Plant Noise Assessment
November 2020
Hann Tucker Associates

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17–37 WILLIAM ROAD

17-37 William Road
London, NW1 3ER

Plant Noise Assessment Report

28066/PNA1.Rev4

6 November 2020

For:
Euston One Limited

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1.0 Introduction

It is proposed to replace the current building at 17-33, 35-37 William Road, Euston with a PBSA building (Purpose Build Student Accommodation). The project comprises the redevelopment of no. 35-37 to provide a 15 storey building with basement level for use as student accommodation, with affordable workspace at ground floor level of no. 17-37 and improvements to ground floor façade of no. 17-33, together with public realm improvements, servicing, cycle storage and facilities, refuse storage and other ancillary and associated works.

Hann Tucker Associates have therefore been commissioned to undertake a plant noise impact assessment to assess noise emissions to the nearest neighbours based on the requirements of the Local Authority and the results of a previously undertaken environmental noise survey (reference report 28066/ENS1 dated 30 October 2020).

2.0 Objectives

Based on the results of a previously undertaken survey, identify noise emission limits from the development with reference to the requirements of the Local Authority and/or the application of BS 4142: 2014 and to minimise the possibility of noise nuisance to neighbours.

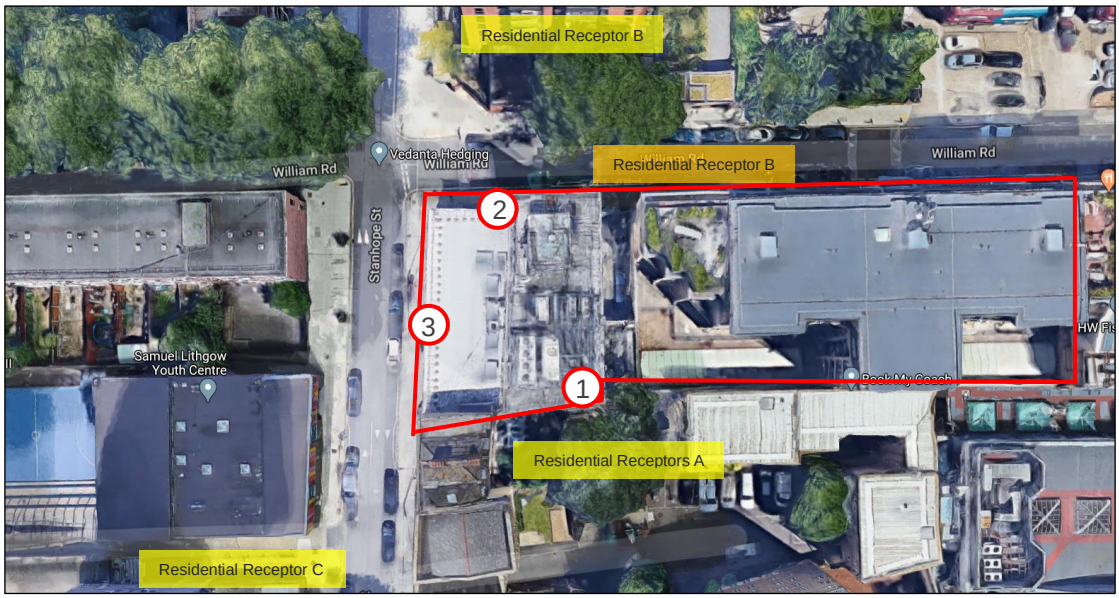
To assess the noise emissions from the proposed plant based upon data with which we are provided, and comment upon the acceptability.

To advise on noise control measures, if required with reference to the requirements of the Local Authority.

3.0 External Noise Levels

The full results of our survey are presented in our Environmental Noise Survey Report 28066/ENS1 dated 30 October 2020. The results presented therein, with suitable corrections applied form the source noise data upon which our analysis and recommendations are based.

Unmanned measurements were undertaken on site to establish the prevailing background noise climate about nearest residential receptors. The following plan and table summarise our measurements and predictions of the prevailing background noise in different positions.



