



47 Upper Brook Street,  
Mayfair, London, W1K 2BW  
Noise Impact Assessment

*For Preetpal Singh Walia*

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*47 Upper Brook Street, Mayfair, London, W1K 2BW*

## *Noise Impact Assessment*

### **1. INTRODUCTION**

Hydrock Consultants have been appointed by Preetpal Singh Walia to provide acoustic consultancy services in relation to the proposed plant installation at 47 Upper Brook Street, Mayfair, London, W1K 2BW in accordance with the requirements of the Mayfair Estate Management Scheme and City of Westminster.

Planning legislation, guidance documents and Local Authority policy have been consulted in order to undertake a noise measurement survey on and around the proposed development with regards to mechanical services plant proposed to be installed.

Prevailing noise levels have been established for compliance with the set criteria.

This report presents details of the noise assessment methodology and available guidance used to assess the acoustic impact of the proposed mechanical plant on the nearest noise sensitive receivers.

## 2. RELEVANT PLANNING CONDITIONS AND NOISE CRITERIA

Noise emission criteria for proposed plant as provided by Mayfair Estate Management Scheme (ref: DB/SR/43.3138(L1), Condition 5) are as follows:

*"The new mechanical and electrical plant hereby approved and any associated equipment shall be designed to a level of 10dB below the lowest measured background noise ( $L_{A90, 15}$  minutes) as measured one metre from the nearest affected window of the nearest affected residential property. The assessment of the background noise shall be made in the absence of all operating plant that services the premises that is the subject of this application. In addition, the plant shall not create an audible tonal noise nor cause perceptible vibration to be transmitted through the structure of the building"*

The noise criteria relating to fixed plant installations as included within the City of Westminster document *Standard Conditions (Dec 2013)* are as follows:

*"(C56BB)*

*Noise from plant & machinery for areas above WHO Guideline levels, where the existing external ambient noise level does not exceed WHO Guideline levels of either  $L_{Aeq, 16hrs}$  55dB daytime (07.00-23.00 hrs) or  $L_{Aeq, 8hrs}$  45dB night-time (23.00-07.00hrs)*

*Where noise emitted from the proposed plant and machinery will not contain tones or will not be intermittent, the 'A' weighted sound pressure level from the plant and machinery (including non-emergency auxiliary plant and generators) hereby permitted, when operating at its noisiest, shall not at any time exceed a value of 5 dB below the minimum external background noise, at a point 1 metre outside any window of any residential and other noise sensitive property, unless and until a fixed maximum noise level is approved by the City Council. The background level should be expressed in terms of the lowest  $L_{A90, 15 mins}$  during the proposed hours of operation. The plant-specific noise level should be expressed as  $L_{AeqTm}$ , and shall be representative of the plant operating at its maximum.*

*or*

*Where noise emitted from the proposed plant and machinery will contain tones or will be intermittent, the 'A' weighted sound pressure level from the plant and machinery (including non-emergency auxiliary plant and generators) hereby permitted, when operating at its noisiest, shall not at any time exceed a value of 10 dB below the minimum external background noise, at a point 1 metre outside any window of any residential and other noise sensitive property, unless and until a fixed maximum noise level is approved by the City Council. The background level should be expressed in terms of the lowest  $L_{A90, 15 mins}$  during the proposed hours of operation. The plant specific noise level should be expressed as  $L_{AeqTm}$ , and shall be representative of the plant operating at its maximum"*

### 3. SITE DESCRIPTION

The building is bounded by Candy Capital to the North, Park Street to the West and existing properties to all other sides.

The location of the site is indicated in red and the nearest noise sensitive receivers (NSR) indicated in green, as shown in Figure 1.



Figure 1: Proposed development site and nearest noise sensitive receivers (ref: google maps)

## 4. ENVIRONMENTAL NOISE SURVEY

### 4.1 Survey Overview

Noise monitoring was undertaken at the site, between the 28th and 29th September 2020 in line with the procedures described within the guidance outlined in British Standard 7445-1:2003 - Description and measurement of environmental noise. Guide to quantities and procedures.

Noise measurements were made using a Class 1, integrating sound level meter. The microphone was positioned vertically on a tripod 1.2m above the ground and at 1m from the property's facade. A wind shield was fitted to the monitoring equipment at all times.

The sound level meter was calibrated to a reference level of 94 dB at 1kHz both prior to, and on completion of, the noise survey. No significant drift in calibration was noted during the survey ( $\leq 0.5$  dB).

Monitoring was carried out by a suitably qualified Acoustic Consultant. Noise measurements were carried out with laboratory calibrated equipment within the appropriate calibration interval.

Noise monitoring took place during conducive conditions, with wind speeds less than 5ms<sup>-1</sup> and no significant precipitation

### 4.2 Measurement Instrumentation

Details of the equipment used for the environmental noise measurements is shown in Table 1.

