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Noise Impact Assessment

Proposed Day Nursery, 81 Belsize Park Gardens

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Noise Impact Assessment

Project: PROPOSED DAY NURSERY, 81 BELSIZE PARK GARDENS

Report reference: RP01-20139

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REVISION	ISSUE DATE	REPORT BY	CHECKED BY	NOTES
0	21 May 2020	Chris McNeillie, MSc CEng MIOA, Director	Fabio Lassandro, MSc BEng MIOA, Senior Acoustics Consultant	Initial issue
1	17 July 2020	Laura Broadley, MSc AMIOA, Acoustics Consultant	Chris McNeillie, MSc CEng MIOA, Director	Additional rear garden and facade predictions
2	25 September 2020	Ronny Ospina Orozco, MSc TechIOA, Acoustics Consultant	Fabio Lassandro, MSc BEng MIOA, Senior Acoustics Consultant	Assessment update following Environmental Health comments
3	14 December 2020	Ronny Ospina Orozco, MSc TechIOA, Acoustics Consultant	Chris McNeillie, MSc CEng MIOA, Director	Updated outdoor plant noise information
4	23 April 2021	Ronny Ospina Orozco, MSc TechIOA, Acoustics Consultant	Fabio Lassandro, MSc BEng MIOA, Senior Acoustics Consultant	Updated proposed rooftop plant location

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1. INTRODUCTION

1.1 Cass Allen has been instructed by U+I Investments UK Ltd to assess the noise impact of the conversion of an existing building into a new Day Nursery at 81 Belsize Park Gardens in London.

1.2 The assessment has been carried out in accordance with relevant local and national planning guidance.

1.3 The aim of the assessment was to calculate the likely noise impact of the proposed development on surrounding sensitive receptors, and where necessary, advise on noise mitigation measures to achieve an acceptable noise impact.

1.4 This report contains technical terminology; a glossary of terms can be found at www.cassallen.co.uk/glossary.

2. PROJECT DESCRIPTION

2.1 The existing building at the site was previously used as a leisure facility, with a swimming pool and gym areas including spaces for group fitness classes. The building is accessed from Belsize Park Gardens to the east. The building directly adjoins other buildings to the north, including a number of residential properties. To the south are large detached residential properties on Belsize Park Gardens.

2.2 An annotated aerial photo of the site is shown in Figure 1 below.

Figure 1 Annotated Aerial Photo

2.3 The proposal is to repurpose the existing building as a day nursery with 120 places for children from the ages 0-5 years old. The nursery would operate from 0700-1900hrs Monday to Friday (except for bank holidays etc). Access to the nursery will be provided via the existing building entrance on Belsize Park Gardens.

2.4 As part of the proposals the existing swimming pool in the building will be converted to a 'secret garden'. The roof of the swimming pool will be removed to form a semi-enclosed outdoor space for the children to play in. Other than the secret garden, all nursery spaces will be contained within the building. The nursery spaces will be ventilated so that windows can remain closed at all times, which is beneficial acoustically as it will help contain noise within the building.

2.5 The eastern area of the existing building roof contains a large amount of mechanical plant associated with the previous leisure use. This plant includes condensers sets and air handling units. The existing plant will be removed and replaced with new plant items. This is discussed further in 4.19.

3. PLANNING POLICY

National Policy

3.1 Outline guidance for the assessment of noise affecting new developments is given in the National Planning Policy Framework (NPPF). Section 170 of the NPPF states:

> *Planning policies and decisions should contribute to and enhance the natural and local environment by … preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of …noise pollution.*

and in Section 180:

> *Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:*
>
> *a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
>
> *b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.*

Noise Policy Statement for England

3.2 The Noise Policy Statement for England (NPSE) was published in March 2010 and seeks to clarify the underlying principles and aims in existing policy documents, legislation and guidance that relate to noise. It also sets out the long term vision of Government noise policy:

> *to promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.*

3.3 The NPSE clarifies that noise should not be considered in isolation of the wider benefits of a scheme or development, and that the intention is to minimise noise and noise effects as far as is reasonably practicable having regard to the underlying principles of sustainable development.

3.4 The explanatory note of NPSE defines the terms used in the NPPF:

> *2.20: There are two established concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organisation. They are:*

NOEL – No Observed Effect Level

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

LOAEL – Lowest Observed Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected.

2.21: Extending these concepts for the purpose of this NPSE leads to the concept of a significant observed adverse effect level.

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur.

3.5 The NPSE does not define the SOAEL numerically, stating in Paragraph 2.22:

It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available.

Noise Planning Practice Guidance

3.6 The Noise Planning Practise Guidance (NPPG) was published on 6 March 2014. It provides further guidance on noise and reiterates the guidance within the NPPF and NPSE. It states that:

noise needs to be considered when new developments may create additional noise and when new developments would be sensitive to the prevailing acoustic environment.

3.7 The NPPG provides advice regarding how to determine the impact of noise, including whether or not a significant adverse effect or adverse effect is occurring or likely to occur and whether or not a good standard of amenity can be achieved.

3.8 It provides more descriptive detail for the definitions of NOEL, LOAEL and SOAEL than the NPSE, but does not specify numerical values. A summary of the advice given is reproduced in Table 1 below.

Table 1 Observed Effect Levels due to Noise (NPPG)

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not noticeable	No effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect Lowest Observed Adverse Effect Level	No specific measures required
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, 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 perceived change in the quality of life.	Observed Adverse Effect Significant Observed Adverse Effect Level	Mitigate and reduce to a minimum
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

Local policy

3.9 Camden Council's Local Plan (2017) contains local policies guiding new development in the borough. Policy A4 relates to noise and states:

Policy A4 Noise and vibration The Council will seek to ensure that noise and vibration is controlled and managed.

Development should have regard to Camden's Noise and Vibration Thresholds (Appendix 3). We will not grant planning permission for:

a. development likely to generate unacceptable noise and vibration impacts; or

b. development sensitive to noise in locations which experience high levels of noise, unless appropriate attenuation measures can be provided and will not harm the continued operation of existing uses.

We will only grant permission for noise generating development, including any plant and machinery, if it can be operated without causing harm to amenity. We will also seek to minimise the impact on local amenity from deliveries and from the demolition and construction phases of development.

3.10 To address the requirements of the national and local policies, the key acoustic matters that have been assessed are:

- Noise from children playing in the secret garden at the positions of nearby residential properties.
- Noise from rooftop mechanical plant at the positions of nearby residential properties.
- Noise breakout from the internal nursery areas including the sound insulation between the nursery and the adjoining buildings to the north.

