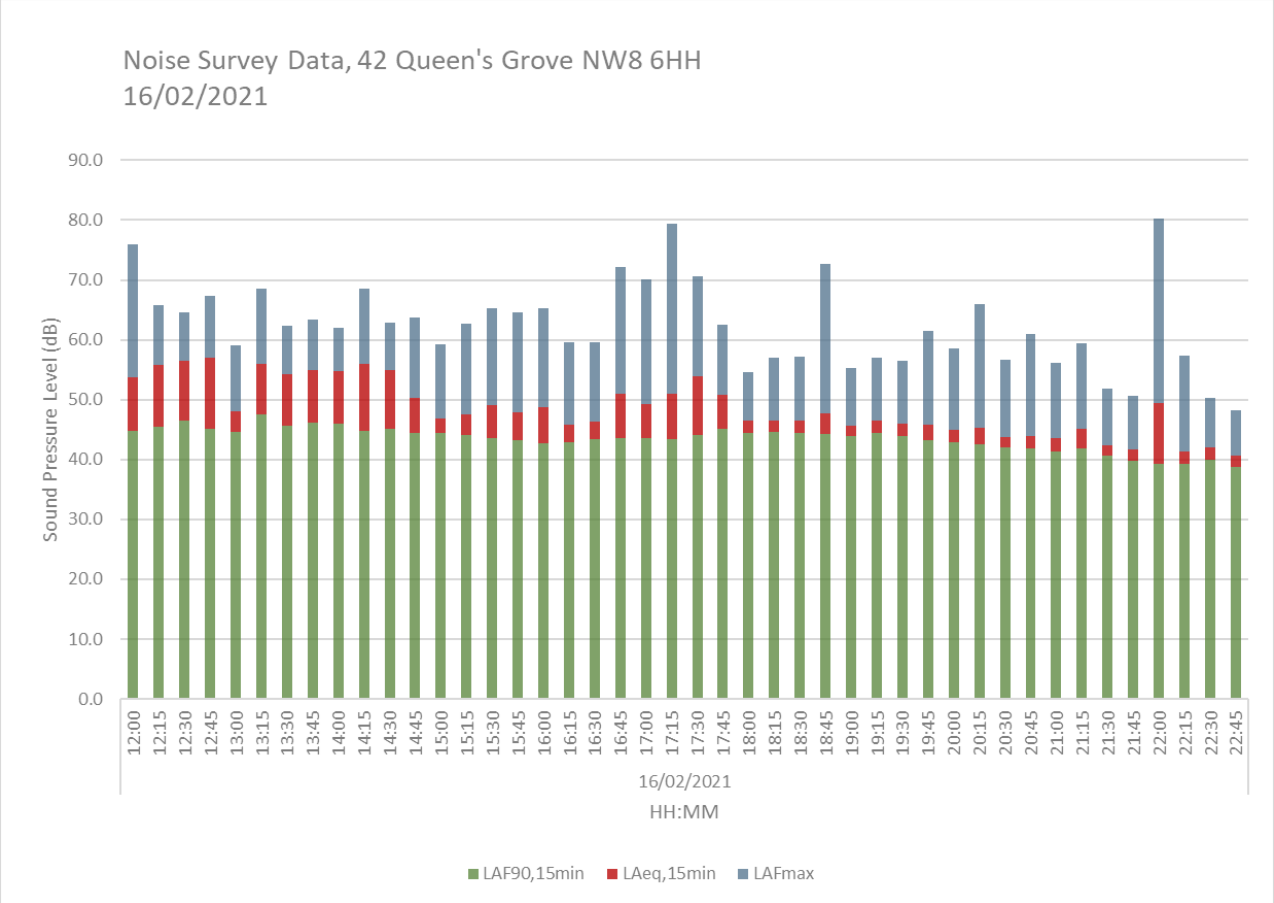
Acoustic Data



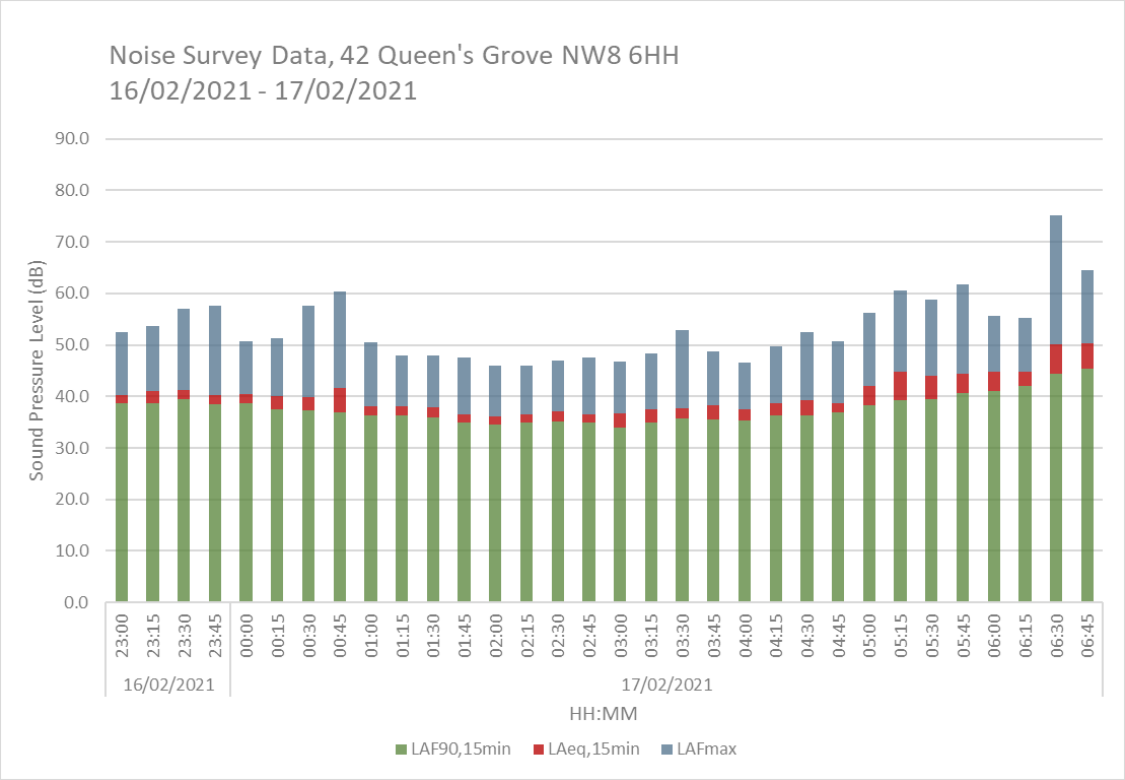
Notes
- Data is valid at free field condition.
- Data is valid at nominal operation condition.
- dBA = A-weighted sound pressure level (A scale according to IEC).
- Reference acoustic pressure 0 dB = 20 µPa



