Property and Infrastructure Capita

100 Avenue Road, Swiss Cottage, London

Baseline Noise Monitoring

296993-01(00)

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RSK GENERAL NOTES

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Author:	Octavio Lora Aranda Graduate Acoustic Consultant	**Technical reviewer:**	Jonathan Mart Principal Acoustic Consultant
Signature:		**Sigature:**	
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1 INTRODUCTION

1.1 Instruction

RSK Environment Ltd has been instructed by Property and Infrastructure Capita to undertake a baseline noise monitoring to quantify the pre-construction existing noise environment at representative locations of nearest sensitive receptors in the surroundings of the proposed construction area at 100 Avenue Road, Swiss Cottage, London.

The site is located at the 100 Avenue Road, within the London Borough of Camden. Nearest residential properties to the site are found to the east (Winchester Road Flats), to the west (Finchley Road Flats) and to the north (properties along Eton Avenue).

1.2 Objectives

The noise assessment is required to:

- Quantify and report the background noise levels at most sensitive receptors in the vicinity of the proposed development and;
- Inform of baseline noise information to the Project to be used to set appropriate noise limits during the construction phase in line with the relevant Standards and local guidance.

2 REGULATORY FRAMEWORK

2.1 BS 7445-1:2003 'Description and measurement of environmental noise. Guide to quantities and procedures'

The three-part standard BS 7445 provides the framework within which environmental noise should be quantified. Part 1 provides a guide to quantities and procedures and Part 2 provides a guide to the acquisition of data pertinent to land use. Part 3 provides a guide to the application of noise limits.

BS 7445 also refers to a further standard, BS EN 61672, which prescribes the equipment necessary for such measurements. Whilst BS 7445 does not prescribe the meteorological conditions under which noise measurements should or should not be taken, it does (part 2, paragraph 5.4.3.3) recommend that in order

> *"…to facilitate the comparison of results (measurements of noise from different sources), it may be necessary to carry out measurements under selected meteorological conditions which are reproducible and correspond to quite stable propagation conditions."*

These conditions include:

- wind speed not exceeding 5 m/s (measured at a height of 3 to 11 m above the ground);
- no strong temperature inversions near the ground; and
- no heavy precipitation.

2.2 BS 5228-1 2009 + A1:2014 'Code of Practice for noise and vibration control on construction and open sites. Noise'

Construction phase noise impacts arising from equipment, vehicular movements and processes related to the construction of the proposed development have the potential for a short-term impact on noise sensitive receptors in the vicinity of the development site. These impacts are assessed by calculating the change in ambient noise level ($L_{Aeq,1hr}$) as a result of such processes using the methods described by BS 5228. To do this, noise emissions from various anticipated construction activities are calculated.

Noise assessment methodology and criteria for construction sites is covered by the British Standard BS 5228-1:2009 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise. The method for assessing the criteria of noise from construction activities are provided within Appendix E of BS 5228 and described as follows.

A detailed criterion for comparing the predicted noise levels from the site against background noise levels at residential receptors is provided in section E.3 of BS 5228. One such method of applying significance to noise effects is repeated in Table 2.2.

Table 2.2 Example threshold of significant effect at dwellings

Assessment category and threshold value period (L_{Aeq})	Threshold value in decibels		
	Category A [A]	Category B [B]	Category C [C]
Night-time (23.00 – 07.00)	45	50	55

Assessment category and threshold value period (L_{Aeq})	Threshold value in decibels		
	Category A [A]	Category B [B]	Category C [C]
Evening and weekends[D]	55	60	65
Daytime (07.00 – 19.00) and Sat (07.00 – 13.00)	65	70	75

NOTE 1 A significant effect has been deemed to occur if the total L_{Aeq} noise level, including construction, extends the threshold level for the Category appropriate to the ambient noise level.

NOTE 2 If the ambient noise level exceeds the threshold values given in the table (i.e. the ambient noise levels is higher than the above values), then a significant effect is deemed to occur if the total L_{Aeq} noise level for the period increases by more than 3 dB due to the construction activity.