Plan Showing Unmanned Measurement Positions (Imagery © 2016 Bluesky, DigitalGlobe, Getmapping plc, Infoterra Ltd & Bluesky, Map Data © 2016 Google)

Receptor	Representative Measured Position	Location
A	1	Rear of Site
B	2	William Road
C	3	Bucklebury Tower Block (overlooking proposed development)
D	2	Proposed Euston One Development (same demise)

3.1 Plant Noise Emissions Criteria to Nearest Adjacent Residential Building

Building services plant external noise emission levels will need to comply with Local Authority requirements. We understand this applies at the facades of neighbouring buildings.

We understand that the requirements/planning condition imposed by the London Borough of Camden states as follows:

"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 merit sof the development.*

• *Red – where noise is observed to have a signifcant adverse effect.*

Industrial and Commercial Noise Sources

A relevant standard or guidance document should be referenced when determining values for LOAEL and SOAEL for non-anonymous noise. 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).

Table C: Noise levels applicable to proposed industrial and commercial developments (including plant and machinery)

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*	*Day*	*'Rating level' 10dB* below background*	*'Rating level' between 9dB below and 5dB above background*	*'Rating level' greater than 5dB above background*

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

**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 periods in Table C correspond to 0700 hours to 2300 hours for the day and 2300 hours to

0700 hours for the night. The Council will take into account the likely times of occupation for types of development and will be amended according to the times of operation of the establishment under consideration.

There are certain smaller pieces of equipment on commercial premises, such as extract ventilation, air conditioning units and condensers, where achievement of the rating levels (ordinarily determined by a BS:4142 assessment) may not afford the necessary protection. In these cases, the Council will generally also require a NR curve specifcation of NR35 or below, dependant on the room (based upon measured or predicted Leq,5mins noise levels in octave bands) 1 metre from the façade of affected premises, where the noise sensitive premise is located in a quiet background area."

A background level to be used with the Local Authority criteria has been selected based on the guidance outlined from Section 8.1.4 (below) in BS4142:2014,

"NOTE 1 To obtain a representative background sound level a series of either sequential or disaggregated measurements ought to be carried out for the period(s) of interest, possibly on more than one occasion. A representative level ought to account for the range of background sound levels and ought not automatically to be assumed to be either the minimum or modal value."

On the basis of the above and the results of the environmental noise survey, we propose that the following plant noise emission criteria be achieved at 1 metre from the nearest noise sensitive window to achieve Camden's "green" noise level criteria. These can be relaxed up to 5dBA to achieve "amber" noise levels - if the development is considered applicable by the local authority.

Position	Plant Noise Emission Criteria (dBA) at 1m from nearest neighbouring noise sensitive residential window			
	Weekday (Mon-Fri)		Weekend (Sat –Sun)	
	Daytime (07:00 – 23:00) Hours	Night-Time (23:00 – 07:00) Hours	Daytime (07:00 – 23:00) Hours	Night-Time (23:00 – 07:00) Hours
1	36	34	36	33
2	39	29*	36	29*
3	42	34	37	33

*it is not generally appropriate to set plant noise criteria less than 30dBA at 1m from a noise sensitive residential window. Therefore we propose an appropriate target noise level is 30dBA.

The above criteria are to be achieved with all of the proposed plant operating simultaneously.

It should be noted that the above are subject to the final approval of the Local Authority.

3.2 Plant Noise Emissions to the Same Demise

We would expect the Local Authority plant noise emissions criteria to only apply to neighbouring demises, not to the building which the plant serves. This is subject to the final approval of the Local Authority.

However, we propose plant emissions to the nearest residential window should be controlled such that they are equal to the L_{A90} background noise levels at the 1m from the nearest noise sensitive residential window which they serve. These are presented in the table below.

Position	Plant Noise Emission Criteria (dBA) at 1m from noise sensitive residential window within the same demise			
	Weekday (Mon-Fri)		Weekend (Sat –Sun)	
	Daytime (07:00 – 23:00) Hours	Night-Time (23:00 – 07:00) Hours	Daytime (07:00 – 23:00) Hours	Night-Time (23:00 – 07:00) Hours
1	46	44	46	43
2	49	39	46	39
3	52	34	47	43

3.3 Emergency and Standby Plant

For life safety standby plant, only used in emergencies and occasional testing - e.g. smoke extract fans and life safety generators - relaxations of the internal and external criteria are normally acceptable but should comply with local authority and occupational requirements and must not interfere with internal audible emergency alarms.

