2 BRITANNIA STREET, LONDON WC1X 9JE

ENVIRONMENTAL NOISE ASSESSMENT

05 September 2013

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ENVIRONMENTAL NOISE ASSESSMENT

Little Venice Developments Ltd

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-	Environmental Noise Assessment	Damien Hesnan	12/09/13

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ARAN ACOUSTICS

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1.0 INTRODUCTION

Aran Acoustics has been appointed to carry out an environmental noise survey at 2 Britannia Street, London. Proposals are to convert the existing building into residential accommodation.

The purpose of this assessment is to determine any appropriate noise control measures to protect the future occupants against noise ingress from the local environment.

Such to undertake this assessment, an environmental noise survey was carried out on-site between the 05 and 06 September 2013.

A review of the requirements of the building façade has then been provided, such to enable compliance with guidance given within BS8233:1999 'Sound insulation and noise reduction for buildings – Code of practice' and World Health Organisation (WHO) guidelines.

This report therefore describes the noise survey and its results. Figure 4.1 contains a graphical representation of the noise measurements taken on site. Section 6.0 provides an assessment in accordance with guidelines set out in BS8233.

2.0 THE SITE

The site for the proposed residential development is located at the intersection of Britannia Street and Kings Cross Road that lies in the borough of Camden, London. It is a 3 No. storey building which it is understood was previously used as a social club. The building is currently vacant with proposals to convert into 8 No. residential apartments.

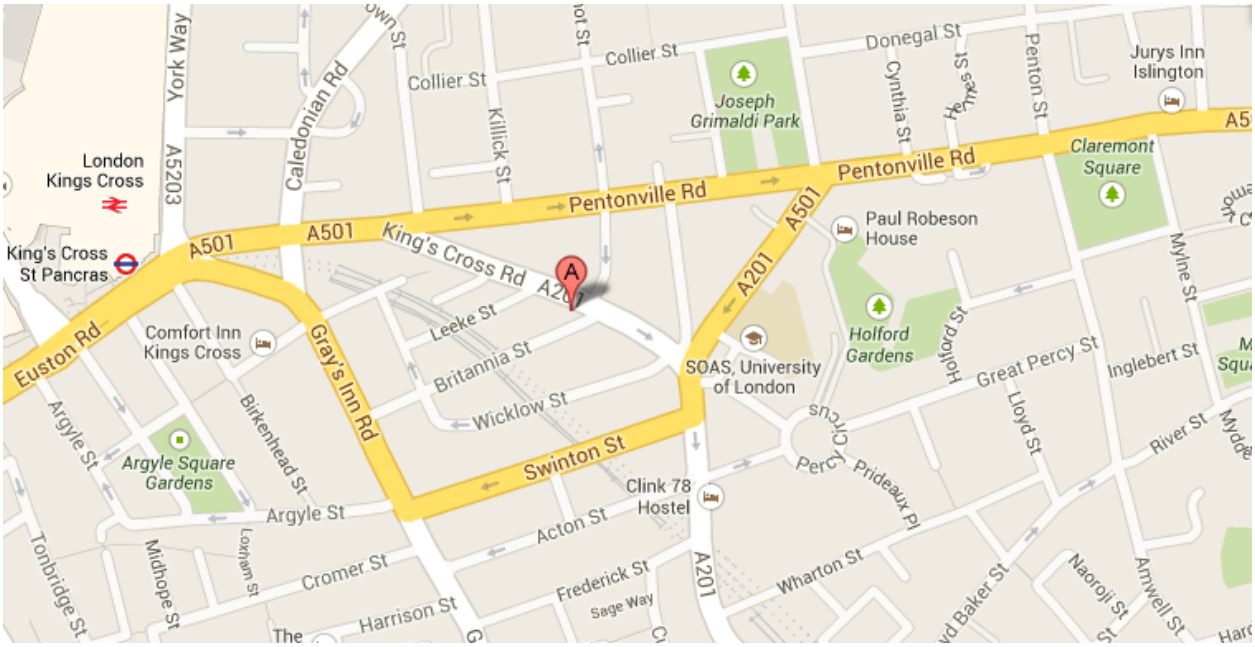
Britannia Street is a built up street that contains a mixture of residential and commercial buildings. The street carries a low volume of road traffic and mainly provides access to the properties along Britannia Street and adjoining side streets.

Kings Cross Road is a one way street that contains both residential and commercial properties and carries a moderate volume of road traffic.

A subjective noise assessment undertaken on-site determined that the predominant noise sources within the area is road-traffic on Kings Cross Road. Background noise levels from road traffic on surrounding roads were also noted.

The site is located in close proximity to Kings Cross St Pancras train station however no noticeable noise levels from trains were observed on site. Additionally, there were no noticeable noise levels from the surrounding commercial units.

Figure 2.1 below shows a location map and aerial photo of the site and surrounding area.



