Herbal House. 10 Back Hill. Camden. London

Acoustics Planning Report

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Herbal House, 10 Back Hill, Camden, London

Acoustics Planning Report

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EXECUTIVE SUMMARY

A noise assessment has been undertaken in order to assess the residential amenity of the proposed Development and determine the potential impacts of the Development on nearby existing and proposed noise sensitive receptors.

Attended and unattended noise surveys were undertaken between the 26th and 28th February 2014 so as to quantify the noise climate at and in the vicinity of the Site.

Based upon measured environmental noise levels affecting the Site, the required sound insulation performance of the building envelope have been determined to ensure internal noise levels meet the criteria set out in BS 8233:2014 within the residential element of the proposed Development. Consideration will be given to internal noise levels within office and retail space as the design develops to ensure the commercial requirements of the development would be met.

The study has shown that through the incorporation of suitable thermal double glazing the required criteria would be met for all residential dwellings.

Maximum noise emission criteria have been set for all fixed building services plant having regards to the London Borough of Camden's plant noise policy. Providing that the proposed limiting criteria are met, which could be secured by way of a suitably worded planning condition, the operation of plant associated with the proposed Development would have a negligible impact upon the ambient noise climate.

Noise impacts arising as a result of the proposed future commercial uses were also found to be negligible.

As such, and in light of the above it is considered that the Site is suitable for the proposed use and that a good level of residential amenity could be provided for all future residents of the development.

1. Introduction

1.1 The Brief

Waterman Energy, Environment and Design Ltd (hereafter "Waterman") has been instructed by Herbal House Investments Limited to provide acoustic advice during the planning and design of the Herbal House development (hereafter referred to as the Development). A noise survey has been carried out at the Development Site to establish typical existing levels of environmental noise. The monitored noise levels have been used to undertake noise break-in calculations to establish internal noise levels within the worst affected habitable rooms of the Development. Assessment of internal noise levels within office and retail space is a commercial, rather than a planning requirement and will be considered as the design develops to ensure the commercial requirements of the development are met. Furthermore, the requirements of London Borough of Camden's (LBC) local noise policy as highlighted in Section 2.3 are applicable to residential and not office or commercial use.

This report provides guidance with regards to the existing noise levels present on the Site and where required, suggests suitable mitigation measures to protect the amenity of future residents.

A glossary of the acoustic terminology used throughout this report is presented as Appendix A.

1.2 Site Description

Herbal House is located at the junction of Back Hill/Herbal Hill, just off the Clerkenwell Road. The site slopes downwards towards the north and is bordered by Back Hill and Herbal Hill to the east and west respectively and their junction with Ray Street to the north. The southern boundary is formed by the abutment with St Peters Italian Church and 4 Back Hill. The building is approximately triangular in plan. Directly to the east of the development beyond Back Hill is a large electricity substation which would have the potential to influence upon the local noise climate. The Site falls within the jurisdiction of LBC.

The closest noise sensitive receptors (NSRs) to the proposed Development have been identified and are illustrated on Figure 1 and summarised in Table 1 below.

Table 1 Noise Sensitive Receptors

NSR	Description	Distance from Site Boundary
A	24 Ray Street and residential located above the Coach and Horses Public House	15m
B	Residential dwellings located on Herbal Hill	5m
C	St Peters Italian Church	Immediately adjacent
D	Residential dwellings on Back Hill	10m

1.3 The Proposed Development

The proposed Development includes the refurbishment and extension of the existing structure to provide retail space, gallery space, residential and office use split across six above ground floors with a basement and mezzanine level below. The retail and gallery space would be provided at basement, mezzanine and ground floor with office space spread between the first and sixth floor. The proposed residential units would be located on the western side of the fifth and sixth floors and orientated towards Back Hill. The residential units would be set back from the building edge and as such would, for the most part, be at least partially screened from identified noise sources. Plant associated with the operation of the development would be located at both basement and roof level.

2. Planning Policy and Guidance

2.1 National Planning Policy

2.1.1 National Planning Policy Framework, 2012

The National Planning Policy Framework (NPPF)[1] for England was adopted in March 2012. The NPPF, which is based on the principle of sustainable development, sets out nationally important issues and leaves other matters for determination by local councils and communities.

In relation to noise, the NPPF seeks to conserve and enhance the local environment, including preventing developments from contributing to, and/or, being put at an unacceptable risk from, noise pollution. In support of this, the NPPF stipulates that decisions should seek 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.

The NPPF supersedes Planning Policy Guidance 24: Planning and Noise (1994). As a result there is currently no specific guidance within England for the assessment of the suitability of a site for noise sensitive development. As such, in order to assess the suitability of the Site for noise sensitive development, guidance has been sought from BS 8233:1999 '*Sound Insulation and Noise Reduction for Buildings – Code of Practice*' and the WHO '*Guidelines for Community Noise*'. These documents set out guideline internal and external noise limits which should be met by all residential dwellings.

2.2 Regional Planning Policy

The London Plan: Spatial Development Strategy for Greater London, July 2011

The London Plan[2] provides guidance in relation to noise for new developments within Policy 5.3, Policy 7.7D, and particularly in Policy 7.15.

Policy 5.3 states:

"Major development proposals should meet the minimum standards outlined in the Mayor's supplementary planning guidance and this should be clearly demonstrated within a design and access statement. The standards include measures to achieve other policies in this Plan and the following sustainable design principles:

D minimising pollution (including noise, air and urban run-off)".

Section D of Policy 7.7 states:

"[Tall Buildings] should not affect their surroundings adversely in terms of microclimate, wind turbulence, overshadowing, noise, reflected glare, aviation, navigation and telecommunication interference."

Policy 7.15 states:

1 DCLG (2012) National Planning Policy Framework
2 Greater London Authority (GLA): 'The London Plan: Spatial Development Strategy of Greater London'. 2011

"The transport, spatial and design policies of this plan will be implemented in order to reduce noise and support the objectives of the Mayor's Ambient Noise Strategy."

Additionally, Policy 7.15 seeks to reduce noise by separating new noise sensitive development from major sources, wherever practicable, and containing emissions from noisy activities, and where appropriate promoting well-managed designated locations and the protection of 'quiet areas'.

Revised Early Minor Alterations to the London Plan, 2013

There are no amendments to the above London Plan policies that relate to noise and vibration, contained in the Revised Early Minor Amendments to the London Plan[3].

The Mayor's Ambient Noise Strategy, 2004

The Mayor's Ambient Noise Strategy[4] sets out 97 policies and 28 proposals for protecting and improving noise environments within London, with particular regard to roads, railways and aircraft. The Mayor also seeks to build a more sustainable City, which is more compact, thus requiring exemplary standards of acoustic design including better sound insulation for new homes.

