35 ELSWORTHY ROAD, LONDON

NEW PLANT PLANNING NOISE ASSESSMENT

Acoustics Report A1842 R06

08/11/2024

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Contents

1 Introduction 1
2 Scheme Details 1
2.1 Scheme Proposals 1
2.2 Survey Details 2
3 Survey Methodology Guidance 3
3.1 Camden Borough's Local Plan (2017) 3
3.2 BS 4142:2014 5
4 Baseline Noise Survey 6
4.1 Survey Methodology 6
4.2 Survey Results 8
5 Plant Noise Limits 9
6 Plant Noise Assessment 10
6.1 Plant Details 10
6.2 Plant Noise Calculations 10
6.3 Uncertainty and Context 11
7 Conclusion 11

Appendix A – Full Survey Measurements
Appendix B – Plant Calculations

1 Introduction

Ion Acoustics is appointed by Spink to provide various acoustic consultancy services for the major refurbishment of a house at 35 Elsworthy Road. This report is prepared to form a planning noise assessment for new building services plant associated with the refurbishment, and in particular the revised planning application for a new plant "shed" at the end of the garden where the external louvres to the ducting will be terminated.. A baseline noise survey was carried out in 2022 to determine background sound levels. This report documents the noise survey, sets out noise limits derived from the background sound and demonstrates that noise from the new plant and shed can meet the noise limits.

The revised scheme now has a smaller shed and now has no provision for a future dry air cooling unit. So the noise levels assessed are lower than in our previous assessment asn the cooler is omitted, and the pool MVHR is slightly quieter.

2 Scheme Details

2.1 Scheme Proposals

The overall scheme is the major refurbishment of a large three-storey brick-built house to form a single dwelling on a residential street just to the north of parkland at Primrose Hill, Figure 1.

Figure 1 Site location plan © Google Earth

The scheme retains the external walls but has fully stripped out the interior and provided a new structural frame with concrete internal floors. The basement has been extended down and out into the garden to form a new gym and swimming pool with associated plant. Most plant is located within the basement and ducted to a new shed at the rear of the garden, where the ducts terminate at louvres facing south away from the housing. This plant comprises:

- An MVHR unit for the main house, located inside a plant room at basement level with intake fresh air and extract air ducted to louvres at the rear of the shed

- An MVHR unit for the pool space located inside a plant room at basement level with intake fresh air and extract air ducted to louvres at the rear of the shed

In addition, there is a ground source heat pump for fan coil units within the house, but this makes no noise. The location of the shed is given in Figure 2, along with the closest sensitive receptors.

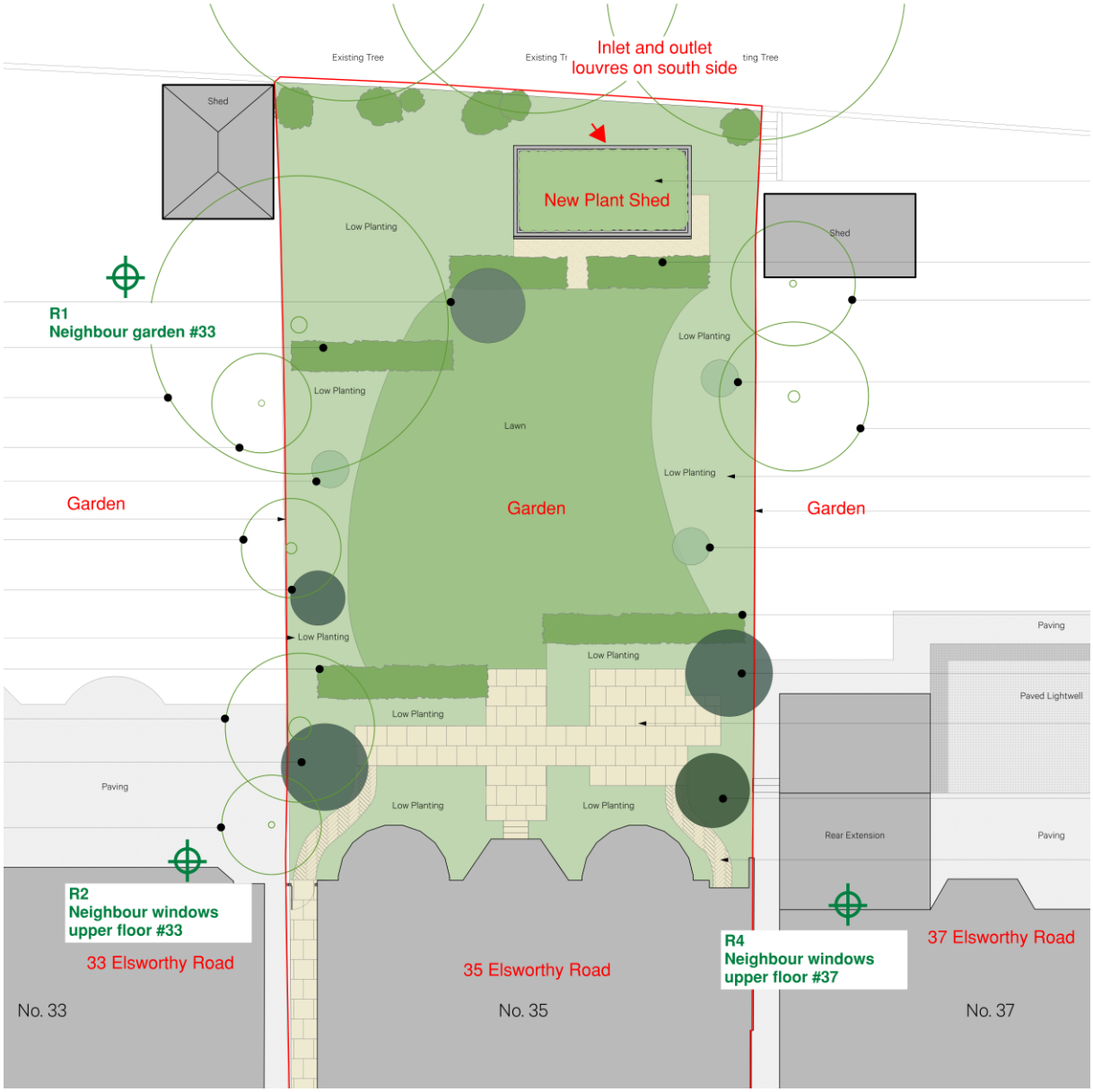

Figure 2: Site Plan showing Location of Plant Shed and Sensitive Receptors

2.2 Survey Details

It is expected that the local authority, Camden Borough Council, will require a plant noise assessment to nearby third-party sensitive receptors, and in particular the dwellings to either side (33 and 37 Elsworthy Road). A baseline noise survey has been carried at the site to determine background noise levels and derive plant noise emission limits. The site location is shown in Figure 1. More detailed images identifying the closest residential receptors are shown in Figures 2 and 3.

