
Our ref: NIA/6681/16/6566/v3/Dodworth

2nd June 2016

Ms. Miranda Steadman
Planning Manager
Commercial Development Projects Limited
Huddersfield Road
Elland
West Yorkshire
HX5 9BW



Sent by email only: msteadman@marshallcdp.com

Dear Ms Steadman

**NOISE IMPACT ASSESSMENT FOR PROPOSED (OUTLINE) COMMERCIAL DEVELOPMENT
LAND AT CAPITOL PARK, CAPITOL CLOSE, DODWORTH, BARNSELY**

1.00 INTRODUCTION

- 1.01 Environmental Noise Solutions Ltd (ENS) has been commissioned by Commercial Development Projects Limited (CDP), to carry out a noise impact assessment in relation to a proposed (outline) commercial development at land at Capitol Park, Capitol Close, Dodworth, Barnsley (hereafter referred to as the application site).
- 1.02 The objectives of the noise impact assessment were therefore to:
- Determine the ambient and background noise climate in the vicinity of the application site during representative periods of the daytime and night time.
 - Assess the potential noise impact of the proposed development in accordance with the National Planning Policy Framework (NPPF) and other pertinent guidelines.
- 1.03 This report details the methodology and results of the noise impact assessment. It has been prepared to accompany a planning application to be submitted to Barnsley Metropolitan Borough Council (BMBC).
- 1.04 This report has been prepared for CDP for the sole purpose described above and no extended duty of care to any third party is implied or offered. Third parties making reference to the report should consult CDP and ENS as to the extent to which the findings may be appropriate for their use.
- 1.05 A glossary of acoustic terms used in the main body of the text is contained in Appendix 1.

2.00 APPLICATION SITE SETTING AND PROPOSED COMMERCIAL DEVELOPMENT

- 2.01 The application site is located at land at Capitol Park, on the northern fringe of Dodworth town, in a mixed-use setting. The proposed development is bound by (see Appendix 2 for annotated site layout):
- Higham Lane to the west.
 - The A628 Whinby Road to the south and south east, with an elevated railway line and existing residential dwellings beyond.
 - Capitol Close to the north and north east, with existing commercial units and a single residential dwelling (Lane Head Farm bungalow) beyond.
- 2.02 During the course of the noise survey, the ambient (L_{Aeq}) and background (L_{A90}) noise level at the application site was predominantly formed of road traffic on the M1 motorway and the A628 Whinby Road.

- 2.03 As indicated by the proposed development master plan, the commercial development consists of 4 no. plots as follows:
- Plot A – Unit (2554 m² footprint) with service yard area adjacent to the northern façade and a car park area (42 no. spaces) adjacent to the eastern façade.
 - Plot B – Unit (2787 m² footprint) with service yard area adjacent to the southern façade and a car park area (63 no. spaces) adjacent to the eastern façade.
 - Plot C – Unit (6503 m² footprint) with service yard area adjacent to the northern and eastern façades and a car park area (118 no. spaces) adjacent to the southern façade.
 - Plot D – Unit (4655 m² footprint) with service yard area adjacent to the eastern façade and a car park area (74 no. spaces) adjacent to the northern façade.
- 2.04 At the time of writing, the occupancy of the proposed units is not known, however it is understood that flexible B2/B8 use and 24/7 operations are sought. Access is to be taken off Capitol Close and it is understood that the units are to be constructed of insulated cladding on a steel frame structure.
- 2.05 The nearest noise sensitive receptors (NSRs) to the development are considered to be:
- Lane Head Farm bungalow (NSR1), which is located approximately 80 metres from the façade of Unit C (the nearest unit) and approximately 80 metres from the centre of the Unit C service yard.
 - Residential dwellings on Thornley Avenue (NSR2), which are located approximately 100 metres from the façade of Unit D and approximately 120 metres from the centre of Units B and D service yards (and fully screened by the elevated railway line).
 - Residential dwellings on Higham Lane (NSR3), which are located approximately 85 metres from the façade of Unit D and approximately 140 metres from the centre of the Unit D service yard (fully screened by the elevated railway line).
 - The Ibis Hotel (NSR4), which is located approximately 215 metres from the façades of Units A and B and approximately 250 metres from the centre of the Unit A service yard.
- 2.06 There are also existing offices on Capitol Close situated ≥ 50 metres from the façades of the nearest proposed units and ≥ 50 metres from the centre of the nearest proposed service yards.

