LSHTM Tavistock Place

Noise Statement for Planning

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BDP.

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Revision History

Revision	Section	Comments	Author	Checked by
-	-	-	SDR	JS

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Executive Summary

BDP has been appointed by LSHTM to undertake a baseline noise survey and produce a noise statement in support of the planning application for the proposed laboratory building to the rear of the existing London School of Hygiene and Tropical Medicine (LSHTM), 15-17 Tavistock Place, Kings Cross, London WC1H 9SH.

The building is proposed to be located on the site of existing garages and stores serving the London School of Hygiene and Tropical Medicine (LSHTM). The site is bounded by noise sensitive dwellings to the north, west, and east, with the existing LSHTM situated to the south. The presence of the existing buildings provides significant screening effects from road traffic noise on surrounding roads.

Attended and unattended environmental noise surveys were undertaken at positions representative of nearby noise sensitive dwellings during both the day and night time periods in February 2015. As no variation to the current noise climate in the area has been identified (e.g. opening of a new road or any other additional element that can contribute to the noise climate), we consider the measurements still valid and a faithful representation of the environmental noise in the area.

Subjectively, the noise climate in the vicinity of the proposed building was dominated by moderate road traffic, with additional contributions from distant road traffic from surrounding roads and distant construction noise from works being undertaken on Cartwright Gardens. Road traffic noise was noted to significantly reduce at night, whereby the chimes of Big Ben were audible.

In order to meet London Borough of Camden Local Plan 2017 Policy A4 relating to noise emissions from fixed plant, plant noise emissions limits have been applied as follows:

Noise description and location of measurement	Period	Time	Plant Noise Emissions Limit
Noise at 1 metre external to a sensitive façade	Day	07:00 – 18:00	39
	Evening	18:00 – 23:00	37
	Night	23:00 – 07:00	36
Noise that has a distinguishable discrete continuous note (whine, hiss, screech, hum), or distinct impulses (bangs, clicks, clatters, thumps), at 1 metre external to a sensitive façade.	Day	07:00 – 18:00	34
	Evening	18:00 – 23:00	32
	Night	23:00 – 07:00	31

Table 1: Environmental noise emission limits for installed mechanical plant

The now superseded BS4142:1997 stated that measured background noise levels below 30dBA and plant rating levels (emissions limits) of less than 35dBA were considered to be very low. This clause has now been removed from the recently published BS4142:2014. Despite the removal of this clause, consideration should be given to the temporal nature of existing environmental noise, and the variability of duty on operational plant, which may include some or all of the following:

- The time of plant operation;
- The duration of plant operations;
- The duty placed upon plant during different times of the day and night;
- The reasons for operating plant, which may be limited to maintenance testing of emergency plant only.

In order to ensure the requirements of London Borough of Camden Local Plan 2017 Policy A4 are met, the following mitigation measures may be considered as part of the design if found to be necessary:

- Management of plant use, potentially through the use of ‘on-demand’ building management systems;
- Purchasing of low-noise plant equipment incorporating low noise switch gear;
- Acoustic attenuation applied to inlets and outlets of plant as appropriate;
- Acoustic shrouds.

1. Introduction

1.1. BDP has been appointed by LSHTM to undertake a baseline noise survey and produce a noise statement in support of the planning application for the proposed laboratory building to the rear of the existing London School of Hygiene and Tropical Medicine (LSHTM), 15-17 Tavistock Place, Kings Cross, London WC1H 9SH.

1.2. This report provide information regarding the following items:

- A formal record of the existing noise climate around the proposed site;
- Plant noise emissions limits in line with local and national planning policy and BS4142:2014 *Methods for rating and assessing industrial and commercial sound.*

2. Assessment Criteria

London Borough of Camden Policy A4

2.1. Policy A4 of the London Borough of Camden (LBC) Local Development Framework sets out their policy as follows:

"*The Council will seek to ensure that noise and vibration is controlled and managed.*

Development should have regard to Camden's Noise and Vibration Thresholds (Appendix 3). We will not grant planning permission for:

a) development likely to generate unacceptable noise and vibration impacts; or

b) development sensitive to noise in locations which experience high levels of noise, unless appropriate attenuation measures can be provided and will not harm the continued operation of existing uses.