Figure 3 Rear view of site showing closest receptors (looking North) © Google Earth

3 Survey Methodology Guidance

3.1 Camden Borough's Local Plan (2017)

Camden Borough Council (CBC) has standard conditions which are typically imposed for new plant, and it is expected that similar conditions would be imposed in this case. In appendix 3 of Camden Local Plan (2017), it states:

The significance of noise impact varies dependent on the different noise sources, receptors and times of operation presented for consideration within a planning application. Therefore, Camden's thresholds for noise and vibration evaluate noise impact in terms of various 'effect levels' described in the National Planning Policy Framework and Planning Practice Guidance:

- *NOEL – No Observed Effect Level*
- *LOAEL – Lowest Observed Adverse Effect Level*
- *SOAEL – Significant Observed Adverse Effect Level*

Three basic design criteria have been set for proposed developments; these being aimed at guiding applicants as to the degree of detailed consideration needed to be given to noise in any planning application. The design criteria outlined below are defined in the corresponding noise tables. The values will vary depending on the context, type of noise and sensitivity of the receptor:

- *Green – where noise is considered to be at an acceptable level.*
- *Amber – where noise is observed to have an adverse effect level, but which may be considered acceptable when assessed in the context of other merits of the development.*
- *Red – where noise is observed to have a significant adverse effect.*

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.

In addition the local plan provides noise limits based on the LOAEL – SOAEL impact assessment criteria with comments.

Table 1 Noise levels applicable to proposed industrial and commercial developments

Existing noise sensitive receptor	Assessment Location	Design Period	LOAEL (Green)	LOAEL to SOAEL (Amber)	SOAEL (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 and below and 5dB above background	Rating level' greater than 5dB above background
Dwellings**	Outside bedroom window (façade)	Night	Rating level' 10dB* below background and no events exceeding 57dBL_{Amax}	Rating level' between 9dB and below and 5dB above background or noise events between 57dB and 88dB L_{Amax}	Rating level' greater than 5dB above background and/or events exceeding 88dBL_{Amax}

**10dB should be increased to 15dB if the noise contains audible tonal elements. (day and night). However, if it can be demonstrated that there is no significant difference in the character of the residual background noise and the specific noise from the proposed development then this reduction may not be required. In addition, a frequency analysis (to include, the use of Noise Rating (NR) curves or other criteria curves) for the assessment of tonal or low frequency noise may be required.*

***levels given are for dwellings, however, levels are use specific and different levels will apply dependent on the use of the premises.*

The general criterion is that the plant rating level (L_{Ar}) should be 10dB below typical background noise level (L_{A90}) as assessed using a BS4142:2104 noise assessment. However, where background levels are low, then BS4142:2014, see below, is clear that absolute levels may be more appropriate. In this case, the night background noise level is 35dB L_{A90}, and to be 10dB below that would require a rating level of L_{Ar} 25dB, which is very low and lower than is needed to protect amenity in residential properties. We propose that the noise limit would not need to drop lower than L_{Ar} 30dB as an absolute limit, regardless of the background noise level.

3.2 BS 4142:2014

The standard method for determining background noise levels and assessing plant noise industrial nature affecting housing, is British Standard BS 4142:2014 "Method for rating and assessing industrial and commercial sound". The survey has been carried out following the principles set out in BS 4142:2104.

A BS 4142 assessment is typically made by calculating the difference between the industrial noise under consideration and the background sound level as represented by the L_{A90} parameter, determined in the absence of the industrial or commercial noise. The L_{A90} parameter is defined as the level exceeded for 90% of the measurement time, representing the underlying noise in the absence of short duration noise events such as dog barks or individual cars passing.

The plant noise under consideration, typical from fixed building services plant, is assessed in terms of the rating level, L_{Ar}. This is the equivalent sound pressure level, L_{Aeq}, with a character correction penalty applied, when necessary, where the noise exhibits acoustic characteristics such as distinguishable tones, impulsiveness, intermittency or other acoustically significant characteristics. The L_{Aeq} is defined as the steady-state noise level with the same energy as the actual fluctuating sound over the same time period. It is effectively the average noise level during the period. The industrial noise level (L_{Aeq}) with the character correction (if necessary) added is known as rating level, L_{Ar}, and the difference between the background noise and the rating level is determined to make the BS 4142 assessment. The standard states:

a) *"Typically, the greater the difference, the greater the magnitude of the impact.*
b) *A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.*
c) *A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context.*
d) *The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound 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."*

The standard outlines several methods for defining appropriate 'character corrections' to determine the rating levels to account for tonal qualities, impulsive qualities, other sound characteristics and/or intermittency.

BS 4142 also stresses the importance of considering the context in which a sound occurs. Factors including the absolute sound level, the character of the sound, the sensitivity of the receptor and the character of the area should be considered when assessing the noise impact.

The absolute sound level is of particular importance where the measured background sound levels are low. In regard to low sound levels, the standard states:

> *"Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night."*

Therefore, in line with the BS4142 guidance, we commonly consider that a rating level below 30dB L_{Ar} is not necessary to protect amenity regardless of the L_{A90} value.

4 Baseline Noise Survey

4.1 Survey Methodology

A baseline noise survey was carried out over the period 30th to 31st May 2022 with the noise monitor (MP1) set up at the rear of the garden in a free-field position. MP1 was not near any operational plant and was representative of the residential dwellings near 35 Elsworthy road. The location is shown in Figures 4 and 5 below. This position meant that the levels were less affected by activity in the nearby dwellings and was in a free field position. During the survey there were demolition works taking place at 35 Elsworthy Road, so the position was also selected to be secure and away from the works. The monitor was set up on a small raised platform at the rear of the garden, this provides a good proxy position for the upper windows of the dwellings.

