Hawkins environmental

Acoustic Impact Assessment:

112a Great Russell Street

Central London Investments Ltd

17th August 2023

Report Details:

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Site	112a Great Russell Street
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V1	19th May 2023	Original Issue	Mathew Vaughan MSc AMIOA	Nick Hawkins MSc MIOA MIAQM
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1. INTRODUCTION

1.1. Overview

Hawkins Environmental Limited has been instructed by Central London Investments Ltd to undertake an acoustic impact assessment for proposed plant at 112a Great Russel Street, situated in the Bloomsbury ward of the London Borough of Camden.

Planning consent was granted at appeal in 2016 for the *"Change of use of part ground floor and basement levels -4 and -5 from Car Park (sui generis) to 166 bedroom hotel (Class C1), including alterations to openings, walls and fascia on ground floor elevations on Great Russell Street and Adeline Place"* (2015/3605/P allowed at appeal ref: APP/X5210/W/16/3147078 dated 04/10/2016).

A revised application was submitted in 2020 for *the "Change of use of part ground floor and basement levels -4 and -5 from Car Park (sui generis) to hotel (Class C1), including alterations to openings, walls and fascia on ground floor elevations on Great Russell Street and Adeline Place', namely to: increase the number of hotel bedrooms from 166 to 187 with associated internal and external alterations on ground floor elevations on Great Russell Street and Adeline Place".*

Condition 9 of the Appeal (which was carried over to revised application) notes:

"Prior to the commencement of the authorised use, a written acoustic report detailing measures to control noise from fixed plant and equipment shall be submitted to and approved in writing by the local planning authority. The noise level from any plant and equipment, together with any associated ducting or vents, shall be 15 dB(A) or more below the lowest relevant measured LA90 (15min) at the nearest noise sensitive premises. The method of assessment is to be in accordance with BS4142:2014. The plant and equipment shall be installed and constructed in accordance with the approved scheme and shall be permanently maintained as such thereafter. Prior to the plant being used a validation test shall be carried out following completion of the development. The use hereby permitted shall not commence until a report of the validation test has been submitted to and approved in writing by the local planning authority".

To discharge Condition 9, Hawkins Environmental Limited prepared an acoustic report (dated 15th December 2022) to determine the acoustic specification of onsite plant and equipment. This was submitted in connection with of "*Variation of conditions 2 (approved plans), 3 (air quality), 6 (cycle storage), 9 (noise), 10 (drainage) and 14 (hotel bedroom number) of planning permission ref: 2015/3605/P allowed at appeal ref: APP/X5210/W/16/3147078 dated 04/10/2016, as amended by 2020/1438/P dated 01/06/2020"*.

Condition 9 was therefore further revised such that it notes:

"The plant and equipment as detailed in the Noise Assessment dated 15 December 2022 by Hawkins Environmental shall be installed and constructed in accordance with the approved scheme and shall be permanently maintained as such thereafter. The noise level from any plant and equipment, together with any associated ducting or vents, shall be 15 dB(A) or more below the lowest relevant measured LA90 (15min) at the nearest noise sensitive premises. Prior to the plant being used a validation test shall be carried out following completion of the development. The use hereby permitted shall not commence until a report of the validation test has been submitted to and approved in writing by the local planning authority.

Reason: To safeguard the amenities of the adjoining premises and the area generally in accordance with the requirements of policies A1 and A4 of the London Borough of Camden Local Plan 2017."

Consequently, this acoustic assessment report presents a validation test which was conducted to determine whether the proposed plant and equipment adheres with permitted levels as outlined by planning condition 9.

The assessment adheres to the principles of Government planning policy in relation to noise, specifically enacted by the *National Planning Policy Framework (NPPF), the National Planning Practice Guidance (NPPG) on Noise* and *the Noise Policy Statement for England (NPSE)*.