3.11 These are discussed in turn below.

4. NOISE IMPACT ASSESSMENT

Noise breakout from the secret garden

4.1 Appendix 3 of the Local Plan contains noise thresholds which have been adopted for the assessment of noise from the development at nearby residential properties. The following thresholds are considered appropriate for the assessment of noise from the secret garden:

		LOEAL (Green)
Activity	**Location**	**07.00 to 23.00**
External	1m from facade	<50 dB L_{Aeq}
Resting	Living room	<35 dB L_{Aeq}
Dining	Dining room/area	<40 dB L_{Aeq}
Sleeping (daytime resting)	Bedroom	<35 dB L_{Aeq}

4.2 Compliance with the above noise thresholds was specifically requested by Camden Council.

4.3 Noise modelling was carried out to predict the likely noise emissions from the secret garden at the positions of the nearest residential properties. The modelling was carried out using Cadna 2019 as described in Appendix 2. The model was built based on the design of the development as well as the positions and heights of surrounding sensitive receptors as noted during the site noise survey.

4.4 The closest sensitive receptors to the secret garden are windows to nearby residential properties. The location of the windows are shown in Figure 2 below. The existing roof of the swimming pool is highlighted in blue. The roof will be removed and become the opening to the secret garden. The floor of secret garden is around 6m lower than the roof level.

Figure 2 Closest Sensitive Receptors to Secret Garden (View to the West)

4.5 Noise emissions from the secret garden were modelled based on 24 children playing in the garden. We understand this is the maximum number of children that would use the garden at the same time and therefore the noise predictions are 'worst case'. Sound power level (SWL) data for the children was taken from previous measurements of a similar enclosed urban play area for nursery age children. The resultant total average SWL (i.e. LAeq,T) of the children playing was calculated to be 89 dB SWL.

4.6 The design of the secret garden was initially added to the model to include a fully open top and acoustically reflective walls. The initial calculated noise level at the closest windows (those directly to the north) was 58 dB LAeq,T.

4.7 The predicted level of 58 dB LAeq,T is 8 dB higher than the relevant LOAEL prescribed by Camden Council, which is 50dB LAeq,T at 1m external to residential windows (refer to Paragraph 4.1 above).

4.8 On the basis of the above, mitigation options were explored in the model to reduce the predicted secret garden noise levels. It was found that the following mitigation measures would provide a combined 10 dB reduction in the predicted noise levels at the closest residential windows:

- Apply acoustically absorptive treatment to the walls of the secret garden to reduce the reverberant noise level in the garden and reflected sound emissions from the garden.

- Build a 2m horizontal noise barrier around the western and northern edges of the secret garden opening (i.e. at the existing roof level) to acoustically screen the children below from the nearest residential windows. The barrier should be imperforate and a minimum mass of 10 kg/m^2.

4.9 The resultant modelling predictions are shown in Appendix 2 and show that the predicted secret garden noise levels at the locations of the nearest residential windows are reduced to 48 LAeq,T including the benefit of these mitigation measures.

4.10 The predicted level of 48 dB LAeq,T is compliant with the relevant Camden Council LOAEL criterion of 50dB LAeq,T.

4.11 On the basis of the above, it is our view that noise emissions from the secret garden would be acceptable subject to the inclusion of acoustic absorption to the walls of the secret garden and a 2m horizontal noise barrier around the western and northern edges of the secret garden. The inclusion of these treatments could be secured through the imposition of a planning condition if deemed necessary by Camden Council.

4.12 The development is therefore acceptable in principle in relation to noise from the secret garden.

Noise from mechanical plant

4.13 As per Section 2 above, the existing plant will be removed and replaced with new, more efficient and quieter plant items.

4.14 Appendix 3 of the Local Plan also contains mechanical plant noise thresholds which have been adopted for the assessment. These thresholds are shown below:

Existing Noise sensitive receptor	Assessment Location	Design Period	LOAEL (Green)	LOAEL to SOAEL (Amber)	SOAL (Red)
Dwellings**	Garden used for main amenity (free field) and Outside living or dining or bedroom window (façade)	Day	'Rating level' 10dB* below background	'Rating level' between 9dB below and 5dB above background	'Rating level' greater than 5dB above background

4.15 The 'rating level' includes a correction factor that can be applied when assessing tonal/irregular noise to account for the potential additional annoyance caused by this type of noise. This is discussed further in Paragraph 4.15.

4.16 The closest sensitive receptors to the rooftop mechanical plant are the roof terraces of the residential properties in the adjoining building to the north. Some of these roof terraces are located in close proximity to the plant areas. An example is shown in Figure 3 below.

Figure 3 Closest Sensitive Receptors to Mechanical Plant (View to the Northeast)

4.17 Background noise levels (LA90) were measured at roof level as part of a site noise survey as described in Appendix 1. The typical lowest background noise levels measured during the daytime periods when the nursery will operate was 47 dB LA90, 1 hour.

4.18 It should be noted that the background noise level results do not include noise from the existing plant items. For comparison, the noise model was used to predict the likely noise emissions from the existing mechanical plant at the positions of the nearest residential properties including within the adjoining roof terraces. The model was then used to predict the likely noise emissions from the proposed mechanical plant at the same positions.

4.19 Indicative details for existing and proposed plant, including noise data, was provided by the project Mechanical and Electrical Engineers – Betton Consulting. The indicative details provided by Betton Consulting are shown on the plan in Appendix 3 and Appendix 4, and summarised in Table 2 and Table 3.

Table 2 Noise Data for Existing Plant Items

Plant Item	Qty.	Sound Power Level (dB)
Mitsubishi PUHZ-RP6YHA Condensing Unit	1	64
Mitsubishi PUHZ-RP5YHA Condensing Unit	1	64
Mitsubishi PUHZ-P125YHA Condensing Unit	1	67
Daikin RSXY5K7W1 Condensing Unit	1	66
Hitachi RAS-4HVNC1E Condensing Unit	1	66
Hitachi RAS-4HQVE5 Condensing Unit	1	61
Air Handling Unit	2	68
Mitsubishi Condensing Unit	5	67
Extract Fan	2	69
Boxed Extract Fan Unit	1	67

Table 3 Noise Data for Proposed Plant Items

Plant Item[1]	Qty.	Sound Power Level (dB)
Air Handling Unit	1	63 (Intake)
		70 (Exhaust)
		59 (Breakout)
Variable Refrigerant Flow Unit	1	76

Note 1: The precise model of the units will be confirmed in due course. Manufacturer noise data has therefore been provided from typical, similar approved models. Plant items will be chosen to be equal to, or below the stated sound power levels.

4.20 It should be noted that Betton Consulting were aware of the potential noise issues and therefore new indicative plant items were selected to minimise noise emissions as far as possible. This includes a 2m high imperforate screen around the variable refrigerant flow unit and attenuators for the intake and exhaust openings of the air handling units. Details of the attenuators are given in Table 4. Additionally, the exhaust of the AHU will be positioned to face away from the nearby noise-sensitive receptors (dwellings on Eton Garages to the south of the site) to minimise noise emissions.