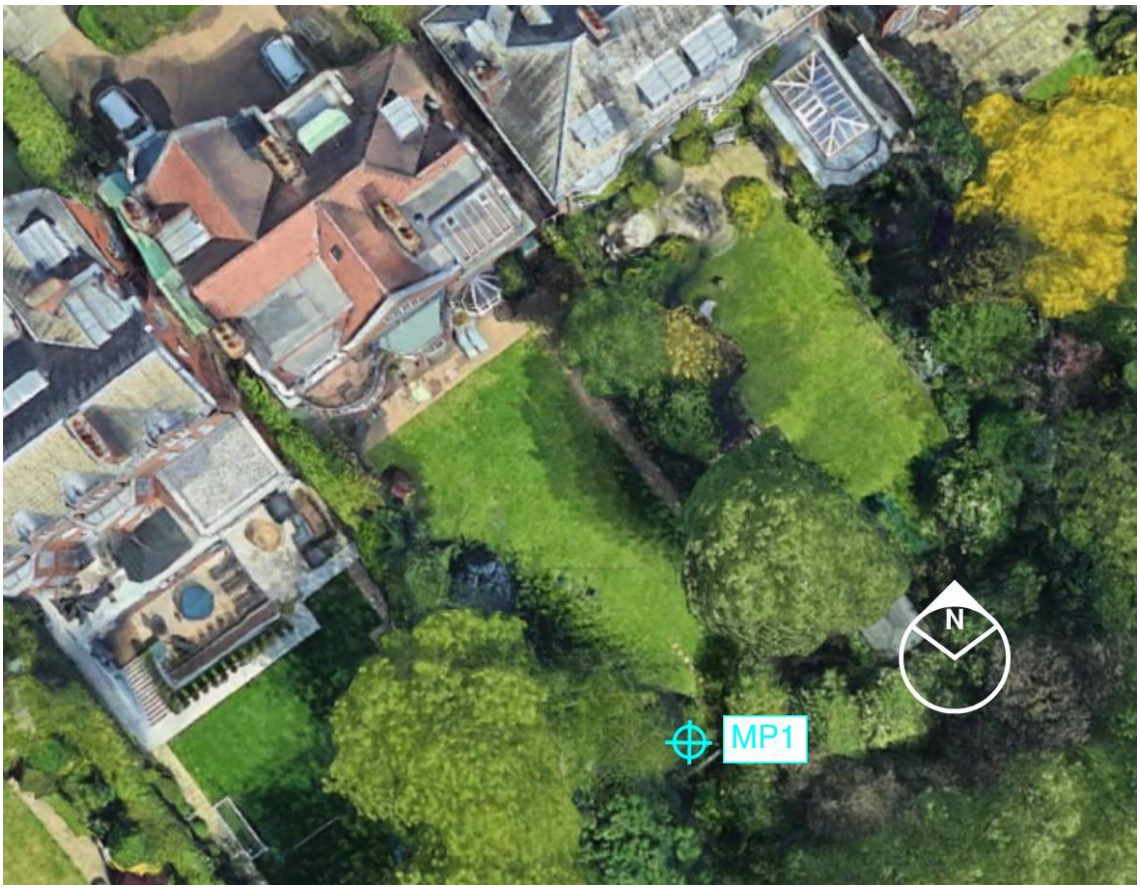

Figure 4 – Existing site illustrating location of MP1 © Google Earth

Figure 5 – Photo of MP1 looking northeast

A Rion NL52 sound level meter was used with Type WS-15 windshield and set up to log various noise parameters in 15-minute periods, including the L_{Aeq}, L_{AFmax}, and L_{A90}. The sound level meter was calibrated to 94.0 dB at 1kHz at set-up and collection using a Brüel & Kjær 4231 calibrator. The drift found on collection was not significant and was within expected tolerances (<0.1 dB). The meter was unattended for the duration of the survey except during the set-up and collection, however audio files were recorded at 10-minute intervals in order to identify noise sources, along with audio recordings made of events above a set threshold of 78dB. Both the sound level meter and the calibrator were within their required external calibration intervals. Calibration certificates are available upon request.

On the set up of the survey, the weather conditions were sunny overcast skies, a temperature of 13°C, and low wind at 3 metres per second wind speeds in a northeast direction. On survey collection weather was overcast with light rain, a temperature of 14°C, and wind speeds of 4 metres per second in a northeast direction. The forecast weather indicated suitable weather conditions to perform the survey for noise monitoring during the period, with wind speeds below acceptable values (5 m/s). There were periods where a small amount of rainfall occurred, these periods have been excluded from the assessment.

During the daytime, approximately 8am - 6pm, demolition and construction noise was taking place on site and whilst this was taking place, the levels are not representative of typical baseline levels and cannot be used to determine background noise levels. At any point where the works were detrimental to the survey, the periods have been excluded from the assessment.

During set up and collection the noise climate was dominated by distant road traffic, aircraft noise, dogs barking and bird noise, as well as some activity including voices from Primrose Hill. There is moderate traffic activity surrounding the site, however the site is screened from this

activity and traffic noise was not significant. The conditions were considered similar to those at the rear of the housing and likely to be representative of typical conditions.

4.2 Survey Results

Full survey measurement results have been provided in Appendix A. The results of the noise survey have been provided in the form of a time history graph below as Figure 6. Sections highlighted are periods of rainfall (shaded red) and demolition works (shaded green), respectively. The measurements within these periods do not give a representative baseline result, they have been excluded in the calculations.