NOTE 3 Applied to residential receptors only.

[A] Category A: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than these values

[B] Category B: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as the category A values

[C] Category C: Threshold values to use when the ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.

[D] 19.00 – 23.00 weekdays, 13.00-22.00 Saturdays and 07.00 – 23.00 Sundays.

3 DEVELOPMENT LOCATION

3.1 Site Location and Description

The site is located at 100 Avenue Road, Swiss Cottage. The proposed development land encompasses an area of circa 2000 square meters and is currently occupied by an existing building.

The site is bounded by existing residential and commercial buildings to the north, east and west, a college to the north-east and a theatre to the east.

3.2 Existing Receptors

The closest sensitive receptors to the proposed development site lie to the north, east and west of the development site. The receptors are largely residential, with the Royal College of Speech and Drama located to the north-east of the site.

The following locations have been chosen to represent the existing noise environment; these are presented in Table 3.1 and in Figure 3.1.

Table 3.1 Existing Receptors and Monitoring Locations

Receptor ID	Location	Type
R1	Finchley Road	Residential
R2	Eton Avenue	Residential
R3	Winchester Road	Residential

Figure 3.1 Monitoring Locations

4 NOISE MEASUREMENT METHOD

4.1 Survey Measurement Details

A baseline noise survey was undertaken during daytime hours on 22nd November 2017 at three different locations, as per Figure 3.1. Noise levels were measured during two non consecutive hours at each location, between 08:00-16:00 to characterise the existing noise environment.

4.2 Monitoring Locations

R1 - Finchley Road

The meter was positioned 3 metres away from the main building façade and at approximately 7 metres from Finchley Road edge.

R2 - Eton Avenue

The meter was positioned at a green grassed area facing the Swiss Cottage Market.

R3 - Rear of Winchester Road properties

The meter was situated on the eastern side of the park, facing the site and approximately at 10 metres from the façade of Winchester Road properties.

4.3 Survey Equipment

The survey was undertaken using the following equipment:

Table 4.1 Monitoring Equipment

Equipment	Type	Serial number	Calibration date
Class 1 Sound Level Meter	Rion NL-52	01021276	21-04-17
Acoustic Calibrator	Rion NC-74	34425552	03-10-17

All measurements were undertaken in free field conditions with the microphone positioned away from reflecting surfaces and at 1.5 m above the ground height to the requirements of BS 7445.

The calibration of each sound level meter was checked before and after the measurements, using the acoustic calibrator at 94 dB at 1 kHz; no significant calibration drift was noted.

The sound level meters used conform to the requirements of *BS EN 61672-1: 2013 Electroacoustics. Sound level meter, Specifications*. The calibrator used conforms to the requirements of *BS EN 60942: 2003 Electroacoustics, Sound calibrators*. The equipment used has a calibration history that is traceable to a certified calibration institution.

4.4 Noise Environment

The noise environment at all measurement locations was dominated by consistent road traffic noise along Finchley Road (A41) and Avenue Road from north to south at the western boundary of the site. Occasional playground noise arising from a football pitch was also noted during the measurements at the rear of Winchester Road properties.

4.5 Weather Conditions

Weather conditions during the monitoring were noted during the survey. Representative weather conditions have been provided in the table below:

Table 4.2 Weather Data

Date	Temp / ºC	Wind Speed / ms^{-1}	Wind Dir.	Precip. / mm	Notes
22/11/2017, 08:30	13.5	2	WSW	0	Clear, 5% CC
22/11/2017, 12:30	14.4	1	W	0	Clear, 10% CC
22/11/2017, 15:00	14.2	2	W	0	Clear, 10% CC

Weather conditions during the monitoring were cold, dry with sunny spells. No significant wind was noted during the measurement period; these conditions are considered to be suitable for environmental noise monitoring.

5 NOISE MEASUREMENT RESULTS

A summary of the measured noise levels is provided in Table 5.1. Extended noise data is included in Appendix 1.