Table 4 Insertion Loss of Attenuators

Insertion Loss (Hz)							
63Hz	**125Hz**	**250Hz**	**500Hz**	**1000Hz**	**2000Hz**	**4000Hz**	**8000Hz**
4	6	9	18	26	24	16	11

4.21 The resultant modelling predictions are shown in Appendix 2. The predictions assumed that all plant was running simultaneously, i.e. 'worst case'. The predicted existing mechanical plant noise level at the nearest roof terrace is 47 dB LAeq,T without the inclusion of character corrections.

4.22 The predicted proposed plant noise level at the nearest roof terrace (as shown in Appendix 2, Figure 4 and 6) is 37 dB LAeq,T. Noise from the proposed plant is expected to be continuous and broadband in nature and therefore no corrections (as per Paragraph 4.15) were added to the predictions to account for tonality or impulsivity. Inverters will be selected for condenser sets and air handling units to ensure they ramp up and down smoothly.

4.23 The predicted mechanical plant noise emissions of 37 dB LAeq,T are 10 dB below the representative background noise level (refer to Paragraph 4.17) at the closest noise-sensitive receptor.

4.24 Using the Camden Council noise thresholds (refer to Paragraph 4.14), plant noise emissions at 47 dB LAeq,T are LOAEL.

4.25 In addition, the following points should also be considered:

- The assessment is based on 'worst-case' plant noise emissions with all plant operating simultaneously. In reality this is unlikely to happen for much of the time (e.g. the variable refrigerant flow unit will only operate during warmer periods), and therefore noise levels will be significantly lower for most of the time.
- Further mitigation measures would be to acoustic lag the air handling units and ductwork. This can be investigated as the design of the plant system progresses. This would be in-line with the requirement of the NPPG to minimise the noise levels as far as possible. The acoustic optimisation of the plant could be secured by Camden Council via the imposition of a suitably worded planning condition.

4.26 Based on the above, it is our view that the development is acceptable in relation to noise from mechanical plant, provided that noise emissions are minimised as far as practicable during the detailed design of the plant.

Noise breakout from the nursery

4.27 The nursery will be mechanically ventilated including cooling to all main nursery rooms. Consequently, it will be possible to keep all main windows closed at all times and contain noise within the building.

4.28 It will be important to ensure that the separating walls between the nursery and the adjoining uses (including residential properties) to the north provide sufficient levels of sound insulation.

4.29 The level of sound insulation currently provided by the separating walls is not known however it is likely to be quite high based on the masonry construction and the previous use (high noise levels would have been generated in the leisure use at times, particularly in the gym areas used for group classes).

4.30 In any case, it would be straightforward to ensure that the separating walls provide adequate levels of sound insulation as part of the fit out of the nursery, which, if necessary, could include additional acoustic wall liners to the separating walls to increase the level of sound insulation.

4.31 This could be assessed further as part of the detailed design of the nursery. This detailed design assessment could be secured by the imposition of a planning condition if deemed necessary by Camden Council.

4.32 It should also be noted that the nursery will only be operational during the daytime and therefore there would be no risk of adjoining residents being disturbed in the evening or during the night-time (these are the periods when residents are most sensitive to noise).

4.33 On the basis of the above it is our view that the proposed development is acceptable in relation to nursery noise breakout from the building.

Noise impact on residential properties along Belsize Park Gardens

4.34 The noise breakout from the secret garden has been combined with an assessment of noise breakout from the nursery to determine the noise impact on residential properties along Belsize Park Gardens. We understand that this assessment was specifically requested by the residents of 83 Belsize Park Gardens.

4.35 Noise breakout from the nursery was modelled based on 40 children playing inside nursey rooms 3 and 4, with 12 adults in attendance. We understand the nursery has capacity for 120 over 5 nursery rooms and an arts & crafts room, therefore we believe the noise predictions are ‘worst case’.

4.36 We have assumed the use of 26dB Rw+Ctr glazing for nursery room windows, which is the performance of standard thermal double glazing.

4.37 The resultant predicted nursery noise levels at the locations of the nearest residential gardens and facades are 23 LAeq,T and 24 LAeq,T respectively. This noise is dictated by noise from the secret garden (noise breakout from the nursery is an order of magnitude lower due to the high attenuation provided by a closed windows).

4.38 Both predicted levels of 23 LAeq,T and 24 LAeq,T are compliant with the relevant Camden Council LOAEL criterion of 50dB LAeq,T.

4.39 On the basis of the above it is our view that the proposed development is acceptable in relation to the noise impact on residential properties and gardens along Belsize Park Gardens.

5. CONCLUSIONS

5.1 Cass Allen Associates was instructed by U+I Investments UK Ltd to assess the noise impact of the proposed new Day Nursery.

5.2 The assessment was carried out in accordance with relevant local and national planning guidance.

5.3 A noise survey was carried out at the site to quantify existing background noise levels in the area.

5.4 A 3D noise model of the nursery was used to predict and assess noise from the proposed 'Secret Garden' at the positions of surrounding residential properties. The modelling showed that acceptable noise levels would be achievable subject to the inclusion of acoustic absorption to the walls of the secret garden and a 2m horizontal noise barrier around the western and northern edges of the secret garden opening at existing roof level.

5.5 The model was also used to predict and assess noise from proposed mechanical plant associated with the nursery use. The modelling showed that acceptable plant noise emissions could be achieved at surrounding residential properties. It will be important that the plant noise emissions are minimised as far as practicable during the detailed design of the plant.

5.6 Noise breakout from the nursery is considered to be acceptable on the basis that windows to the nursery can remain closed at all times and that separating walls to adjoining areas can be acoustically upgraded during the fit out of the nursery, if necessary.

5.7 It is our view therefore that the development is acceptable in principle in relation to noise and that planning permission may be granted, subject to the inclusion of noise related planning conditions if deemed necessary by Camden Council.

Appendix 1 Survey Results

Survey Summary:

The survey comprised short-term operator attended noise measurements and longer-term unattended noise monitoring at the site. Noise levels at the site were generally dictated by road traffic on surrounding roads and noise from train passes on the adjacent railway. Vibration levels at the site were very low.

Survey Period:

07/02/2020 to 12/02/2020

Survey Objectives:

- To identify noise and vibration sources that contribute to ambient noise levels at the site;
- To measure noise and vibration levels around the site over a typical day and night-time period.

Equipment Used (Appendix 1, Table 1):

Type	Manufacturer	Model	Serial Number
Sound level meter[1]	Bruel & Kjaer	2250 (G1)	2630237
Calibrator	Bruel & Kjaer	4231	2115551
Sound level meter[1] (noise logger)	Rion	NL-32	00530374

Note 1: All sound level meters were calibrated before and after measurement periods and no significant drift in calibration was found to have occurred. The results of the measurements are therefore considered to be representative.