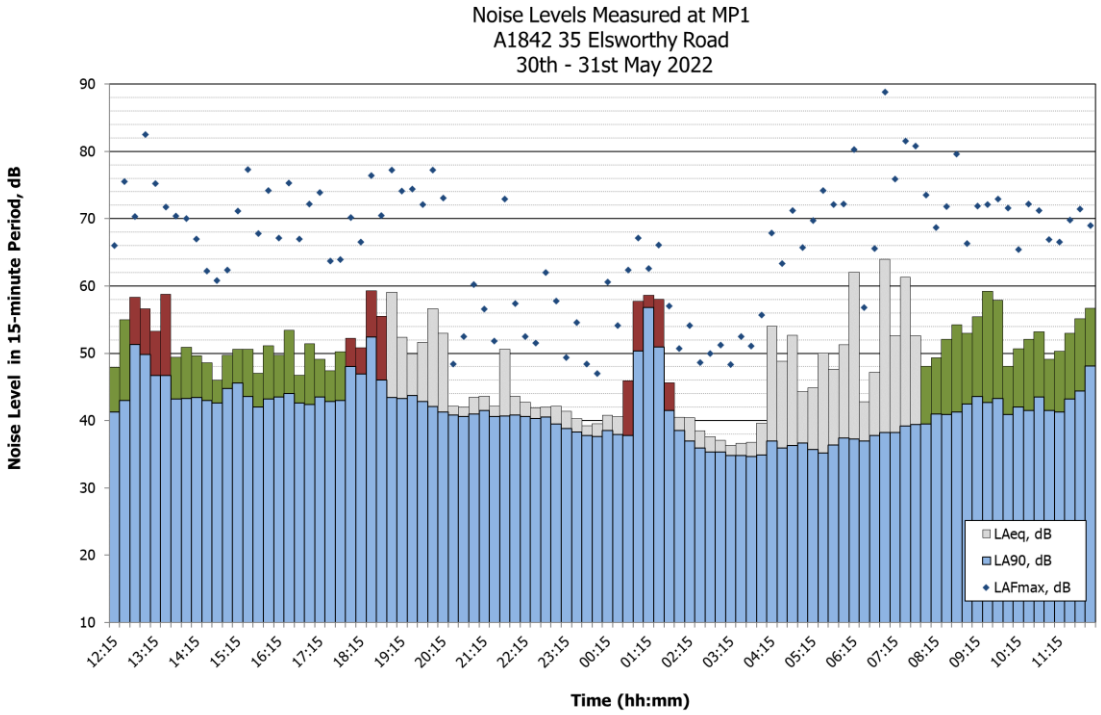

Figure 6 – Time history graph.

The time history graph shows fairly steady underlying L_{A90} noise levels outside of the working day period of site activity. The L_{Aeq} values during the night are generally similar, with the exception of a large increase at around 0100 hrs; from inspection of the audio files there was a short period of rainfall at this time which generates this increase.

As the measurements were made in the summer, the morning chorus happens in the calculated night time period (2300 to 0700), hence the elevated L_{Aeq} values lasting until approximately 2000 hrs and starting again at approximately 0415. Further noises begin to contribute from this period including aircraft noise, and distant road traffic. Otherwise, the site has a quiet noise climate, and is reasonably steady with L_{Aeq} 55dB daytime and L_{Aeq} 50dB night time.

A summary of the noise levels has been provided in Table 2 below. The typical background noise level has been determined; these can be seen in the frequency distribution of the integer L_{A90} values as discussed in BS 4142:2014, as shown in Figure 7. Table 2 also shows the typical L_{A90} based on the frequency distribution which is determined in line with BS4142:2014

Table 2 – L_{Aeq} and minimum L_{A90} noise indices measured at MP1

Period	$L_{Aeq, T}$ (dB): log average for period	Typical L_{A90} (dB)
Day[1] 0700-2300	55	41
Evening[2] 1800-2300	51	41
Night[3] 2300-0700	50	35

[1] *Day Period 30th May 12:15-23:00, 5th April 07:00-12.15*

[2] *Evening Period 30th May 19:00-23:00*

[3] *Night Period 30th May 23:00-31st May 07:00*

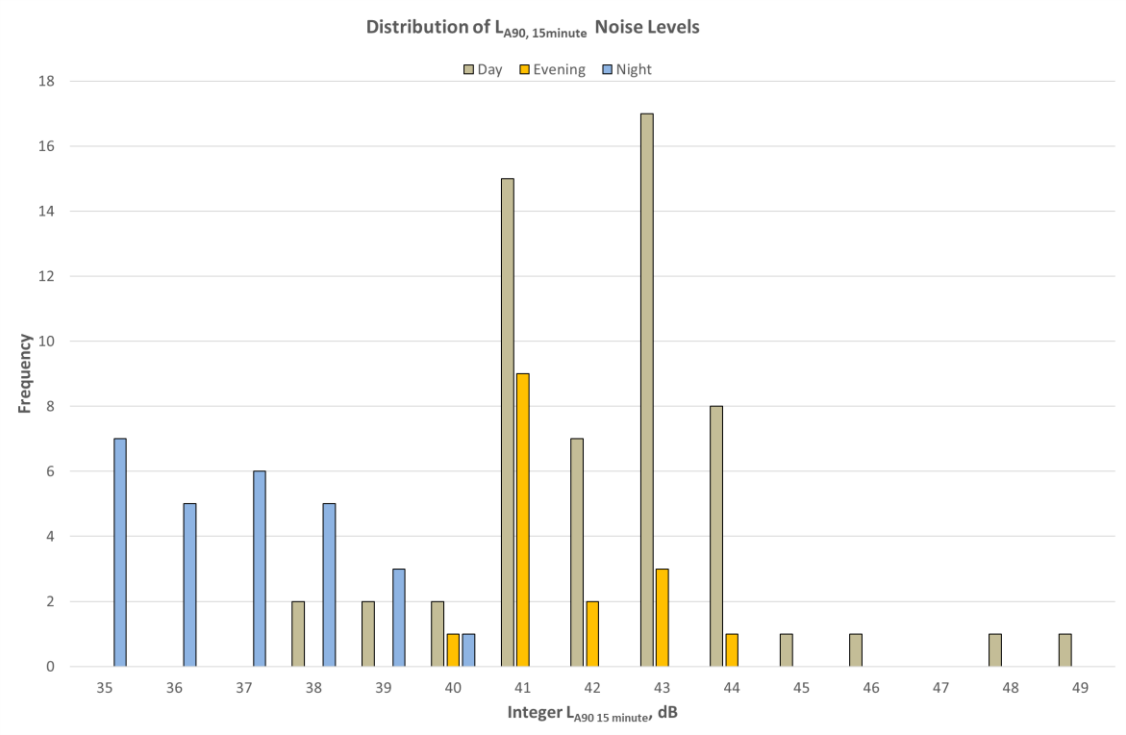

Figure 7 – Frequency distribution of L_{A90} measurements during the day, evening and night

5 Plant Noise Limits

Typically, LB Camden sets plant noise emissions limits at 10dB below the background (L_{A90}) outside residential windows and in gardens. It also refers to implementing the guidance in BS4142:2014. We are also aware that in some locations LB Camden has imposed a noise limit for the rating plant level to be 5dB below the background, L_{A90}. BS4142 state that where background noise levels are low then a fixed limit is appropriate and in this case at night the background is low (35dB L_{A90}) and would result in a limit of 25dB L_{AR} if the level were set at 10dB below the background noise. In line with BS4142 and our standard procedure, we propose that the noise limit at night would be L_{Ar} 30dB outside windows of dwellings. We note that this would not apply in gardens at night, the limit in gardens is determined from the daytime results.