3.00 BASELINE NOISE SURVEY

- 3.01 In order to establish the ambient and background noise levels at the application site and its surrounding environs, a baseline noise survey was undertaken during the night time (early hours) and daytime on Wednesday 27th April 2016.
- 3.02 For the purpose of the assessment, the following noise monitoring positions were adopted (see Appendix 2 for approximate monitoring positions):
- MP1 was located in the vicinity of Lane Head Farm bungalow (NSR1), at 10 metres from the nearside kerb of Higham Lane.
 - MP2 was located at the rear of dwellings on Thornley Avenue (NSR2).
 - MP3 was located at the rear of dwellings on Higham Lane (NSR3).
 - MP4 was located in the vicinity of the Ibis Hotel (NSR4).

- 3.03 Noise measurements were undertaken in free field conditions, at a height of 1.5 metres above local ground level, using a Bruel & Kjaer 2260 Type 1 integrating sound level meter. The measurement system calibration was verified immediately before the commencement of the measurement sessions and again at the end, using a Bruel & Kjaer Type 4231 calibrator. No drift in calibration level was noted. Weather conditions throughout the survey were appropriate for monitoring.
- 3.04 Measurements consisted of A-weighted broadband parameters, together with linear octave band L_{eq} levels. The following table contains a summary of the measurement data for each measurement session, rounded to the nearest decibel.

Table 3.1 – Summary of Noise Measurement Data in the vicinity of Application Site

Position	Date	Time	L_{Aeq} (dB)	L_{A90} (dB)	L_{A10} (dB)	L_{A1} (dB)	Comments
MP1	27/04/16	1426–1503	64	53	68	72	M1 motorway traffic
MP1	27/04/16	0348–0403	47	43	49	51	M1 motorway traffic, occasional HGV movements on A628 Whinby Road
Daytime ambient and background noise level of 64 dB L_{Aeq} and 53 dB L_{A90}, respectively Night time ambient and background noise level of 47 dB L_{Aeq} and 43 dB L_{A90}, respectively							
MP2	27/04/16	1334–1407	53	47	54	64	A628 Whinby Road dominant, distant M1 motorway traffic, occasional train passes on adjacent railway line
MP2	27/04/16	0414–0434	51	46	54	59	Distant M1 motorway traffic, occasional HGV movements on A628 Whinby Road
Daytime ambient and background noise level of 53 dB L_{Aeq} and 47 dB L_{A90}, respectively Night time ambient and background noise level of 51 dB L_{Aeq} and 46 dB L_{A90}, respectively							
MP3	27/04/16	1301–1322	51	48	52	57	A628 Whinby Road and distant M1 motorway traffic, occasional HGV movements at B&B Trucks and train passes on adjacent railway line
MP3	27/04/16	0316–0340	48	42	52	56	Distant M1 motorway traffic, HGV movement at B&B Trucks
Daytime ambient and background noise level of 51 dB L_{Aeq} and 48 dB L_{A90}, respectively Night time ambient and background noise level of 48 dB L_{Aeq} and 42 dB L_{A90}, respectively							
MP4	27/04/16	0249–0306	54	49	57	59	M1 motorway traffic
Night time ambient and background noise level of 54 dB L_{Aeq} and 49 dB L_{A90}, respectively							

- 3.05 The ambient and background noise climate is commensurate with the application site setting with traffic noise from the surrounding road network (M1 motorway and the A628 Whinby Road), in addition to localised noise contributions (at MP2 and MP3) associated with occasional vehicle movements at B&B Trucks and train passes on the adjacent railway line.
- 3.06 The Ibis Hotel (NSR4) is not considered further in this assessment as it is situated a significant distance from the subject site, and ambient and background noise levels were highest at MP4, due to its proximity to the M1 motorway.