Policies 69 and 70 of the Ambient Noise Strategy specifically relate to new development and require a noise assessment to be carried out for sites where noise levels are above NEC A, as specified in PPG24. With the replacement of PPG24 with NPPF these values are taken as greater than 55dB $L_{Aeq,16h}$ during the daytime period and greater than 45dB $L_{Aeq,8h}$ during the night-time period which are themselves WHO guideline values.

Such assessment must also demonstrate that potential noise issues are addressed to ensure a satisfactory standard of noise in and around the development. Additionally, the Ambient Noise Strategy stipulates that any adverse noise effects from new developments must be minimised both within, and in the vicinity of, the development.

2.3 Local Policy

Camden Local Development Framework, Camden Core Strategy, 2010-2025 Adopted, November 2010

In respect of managing the impact of growth and development, London Borough of Camden's (LBC's) Adopted Core Strategy[5] of the Local Development Framework (LDF) identifies that in Camden, the close proximity of various land uses and the presence of major roads and railways can mean that noise can be particularly an issue for amenity. As such, the Adopted Core Strategy acknowledges the key policy (Development Policy (DP) 28 – Noise and Vibration) relevant to noise issues within the Camden Development Policies document[6].

Camden Local Development Framework, Camden Development Policies, Adopted, November 2010

DP 28: 'Noise and Vibration' of the LBC Camden Development Policies indicates that LBC will seek to ensure that noise and vibration is controlled and managed, and that planning permission will not be granted where:

- A development is likely to generate noise pollution; or
- Development sensitive to noise is proposed in locations with noise pollution, unless appropriate attenuation measures are provided.

3 Mayor's of London. 2013. Early Minor Alterations to The London Plan
4 GLA: 'The Mayors Ambient Noise Strategy'. 2004
5 LBC (2010). Camden Local Development Framework, Camden Core Strategy, 2010-2025 Adopted, November, 2010
6 LBC (2010). Camden Local Development Framework, Camden Development Policies, Adopted , November 2010.

Furthermore, DP 28 states that development that exceeds LBC's Noise and Vibration Thresholds will not be permitted. These are provided within Tables 2 to 4 inclusive.

Table 2 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	Limit Level (dB(A))	
			Railways	Roads
Noise at 1m external to a sensitive façade	Day ($L_{Aeq,12\ hour}$)	0700-1900	74	72
	Evening ($L_{Aeq,4\ hour}$).	1900-2300	74	72
	Night ($L_{Aeq,\ 8\ hour}$).	2300-0700	66	66

Table 3 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	Limit Level (dB(A))	
			Railways	Roads
Noise at 1m external to a sensitive façade	Day ($L_{Aeq,12\ hour}$)	0700-1900	65	62
	Evening ($L_{Aeq,4\ hour}$).	1900-2300	60	57
	Night ($L_{Aeq,\ 8\ hour}$).	2300-0700	55	52
Individual noise events several times in one hour.*	Night ($L_{Amax,S}$).	2300-0700	82	82

* Note that Waterman interpret 'several times in one hour' as more than twice in one hour

Table 4 Noise Levels from Plant and Machinery at which Planning Permission will not be Granted

Noise Description and Location of Measurement	Period	Time	Noise Level (dB(A))
Noise at 1m external to a sensitive façade.	Day, evening and night.	0000-2400	5dB(A) $<L_{A90}$
Noise that has a distinguishable discrete continuous note (whine, hiss, screech, hum) at 1m external to a sensitive façade.	Day, evening and night.	0000-2400	10dB(A) $<L_{A90}$
Noise that has distinct impulses (bangs, clicks, clatters, thumps) at 1m external to a sensitive façade.	Day, evening and night.	0000-2400	10dB(A) $<L_{A90}$
Noise at 1m external to sensitive façade where L_{A90}>60dB.	Day, evening and night.	0000-2400	55dB$L_{Aeq'}$

Finally, DP 28 states:

"The Council will only grant permission for plant or machinery if it can be operated without causing harm to amenity and does not exceed our noise thresholds.

The Council will seek to minimise the impact on local amenity from the demolition and construction phases of development. Where these phases are likely to cause harm, conditions and planning obligations may be used to minimise the impact."

3. Noise Assessment Criteria

3.1 Assessment of Residential Amenity

Notwithstanding the criteria set out in Policy DP28 of the LBC Local Development Framework, when considering the residential amenity of future residents of the Development, guideline noise levels are provided in BS 8233:2014[7]. BS 8233[i] provides guidelines for the control of noise in and around buildings. The guidelines recommend internal ambient noise criteria for a range of indoor spaces including residential land uses. Guideline indoor ambient noise levels for unoccupied spaces are presented in Table 5.

Table 5: BS 8233 Internal Noise Level Criteria

Activity	Location	Daytime $L_{Aeq,\ 16\ hour}$ (07:00 to 23:00)	Night-Time $L_{Aeq,\ 8\ hour}$ (23:00 to 07:00)
Resting	Living room	35dB	Not applicable
Dining	Dining room / area	40dB	Not applicable
Sleeping (daytime resting)	Bedroom	30dB	30dB

When considering external amenity spaces such as gardens balconies and terraces, the guidance provided in BS 8233 states:

"For traditional external areas that are used for amenity space, such as gardens or patios it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognised that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited".

3.2 Building Services Plant Noise

The significance of building services noise impacts depends upon a number of factors including the absolute noise level, the nature of the noise, the time and duration at which the noise occurs, whether the noise is temporary, intermittent or permanent, whether the impact is as a result of a new source, or whether it is a change to an existing source and/or the sensitivity of the receptor.

The proposed Development includes a number of items of fixed building services plant relating to the proposed Mechanical Ventilation and Heat Recovery (MVHR) and Combined Heat and Power (CHP) systems. Plant proposed for the Development would include boilers, generators and associated cooling and heat rejection plant, which are to be located in centralised systems at rooftop and basement level.

The primary source of guidance in relation to noise which is industrial in nature, such as fixed building services plant, is provided in BS 4142:1997[8]. BS 4142:1997 provides an objective method for rating the likelihood of complaints from industrial and commercial operations and also provides a means of determining noise levels from fixed building services plant installations and prevailing background noise

[7] British Standard Institute (BSI) (1999): BS 8233:1999 'Sound insulation and noise reduction for buildings – Code of Practice', BSI

[8] British Standard (BS), 1997, BS 4142:1997 'Method for Rating Industrial Noise Affecting Mixed Residential and Industrial Areas

levels on, and around, proposed developments. The criteria for the assessment of complaints as taken from BS 4142:1997 are presented in Table 6.