We will only grant permission for noise generating development, including any plant and machinery, if it can be operated without causing harm to amenity."

2.2. Table 2 below summarises the noise emissions requirements as set out by London Borough of Camden.

Existing Noise sensitive receptor	Assessment location	Period	LOAEL (Green)	LOAEL to SOAEL (Amber)	SOAL (Red)
Dwellings[2]	Garden used for main amenity (free field) and outside living or dining or bedroom window (façade)	Day (07:00 to 23:00)	'Rating level' 10dB[1] below background	'Rating level' between 9dB below and 5dB above background	'Rating level' greater than 5dB above background
Dwellings[2]	Outside bedroom window	Night (23:00 to 07:00)	'Rating level' 10dB[1] below Background and no events exceeding 57dBL_{Amax}	'Rating level' between 9dB below and 5dB above background or noise events between 57dB and 88dB L_{Amax}	'Rating level' greater than 5dB above background and/or events exceeding 88dBL_{Amax}

Table 2: London Borough of Camden Policy A4 Noise Emissions Limits

[1] *10dB should be increased to 15dB if the noise contains audible tonal elements. (day and night). However, if it can be demonstrated that there is no significant difference in the character of the residual background noise and the specific noise from the proposed development then this reduction may not be required. In addition, a frequency analysis (to include, the use of Noise Rating (NR) curves or other criteria curves) for the assessment of tonal or low frequency noise may be required.*

[2] *levels given are for dwellings, however, levels are use specific and different levels will apply dependent on the use of the premises.*

2.3. Policy A4 also states:

"There are certain smaller pieces of equipment on commercial premises, such as extract ventilation, air conditioning units and condensers, where achievement of the rating levels (ordinarily determined by a BS:4142 assessment) may not afford the necessary protection. In these cases, the Council will generally also require a NR curve specification of NR35 or below, dependant on the room (based upon measured or predicted Leq,5mins noise levels in octave bands) 1 metre from the façade of affected premises, where the noise sensitive premise is located in a quiet background area."

And

"Emergency equipment such as generators which are only to be used for short periods of time will be required to meet the noise criteria of no more than 10dB above the background level (L90 15 minutes). During standby periods, emergency equipment will be required to meet the usual criteria for plant and machinery. Conditions to this effect may be imposed in instances where emergency equipment forms part of the application."

National Planning Policy Framework (NPPF)

2.4. The National Planning Policy Framework (NPPF), published in 2012, has superseded Planning Policy Guidance documents, and with specific regard to noise, PPG24. The NPPF states the following in relation to noise:

"The planning system should contribute to and enhance the natural and local environment by...preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or ***noise*** *pollution or land instability.*

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;*
- *mitigate and reduce to a minimum other adverse impacts 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; 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."*

2.5. In order to achieve the aims listed above the Noise Policy Statement for England (NPSE) was developed, stating its vision as follows:

"Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development"

2.6. The mechanism by which the vision is proposed to be fulfilled is detailed in the Explanatory Note to the NPSE, which provides three definitions of noise impact as follows:

- *NOEL – No Observed Effect Level*;
  The level below which no detectable effect on the health and quality of life due to noise can be detected.

- *LOAEL – Lowest Observed Adverse Effect Level*
  The level above which adverse effects on health and quality of life due to noise can be detected.

- *SOAEL – Significant Observed Adverse Effect Level*
  The level above which significant adverse effects on health and quality of life due to noise can be detected.

BS4142:2014 Methods for rating and assessing industrial and commercial sound

2.7. British Standard 4142:2014 describes methods for rating and assessing sound of an industrial and/or commercial nature and states the following:

> '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…Obtain an initial estimate of the impact of the specific sound by subtracting the measured background sound level from the rating level and consider the following…
>
> a) Typically, the greater this difference, the greater the magnitude of the impact.
> b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
> c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
> d) The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.'

2.8. Based on the Joint Nordic Method, BS4142 sets out the following additional penalty to the noise emission limit for sound displaying tonal characteristics:

- 2 dB for a tone which is just perceptible at the noise receptor;
- 4 dB where it is clearly perceptible;
- 6 dB where it is highly perceptible.

