

Regents Park Road Hotel

Noise and Vibration Report

Uchaux Limited


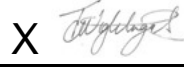

Job No: 1016671
Doc Ref: 1016671-RPT-AS-001
Revision: B
Revision Date: 18 July 2019

Project title	Regents Park Road Hotel	Job Number
Report title	Noise and Vibration Report	1016671

Document Revision History

Revision Ref	Issue Date	Purpose of issue / description of revision
—	04 July 2019	For planning
A	18 July 2019	Updated following comments
B	18 July 2018	Updated following comments

Document Validation (latest issue)

18/07/2019  X _____ Principal author Signed by: Barnard, Jonathan	18/07/2019  X _____ Checked by Signed by: Nightingale, Tom	18/07/2019  X _____ Verified by Signed by: Nightingale, Tom
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1.0 Executive Summary

Noise and vibration surveys have been carried out in relation to the proposed Regents Park Road Hotel development at 155 - 157 Regent's Park Road, London.

This report documents the measured noise and vibration levels at the site which have been used to determine appropriate glazing and ventilation attenuation measures, set limiting noise levels for building services plant and also to determine if vibration mitigation measures would be required due to nearby London Underground services.

1.1 Glazing and ventilation

Recommendations for glazing and ventilation attenuation have been made to see internal noise levels compliant with British Standard 8233: 2014 can be achieved. The following table summarises the glazing attenuation requirements:

Façade	Floors	Measured noise level incident on the façade	Internal ambient noise level criteria Ref. BS 8233	Required glazing attenuation dB $R_w + C_{tr}$	Example construction to achieve minimum sound insulation
North, East & South	0-7	Daytime: 62 dBA $L_{eq,T}$ Night-time: 59 dBA $L_{eq,T}$ Night-time: 81 dBA $L_{Fmax,5min}$	Daytime: 35 dBA $L_{eq,16hr}$ Night-time: 30 dBA $L_{eq,8hr}$ Night-time: 45 dBA $L_{Fmax,5min}$	35	<ul style="list-style-type: none"> 6 mm laminated glass 16 mm cavity 10.8 mm laminated glass
	0-2	Daytime: 58* dBA $L_{eq,T}$ Night-time: 53 dBA $L_{eq,T}$ Night-time: 66 dBA $L_{Fmax,5min}$ * Predicted based on survey data		28	<ul style="list-style-type: none"> 6 mm glass 16 mm cavity 4 mm glass
	3-7	Daytime: 62 dBA $L_{eq,T}$ Night-time: 59 dBA $L_{eq,T}$ Night-time: 72 dBA $L_{Fmax,5min}$		32	<ul style="list-style-type: none"> 10 mm glass 16 mm cavity 6 mm glass

1.2 Noise emission limits

Noise emission limits for building services plant, not to be exceeded at the nearest noise sensitive receptors have been set as shown below. It should be noted that should noise from the new plant and equipment contain tonal characteristics, the noise emission limits should be reduced by 5 dB.

Daytime plant noise emission limit, $L_{Aeq,1hr}$ (dB)	Night time plant noise emission limit, $L_{Aeq,15mins}$ (dB)
34	30

1.3 Vibration assessment

Vibration measurements were taken in the basement of the existing building. The measurements have been compared to both the Local Authority and BS 6472 criteria, as follows:

Measurement position	Daytime - VDV_{16h} ($m.s^{-1.75}$)	Night-time - VDV_{8h} ($ms^{-1.75}$)	LBC criteria ($ms^{-1.75}$)	BS 6472-1 criteria* ($ms^{-1.75}$)
1	0.04	0.03	Residential day: 0.2 to 0.4	Residential day: 0.2 to 0.4

Measurement position	Daytime - VDV _{16h} (m.s ^{-1.75})	Night-time - VDV _{8h} (ms ^{-1.75})	LBC criteria (ms ^{-1.75})	BS 6472-1 criteria* (ms ^{-1.75})
2	0.04	0.03	Residential night: 0.13	Residential night: 0.1 to 0.2
* These criteria correspond to the "low probability of adverse comment" presented in BS 6472-1.				

Calculated VDV (Vibration Dose Values) detailed above are significantly below the London Borough of Camden criteria. It is also noted that the levels are also significantly below the criteria for 'low probability of adverse comment' for residential properties and as such BS 6472-1 suggests that 'adverse comment is not expected'.

Contents

1.0	Executive Summary	1	8.3	Results	18
1.1	Glazing and ventilation	1	8.4	Assessment of vibration impact	18
1.2	Noise emission limits	1	9.0	Conclusion	19
1.3	Vibration assessment	1	Appendix A		20
2.0	Introduction	4			
3.0	Proposed development	5			
3.1	Site location	5			
3.2	Noise-sensitive receptors	5			
4.0	Assessment criteria	6			
4.1	Noise Policy Statement for England	6			
4.2	National Planning Policy Framework	6			
4.3	London Plan	7			
4.4	Local policies	7			
4.5	Relevant standards used with this assessment	8			
5.0	Environmental noise survey	10			
5.1	Measurement times and locations	10			
5.2	Existing noise climate	11			
5.3	Survey equipment	11			
5.4	Weather conditions	11			
5.5	Survey results	11			
6.0	Plant noise emission limits	13			
7.0	Noise impact on the site	14			
7.1	Criteria	14			
7.2	Calculation method	14			
7.3	Glazing and ventilation specification	14			
7.4	General glazing notes	16			
7.5	General ventilation notes	16			
8.0	Vibration survey	17			
8.1	Measurement procedure	17			
8.2	Measurement equipment	17			

2.0 Introduction

Cundall has been instructed by Uchaux Limited to undertake a noise and vibration assessment for the proposed development at 155 - 157 Regent's Park Road, London.