The Camden Local Plan (2017) states the following:

"6.100 Emergency equipment such as generators which are only to be used for short periods of time will be required to meet the noise criteria of no more than 10dB above the background level (L90 15 minutes)…"

The standby/emergency plant including the generator and smoke extraction plant should therefore not exceed the following noise criteria during monthly testing, which would usually be

for periods less than one hour.

Position	Emergency Plant Noise Emission Criteria at Noise Sensitive Facade (dB re 2x10^{-5} Pa) For Short Period Testing			
	Weekday (Mon-Fri)		Weekend (Sat –Sun)	
	Daytime (07:00 – 23:00) Hours	Night-Time (23:00 – 07:00) Hours	Daytime (07:00 – 23:00) Hours	Night-Time (23:00 – 07:00) Hours
1	56	54	56	53
2	59	49	56	49
3	62	54	57	53

Atmospheric noise emissions from smoke extract fans are not normally considered to be an issue.

4.0 Plant Noise Impact Assessment

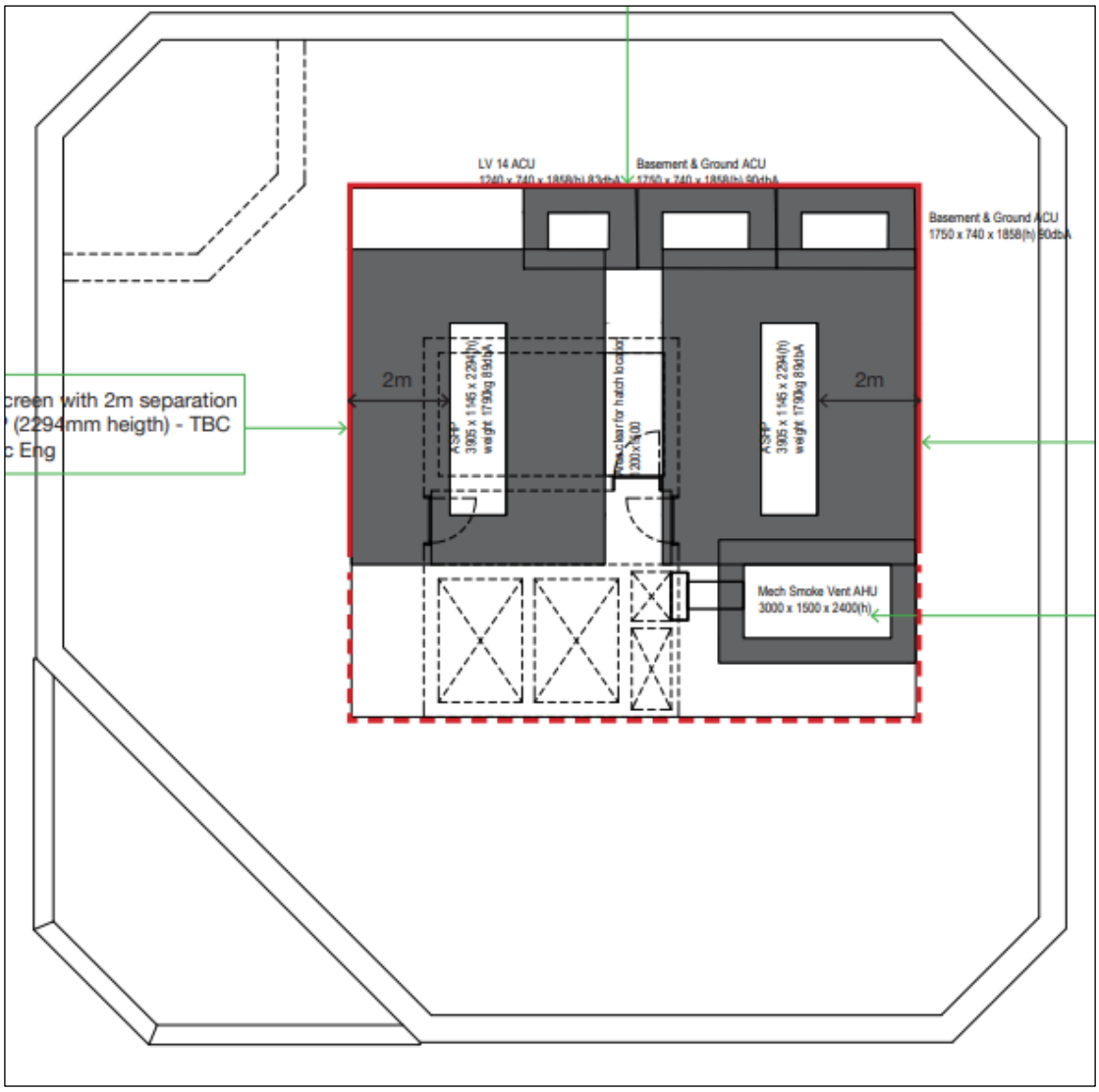
We understand the proposed plant comprises the items summarised in the table below:

Plant Description	Location	Qty	Sound Level
Air Source Heat Pumps (ASHP)	Roof	2No.	64dBA L_p at 1m*
LV14 Air Conditioning Unit (ACU-14)		1No.	83dBA L_w
Basement & Ground Air Conditioning Unit (ACU-BG)		2No.	90dBA L_w

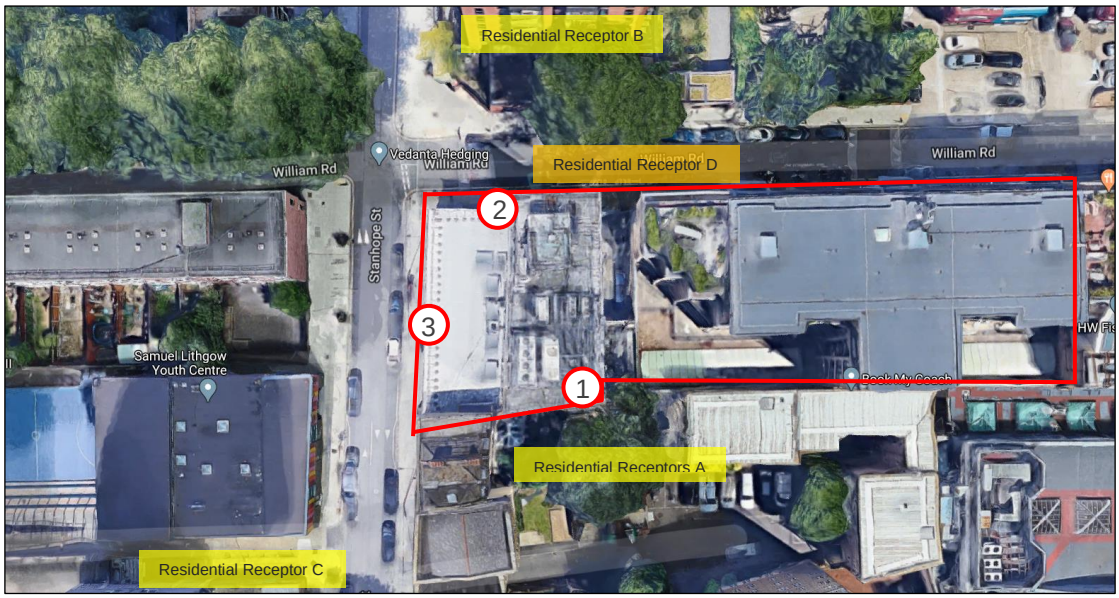
*Attenuated unit selection

4.1 Location of Plant

We understand the 2No. ASHPs, 2No. ACU-BG and 1No. ACU-14 are to be located on the roof along with a Mechanical Smoke Vent AHU (which we understand will operate in emergencies only). The image below shows the approximate location.



We understand the nearest residential receptors are located to the north and south of the proposed development as per the site plan below.