Instrument	Manufacturer	Type	Serial No. / Version	Type of Measurement
Sound Level Meter	01dB	Fusion	12242	Long term unattended and attended
Microphone		40CD	347053	
Acoustic Calibrator	Rion	NC74	35157400	Calibration

Table 1: Survey Equipment



## 4.3 Noise Monitoring Locations

Long term unattended noise monitoring was undertaken at the location shown below in Figures 1 and 2. This location was chosen in order to provide representative noise levels of the nearest noise sensitive receptors in relation to the proposed plant installation locations.

Considering that the microphone was positioned at lower ground floor with road traffic noise and other surrounding noise sources partially screened, the façade reflection correction of (+3dB) would not apply.



Figure 2: Monitoring Location (ref: google maps)



Figure 3: Monitoring Location

#### 4.4 Summary of Existing Noise Environment

The ambient noise profile of the area was dominated by road traffic noise from the surrounding streets.

#### 4.5 Summary of Existing Noise Levels

Measured ambient and minimum background noise levels at monitoring location have been separated in to daytime and night-time categories and are shown in Table 2.

Monitoring Location	Time Period	Measured Noise Level, L <sub>Aeq,T</sub> dB	Minimum Background L <sub>A90,15min</sub>
ML	Daytime 0700 - 2300	63	45
	Night-time 2300 - 0700	55	40

Table 2: Average ambient and minimum background measured noise levels during daytime and night-time

#### 4.6 Plant Noise Emission Limits

Based on the environmental noise survey results and the most onerous noise emission criteria provided by Mayfair Estate Management and City of Westminster described in Section 2, the noise emission limits for proposed plant at 1 metre from the nearest noise sensitive receptors are shown in Table 3.

Time Period	Noise Criterion at 1 metre from NSR (10dB below minimum Background L <sub>A90,15min</sub> )
Daytime 0700 - 2300	35
Night-time 2300 - 0700	30

Table 3: Noise emissions limits at 1 metre from the NSR during daytime and night-time

## 5. NOISE ASSESSMENT

### 5.1 Proposed Plant Information

Further to discussions with the Mechanical Engineer of the project, it is understood that a total of 4 No. condenser units are proposed at 3 locations (A, B, C) within the properties lower ground floor.

The make, model and noise emissions at 1m as provided by the manufacturers of the proposed plant are shown in Table 4. The proposed locations of the plant and nearest NSRs are shown in Figure 4.

Location	Plant Description	Sound pressure level (dBA) per Octave Band Frequency (Hz)								dB(A)
		63	125	250	500	1k	2k	4k	8k	
A	Daikin RXYSQ8TMYB1 *	60	63	55	52	47	48	42	34	55
B	Daikin RXYSQ8TMYB1*	60	63	55	52	47	48	42	34	55
C	Daikin 2MXM40M4V1B	53	54	49	46	42	37	33	27	48
C	Heronhill Friax EVA30**	No Spectral Noise Levels Available. Broadband Noise Level at 5m 37dB (including the BNS-Low Noise Kit recommended by the manufacturer)								

Table 4: Noise emissions limits at 1 metre from the NSR during daytime and night-time

\* Daikin RXYSQ8TMYB1 units are to operate under the night quite mode during the night-time. The noise emissions for the 3 different step modes are: Step 1: 47dBA, Step 2: 44 dBA, Step 3: 41 dBA. In order to represent worst case scenario, the night-time assessment would reflect an 8dB reduction across the spectral noise emissions for the Daikin RXYSQ8TMYB1 units, as per Step 1 - low noise mode.

\*\* In the absence of spectral noise data, assumed octave band noise emissions levels will be used for the purposes of the assessment calculations.



Figure 4: Proposed plant units location and nearest NSRs

## 5.2 Nearest Noise Sensitive Receivers

The approximate distance between the proposed plant locations and the nearest NSRs is shown in Table 5.

Plant Location	NSR 1 Distance in Metres (m)	NSR 2 Distance in Metres (m)
A	4m	20m
B	12m	11m
C	20m	5m

Table 5: Distance in metres between plant locations and nearest NSRs

## 5.3 Predicted Noise Level at NSRs

Based on the noise emissions and proposed installation locations of the plant described above, detailed acoustic calculations have been undertaken during both daytime and night-time in order to predict the noise levels at NSR 1 and NSR 2 and determine whether mitigation measures are required to demonstrate compliance with the planning requirements.

The aforementioned acoustic calculations can be found in **Appendix B**.

The predicted noise levels at 1 metre from both NSRs windows without mitigation measures are shown in Table 6.