The purpose of this report is as follows:

- Identify relevant Local Authority planning criteria;
- Document existing background noise levels at the site;
- Suggest noise emission limits for noise from new building services plant and equipment associated with the proposed development;
- Assess the noise levels incident on the site;
- Carry out an acoustic assessment of the external building fabric requirements;
- Document vibration dose levels (VDV) at the site;
- Determine whether specific vibration mitigation measures are likely to be required; and
- Advise on appropriate methods of vibration mitigation if necessary.

3.0 Proposed development

Proposals are for the redevelopment of the existing site to provide a ground plus 7-storey building comprising a retail unit at ground, a hotel and single residential unit with associated works.

3.1 Site location

The site is located at 155 - 157 Regents Park Road, London, NW1 8BB, in the London Borough of Camden (LBC).

It is bounded to the north by Adelaide Road, to the east by Haverstock Hill (A502), to the south by Regent's Park Road and to the west by existing residential properties. The site comprises a mix of uses including retail at ground floor with office accommodation at first and third floors above and a single residential unit on the top floor.

The land use in the area is mixed, with a range of commercial properties on Haverstock Hill, as well as Chalk Farm underground station opposite the site over Adelaide Road.

3.2 Noise-sensitive receptors

The nearest residential properties are directly adjacent to the development site to the west on Adelaide Road and Regent's Park Road. These are located within the red line boundary of the site, but are to be retained, as indicated in Figure 1.



Figure 1 - Site plan

4.0 Assessment criteria

This section of the report outlines the key legislation and guidance relevant to the assessment of noise and vibration for a development of this type. The assessment methodology adopted has been based on relevant British Standards and the requirements of the London Borough of Camden (LBC).

4.1 Noise Policy Statement for England

The Noise Policy Statement for England (NPSE) was published by Defra in March 2010. This NPSE sets out the long-term vision of Government noise policy:

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

The NPSE long term vision is supported by the following aims:

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

- Avoid significant adverse impacts on health and quality of life;
- Mitigate and minimise adverse impacts on health and quality of life; and
- Where possible, contribute to the improvement of health and quality of life.”

4.2 National Planning Policy Framework

The National Planning Policy Framework was updated in February 2019 and sets out the Government’s planning policies for England and how these are expected to be applied.

The NPPF states:

- “130. *Permission should be refused for development of poor design that fails to take the opportunities available for improving the character and quality of an area and the way it functions, taking into account any local design standards or style guides in plans or supplementary planning documents. Conversely, where the design of a development accords with clear expectations in plan policies, design should not be used by the decision-maker as a valid reason to object to development. Local planning authorities should also seek to ensure that the quality of approved development is not materially diminished between permission and completion, as a result of changes being made to the permitted scheme (for example through changes to approved details such as the materials used).*
170. *Planning policies and decisions should contribute to and enhance the natural and local environment by: [...]*
- e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans;*
180. *Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:*
- a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
- b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; [...]*

182. *Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed."*

4.3 London Plan

Policy 7.15 of the London Plan states the following regarding planning decisions:

"Development proposals should seek to manage noise by:

- Avoiding significant adverse noise impacts on health and quality of life as a result of new development;
- Mitigating and minimising the existing and potential adverse impacts of noise on, from, within as a result of or in the vicinity of new development without placing unreasonable restrictions on development or adding unduly to the costs and administrative burdens on existing businesses;
- Improving and enhancing the acoustic environment and promoting appropriate soundscapes (including Quiet Areas and spaces of relative tranquillity);
- Separating new noise sensitive development from major noise sources, (such as road, rail, air transport and some types of industrial development) through the use of distance, screening or internal layout – in reference to sole reliance on sound insulation;
- Where it is not possible to achieve separation of noise sensitive development objectives, then any potential adverse effects should be controlled and mitigated through the application of good acoustic design principles;
- Having particular regard to the impact of aviation noise on noise sensitive development
- Promoting new technologies and improved practices to reduce noise at source, and on the transmission path from source to receiver."

4.4 Local policies

The site falls within the London Borough of Camden (LBC). Policy A4 of the Camden Local Plan, adopted June 2017 gives details of the local authority planning policy where "uses sensitive to noise are proposed close to an existing source of noise or when development that is likely to generate noise is proposed". It states that: "Development should have regard to Camden's Noise and Vibration Thresholds (Appendix 3)."