Plan Showing Unmanned Measurement Positions (Imagery © 2016 Bluesky, DigitalGlobe, Getmapping plc, Infoterra Ltd & Bluesky, Map Data © 2016 Google)

Due to the location of the plant (on the roof) and the location of Receptors A and B which are below this level there is likely to be significant screening and distance losses to these from the rooftop. Receptor C, the tower block (Bucklebury) on Stanhope Street is taller than the proposed rooftop therefore however there is likely to be a small amount of screening from the lift overrun/roof access and edge of the rooftop. Receptor D is to the proposed same demise (approximately 1 floor down).

4.2 Mitigation Measures

In order to control plant noise emissions in line with the proposed criterion, we recommend the units are suitably attenuated such that the following limiting sound power levels are not exceeded. The table below gives guidance of the limiting sound power level for each unit and amount of attenuation required.

Approximate Plant Noise Emission Limits For Each Unit			
Description	**Limiting SWL (dBA)**	**Limiting Sound Pressure Level (dBA) at 1m**	**Attenuation Required (dBA)**
Air Source Heat Pumps (ASHP)	72	64 at 1m	*
LV14 Air Conditioning Unit (ACU-14)	68	60 at 1m	15
Basement & Ground Air Conditioning Unit (ACU-BG)	68	60 at 1m	22

*Manufacturers attenuation included

The above table includes the allowance of the proposed 2m solid (minimum mass per unit area 10kg/m^2) or acoustically louvered screen at a height of 2000mm, with a maximum plant height of 1800mm.

The units should be selected and attenuated such that the above limits are achieved in any horizontal or vertical direction from the plant, including from the top of the plant. The current ACU-14 and ACU-BG selections are likely to require a small acoustic enclosure.

4.3 Plant Noise Impact Assessment

We understand that all plant could be operational up to 24 hours.

The following tables summarise our predictions of atmospheric noise emissions from the plantroom louvres to the nearest noise sensitive residential window.

4.3.1 Receptor A – To Rear of Site

Assuming a 24 hour operation the plant noise criteria proposed in Section 3.1 is 33dBA at the nearest noise sensitive residential window.

The following table presents our predictions of plant noise emissions at the worst affected residential window.

	Sound Power/Pressure Level (dBA) 24 hour operation
2No. ASHP with attenuation Limiting SWL	75
2No. ACU-BG with attenuation Limiting SWL	71
1No. ACU-14 with attenuation Limiting SWL	68
Cumulative Sound Power Level (SWL) For All Plant Operating	77
Distance Losses (SWL to 42m)	-44
Barrier Losses (ISO9613-2)	-13
Façade Reflection	+3
Calculated Cumulative Noise Level at Receptor	23

4.3.2 Receptor B – William Road Residential

Assuming a 24 hour operation the plant noise criteria proposed in Section 3.1 is 29dBA at the nearest noise sensitive residential window.

The following table presents our predictions of plant noise emissions at the worst affected residential window.

	Sound Power/Pressure Level (dBA) 24 hour operation
2No. ASHP with attenuation Limiting SWL	75
2No. ACU-BG with attenuation Limiting SWL	71
1No. ACU-14 with attenuation Limiting SWL	68
Cumulative Limiting Sound Power Level (SWL) For All Plant Operating	77
Distance Losses (SWL to 45m)	-44
Barrier Losses (ISO9613-2)	-15
Façade Reflection	+3
Calculated Cumulative Noise Level at Receptor	21

4.3.3 Receptor C – Bucklebury Residential Tower

Assuming a 24 hour operation the plant noise criteria proposed in Section 3.1 is 33dBA at the nearest noise sensitive residential window.

The following table presents our predictions of plant noise emissions at the worst affected residential window.

	Sound Power/Pressure Level (dBA) 24 hour operation
2No. ASHP with attenuation Limiting SWL	75
2No. ACU-BG with attenuation Limiting SWL	71
1No. ACU-14 with attenuation Limiting SWL	68
Cumulative Limiting Sound Power Level (SWL) For All Plant Operating	77
Distance Losses (SWL to 80m)	-49
Barrier Losses (ISO9613-2)	-4
Façade Reflection	+3
Calculated Cumulative Noise Level at Receptor	27

Our calculations indicate that the proposed plant, in conjunction with the proposed suitable mitigation measures should be capable of achieving the requirements of the Local Authority.