Time Period	Noise Criteria at 1 metre from NSR (10dB below minimum Background $L_{A90,15min}$ )	Noise Level at 1 metre from NSR 1 $L_p$ , dB	Noise Level at 1 metre from NSR 2 $L_p$ , dB
Daytime 0700 - 2300	35	42	40
Night-time 2300 - 0700	30	34	37

Table 6: Predicted Noise Levels at 1m from the NSRs windows (without mitigation measures)

### 5.3.1 Summary of Impact at NSR

As it can be seen above, noise emissions from the proposed plant would exceed the noise criteria at both NSRs. Specifically, the noise level during daytime is exceeded by 7dB at NSR 1 and 5dB at NSR 2, while during the night-time the noise level is exceeded by 4dB at NSR 1 and by 7dB at NSR 2.

It should be noted that, even though the noise level at the NSRs is exceeded by the aforementioned margin, this would not be considered to indicate an adverse impact at NSR due to the following reasons:

- The noise criterion has been established based on 10dB below the minimum  $L_{A90}$  rather than the representative as described in BS4142 (The standard method for assessing noise from fixed external plant items).
- It is assumed within the assessment that all plant would be operating at the same time and at maximum capacity which is unlikely to be the case. This further demonstrates that worst case scenario has already been taken into account.
- The predicted external noise level at 1 metre from the nearest receiving windows is 7dB higher than the internal ambient noise level described by BS 8233:2014: "Guidance on

sound insulation and noise reduction for buildings" in bedrooms during daytime (35dBA) and night (30dBA). It is appreciated within the aforementioned standard that even a partially open window can provide 10-15dB attenuation. This suggests that the external noise level from the proposed plant would have no significant impact internally.

However, in order to satisfy the planning conditions and Local Authority's requirements as outlined in Section 2, mitigation would need to be implemented in order to provide the required attenuation.

#### 5.4 Noise Control Strategy

In order to reduce noise emissions at the NSRs to within the noise criteria described above, a detailed noise control strategy comprising of acoustic enclosures around the proposed plant units at all locations is required.

The minimum insertion loss values required to be achieved by the acoustic enclosure are shown in Table 7 below.

Noise Control Strategy	Insertion Loss Levels (dB) in each Octave Frequency Band (Hz)							
	63	125	250	500	1000	2000	4000	8000
Acoustic Enclosure	6	6	8	10	14	18	16	15

Table 7: Proposed acoustic enclosures insertion loss

It should be noted that in addition to the acoustic enclosure, the Heronhill Friax EVA30 unit at location C would need to be installed within the BNS-Low Noise Kit recommended by the manufacturer.

#### 5.5 Discussion

As shown above, without mitigation measures the predicted noise emissions from the plant units would not satisfy the design criteria. Detail calculations have been undertaken taking into account the mitigation measures described in Section 5.4.

The acoustic calculations with mitigation measures are presented in **Appendix B**.

The anticipated noise level at the NSRs should the mitigation measures recommended above are followed, is shown in Table 8.

Time Period	Noise Criteria at 1 metre from NSR (10dB below minimum Background LA90,15min)	Noise Level at 1 metre from NSR 1 Lp, dB	Noise Level at 1 metre from NSR 2 Lp, dB
Daytime 0700 - 2300	35	34	31
Night-time 2300 - 0700	30	26	29

Table 8: Predicted Noise Levels at 1m from the NSRs windows (witht mitigation measures)

Through the above predictions, it has been demonstrated that noise emissions from the proposed plant are in full compliance with the Mayfair Estate Management Scheme and City of Westminster requirements.

## 6. SUMMARY

Hydrock Consultants have been appointed by Preetpal Singh Walia to provide acoustic consultancy services in relation to the proposed plant installation at 47 Upper Brook Street, Mayfair, London, W1K 2BW.

An environmental noise survey has allowed the background noise level and plant noise emission limits on site to be established. Based on the details provided by the design team, acoustic calculations have demonstrated that noise emissions from the proposed plant would fully satisfy the Mayfair Estate Management Scheme and City of Westminster planning requirements, provided that the mitigation measures described in Section 5.5 are adopted.

## Appendix A: Glossary of technical terms

Term	Description
dB (decibel)	The scale on which sound pressure level is expressed. Sound pressure level is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure (2x10 <sup>-5</sup> Pa).
dB(A)	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. 'A' - weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
L <sub>Aeq,T</sub>	L <sub>Aeq</sub> is defined as the notional steady sound level which, over a stated period of time (T), would contain the same amount of acoustical energy as the A - weighted fluctuating sound measured over that period.
L <sub>Amax</sub>	L <sub>Amax</sub> is the maximum A - weighted sound pressure level recorded over the period stated. L <sub>Amax</sub> is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall L <sub>eq</sub> noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
L <sub>10</sub> and L <sub>90</sub>	If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The L <sub>n</sub> indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence L <sub>10</sub> is the level exceeded for 10% of the time, and the L <sub>90</sub> is the level exceeded for 90% of the time.
R <sub>w</sub>	R <sub>w</sub> is the single-number quantity which characterizes the sound insulating properties of a given material over a range of frequencies. This is typically measured in a laboratory in accordance with BS EN ISO 717-1.
D <sub>n,e,w</sub>	D <sub>n,e,w</sub> is the single number quantity which characterizes the airborne sound insulation performance across a given 'element' and is typically used to describe the acoustic performance of trickle ventilators etc.
C <sub>tr</sub>	C <sub>tr</sub> is a correction term applied to single-number sound insulation values (R <sub>w</sub> , D <sub>n,e,w</sub> etc.) to afford additional weighting against low frequency performance.
Free-field Level	A sound field determined at a point away from reflective surfaces other than the ground with no significant contributions due to sound from other reflective surfaces. Generally, as measured outside and at least 3m from buildings.