4.4.1 Noise thresholds

Camden's policy evaluates noise in terms of various 'effect levels' described in the Planning Practice Guidance:

- NOEL – No Observed Effect Level;
- LOAEL – Lowest Observed Adverse Effect Level;
- SOAEL – Significant Observed Adverse Effect Level.

LBC set out three basic design criteria for proposed developments:

- "Green – where noise is considered to be at an acceptable level [LOAEL];
- Amber – where noise is observed to have an adverse effect level, but which may be considered acceptable when assessed in the context of other merits of the development [LOAEL to SOAEL];
- Red – where noise is observed to have a significant adverse effect." [SOAEL]

Appendix 3 of the Camden Local Plan Adoption details the noise thresholds set out by the LBC. The following is stated with regards to industrial and commercial noise sources:

“A relevant standard or guidance document should be referenced when determining values for LOAEL and SOAEL for non-anonymous noise. Where appropriate and within the scope of the document it is expected that British Standard 4142:2014 ‘Methods for rating and assessing industrial and commercial sound’ (BS 4142) will be used. For such cases a ‘Rating Level’ of 10 dB below background (15 dB if tonal components are present) should be considered as the design criterion.”

It should be noted that at this point the ‘rating level’ ($L_{Ar,Tr}$) as defined in BS 4142: 2014 already includes adjustments for acoustic features, including tonality.

Therefore, using the ‘rating level’ to set criteria 15 dB below the background level for tonal plant noise is considered overly stringent, as the penalty for tonality will be effectively doubled.

It is therefore suggested that the assessment is based on the ‘specific sound level’ (daytime: $L_{Aeq,1h}$ dB, night-time: $L_{Aeq,15min}$ as specified by BS 4142: 2014) which is in line with London Borough of Camden’s requirements. Where the specific sound level does not contain tonal components, it is assumed that 10 dB below background is acceptable.

Where noise from plant and equipment contains tonal elements, a design target of 15 dB below background will be assumed. For the purposes of this assessment, the specific sound level is equivalent to the plant noise emission level given in terms of $L_{Aeq,T}$.

In addition to the above, London Borough of Camden has stated that assessments should be based on the lowest measured background noise level, $L_{A90,15min}^1$.

4.4.2 Vibration thresholds

Table A of Appendix 3 of Camden’s Local Plan sets out vibration levels from sources such as railways and roads above which planning permission will not normally be granted. These levels, given in terms of vibration dose values (VDV), are reproduced for reference in the following table:

Vibration description and location of measurement	Period	Time	Vibration level (Vibration Dose Value)
Vibration inside dwellings	Daytime and evening	07:00 to 23:00 hours	0.2 to 0.4 VDV $ms^{-1.75}$
Vibration inside dwellings	Night-time	23:00 to 07:00 hours	0.13 VDV $ms^{-1.75}$
Vibration inside offices	Daytime, evening and night-time	00:00 to 24:00 hours	0.4 VDV $ms^{-1.75}$

Table 1 - LBC’s vibration dose value thresholds

4.5 Relevant standards used with this assessment

Relevant standards that are referenced within this report are summarised below:

4.5.1 BS 8233: 2014 ‘Guidance on sound insulation and noise reduction for buildings’

Table 4 of British Standard 8233: 2014 provides guidance on internal ambient noise levels in residential spaces. This table is reproduced below:

¹ Email correspondence between Jon Barnard of Cundall and Nick Priddle of London Borough of Camden dated 13/12/2018.

Location	Daytime (07:00 to 23:00 hours)	Night-time (23:00 to 07:00 hours)
Living room	≤ 35 dBA $L_{eq,16hour}$	N/A
Dining room	≤ 40 dBA $L_{eq,16hour}$	N/A
Bedroom	≤ 35 dBA $L_{eq,16hour}$	≤ 30 dBA $L_{eq, 8hour}$

Table 2 - BS 8233: 2014 'indoor ambient noise levels for dwellings'

The above design criteria are based on standard residential dwellings and should be suitable for the purposes of planning. It should be noted however, that at the time of writing, there are no specific Employer’s Requirements for the hotel. Many hotel providers require more onerous requirements than BS 8233: 2014 and, as such, the requirements for glazing and ventilation may increase.

The 2014 version of BS 8233 does not include any specific requirement for maximum instantaneous noise levels within dwellings. However, BS 8233: 1999 (superseded) stated that “For a reasonable standard in bedrooms at night, individual noise events (measured with F time-weighting) should not normally exceed 45 dB L_{AFMax} .”

4.5.2 BS 4142: 2014 ‘Methods for rating and assessing industrial and commercial sound’

BS 4142 provides a methodology for assessing the impacts arising at sensitive receptors due to noise from industrial and commercial activities. A formal BS 4142 impact assessment has not been carried out in this report; however, the principles of the standard have been used to inform the method used.

4.5.3 BS 6472-1: 1992 ‘Evaluation of human exposure to vibration in buildings’

BS 6472-1: 1992 provides general guidance on the evaluation of human exposure to vibration in buildings in the frequency range 1 Hz to 80 Hz. Whilst this British standard is not specifically referred to in LBC’s noise and vibration policy, the thresholds set by the LBC are the same as the vibration dose values (VDV) stated in BS 6472: 1992 for residential buildings which have a “low probability of adverse comment”. Vibration measurements have been determined in light of the methodology given in BS 6472:1 992.