Table 6: Likelihood of Complaints (BS 4142:1997)

Noise Level Difference dB(A)	Likelihood of Complaints
-10	Complaints unlikely
+5	Results are of marginal significance
+10	Positive indication that complaints are likely

The standard sets out a methodology whereby the likelihood of complaints about an industrial noise source can be assessed. The measured or predicted noise level from the source in question, the 'Specific Noise Level', immediately outside of the dwellings is compared with the 'Background Noise Level'. Where the noise contains a "*distinguishable discrete continuous note (whine, hiss, screech, hum, etc.)*" or "*if there are distinct impulses in the noise (bangs, clinks, clatters or thumps),* or *"if the noise is sufficiently irregular as to attract attention*", then a correction of +5dB is added to the Specific Noise Level to obtain the 'Rating Noise Level. The likelihood of noise provoking complaints is assessed by subtracting the Background Noise Level from the Rating Noise Level.

Based on the environmental noise survey data detailed in Section 4 and in accordance with LBC's plant noise policy, maximum plant emission levels have been set in controlling fixed building services plant to an acceptable level and are detailed in Section 6 of this report. Noise limits apply at a position 1m from the façade of the nearest noise sensitive properties and include the total contribution of noise from all plant items associated with the proposed plant scheme that may run during any particular period.

3.3 Noise from Proposed Future Commercial Use

The potential effect of noise sources associated with the future use of the ground floor retail units would be dependent upon their ultimate occupier. For the most part retail use is not noisy, however, should the retail units be utilised for A3 (restaurants & café's) use, consideration of noise breakout from these units would be required. The Code of Practice on the Control of Noise from Pubs and Clubs sets out a methodology whereby the likelihood of disturbance as a result of noise breakout from units can be determined based upon the following criteria:

- The L_{10} leisure noise should not exceed the representative background noise level L_{90} (without entertainment noise) in any 1/3 octave band between 40Hz and 160Hz; and
- The L_{Aeq} of the leisure noise should not exceed the representative background noise level (L_{A90}) without entertainment noise.

4. Baseline Conditions

Long term unattended and short term attended noise monitoring was undertaken between the 26th and 28th February 2014. Monitoring locations were selected to provide a a full representation of the noise climate on and in the vicinity of the site. All measurements were undertaken under façade conditions (within 3m of the building facade). The weather was dry and maximum wind speeds were less than 5 m/s. A windshield was fitted to the monitoring equipment throughout the survey periods.

The monitoring locations are identified in Figure 1 and described in Table 7 below.

Table 7: Noise Monitoring Locations

Location	Description	Notes
LT1	Long term façade monitoring location at roof level on the northern corner of the existing Herbal House building.	Noise climate dominated by road traffic noise on Back Hill, Herbal Hill and Ray Street
LT2	Long term façade monitoring location at third floor level facing onto Herbal Hill.	Noise climate dominated by road traffic noise on Herbal Hill.
LT3	Long term façade monitoring location at roof level on the western façade of the existing herbal house building facing onto Back Hill.	Noise climate dominated by road traffic noise on Back Hill and the more distant Clerkenwell Road.
ST1	Ground level monitoring location directly below location LT1	Noise climate dominated by road traffic noise on Back Hill, Herbal Hill and Ray Street
ST2	Ground level monitoring location directly below location LT2	Noise climate dominated by road traffic noise on Herbal Hill.
ST3	Ground level monitoring location directly below location LT3	Noise climate dominated by road traffic noise on Back Hill and the more distant Clerkenwell Road.
ST4	Ground level monitoring location adjacent to substation on Back Hill	Noise climate dominated by road traffic noise on Back Hill although some noise from the substation noted.

Noise levels were monitored at five minute intervals throughout the survey period. The parameters logged throughout the survey period were L_{Aeq}, L_{Amax}, L_{A90} and L_{A10}. The L_{Aeq} level is the equivalent continuous sound pressure level over the measurement period; L_{Amax} is an indicator of the highest sound level during the measurement period; L_{A90} is used as a descriptor of background noise levels and L_{A10} is the noise level which is achieved for 10% of the monitoring period and is often used to describe road traffic noise.

The monitoring equipment used during the survey period is described in Table 3. The sound level meters were calibrated both before and after each monitoring period; no significant drift from the reference level of 94 dB was recorded.

Table 8: Noise Monitoring Equipment

Sound Level Meter	LT1 and ST 1 to ST4	LT2	LT3
Meter Mode	Rion NL-52	Rion NL-52	Rion NL-52
Serial Number	00620869	00610194	00610203
Calibrator			
Calibrator Model	NC-74	NC-74	NC-74
Serial Number	35173533	35173533	35173533
Calibration Level at 1000 Hz	94 dB	94 dB	94 dB

All measurements were undertaken under facade conditions and a wind shield was fitted to the monitoring equipment at all times. Measurements were taken in 5-minute samples and are summarised in Table 9. Due to potential outliers in the maximum monitored noise level data, the 90th percentile of the dataset has been included to give a more accurate representation of the maximum noise levels experienced throughout the survey period.

The monitored baseline noise levels obtained at each monitoring located are presented in full as Appendix B and summarised in Table 9 below.