4.00 NOISE IMPACT ASSESSMENT CRITERIA

- 4.01 In terms of noise impact assessment criteria, Paragraph 123 of the National Planning Policy Framework states that planning policies and decisions should aim to *'avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development'*.
- 4.02 Planning Practice Guidance specifically dealing with noise was uploaded to the Government's Planning Portal in March 2014 as an accompaniment to the National Planning Policy Framework. This guidance is summarised herein.
- 4.03 The guidance states that noise needs to be considered when new developments may create additional noise. Whilst noise can override other planning concerns, neither the Noise Policy Statement for England nor the National Planning Policy Framework (which reflects the Noise Policy Statement for England) expects noise to be considered in isolation, separately from the economic, social and other environmental dimensions of proposed development.
- 4.04 In order to determine noise impact, local planning authorities' plan-making and decision taking should take account of the acoustic environment and in doing so consider:
- Whether or not a significant adverse effect is occurring or likely to occur;
 - Whether or not an adverse effect is occurring or likely to occur; and
 - Whether or not a good standard of amenity can be achieved.
- 4.05 In line with the Explanatory Note of the Noise Policy Statement for England, this would include identifying whether the overall effect of the noise exposure is, or would be, above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation.
- 4.06 In terms of Observed Effect Levels:
- No Observed Adverse Effect Level (NOAEL) – This is the level of noise exposure below which no effect at all on health or quality of life can be detected;
 - Lowest Observed Adverse Effect Level (LOAEL) – This is the level of noise exposure above which adverse effects on health and quality of life can be detected; and
 - Significant Observed Adverse Effect Level (SOAEL) – This is the level of noise exposure above which significant adverse effects on health and quality of life occur.
- 4.07 At the lowest extreme, when noise is not noticeable, there is by definition no effect. As the noise exposure increases, it will cross the no observed effect level as it becomes noticeable. However, the noise has no adverse effect so long as the exposure is such that it does not cause any change in behaviour or attitude. The noise can slightly affect the acoustic character of an area but not to the extent there is a perceived change in quality of life. If the noise exposure is at this level no specific measures are required to manage the acoustic environment.
- 4.08 As the exposure increases further, it crosses the lowest observed adverse effect level boundary above which the noise starts to cause small changes in behaviour and attitude, for example, having to turn up the volume on the television or needing to speak more loudly to be heard. The noise therefore starts to have an adverse effect and consideration needs to be given to mitigating and minimising those effects (taking account of the economic and social benefits being derived from the activity causing the noise).
- 4.09 Increasing noise exposure will at some point cause the significant observed adverse effect level boundary to be crossed. Above this level the noise causes a material change in behaviour such as keeping windows closed for most of the time or avoiding certain activities during periods when the noise is present. If the exposure is above this level the planning process should be used to avoid this effect occurring, by use of appropriate mitigation such as by altering the design and layout. Such decisions must be made taking account of the economic and social benefit of the activity causing the noise, but it is undesirable for such exposure to be caused.

- 4.10 At the highest extreme, noise exposure would cause extensive and sustained changes in behaviour without an ability to mitigate the effect of noise. The impacts on health and quality of life are such that regardless of the benefits of the activity causing the noise, this situation should be prevented from occurring.
- 4.11 The following table summarises the noise exposure hierarchy, based on the likely average response.