All sound measurements were conducted in accordance with BS 7445-2: 1991 *'Description and measurement of environmental noise Part 2: Guide to the acquisition of data pertinent to land use'*. The assessment of plant sound has been assessed in accordance with British Standard BS 4142: 2014 +A1:2019 *'Methods for rating and assessing industrial and commercial sound'.*

1.2. The Nature, Measurement and Effect of Noise

Noise is often defined as sound that is undesired by the recipient. Whilst it is impossible to measure nuisance caused by noise directly, it is possible to measure the loudness of that noise. 'Loudness' is related to both sound pressure and frequency, both of which can be measured. The human ear is sensitive to a wide range of sound levels. The sound pressure level of the threshold of pain is over a million times that of the quietest audible sound. In order to reduce the relative magnitudes of the numbers involved, a logarithmic scale of decibels (dB) is normally used, based on a reference level of the lowest audible sound.

The response of the human ear is not constant over all frequencies. It is therefore usual to weight the measured frequencies to approximate the human response. The resulting 'A' weighted decibel, dB(A), has been shown to correlate closely to the subjective human response.

When related to changes in noise, a change of ten decibels from say 60 dB(A) to 70 dB(A) would represent a doubling in 'loudness'. Similarly, a decrease in noise from 70 dB(A) to 60 dB(A) would represent a halving in 'loudness'. A change of 3 dB(A) is generally considered to be just perceptible. **Table 1.1** details typical noise levels. A glossary of acoustic terms can be found in **Appendix 1**.