2.9. BS4142 also sets out the following additional penalty to the noise emission limit for impulsive sound:

- 3 dB for impulsivity which is just perceptible at the noise receptor;
- 6 dB where it is clearly perceptible;
- 9 dB where it is highly perceptible.

2.10. It states that for sound featuring characteristics that are neither tonal nor impulsive, a penalty of 3 dB can be applied, however it also states the following:

> "Where tonal and impulsive characteristics are present in the specific sound within the same reference period then these two corrections can both be taken into account. If one feature is dominant then it might be appropriate to apply a single correction. Where both features are likely to affect perception and response, the corrections ought normally to be added in a linear fashion."

2.11. BS4142 also sets out the following additional penalty to the noise emission limit for intermittent sound:

> "When the specific sound has identifiable on/off conditions, the specific sound level ought to be representative of the time period of length equal to the reference time interval which contains the greatest total amount of on time. This can necessitate measuring the specific sound over a number of shorter sampling periods that are in combination less than the reference time interval in total, and then calculating the specific sound level for the reference time interval allowing for time when the specific sound is not present. If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied."

2.12. BS 4142 emphasises that the background level (LA90,T) is in fact a range of levels, not one absolute value. Whilst stating that the measurements of background sound should be normally not less than 15 mins, the focus is on obtaining a level for use in assessment that is representative of typical conditions at the noise-sensitive receivers.

2.13. Notwithstanding the guidance provided in BS4142:2014, the London Borough of Camden Local Development Policy A4 is judged to be the overriding requirement when setting out plant noise emissions limits.

3. Site description

3.1. The building is proposed to be located on the site of an existing garage and storage area to the rear of the existing London School of Hygiene and Tropical Medicine. The proposed site is bounded by:

- The existing LSHTM building to the south;
- The rear elevations of hotels and residential properties to the north and north east, located on Cartwright Gardens
- Residential dwellings to the west on Marchmont Street.
- The Lord John Russel public house to the west on Marchmont Street.

3.2. No major roads are recorded as surrounding the site. Minor roads around the site include the Cartwright Gardens, Burton Street and Tavistock Place, although these are largely screened from the proposed site by existing buildings.

3.3. Figure 1 below indicates the location of the proposed site along with locations of observed noise sensitive receptors.

Figure 1: Proposed Site Location

4. Survey Details

4.1. All measurements were undertaken in compliance with measurement procedures set out in *BS 7445 2003 Part 1 Environmental noise - Guide to quantities and procedures*.

4.2. All surveys were undertaken in the free field, with monitoring equipment located at least 1.5m from the ground and more than 1.5m from any facades.

4.3. Weather conditions during all attended and unattended noise surveys were dry with little to no wind.

Unattended continuous noise measurements

4.4. An unattended continuous noise survey was carried out between 09:00 hrs on 12 February 2015 and 08:55 hrs on 13 February 2015 by Richard Grove (MIOA). The following equipment was used:

- Rion NL-52 Sound level meter Ser No. 00242746
- Rion Microphone UC-59 Ser No. 06231
- Rion Pre-amp NH-25 Ser No. 32774
- RION NC-74 Sound calibrator Ser No. 35046790

4.5. The calibration of the sound level meter was checked before and after the measurements were taken, and no drift in calibration level was observed.

4.6. Measurements were undertaken continuously in periods of 5 minutes.

4.7. The weather was noted as being dry with little to no wind during the course of the 24 hour period.

4.8. The location of the semi-permanent continuous noise monitoring equipment is detailed in Figure 2. This location was selected as it rests on the same level and in line of site of the proposed plant location, and was judged to be representative of the nearest noise sensitive receptor to the proposed site.

Attended short-term noise measurements

4.9. Attended short-term measurements were conducted by Richard Grove (MIOA) over 15 minute periods during the day and 5 minute periods during the night at the positions indicated in Figure 2. The following equipment was used:

- Bruel & Kjaer 2260 Sound Level Meter Ser No. 2447614
- Bruel & Kjaer 4189 Microphone Ser No. 06231
- Bruel & Kjaer ZC 0026 Preamplifier Ser No. 32774
- RION NC-74 Sound calibrator Ser No. 35046790

4.10. The calibration of the sound level meter was checked before and after the measurements were taken, and no drift in calibration level was observed.