Table 5.1 Short Term Noise Monitoring Results (22nd November 2017)

Location	Start Time	Duration (hr:min)	$L_{Aeq, T}$ dB	$L_{AFmax, T}$ dB*	$L_{A90, T}$ dB	$L_{A10, T}$ dB
Finchley Road	08:29	01:00	73	99	66	75
	12:54	01:00	73	102	67	75
	Resultant Level		**73**	**102**	**66**	**75**
Eton Avenue	10:01	01:00	63	87	55	62
	14:01	01:00	59	80	55	61
	Resultant Level		**62**	**87**	**55**	**62**
Winchester Road	11:03	01:00	58	80	53	60
	15:07	01:00	57	77	53	59
	Resultant Level		**58**	**80**	**53**	**60**

** Maximum noise level during assessment period*

The highest measured noise levels were obtained at Finchley Road during both the morning and afternoon measurement periods. Overall 1 hour equivalent noise levels at this location were 73 $L_{Aeq, T}$ dB and highly influenced by mixed traffic along Finchley Road and Avenue Road.

A noise reduction of approximately 10 dB(A) was measured at Eton Avenue, mainly due to the distance attenuation to the main roads, and the lower traffic movements registered along Adamson Road and Eton Avenue.

A small variability in the measured noise levels has been observed from the results at the three monitored locations. Highest difference of 4 dB(A) was measured at Eton Avenue due to an increase in car movements along Eton Avenue during the first hour of measurement.

Noise levels measured in the park, representative of the rear of properties along Winchester Road also experienced a notable reduction due to a distance of approximately 110 metres from the main roads and the shielding provided by the existing buildings along Avenue Road.

6 DISCUSSION

Baseline monitoring was conducted at three locations surrounding the proposed construction area at 100 Avenue Road, Swiss Cottage, London on 22nd November 2017

According to British Standard 5228-1 criteria based upon ambient levels due to construction activities (the ABC method), properties along Finchley Road would fall within Category C (Note 2) and properties along Eton Avenue and Winchester Road would fall within Category A. Resultant values of the two non-consecutive hours measured at each location have been used to inform this assessment.

A potential significant effect at properties along Finchley Road would occur if noise levels during construction activities exceed 76 dB(A) during daytime hours 07:00-19:00. This criteria has been obtained by adding 3 dB(A) to the baseline measurements in accordance with Note 2 of the ABC Method within BS 5228-1.

For the residential properties along Eton Road and Winchester Road, a potential significant effect is likely to occur when the noise arising from the construction activity, in conjunction with the existing ambient noise exceeds 65 dB(A) during daytime hours 07:00-19:00.

APPENDIX 1: BASELINE NOISE DATA

Finchley Road (Location R1)

Date	Time	Duration	$L_{Aeq, T}$ dB	L_{AFmax}, T dB	$L_{A90, T}$ dB	$L_{A10, T}$ dB
22/11/2017	08:29	00:05	71.8	81.5	66.1	74.7
22/11/2017	08:34	00:05	72.2	84.9	65.4	75.1
22/11/2017	08:39	00:05	71.4	82.3	64.9	74.8
22/11/2017	08:44	00:05	72.6	83.4	66.7	75.6
22/11/2017	08:49	00:05	71.3	82.4	65.5	74.4
22/11/2017	08:54	00:05	72.7	83.6	66.8	75.6
22/11/2017	08:59	00:05	73.1	83.1	67.1	76.4
22/11/2017	09:04	00:05	72.2	84.4	65.9	75.5
22/11/2017	09:09	00:05	72.3	82.9	66.1	75.5
22/11/2017	09:14	00:05	71	82.5	64.4	73.8
22/11/2017	09:19	00:05	78.2	99.4	64.9	76.2
22/11/2017	09:24	00:05	69.3	79.9	65.7	71.9

