
GLEBE PRIMARY SCHOOL

DESIGN NOTE

BREEAM POL 05 - PLANT NOISE ASSESSMENT

14/05/2013

1.0 INTRODUCTION

MACH Acoustics have been appointed by Mace Group to undertake an assessment of plant noise associated with the proposed new development at Glebe Primary School, which is located in the London Borough of Hillingdon.

It is understood that the proposed development is being constructed to achieve the credits available under the BREEAM New Construction 2011 scheme. Within the Pollution section of the scheme there is one credit available regarding noise *Pollution POL05 – Noise Attenuation*. This design note addresses the POL05 credit only.

A noise survey has been previously undertaken by RBA Acoustics. Further background noise measurements by MACH Acoustics have been used in this plant noise assessment. This assessment has been undertaken according to the guidance of BS4142:1997 '*Method for Rating Industrial Noise Affecting Mixed Residential and industrial Areas*'.

1.1 Site Description

The proposed development will involve the introduction of a new school building to the west of the existing main building. It is understood that the existing school building will be demolished with the introduction of the new school building. The new school building will consist of two floors and will accommodate all rooms teaching and ancillary spaces. Figure 1 on the following page shows the location of the existing school in relation to its surroundings.

Figure 2 below shows the extent of the proposed development shown in grey in relation to the existing school site outlined in red. The nearest noise sensitive dwellings are illustrated in orange.

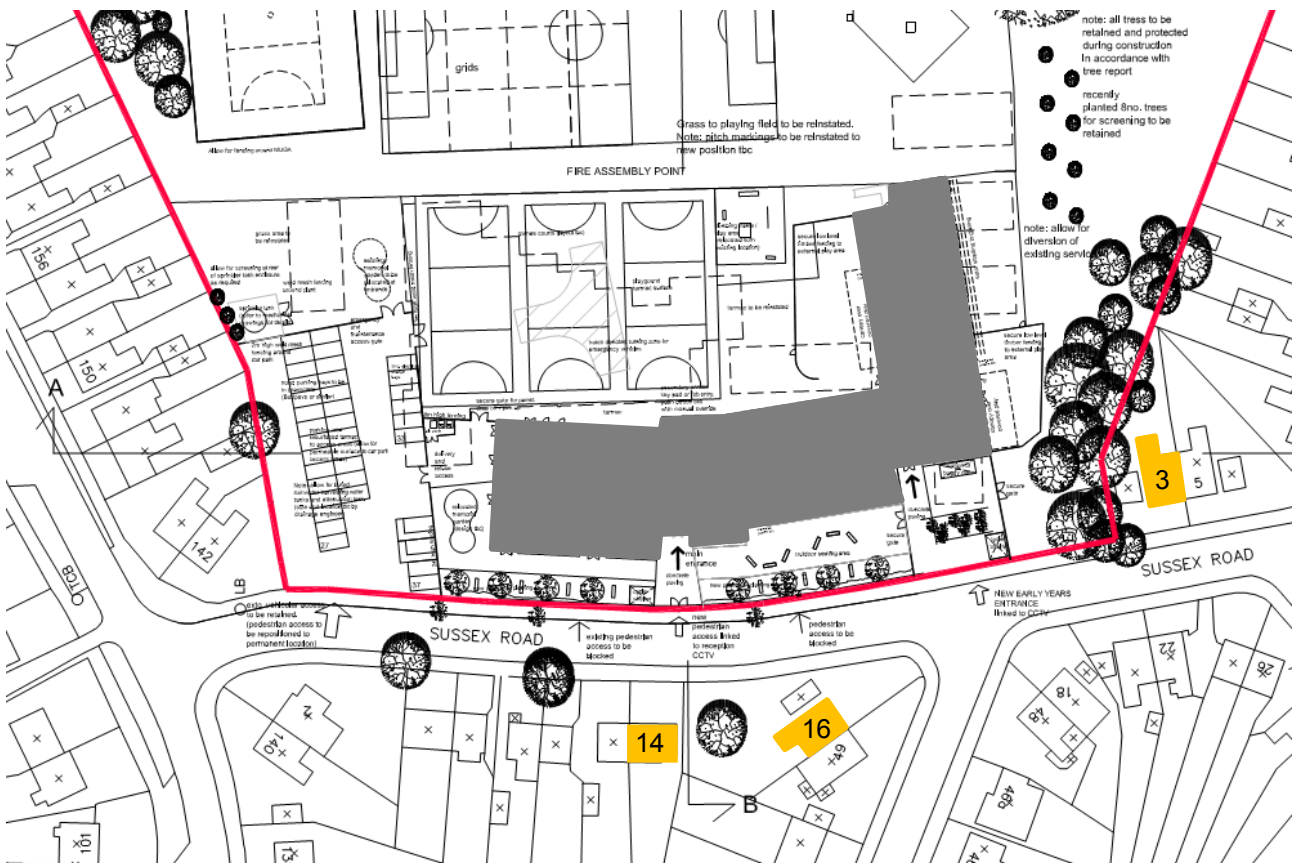


Figure 2: Extent of proposed development

2.0 BREEAM NEW CONSTRUCTION 2011

There is one credit available within the Pollution section POL05 for a building project of this type, where the aim is to reduce the likelihood of noise from the new development affecting nearby noise –sensitive buildings.