The typical measured background noise levels are given in Table 3, which also includes the noise limits derived.

Table 3 The Typical L_{A90} and L_{Ar} for each measurement period

Measurement Period	Typical L_{A90} (dB)	Standard Camden Limit at 10dB below background L_{Ar} (dB)	Proposed limit with low background noise at night. L_{Ar} (dB)
Day	41	**31**	**31**
Night	35	**25**	**30**

We propose that the day limit would apply in the main amenity garden areas of the adjacent dwellings, specifically L_{Ar} 31dB.

6 Plant Noise Assessment

6.1 Plant Details

The plant details have been provided by Method, the engineers for the scheme and the noise data is taken from manufacturer's published information. Specifically the plant comprises:

MVHR Main House: Nuaire XBoxer XBC+45 (size 45)
MVHR Pool: Recotherm Aeris 50

The spectral sound power data used is shown in the sample calculations in Appendix B.

The pool MVHR and main house MVHR are located at basement level internally and ducted to the exterior. Both MVHR units will have primary attenuators; these have now been selected by the plant contractor's designers and the actual proposed attenuators are used in the calculations. The insertion losses are given in the calculation attached.

Operational Hours

The plant is assumed to potentially all operate at full duty during the daytime hours. During the night the MVHR units for the house and pool are expected to be able to run for periods and therefore the assessment takes account of the plant running potentially at any time of the day or night. The noise limits at the house are taken to apply during the day and night, but in the garden noise levels are only compared with a daytime limit.

6.2 Plant Noise Calculations

Example of the plant calculations are given in Appendix B. This shows the calculation to the worst-affected garden (R1 garden of number 33) and the calculation to the worst-affected windows (R2 upper floor of number 33). There is no expectation that the plant will be tonal or will exhibit any characteristics which would attract at character correction according to BS4142:2104.

The plant noise and rating level assessment are set out in Table 6.

Table 6: BS4142 rating level assessment

Receptor	Noise Limit L_{Ar}	Plant Specific Level L_{Aeq}	Character correction BS4142	Rating Level L_{Ar}	Margin of compliance
R1 (#33 garden)	31dB (day)	23.1	0dB	23.1	8dB
R2 (#33 house)	30dB (night)	17.2	0dB	17.2	13dB

The noise levels therefore are compliant with the proposed noise limits with a comfortable margin. It is also noted that the noise levels would also comply with the standard Camden requirement to be 10dB below the background L_{A90}.

We have also predicted noise to the public path which skirts around the edge of Primrose Hill and predict a level of 29dBA. This assumes the rear fence is solid and acts as a barrier (although we have only assumed 5dB shielding). There would not commonly be a planning limit on a public outdoor area, but it is noted that this would in any case meet the standard Camden planning noise limit for outside housing during the day.

6.3 Uncertainty and Context

BS 4142 requires and assessment of uncertainty and context.

There is always an element of uncertainty in an acoustic assessment. This could relate to the baseline levels measured or the plant noise levels. In this case the absolute noise limit is low in any case and would be expected to protect amenity regardless of the comparison with the background noise level. The plant noise level is predicted to be well below the background noise level too, which gives a margin to account for uncertainty.

The context in this case is that new plant is being introduced to a residential area. Low noise levels would be expected in these circumstances and the limits can be met.

7 Conclusion

This report presents details of a baseline noise survey and plant noise assessment carried out at 35 Elsworthy Road. The survey has determined background noise levels from which plant noise limits have been derived. The proposed plant associated with the scheme and the new plant shed at the rear of the garden has been assessed and the plant noise emissions levels predicted to sensitive receptors. The calculations indicate that the noise limits can be met with the plant operating as proposed and hence there is no reason to refuse planning permission in respect of noise emissions.