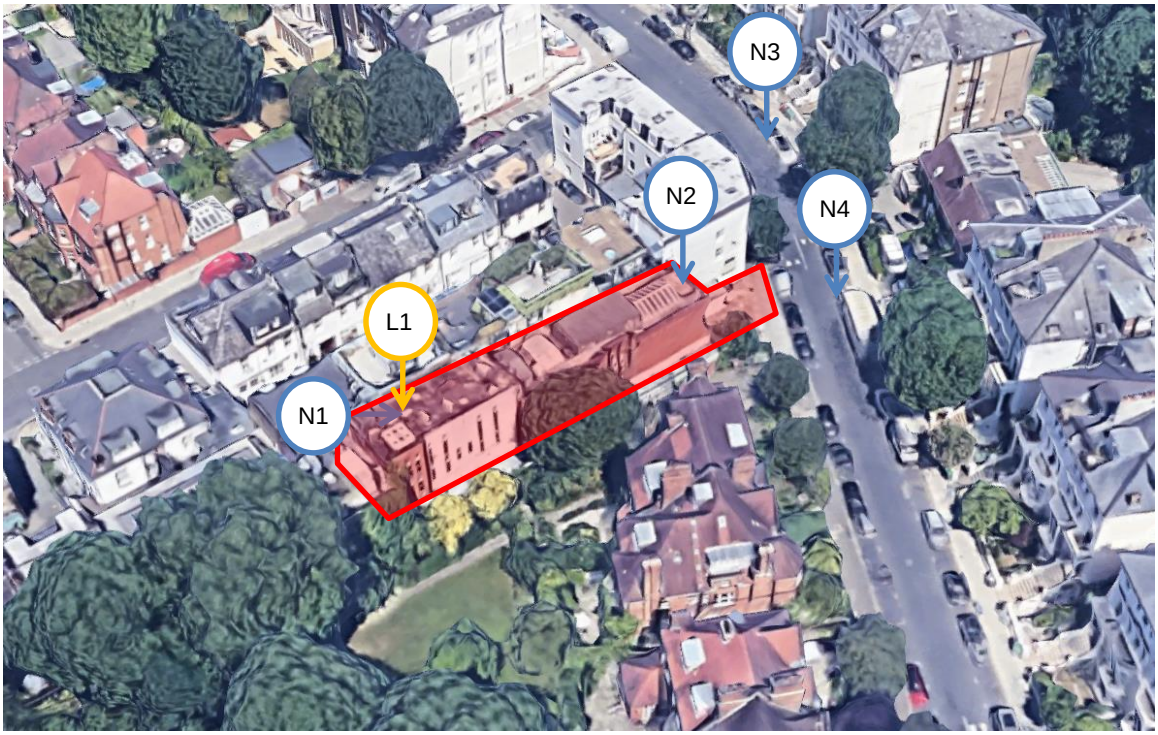
Weather Conditions:

The observed weather conditions were acceptable for acoustic measurement throughout the attended survey periods (low-medium wind speeds and no rain). Weather records for the area confirmed that weather conditions were also generally acceptable for acoustic measurement during the unattended monitoring. Any periods of unattended monitoring that may have been adversely affected by weather conditions have been excluded from the data analysis.

Measurement Positions (Appendix 1, Table 2):

Position (refer plan below)	Description
N1	Attended noise monitoring position. Roof level (1.5m above the roof). Free-field.
N2	Attended noise monitoring position. Roof level (1.5m above the roof). Free-field.
N3	Attended noise monitoring position. 1.5m above ground. Free-field. Direct line of sight to nearby roads
N4	Attended noise monitoring position. 1.5m above ground. Free-field. Direct line of sight to nearby roads
L1	Unattended noise logging position. Roof level. Free-field.

Site Plan showing Measurement Positions (Appendix 1, Figure 1):



Attended Noise Monitoring Results (Appendix 1, Table 3):

Date	Position	Time	Meas. Length	LAeq, dB	LAmax, dB	LA90, dB	Observations
12/02/2020	N1	11:22	5 mins	49	63	45	Noise dictated by road traffic on surrounding roads
12/02/2020	N2	11:29	5 mins	52	66	46	Noise dictated by road traffic on surrounding roads
12/02/2020	N3	11:48	5 mins	60	77	49	Noise dictated by road traffic on surrounding roads
12/02/2020	N4	11:55	~10 seconds	58	72	46	Noise dictated by car pass on road
12/02/2020	N4	12:00	~10 seconds	60	66	55	Noise dictated by car pass on road
12/02/2020	N4	12:01	~10 seconds	64	71	51	Noise dictated by car pass on road
12/02/2020	N4	12:01	~10 seconds	65	68	60	Noise dictated by car pass on road
12/02/2020	N4	12:02	~10 seconds	67	72	59	Noise dictated by car pass on road

Attended Noise Monitoring Results (Appendix 1, Table 3):

Date	Position	Time	Meas. Length	LAeq, dB	LAmax, dB	LA90, dB	Observations
12/02/2020	N4	12:02	~10 seconds	65	71	58	Noise dictated by car pass on road
12/02/2020	N4	12:03	~10 seconds	58	62	53	Noise dictated by car pass on road

Unattended Noise Monitoring Results (Appendix 1, Table 4):

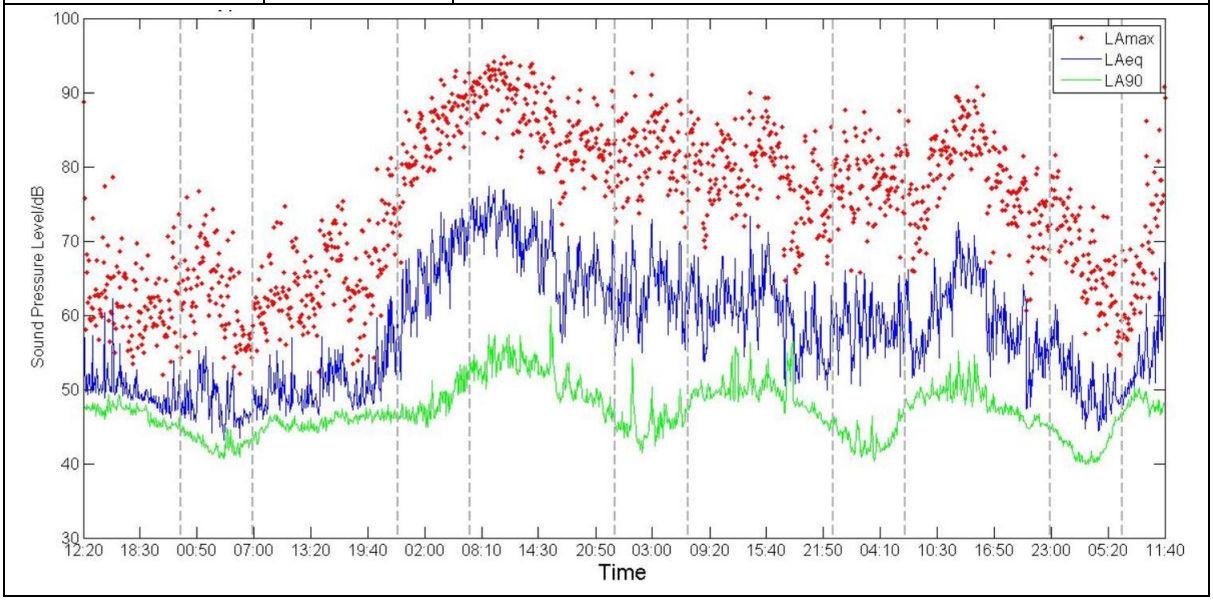
Meas. Period	Position	Daytime (0700-2300hrs)		Night-time (2300-0700hrs)		
		LAeq,16hr, dB	LA90,1hr dB[1]	LAeq,8hr, dB	LA90,5mins, dB[1]	LAmax, dB[2]
07/02/2020 to 12/02/2020	L1	52	47	50	42	72

Note 1: Typical lowest measured during the period shown.