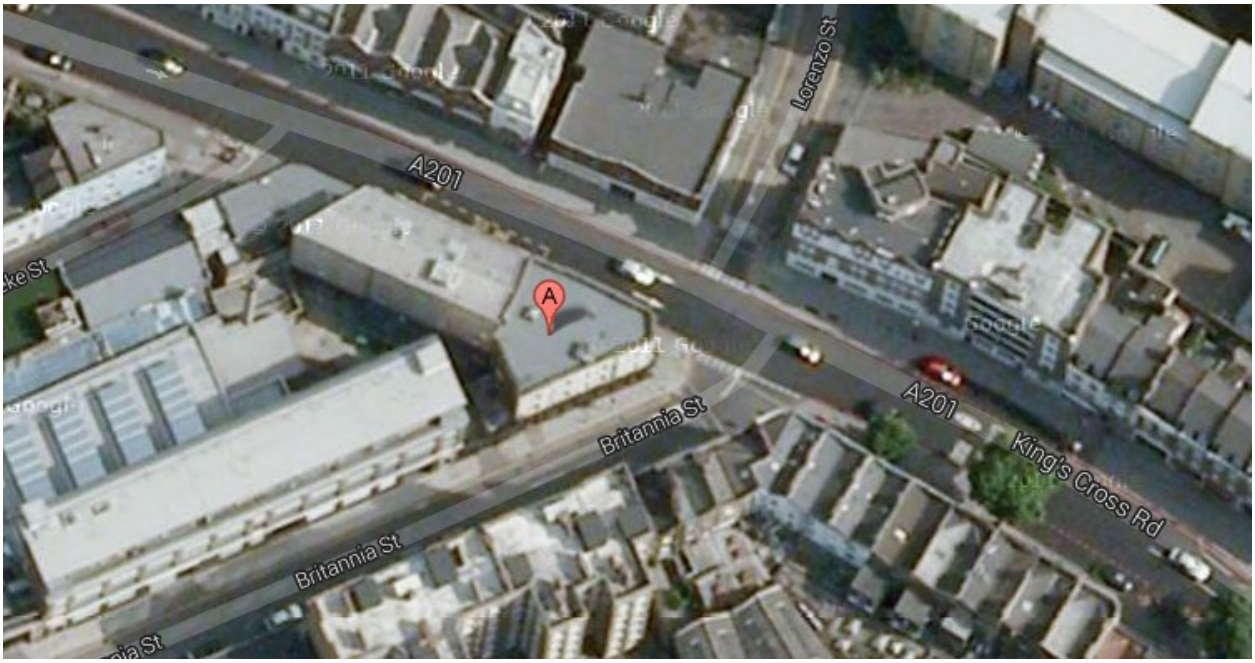


Figure 2.1 – Location map and aerial photo of proposed site

3.0 THE SURVEY

A 24 hour environmental noise survey was carried out between Thursday 05 September and Friday 06 September 2013. A single noise monitor was placed on site and located on the corner of the building at the intersection of Kings Cross Road and Britannia Street. The microphone was located at 1st Floor level and extended approximately 1m from the façade of the building to avoid anomalies in measurements. At this location noise levels are considered to be representative of the noise levels on the front façade of the building overlooking Kings Cross Road.

Figure 3.1 below provides a photo of the building and microphone position (P1).

Figure 3.1 - Site photo indicating measurement position

3.1 Measurement Equipment

The following measurement equipment was used, which complies with BS EN 60942:2003 i.e. a Class 1 device:

Name	Serial Number	Last Calibrated	Calibration Due
Norsonic Precision Sound Analyser Type 140	1404425	June 2013	June 2015
Norsonic Type 1209 Pre-amplifier	13231	June 2013	June 2015
Norsonic Type 1225 Microphone	128783	June 2013	June 2015
Norsonic Sound Calibrator Type 1251	32994	June 2013	June 2014
Weather Protection Kit	-	-	-

Table 3.1 – Measurement equipment used on site

The meter was calibrated before and after testing where no significant deviations were found. The meter was set to measure consecutive 'A' weighted 5-minute samples.

3.2 Weather Conditions

The weather was mainly fine and dry for the duration of the survey. Some light showers on Friday morning between 07:00 and 10:00 however was not considered to affect the measured results. Wind speed remained below 5 m/s. The temperature varied between approximately 12 – 24 ^{o}C.

4.0 SURVEY RESULTS

The noise levels measured on site are shown in Figure 4.1 below. The full set of acoustic data measured on site can be provided on request.