Date	Time	Duration	$L_{Aeq, T}$ dB	L_{AFmax}, T dB	$L_{A90, T}$ dB	$L_{A10, T}$ dB
22/11/2017	12:54	00:05	71.3	81.8	64.8	74.3
22/11/2017	12:59	00:05	72.7	81.1	66.7	75.3
22/11/2017	13:04	00:05	74.3	90.7	65.9	75.2
22/11/2017	13:09	00:05	72	81.4	66.5	75.4
22/11/2017	13:14	00:05	72.1	88.7	67.4	74.2
22/11/2017	13:19	00:05	78.8	101.6	66.9	76.3
22/11/2017	13:24	00:05	72.3	80.9	67	75.5
22/11/2017	13:29	00:05	71.9	88	65.6	75.1
22/11/2017	13:34	00:05	71.9	81.2	66	75.5
22/11/2017	13:39	00:05	71.9	81.7	66.4	74.7
22/11/2017	13:44	00:05	71.8	84.5	66.1	74.3
22/11/2017	13:49	00:05	74.8	93.8	67.8	76.5

Eton Avenue (Location R2)

Date	Time	Duration	$L_{Aeq, T}$ dB	L_{AFmax}, T dB	$L_{A90, T}$ dB	$L_{A10, T}$ dB
22/11/2017	10:01	00:05	69.5	69.5	61.0	70.4
22/11/2017	10:06	00:05	69.5	69.5	57.8	71.6
22/11/2017	10:11	00:05	57.9	57.9	53.8	60.6
22/11/2017	10:16	00:05	57.6	57.6	53.7	59.5
22/11/2017	10:21	00:05	57.6	57.6	54.6	59.7
22/11/2017	10:26	00:05	58.1	58.1	55.0	60.1
22/11/2017	10:31	00:05	61.7	61.7	54.8	64.5
22/11/2017	10:36	00:05	57.4	57.4	53.5	59.1
22/11/2017	10:41	00:05	56.7	56.7	53.2	58.9
22/11/2017	10:46	00:05	57.2	57.2	54.6	59.3
22/11/2017	10:51	00:05	57.0	57.0	53.3	59.4
22/11/2017	10:56	00:05	58.5	58.5	54.0	61.0

Date	Time	Duration	$L_{Aeq, T}$ dB	$L_{AFmax, T}$ dB	$L_{A90, T}$ dB	$L_{A10, T}$ dB
22/11/2017	13:56	00:05	61.6	76.2	56.7	64.0
22/11/2017	14:01	00:05	63.1	79.9	57.6	66.0
22/11/2017	14:06	00:05	61.4	74.0	57.3	63.7
22/11/2017	14:11	00:05	59.5	70.7	55.4	62.6
22/11/2017	14:16	00:05	57.7	71.7	54.7	59.9
22/11/2017	14:21	00:05	58.7	67.2	55.1	61.4
22/11/2017	14:26	00:05	57.2	69.8	53.7	59.8
22/11/2017	14:31	00:05	58.3	76.8	54.4	60.0
22/11/2017	14:36	00:05	57.8	72.8	54.0	60.5
22/11/2017	14:41	00:05	59.2	75.3	54.7	60.1
22/11/2017	14:46	00:05	56.7	64.5	54.0	58.8
22/11/2017	14:51	00:05	56.9	66.7	54.7	58.6

Winchester Road (Location R3)

Date	Time	Duration	$L_{Aeq, T}$ dB	$L_{AFmax, T}$ dB	$L_{A90, T}$ dB	$L_{A10, T}$ dB
22/11/2017	11:03	00:05	57.7	68.5	53.8	60.0
22/11/2017	11:08	00:05	57.6	73.2	52.9	59.6
22/11/2017	11:13	00:05	62.5	79.6	54.4	64.9
22/11/2017	11:18	00:05	56.3	63.6	53.6	58.2
22/11/2017	11:23	00:05	56.4	65.6	52.8	58.6
22/11/2017	11:28	00:05	56.7	67.1	53.0	59.0
22/11/2017	11:33	00:05	57.7	73.8	52.6	59.2
22/11/2017	11:38	00:05	59.7	74.9	52.9	61.6
22/11/2017	11:43	00:05	57.6	70.9	52.8	59.8
22/11/2017	11:48	00:05	56.3	66.9	52.3	58.8
22/11/2017	11:53	00:05	59.7	72.2	52.9	62.4
22/11/2017	11:58	00:05	56.5	69.2	51.8	59.1