5.0 Environmental noise survey

This section of the report gives details of the environmental noise survey undertaken at the site.

5.1 Measurement times and locations

The survey consisted of both attended and unattended measurements completed between 19 July 2018 and 4 October 2018. Measurement positions are shown in Figure 2 below.

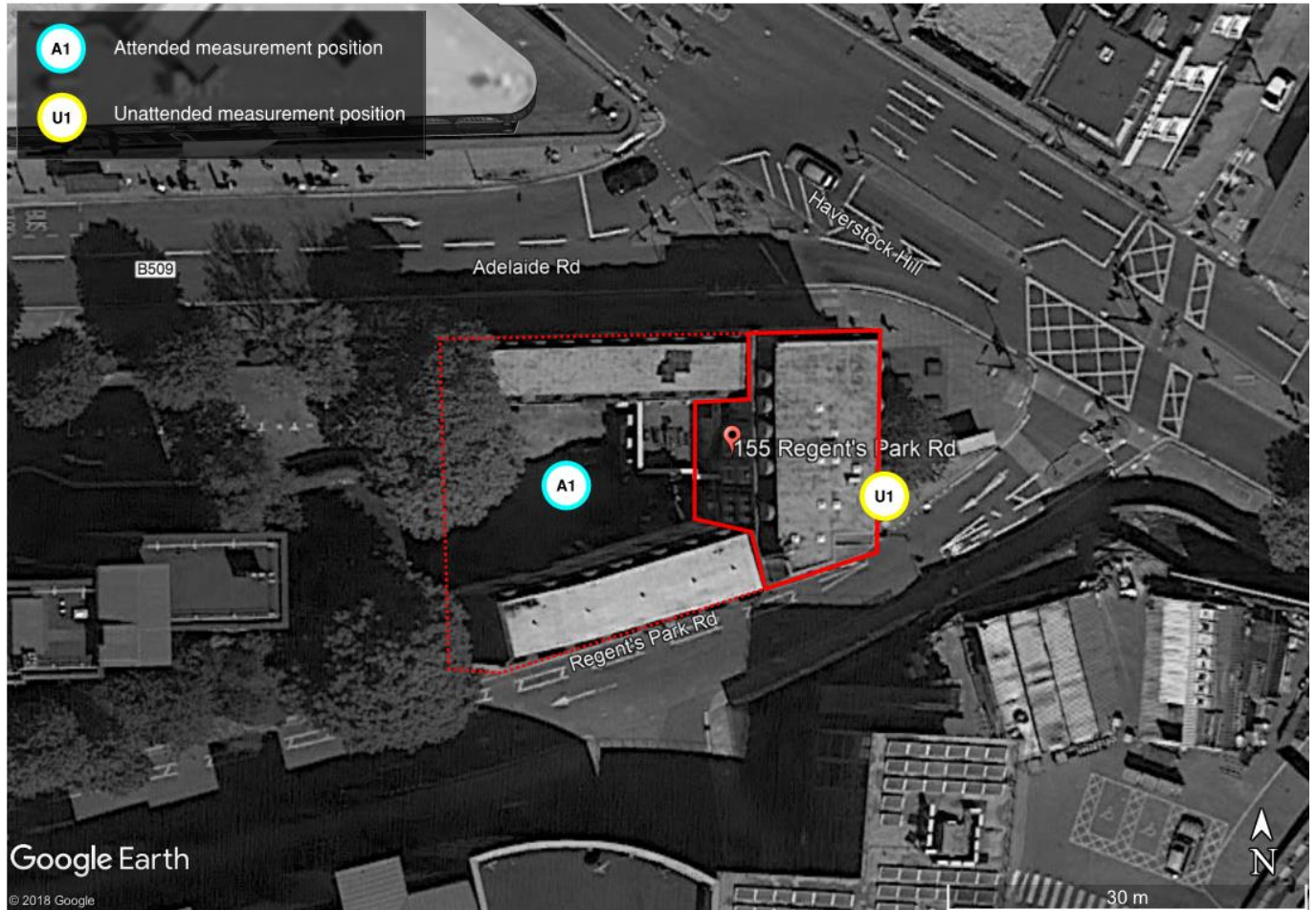


Figure 2 - Noise measurement locations

The following paragraphs summarise the monitoring conditions and acoustic climate at each of the measurement positions:

- **Position U1:** Unattended logging from the first-floor window of 155 Regent's Park Road. The sound level meter was placed on a pole approximately 1.5 m from the façade. This measurement position is considered representative of the noise climate at the most exposed eastern façade of the proposed development;
- **Position A1:** Attended logging in the rear courtyard of the development. The sound level meter was placed on a tripod, approximately 1.5 m from the ground. The noise environment in this position was dominated by road traffic on the surrounding roads, although with the existing buildings providing shielding. This measurement position is considered representative of the noise climate on the western elevation of the proposed development and at the nearest noise sensitive receptors (NSR) to the development, referred to in Section 3.2.