4.11. Measurements were undertaken between 14:20 hrs and 15:00 hrs on 12th February 2015, and between 01:20 hrs to 02:05 hrs on 13h February 2015.

4.12. Other representative positions to the North of the proposed site were inaccessible during both the day and the night. Due to the location of the proposed site, it is judged that the noise levels measured at the attended and unattended survey positions are representative of the noise climate in the area.

Figure 2: Measurement Locations

5. Ambient noise climate

5.1. The ambient noise climate primarily consists of moderate road traffic on Tavistock Place, audible when in line of site of the road.

5.2. As of September 2017, the noise climate in the area is considered not to have changed substantially as no new roads have been opened hence road traffic has remained substantially the same, and only the new UCL building on Cartwright Garden has been built not changing the effects of screening from road traffic and to other surrounding buildings.

5.3. Other noise sources which contributed to the noise climate in the site included distant road traffic on surrounding roads lessened by screening provided existing buildings, and distant construction noise from road works being undertaken on Cartwright Gardens.

5.4. During the night, road traffic noise was noted to significantly reduce, and construction noise was not present. During this period, the dominant source of noise was the distant chimes of Big Ben. Additional sources of noise resulted from occasional bird song.

6. Measured Survey Results

6.1. A large range of statistical noise data was captured; however, the following A-weighted noise parameters are presented for information:

L_{Aeq} Time averaged sound pressure level. This is generally considered to be an acceptable representative descriptor of environmental noise;

L_{A90} Sound pressure level exceeded for 90% of the measurement period, this is generally accepted to be indicative of the continuous background noise level.

L_{AMax} The maximum sound pressure level recorded within any measurement period.

6.2. For the purposes of planning, the L_{A90} background noise measurements are of most interest.

Unattended continuous noise measurements

6.3. Time history of half-hourly measurements is provided in Appendix A at the rear of this report. A summary of the results is provided below.

Time Period	A-weighted sound pressure level (dB re. 2 x 10^{-5} Pa)		
	Highest $L_{Aeq, 5 mins}$ $L_{Aeq, 5 mins}$	Highest $L_{Amax, 5 mins}$ $L_{Amax, 5 mins}$	Lowest $L_{A90, 5 mins}$ $L_{A90, 5 mins}$
Daytime (0700-1700 hrs)	61	81	44
Evening (1700 – 2300 hrs)	60	76	42
Night time (2300 – 0700 hrs)	54	75	41

Table 3: Summary of unattended continuous noise measurements

Attended short-term noise measurements

6.4. A summary of the attended noise measurements is provided in Table 4 below. Full measured data in octave-bands is provided in Appendix B at the rear of this report.

Time	Duration, T	Location	Lowest measured A-weighed sound pressure level, dB		
			$L_{Aeq,T}$	$L_{AFmax,T}$	$L_{A90,T}$
14:21	15 min	1	49	65	46
14:39	15 min	2	46	70	41
01:24	5 min	1	46	63	40
01:29	5 min	1	44	58	40
01:35	5 min	1	42	49	40
01:40	5 min	1	41	47	40
01:46	5 min	1	41	46	40
01:51	5 min	1	41	45	40
01:56	5 min	1	41	45	40

Table 4: Summary of attended short-term noise measurements

6.5. Measurements undertaken at position 2 were within the garage space due to a restriction in access to external spaces. These measurements therefore benefitted from the attenuation provided by the garage building fabric and should be viewed as indicative. Measurements undertaken at position 1 should be considered more representative.

7. Assessment

7.1. In order to meet the requirements of London Borough of Camden Policy A4 (LOAL), the following plant noise emissions limits should be adhered to when selecting plant and associated mitigation measures. Plant noise emissions limits have been set based upon unattended noise measurements as these are most representative of the nearest noise sensitive receptor in line of site of the proposed plant location.