The following demonstrates compliance.

First and only Credit

1. The credit can be awarded by default where there are or will be no noise-sensitive areas or buildings within 800m radius of the assessed development.
2. Where there are or will be noise-sensitive areas or buildings within 800m radius of the assessed development a noise impact assessment in compliance with BS 7445:1991 has been carried out and the following noise levels measured/determined.
 - a. Existing background noise levels at the nearest or most exposed noise-sensitive development to the proposed development; or at a location where background conditions can be argued to be similar.
 - b. The rating noise level resulting from the proposed noise-source. This can be based upon reference to similar installations or sites, or determined by calculation.
3. The noise impact assessment must be carried out by a suitably qualified acoustic consultant holding a recognised acoustic qualification and membership of an appropriate professional body. The primary professional body for acoustics in the UK is the Institute of Acoustics.
4. The noise level from the proposed site/building, as measured in the locality of the nearest or most exposed noise-sensitive development, is a difference no greater than +5dB during the day (0700hrs to 2300hrs) and +3dB at night (2300hrs to 0700hrs) compared to the background noise level.
5. Where the noise source(s) from the proposed site/building is greater than the levels described in criterion 4, measures have been installed to attenuate the noise at its source to a level where it will comply with requirement 4.

3.0 EXISTING CONDITIONS

An environmental noise survey was previously undertaken by RBA Acoustics on the school site. The results of the survey are presented in the report by RBA Acoustics '*Glebe Primary School, London Borough of Hillingdon – Environmental Noise Survey*' dated 20th September 2011. A summary of these results are presented below.

	Location	Time	Maximum	Maximum	Minimum
			L _{Aeq,1hour}	L _{A1,1hour}	L _{A90, 1hour}
1	Sussex Road site boundary		61.3	71.5	50.6
2	Car park close to Sussex Road		56.0	64.0	50.1
3	North eastern boundary of playing field		55.0	63.7	49.8

Table 1: Summary of measured noise levels

The following is considered based upon the observations of RBA Acoustics during the environmental noise survey undertaken on the 9th September 2011:

- Measurement location 1; noise levels were influenced by road traffic noise from Sussex Road;
- Measurement location 2; noise levels were influenced by road traffic noise from Sussex Road and Glebe Road;
- Measurement location 3; noise levels were influenced by road traffic noise from A40 and other roads.
- Noise levels at all three locations were influenced by aircraft noise from the nearby RAF Northolt.

Further measurement by MACH Acoustics identified the lowest L_{A90,1m} noise levels at the boundary of school with Sussex Place to be 35dBA during a quiet daytime period. This was measured at 10:41am on the 16/04/2012. This measurement is considered to be representative of the background noise levels which would be experienced at the nearest noise sensitive receptors. This has therefore been used in this assessment.

4.0 PROPOSED PLANT

4.1 Noisy Plant

There are a number of plant items which are proposed to be located on the roof of the new development. Some of which are considered to be non-noisy plant items and therefore have not been included in this assessment. Those which have and the manufacturers performance data is presented in the table below.

Item	Plant Item	Sound Power Level (dBA)	Sound Pressure Level (dBA) @ 1m
A	Daikin RXL35J Unit 1	65	-
B	Daikin RXL35J Unit 2	65	-
C	Rain/cold water Booster Set	-	67

Table 2: Noisy Plant – manufacturers performance data

4.2 Plant Locations

Figure 3 below illustrates the proposed plant locations, where the noisy plant have been highlighted in green. For this assessment the rain/cold water booster set are considered to be as one.