## Appendix B: Acoustic Calculations

## Daytime Plant Noise Calculations at NSR1 Without Mitigation

*Daytime Noise Criterion: 35dB at 1m from NSR*

<i>Description</i>	<i>1/1 Octave Band Frequency, (Hz)</i>								<i>dB(A)</i>
	<i>63</i>	<i>125</i>	<i>250</i>	<i>500</i>	<i>1k</i>	<i>2k</i>	<i>4k</i>	<i>8k</i>	
<b>Location A</b>									
Daikin RXYSQ8TMYB1 Lp at 1m	60	63	55	52	47	48	42	34	55
Distance attenuation	-12	-12	-12	-12	-12	-12	-12	-12	
Correction due to reflections	6	6	6	6	6	6	6	6	
Directivity	-2	-3	-6	-11	-11	-11	-11	-11	
<b>Lp at NSR1</b>	<b>52</b>	<b>54</b>	<b>43</b>	<b>35</b>	<b>30</b>	<b>31</b>	<b>25</b>	<b>17</b>	<b>41</b>
<b>Location B</b>									
Daikin RXYSQ8TMYB1 Lp at 1m	60	63	55	52	47	48	42	34	55
Distance attenuation	-22	-22	-22	-22	-22	-22	-22	-22	
Correction due to reflections	3	3	3	3	3	3	3	3	
Directivity	-1	-1	-2	-2	-7	-11	-11	-11	
<b>Lp at NSR1</b>	<b>41</b>	<b>43</b>	<b>34</b>	<b>31</b>	<b>21</b>	<b>18</b>	<b>12</b>	<b>4</b>	<b>33</b>
<b>Location C</b>									
Daikin 2MXM40M4V1B Lp at 1m	53	54	49	46	42	37	33	27	48
Distance attenuation	-26	-26	-26	-26	-26	-26	-26	-26	
Barrier attenuation provided by the building	-15	-18	-21	-24	-27	-30	-33	-36	
Correction due to reflections	6	6	6	6	6	6	6	6	
<b>Lp at NSR1</b>	<b>18</b>	<b>16</b>	<b>8</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>8</b>
<b>Location C</b>									
Heronhill Friax EVA30 LpA at 5m	42	43	38	36	31	26	22	16	37
Lp correction at 1m	56	57	52	50	45	40	36	30	51
Distance attenuation	-26	-26	-26	-26	-26	-26	-26	-26	
Barrier attenuation provided by the building	-15	-18	-21	-24	-27	-30	-33	-36	
Correction due to reflections	6	6	6	6	6	6	6	6	
<b>Lp at NSR1</b>	<b>21</b>	<b>19</b>	<b>11</b>	<b>6</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>10</b>
<b>Total Lp at NSR1</b>	<b>52</b>	<b>54</b>	<b>44</b>	<b>37</b>	<b>31</b>	<b>31</b>	<b>25</b>	<b>17</b>	<b>42</b>