Note 2: Highest typical maximum noise level during the night-time (not exceeded more than 10-15 times per night).

Unattended Noise Monitoring Results (Appendix 1, Figure 4):

Meas. Period	Position	
07/02/2020 to 12/02/2020	L1	

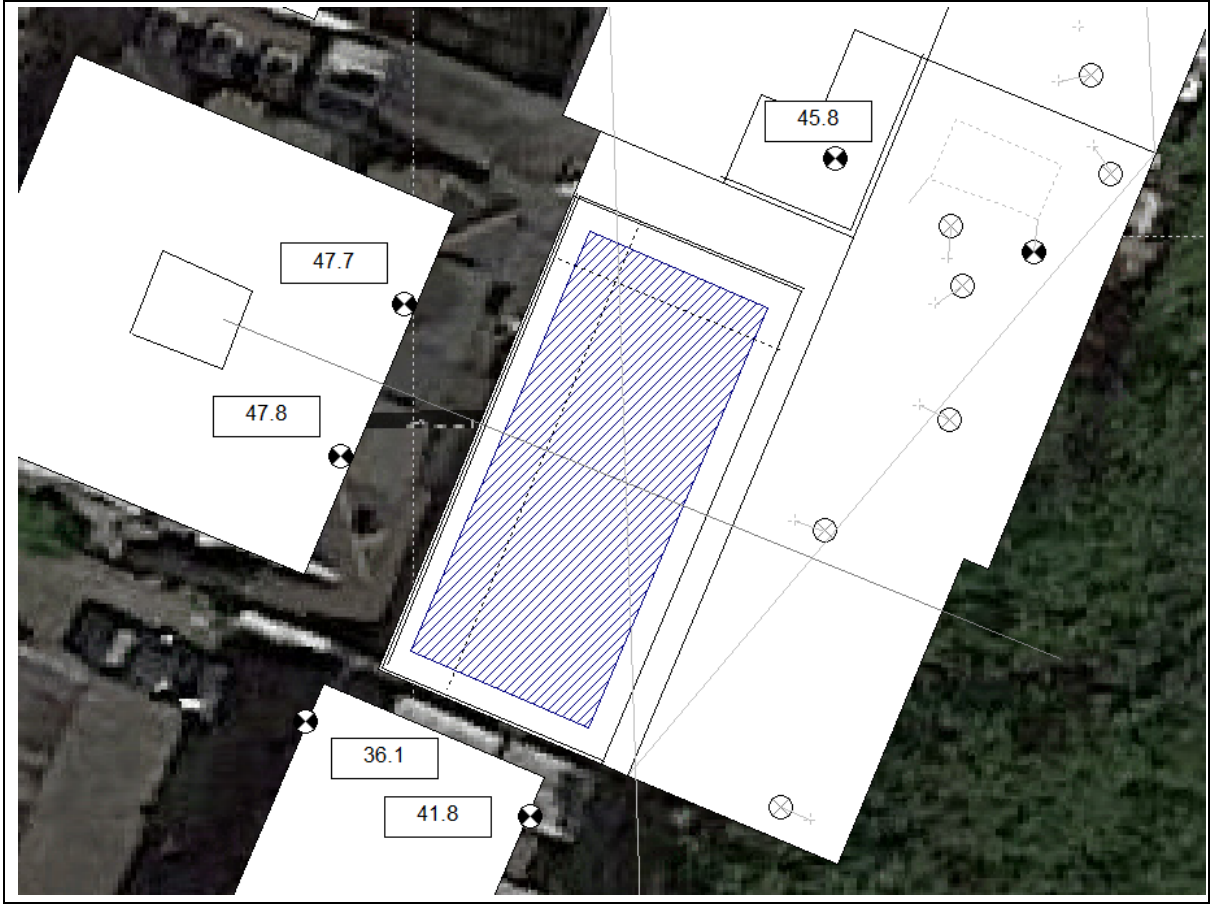


Appendix 2 Modelling Results

Modelling Software:	CADNA/A Version 2019
Modelled Scenarios:	- Noise emissions from the pocket garden during worst case use - Noise emissions from mechanical plant
Data inputs:	• Noise survey results • Development and surrounding buildings layout
Calculation Algorithms Used:	• ISO 9613-1:1993 Acoustics-Attenuation of sound during propagation outdoors – Part 1: Calculation of the absorption of sound by the atmosphere • ISO 9613-2:1996 Acoustics-Attenuation of sound during propagation outdoors – Part 2: General method of calculation

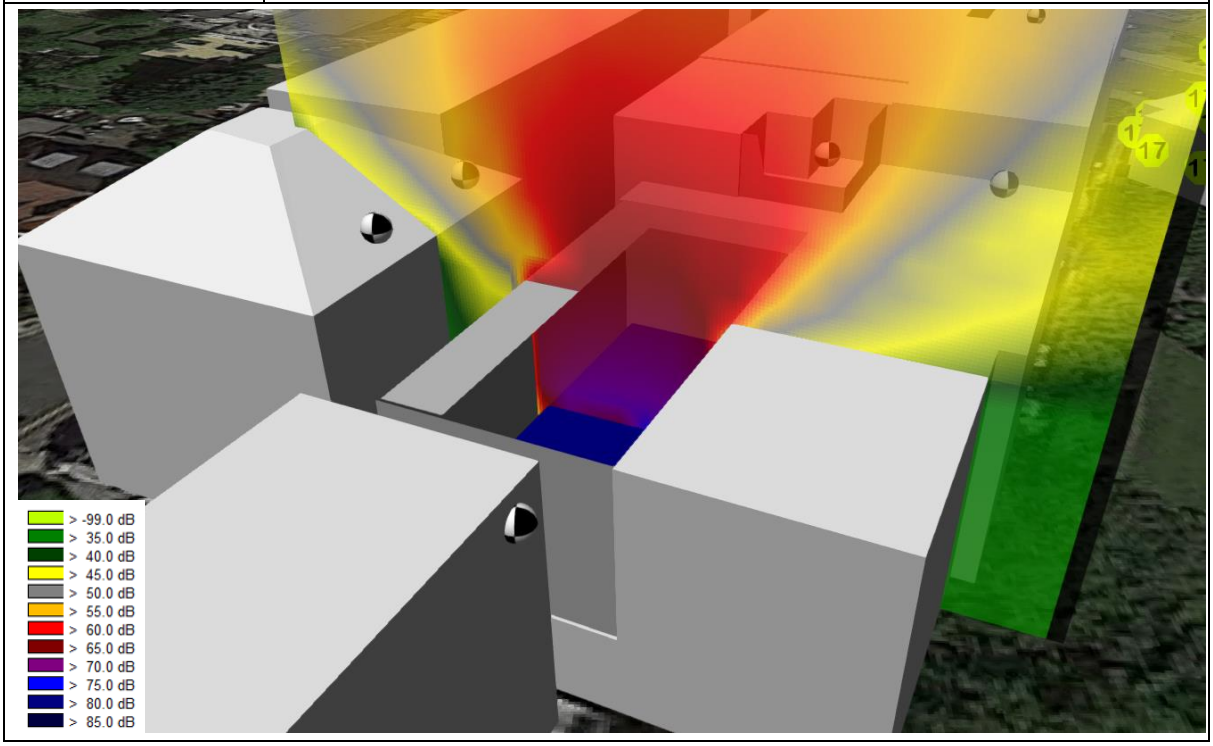
Modelling Printout (Appendix 2, Figure 1):