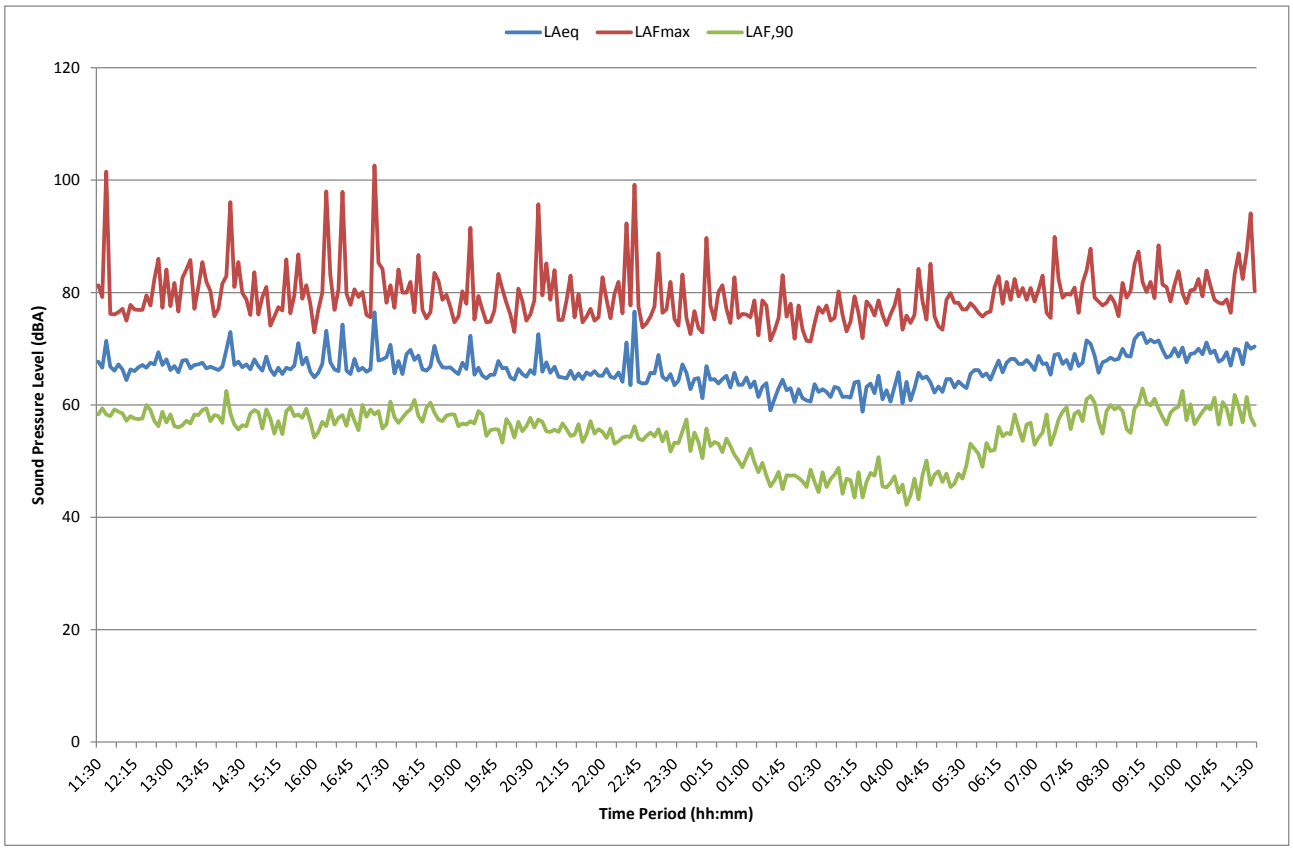


Figure 4.1 - Hour Noise levels measured on site

The table below provides the logarithmically averaged equivalent daytime, evening and night time noise levels measured on site.

Time Period	Measured Noise Levels (P1)
Daytime $L_{Aeq,12\ Hour}$ between 0700-1900	68.6 dBA
Evening $L_{Aeq,4\ Hour}$ between 1900-2300	67.2 dBA
Night time $L_{Aeq,8\ Hour}$ between 2300-0700	64.4 dBA

Table 4.1 – Summary of noise levels Position 1

As can be seen from the table above noise levels during the daytime and evening period remained relatively constant with a drop off into the night time period.

5.0 GUIDANCE DOCUMENTATION – NOISE AND VIBRATION CONTROL

The section above provides a summary of the noise levels measured on site. The purpose of this section is to provide a summary of guidance documentation relating to this development.

5.1 National Planning Policy Framework

In March 2012 the Government published the National Planning Policy Framework (NPPF) which sets out the Government's planning policies for England and how these are expected to be applied.

The Framework replaces many of the existing Planning Policy documents including Planning Policy Guidance 24: Planning and Noise that provided guidance on the control of noise to sensitive developments which may be affected by noise and vice versa. The NPPF provides a framework within which local people and their council can produce their own distinctive local and neighbourhood plans, which reflect the needs and priorities of their communities.

With regards to noise the Framework states that 'Planning policies and decisions should aim to:

- avoid noise from giving rise to significant adverse impacts[27] on health and quality of life as a result of new development;
- mitigate and reduce to a minimum other adverse impacts[27] on health and quality of life arising from noise from new development, including through the use of conditions;
- recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established;[28] and
- identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

[27] The NPPF does make reference to The Noise Policy Statement for England, published by Defra in March 2010.

5.2 Noise Policy Statement for England

The aim of the Noise Policy Statement for England (NPSE) is to provide clarity regarding current policies and practices to enable noise management decisions to be made within the wider context, at the most appropriate level, in a cost-effective manner and in a timely fashion. The NPSE applies to all forms of noise including environmental noise, neighbour noise and neighbourhood noise.

Noise Policy Vision: Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.

Noise Policy Aims: Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- avoid significant adverse impacts on health and quality of life;
- mitigate and minimise adverse impacts on health and quality of life; and
- where possible, contribute to the improvement of health and quality of life

5.2.1 Interpretation of NPSE

The Noise Policy Statement for England does not provide any specific guidance on noise levels for residential developments therefore it is seen that it is up to the discretion of the Local Planning Authority to decide on what is deemed acceptable.

5.3 Camden Development Policies – DP28

Camden Development Policies sets out detailed planning policies that the Council use when determining applications for planning permission in the borough. Development Policy 28 (DP28) – provides assessment criteria for Noise and Vibration.