Noise description and location of measurement	Period	Time	Plant Noise Emissions Limit
Noise at 1 metre external to a sensitive façade	Day	07:00 – 18:00	39
	Evening	18:00 – 23:00	37
	Night	23:00 – 07:00	36
Noise that has a distinguishable discrete continuous note (whine, hiss, screech, hum), or distinct impulses (bangs, clicks, clatters, thumps), at 1 metre external to a sensitive façade.	Day	07:00 – 18:00	34
	Evening	18:00 – 23:00	32
	Night	23:00 – 07:00	31

Table 5: Plant noise emissions limit to meet LBC Policy A4

7.2. Mitigation of noise emissions from individual items of plant should be designed such that the cumulative noise emissions of all items of plant do not exceed the values stated above at the nearest noise sensitive receptor.

7.3. Consideration should be given to the planned hours of operation for each item of plant and mitigation measures designed accordingly.

7.4. The now superseded BS4142:1997 stated that measured background noise levels below 30dBA and plant rating levels (emissions limits) of less than 35dBA were considered to be very low. This clause has now been removed from the recently published BS4142:2014. Despite the removal of this clause, consideration should be given to the temporal nature of existing environmental noise, and the variability of duty on operational plant, which may include some or all of the following:

- The time of plant operation;
- The duration of plant operations;
- The duty placed upon plant during different times of the day and night;
- The reasons for operating plant, which may be limited to maintenance testing of emergency plant only.

8. Potential Mitigation Measures

8.1. In order to ensure the requirements of London Borough of Camden Policy A4 (LOAL) are met, the following mitigation measures may be considered as part of the design:

- Management of plant use, potentially through the use of ‘on-demand’ building management systems;
- Purchasing of low-noise plant equipment incorporating low noise switch gear;
- Acoustic attenuation applied to inlets and outlets of plant as appropriate;
- Acoustic shrouds

8.2. As plant selections become available and are confirmed, assessments should be made of the plant noise emissions and plant mitigation applied appropriately.

8.3. Plant selections will be responsibility of the contractor and will be part of their procurement, hence final assessment can only be performed when the design will be finalised

9. Conclusions

9.1. BDP has been appointed by LSHTM to undertake a baseline noise survey and produce a noise statement in support of the planning application for the proposed laboratory building to the rear of the existing London School of Hygiene and Tropical Medicine (LSHTM), 15-17 Tavistock Place, Kings Cross, London WC1H 9SH.