4.3.4 Receptor D – To Euston One (Same Demise)

Assuming a 24 hour operation the plant noise criteria proposed in Section 3.2 is 39dBA at the nearest noise sensitive residential window within Euston One (the same demise).

The following table presents our predictions of plant noise emissions at the worst affected residential window.

	Sound Power/Pressure Level (dBA) 24 hour operation
2No. ASHP with attenuation Limiting SWL	75
2No. ACU-BG with attenuation Limiting SWL	71
1No. ACU-14 with attenuation Limiting SWL	68
Cumulative Limiting Sound Power Level (SWL) For All Plant Operating	77
Distance Losses (SWL to 8m)	-26
Barrier Losses (ISO9613-2)	-13
Calculated Cumulative Noise Level at Receptor	38

Our calculations indicate that the proposed plant, in conjunction with the proposed suitable mitigation measures should be capable of achieving the requirements of the Section 3.2.

4.4 Mechanical Smoke Vent AHU (Emergency Only)

We understand a Smoke Vent AHU will also be placed on the roof, which is subject to Camden's emergency plant criteria which assumes monthly testing for short durations.

Assuming testing of this plant is likely to take place during the daytime the criteria at the nearest receptor window would be 56dBA as outlined in Section 3.2 (23dB greater than the criteria for constantly running plant).

To meet the Local Authority criterion cumulative noise levels from the Smoke Vent AHU should be attenuated and limited to a sound power level of approximately 100dBA SWL, which we expect should be comfortably achievable for this type of plant.

However, we would advise that a more onerous limiting noise level may be considered such that noise levels do not pose a health and safety risk during testing in line with the control of noise at work regulations 2005. For this we would propose a limiting sound power level of 92dBA SWL.

5.0 Conclusions

An environmental noise survey has been undertaken in order to establish the currently prevailing noise levels.

Plant noise emission criteria have been recommended based on the results of the noise survey and with reference to the Local Authority's requirements.

An assessment has been carried out to determine the plant noise emissions at the nearest noise sensitive window.

The assessment indicates that the proposed plant should be capable of achieving the proposed environmental noise criteria at the nearest noise sensitive residential windows.

Appendix A

The acoustic terms used in this report are defined as follows:

dB — Decibel - Used as a measurement of sound level. Decibels are not an absolute unit of measurement but an expression of ratio between two quantities expressed in logarithmic form. The relationships between Decibel levels do not work in the same way that non-logarithmic (linear) numbers work (e.g. 30dB + 30dB = 33dB, not 60dB).

dBA — The human ear is more susceptible to mid-frequency noise than the high and low frequencies. The 'A'-weighting scale approximates this response and allows sound levels to be expressed as an overall single figure value in dBA. The $_A$ subscript is applied to an acoustical parameter to indicate the stated noise level is A-weighted

It should be noted that levels in dBA do not have a linear relationship to each other; for similar noises, a change in noise level of 10dBA represents a doubling or halving of subjective loudness. A change of 3dBA is just perceptible.

$L_{90,T}$ — L_{90} is the noise level exceeded for 90% of the period *T* (i.e. the quietest 10% of the measurement) and is often used to describe the background noise level.

$L_{eq,T}$ — $L_{eq,T}$ is the equivalent continuous sound pressure level. It is an average of the total sound energy measured over a specified time period, *T*.

L_{max} — L_{max} is the maximum sound pressure level recorded over the period stated. L_{max} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the L_{eq} noise level.

Sound Pressure Level (L_p) is the sound pressure relative to a standard reference pressure of 2×10^{-5} Pa. This level varies for a given source according to a number of factors (including but not limited to: distance from the source; positioning; screening and meteorological effects).

Sound Power Level (SWL or L_w) is the total amount of sound energy inherent in a particular sound source, independent of its environment. It is a logarithmic measure of the sound power in comparison to a specified reference level (usually 10^{-12} W).