This document states that a development that exceeds Camden's Noise and Vibration thresholds will not be permitted. The upper limits for noise exposure are divided into daytime, evening and night time noise levels. The upper limits pertaining to rail and road traffic are provided in the following Table:

Table A: Noise levels on residential sites adjoining railways and roads at which planning permission will not be granted

Noise description and location of measurement	Period	Time	Sites adjoining railways	Sites adjoining roads
Noise at 1 metre external to a sensitive façade	Day	0700-1900	74 dB L_{Aeq},12h	72 dB L_{Aeq},12h
Noise at 1 metre external to a sensitive façade	Evening	1900-2300	74 dB L_{Aeq},4h	72 dB L_{Aeq},4h
Noise at 1 metre external to a sensitive façade	Night	2300-0700	66 dB L_{Aeq},8h	66 dB L_{Aeq},8h

Table 5.1 – Table A of DP28: Upper noise limits for planning

Taking the measured noise levels given in Table 4.1 above, it is seen that this development does not exceed the upper noise limits for granting planning permission.

In addition to providing upper noise level limits for planning permission, DP28 also provides noise level criteria for road and rail traffic at which attenuation measures will be required. These criteria are provided in the following Table:

Table B: Noise levels on residential streets adjoining railways and roads at and above which attenuation measures will be required

Noise description and location of measurement	Period	Time	Sites adjoining railways	Sites adjoining roads
Noise at 1 metre external to a sensitive façade	Day	0700-1900	65 dB L_{Aeq},12h	62 dB L_{Aeq},12h
Noise at 1 metre external to a sensitive façade	Evening	1900-2300	60 dB L_{Aeq},4h	57 dB L_{Aeq},4h
Noise at 1 metre external to a sensitive façade	Night	2300-0700	55 dB L_{Aeq},1h	52 dB L_{Aeq},1h
Individual noise events several times an hour	Night	2300-0700	>82 dB L_{Amax} (S time weighting)	>82 dB L_{AMAX} (S time weighting)

Table 5.2 – Table B of DP28: Attenuation criteria

Based on measured noise levels presented in Table 4.1 above and noise level criteria in Table B of DP28 it is seen that attenuation measures will be required in order to achieve a comfortable internal acoustic environment for habitable rooms within the proposed development.

It is also noted that the L_{Amax} during the night time period did not regularly exceed 82 dB. The upper limit was exceeded for a total of 9 No. occurrences which approximates to 1.125 times per hour. On 7 of these occasions the maximum noise level remained below 85 dB.

5.4 Planning Policy Guidance 24

Although no longer used as the main assessment criteria for residential planning, DP28 does make reference to Planning Policy Guidance Note 24: Planning and Noise. This document (PPG24) gives guidance on the control of noise to sensitive developments which may be affected by noise and vice versa. PPG24 states how a development is categorized into one of four Noise Exposure Categories, (NECs), according to the day and night time average noise levels.

Using the measured levels given in Table 4.2 above, and category ratings within PPG24 it can be shown that this development would fall within Noise Exposure Category C. In accordance with PPG24, for sites that fall within Category C the following guidance note is provided:

Planning permission should not normally be granted. Where it is considered that permission should be given, for example because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise.

Based on measured noise levels and resultant NEC C rating it is considered that noise mitigation measures will be required in order to achieve a comfortable internal acoustic environment for habitable room within the development.

5.5 Vibration

DP28 does make reference to vibration levels for residential developments adjoining railways and roads at which planning permission will not be granted.

The passage of trains can cause structural vibration in buildings which can affect the occupants in many ways. BS6472-1:2008 provides guidance on human response to building vibration. Complaint levels from occupants of buildings subject to vibration and the acceptable magnitudes, or limits, for building vibration depend upon specific circumstances.

No specific assessment relating to vibration has been carried out for this development. It is considered that due to the distance between the proposed site and nearest railway adverse comments from residents is unlikely.

5.6 Summary of Guidance Documentation and Conclusion

The Noise Policy Statement for England does not provide any specific guidance on noise levels for residential developments therefore Camden Development Policy 28 – Noise and Vibration has been adopted.

Based on the noise level criteria for planning permission within DP28 and measured noise levels on site it is seen that a scheme of noise attenuation will be required for the proposed development. This corresponds to guidance notes provided with PPG 24.

It is considered that noise mitigation measures will be required in order to achieve a comfortable internal acoustic environment for habitable room on the front facade of the building overlooking Britannia Street and Kings Cross Road. It is noted that there are no habitable rooms been proposed overlooking the courtyard to the rear of the building.

Based on Aran Acoustics previous experience on similar developments it is proposed that planning permission be granted providing that the noise control methods provided within Section 6 of this report are adopted.

6.0 BS8233 FAÇADE ASSESSMENT

The Noise Policy Statement for England does not provide guidance on internal noise levels within residential buildings. As a result, the advised levels within BS8233:1999 'Sound insulation and noise reduction for buildings – Code of practice' have been adopted.

6.1 Design Criteria

BS8233 provides a range of internal noise levels within unoccupied spaces depending on the buildings use. BS8233 states that for bedrooms at night, background noise levels should be in the range 30 – 35 dB L_{Aeq}. For living rooms during the day time background noise levels should be in the range of 30 – 40 dB L_{Aeq}.

Aran Acoustics typically use a design target of 30 dB L_{Aeq} for bedrooms at night and 35 dB L_{Aeq} for living rooms during the day time period. These targets have been imposed upon similar developments and are seen as suitable design targets where complaints are unlikely. These levels are tabulated within the table below.