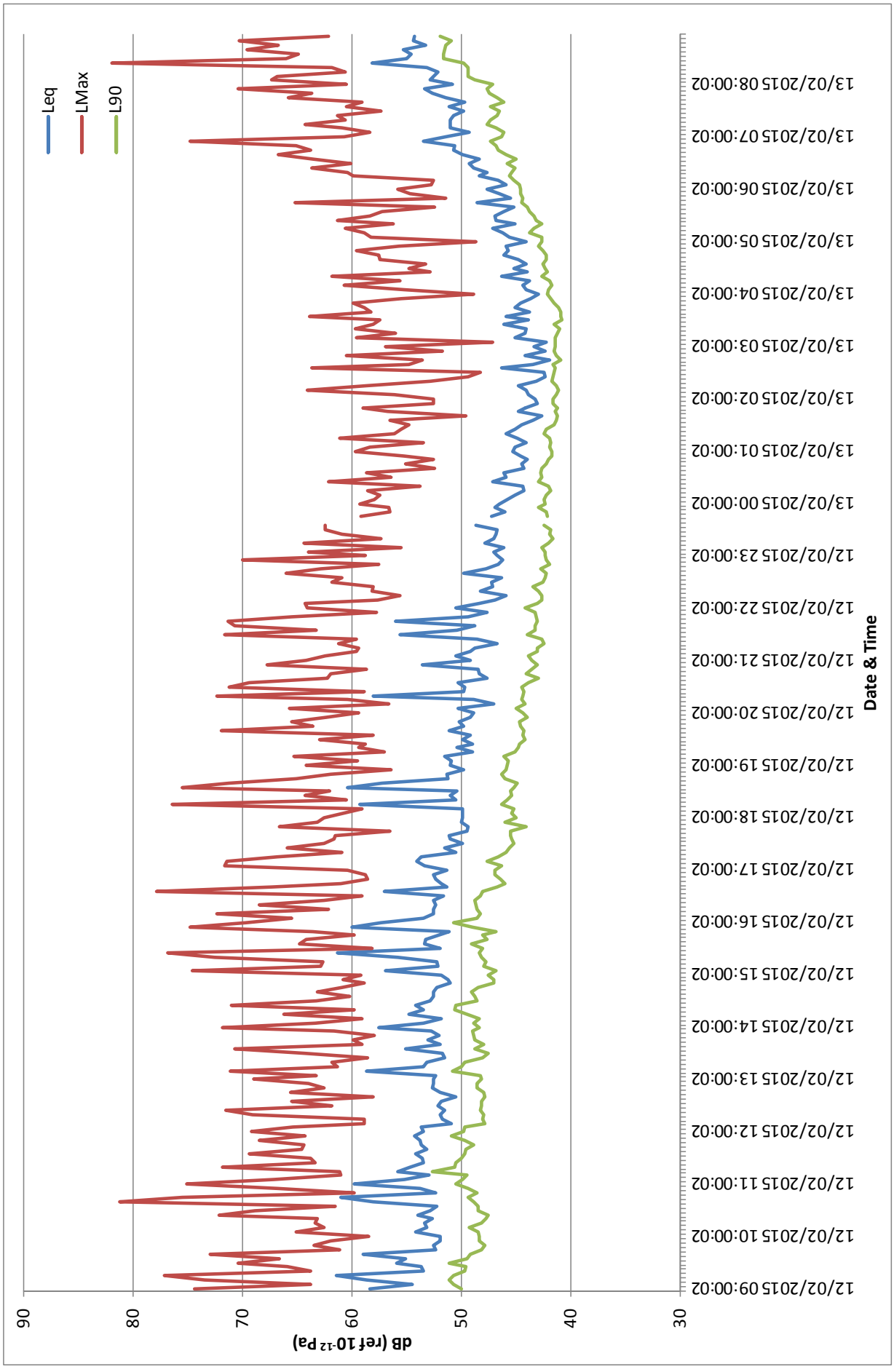
9.2. The building is proposed to be located on the site of existing garages and stores serving the London School of Hygiene and Tropical Medicine (LSHTM). The site is bounded by noise sensitive dwellings to the north, west, and east, with the existing LSHTM situated to the south. The presence of the existing buildings provides significant screening effects from road traffic noise on surrounding roads.

9.3. Attended and unattended environmental noise surveys were undertaken at positions representative of nearby noise sensitive dwellings during both the day and night time periods.

9.4. Subjectively, the noise climate in the vicinity of the proposed building was dominated by moderate road traffic, with additional contributions from distant road traffic from surrounding roads and distant construction noise from works being undertaken on Cartwright Gardens. Road traffic noise was noted to significantly reduce at night, whereby the chimes of Big Ben were audible.

9.5. In order to meet London Borough of Camden Policy A4 relating to noise emissions from fixed plant, plant noise emissions limits of between 31dB (night) and 39dB (day) have been set depending upon whether or not plant has distinguishable discreet acoustic notes or distinct acoustic impulses.

APPENDIX A – Unattended Noise Survey Results



Appendix B –Attended noise survey results

$L_{Eq, T}$

			Sound pressure level (dB) Octave Band Centre Frequency, (Hz)								Overall A-weighted sound pressure level
Time	T	Position	63	125	250	500	1k	2k	4k	8k	dB(A)
14:21	15 min	1	53.2	47.3	42.6	41.0	39.6	34.6	---	---	49
14:39	15 min	2	50.5	44.6	39.9	37.1	33.1	---	36.8		46
14:57	1 min*	3	60.0	52.7	50.8	46.0	45.1	39.4	32.9	---	54
01:24	5 min	1	49.9	42.8	38.2	36.0	37.8	31.6	---	---	46
01:29	5 min	1	47.2	42.9	37.8	35.0	34.5	---	---	---	44
01:35	5 min	1	47.9	42.6	37.8	34.4	32.9	---	---	---	42
01:40	5 min	1	48.3	42.3	38.0	35.3	32.6	---	---	---	41
01:46	5 min	1	47.3	42.6	38.1	34.5	32.6	---	---	---	41
01:51	5 min	1	46.5	42.6	37.9	34.1	32.1	---	---	---	41
01:56	5 min	1	46.8	42.8	37.8	34.6	32.3	---	---	---	41