Table 9: Noise Monitoring Results

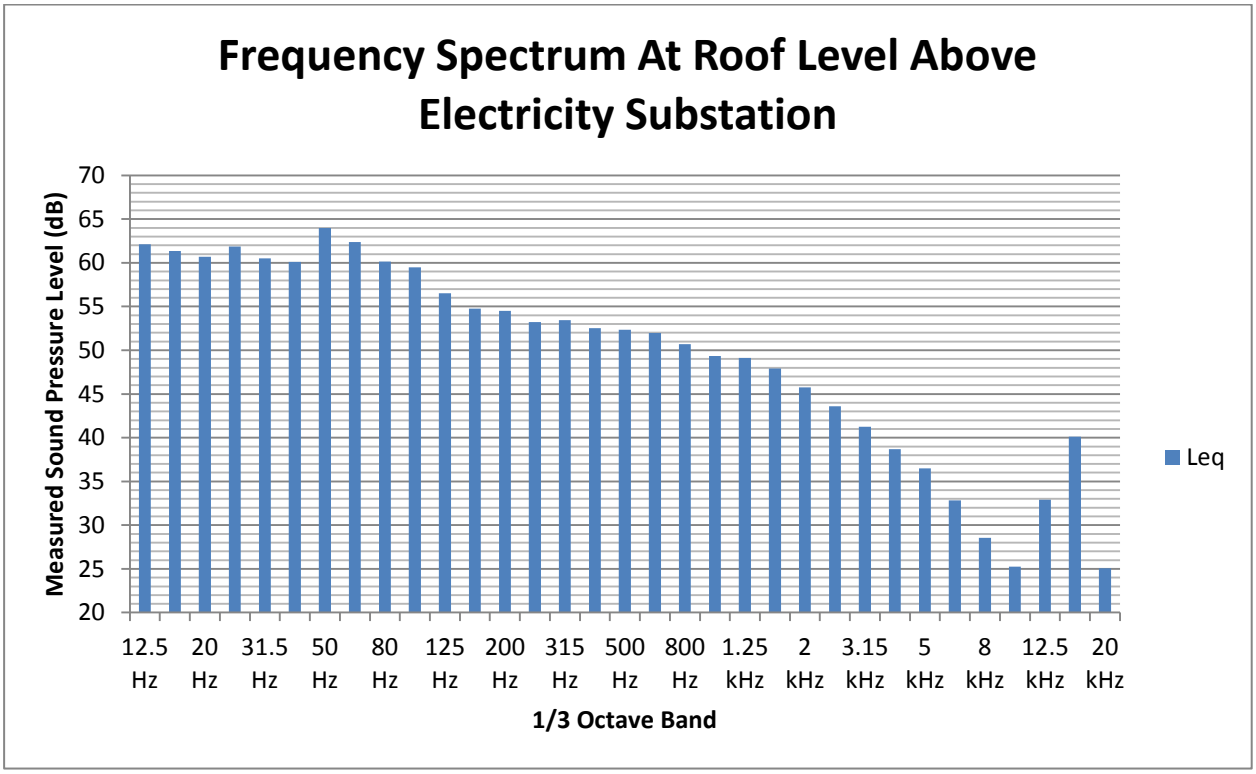
Location	Period	L_{Aeq}*	L_{Amax}		L_{A90}	
			Max	90th Percentile	Minimum	Average
LT1	Daytime (07:00 to 23:00)[1]	61	93	81	51	55
	Night-time (23:00 to 07:00)[2]	55	90	79	47	50
LT2	Daytime (07:00 to 23:00)[1]	62	95	81	50	55
	Night-time (23:00 to 07:00)[2]	58	91	78	46	50
LT3	Daytime (07:00 to 23:00)[1]	59	89	78	50	54
	Night-time (23:00 to 07:00)[2]	55	84	72	47	49
ST1	Daytime (14:28 to 14:58)	65	86	84	54	55
ST2	Daytime (13:57 to 14:27)	58	78	77	53	54
ST3	Daytime (13:23 to 13:53)	62	90	86	55	56
ST4[4]	Daytime (15:14 to 15:44)	61	-	-	-	-

[1] The daytime period is classed as between 07:00 and 23:00. [2] The night-time period is between 23:00 and 07:00. [3] 5-minute measurements logarithmically averaged [4] Measurements as L_{Aeq} only.

The monitored noise levels during the daytime period were noted to range between 58 and 65dB $L_{Aeq,T}$. The surveyor noted the dominant noise source during the survey period to be road traffic noise.

During the night-time period monitored noise levels were typically lower (between 55dB $L_{Aeq,T}$ and 58dB $L_{Aeq,T}$) as a result of reduced traffic flows during this period. The monitored noise levels indicate a variation in noise levels between lower and upper floors of between 3 and 5dB(A).

Monitoring location ST4 was located at roof level looking directly onto the electricity substation which was audible throughout the survey period. In addition to the summary data presented above supplementary octave band measurements were undertaken so as to determine the tonal content of any noise. The frequency spectrum for the substation is presented below.



The presented frequency spectrum indicates that there was a small amount of tonal content associated with the substation noise at 50Hz.

5. Assessment of Residential Amenity

5.1 Internal Noise Levels

The development includes for the provision of 835m^2 of residential space at the western side of floors five and six and facing onto Back Hill. Noise levels which would be experienced for each of the proposed residential facades have been determined based upon the monitored noise levels presented in Table 9.

The predicted noise levels indicate that there would be the potential for the proposed residential facades to be exposed to noise levels in the region of 59 to 62dB $L_{Aeq,16\ hour}$ during the daytime and 55 to 58dB $L_{Aeq,8\ hour}$ and 78 to 79dB L_{AFmax} during the night-time.

The residential development would be required to meet the 'Good' standard internal noise criteria as set out in BS 8233:1999. The minimum performance which the proposed façade would be required to provide in order to meet the required internal noise levels has been predicted. The required façade performance of the solid and glazed elements of the façade is presented as Table 10. Note should be taken that the required performance of the eastern façade of the development allows for both existing environmental noise sources and potential future impacts associated with plant located within the proposed roof top plant area. A further review of the glazing specification would be undertaken as the design develops.

Table 10: Required Facade Performance

Facade	Composite façade sound insulation	Minimum sound insulation of solid portion	Minimum sound insulation of glazing based on 50% coverage of façade[1]	Indicative Glazing Specification to meet Criteria[2]
North	$D_w + C_{tr} \geq 31$ dB	$R_w + C_{tr} \geq 35$ dB	$R_w + C_{tr} \geq 30$ dB	4/6/6.4 Acoustic
East	$D_w + C_{tr} \geq 35$ dB	$R_w + C_{tr} \geq 40$ dB	$R_w + C_{tr} \geq 34$ dB	6/12/10
West	$D_w + C_{tr} \geq 31$ dB	$R_w + C_{tr} \geq 35$ dB	$R_w + C_{tr} \geq 30$ dB	4/6/6.4 Acoustic

[1] A +3dB correction may be required subject to consultation with glazing contractor in order to allow for framing and gasket losses.
[2] Glazing specification provided by Saint Gobain Glass.

At this stage in the design the build-up of the external façade has yet to be fully determined. However, it is assumed that the performance would be in excess of the 40dB R_{w+Ctr} specified in Table 10 above. As such, provided that the proposed glazing meets or exceeds the required performance presented in Table 10 the required guideline internal noise levels would be met.

In addition to the above, noise associated with the operation of the existing substation located to the east of the proposed development was audible. As such, in addition to achieving the overall single figure required performance presented in Table 10 it is recommended that the glazing units on the western facade also meet the sound reduction index criteria presented as Table 11 below.