Living Spaces	BS8233 Design Target
Bedroom (night)	30 dB L_{Aeq}
Living Room (day)	35 dB L_{Aeq}

Table 6.1 – BS8233 Internal noise level target

To determine internal noise levels, an indicative façade noise break-in assessment has been undertaken in accordance with the method given within BS8233 for both day and night time noise levels. These calculations are shown within Appendix A and use the calculated noise levels given within Table 4.1 along with the measured spectral data.

The exact window sizes and exposed areas of the façade, at this stage are not fully determined however approximations have been made based on current drawings provided. Aran Acoustics has therefore based noise ingress calculations on approximate window sizes for both the Living room area and Bedrooms.

Calculations were carried out for both ground and first floor levels due to the variation in window sizes. It is understood that the original windows frames contain 4mm glass and are to be retained therefore calculations are based on installing a secondary glazed system to increase the sound insulation performance.

Additional calculations were carried out for the proposed new build top floor level where it is assumed standard double glazing will be sufficient.

6.2 Façade Noise Levels

Based on achieving an indoor ambient noise level of 35 dB during the daytime and 30 dB during the night time period, calculations were carried out to determine the levels of attenuation required by the glazing and ventilation elements.

Noise levels measured at Position 1 are considered representative of noise levels incident on facades of the residential building with a direct line of sight to the Kings Cross Road and Britannia Street. This is assumed to be the two front facades of the building. It is considered that noise levels to the rear of the building will be considerable lower however no habitable rooms are proposed for this side of the building.

6.3 Façade Construction

Calculations show that to achieve a reasonable internal acoustic environment in habitable rooms as specified within BS 8233, the building envelope constructions should be selected to meet the sound reduction index (SRI) presented in Table 6.2.

Building envelope element	Required sound reduction index (SRI)	Example construction
Walls	R_w 52	Brick/block cavity wall
Roof	R_w 34	Pitched, tiles on felf roof, 12.5mm pb ceiling with 100mm insulation

Table 6.2 – Building envelope performance requirements

Appendix A contains the spreadsheets used in the facade calculations.

6.4 Secondary Glazing

Secondary glazing to habitable rooms with a direct line of sight to Kings Cross Road and Britannia Street should match or exceed the SRI values set out in Table 6.3. The SRI is based on the primary unit containing 4mm glass, 150mm air gap with secondary unit containing 6mm glass.

Specification	125 Hz	250 Hz	500 Hz	1.0 K Hz	2.0 K Hz	4.0 K Hz	R_w
4/150/6 Glazing*	32	42	48	56	55	48	**45**

Table 6.3 – Minimum SRI for secondary glazing

*Data based on SRI values provided by Granada Secondary Glazing Ltd. A copy of the test report for this glazing configuration is provided in Appendix B.

6.5 Double Glazing

Double glazing to habitable rooms on the proposed top floor should match or exceed the SRI values set out in Table 6.4.

Specification	125 Hz	250 Hz	500 Hz	1.0 K Hz	2.0 K Hz	4.0 K Hz	R_w
4/12/4 Glazing**	30	25	35	43	40	54	**36**

Table 6.4 - Minimum SRI for double glazing

**Data based on SRI values provided by Saint Gobain Glass.

Note that the glazing specifications are for guidance only. Similar products to the ones used in Aran Acoustics calculations may achieve the same desired internal noise levels. It is considered that a similar glazing specifications be used for all rooms throughout the building to ensure a comfortable acoustic environment.

6.6 Ventilation

Due to levels of environmental noise and the retention of the existing windows, ventilation to habitable rooms will be provided through a mechanical ventilation system. The proposed ventilation system should not exceed 55 dBA when measured at 1m from the nearest noise sensitive façade in accordance with plant noise level criteria within DP28.

Further calculations can be carried out once the ventilation system and proposed location has been determined.

6.7 Maximum Internal Noise Levels

BS8233 states that for a reasonable standard in bedrooms at night, individual noise events should not normally exceed 45 dB L_{Amax}. Based on a maximum internal noise level of 45 dB L_{Amax} and the proposed secondary glazing specification of 45 dB R_w it is considered that external noise levels should not normally exceed 90 dB externally during the night time period. Based on measured results the external noise level did not exceed 90 dB L_{Amax} on any occasion during the night time.

Note that the double glazed units provide a SRI of 36 dB R_w therefore noise levels should not regularly exceed 81 dB during the night time period on the proposed top floor however this does not take into consideration the effect of distance and barrier attenuation. It is considered that a minimum of 5dB attenuation will be provided therefore noise levels should not regularly exceed 86 dB. Based on measured results the external noise level did exceed 81 dB L_{Amax} on 2 occasions which is not considered regular enough to cause disturbance.

7.0 SUMMARY

An environmental noise survey was carried out at the location of a proposed residential development at 2 Britannia Street, London between 05 and 06 September 2013.

The result of the noise survey showed that equivalent daytime, evening and night time average noise levels do not exceed Camden's Development Policies Noise threshold for granting planning permission.

Based on measured noise levels criteria it is seen that attenuation measures will be required in order to achieve a comfortable internal acoustic environment for habitable rooms within the proposed development.