APPENDIX C – Noise monitoring Data



Date	Time	$L_{Aeq,15min}$	L_{AFmax}	$L_{AF90,15min}$	$L_{Aeq,1hour}$	$L_{AF90,1hour}$	Date	Time	$L_{Aeq,15min}$	L_{AFmax}	$L_{AF90,15min}$	$L_{Aeq,1hour}$	$L_{AF90,1hour}$
16/02/2021	12:00	53.7	75.9	44.8	56.0	45.5	16/02/2021	18:00	46.5	54.6	44.4	46.9	44.4
	12:15	55.8	65.8	45.5				18:15	46.5	57.0	44.6		
	12:30	56.6	64.6	46.5				18:30	46.6	57.2	44.4		
	12:45	57.1	67.4	45.1				18:45	47.7	72.6	44.3		
	13:00	48.0	59.1	44.6	54.1	46.1		19:00	45.7	55.3	43.9	46.0	43.9
	13:15	55.9	68.6	47.5				19:15	46.4	56.9	44.5		
	13:30	54.2	62.4	45.7				19:30	46.0	56.4	44.0		
	13:45	54.9	63.3	46.2				19:45	45.9	61.6	43.3		
	14:00	54.8	62.1	46.0	54.5	45.1		20:00	45.0	58.6	42.9	44.6	42.4
	14:15	55.9	68.5	44.7				20:15	45.3	65.9	42.5		
	14:30	54.9	62.8	45.2				20:30	43.8	56.7	42.1		
	14:45	50.3	63.7	44.5				20:45	43.9	61.0	41.9		
	15:00	46.8	59.3	44.5	47.9	43.9		21:00	43.5	56.2	41.4	43.3	41.0
	15:15	47.5	62.8	44.1				21:15	45.1	59.4	41.8		
	15:30	49.2	65.2	43.6				21:30	42.4	51.8	40.7		
	15:45	47.9	64.6	43.2				21:45	41.7	50.7	39.8		
	16:00	48.8	65.2	42.7	48.5	43.1		22:00	49.5	80.2	39.2	45.1	39.3