Time	L_{Aeq} dB	$L_{Amax,F}$ dB	L_{AF90} dB	Time	L_{Aeq} dB	$L_{Amax,F}$ dB	L_{AF90} dB
30/05/2022 12:00	52.6	82.0	42.7	31/05/2022 00:15	40.8	60.6	38.5
30/05/2022 12:15	47.9	66.0	41.3	31/05/2022 00:30	40.6	54.1	37.9
30/05/2022 12:30	55.0	75.5	43.0	31/05/2022 00:45	45.9	62.4	37.8
30/05/2022 12:45	58.3	70.3	51.3	31/05/2022 01:00	57.7	67.1	50.3
30/05/2022 13:00	56.6	82.5	49.8	31/05/2022 01:15	58.6	62.6	56.8
30/05/2022 13:15	53.3	75.2	46.7	31/05/2022 01:30	58.0	66.1	50.9
30/05/2022 13:30	58.8	71.7	46.7	31/05/2022 01:45	45.6	57.0	41.5
30/05/2022 13:45	49.4	70.4	43.2	31/05/2022 02:00	40.5	50.7	38.5
30/05/2022 14:00	50.9	70.0	43.3	31/05/2022 02:15	40.4	54.1	37.0
30/05/2022 14:15	49.6	67.0	43.4	31/05/2022 02:30	38.5	48.6	35.9
30/05/2022 14:30	48.6	62.2	43.0	31/05/2022 02:45	37.6	50.0	35.3
30/05/2022 14:45	46.0	60.8	42.6	31/05/2022 03:00	37.1	51.2	35.3
30/05/2022 15:00	49.7	62.4	44.8	31/05/2022 03:15	36.3	48.3	34.8
30/05/2022 15:15	50.6	71.1	45.6	31/05/2022 03:30	36.6	52.5	34.8
30/05/2022 15:30	50.6	77.3	43.6	31/05/2022 03:45	36.8	51.1	34.7
30/05/2022 15:45	47.0	67.8	42.0	31/05/2022 04:00	39.6	55.7	34.9
30/05/2022 16:00	51.1	74.2	43.2	31/05/2022 04:15	54.0	67.9	37.0
30/05/2022 16:15	49.7	67.1	43.5	31/05/2022 04:30	48.8	63.3	35.9
30/05/2022 16:30	53.4	75.3	44.0	31/05/2022 04:45	52.7	71.2	36.3
30/05/2022 16:45	46.7	67.0	42.6	31/05/2022 05:00	44.3	65.7	36.7
30/05/2022 17:00	51.4	72.2	42.4	31/05/2022 05:15	44.9	69.7	35.7
30/05/2022 17:15	49.1	73.9	43.5	31/05/2022 05:30	50.0	74.2	35.2
30/05/2022 17:30	47.4	63.7	42.8	31/05/2022 05:45	47.6	72.1	36.4
30/05/2022 17:45	50.2	63.9	43.0	31/05/2022 06:00	51.3	72.2	37.4
30/05/2022 18:00	52.2	70.2	48.0	31/05/2022 06:15	62.0	80.3	37.3
30/05/2022 18:15	50.8	66.5	46.9	31/05/2022 06:30	42.8	56.8	37.0
30/05/2022 18:30	59.3	76.4	52.4	31/05/2022 06:45	47.2	65.6	37.8
30/05/2022 18:45	55.5	70.5	46.0	31/05/2022 07:00	64.0	88.8	38.2
30/05/2022 19:00	59.1	77.2	43.4	31/05/2022 07:15	52.6	75.9	38.2
30/05/2022 19:15	52.4	74.1	43.3	31/05/2022 07:30	61.3	81.5	39.2
30/05/2022 19:30	49.9	74.4	43.7	31/05/2022 07:45	52.6	80.8	39.4
30/05/2022 19:45	51.6	72.1	42.8	31/05/2022 08:00	48.1	73.5	39.5
30/05/2022 20:00	56.6	77.2	42.1	31/05/2022 08:15	49.3	68.7	41.0
30/05/2022 20:15	53.0	73.1	41.3	31/05/2022 08:30	52.1	71.8	40.9
30/05/2022 20:30	42.1	48.4	40.8	31/05/2022 08:45	54.2	79.6	41.3
30/05/2022 20:45	42.0	52.5	40.6	31/05/2022 09:00	53.0	66.3	42.5
30/05/2022 21:00	43.5	60.2	41.0	31/05/2022 09:15	55.4	71.9	43.6
30/05/2022 21:15	43.6	56.6	41.5	31/05/2022 09:30	59.2	72.1	42.7
30/05/2022 21:30	42.1	51.8	40.6	31/05/2022 09:45	57.9	72.9	43.3
30/05/2022 21:45	50.6	72.9	40.7	31/05/2022 10:00	48.1	71.6	40.9
30/05/2022 22:00	43.6	57.4	40.8	31/05/2022 10:15	50.7	65.4	42.0
30/05/2022 22:15	42.7	52.5	40.6	31/05/2022 10:30	52.1	72.2	41.5
30/05/2022 22:30	41.9	51.5	40.3	31/05/2022 10:45	53.2	71.2	43.5
30/05/2022 22:45	42.0	62.0	40.5	31/05/2022 11:00	49.1	66.9	41.5
30/05/2022 23:00	42.1	57.8	39.5	31/05/2022 11:15	50.3	66.5	41.3
30/05/2022 23:15	41.4	49.4	38.8	31/05/2022 11:30	53.0	69.8	43.2
30/05/2022 23:30	40.3	54.6	38.3	31/05/2022 11:45	55.1	71.4	44.4
30/05/2022 23:45	39.2	48.4	37.8	31/05/2022 12:00	56.7	69.0	48.1
31/05/2022 00:00	39.5	47.0	37.6	31/05/2022 12:15	55.5	77.0	48.7

Plant Noise to R1 – Garden of Number 33 Elsworthy Road.