To determine internal noise levels, an indicative façade noise break-in assessment has been undertaken in accordance with the method given within BS8233 for both day and night time noise levels. Calculations were based on the most onerous requirement for facades overlooking Kings Cross Road and Britannia Street.

Table 6.2 above indicates that to comply with the internal noise levels given in BS8233, a secondary glazing system comprising of at least 150mm air gap and a 6mm glass unit should be installed on all facades of the building where the existing windows are to be retained.

For the proposed new build top floor a double glazing system of 4mm glass, 12mm air gap and 12mm glass should be installed within habitable rooms.

Ventilation is to be provided through a mechanical ventilation system.

APPENDIX A – FACADE NOISE CALCULATIONS

Flat 3 Ground Floor Living Room - Day time								
BS8233 Facade Noise Break In Calculation			**125**	**250**	**500**	**1000**	**2000**	**4000**	**dBA**
Noise Level at Façade			66.1	65.2	63.9	64.4	61.6	57.6	69
Façade Correction	-3 dB								
3dB Safety	3 dB		3.0	3.0	3.0	3.0	3.0	3.0	
Calculation of enviromental noise break-in to residential rooms									
L2 = L0 - R + 10*log(S/A) + 3dB (Freefield version)									
Calculated A = 0.16V/RT									
Volume =	151.2 m3								
RT =			0.5	0.5	0.5	0.5	0.5	0.5	
Absorption			49.3	49.3	49.3	49.3	49.3	49.3	
10*log(A/S)			0.9	0.9	0.9	0.9	0.9	0.9	
FAÇADE Elements									
Façade Area	**60.7 m2**								
Glazing Area, S	24.0 m2		32	42	48	56	55	48	
4mm Glass with 150mm air gap and 6mm Secondary Glazing			-36	-46	-52	-60	-59	-52	
Predicted noise level in building from glazing			33.6	23	16	8	7	9.6	21.1
Solid Façade 1	36.7 m2		41	45	45	54	58	58	
Brick/block cavity wall			-43	-47	-47	-56	-60	-60	
Predicted noise level through solid façade			26.8	22	21	12	5	1.3	20.5
Solid Façade 2 / Roof	0.0 m2		0	0	0	0	0	0	
			0	0	0	0	0	0	
Predicted noise level through solid façade			0.0	0	0	0	0	0.0	0.0
Trickle Vent									
N/A		Dne	99	99	99	99	99	99	
		Ao/A	-107	-107	-107	-107	-107	-107	
Predicted noise level through trickle vent `		Lff-Dne+10log(A0/A)+K	-37	-38	-39	-39	-41	-45	-34.4
Combined Noise Levels (1+2+3+4)			**34.4**	**25.6**	**21.9**	**13.9**	**9.7**	**10.6**	**24**
Target Internal Noise Level (dBA)									**35**
									Pass

Flat 1 Ground Floor Bedroom 1 - Night time								
BS8233 Facade Noise Break In Calculation		**125**	**250**	**500**	**1000**	**2000**	**4000**	**dBA**
Noise Level at Façade		61.8	60.5	59.8	61	57.3	50.1	64
Façade Correction	-3 dB							
3dB Safety	3 dB	3.0	3.0	3.0	3.0	3.0	3.0	
Calculation of enviromental noise break-in to residential rooms								
L2 = L0 - R + 10*log(S/A) + 3dB (Freefield version)								
Calculated A = 0.16V/RT								
Volume =	56.4 m3							
RT =		0.5	0.5	0.5	0.5	0.5	0.5	
Absorption		18.4	18.4	18.4	18.4	18.4	18.4	
10*log(A/S)		-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	
FAÇADE Elements								
Façade Area	**14.6 m2**							
Glazing Area, S	5.6 m2	32	42	48	56	55	48	
4mm Glass with 150mm air gap and 6mm Secondary Glazing		-37	-46	-52	-60	-59	-52	
Predicted noise level in building from glazing		27.2	16	10	3	1	0.0	14.5
Solid Façade 1	9.0 m2	41	45	45	54	58	58	
Brick/block cavity wall		-43	-47	-47	-56	-60	-60	
Predicted noise level through solid façade		20.7	15	15	7	-1	-8.0	14.5
Solid Façade 2 / Roof	0.0 m2	0	0	0	0	0	0	
		0	0	0	0	0	0	
Predicted noise level through solid façade		0.0	0	0	0	0	0.0	0.0
Trickle Vent								
N/A	Dne	99	99	99	99	99	99	
	Ao/A	-101	-101	-101	-101	-101	-101	
Predicted noise level through trickle vent `	Lff-Dne+10log(A0/A)+K	-37	-38	-39	-38	-41	-49	-34.2
Combined Noise Levels (1+2+3+4)		**28.1**	**19.0**	**16.0**	**9.0**	**4.7**	**3.4**	**18**
Target Internal Noise Level (dBA)								30
								Pass