Scenario	Daytime secret garden noise emissions with mitigation (LAeq,T)



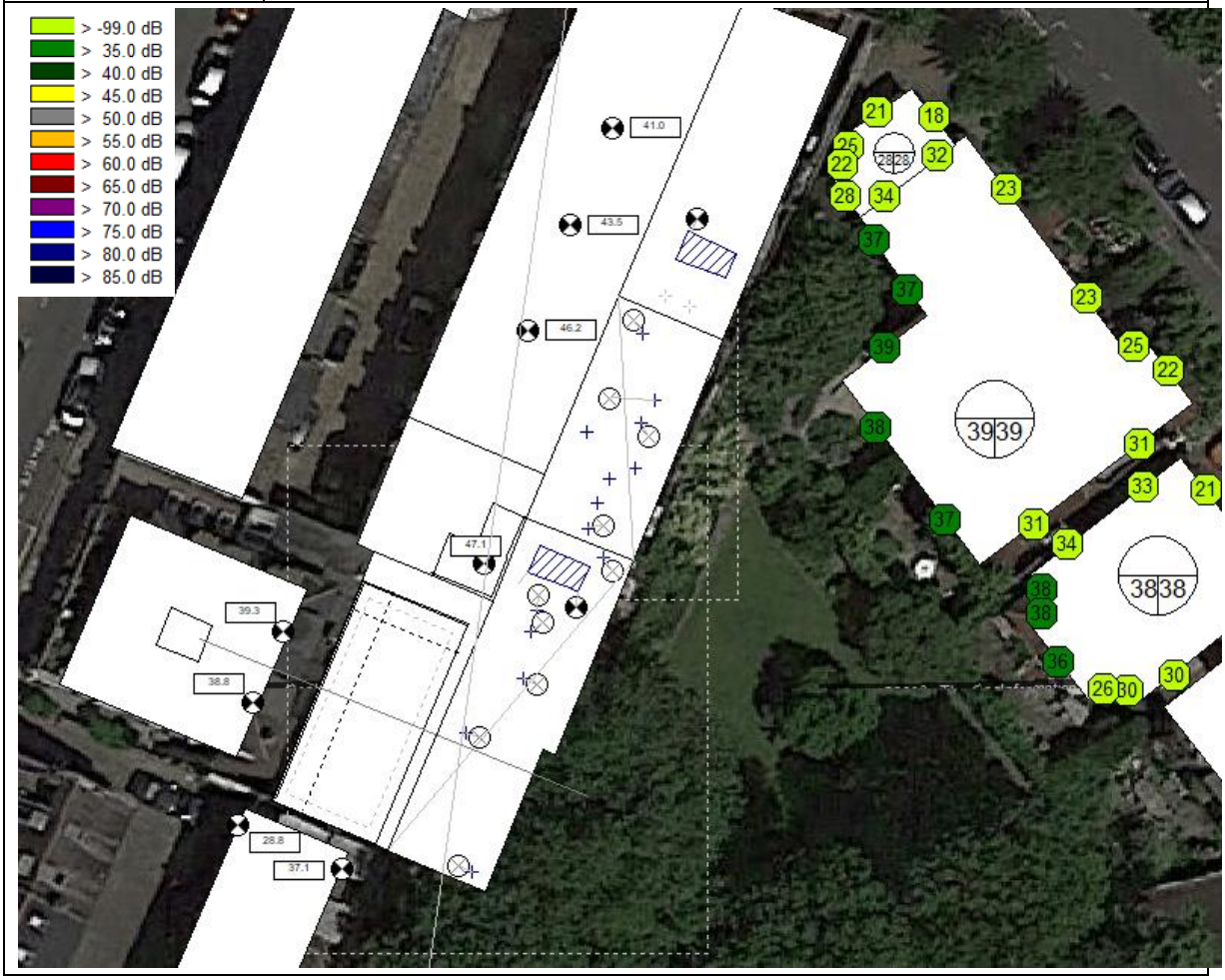
Modelling Printout (Appendix 2, Figure 2):

Scenario	Daytime secret garden noise emissions with mitigation (LAeq,T)



Modelling Printout (Appendix 2, Figure 3):

Scenario	Daytime existing mechanical plant noise levels (LAeq,1hr)