14/10/24	A1842				Octave Band Centre Frequency, Hz								
35 Elsworth Road - Plant Emissions Calculation					63	125	250	500	1000	2000	4000	dBA	
Receptor	**Adacent Garden #33 (assumes solid garden fence)**												
Limit (day - to garden)												31.0	
TOTAL Plant Level					38.0	30.0	30.7	6.5	5.2	-10.5	-11.5	**23.2**	
Main MVHR													
Fresh Air Supply inlet					31.8	22.8	20.3	-2.2	-5.2	-23.7	-26.7	13.7	
Exhaust Air Outlet					36.8	28.8	30.3	5.8	4.8	-10.7	-11.7	22.6	
Pool MVHR													
Fresh Air Supply inlet					12.2	9.0	-5.0	-14.9	-25.9	-40.4	-36.4	-5.3	
Exhaust Air Outlet					18.2	16.0	-1.0	-10.9	-21.9	-33.4	-32.4	1.1	
Main House MVHR													
Nuaire Xboxer XBC+45 size 45 unit													
SWL FAI inlet					83.0	75.0	75.0	64.0	64.0	62.0	54.0		
SWL discharge outlet					88.0	81.0	85.0	71.0	72.0	72.0	66.0		
Fresh Air Supply inlet													
SWL FAI inlet					83.0	75.0	75.0	64.0	64.0	62.0	54.0		
generic attenuator, 600mm, 40% free area					3.0	5.0	9.0	13.0	15.0	16.0	11.0		
radiused bend, 400mm					0.0	0.0	0.0	1.0	2.0	3.0	3.0		
radiused bend, 400mm					0.0	0.0	0.0	1.0	2.0	3.0	3.0		
rectangular duct, 12m, 400mm, 350mm					6.0	7.2	3.6	3.6	3.6	3.6	3.6		
radiused bend, 400mm					0.0	0.0	0.0	1.0	2.0	3.0	3.0		
rectangular duct, 3m, 400mm, 350mm					1.5	1.8	0.9	0.9	0.9	0.9	0.9		
mitred bend, 400mm					0.0	0.0	5.0	8.0	4.0	3.0	3.0		
radiused bend, 400mm					0.0	0.0	0.0	1.0	2.0	3.0	3.0		
end reflection, 400mm, 350mm					4.5	2.5	0.5	0.0	0.0	0.0	0.0		
				Lw	68.0	58.5	56.0	34.5	32.5	26.5	23.5		
Atmosphere			distance	14.5m	34.2	34.2	34.2	34.2	34.2	34.2	34.2		
	directivity : 90°,30°, 400mm, 350mm				3.0	3.5	3.5	2.5	1.5	-11.0	-11.0		
				Lp	36.8	27.8	25.3	2.8	-0.2	-18.7	-21.7	18.7	dB(A)
Shielding	-5			Lp	31.8	22.8	20.3	-2.2	-5.2	-23.7	-26.7	13.7	dB(A)
Exhaust Air Outlet													
SWL discharge outlet					88.0	81.0	85.0	71.0	72.0	72.0	66.0		
generic attenuator, 600mm, 40% free area					3.0	5.0	9.0	13.0	15.0	16.0	11.0		
radiused bend, 400mm					0.0	0.0	0.0	1.0	2.0	3.0	3.0		
rectangular duct, 12m, 400mm, 350mm					6.0	7.2	3.6	3.6	3.6	3.6	3.6		
radiused bend, 400mm					0.0	0.0	0.0	1.0	2.0	3.0	3.0		
rectangular duct, 3m, 400mm, 350mm					1.5	1.8	0.9	0.9	0.9	0.9	0.9		
mitred bend, 400mm					0.0	0.0	5.0	8.0	4.0	3.0	3.0		
radiused bend, 400mm					0.0	0.0	0.0	1.0	2.0	3.0	3.0		
end reflection, 400mm, 350mm					4.5	2.5	0.5	0.0	0.0	0.0	0.0		
				Lw	73.0	64.5	66.0	42.5	42.5	39.5	38.5		
Atmosphere			distance	14.5m	34.2	34.2	34.2	34.2	34.2	34.2	34.2		
	directivity : 90°,30°, 400mm, 350mm				3.0	3.5	3.5	2.5	1.5	-11.0	-11.0		
				Lp	41.8	33.8	35.3	10.8	9.8	-5.7	-6.7	27.6	dB(A)
Shielding	-5			Lp	36.8	28.8	30.3	5.8	4.8	-10.7	-11.7	22.6	dB(A)
Pool MVHR					Octave Band Centre Frequency, Hz								
Aeris 50 Recotherm					63	125	250	500	1000	2000	4000	dBA	
SWL FAI inlet					60.0	61.0	60.0	61.0	58.0	53.0	50.0		
SWL discharge outlet					65.0	66.0	61.0	64.0	65.0	61.0	56.0		
allaway attenuators as 03/10/24													
FAI supply	800mm				8.0	14.0	22.0	32.0	42.0	40.0	33.0		
AHU exhaust	800mm				7.0	12.0	19.0	31.0	45.0	41.0	35.0		
Fresh Air Supply inlet													
SWL FAI inlet					60.0	61.0	60.0	61.0	58.0	53.0	50.0		
FAI supply	800mm				8.0	14.0	22.0	32.0	42.0	40.0	33.0		
rectangular duct, 1m, 650mm, 650mm					0.6	0.3	0.3	0.2	0.2	0.2	0.2		
mitred bend, 650mm					0.0	1.0	7.0	7.0	4.0	3.0	3.0		
end reflection, 650mm, 650mm					3.0	1.0	0.0	0.0	0.0	0.0	0.0		
				Lw	48.4	44.7	30.7	21.8	11.8	9.8	13.8		
Atmosphere			distance	14.5m	34.2	34.2	34.2	34.2	34.2	34.2	34.2		
	directivity : 90°,30°, 400mm, 350mm				3.0	3.5	3.5	2.5	1.5	-11.0	-11.0		
				Lp	17.2	14.0	0.0	-9.9	-20.9	-35.4	-31.4	-0.3	dB(A)
Shielding	-5			Lp	12.2	9.0	-5.0	-14.9	-25.9	-40.4	-36.4	-5.3	dB(A)
Exhaust Air Outlet													
SWL discharge outlet					65.0	66.0	61.0	64.0	65.0	61.0	56.0		
AHU exhaust	800mm				7.0	12.0	19.0	31.0	45.0	41.0	35.0		
rectangular duct, 1m, 650mm, 650mm					0.6	0.3	0.3	0.2	0.2	0.2	0.2		
mitred bend, 650mm					0.0	1.0	7.0	7.0	4.0	3.0	3.0		
end reflection, 650mm, 650mm					3.0	1.0	0.0	0.0	0.0	0.0	0.0		
				Lw	54.4	51.7	34.7	25.8	15.8	16.8	17.8		
Atmosphere			distance	14.5m	34.2	34.2	34.2	34.2	34.2	34.2	34.2		
	directivity : 90°,30°, 400mm, 350mm				3.0	3.5	3.5	2.5	1.5	-11.0	-11.0		
				Lp	23.2	21.0	4.0	-5.9	-16.9	-28.4	-27.4	6.1	dB(A)
Shielding	-5			Lp	18.2	16.0	-1.0	-10.9	-21.9	-33.4	-32.4	1.1	dB(A)

Plant Noise to R2 – Rear Upper Floor Window of Number 33 Elsworthy Road.