5.2 Existing noise climate

The dominant noise sources affecting the site and the surrounding area are road traffic on Haverstock Hill, Adelaide Road and other surrounding roads and existing plant at existing commercial units at the site.

5.3 Survey equipment

Table 3 provides relevant details of the equipment used for the background noise survey. The sound level meter used conforms to BS EN 60650 Type 1 accuracy and was field-calibrated before and after use, with no significant drift noticed.

Equipment	Manufacturer & model	Serial number
Sound level meter	Norsonic type 140	1405754
Calibrator	Casella CEL type 120/1	2652023

Table 3 – Noise survey equipment

Copies of external calibration certificates are available upon request.

Measurements were made of various noise descriptors, but the key indices in this assessment are as follows:

- dBA $L_{eq,T}$ – the average A-weighted noise level exposure over a given time period, T;
- dBA $L_{90,T}$ – the noise level exceeded for 90% of the measurement period T, referred to as the ‘background’ noise level.

5.4 Weather conditions

Weather conditions throughout the attended and unattended measurements were dry with low wind speeds (below 5 m/s) and deemed conducive for noise monitoring. Following review and analysis of the data, no periods have been edited / removed to account for adverse weather conditions.

5.5 Survey results

The following table provides a summary of noise levels measured during the survey.

Date (2018)	Measurement position	Period	Measurement time	Measurement duration	Ambient noise level dBA $L_{eq,T}$	Lowest background noise level dBA $L_{90,15min}$
Thu 19 July	U1	Daytime	12:00 – 23:00	11 hours	63	52
		Night-time	23:00 – 07:00	8 hours	61	40
Fri 20 July		Daytime	07:00 - 23:00	16 hours	64	51
		Night-time	23:00 – 07:00	8 hours	59	41
Sat 21 July		Daytime	07:00 – 23:00	16 hours	63	48
		Night-time	23:00 – 07:00	8 hours	60	40
Sun 22 July		Daytime	07:00 - 23:00	16 hours	61	44
		Night-time	23:00 – 07:00	8 hours	59	40
Mon 23 July		Daytime	07:00 – 12:00	5 hours	61	50
Fri 5 October		A1	Night-time	01:30 – 04:30	3 hours	53

Table 4 - Measured ambient and background noise level results

Date (2018)	Measurement position	Period	Measurement time (T)	*Representative maximum noise levels dBA L _{Max,5mins} (fast)
Thu 19 July	U1	Night-time	8 hours	79
Fri 20 July			8 hours	80
Sat 21 July			8 hours	81
Sun 22 July			8 hours	80
Fri 5 October	A1		3 hours	70

*L_{AF,Max,5mins} Values used for this assessment are those that occurred between 10-15 times per night. A lower threshold of 5 occurrences has been used for position A1 due to the shorter length of the measurement.

Table 5 - Measured maximum noise levels

A detailed measurement time history graph is included in Appendix A to this report.

6.0 Plant noise emission limits

The proposed development includes noise-generating building services plant which have the potential to have an impact upon existing noise sensitive receptors in the locality of the site.

In accordance with LBC’s noise policy, it is required that building services noise, which fall into the category of industrial and commercial noise sources, “be designed not to exceed a ‘Rating Level’ of 10 dB below background (15 dB if tonal components are present) should be considered as the design criterion.”

To satisfy the planning requirements of the London Borough of Camden, the level of noise produced by any new items of plant must not exceed the plant noise level limits set out in Table 6.

Period	Measured noise level	Noise emission limit
Daytime	44 dBA $L_{A90,T}$	34 dBA $L_{Aeq,T}$
Night-time	40 dBA $L_{A90,T}$	30 dBA $L_{Aeq,T}$

Table 6 - Proposed plant noise emission limit levels

The limits should be applied to the cumulative noise level from plant when operating at maximum normal design duty (dBA $L_{eq,T}$). The limits are free field noise levels at one metre from the nearest sensitive façade / window.

Notwithstanding the above, rating levels of 35 dB and background noise levels below 30 dB are considered very low (ref. BS 4142: 1997). Therefore, we would not normally recommend plant noise emission limits below 30 dB $L_{Aeq,T}$ (as would be required if noise from plant / equipment is tonal). This will need to be confirmed with LBC.

It is important to note that by meeting the LBC requirements this is effectively the ‘lowest observed adverse effect level’. Therefore, based on the Camden noise policy (Section 4.4 of this report) these limits could still be exceeded and (assuming the ‘significant observed adverse effect level was not exceeded) the development:

‘may be considered acceptable when assessed in the context of other merits of the development’.

7.0 Noise impact on the site

Calculations have been undertaken to determine a suitable façade sound insulation strategy for the development.

The following section summarises the recommendations made for the control of noise break-in from environmental noise on the proposed development from existing sources.

7.1 Criteria

Based on the results of the survey, predicted levels of noise incident on various parts of the building façade have been established. This information has been used to identify the required acoustic performance of façade elements to meet the internal ambient noise criteria of BS 8233, detailed in Section 4.5.1.

It should be noted that these recommendations are based on generic British Standard criteria for dwellings. Following consultation with the hotel operators, the internal ambient noise level criteria may become more stringent and attenuation values may need to increase accordingly.