$L_{max, T}$

			Sound pressure level (dB) Octave Band Centre Frequency, (Hz)								Overall A-weighted sound pressure level
Time	T	Position	63	125	250	500	1k	2k	4k	8k	dB(A)
14:21	15 min	1	69.6	57.4	55.5	62.3	63.3	51.3	48.0	43.3	65
14:39	15 min	2	69.4	61.1	57.1	60.2	50.1	51.0	65.1	48.1	70
14:57	1 min*	3	75.8	57.7	57.4	53.5	55.7	47.2	47.1	39.3	60
01:24	5 min	1	64.0	58.2	53.4	54.7	64.0	58.0	56.8	49.4	63
01:29	5 min	1	59.3	52.3	46.9	47.5	53.5	49.0	52.3	50.3	58
01:35	5 min	1	63.6	50.4	43.4	43.3	47.3	45.0	40.0	37.2	49
01:40	5 min	1	62.8	49.5	53.9	48.8	43.5	40.5	35.1	34.2	47
01:46	5 min	1	59.1	49.3	48.4	42.4	42.3	36.8	33.4	32.7	46
01:51	5 min	1	57.5	49.3	47.6	42.9	40.7	38.9	38.9	33.7	45
01:56	5 min	1	58.4	52.0	42.4	48.4	42.9	34.5	36.2	36.2	45

$L_{90, T}$

			Sound pressure level (dB) Octave Band Centre Frequency, (Hz)								Overall A-weighted sound pressure level
Time	T	Position	63	125	250	500	1k	2k	4k	8k	dB(A)
14:21	15 min	1	48.4	44.5	40.1	38.2	35.7	30.3	---	---	46
14:39	15 min	2	44.5	41.1	37.1	33.3	---	---	---	---	41
14:57	1 min*	3	49.5	50.1	48.7	44.0	43.0	37.1	---	---	53
01:24	5 min	1	45.1	40.0	35.9	33.2	32.1	---	---	---	40
01:29	5 min	1	44.1	40.3	36.0	32.7	31.1	---	---	---	40
01:35	5 min	1	44.3	40.1	36.0	32.5	30.5	---	---	---	40
01:40	5 min	1	44.1	40.0	35.8	32.5	31.0	---	---	---	40
01:46	5 min	1	44.1	40.2	36.1	33.1	31.0	---	---	---	40
01:51	5 min	1	43.6	40.3	35.9	32.4	30.6	---	---	---	40
01:56	5 min	1	43.9	40.2	36.0	32.7	30.9	---	---	---	40

Appendix C – Calibration Certificates

MEASUREMENT SYSTEMS

CERTIFICATE OF CONFORMANCE

Date of Issue	**16 December 2014**
Customer	**BDP Ltd**
Certificate Number	**CONF121412**

	Manufacturer	Type	Serial Number
Sound Level Meter	Rion	NL-52	00242746
Preamplifier	Rion	NH-25	32774
Microphone	Rion	UC-59	06231

This is to certify that the instrument was tested and calibrated at the Manufacturer's factory according to their specification and that the product satisfied all the relevant requirements of the following Standards:

IEC 61672-1:2002 Class 1.

The instrument also received a functional check by ANV Measurement Systems prior to despatch in the UK, in accordance with our standard procedures.

Signed. Amrat C Patel ..... Position.Laboratory Manager Date.16th December 2014

Amrat C Patel

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✉ info@noise-and-vibration.co.uk 💻 www.noise-and-vibration.co.uk

Certificate of Calibration

Issued by University of Salford (Acoustics Calibration Laboratory)
UKAS ACCREDITED CALIBRATION LABORATORY NO. 0801

APPROVED SIGNATORIES
Claire Lomax [✓] Andy Moorhouse [ ]
Gary Phillips [ ] Danny McCaul [ ]

acoustic calibration laboratory
The University of Salford, Salford, Greater Manchester, M5 4WT, UK
http://www.acoustics.salford.ac.uk
t 0161 295 3030/0161 295 3319 f 0161 295 4456 e c.lomax1@salford.ac.uk