## Night-Time Plant Noise Calculations at NSR1 Without Mitigation

Night-time Noise Criterion: 30dB at 1m from NSR

Description	1/1 Octave Band Frequency, (Hz)								dB(A)
	63	125	250	500	1k	2k	4k	8k	
<b>Location A</b>									
Daikin RXYSQ8TMYB1 Lp at 1m	52	55	47	44	39	40	34	26	47
Distance attenuation	-12	-12	-12	-12	-12	-12	-12	-12	
Correction due to reflections	6	6	6	6	6	6	6	6	
Directivity	-2	-3	-6	-11	-11	-11	-11	-11	
<b>Lp at NSR1</b>	<b>44</b>	<b>46</b>	<b>35</b>	<b>27</b>	<b>22</b>	<b>23</b>	<b>17</b>	<b>9</b>	<b>33</b>
<b>Location B</b>									
Daikin RXYSQ8TMYB1 Lp at 1m	52	55	47	44	39	40	34	26	47
Distance attenuation	-22	-22	-22	-22	-22	-22	-22	-22	
Correction due to reflections	3	3	3	3	3	3	3	3	
Directivity	-1	-1	-2	-2	-7	-11	-11	-11	
<b>Lp at NSR1</b>	<b>33</b>	<b>35</b>	<b>26</b>	<b>23</b>	<b>13</b>	<b>10</b>	<b>4</b>	<b>0</b>	<b>25</b>
<b>Location C</b>									
Daikin 2MXM40M4V1B Lp at 1m	53	54	49	46	42	37	33	27	48
Distance attenuation	-26	-26	-26	-26	-26	-26	-26	-26	
Barrier attenuation provided by the building	-15	-18	-21	-24	-27	-30	-33	-36	
Correction due to reflections	6	6	6	6	6	6	6	6	
<b>Lp at NSR1</b>	<b>18</b>	<b>16</b>	<b>8</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>8</b>
<b>Location C</b>									
Heronhill Friax EVA30 LpA at 5m	42	43	38	36	31	26	22	16	37
Lp correction at 1m	56	57	52	50	45	40	36	30	51
Distance attenuation	-26	-26	-26	-26	-26	-26	-26	-26	
Barrier attenuation provided by the building	-15	-18	-21	-24	-27	-30	-33	-36	
Correction due to reflections	6	6	6	6	6	6	6	6	
<b>Lp at NSR1</b>	<b>21</b>	<b>19</b>	<b>11</b>	<b>6</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>10</b>
<b>Total Lp at NSR1</b>	<b>44</b>	<b>46</b>	<b>36</b>	<b>29</b>	<b>23</b>	<b>23</b>	<b>17</b>	<b>10</b>	<b>34</b>

## Daytime Plant Noise Calculations at NSR2 Without Mitigation

*Daytime Noise Criterion: 35dB at 1m from NSR*

Description	1/1 Octave Band Frequency, (Hz)								dB(A)
	63	125	250	500	1k	2k	4k	8k	
<b>Location A</b>									
Daikin RXYSQ8TMYB1 Lp at 1m	60	63	55	52	47	48	42	34	55
Distance attenuation (20m)	-26	-26	-26	-26	-26	-26	-26	-26	
Correction due to reflections	6	6	6	6	6	6	6	6	
Barrier attenuation provided by the building	-15	-18	-21	-24	-27	-30	-33	-36	
<b>Lp at NSR2</b>	<b>25</b>	<b>25</b>	<b>14</b>	<b>8</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>13</b>
<b>Location B</b>									
Daikin RXYSQ8TMYB1 Lp at 1m	60	63	55	52	47	48	42	34	55
Distance attenuation (11m)	-21	-21	-21	-21	-21	-21	-21	-21	
Correction due to reflections	3	3	3	3	3	3	3	3	
<b>Lp at NSR2</b>	<b>42</b>	<b>45</b>	<b>37</b>	<b>34</b>	<b>29</b>	<b>30</b>	<b>24</b>	<b>16</b>	<b>37</b>
<b>Location C</b>									
Daikin 2MXM40M4V1B Lp at 1m	53	54	49	46	42	37	33	27	48
Distance attenuation (5m)	-14	-14	-14	-14	-14	-14	-14	-14	
Directivity	-2	-3	-6	-11	-11	-11	-11	-11	
Correction due to reflections	6	6	6	6	6	6	6	6	
<b>Lp at NSR2</b>	<b>43</b>	<b>43</b>	<b>35</b>	<b>27</b>	<b>23</b>	<b>18</b>	<b>14</b>	<b>8</b>	<b>32</b>
<b>Location C</b>									
Heronhill Friax EVA30 LpA at 5m	42	43	38	36	31	26	22	16	37
Lp correction at 1m	56	57	52	50	45	40	36	30	51
Distance attenuation	-14	-14	-14	-14	-14	-14	-14	-14	
Barrier attenuation provided by the building	-2	-3	-6	-11	-11	-11	-11	-11	
Correction due to reflections	6	6	6	6	6	6	6	6	
<b>Lp at NSR2</b>	<b>46</b>	<b>46</b>	<b>38</b>	<b>31</b>	<b>26</b>	<b>21</b>	<b>17</b>	<b>11</b>	<b>35</b>
<b>Total Lp at NSR2</b>	<b>49</b>	<b>50</b>	<b>42</b>	<b>36</b>	<b>32</b>	<b>31</b>	<b>25</b>	<b>18</b>	<b>40</b>