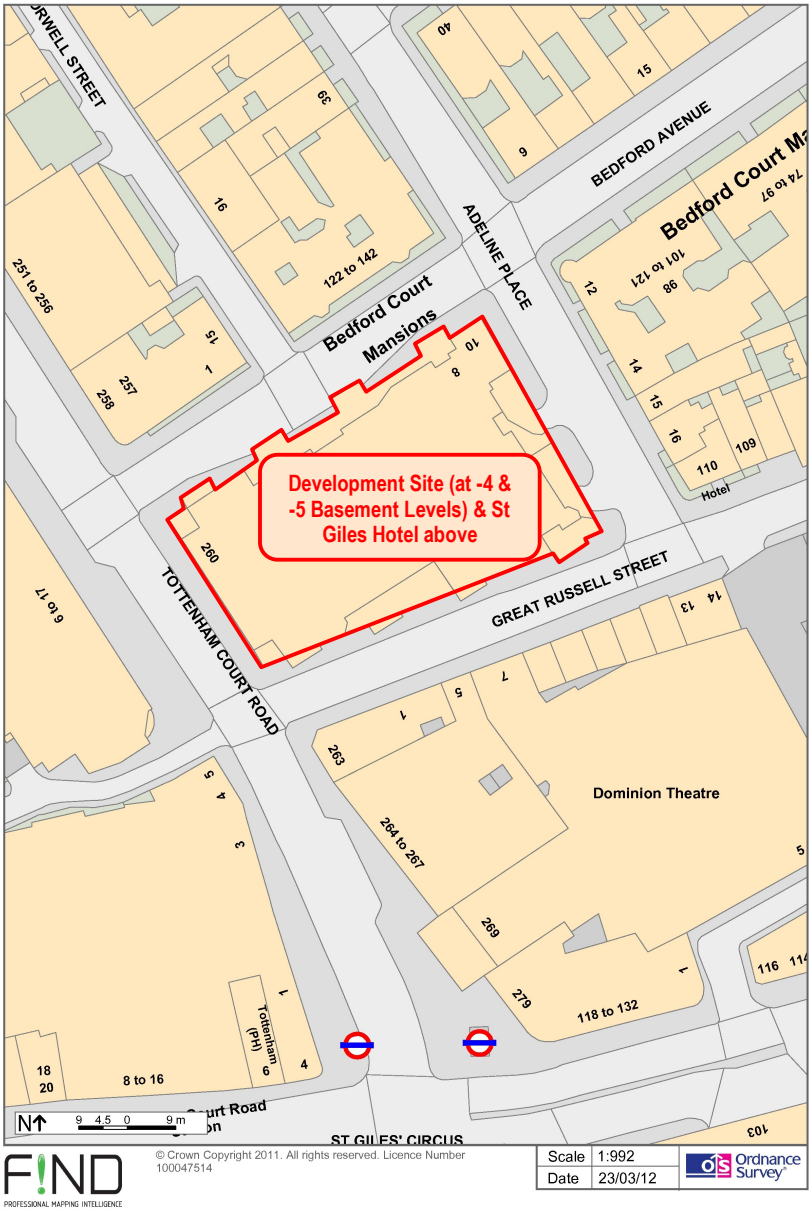
Table 1.1: Typical Noise Levels

Approximate Noise Level (dB(A))	Example
0	Limit of hearing
30	Rural area at night
40	Library
50	Quiet office
60	Normal conversation at 1 m
70	In car noise without radio
80	Household vacuum cleaner at 1 m
100	Pneumatic drill at 1 m
120	Threshold of pain

1.3. Site Description

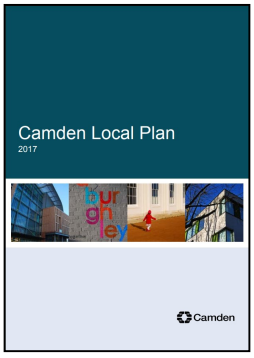
The proposed development site is situated in Bloomsbury in the London Borough of Camden, enclosed by Tottenham Court Road to the west, Great Russell Street to the south, Adeline Place to the east and Bedford Avenue to the north. The part of the site that forms the proposed development is currently a car park at the 4th and 5th levels below ground. The proposed development will see conversion of these existing floors into a hotel. A location plan of the proposed site can be seen in **Figure 1.1**.

Figure 1.1: Site Location Plan



2. PLANNING POLICY & GUIDANCE

2.1. The London Borough of Camden Local Plan (2017)



The London Borough of Camden's Local Plan (2017) states in 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".

Appendix 3 goes on to determine the noise thresholds to applied in Camden. The Guidance states that if noise from a particular source is below the LOAEL (the Lowest Observed Adverse Effect Level) at an appropriate receptor, the source would be *"considered to be at an acceptable level"*.

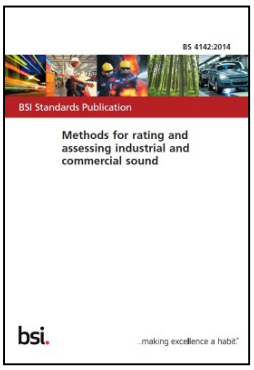
In relation to industrial and commercial noise sources, the guidance states that:

"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)".

The Guidance goes on to clarify that outside living room, dining room or bedroom windows during the day, the Rating level should be at least 10 dB lower than the background noise level. At night, outside bedroom windows, the Rating level should be at least 10 dB lower than the background noise level. The 10 dB should be increased to 15 dB if the noise contains audible tonal elements.

3. ASSESSMENT METHODOLOGY & GUIDANCE

3.1. BS 4142: 2014 +A1:2019 Methods for Rating and Assessing Industrial and Commercial Sound



British Standard BS 4142: 2014 +A1:2019 *"Methods for rating and assessing industrial and commercial sound"* provides a method for the measurement and rating of industrial noise or noise of an industrial nature and background noise levels outside dwellings in mixed residential and industrial areas. The rating level (defined in the BS) is used to rate the industrial noise source outside residential dwellings (this is defined as the "specific noise source").

The procedure defined in BS 4142 for predicting the likelihood of complaints is based on establishing the difference between the rating level and the background level outside the residential property of interest. The greater the difference the greater the likelihood of complaints and more specifically:

- "A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context;
- A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context;
- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.
- Adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact."

The guidance goes on to state that "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." Consequently, when considering the impact of a BS 4142 assessment, it is often also necessary to consider the absolute noise levels experienced at the receptor location in relation to BS 8233 and World Health Organisation guidelines.

4. BACKGROUND SOUND MEASUREMENT STUDY

In order to determine the extent to which the nearest noise sensitive receptors are affected by sound, a detailed sound measurement study has been carried out on the proposed development site. Sound measurements have been carried out in order to determine the background sound levels for the day and night time periods.