UKAS CALIBRATION
0801

University of Salford MANCHESTER

Certificate Number: 01296/2 Date of Issue: 3 May 2013

VERIFICATION OF A TYPE 1 SOUND LEVEL METER to BS7580 Part 1

FOR:	BDP 16 Brewhouse Yard Clerkenwell London EC1V 4LJ
FOR THE ATTENTION OF:	Jai Shikotra
CALIBRATION DATE:	03/05/2013
TEST PROCEDURE:	CTP08 (Laboratory Manual)

Sound Level Meter						
Manu:	Bruel & Kjaer	Model:	2260	Serial No:	2447614	
Microphone						
Manu:	Bruel & Kjaer	Model:	4189	Serial No:	2453294	
Preamp						
Manu:	Bruel & Kjaer	Model:	ZC 0026	Serial No:	2863	
Associated Calibrator						
Manu:	Bruel & Kjaer	Model:	4231	Serial No:	2170240	Adaptor: UC0210

Test Engineer (initial): GP Name: Gary Phillips

Certificate of Calibration

Issued by University of Salford (Acoustics Calibration Laboratory)
UKAS ACCREDITED CALIBRATION LABORATORY NO. 0801

Certificate Number: 01296/2 Date of Issue: 3 May 2013

SET-UP INFORMATION

The instrument was running software module BZ7206 version 2.2. The reference range, reference SPL, primary indicator range, pulse range and linearity range as specified by the manufacturer have been used. The instrument was adjusted to read 94.0 dB (A) in response to the associated calibrator. This reading was obtained from the calibration certificate of the calibrator, 01296/1 and information in the manufacturer's instruction manual, with the following instrument settings; S.I.Corr: Frontal, Windscreen: None. The instrument was calibrated without a windshield. Consult manufacturer's instructions if using a windshield.

MEASUREMENTS

The levels of self-generated noise were:

A:	**12.0 dB**
C:	**14.8 dB**
Lin:	**22.5 dB**
Lin-LF:	**29.7 dB**

At the end of the tests the indication of the sound level meter in response to the associated sound calibrator was 94.1 dB (A) which corresponds to the following level at 101.325 kPa:

Sound Pressure Level 94.1 dB (A)
This reading should be used henceforth to set up the sound level meter for field use.

THE SOUND LEVEL METER WAS VERIFIED ACCORDING TO THE PROCEDURE GIVEN IN BS7580: Part 1 1997 WITH THE FOLLOWING EXCEPTIONS:

The microphone corrections applied as specified in BS 7580: Part 1: 1997 were obtained from a frequency response measurement by this Laboratory using the electrostatic actuator method. The response in isolation is not covered by our UKAS accreditation.

A stricter test than that specified in 5.5.10 and 5.5.11 of BS 7580 has been used by not applying the low level signal.

STATEMENT OF RESULT:

THE SOUND LEVEL METER CONFORMS TO THE TYPE 1 REQUIREMENTS OF BS7580: PART1 1997

Instruments used in the verification procedure were traceable to National Standards. The method of acoustic calibration employed a standard sound pressure calibrator for the 1 kHz test whilst the tests at 125 Hz and 8 kHz were performed by the electrostatic actuator method. The uncertainty of the Laboratory's 1 kHz calibrator was ±0.10 dB. The uncertainty of the standard calibrator is not included in the applied tolerances. It is assumed that the sound level meter was manufactured in accordance with BSEN60651: 1994 Type 1, and BSEN60804: 1994 Type 1.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements. All measurement results are retained at the acoustic calibration laboratory for at least four years.

MEASUREMENT SYSTEMS

CERTIFICATE OF CONFORMANCE

Date of Issue	**16 December 2014**
Customer	**BDP Ltd**
Certificate Number	**CONF121410**

	Manufacturer	**Type**	**Serial Number**
Acoustic Calibrator	Rion	NC-74	35046790

This is to certify that the instrument was tested and calibrated at the Manufacturer's factory according to their specification and that the product satisfied all the relevant requirements of the following Standards:

IEC 60942:2003 Class 1 (Electroacoustics - Sound Calibrators)

The instrument also received a functional check by ANV Measurement Systems prior to despatch in the UK, in accordance with our standard procedures.

Signed. Amrat C Patel Position.Laboratory Manager Date.16th December 2014

Amrat C Patel

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