Table 11: Required Glazing Performance Western Facade

Octave Band Centre Frequency (Hz)						
63	125	250	500	1k	2k	4k
16	27	26	29	39	45	46

It is recognised that with windows open the level of attenuation provided by the glazing would reduce to between 10 and 15dB(A). However, it is understood that a mechanical ventilation and heat recovery system is proposed which would provide residents with the option to open windows if required. The

system has been designed to meet the background ventilation requirements of Part F of the Building Regulations[9] whilst opening windows would allow purge ventilation where required.

As such, and with reference to the above provided that glazing meeting the requirements set out in Table 10 is installed as an integral part of the design a good level of residential amenity would be achieved for all future residents.

5.2 External Noise Levels

The current proposals include for a private balcony and terrace area at the fifth floor facing onto Back Hill Given that the balcony areas are located at height and would be screened from road traffic noise by a solid glass balustrade of minimum 1100mm height as required under building regulations it is considered that noise levels on the balcony/terrace areas would fall below the 55dB $L_{Aeq,16h}$ criteria above which the onset of serious community annoyance may arise. As such, it is considered that a good level of residential amenity would be provided for all future residents of the proposed development.

[9] HM Government, 2010, The Building Regulations Approved Document F – Means of Ventilation

6. Noise Impact Assessment

6.1 Building Services Plant

It is understood that plant is to be located both at roof and basement level. Roof plant would be located within a dedicated plant area towards the western edge of the Development and would include chillers, condensers, smoke extract fan and flues for both the standby generator and CHP/boilers. At basement level plant would be located in a dedicated plant area with louvered air intake at ground floor. Basement plant would include air handling plant and fans, boilers, CHP, transformers and a standby generator.

Any items of fixed plant associated with the operation of the proposed Development would have the potential to generate noise. However at this stage in the design of the Development, specific details of the plant associated with the scheme are not yet finalised. Consequently, suitable limits to which plant should adhere have been set.

In setting the plant noise emission limit regard has been given to the monitored background noise levels from the baseline noise survey presented in Section 4 and the noise requirements of the LBC detailed in Section 2. The adopted limiting criteria are presented as Table 12.

Table 12: Plant Noise Limits at Nearest Noise Sensitive Premises

Location	Period	Minimum Measured $L_{A90,5min}$	Plant Noise Emission Limit
NSR A – Ray Street	Daytime	51	46
	Night-time	47	42
NSR B – Herbal Hill	Daytime	50	45
	Night-time	46	41
NSR C – St Peters Italian Church	Daytime	50	45
	Night-time	47	42
NSR D – Residential Dwellings on Back Hill	Daytime	50	45
	Night-time	47	42

Notes: [1] If there is determined to be tonal or intermittent content emitting from plant then a 5dB acoustic feature correction shall be applied (i.e. the plant noise limits shall be reduced by 5dB).

Plant specification is sufficiently flexible to ensure that suitably quiet, non-tonal plant can be procured and / or practical, cost-effective mitigation options incorporated into the design to ensure that guideline noise criteria are met.

It is considered that it would be reasonable to expect a planning condition attached to the consent based on the guidance provided in BS 4142:1997 and the requirements of LBC, requiring the plant 'rating level' to be 5dB(A) below the lowest measured background noise level.

6.2 Assessment of Noise from Proposed Commercial Use

The exact nature of the commercial uses within the proposed Development is not yet known because this is dependent on the type of future occupiers secured. Consideration would need to be given at future design stages to ensure that the amenity of the future residents within the Development and surrounding areas are protected.

Noise breakout from the proposed ground floor commercial units is expected to be negligible. The façade insulation provided by the development would be more than adequate to attenuate internally generated noise to below the existing ambient noise levels in the vicinity of the site. Standard controls, which would

be secured through planning conditions relating to the opening hours and use of outside space, would also minimise the potential noise effects on future and existing sensitive receptors.

7. Summary and Conclusions

A noise assessment has been undertaken in order to assess the residential amenity of the proposed Development and determine the potential impacts of the proposed Development on nearby existing and proposed noise sensitive receptors.

Attended and unattended noise surveys were undertaken between the 26th and 28th February 2014 so as to quantify the noise climate at and in the vicinity of the Site.

Based upon measured environmental noise levels affecting the Site, the required sound insulation performance of the building envelope has been determined to ensure internal noise levels meet the criteria set out in BS 8233:2014 within the residential element of the proposed Development. Assessment of internal noise levels within office and retail space is a commercial, rather than a planning requirement and will be considered as the design develops to ensure the commercial requirements of the development are met. Furthermore, the requirements of LBC local noise policy as highlighted in Section 2.3 are applicable to residential and not office or commercial use.

The study has shown that through the incorporation of suitable thermal double glazing the required criteria would be met for all residential dwellings.