7.2 Calculation method

The calculation procedure used in this assessment follows the more rigorous calculation method outlined in BS 8233: 2014.

Sound insulation performance requirements for the external building façade have been predicted based on the following assumptions:

- Internal noise levels to meet BS 8233;
- Sound insulation performance in terms of $R_w + C_{tr}$ has been used;
- Detailed internal layouts have not been confirmed by the scheme. Therefore, the internal noise level calculations have been based on 'typical' room layouts in the current plans.

7.3 Glazing and ventilation specification

It is understood that the Hotel is to be mechanically ventilated with cooling and will therefore not require façade openings (e.g. open windows or trickle vents etc.) for the purposes of ventilation (to meet Part F of the Building Regulations) or for the relief from overheating. Ducted supply and extract into a MVHR unit for example provides a high level of sound attenuation.

Calculations for the glazing attenuation have therefore been based on the average noise levels and also the maximum noise levels measured.

The following table summarises the results of these calculations and also identifies glazing and ventilation configurations that should be capable of providing the required sound insulation:

Façade	Floors	Measured noise level incident on the façade	Internal ambient noise level criteria Ref. BS 8233	Required glazing attenuation dB $R_w + C_{tr}$	Example construction to achieve minimum sound insulation
North, East & South (Red)	0-7	Daytime: 62 dBA $L_{eq,T}$ Night-time: 59 dBA $L_{eq,T}$ Night-time: 81 dBA $L_{Fmax,5min}$	Daytime: 35 dBA $L_{eq,16hr}$ Night-time: 30 dBA $L_{eq,8hr}$ Night-time: 45 dBA $L_{Fmax,5min}$	35	<ul style="list-style-type: none"> 6 mm laminated glass 16 mm cavity 10.8 mm laminated glass
West (Green)	0-2	Daytime: 58* dBA $L_{eq,T}$ Night-time: 53 dBA $L_{eq,T}$ Night-time: 66 dBA $L_{Fmax,5min}$		28	<ul style="list-style-type: none"> 6 mm glass 16 mm cavity 4 mm glass
	3-7	Daytime: 62 dBA $L_{eq,T}$ Night-time: 59 dBA $L_{eq,T}$ Night-time: 72 dBA $L_{Fmax,5min}$		32	<ul style="list-style-type: none"> 10 mm glass 16 mm cavity 6 mm glass

*Daytime levels used to identify glazing specification on floors 0-2 of west façade have been predicted based on the difference in the night-time attended measurement in positions A1 and U1. A correction of + 4dB has been applied the A1 night-time levels to estimate daytime levels in the courtyard area during the day.
 **Glazing specifications in floors 3-7 on the west façade are based on measured levels in position U1, due to the higher exposure to road traffic noise at these elevations.

Table 7 - Glazing attenuation requirements

Recommendations given for glazing attenuation include both windows and doors.

The figure Figure 3 - Location of acoustic conditions below indicates the facades where the acoustic conditions referred to in Table 7.

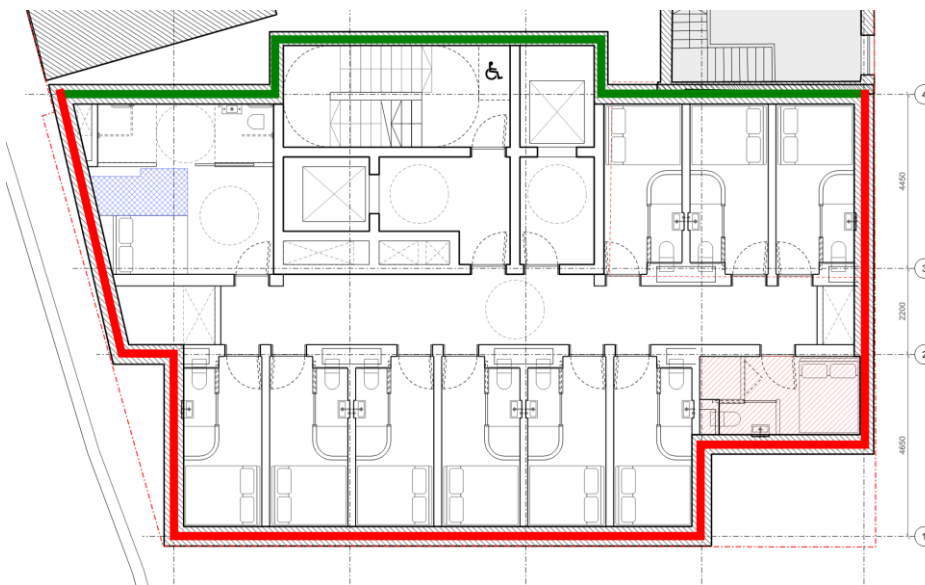


Figure 3 - Location of acoustic conditions

It should be noted that the calculations undertaken demonstrate that internal ambient noise levels in line with BS 8233 criteria can be achieved using glazing systems detailed in Table 7, however, the manufacturer should provide evidence that the attenuation requirements can be achieved using the proposed constructions.