## Night-time Plant Noise Calculations at NSR2 Without Mitigation

Night-time Noise Criterion: 30dB at 1m from NSR

Description	1/1 Octave Band Frequency, (Hz)								dB(A)
	63	125	250	500	1k	2k	4k	8k	
<b>Location A</b>									
Daikin RXYSQ8TMYB1 Lp at 1m	52	55	47	44	39	40	34	26	47
Distance attenuation (20m)	-26	-26	-26	-26	-26	-26	-26	-26	
Correction due to reflections	6	6	6	6	6	6	6	6	
Barrier attenuation provided by the building	-15	-18	-21	-24	-27	-30	-33	-36	
<b>Lp at NSR2</b>	<b>17</b>	<b>17</b>	<b>6</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>8</b>
<b>Location B</b>									
Daikin RXYSQ8TMYB1 Lp at 1m	52	55	47	44	39	40	34	26	47
Distance attenuation (11m)	-21	-21	-21	-21	-21	-21	-21	-21	
Correction due to reflections	3	3	3	3	3	3	3	3	
<b>Lp at NSR2</b>	<b>34</b>	<b>37</b>	<b>29</b>	<b>26</b>	<b>21</b>	<b>22</b>	<b>16</b>	<b>8</b>	<b>29</b>
<b>Location C</b>									
Daikin 2MXM40M4V1B Lp at 1m	53	54	49	46	42	37	33	27	48
Distance attenuation (5m)	-14	-14	-14	-14	-14	-14	-14	-14	
Directivity	-2	-3	-6	-11	-11	-11	-11	-11	
Correction due to reflections	6	6	6	6	6	6	6	6	
<b>Lp at NSR2</b>	<b>43</b>	<b>43</b>	<b>35</b>	<b>27</b>	<b>23</b>	<b>18</b>	<b>14</b>	<b>8</b>	<b>32</b>
<b>Location C</b>									
Heronhill Friax EVA30 LpA at 5m	42	43	38	36	31	26	22	16	37
Lp correction at 1m	56	57	52	50	45	40	36	30	51
Distance attenuation	-14	-14	-14	-14	-14	-14	-14	-14	
Barrier attenuation provided by the building	-2	-3	-6	-11	-11	-11	-11	-11	
Correction due to reflections	6	6	6	6	6	6	6	6	
<b>Lp at NSR2</b>	<b>46</b>	<b>46</b>	<b>38</b>	<b>31</b>	<b>26</b>	<b>21</b>	<b>17</b>	<b>11</b>	<b>35</b>
<b>Total Lp at NSR2</b>	<b>48</b>	<b>48</b>	<b>40</b>	<b>33</b>	<b>29</b>	<b>26</b>	<b>21</b>	<b>14</b>	<b>37</b>

## Daytime Plant Noise Calculations at NSR1 With Mitigation

*Daytime Noise Criterion: 35dB at 1m from NSR*

<i>Description</i>	<i>1/1 Octave Band Frequency, (Hz)</i>								<i>dB(A)</i>
	<i>63</i>	<i>125</i>	<i>250</i>	<i>500</i>	<i>1k</i>	<i>2k</i>	<i>4k</i>	<i>8k</i>	
<b>Location A</b>									
Daikin RXYSQ8TMYB1 Lp at 1m	60	63	55	52	47	48	42	34	55
Distance attenuation	-12	-12	-12	-12	-12	-12	-12	-12	
Correction due to reflections	6	6	6	6	6	6	6	6	
Directivity	-2	-3	-6	-11	-11	-11	-11	-11	
Required Acoustic Enclosure Sound Transmission Loss	-6	-6	-8	-10	-14	-18	-16	-15	
<b>Lp at NSR1</b>	<b>46</b>	<b>48</b>	<b>35</b>	<b>25</b>	<b>16</b>	<b>13</b>	<b>9</b>	<b>2</b>	<b>34</b>
<b>Location B</b>									
Daikin RXYSQ8TMYB1 Lp at 1m	60	63	55	52	47	48	42	34	55
Distance attenuation	-22	-22	-22	-22	-22	-22	-22	-22	
Correction due to reflections	3	3	3	3	3	3	3	3	
Directivity	-1	-1	-2	-2	-7	-11	-11	-11	
Required Acoustic Enclosure Sound Transmission Loss	-6	-6	-8	-10	-14	-18	-16	-15	
<b>Lp at NSR1</b>	<b>35</b>	<b>37</b>	<b>26</b>	<b>21</b>	<b>7</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>25</b>
<b>Location C</b>									
Daikin 2MXM40M4V1B Lp at 1m	53	54	49	46	42	37	33	27	48
Distance attenuation	-26	-26	-26	-26	-26	-26	-26	-26	
Barrier attenuation provided by the building	-15	-18	-21	-24	-27	-30	-33	-36	
Correction due to reflections	6	6	6	6	6	6	6	6	
Required Acoustic Enclosure Sound Transmission Loss	-6	-6	-8	-10	-14	-18	-16	-15	
<b>Lp at NSR1</b>	<b>12</b>	<b>10</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>7</b>
<b>Location C</b>									
Heronhill Friax EVA30 LpA at 5m	42	43	38	36	31	26	22	16	37
Lp correction at 1m	56	57	52	50	45	40	36	30	51
Distance attenuation	-26	-26	-26	-26	-26	-26	-26	-26	
Barrier attenuation provided by the building	-15	-18	-21	-24	-27	-30	-33	-36	
Correction due to reflections	6	6	6	6	6	6	6	6	
Required Acoustic Enclosure Sound Transmission Loss	-6	-6	-8	-10	-14	-18	-16	-15	
<b>Lp at NSR1</b>	<b>15</b>	<b>13</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>8</b>
<b>Total Lp at NSR1</b>	<b>46</b>	<b>48</b>	<b>36</b>	<b>27</b>	<b>17</b>	<b>14</b>	<b>10</b>	<b>7</b>	<b>34</b>