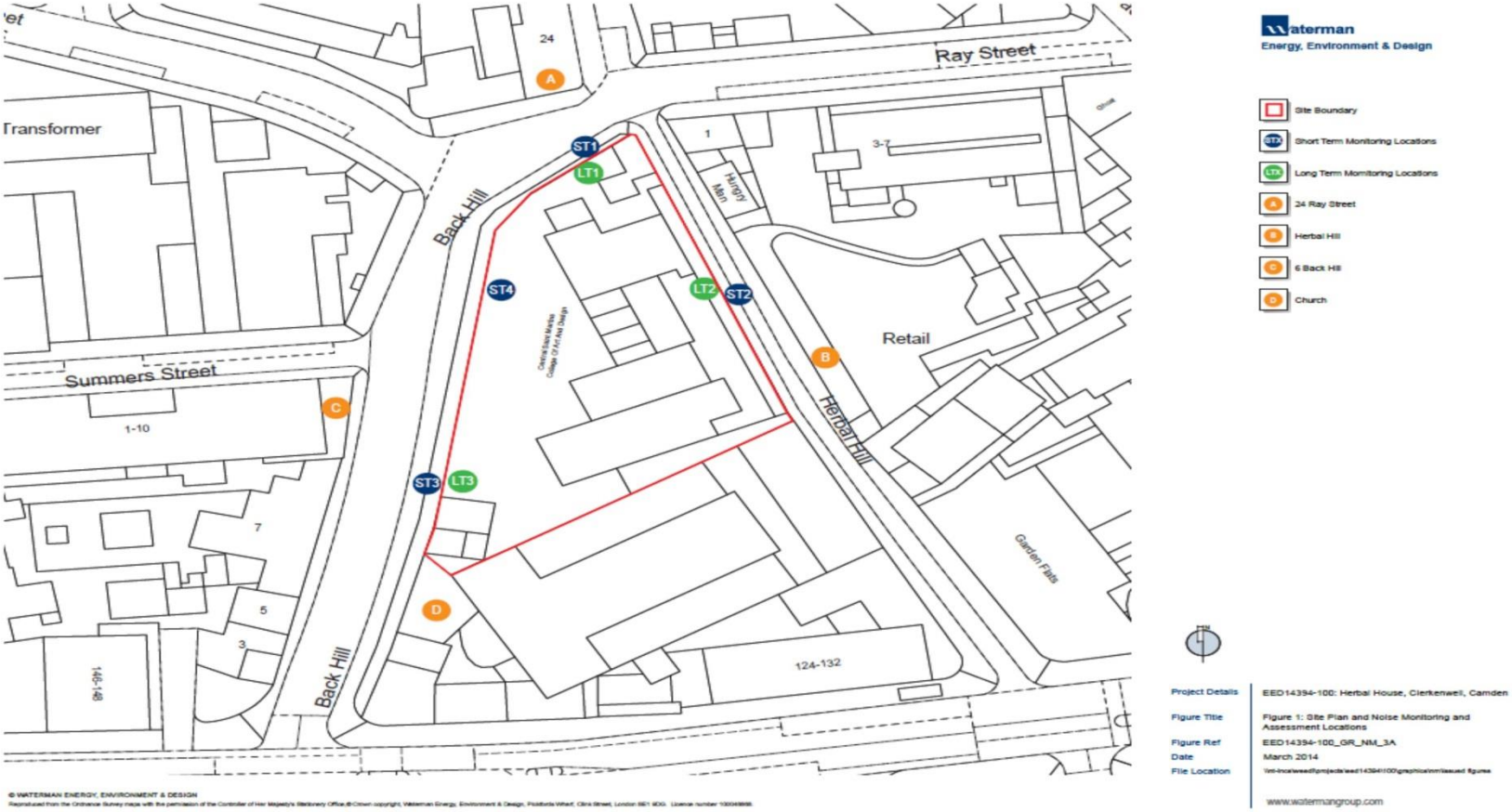
Maximum noise emission criteria have been set for all fixed building services plant having regards to LBC's plant noise policy. Providing that the proposed limiting criteria are met, which could be secured by way of a suitably worded planning condition, the operation of plant associated with the proposed Development would have a negligible impact upon the ambient noise climate.

Noise impacts arising as a result of the proposed future commercial uses were also found to be negligible.

As such, and in light of the above it is considered that the Site is suitable for the proposed use and that a good level of residential amenity could be provided for all future residents of the Development.