Flat 5 - First Floor Living Room - Day time								
BS8233 Facade Noise Break In Calculation			**125**	**250**	**500**	**1000**	**2000**	**4000**	**dBA**
Noise Level at Façade			66.1	65.2	63.9	64.4	61.6	57.6	69
Façade Correction	-3 dB								
3dB Safety	3 dB		3.0	3.0	3.0	3.0	3.0	3.0	
Calculation of enviromental noise break-in to residential rooms									
L2 = L0 - R + 10*log(S/A) + 3dB (Freefield version)									
Calculated A = 0.16V/RT									
Volume =	119.0 m3								
RT =			0.5	0.5	0.5	0.5	0.5	0.5	
Absorption			38.8	38.8	38.8	38.8	38.8	38.8	
10*log(A/S)			1.4	1.4	1.4	1.4	1.4	1.4	
FAÇADE Elements									
Façade Area	**54.1 m2**								
Glazing Area, S	6.3 m2		32	42	48	56	55	48	
4mm Glass with 150mm air gap and 6mm Secondary Glazing			-42	-51	-57	-65	-64	-57	
Predicted noise level in building from glazing			28.8	18	11	4	2	4.8	16.3
Solid Façade 1	47.8 m2		41	45	45	54	58	58	
Brick/block cavity wall			-42	-46	-46	-55	-59	-59	
Predicted noise level through solid façade			29.0	24	23	14	8	3.5	22.6
Solid Façade 2 / Roof	0.0 m2		0	0	0	0	0	0	
			0	0	0	0	0	0	
Predicted noise level through solid façade			0.0	0	0	0	0	0.0	0.0
Trickle Vent									
N/A		Dne	99	99	99	99	99	99	
		Ao/A	-106	-106	-106	-106	-106	-106	
Predicted noise level through trickle vent `		Lff-Dne+10log(A0/A)+K	-36	-37	-38	-37	-40	-44	-33.3
Combined Noise Levels (1+2+3+4)			**31.9**	**25.1**	**23.1**	**14.8**	**9.2**	**8.0**	**24**
Target Internal Noise Level (dBA)									**35**
									Pass

Flat 5 - First Floor Bedroom 1 - Night time								
BS8233 Facade Noise Break In Calculation			**125**	**250**	**500**	**1000**	**2000**	**4000**	**dBA**
Noise Level at Façade			61.8	60.5	59.8	61	57.3	50.1	64
Façade Correction	-3 dB								
3dB Safety	3 dB		3.0	3.0	3.0	3.0	3.0	3.0	
Calculation of enviromental noise break-in to residential rooms									
L2 = L0 - R + 10*log(S/A) + 3dB (Freefield version)									
Calculated A = 0.16V/RT									
Volume =	41.0 m3								
RT =			0.5	0.5	0.5	0.5	0.5	0.5	
Absorption			13.4	13.4	13.4	13.4	13.4	13.4	
10*log(A/S)			-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	
FAÇADE Elements									
Façade Area	**13.0 m2**								
Glazing Area, S	2.1 m2		32	42	48	56	55	48	
4mm Glass with 150mm air gap and 6mm Secondary Glazing			-40	-50	-56	-64	-63	-56	
Predicted noise level in building from glazing			24.4	13	7	0	-2	-2.8	11.7
Solid Façade 1	10.9 m2		41	45	45	54	58	58	
Brick/block cavity wall			-42	-46	-46	-55	-59	-59	
Predicted noise level through solid façade			22.9	18	17	9	1	-5.8	16.7
Solid Façade 2 / Roof	0.0 m2		0	0	0	0	0	0	
			0	0	0	0	0	0	
Predicted noise level through solid façade			0.0	0	0	0	0	0.0	0.0
Trickle Vent									
N/A		Dne	99	99	99	99	99	99	
		Ao/A	-100	-100	-100	-100	-100	-100	
Predicted noise level through trickle vent `		Lff-Dne+10log(A0/A)+K	-35	-37	-37	-36	-40	-47	-32.9
Combined Noise Levels (1+2+3+4)			**26.7**	**19.1**	**17.4**	**10.1**	**4.7**	**2.5**	**18**
Target Internal Noise Level (dBA)									30
									Pass

Flat 8 - Third Floor Living Room - Day time								
BS8233 Facade Noise Break In Calculation			**125**	**250**	**500**	**1000**	**2000**	**4000**	**dBA**
Noise Level at Façade			66.1	65.2	63.9	64.4	61.6	57.6	69
Façade Correction	-3 dB								
3dB Safety	3 dB		3.0	3.0	3.0	3.0	3.0	3.0	
Calculation of enviromental noise break-in to residential rooms									
L2 = L0 - R + 10*log(S/A) + 3dB (Freefield version)									
Calculated A = 0.16V/RT									
Volume =	143.6 m3								
RT =			0.5	0.5	0.5	0.5	0.5	0.5	
Absorption			46.8	46.8	46.8	46.8	46.8	46.8	
10*log(A/S)			0.4	0.4	0.4	0.4	0.4	0.4	
FAÇADE Elements									
Façade Area	**51.8 m2**								
Glazing Area, S	12.6 m2		30	25	35	43	40	54	
Double Glazed Unit 4 (12) 8			-36	-31	-41	-49	-46	-60	
Predicted noise level in building from glazing			33.4	37	26	19	19	0.9	30.8
Solid Façade 1	39.2 m2		41	45	45	54	58	58	
Brick/block cavity wall			-42	-46	-46	-55	-59	-59	
Predicted noise level through solid façade			27.3	22	21	13	6	1.8	21.0
Solid Façade 2 / Roof	46.3 m2		24	34	40	45	49	49	
Tiled/slated roof, 12mm p/bd ceiling, 100mm m/w			-24	-34	-40	-45	-49	-49	
Predicted noise level through solid façade			45.1	34	27	22	16	11.6	32.1
Trickle Vent									
N/A		Dne	99	99	99	99	99	99	
		Ao/A	-106	-106	-106	-106	-106	-106	
Predicted noise level through trickle vent `		Lff-Dne+10log(A0/A)+K	-37	-38	-39	-38	-41	-45	-34.2
Combined Noise Levels (1+2+3+4)			**45.4**	**39.2**	**30.1**	**24.2**	**20.7**	**12.3**	**35**
Target Internal Noise Level (dBA)									35
									Pass