14 october 2024	A1842			Octave Band Centre Frequency, Hz								
35 Elsworth Road - Plant Emissions Calculation				63	125	250	500	1000	2000	4000	dBA	
Receptor	**Rear of Adjacent House #33**											
Limit (night - to house)											31.0	
TOTAL				32.0	23.9	24.7	0.5	-0.8	-16.5	-17.6	**17.2**	
Main MVHR												
Fresh Air Supply inlet				25.8	16.8	14.3	-8.2	-11.2	-29.7	-32.7	7.7	
Exhaust Air Outlet				30.8	22.8	24.3	-0.2	-1.2	-16.7	-17.7	16.6	
Pool MVHR												
Fresh Air Supply inlet				6.2	3.0	-11.0	-20.9	-31.9	-46.4	-42.4	-11.3	
Exhaust Air Outlet				12.2	10.0	-7.0	-16.9	-27.9	-39.4	-38.4	-4.9	
Main House MVHR												
Nuaire Xboxer XBC+45 size 45 unit												
SWL FAI inlet				83.0	75.0	75.0	64.0	64.0	62.0	54.0		
SWL discharge outlet				88.0	81.0	85.0	71.0	72.0	72.0	66.0		
Fresh Air Supply inlet												
SWL FAI inlet				83.0	75.0	75.0	64.0	64.0	62.0	54.0		
generic attenuator, 600mm, 40% free area				3.0	5.0	9.0	13.0	15.0	16.0	11.0		
radiused bend, 400mm				0.0	0.0	0.0	1.0	2.0	3.0	3.0		
radiused bend, 400mm				0.0	0.0	0.0	1.0	2.0	3.0	3.0		
rectangular duct, 12m, 400mm, 350mm				6.0	7.2	3.6	3.6	3.6	3.6	3.6		
radiused bend, 400mm				0.0	0.0	0.0	1.0	2.0	3.0	3.0		
rectangular duct, 3m, 400mm, 350mm				1.5	1.8	0.9	0.9	0.9	0.9	0.9		
mitred bend, 400mm				0.0	0.0	5.0	8.0	4.0	3.0	3.0		
radiused bend, 400mm				0.0	0.0	0.0	1.0	2.0	3.0	3.0		
end reflection, 400mm, 350mm				4.5	2.5	0.5	0.0	0.0	0.0	0.0		
			Lw	68.0	58.5	56.0	34.5	32.5	26.5	23.5		
Atmosphere		distance	29.0m	40.2	40.2	40.2	40.2	40.2	40.2	40.2		
	directivity : 90°,30°, 400mm, 350mm			3.0	3.5	3.5	2.5	1.5	-11.0	-11.0		
			Lp	30.8	21.8	19.3	-3.2	-6.2	-24.7	-27.7	12.7	dB(A)
Shielding	-5		Lp	25.8	16.8	14.3	-8.2	-11.2	-29.7	-32.7	7.7	dB(A)
Exhaust Air Outlet												
SWL discharge outlet				88.0	81.0	85.0	71.0	72.0	72.0	66.0		
generic attenuator, 600mm, 40% free area				3.0	5.0	9.0	13.0	15.0	16.0	11.0		
radiused bend, 400mm				0.0	0.0	0.0	1.0	2.0	3.0	3.0		
rectangular duct, 12m, 400mm, 350mm				6.0	7.2	3.6	3.6	3.6	3.6	3.6		
radiused bend, 400mm				0.0	0.0	0.0	1.0	2.0	3.0	3.0		
rectangular duct, 3m, 400mm, 350mm				1.5	1.8	0.9	0.9	0.9	0.9	0.9		
mitred bend, 400mm				0.0	0.0	5.0	8.0	4.0	3.0	3.0		
radiused bend, 400mm				0.0	0.0	0.0	1.0	2.0	3.0	3.0		
end reflection, 400mm, 350mm				4.5	2.5	0.5	0.0	0.0	0.0	0.0		
			Lw	73.0	64.5	66.0	42.5	42.5	39.5	38.5		
Atmosphere		distance	29.0m	40.2	40.2	40.2	40.2	40.2	40.2	40.2		
	directivity : 90°,30°, 400mm, 350mm			3.0	3.5	3.5	2.5	1.5	-11.0	-11.0		
			Lp	35.8	27.8	29.3	4.8	3.8	-11.7	-12.7	21.6	dB(A)
Shielding	-5		Lp	30.8	22.8	24.3	-0.2	-1.2	-16.7	-17.7	16.6	dB(A)
Pool MVHR				Octave Band Centre Frequency, Hz								
Aeris 50 Recotherm				63	125	250	500	1000	2000	4000	dBA	
SWL FAI inlet				60.0	61.0	60.0	61.0	58.0	53.0	50.0		
SWL discharge outlet				65.0	66.0	61.0	64.0	65.0	61.0	56.0		
allaway attenuators as proposed 03/10/24												
FAI supply	800mm			8.0	14.0	22.0	32.0	42.0	40.0	33.0		
AHU exhaust	800mm			7.0	12.0	19.0	31.0	45.0	41.0	35.0		
Fresh Air Supply inlet												
SWL FAI inlet				60.0	61.0	60.0	61.0	58.0	53.0	50.0		
FAI supply	800mm			8.0	14.0	22.0	32.0	42.0	40.0	33.0		
rectangular duct, 1m, 650mm, 650mm				0.6	0.3	0.3	0.2	0.2	0.2	0.2		
mitred bend, 650mm				0.0	1.0	7.0	7.0	4.0	3.0	3.0		
end reflection, 650mm, 650mm				3.0	1.0	0.0	0.0	0.0	0.0	0.0		
			Lw	48.4	44.7	30.7	21.8	11.8	9.8	13.8		
Atmosphere		distance	29.0m	40.2	40.2	40.2	40.2	40.2	40.2	40.2		
	directivity : 90°,30°, 400mm, 350mm			3.0	3.5	3.5	2.5	1.5	-11.0	-11.0		
			Lp	11.2	8.0	-6.0	-15.9	-26.9	-41.4	-37.4	-6.3	dB(A)
Shielding	-5		Lp	6.2	3.0	-11.0	-20.9	-31.9	-46.4	-42.4	-11.3	dB(A)
Exhaust Air Outlet												
SWL discharge outlet				65.0	66.0	61.0	64.0	65.0	61.0	56.0		
AHU exhaust	800mm			7.0	12.0	19.0	31.0	45.0	41.0	35.0		
rectangular duct, 1m, 650mm, 650mm				0.6	0.3	0.3	0.2	0.2	0.2	0.2		
mitred bend, 650mm				0.0	1.0	7.0	7.0	4.0	3.0	3.0		
end reflection, 650mm, 650mm				3.0	1.0	0.0	0.0	0.0	0.0	0.0		
			Lw	54.4	51.7	34.7	25.8	15.8	16.8	17.8		
Atmosphere		distance	29.0m	40.2	40.2	40.2	40.2	40.2	40.2	40.2		
	directivity : 90°,30°, 400mm, 350mm			3.0	3.5	3.5	2.5	1.5	-11.0	-11.0		
			Lp	17.2	15.0	-2.0	-11.9	-22.9	-34.4	-33.4	0.1	dB(A)
Shielding	-5		Lp	12.2	10.0	-7.0	-16.9	-27.9	-39.4	-38.4	-4.9	dB(A)