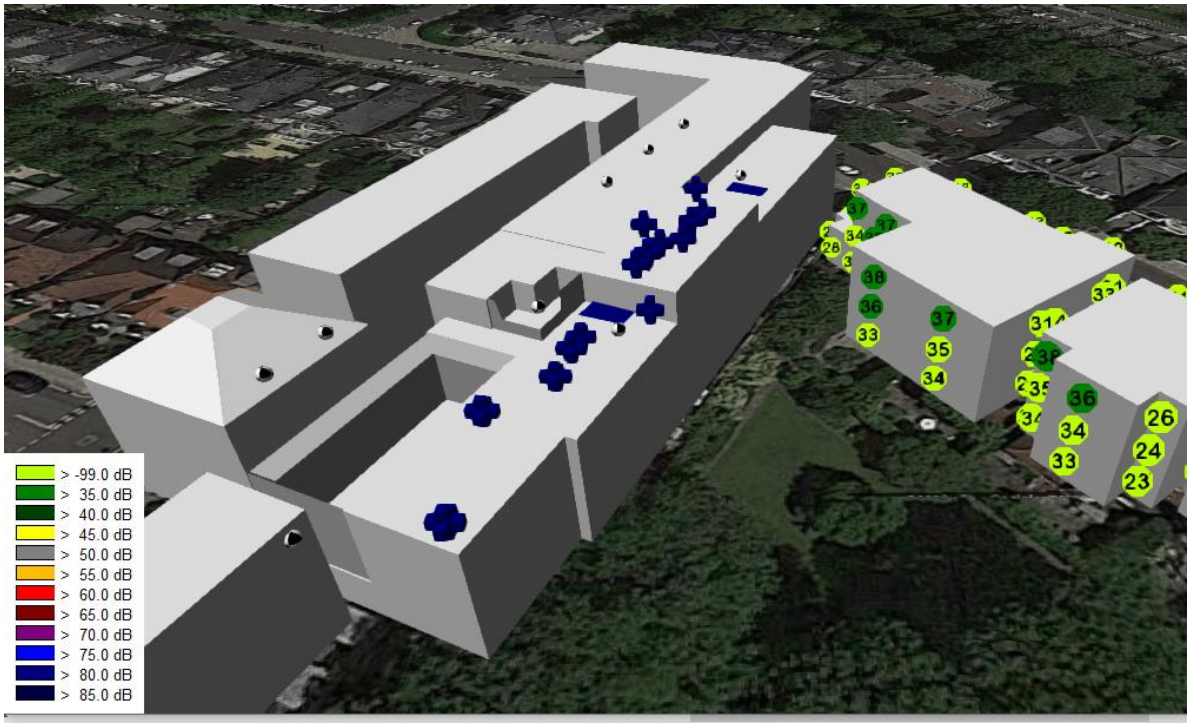


Modelling Printout (Appendix 2, Figure 4):

Scenario	Daytime proposed mechanical plant noise levels (LAeq,1hr)

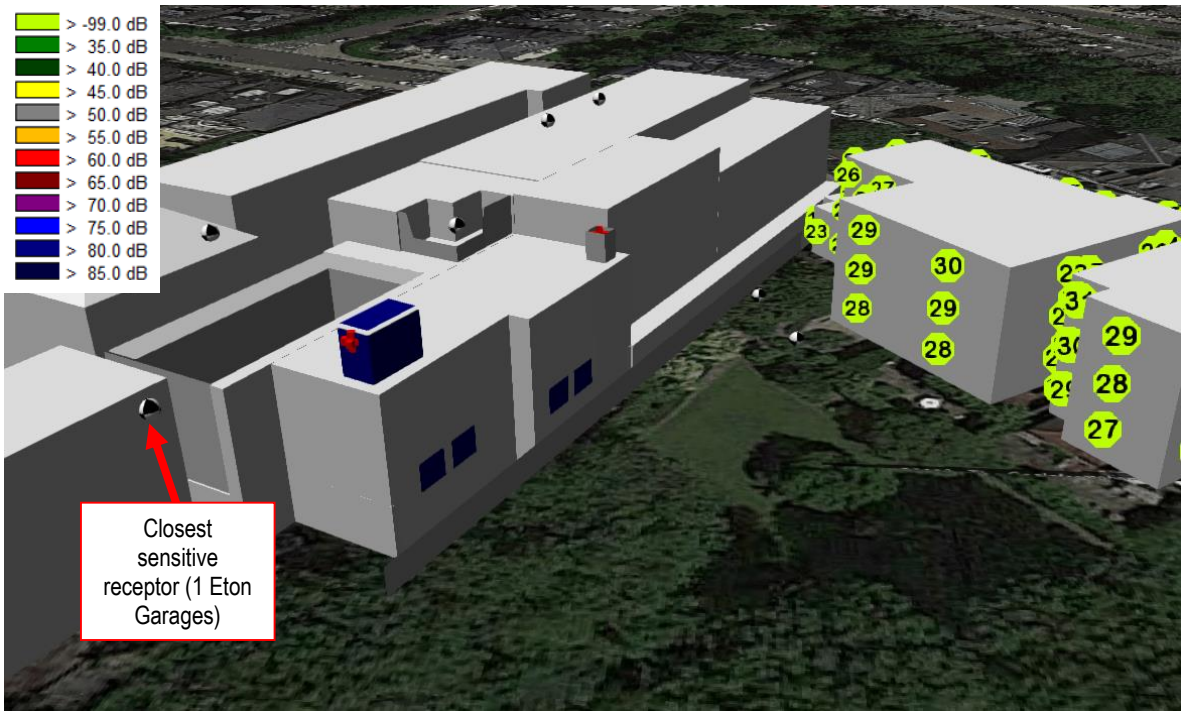
Modelling Printout (Appendix 2, Figure 5):

Scenario	Daytime existing mechanical plant noise levels (LAeq,T)



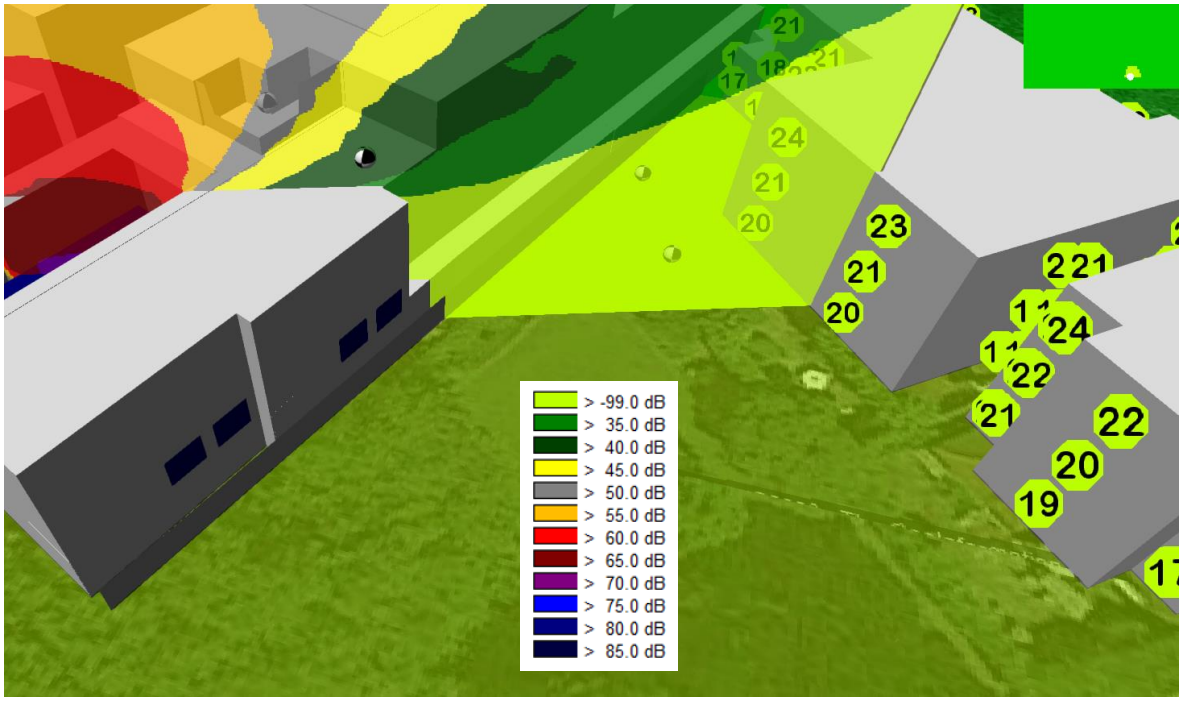
Modelling Printout (Appendix 2, Figure 6):