As the design progresses, alternative glazing and ventilation configurations may be proposed. These should be verified by the acoustic consultant to see that the internal ambient noise level criteria would still be achieved.

7.4 General glazing notes

BS 12354-3: 2000 states that for glazing having an R_w performance of less than 37 dB, the sound attenuation through the frame can be ignored.

All windows should be well sealed when closed. No gaps should be visible around the frame from the exterior.

All glazing should meet with minimum requirements under Part L of Building Regulations.

7.5 General ventilation notes

Whilst it is understood that ventilation requirements of Part F will be achieved through mechanical ventilation means, and cooling is to be provided, effectively negating the requirement for opening windows, it is recommended that the façade is not sealed, as occupants often like to have control over their environment and a connection to the outside via opening windows is often preferred.

8.0 Vibration survey

Due to the close proximity of the London Underground Northern Line, vibration measurements were taken in the existing basement of the 155 Regent’s Park Road building.

The survey was carried out to determine the specific vibration levels associated with the Northern Line which runs beneath the property and is served by the Chalk Farm underground station opposite the site on Adelaide Road. These specific event levels have been time averaged to determine the 16-hour daytime and evening, and 8-hour night-time vibration levels. The calculations have assumed a worst-case scenario of Northern Line trains running every 3 minutes during both daytime and night-time periods. These measurements have been used to calculate vibration does values (VDV).

8.1 Measurement procedure

Vibration measurement of tube train pass-by events were undertaken at two locations on the ceramic floor of the existing lower ground level.

Measurements were a minimum of 20 minutes, allowing for a number of tube train pass-by events to be observed at each location.

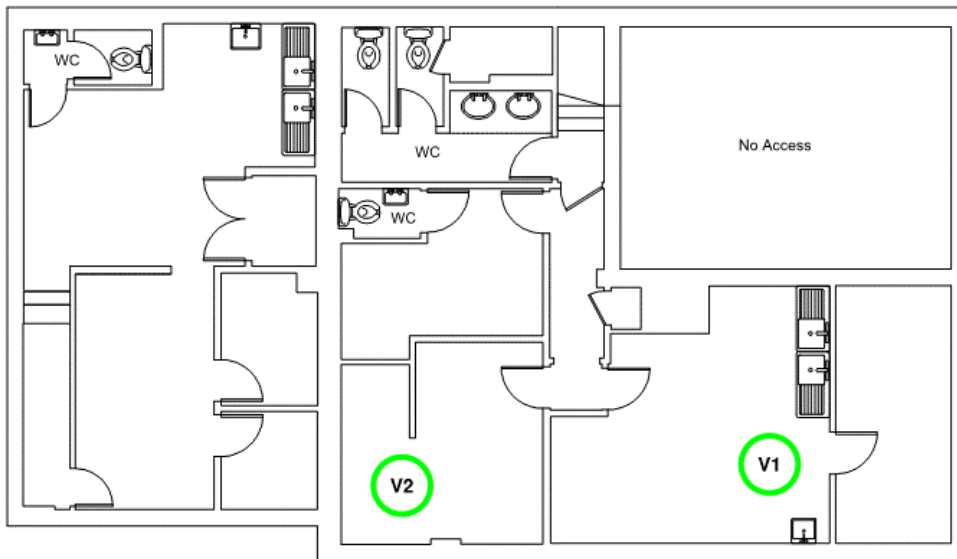


Figure 4 - Vibration measurement locations in the basement of the existing building

8.2 Measurement equipment

Table 8 provides relevant details of the equipment used for the noise and vibration survey. The sound level meter used confirms to BS EN 60650 type 1 accuracy and was field-calibrated before and after use

Equipment	Manufacturer & model	Serial number
Sound level meter	01dB Fusion	11403
Calibrator	01dB Cal31	35054817
Accelerometer	Acoem CAC1005000	10668
DIN Plate	Acoem	-

Table 8 - Vibration survey equipment

8.3 Results

The following table summarises the 16-hour daytime and 8-hour night-time VDV_d calculated from the VDV measurements taken on site.

It is important to note that both the 16-hour daytime and 8-hour night-time VDV_d have been calculated based on daytime measurements that include daytime train pass-by frequency. During the night-time period rail movements on the Northern Line will be reduced and therefore this assessment can be viewed as a worst-case scenario.

Measurement position	Daytime (16 hour) VDV _{d,day} (ms ^{-1.75})	Night-time (8 hour) VDV _{d,night} (ms ^{-1.75})	LBC criteria (ms ^{-1.75})	BS 6472-1 criteria* (ms ^{-1.75})
1	0.04	0.03	Residential day: 0.2 to 0.4	Residential day: 0.2 to 0.4
2	0.04	0.03	Residential night: 0.13	Residential night: 0.1 to 0.2
* These criteria correspond to the "low probability of adverse comment" presented in BS 6472-1.				

Table 9 - Calculated vibration dose values

8.4 Assessment of vibration impact

The calculated VDV summarised in Table 9 are significantly below LBC criteria and therefore it is considered that no additional measures are required. It is also noted that the determined VDV values are significantly below the value for 'low probability of adverse comment' for residential properties given in BS 6472-1. This suggests that 'adverse comment is not expected'.