Noise levels in the vicinity of the site are characterised mainly by road traffic noise from surrounding roads. During the daytime, it was also observed that noise from distant construction work was also occasionally audible.

For receptors along Adeline Place, a previous noise survey was conducted for a period of five days at 104a Bedford Court Mansions, one of the properties with the greatest potential to be affected by the proposed development. The sound monitoring was conducted by Nick Hawkins of Hawkins Environmental Limited. Nick is a Member of the Institute of Acoustics and holds the Institute of Acoustic's Certificate of Competence in Environmental Noise Measurement. Weather conditions were conducive to successful monitoring.

Noise measurements were carried out at the location identified in **Figure 4.1**. The measurement location is considered to be representative of the ambient and background noise levels experienced by the closest affected properties on Bedford Court Mansions and was positioned in a facade location.

The background noise analysis determines the L_{A90} noise level to be used in the assessment is 56 dB(A) during the daytime and 50 dB(A) during the night-time.

For noise sensitive receptors along Great Russell Street, a previous Acoustic Impact Assessment prepared by Hawkins Environmental (Report Ref: H320 – NV – v5) had determined that the receptors are likely to experience high levels of noise when compared to receptors along Adeline place due to its reduced distance from Tottenham Court Road. In the absence of additional survey data, it was decided to use monitoring data collected by Holtz Acoustics in January 2019 in connection with a planning application in relation to plant at the YMCA. The background noise monitoring is considered representative of receptors on Great Russell Street. The report noted that typical L_{A90} noise levels of 70 and 54 dB(A) have been determined for the day and night-time periods respectively.

Table 4.1 below presents the lowest $L_{A90,15mins}$ sound level for receptors of both Adeline Place and Great Russell Street.

Table 4.1: Lowest $L_{A90,15mins}$ Background Sound Levels

Location	Lowest $L_{A90,15mins}$, dB
Adeline Place	50
Great Russell Street	54

Figure 4.1: Noise Measurement Location

5. IMPACT OF THE PLANT

5.1. Validation Survey

5.1.1. Survey Results

Onsite acoustic validation testing was conducted on the 30th June to characterize the rooftop AHU plant along the Great Russell Street façade and 28th July 2023 to characterize the dry cooler plant along the Adeline Place façade.

The sound monitoring was conducted by Mathew Vaughan of Hawkins Environmental Limited. Mathew is an Associate Member of the Institute of Acoustics and holds a Masters of Science in Applied Acoustics from Solent University. Weather conditions were conducive to successful monitoring.

Table 5.1 summarises the weather conditions during the measurement periods where the plant noise measurements.

Table 5.1: Summary of Weather Conditions during the Sound Measurements

Date	30th June 2023	28th July 2023
General Description	The measurement periods were warm, with some sunshine during the day with light winds.	
Windspeed	Average wind speeds were low, typically less than 0.5 m/s.	
Temperature	The daytime temperatures peaked at 18°C	The daytime temperatures peaked at 23°C
Precipitation	The measurement period remained dry.	

5.1.2. Plant Sound Level – Dry Cooler

The operators of the hotel turned on the dry cooler located on the Adeline Place façade of the hotel. It is understood from the operators of the hotel that the plant was operating under maximum normal conditions, i.e. the plant is not expected to be any louder than the conditions under which the survey was conducted.

The plant sound level of the dry cooler was determined by measuring the ambient sound level at 1m from the louvres of the plant whilst the plant was operating. This was conducted during short intervals where the residual sound has subsided to typically low levels. It should however be noted that since the location of the site is often busy, the ambient noise measured during these lower levels fluctuate typically by ±1.3 dB based on two standard deviations (confidence level of 95%) of the sample measurements which were conducted during the quietest times.