Date	Time	Duration	$L_{Aeq, T}$ dB	$L_{AFmax, T}$ dB	$L_{A90, T}$ dB	$L_{A10, T}$ dB
22/11/2017	15:07	00:05	58.7	77.1	53.3	60.0
22/11/2017	15:12	00:05	56.3	64.2	53.4	58.9
22/11/2017	15:17	00:05	57.1	71.6	52.1	59.9
22/11/2017	15:22	00:05	56.1	64.4	52.1	58.9
22/11/2017	15:27	00:05	53.4	58.2	51.8	54.6
22/11/2017	15:32	00:05	55.6	65.0	53.1	57.4
22/11/2017	15:37	00:05	56.0	75.7	52.8	56.9
22/11/2017	15:42	00:05	56.1	71.3	52.8	58.3
22/11/2017	15:47	00:05	59.1	71.9	54.0	62.5
22/11/2017	15:52	00:05	59.1	75.1	53.2	60.6
22/11/2017	15:57	00:05	56.8	71.8	52.9	58.8
22/11/2017	16:02	00:05	55.8	68.8	53.3	57.7

APPENDIX 2: GLOSSARY

L_p - Sound Pressure Level

The basic unit of sound measurement is the sound pressure level, which is measured on a logarithmic scale and expressed in decibels (dB). The logarithmic scale makes it easier to manage the large range of audible sound pressures, and also more closely represents the way the human ear responds to differences in sound pressure:

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

where p = RMS (root mean square) sound pressure; and

p_0 = reference sound pressure 2 x 10^{-5} Pa.

Frequency Weighting Networks

Frequency weighting networks, which are generally built into sound level meters, attenuate the signal at some frequencies and amplify it at others. The A-weighting network approximately corresponds to human frequency response to sound. Sound levels measured with the A-weighting network are expressed in dB(A). Other weighting networks also exist, such as C-weighting which is nearly linear (i.e. unweighted) and other more specialised weighting networks. Variables such as L_p and L_{eq} that can be measured using such weightings are expressed as L_{pA} / L_{pC}, L_{Aeq} / L_{Ceq} etc.

Time Weighting

Sound level meters use various averaging times for the measurement of RMS sound pressure level. The most commonly used are fast (0.125 s averaging time), slow (1 s averaging time) and impulse (0.035 s averaging time). Variables that are measures with time weightings are expressed as L_{AFmax} etc.

L_{Aeq} – Equivalent Continuous Sound Pressure Level

Sound levels tend to fluctuate, and as such an 'instantaneous' measurement like sound pressure level cannot fully describe many real-world situations. A summation can be made of the measured sound energy over a certain period, and a notional steady level can be calculated which would contain the same total energy as the fluctuating sound. This notional level is termed the equivalent continuous sound level L_{eq}. L_{eq} can be determined over any time period, which is indicated as $L_{eq,T}$ where T is the time period (e.g. $L_{eq,24h}$).

In mathematical terms, for n discrete sound level measurements, Leq is given by:

$L_{eq,T}$ = 10 log10 (t1 x 10L1/10 + t2 x 10L2/10 +… tn x 10Ln/10)/T

where t_1 = time at level L_1 dB;

t_2 = time at level L_2 dB;

and T = total time

L_{max} - Maximum Sound Pressure Level or Maximum Noise Level

This is the maximum RMS sound pressure level occurring within a specified period. The time weighting is usually specified, such as in L_{Fmax}.

L_N - Percentile or Statistical Levels

Sometimes it is useful to calculate the level which is exceeded for a certain percent of a total period. Background noise is often defined as the A-weighted sound pressure level exceeded for 90% of the specified period T, expressed $L_{90,T}$. Road traffic noise is often characterised in terms of $L_{A10,18}$