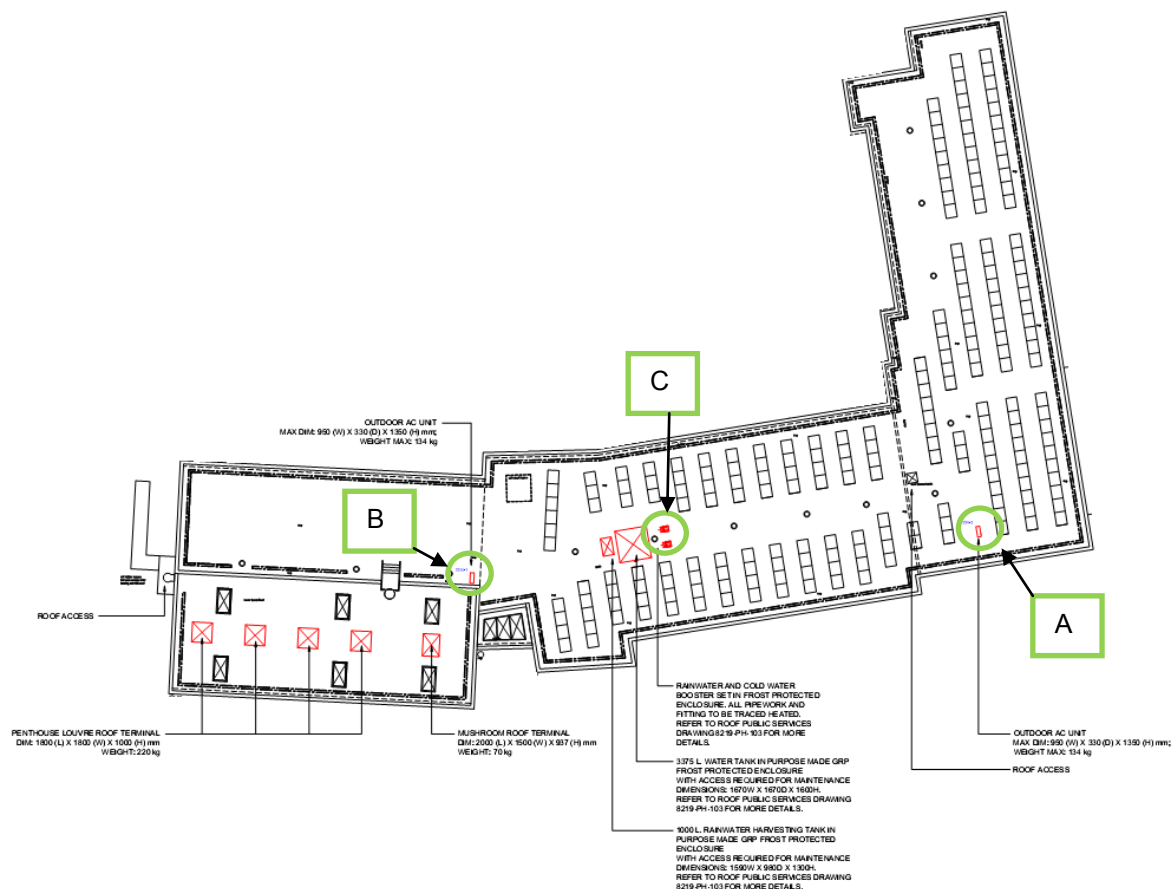


Figure 3: Roof top plan

4.3 Nearest Sensitive Receptors

The nearest noise sensitive receptors to the noisy plant items are illustrated in the Table Below.

Sensitive Receptor	Distance between source and receiver (m)		
	Item A	Item B	Item C
3 Sussex Road	36	80	63
14 Sussex Road	80	43	38
16 Sussex Road	63	38	43

Table 3: Distance between plant items and sensitive receptors

5.0 PLANT NOISE ASSESSMENT

Noise from plant can cause a noise nuisance for nearby neighbours. As such it is important to ensure that the correct level of attention is given to the plant to ensure that this does not take place.

5.1 Target Noise Levels

Within the POL05 assessment criteria, target plant noise levels are specified for day and night time periods and as follows:

- Daytime (0700 – 2300) +5dB above the lowest measured background noise level measured during the day; and
- Night time (2300 – 0700) +3dB above the lowest measured background noise level measured during the night.

This assessment is based upon the noise levels measured during by MACH Acoustics during the daytime. In the event that the proposed plant will operate in during night time periods further measurements may be required to determine the background noise levels representative of these periods.

The lowest background noise level ($L_{A90,1m}$) measured by MACH Acoustics was 35 dB. Therefore, to satisfy BREEAM POL05 the rating level of the proposed plant must not exceed 40dBA at the nearest sensitive buildings during the hours of 0700 – 2300.

5.2 BS4142 Criteria

BS 4142 describes a method of determining the level of noise of an industrial nature, together with the procedures for assessing whether the noise in question is likely to give rise to complaints from persons living in the vicinity. As such, an assessment to BS 4142 is typically called for within planning conditions.

The likelihood of complaints in response to a noise depends on various factors. BS 4142 assesses the likelihood of complaints by considering the margin by which the noise in question exceeds the background noise level. This standard also allows for an appropriate correction for the acoustic features present in the noise. BS 4142 states that:

- A difference of around +10 dB or more indicates that complaints are likely.
- A difference of around + 5 dB is of marginal significance.
- If the rating level is more than 10 dB below the measured background noise level, then this is a positive indication that complaints are unlikely.

A 5 dB correction should be added if one or more of the following features (see the list below), are present within the noise sources in question.