Flat 5 - First Floor Bedroom 1 - Night time								
BS8233 Facade Noise Break In Calculation			**125**	**250**	**500**	**1000**	**2000**	**4000**	**dBA**
Noise Level at Façade			61.8	60.5	59.8	61	57.3	50.1	64
Façade Correction	-3 dB								
3dB Safety	3 dB		3.0	3.0	3.0	3.0	3.0	3.0	
Calculation of enviromental noise break-in to residential rooms									
L2 = L0 - R + 10*log(S/A) + 3dB (Freefield version)									
Calculated A = 0.16V/RT									
Volume =	33.8 m3								
RT =			0.5	0.5	0.5	0.5	0.5	0.5	
Absorption			11.0	11.0	11.0	11.0	11.0	11.0	
10*log(A/S)			-1.1	-1.1	-1.1	-1.1	-1.1	-1.1	
FAÇADE Elements									
Façade Area	**8.5 m2**								
Glazing Area, S	2.1 m2		30	25	35	43	40	54	
Double Glazed Unit 4 (12) 8			-36	-31	-41	-49	-46	-60	
Predicted noise level in building from glazing			27.6	31	21	14	13	-8.1	24.9
Solid Façade 1	6.4 m2		41	45	45	54	58	58	
Brick/block cavity wall			-42	-46	-46	-55	-59	-59	
Predicted noise level through solid façade			21.4	16	15	8	0	-7.3	15.2
Solid Façade 2 / Roof	10.9 m2		24	34	40	45	49	49	
Tiled/slated roof, 12mm p/bd ceiling, 100mm m/w			-23	-33	-39	-44	-48	-48	
Predicted noise level through solid façade			40.8	29	23	19	11	4.1	27.8
Trickle Vent									
N/A		Dne	99	99	99	99	99	99	
		Ao/A	-98	-98	-98	-98	-98	-98	
Predicted noise level through trickle vent `		Lff-Dne+10log(A0/A)+K	-35	-36	-37	-35	-39	-46	-32.0
Combined Noise Levels (1+2+3+4)			**41.0**	**33.6**	**25.3**	**20.3**	**15.4**	**4.6**	**30**
Target Internal Noise Level (dBA)									30
									Pass

APPENDIX B – SECONDARY GLAZING TEST REPORT

AIRO

Test Certificate

SOUND REDUCTION INDEX

4/150/6 SECONDARY WINDOW UNIT

MEASUREMENTS

Sound Reduction Index (R) measurements were conducted at the AIRO Acoustics Laboratory in accordance with BS 2750: Part 3:1980 and BS 5821:Part 3:1984, using a purpose built sound transmission suite. AIRO is accredited as NAMAS TESTING Laboratory No. 0483. The test was performed on 19 September 1997.

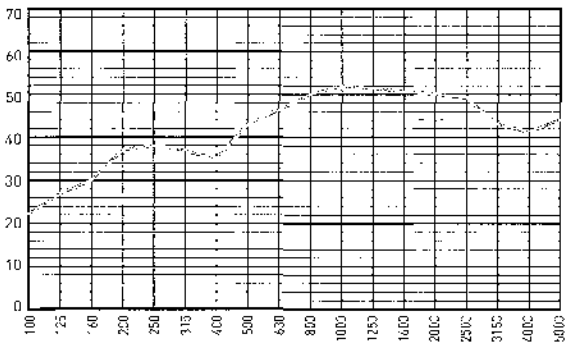
DESCRIPTION

The specimen filled a 1250mm wide x 1500mm high test aperture and comprised a primary and secondary window system. The primary unit consisted of a softwood frame which was glazed with 2 no 4mm fixed panes of area 520 x 1370mm each. The secondary unit consisted of a pair of horizontally sliding sashes with 6mm glazing of area 540 x 1365mm supported in a aluminium framework with an outer frame of English Ash. The cavity between the primary and secondary glazing was 150mm.

Estimated mass of the glazing = 25 kg/m^2
Tested for and supplied by Granada Secondary Glazing Limited

RESULTS

Frequency Hz	R dB	Frequency Hz	R dB
100	23.2	800	49.8
125	26.9	1000	51.9
160	30.1	1250	51.0
200	36.8	1600	50.5
250	37.8	2000	50.0
315	37.1	2500	48.9
400	34.6	3150	43.3
500	43.1	4000	41.0
630	45.7	5000	44.5



The Weighed Sound Reduction Index, R_W = 45 dB (BS 5821:Part 3:1984) with an unfavourable deviation of 9.4 dB at 400 Hz

This Test Certificate summarises Report No. L/2543 dated 4 November 1997

A J Jones Bsc PhD Cphys MInstP FIOAM Sawyer MIOA
Managing Director Laboratory Supervisor

NAMAS TESTING No 0483

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