To isolated the activity sound level of the plant at 1m from the ambient sound level, the residual sound level was measured which was equivalent to the ambient sound level conditions at the assessment location which excludes noise generated by the plant. Using the typical lowest residual sound level, the plant sound level can

be determined by logarithmically subtracting the residual sound level from the ambient sound level. The result of this calculation is presented below in **Table 5.2.**

Table 5.2: Plant Sound Level at 1m (Freefield)

Location	Freefield Sound Levels, dB $L_{Aeq,T}$		
	Ambient	Residual	Plant
1m from Louvre	53.9	53.6	41.8

Table 5.2 notes that the freefield sound level of the plant is 41.8 dB(A) ±1.3 dB with a confidence level of 95%.

5.1.3. Plant Sound Level – Rooftop AHU Plant

It is understood from the operators of the hotel that the rooftop AHU plant was operating under maximum normal conditions, i.e. the plant is not expected to be any louder than the conditions under which the survey was conducted.

The plant sound level of the rooftop AHU was determined by measuring the ambient sound level at 1m from the louvres of the plant whilst the plant was operating. This was conducted during short intervals where the residual sound has subsided to typically low levels. Measurements were taken of both the exhaust louvre and intake louvre.

It should however be noted that since the location of the site is often busy, the ambient noise measured during these lower levels fluctuate typically by ±1.7 dB based on two standard deviations (confidence level of 95%) of the sample measurements which were conducted during the quietest times.

To isolated the activity sound level of the plant at 1m from the ambient sound level, the residual sound level was measured which was equivalent to the ambient sound level conditions at the assessment location which excludes noise generated by the plant. Using the typical lowest residual sound level, the plant sound level can be determined by logarithmically subtracting the residual sound level from the ambient sound level. The result of this calculation is presented below in **Table 5.3.**

Table 5.3: Plant Sound Level at 1m (Freefield)

Location	Freefield Sound Levels, dB $L_{Aeq,T}$		
	Ambient	Residual	Plant
1m from Intake Louvre	58.6	58.8	44.8
1m from Exhaust Louvre	57.3	58.8	53.3
Cumulative at 1m	61.0	58.8	53.9

Table 5.3 notes that the cumulative freefield sound level of both the intake and exhaust of the plant is 53.9 dB(A) ±1.7 dB with a confidence level of 95%.

5.2. Receptor Noise Levels

5.2.1. Adeline Place

Based on the freefield activity sound level at 1m from the louvres, the plant sound level at the location of the nearest noise sensitive receptor – St Giles Hotel – can be determined with the consideration of distance attenuation, directivity and façade. The result of this calculation is presented in **Table 5.4**.

Table 5.4: Receptor Sound Level Calculation (Façade)

Plant Sound Level at 1m, dB(A) (Freefield)	Propagation Corrections			Receptor Plant Sound Level, dB(A) (Façade)
	Distance Attenuation	Directivity of Source	Façade Correction	
41.8	-20.8	+3.0	+3.0	27.0

5.2.2. Great Russell Street

Based on the freefield activity sound level at 1m from the louvres, the plant sound level at the location of the nearest noise sensitive receptor – St Giles Hotel – can be determined with the consideration of distance attenuation, directivity and façade. The result of this calculation is presented in **Table 5.5**.

Table 5.5: Receptor Sound Level Calculation (Façade) – St Giles Hotel

Cumulative Plant Sound Level at 1m, dB(A) (Freefield)	Propagation Corrections				Receptor Plant Sound Level, dB(A) (Façade)
	Distance Attenuation	Directivity of Source	Façade Correction	Barrier Attenuation	
53.9	-16.5	+3.0	+3.0	-5.0	38.4

5.2.3. Impact of the Proposed Plant

To assess the impact of the proposed plant, the predicted sound levels have been compared to the criteria of policies A1 and A4 of the London Borough of Camden's Local Plan 2017 which requires the activity sound level of the plant to be at least 15 dB below the background sound level. The results of this assessment are presented in **Table 5.6** below.

Table 5.6: BS 4142 Assessment

Source	Receptor	Sound Level, dB(A)		Difference between Activity and Background, dB
		Background $L_{A90,15mins}$	Plant L_{Aeq}	
Dry Cooler	St Giles Hotel – Adeline Place Façade	50	27	-23
Rooftop AHU	5 Great Russell Street	54	29	-25
Rooftop AHU	St Giles Hotel – Great Russell Street Façade	54	38	-16

Note: All sound levels are facade sound measurements.