Table 4.1 – Noise Exposure Hierarchy

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	No specific measures required
		Lowest Observed Adverse Effect Level	
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	Mitigate and reduce to a minimum
		Significant Observed Adverse Effect Level	
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

- 4.12 The subjective nature of noise means that there is not a simple relationship between noise levels and the impact on those affected. This will depend on how various factors combine in any particular situation. These factors include:
- The source and absolute level of the noise together with the time of day it occurs
 - For non-continuous sources of noise, the number of noise events, and the frequency and pattern of occurrence of the noise
 - The spectral content of the noise (i.e. whether or not the noise contains particular high or low frequency content) and the general character of the noise (i.e. whether or not the noise contains particular tonal characteristics or other particular features)
 - The local acoustic character of the area

- 4.13 Further useful contextual guidance is found in British Standard BS 4142:2014 'Methods for Rating and Assessing Industrial and Commercial Sound' (BS 4142) describes methods for determining, at the outside of a building, noise levels from factories or industrial premises and a method for assessing whether the noise is likely to give rise to an adverse impacts at the nearest noise sensitive receptors.
- 4.14 BS 4142 considers that the likelihood of an adverse impact is dependent on the difference between the rating level and background noise level; the greater this difference the greater the likelihood of adverse impacts.
- 4.15 The rating level is described as the specific noise level (the equivalent continuous A-weighted sound pressure level at the assessment position produced by the specific noise source over a given reference period) plus any adjustment for the characteristic features of the noise.
- 4.16 The background noise level is the A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90 percent of a given time interval, T, measured using time weighting 'F' and quoted to the nearest whole number of decibels.
- 4.17 With respect to the impact of the development upon neighbouring offices, Table 2 of BS 8233:2014 'Guidance on Sound Insulation and Noise Reduction for Buildings' (BS 8233) gives guideline internal office criteria of **45–50 dB (A)**.

5.00 NOISE IMPACT ASSESSMENT

- 5.01 The principal noise sources potentially associated with the proposed development are considered to be:
- Noise associated with any fixed external plant.
 - Noise associated with internal/external operations.
 - Noise associated with service yard activity.
- 5.02 At the time of writing, the occupancy of the proposed units is not known, however it is understood that flexible B2/B8 use and 24/7 operations are sought.
- 5.03 The following sections of the noise impact assessment discuss the potential noise impacts of the above activities on the amenity of the nearest noise sensitive receptors.

Noise Associated with Fixed External Plant and Internal/External Operations

- 5.04 It is anticipated that the proposed development may include internal/external operations and fixed installations (mechanical and electrical plant and equipment) that could have the potential to generate noise.
- 5.05 It is therefore considered appropriate to specify suitable noise limits to which any operations and external plant items should conform. These limits should take account of the background noise level at the nearest noise sensitive receptors and the context of the area.
- 5.06 Section 11 of BS 4142, 'Assessment of the impacts', states that:

A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.

However, in relation to context, commentary on Clause 11 is as follows:

The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs. An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context.

- 5.07 In terms of context, the application site is located in a predominantly commercial/industrial area with a number of existing commercial/industrial units in the vicinity (on Capitol Park itself as well as the neighbouring Fall Bank Industrial Estate, Dodworth Business Park and Elmhirst Park).
- 5.08 It is considered that noise rating levels of no more than +5 dB above the background noise level in a free field position at the nearest residential dwellings are acceptable in the context of the application site. The maximum permitted noise rating levels are summarised below.

NSR	Period	Existing Background	Maximum permitted noise rating level at NSR
NSR1	Daytime	53 dB $L_{A90, T}$	58 dB $L_{Ar, T}$
	Night Time	43 dB $L_{A90, T}$	48 dB $L_{Ar, T}$
NSR2 and NSR3	Daytime	≥ 47 dB $L_{A90, T}$	52 dB $L_{Ar, T}$
	Night Time	≥ 42 dB $L_{A90, T}$	47 dB $L_{Ar, T}$

- 5.09 It is considered that compliance with such limits would be achievable with judicious selection of plant, equipment, building envelope design and/or standard noise mitigation techniques
- 5.10 Such maximum permissible noise rating levels would not change the acoustic character of the area and are comparable to existing ambient noise levels in the vicinity of the application site.