	16:15	45.8	59.5	42.9				22:15	41.4	57.4	39.2		
	16:30	46.3	59.6	43.4				22:30	42.0	50.3	40.0		
	16:45	50.9	72.1	43.5				22:45	40.7	48.2	38.8		
	17:00	49.2	70.2	43.5	51.6	44.1							
	17:15	51.0	79.5	43.4									
	17:30	53.8	70.6	44.1									
	17:45	50.8	62.5	45.2									



Date	Time	$L_{Aeq,15min}$	L_{AFmax}	$L_{AF90,15min}$
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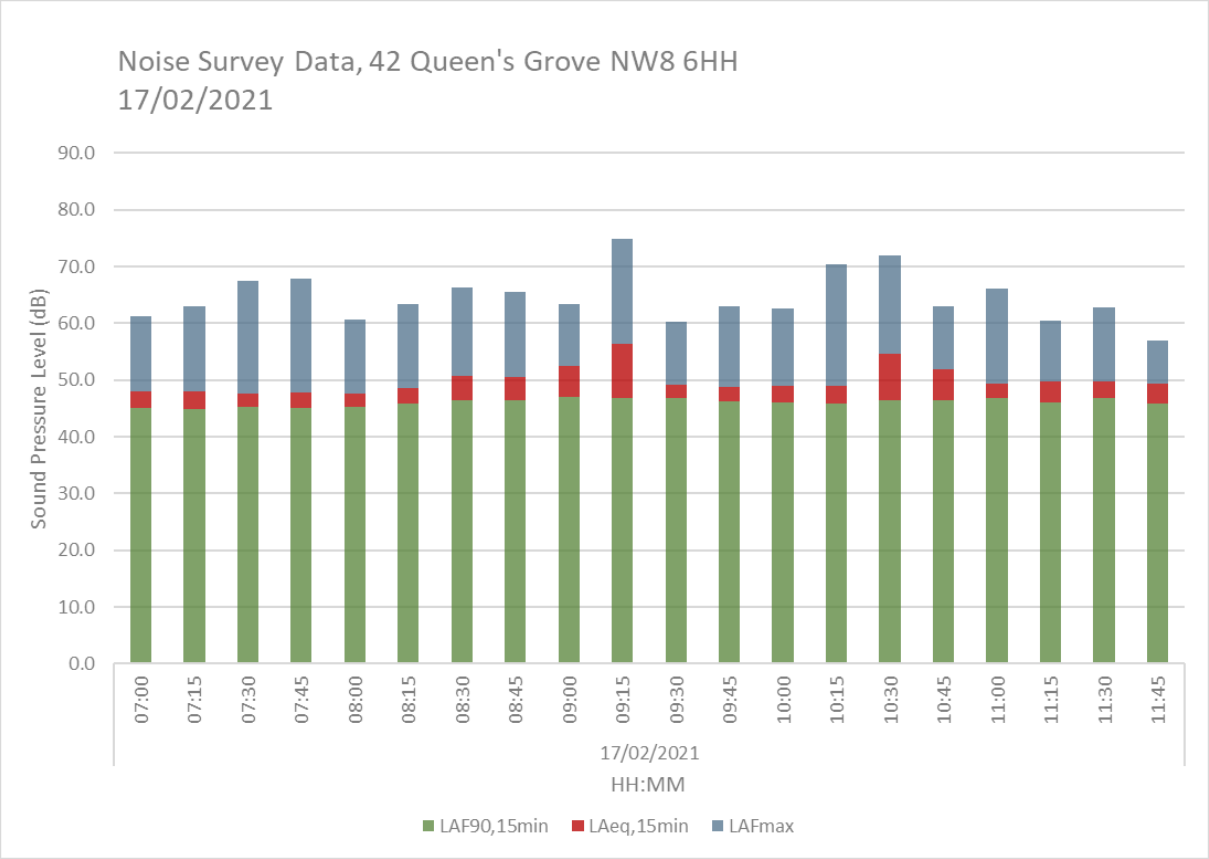
	23:30	41.3	57.0	39.5
	23:45	40.2	57.5	38.5
17/02/2021	00:00	40.5	50.7	38.6
	00:15	40.1	51.4	37.5
	00:30	39.8	57.6	37.3
	00:45	41.6	60.4	37.0
	01:00	38.1	50.5	36.3
	01:15	38.1	48.0	36.4
	01:30	37.9	48.0	36.0
	01:45	36.6	47.6	34.9
	02:00	36.1	46.0	34.6
	02:15	36.5	45.9	34.9
	02:30	37.1	47.0	35.1
	02:45	36.6	47.6	34.9
	03:00	36.7	46.7	33.9
	03:15	37.5	48.3	34.9
	03:30	37.6	52.9	35.7
	03:45	38.2	48.7	35.5
	04:00	37.5	46.6	35.4
	04:15	38.7	49.7	36.3
	04:30	39.3	52.5	36.3
	04:45	38.7	50.8	36.9
	05:00	42.0	56.2	38.3
	05:15	44.7	60.6	39.2
	05:30	44.0	58.7	39.5
	05:45	44.4	61.8	40.7
	06:00	44.8	55.7	41.1
	06:15	44.9	55.2	42.1
	06:30	50.2	75.2	44.3
	06:45	50.3	64.5	45.3