## Night-Time Plant Noise Calculations at NSR1 With Mitigation

*Night-time Noise Criterion: 30dB at 1m from NSR*

Description	1/1 Octave Band Frequency, (Hz)								dB(A)
	63	125	250	500	1k	2k	4k	8k	
<b>Location A</b>									
Daikin RXYSQ8TMYB1 Lp at 1m	52	55	47	44	39	40	34	26	47
Distance attenuation	-12	-12	-12	-12	-12	-12	-12	-12	
Correction due to reflections	6	6	6	6	6	6	6	6	
Directivity	-2	-3	-6	-11	-11	-11	-11	-11	
Required Acoustic Enclosure Sound Transmission Loss	-6	-6	-8	-10	-14	-18	-16	-15	
<b>Lp at NSR1</b>	<b>38</b>	<b>40</b>	<b>27</b>	<b>17</b>	<b>8</b>	<b>5</b>	<b>1</b>	<b>0</b>	<b>26</b>
<b>Location B</b>									
Daikin RXYSQ8TMYB1 Lp at 1m	52	55	47	44	39	40	34	26	47
Distance attenuation	-22	-22	-22	-22	-22	-22	-22	-22	
Correction due to reflections	3	3	3	3	3	3	3	3	
Directivity	-1	-1	-2	-2	-7	-11	-11	-11	
Required Acoustic Enclosure Sound Transmission Loss	-6	-6	-8	-10	-14	-18	-16	-15	
<b>Lp at NSR1</b>	<b>27</b>	<b>29</b>	<b>18</b>	<b>13</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>17</b>
<b>Location C</b>									
Daikin 2MXM40M4V1B Lp at 1m	53	54	49	46	42	37	33	27	48
Distance attenuation	-26	-26	-26	-26	-26	-26	-26	-26	
Barrier attenuation provided by the building	-15	-18	-21	-24	-27	-30	-33	-36	
Correction due to reflections	6	6	6	6	6	6	6	6	
Required Acoustic Enclosure Sound Transmission Loss	-6	-6	-8	-10	-14	-18	-16	-15	
<b>Lp at NSR1</b>	<b>12</b>	<b>10</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>7</b>
<b>Location C</b>									
Heronhill Friax EVA30 LpA at 5m	42	43	38	36	31	26	22	16	37
Lp correction at 1m	56	57	52	50	45	40	36	30	
Distance attenuation	-26	-26	-26	-26	-26	-26	-26	-26	
Barrier attenuation provided by the building	-15	-18	-21	-24	-27	-30	-33	-36	
Required Acoustic Enclosure Sound Transmission Loss	-6	-6	-8	-10	-14	-18	-16	-15	
<b>Lp at NSR1</b>	<b>15</b>	<b>13</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>8</b>
<b>Total Lp at NSR1</b>									
	<b>38</b>	<b>40</b>	<b>28</b>	<b>19</b>	<b>10</b>	<b>8</b>	<b>6</b>	<b>6</b>	<b>26</b>