- The noise contains a distinguishable, discreet, continuous note (whine, hiss, screech, hum);
- The noise contains distinct impulses (bangs, clicks, clatters, or thumps);
- The noise is irregular enough to attract attention.

It is considered that both the noise from both the roof top plant will not contain any of the acoustic features previously mentioned. Therefore a 5dB correction has not been applied in this instance.

In this instance, the items of plant will act as point source and will decay at a rate of -6dB per doubling of distance. The equation below has been used to establish the level of distance attenuation from the plant.

Distance Attenuation = $20 \times \log_{10} (1 / X) = XX \text{ dB}$

5.3 Predicted Plant Noise Levels

The following tables illustrate the predicted plant noise levels at each of the nearest noise sensitive receptors.

Plant Item	No. of units	Distance to 3 Sussex Road	Distance Attenuation (dB)	Sound Power level of plant (dB)	Sound Pressure Level @ 1m (dB)	Predicted Plant Noise Level (dB)
A	1	36	-31	65	57	26
B	1	80	-38	65	57	19
C	2	63	-36	75	67	34
Total Predicted Noise Level						35

Table 4: Predicted plant noise level at 3 Sussex Place

Plant Item	No. of units	Distance to 14 Sussex Road	Distance Attenuation (dB)	Sound Power level of plant (dB)	Sound Pressure Level @ 1m (dB)	Predicted Plant Noise Level (dB)
A	1	80	-38	65	57	19
B	1	38	-32	65	57	25
C	2	43	-33	75	67	37
Total Predicted Noise Level						38

Table 5: Predicted plant noise level at 14 Sussex Place

Plant Item	No. of units	Distance to 16 Sussex Road	Distance Attenuation (dB)	Sound Power level of plant (dB)	Sound Pressure Level @ 1m (dB)	Predicted Plant Noise Level (dB)
A	1	63	-36	65	57	21
B	1	43	-33	65	57	24
C	2	38	-32	75	67	38
Total Predicted Noise Level						39

Table 6: Predicted plant noise level at 16 Sussex Place

It can be seen from the tables above that the worst case plant noise level is predicted to be 39 dB at 16 Sussex Place. It is understood that plant item C will be enclosed within a weather proof case, this enclosure has not been included in the assessment. No screening affects have also been included in this assessment. Therefore, this assessment is considered to be worst case.

Based upon the predicted plant noise levels presented in the tables above, an assessment of plant noise level in accordance with the BS4142 has been made.

Sensitive Receptor	Predicted Noise Level (dB)	Acoustic Correction (dB)	Rating Level (dB)	Background Noise Level L_{A90} (dB)	Difference (dB)
3 Sussex Place	35	0	35	35	0
14 Sussex Place	38	0	38	35	+3
16 Sussex Place	39	0	39	35	+4

Table 7: Plant noise assessment

It can be seen that the worst case assessment has predicted the plant noise levels to be +4dB above the lowest background noise levels measured, according to BS4142 this is of marginal significance. BREEAM POL 05 requires that plant noise levels should be no more than +5 dB above the lowest background during the daytime. Therefore it is considered that in this case the BREEAM targets will be achieved. Following the introduction of a weather enclosure and screening effects on site, predicted plant noise levels are likely to be less than those calculated in this assessment.

Should there be any further plant which has not been included in this assessment then the plant noise should be no more than 62dB at 1 metre from the facade of the proposed development.

6.0 DISCUSSION

An assessment of plant noise associated with the proposed development of Glebe Primary School has been undertaken. This assessment has considered that the proposed plant will only operate during the daytime, i.e. between the hours of 07:00 and 23:00.

The results of this worst case assessment suggest that plant noise levels will be at least 1dB below the BREEAM criteria during the daytime at the nearest sensitive buildings. This therefore satisfies the BREEAM POL05 credit in this instance.

APPENDIX A – MANUFACTURERS DATA

OUTDOOR UNIT				RXL35J	RXL42J	RXL50J
Dimensions	Unit	HeightxWidthxDepth	mm	550x765x285		
Weight	Unit		kg	34	39	48
Sound power level	Cooling	High	dB(A)	63		
	Heating	High	dB(A)	63		
Sound pressure level	Cooling	High/Silent operation	dB(A)	48/44		
	Heating	High/Silent operation	dB(A)	48/45		
Operation range	Cooling	Ambient	Min.-Max. °CDB	-10~46		
	Heating	Ambient	Min.-Max. °CWB	-25~18		
Refrigerant	Type/GWP			R-410A/1,975		
Piping connections	Piping length	OU - IU	Max. m	20		30
	Level difference	IU - OU	Max. m	15		20
Power supply	Phase / Frequency / Voltage			1 ~ / 50 / 220-240		
Current - 50Hz	Maximum fuse amps (MFA)			10		20

(1) EER/COP according to Eurovent 2012