9.0 Conclusion

A vibration and baseline noise survey and assessment has been undertaken as part of the planning application for the proposed development at 155 - 157 Regents Park Road, London, NW1 8BB.

Existing background noise levels and noise levels incident upon the site of the proposed development have been measured at representative locations and analysed.

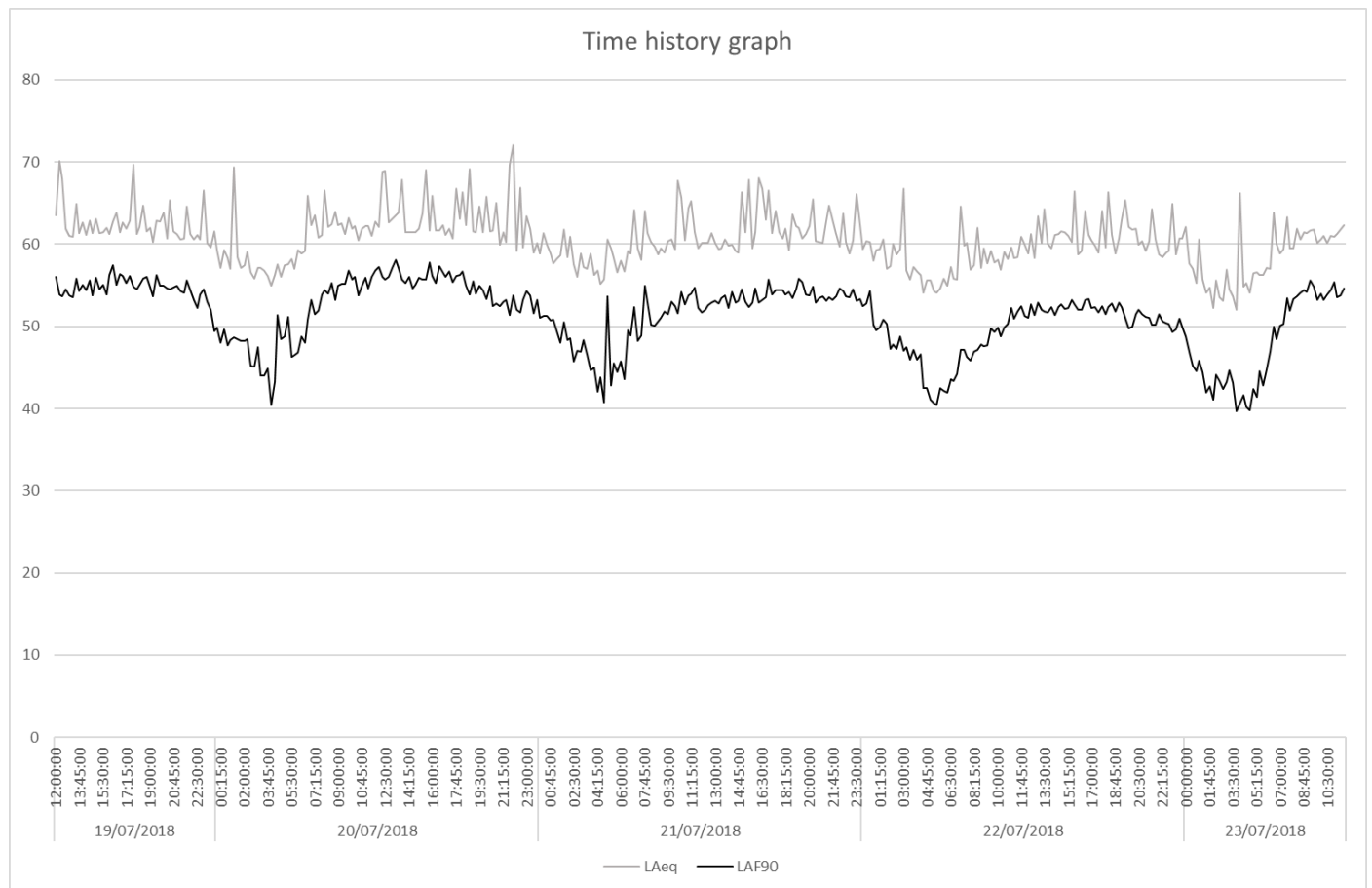
Based on the results of the noise survey and the requirements of London Borough of Camden as well as relevant guidance, noise emission limits have been identified for proposed new items of plant and equipment. If these noise limits are complied with, it is considered unlikely that adverse noise effects will occur as a result of the proposed development and are likely to fall within Camden's LOEL (Lowest Observable Effect Level) threshold.

Indicative façade / glazing performance guidance has been provided for the development based on internal ambient noise level guidelines from BS 8233: 2014.

Measured VDVs at the site are significantly below LBC criteria. Based on the assessment results and in light of BS 6472-1 criteria, 'adverse comment is not expected'.

Therefore, in terms of noise and vibration, it is considered that the site is suitable for residential / hotel development assuming appropriate mitigation measures are implemented.

Appendix A



Appendix A: Detailed measurement time history graph