Service Yard Activity

- 5.11 It is assumed that service yard activity may consist of HGV movements, forklift truck (FLT) movements and loading operations.
- 5.12 The nearest residential dwelling (NSR1) is located circa 80 metres from the centre of the nearest service yard. This is adopted as worst case, as NSR2 and NSR3 are further from the nearest service yards, and fully screened from the application site by the elevated railway line.
- 5.13 An operational service yard has previously been measured by ENS at circa 48 dB $L_{Aeq, 1 \text{ hour}}$ at 20 metres. This measurement encapsulated typical FLT movements and loading operations (pallets loaded onto open-sided wagons). For reference, maximum noise levels from diesel FLT passes were measured at circa 69 dB L_{AFMax} at 10 metres.
- 5.14 Assuming point source propagation (-6 dB per doubling of distance) this equates to a typical service yard noise level of circa 36 dB $L_{Aeq, 1 \text{ hour}}$ at 80 metres (considered representative of NSR1). As this is 7 decibels below the existing background noise level at NSR1, it is considered that noise associated with FLT movements and loading operations will be negligible.
- 5.15 In order to assess the impact of HGV movements within the service yard, the Sound Exposure Level (SEL) is used. The SEL of a single discrete noise event is the level which if maintained constant for a period of one second would contain as much A-weighted sound energy as is contained in the actual noise event.
- 5.16 The SEL of HGV movements at low speed has previously been measured by ENS at circa 74 dB(A) at 10 metres. For reference, maximum noise levels were measured at circa 68 dB L_{AFMax} at 10 metres.
- 5.17 Assuming point source propagation this equates to an SEL of 56 dB (A) at 80 metres (NSR1).

- 5.18 The following formula may be used for calculating the L_{Aeq} level from the SEL:

$$L_{Aeq, T} = 10 * \log_{10} [(n \times 10^{SEL/10}) / T] \text{ where:}$$

SEL is the worst case Single Event Level (56 dB (A))

n is the number of occurrences

T is the time period in seconds

- 5.19 On the basis of the above formula, there would need to be circa 200 HGV movements in any single hour in order for service yard activity noise to exceed existing night time background levels at NSR1.
- 5.20 It is further considered that noise associated with HGV movements within the service yard will not be readily distinguishable against the residual acoustic climate, which is formed of road traffic on the M1 motorway and the A628 Whinby Road (both subject to HGV traffic throughout the night). The noise impact of HGV movements within the service yard is therefore considered negligible.
- 5.21 The WHO Guidelines on Community Noise (1999) considers that if negative effects on sleep are to be avoided, internal noise events exceeding 45 dB L_{AFMax} should be limited, and also states that a partially open window provides 15 decibels insulation. The implication of this is that external noise levels should not exceed 60 dB L_{AFMax} at the nearest dwellings during the night.
- 5.22 Assuming point source propagation, the predicted worst case maximum noise levels associated with HGV and FLT movements at NSR1 (80 metres distance) are calculated as 50 dB L_{AFMax} and 51 dB L_{AFMax} respectively. This would not give rise to any sleep disturbance, even with partially open windows.

Noise impact on adjacent offices on Capitol Park

- 5.23 The nearest office building façades at Capitol Park are circa 50 metres from the nearest proposed façade and/or service yard at the application site and it is assumed that windows are sealed to protect against noise from the M1. Façade incident noise levels at these façades are predicted to be +4 dB higher than those at NSR1, which equates to a maximum permitted daytime noise rating level of circa **62 dB $L_{Ar, T}$** from operations and fixed installations.
- 5.24 Based on external and internal noise measurements undertaken by ENS at other sites, it is considered that a standard double glazed window with standard trickle vents in a building façade will provide of the order of 27 dB(A) sound insulation (from external to internal). This equates to a worst case noise level of **35 dB(A)** inside neighbouring offices, which is well below the guideline internal office criteria of **45–50 dB(A)** provided in Table 2 of BS 8233.
- 5.25 As stated above, noise associated with the use of the service yard is unlikely to exceed background noise levels, even during the night time period.
- 5.26 On the basis of the above, the noise impact of the proposed development upon neighbouring offices is considered to be negligible.