The above BS 4142 assessment notes that in regards to the Dry Cooler plant situated along the Adeline Place façade, the activity sound level of the plant at the nearest noise sensitive receptor (St Giles Hotel) is 23 dB less than the lowest $L_{A90,15mins}$ background sound level. In relation to the rooftop AHU plant, the cumulative activity

sound level of the plant at the nearest noise sensitive receptor (St. Giles Hotel) is 16 dB less than the lowest $L_{A90,15mins}$ background sound level.

Consequently, it has therefore been demonstrated through in-situ validation testing of the plant that the plant adheres to Condition 9 of the planning consent where *"The noise level from any plant and equipment, together with any associated ducting or vents, shall be 15 dB(A) or more below the lowest relevant measured LA90 (15min) at the nearest noise sensitive premises."*

6. OVERALL CONCLUSIONS AND RECOMMENDATIONS

It is proposed to redevelop basement levels -4 and -5 of 112a Great Russell Street. As part of the redevelopment it is proposed to convert the two basement floors into hotel accommodation. Since the hotel will be situated below ground, plant will be situated on the ground floor. Consequently, in accordance with condition 9 of the decision notice, a verification noise impact assessment study has been conducted to verify whether the activity noise levels at the closest sensitive properties inclusive of mitigation are 15 dB or more below the background sound level.

For the dry cooler plant situated along the Adeline Place façade, this requires the activity sound levels of the plant to be less than 35 dB(A) at the nearest noise sensitive receptor – St Giles Hotel. In regards to the rooftop AHU plant, this requires the activity sound levels of the plant to be less than 39 dB(A) at the nearest noise sensitive development.

Calculations of the validation survey have demonstrated that the activity sound level of the plant is 27 dB(A) and 38 dB(A) for the dry cooler and rooftop AHU plant respectively, and therefore it is verified that the sound level of both the dry cooler and rooftop AHU plant is more than 15 dB below the lowest relevant measured $L_{A90,15min}$ of 50 dB(A), therefore demonstrating compliance to Condition 9.

Appendix 1
Glossary of Acoustic Terms

Appendix 1: Glossary of Acoustic Terms

Decibel (dB)	This is a tenth (deci) of a bel. Decibel can be a measure of the magnitude of sound, changes in sound level and a measure of sound insulation. Decibels are not an absolute unit of measurement but are an expression of the ratio between two quantities expressed in logarithmic form.
dB(A)	A-weighted decibels, i.e. decibel level incorporating a frequency weighting (A-weighting), which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB(A) broadly agree with people's assessment of loudness.
Freefield	A situation in which the radiation from a sound source is completely unaffected by the presence of any reflecting boundaries.
Hertz (Hz)	Unit of frequency, equal to one cycle per second. The frequency of sound waves refers to the number of pressure fluctuations per second. Frequency is related to the pitch of a sound.
$L_{Aeq,T}$	The equivalent steady sound level in dB(A) containing the same acoustic energy as the actual fluctuating sound level over the given period, T. For example, daytime noise is generally measured over a 16 hour period, so T is 16 hours. $L_{Aeq,T}$ can be measured directly with an integrating sound level meter.
L_{A10}	The 'A'-weighted sound pressure level of the residual noise in decibels exceeded for 10 percent of a given time and is the $L_{A10,T}$. The L_{A10} is used to describe the levels of road traffic noise at a particular location.
L_{A50}	The 'A'-weighted sound pressure level of the residual noise in decibels exceeded for 50 percent of a given time and is the $L_{A50,T}$.
L_{A90}	The 'A'-weighted sound pressure level of the residual noise in decibels exceeded for 90 percent of a given time and is the $L_{A90,T}$. The L_{A90} is used to describe the background noise levels at a particular location.
L_{Amax}	The 'A'-weighted maximum sound pressure level measured over a measurement period.
R_w (or SRI)	The weighted sound reduction index as a single number laboratory measured rating used to describe the sound insulation of building elements.