## Daytime Plant Noise Calculations at NSR2 With Mitigation

*Daytime Noise Criterion: 35dB at 1m from NSR*

<i>Description</i>	<i>1/1 Octave Band Frequency, (Hz)</i>								<i>dB(A)</i>
	<i>63</i>	<i>125</i>	<i>250</i>	<i>500</i>	<i>1k</i>	<i>2k</i>	<i>4k</i>	<i>8k</i>	
<b>Location A</b>									
Daikin RXYSQ8TMYB1 Lp at 1m	60	63	55	52	47	48	42	34	55
Distance attenuation (20m)	-26	-26	-26	-26	-26	-26	-26	-26	
Correction due to reflections	6	6	6	6	6	6	6	6	
Barrier attenuation provided by the building	-15	-18	-21	-24	-27	-30	-33	-36	
Required Acoustic Enclosure Sound Transmission Loss	-6	-6	-8	-10	-14	-18	-16	-15	
<b>Lp at NSR2</b>	<b>19</b>	<b>19</b>	<b>6</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>9</b>
<b>Location B</b>									
Daikin RXYSQ8TMYB1 Lp at 1m	60	63	55	52	47	48	42	34	55
Distance attenuation (11m)	-21	-21	-21	-21	-21	-21	-21	-21	
Correction due to reflections	3	3	3	3	3	3	3	3	
Required Acoustic Enclosure Sound Transmission Loss	-6	-6	-8	-10	-14	-18	-16	-15	
<b>Lp at NSR2</b>	<b>36</b>	<b>39</b>	<b>29</b>	<b>24</b>	<b>15</b>	<b>12</b>	<b>8</b>	<b>1</b>	<b>27</b>
<b>Location C</b>									
Daikin 2MXM40M4V1B Lp at 1m	53	54	49	46	42	37	33	27	48
Distance attenuation (5m)	-14	-14	-14	-14	-14	-14	-14	-14	
Directivity	-2	-3	-6	-11	-11	-11	-11	-11	
Correction due to reflections	6	6	6	6	6	6	6	6	
Required Acoustic Enclosure Sound Transmission Loss	-6	-6	-8	-10	-14	-18	-16	-15	
<b>Lp at NSR2</b>	<b>37</b>	<b>37</b>	<b>27</b>	<b>17</b>	<b>9</b>	<b>0</b>	<b>-2</b>	<b>0</b>	<b>24</b>
<b>Location C</b>									
Heronhill Friax EVA30 LpA at 5m	42	43	38	36	31	26	22	16	37
Lp correction at 1m	56	57	52	50	45	40	36	30	51
Distance attenuation	-14	-14	-14	-14	-14	-14	-14	-14	
Barrier attenuation provided by the building	-2	-3	-6	-11	-11	-11	-11	-11	
Correction due to reflections	6	6	6	6	6	6	6	6	
Required Acoustic Enclosure Sound Transmission Loss	-6	-6	-8	-10	-14	-18	-16	-15	
<b>Lp at NSR2</b>	<b>40</b>	<b>40</b>	<b>30</b>	<b>21</b>	<b>12</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>27</b>
<b>Total Lp at NSR2</b>	<b>43</b>	<b>44</b>	<b>34</b>	<b>26</b>	<b>18</b>	<b>13</b>	<b>10</b>	<b>3</b>	<b>31</b>



## Night-time Plant Noise Calculations at NSR2 With Mitigation

*Night-time Noise Criterion: 30dB at 1m from NSR*

Description	1/1 Octave Band Frequency, (Hz)								dB(A)
	63	125	250	500	1k	2k	4k	8k	
<b>Location A</b>									
Daikin RXYSQ8TMYB1 Lp at 1m	52	55	47	44	39	40	34	26	47
Distance attenuation (20m)	-26	-26	-26	-26	-26	-26	-26	-26	
Correction due to reflections	6	6	6	6	6	6	6	6	
Barrier attenuation provided by the building	-15	-18	-21	-24	-27	-30	-33	-36	
Required Acoustic Enclosure Sound Transmission Loss	-6	-6	-8	-10	-14	-18	-16	-15	
<b>Lp at NSR2</b>	<b>11</b>	<b>11</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>7</b>
<b>Location B</b>									
Daikin RXYSQ8TMYB1 Lp at 1m	52	55	47	44	39	40	34	26	47
Distance attenuation (11m)	-21	-21	-21	-21	-21	-21	-21	-21	
Correction due to reflections	3	3	3	3	3	3	3	3	
Required Acoustic Enclosure Sound Transmission Loss	-6	-6	-8	-10	-14	-18	-16	-15	
<b>Lp at NSR2</b>	<b>28</b>	<b>31</b>	<b>21</b>	<b>16</b>	<b>7</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>19</b>
<b>Location C</b>									
Daikin 2MXM40M4V1B Lp at 1m	53	54	49	46	42	37	33	27	48
Distance attenuation (5m)	-14	-14	-14	-14	-14	-14	-14	-14	
Directivity	-2	-3	-6	-11	-11	-11	-11	-11	
Correction due to reflections	6	6	6	6	6	6	6	6	
Required Acoustic Enclosure Sound Transmission Loss	-6	-6	-8	-10	-14	-18	-16	-15	
<b>Lp at NSR2</b>	<b>37</b>	<b>37</b>	<b>27</b>	<b>17</b>	<b>9</b>	<b>0</b>	<b>-2</b>	<b>0</b>	<b>24</b>
<b>Location C</b>									
Heronhill Friax EVA30 LpA at 5m	42	43	38	36	31	26	22	16	37
Lp correction at 1m	56	57	52	50	45	40	36	30	51
Distance attenuation	-14	-14	-14	-14	-14	-14	-14	-14	
Barrier attenuation provided by the building	-2	-3	-6	-11	-11	-11	-11	-11	
Correction due to reflections	6	6	6	6	6	6	6	6	
Required Acoustic Enclosure Sound Transmission Loss	-6	-6	-8	-10	-14	-18	-16	-15	
<b>Lp at NSR2</b>	<b>40</b>	<b>40</b>	<b>30</b>	<b>21</b>	<b>12</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>27</b>
<b>Total Lp at NSR2</b>									
	<b>42</b>	<b>42</b>	<b>32</b>	<b>23</b>	<b>15</b>	<b>8</b>	<b>6</b>	<b>6</b>	<b>29</b>

## Appendix C: Environmental Noise Survey Results

47 Upper Brook Street, Mayfair, London, W1K 2BW  
Noise Time History Plot  
Monday 28 September 2020