FIGURES

Figure 1: Noise Monitoring Locations



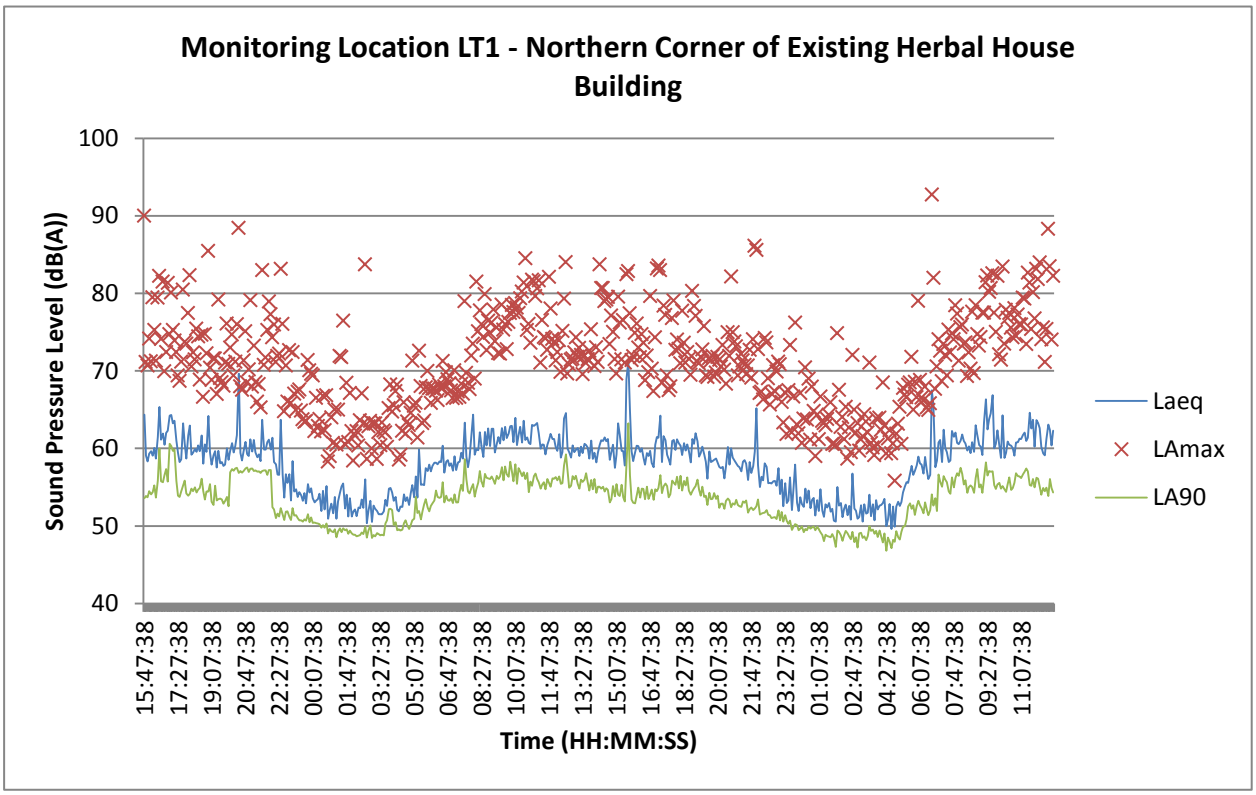
APPENDICES

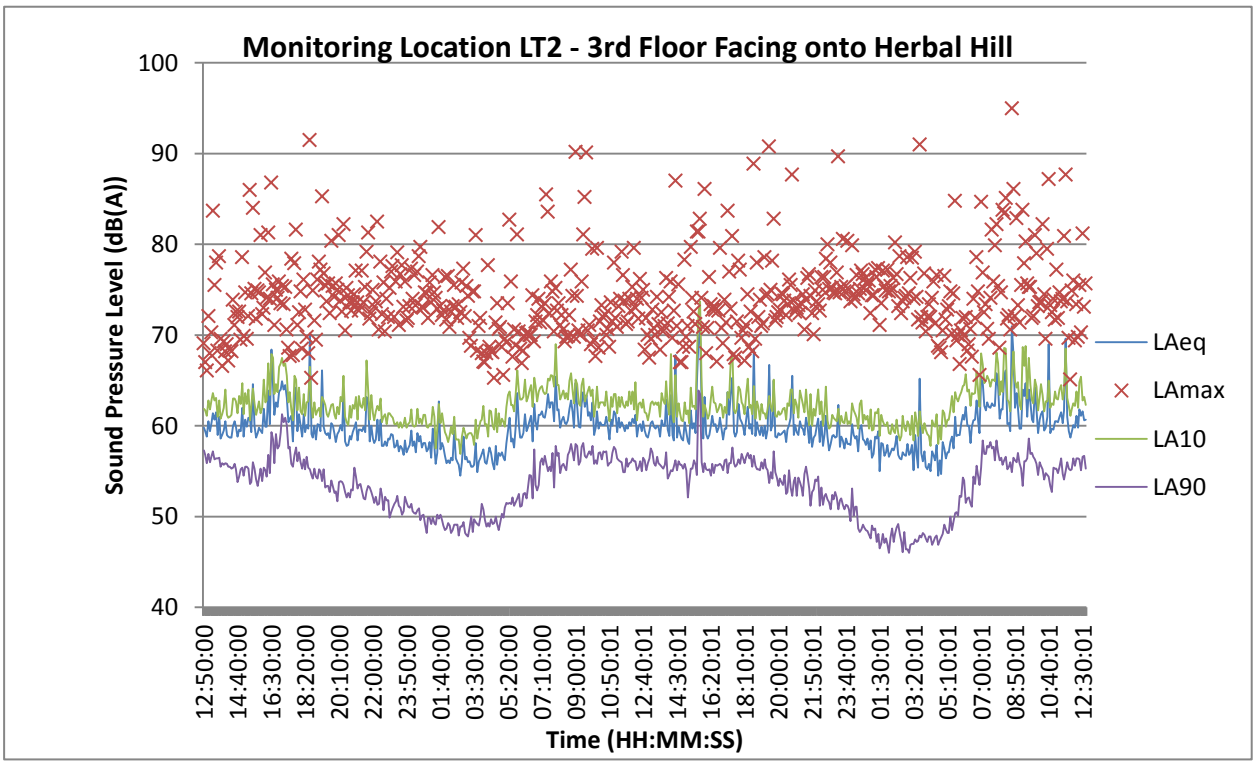
Appendix A Acoustic Terminology

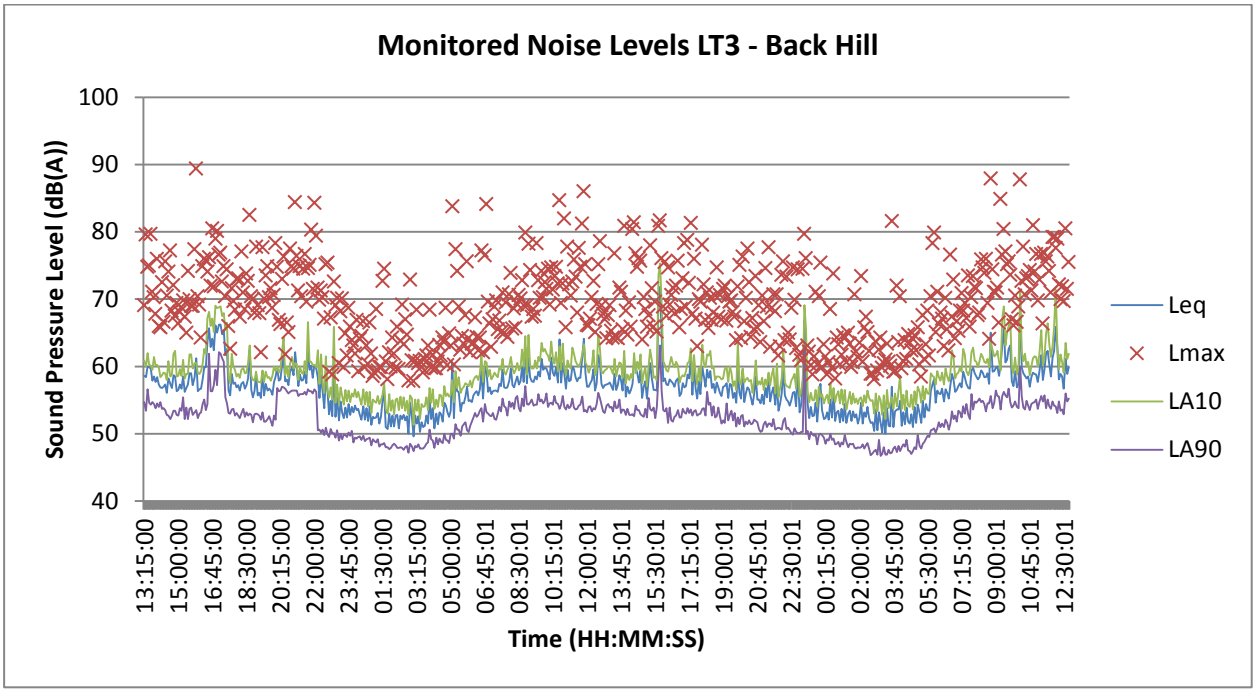
Ambient sound	The totally encompassing sound in a given situation at a given time, usually composed of sound from all sources near and far.
Assessment period	The period in a day over which assessments are made.
A-weighting	A frequency weighting applied to measured or predicted sounds levels in order to compensate for the non-linearity of human hearing.
Background noise	Background noise is the term used to describe the noise measured in the absence of the noise under investigation. It is described as the average of the minimum noise levels measured on a sound level meter and is measured statistically as the A-weighted noise level exceeded for ninety percent of a sample period. This is represented as the L_{90} noise level (see below).
Broadband	Containing the full range of frequencies.
Decibel [dB]	The level of noise is measured objectively using a Sound Level Meter. This instrument has been specifically developed to mimic the operation of the human ear. The human ear responds to minute pressure variations in the air. These pressure variations can be likened to the ripples on the surface of water but of course cannot be seen. The pressure variations in the air cause the eardrum to vibrate and this is heard as sound in the brain. The stronger the pressure variations, the louder the sound that is heard. The range of pressure variations associated with everyday living may span over a range of a million to one. On the top range may be the sound of a jet engine and on the bottom of the range may be the sound of a pin dropping. Instead of expressing pressure in units ranging from a million to one, it is found convenient to condense this range to a scale 0 to 120 and give it the units of decibels. The following are examples of the decibel readings of every day sounds; Four engine jet aircraft at 100m 120 dB Riveting of steel plate at 10m 105 dB Pneumatic drill at 10m 90 dB Circular wood saw at 10m 80 dB Heavy road traffic at 10m 5 dB Telephone bell at 10m 65 dB Male speech, average at 10m 50 dB Whisper at 10m 25 dB Threshold of hearing, 1000 Hz 0 dB
dB(A): **A-weighted decibels**	The ear is not as effective in hearing low frequency sounds as it is hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the 'A' filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is measured using the A filter. The sound pressure level in dB(A) gives a close indication of the subjective loudness of the noise.
Do-Minimum	Describes a scenario under which the road scheme that is under consideration does not proceed.
Façade Noise Level	A noise level measured or predicted at the façade of a building, typically at a distance of 1m, containing a contribution made up of reflections from the façade itself (+3dB).