Outline Considerations

- 5.27 It is noted that whilst NSR2 and NSR3 are screened by the elevated railway line to the north, NSR1 has a direct line-of-sight to the application site. NSR1 itself is elevated circa 2 metres above the application site, with an embankment at the site boundary.
- 5.28 For reference, BS 5228:2009 Part 1 states '*In the absence of spectral data, as a working approximation, if there is a barrier or other topographic feature between the source and the receiving position, assume an approximate attenuation of 5 dB when the top of the plant is just visible to the receiver over the noise barrier, and of 10 dB when the noise screen completely hides the sources from the receiver. High topographical features and specifically designed and positioned noise barriers could provide greater attenuation.*'

- 5.29 Consideration should therefore be given to the provision of boundary screening to NSR1, in the form of a circa 2 metre high close-boarded timber fence positioned at the top of the embankment. This should provide circa 10 dB attenuation to service yard noise, and allow more flexible use of the service yard.

6.00 CONCLUSIONS

- 6.01 A noise impact assessment has been undertaken for a proposed (outline) commercial development at land at Capitol Park, Capitol Close, Dodworth, Barnsley.
- 6.02 It is concluded that the control of noise associated with any fixed plant and operations can be achieved with the judicious selection of plant, equipment, building envelope design and/or standard noise mitigation techniques.
- 6.03 External noise associated with the use of the service yard will not give rise to any sleep disturbance, even with partially open windows.
- 6.04 It is concluded that 24-hour internal and external activities at the proposed development represents a No Observed Adverse Effect Level (NOAEL) in that such noise is noticeable and not intrusive i.e. noise can be heard, but does not cause any change in behaviour or attitude and such noise can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life. The noise impact is therefore considered to be negligible.

I trust the foregoing is sufficient for your needs. Should you have any queries regarding the above, please do not hesitate to contact me.

Yours sincerely



Thomas Crabb
MIOA, Diploma in Acoustics & Noise Control
Environmental Noise Solutions Limited

cc File

Appendix 1

Glossary of Acoustic Terms

Sound Pressure Level (L_p)

The basic unit of sound measurement is the sound pressure level. As the pressures to which the human ear responds can range from 20 μ Pa to 200 Pa, a linear measurement of sound levels would involve many orders of magnitude. Consequently, the pressures are converted to a logarithmic scale and expressed in decibels (dB) as follows:

$$L_p = 20 \log_{10}(p/p_0)$$

Where L_p = sound pressure level in dB; p = rms sound pressure in Pa; and p_0 = reference sound pressure (20 μ Pa).

A-weighting Network

A frequency filtering system in a sound level meter, which approximates under defined conditions the frequency response of the human ear. The A-weighted sound pressure level, expressed in dB(A), has been shown to correlate well with subjective response to noise.

Equivalent continuous A-weighted sound pressure level, $L_{Aeq, T}$

The value of the A-weighted sound pressure level in decibels of continuous steady sound that within a specified time interval, T , has the same mean-square sound pressure as a sound that varies with time. $L_{Aeq, 16h}$ (07:00 to 23:00 hours) and $L_{Aeq, 8h}$ (23:00 to 07:00 hours) are used to qualify daytime and night time noise levels.

$L_{A10, T}$

The A-weighted sound pressure level in decibels exceeded for 10% of the measurement period, T . $L_{A10, 18h}$ is the arithmetic mean of the 18 hourly values from 06:00 to 24:00 hours.

$L_{A90, T}$

The A-weighted sound pressure level of the residual noise in decibels exceeded 90% of a given time interval, T . L_{A90} is typically taken as representative of background noise.

$L_{AF \max}$

The maximum A-weighted noise level recorded during the measurement period. The subscript 'F' denotes fast time weighting, slow time weighting 'S' is also used.

Sound Exposure Level (SEL or L_{AE})

The energy produced by a discrete noise event averaged over one second, no matter how long the event actually took. This allows for comparison between different noise events which occur over different lengths of time.

Weighted Sound Reduction Index (R_w)

Single number quantity which characterises the airborne sound insulation properties of a material or building element over a defined range of frequencies (R_w is used to characterise the insulation of a material or product that has been measured in a laboratory).

Appendix 2
Site Location / Noise Monitoring Positions