Scenario	Daytime proposed mechanical plant noise levels (LAeq,T)



Modelling Printout (Appendix 2, Figure 7):

Scenario	Daytime secret garden noise emissions and nursery noise breakout (LAeq,T)



Appendix 3 Details of Existing Plant

Rev	Date	Amendments	By	Check
-	13/05/2020	FIRST ISSUE	JR	JW

NOTES:

1. DRAWING BASED ON MEASURED SURVEY DRAWINGS "19086-13-B-3" AND "19086-13-B-R"

MITSUBISHI PUHZ-RP6YHA CONDENSING UNIT
ANTICIPATED SOUND PRESSURE LEVEL:
52dB(A) AT 1m DISTANCE/1.5m AFFL

DAIKIN RSXY5K7W1 CONDENSING UNIT
ANTICIPATED SOUND PRESSURE LEVEL:
54dB(A) AT 1m DISTANCE/1.5m AFFL

HITACHI RAS-4HVNC1E CONDENSING UNIT
ANTICIPATED SOUND PRESSURE LEVEL:
54dB(A) AT 1m DISTANCE/1.5m AFFL
SOUND POWER LEVEL: 68dB(A)

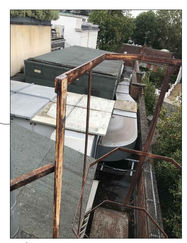
LEFT:
MITSUBISHI PUHZ-RP5YHA CONDENSING UNIT
ANTICIPATED SOUND PRESSURE LEVEL:
52dB(A) AT 1m DISTANCE/1.5m AFFL
RIGHT:
HITACHI RAS-4HQVE5 CONDENSING UNIT
ANTICIPATED SOUND PRESSURE LEVEL:
49dB(A) AT 1m DISTANCE/1.5m AFFL

BOILER FLUE (NEGLIGIBLE)

AHU/02
UNKNOWN NOISE INFORMATION, ASSUMED SIMILAR TO NEW UNIT (DETAILS OPPOSITE) BUT FACTOR IN A 10% WORSENING FOR AGE OF CONSTRUCTION AND CONDITION

MITSUBISHI PUHZ-P125YHA CONDENSING UNIT
ANTICIPATED SOUND PRESSURE LEVEL:
55dB(A) AT 1m DISTANCE/1.5m AFFL

3No. A.O.SMITH ADM 60G GAS FIRED WATER HEATERS WITHIN ROOF TOP PLANTROOM (FLUE RISES TO ROOF ABOVE)
ANTICIPATED SOUND POWER LEVEL:
60dBA Lwp EACH



AHU/01
UNKNOWN NOISE INFORMATION, ASSUMED SIMILAR TO NEW UNIT (DETAILS OPPOSITE) BUT FACTOR IN A 10% WORSENING FOR AGE OF CONSTRUCTION AND CONDITION

UNKNOWN DRY AIR COOLER
ANTICIPATED SOUND PRESSURE LEVEL:
52dB(A) AT 1m DISTANCE/1.5m AFFL

MITSUBISHI ?? CONDENSING UNIT
ANTICIPATED SOUND PRESSURE LEVEL:
55dB(A) AT 1m DISTANCE/1.5m AFFL

MITSUBISHI ?? CONDENSING UNIT
ANTICIPATED SOUND PRESSURE LEVEL:
55dB(A) AT 1m DISTANCE/1.5m AFFL

MITSUBISHI ?? CONDENSING UNIT
ANTICIPATED SOUND PRESSURE LEVEL:
55dB(A) AT 1m DISTANCE/1.5m AFFL

MITSUBISHI ?? CONDENSING UNIT
ANTICIPATED SOUND PRESSURE LEVEL:
55dB(A) AT 1m DISTANCE/1.5m AFFL

ROOF MOUNTED EXTRACT FAN
ANTICIPATED SOUND PRESSURE LEVEL:
48dB(A) AT 3m DISTANCE

BOXED EXTRACT FAN UNIT
ANTICIPATED SOUND PRESSURE LEVEL:
55dB(A) AT 1m DISTANCE/1.5m AFFL

PROVISIONAL DATA FOR PROPOSED NEW PLANT

NEW AIR HANDLING UNIT
NEW SUPPLY AND EXTRACT AIR HANDLING UNIT, PROPOSED LOCATION IN SIMILAR POSITION TO AHU/02
UNIT WILL BE PROVIDED WITH INLET AND OUTLET ATTENUATORS AS REQUIRED TO SUIT ACOUSTIC SPECIALISTS RECOMMENDATIONS.
INDICATIVE DETAILS:

AHU ACOUSTIC DATA SUPPLY SECTION								
Description	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	Overall dB(A)
Outlet Sound Power(dB)	78	84	91	88	85	79	79	75	90
Inlet Sound Power(dB)	70	74	79	74	66	61	58	57	75
Airborne sound power (dB)	58	64	65	57	51	42	44	35	59

AHU ACOUSTIC DATA EXHAUST SECTION								
Description	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	Overall dB(A)
Outlet Sound Power(dB)	74	88	83	82	78	74	73	73	84
Inlet Sound Power(dB)	67	77	75	71	67	62	59	57	73
Airborne sound power (dB)	54	66	57	51	45	37	38	5	54

NEW VRF SYSTEM
OUTDOOR UNIT LOCATED ON ROOF, CAN BE POSITIONED TO SUIT ACOUSTICIAN REQUIREMENTS BUT RECOMEND KEEPING CENTRALLY NEAR NEW AHU TO AVOID ANY ISSUES WITH PIPEWORK LENGTHS ETC.
ANTICIPATED UNIT:
DAIKIN REYQ20U
ANTICIPATED SOUND PRESSURE LEVEL:
65dB(A) AT 1m DISTANCE/1.5m AFFL

THIRD FLOOR

PRELIMINARY

Client
CARE CONCERN GROUP

Project
PROPOSED DAY NURSERY
81 BELSIZE PARK GARDENS
LONDON NW3 4NJ

Title
EXISTING PLANT LAYOUT AND
INIDCATIVE NOISE INFORMATION

Drawing Type
INFORMATION

Drawing No. 1241-M-901 Revision -

Scale 1:100 Original Size A0 Date 13/05/2020

Drawn JR Engineer JR Checked JW

betton consulting
Building Services Design and Consultancy
www.bettonconsulting.co.uk

Appendix 4 Details of Proposed Plant

cass allen

Architectural & Environmental Acousticians

Noise & Vibration Engineers

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