Date	Time	$L_{Aeq,15min}$	L_{AFmax}	$L_{AF90,15min}$	$L_{Aeq,1hour}$	$L_{AF90,1hour}$
17/02/2021	07:00	48.0	61.2	45.0	47.9	45.0
	07:15	48.0	63.0	44.8		
	07:30	47.6	67.5	45.2		
	07:45	47.9	67.8	45.1		
	08:00	47.5	60.7	45.2	49.5	46.0
	08:15	48.7	63.4	45.9		
	08:30	50.7	66.3	46.5		
	08:45	50.5	65.5	46.4		
	09:00	52.5	63.4	47.0	52.8	46.8
	09:15	56.3	74.9	46.9		
	09:30	49.2	60.3	46.9		
	09:45	48.8	63.0	46.2		
	10:00	48.9	62.5	46.1	51.7	46.2
	10:15	49.0	70.4	45.9		
	10:30	54.6	71.9	46.4		
	10:45	51.8	63.0	46.4		
	11:00	49.3	66.2	46.8	49.5	46.4
	11:15	49.7	60.4	46.1		
	11:30	49.7	62.9	46.9		
	11:45	49.3	56.9	45.9		

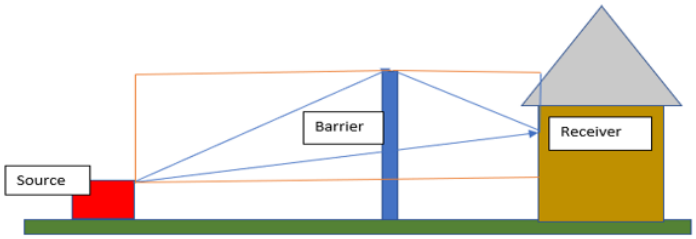
APPENDIX D – Calculations

Daikin RYYQ18U7Y1B

Enclosure/Barrier Attenuation Calculation

Applicable where barrier breaks line of sight between source and receiver

Example Illustration of Barrier Attenuation



		Metres
Source to Barrier		1.5
Receiver to Barrier		23
Source to Receiver		24

Path Difference	0.5

Frequency Hz	63	125	250	500	1000	2000	4000	8000
Barrier Correction	8.2	10.1	12.4	15.1	17.9	20.8	23.7	26.7

Attenuation per double distance required = 6 dB
(6dB for LpA recommended) Enter Distance = Metres 24

	Frequency Hz								
	63	125	250	500	1000	2000	4000	8000	Total
	68	64	60	60	55	53	53	46	70.64
Total LW	68.0	64.0	60.0	60.0	55.0	53.0	53.0	46.0	70.64
'A' Weight	26.2	16.1	8.6	3.2	0	-1.2	-1	1.1	
LWA (Power)	41.8	47.9	51.4	56.8	55.0	54.2	54.0	44.9	61.92
LPA at New Dist'	6.29	12.39	15.89	21.29	19.49	18.69	18.49	9.39	26.41
BARRIER	8.2	10.1	12.4	15.1	17.9	20.8	23.7	26.7	
LPA After Insert	**-1.95**	**2.27**	**3.44**	**6.22**	**1.62**	**-2.09**	**-5.24**	**-17.33**	**10.45**

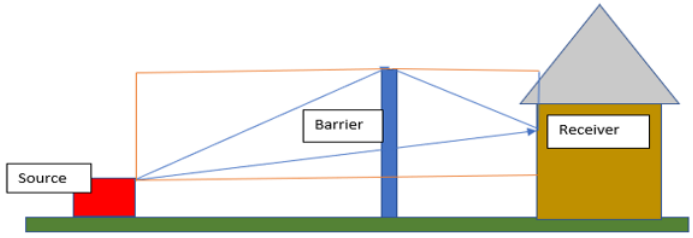
Sound Pressure Level @ Nearest Sensitive Receptor = 10dB $L_{Aeq,T}$

Daikin RXYSCQ5TMV1B

Enclosure/Barrier Attenuation Calculation

Applicable where barrier breaks line of sight between source and receiver

Example Illustration of Barrier Attenuation



		Metres
Source to Barrier		0.7
Receiver to Barrier		23
Source to Receiver		23

Path Difference	0.7

Frequency Hz	63	125	250	500	1000	2000	4000	8000
Barrier Correction	9.1	11.2	13.7	16.4	19.3	22.2	25.2	28.2

Attenuation per double distance required =				6	dB			Metres	
(6dB for LpA recommended)					Enter Distance =			23	
	Frequency Hz								
	63	125	250	500	1000	2000	4000	8000	Total
	51	53	52	53	46	41	34	27	58.69
Total LW	51.0	53.0	52.0	53.0	46.0	41.0	34.0	27.0	58.69
'A' Weight	26.2	16.1	8.6	3.2	0	-1.2	-1	1.1	
LWA (Power)	24.8	36.9	43.4	49.8	46.0	42.2	35.0	25.9	52.61
LPA at New Dist'	-10.34	1.76	8.26	14.66	10.86	7.06	-0.14	-9.22	17.47
BARRIER	9.1	11.2	13.7	16.4	19.3	22.2	25.2	28.2	
LPA After Insert	**-19.45**	**-9.45**	**-5.43**	**-1.76**	**-8.42**	**-15.15**	**-25.32**	**-37.39**	**0.99**

Sound Pressure Level @ Nearest Sensitive Receptor = 1dB $L_{Aeq,T}$

Cumulative

Adding dB

Levels to be added (Max. of eight)

Enter values	10	1	0	0	0	0	0	0

Total = **10.5 dB**

Cumulative Sound Pressure Level @ Nearest Sensitive Receptor + Intermittency (3dB) = 14dB $L_{Aeq,T}$