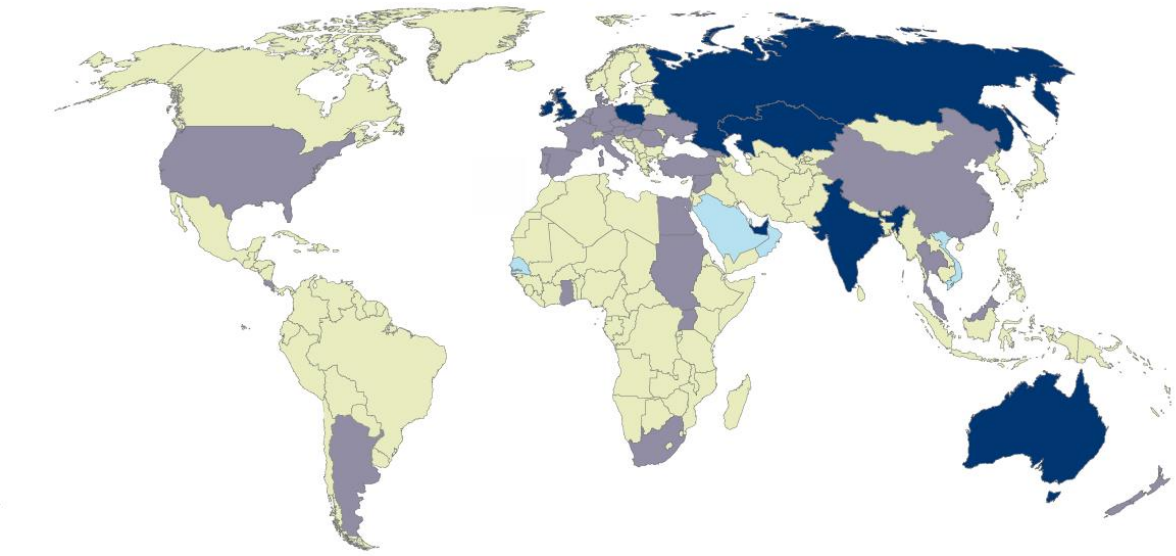
L_{Amax} noise level	This is the maximum noise level recorded over the measurement period.
L_{Amin} noise level	This is the lowest level during the measurement period.
$L_{Aeq,T}$ noise level	This is the 'equivalent continuous A-weighted sound pressure level, in decibels' and is defined in British Standard 7445 as the 'value of the A-weighted sound pressure level of a continuous, steady sound that, within a specified time interval, T, has the same mean square sound pressure as a sound under consideration whose level varies with time'. It is a unit commonly used to describe construction noise, noise from industrial premises and is the most suitable unit for the description of other forms of environmental noise.
L_{A90} noise level	This is the noise level that is exceeded for 90% of the measurement period and gives an indication of the noise level during quieter periods. It is often referred to as the background noise level and is used in the assessment of disturbance from industrial noise.
L_{A10} noise level	This is the noise level which is achieved for 10% of the monitoring period and is often used to describe road traffic noise
R_w	Single number rating used to describe the **laboratory** airborne sound insulation properties of a material or building element over a range of frequencies, typically 100-3150Hz.

Appendix B Noise Monitoring Results


Monitoring Location LT1 - Northern Corner of Existing Herbal House Building
Sound Pressure Level (dB(A))
100
90
80
70
60
50
40
15:47:38
17:27:38
19:07:38
20:47:38
22:27:38
00:07:38
01:47:38
03:27:38
05:07:38
06:47:38
08:27:38
10:07:38
11:47:38
13:27:38
15:07:38
16:47:38
18:27:38
20:07:38
21:47:38
23:27:38
01:07:38
02:47:38
04:27:38
06:07:38
07:47:38
09:27:38
11:07:38
Time (HH:MM:SS)
Laeq
LAmax
LA90


Monitoring Location LT2 - 3rd Floor Facing onto Herbal Hill
Sound Pressure Level (dB(A))
100
90
80
70
60
50
40
12:50:00
14:40:00
16:30:00
18:20:00
20:10:00
22:00:00
23:50:00
01:40:00
03:30:00
05:20:00
07:10:00
09:00:01
10:50:01
12:40:01
14:30:01
16:20:01
18:10:01
20:00:01
21:50:01
23:40:01
01:30:01
03:20:01
05:10:01
07:00:01
08:50:01
10:40:01
12:30:01
Time (HH:MM:SS)
LAeq
LAmax
LA10
LA90


Monitored Noise Levels LT3 - Back Hill
Sound Pressure Level (dB(A))
100
90
80
70
60
50
40
13:15:00
15:00:00
16:45:00
18:30:00
20:15:00
22:00:00
23:45:00
01:30:00
03:15:00
05:00:00
06:45:01
08:30:01
10:15:01
12:00:01
13:45:01
15:30:01
17:15:01
19:00:01
20:45:01
22:30:01
00:15:00
02:00:00
03:45:00
05:30:00
07:15:00
09:00:01
10:45:01
12:30:01
Time (HH:MM:SS)
Leq
Lmax
LA10
LA90



Offices

Australia
India
Ireland
Kazakhstan
Poland
Russia
UAE
UK

Associate companies

Argentina
Austria
Belgium
China
Costa Rica
Czech Republic
Denmark
Egypt
France
Georgia
Germany
Ghana
Hong Kong
Hungary
Italy
Lebanon
Malaysia
Netherlands
New Zealand
Portugal
Romania
Singapore
Slovakia
South Africa
Spain
Sudan
Syria
Thailand
Turkey
Uganda
Ukraine
USA

Project countries

Oman
Qatar
Saudi Arabia
Senegal
Vietnam

i British Standard (BS) 8233 (2014): Sound insulation and noise reduction for buildings - Code of practice, BSI, Great Britain.