NOISE ASSESSMENT

AECOM

247 TOTTENHAM COURT ROAD

JULY 2020

247 Tottenham Court Road

Noise Assessment

Prudential UK Real Estate Nominee 1 Limited and
Prudential UK Real Estate Nominee 2 Limited.

Project number: TBC

29 July 2020

Quality information

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Revision History

Revision	Revision date	Details	Authorized	Name	Position
V3	29/07/20	Final	YL	Yuyou Liu	Regional Director - Acoustics

Distribution List

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Table of Contents

Figures

Tables

1. Introduction

This Noise Assessment has been prepared on behalf of Prudential UK Real Estate Nominee 1 Limited and Prudential UK Real Estate Nominee 2 Limited in support of an application at 247 Tottenham Court Road for full planning permission for:-

“Demolition of 247 Tottenham Court Road, 3 Bayley Street, 1 Morwell Street, 2-3 Morwell Street and 4 Morwell Street and the erection of a mixed use office led development comprising ground plus five storey building for office (Class B1) use, flexible uses at ground and basement (Class A1/A2/A3/B1/D1/D2), residential (Class C3) use, basement excavation, provision of roof terraces, roof level plant equipment and enclosures, cycle parking, public realm and other associated works.”

The purpose of this noise assessment is to determine the noise climate in the vicinity of the site. From these determined levels outline recommendations for glazing and ventilation requirements can be given to meet internal ambient noise criteria and confirm the site suitability for the intended use. Maximum operational noise limits from fixed plant and building services at nearby noise sensitive receptors has also been identified. These noise limits are identified as to ensure that plant from the development doesn’t increase background noise levels at nearby sensitive receptors causing a breach of relevant noise criteria.

Due to constraints given the on-going coronavirus outbreak, it was not feasible to undertake a representative baseline noise survey to inform this assessment. It was not possible to measure representative baseline sound levels because typical road, air and rail transport usage has been reduced by travel restrictions and social distancing measures. As such a desktop study has been undertaken to determine the noise environment across the site.

AECOM has used a number of previous planning application noise surveys, with approval from the London Borough of Camden (LBC), to determine the noise climate in the vicinity of the site. The following statement was given by LBC “I’ve also discussed your query regarding the noise impact assessment with our EHO who has confirmed they can use a comparable report carried out before Covid-19 as long as it is stated within their submission**.”** This survey information was also used to determine noise levels at nearby noise sensitive receptors. DEFRA noise mapping has also been used to predict the daytime $L_{Aeq,16h}$ and night-time $L_{Aeq,8h}$ noise level indicators at the facades of the site facing Tottenham Court Road, Morwell Street and Bayley Street. This information is used to provide outline recommendations for glazing and ventilation requirements in order to achieve internal ambient noise criteria and confirms the site suitability for the intended use.

Using the information above it can be considered that this assessment provides a reasonable worst-case scenario of external noise in the vicinity of the site.

This report presents the criteria to which the noise limits are established, the prediction of noise levels in the vicinity of the site and nearby noise sensitive receptors, a comparison of external noise and internal noise levels set out in the noise criteria and finally the glazing and ventilation recommendations from the results of the assessment.

A glossary of acoustic terminology can be found in Appendix A.

2. Application Site Description

The application site is located at 247 Tottenham Court Road in the London Borough of Camden. The application includes redevelopment of 247 Tottenham Court Road, 3 Bayley Street, 1 Morwell street, 2-3 Morwell Street and 4 Morwell Steet into a new mixed use office led development with the addition of roof level plant.

Figure 2-1 presents the site location within red line boundary (created by Stiff + Trevillion Architects Ltd. Document number ST-PR-01-003).

Stiff + Trevillion

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247 Tottenham Court Road

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Site Plan

INFORMATION

APR 2020 — 1:1250@A4

4486 ST-PR-01-003 -

NOTE: THIS APPROX SITE BOUNDARY WAS SCALED FROM A PDF DOCUMENT AND THEREFORE SHOULD NOT BE USED FOR MEASURING PURPOSES

3. Noise Guidance and Assessment Criteria

The noise assessment has been carried out in accordance with the following policy and guidance:

- National Planning Policy Framework (2019);
- Noise Policy Statement for England (2010);
- Planning Practice Guidance Noise (2019);
- Camden Local Plan (2017);
- BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings (2014); and
- Professional Practice Guidance: Planning & Noise (2017).

Detailed information on the reference planning policy context and noise guidance is provided in Appendix B.

3.1 Indoor Ambient Noise (external noise sources)

A summary of noise criteria in relation to suitable internal ambient noise of residential dwellings and outdoor amenity areas within the proposed development is given within the Camden Local Plan. The local plan also makes reference to BS 8233 and the internal noise criteria for offices has been made using this standard. Table 3-1 below outlines these criteria. The $L_{Aeq,T}$ noise thresholds indicate a logarithmically averaged internal noise level over a time period T. While the L_{AFmax} indicates the maximum noise level internally.

Table 3-1 Indoor Ambient Noise Levels

Type	Activity	Location	07:00-00 to 23:00	23:00 to 07:00
Residential	Resting	Living Room	35 dB $L_{Aeq,16h}$	-
	Dining	Dining Room / Area	40 dB $L_{Aeq,16h}$	-
	Sleeping (Daytime Resting)	Bedroom	35 dB $L_{Aeq,16h}$	30 dB $L_{Aeq,8h}$ 42 dB L_{AFmax}
Outdoor living Space	-	-	50 dB $L_{Aeq,16h}$	-
Open Plan Office	-	-	45-50 dB $L_{Aeq,8h}$	

3.2 Industrial and Commercial Noise

A summary of noise criteria in relation to industrial and commercial noise affecting a dwelling is given in the Camden Local Plan. Table 3-2 below outlines these criteria. The Camden Local Plan rates noise from industrial and commercial sources via a traffic light system of Green, Amber and Red. Green levels and below are considered desirable whereas Red and above are undesirable. Industrial and commercial noise is rated against the background noise level to determine which category it falls under. A rating level of 10dB below background means that the noise coming from any industrial or commercial plant will be 10dB below background noise when measured at the affected dwelling. No events exceeding $57dBL_{Amax}$ mean that at any time plant from industrial and commercial sources must not exceed 57dB when measured at the effected dwelling.

Table 3-2 Noise from industrial and Commercial noise affecting a dwelling

Location	Period of Day	LOAL(Green)	LOAL to SOAEL(Amber)	SOAL(Red)
Amenity area e.g. Garden	Day	'Rating level' 10dB below background	'Rating level' between 9dB below and 5dB above background	'Rating level' Greater than 5dB above Background
Facade	Night	'Rating level' 10dB below background (to be changed to 15dB if source contains tonal elements) 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 $88dBL_{Amax}$

4. External Noise Levels

Noise levels in the vicinity of the site have been determined by using existing planning applications in order to determine baseline conditions at nearby receptors and the site. DEFRA Noise Mapping has also been used to determine the daytime and Night-time L_{Aeq} noise level contribution from Tottenham Court Road experienced at the Tottenham Court Road façade of the site. An overall summary has been provided showing the overall predicted noise levels used in the assessments.

4.1 Review of Historic Noise Surveys

AECOM has identified several historic noise survey reports produced as part of previous planning applications in the local area. The following planning applications have been identified as containing noise survey data;

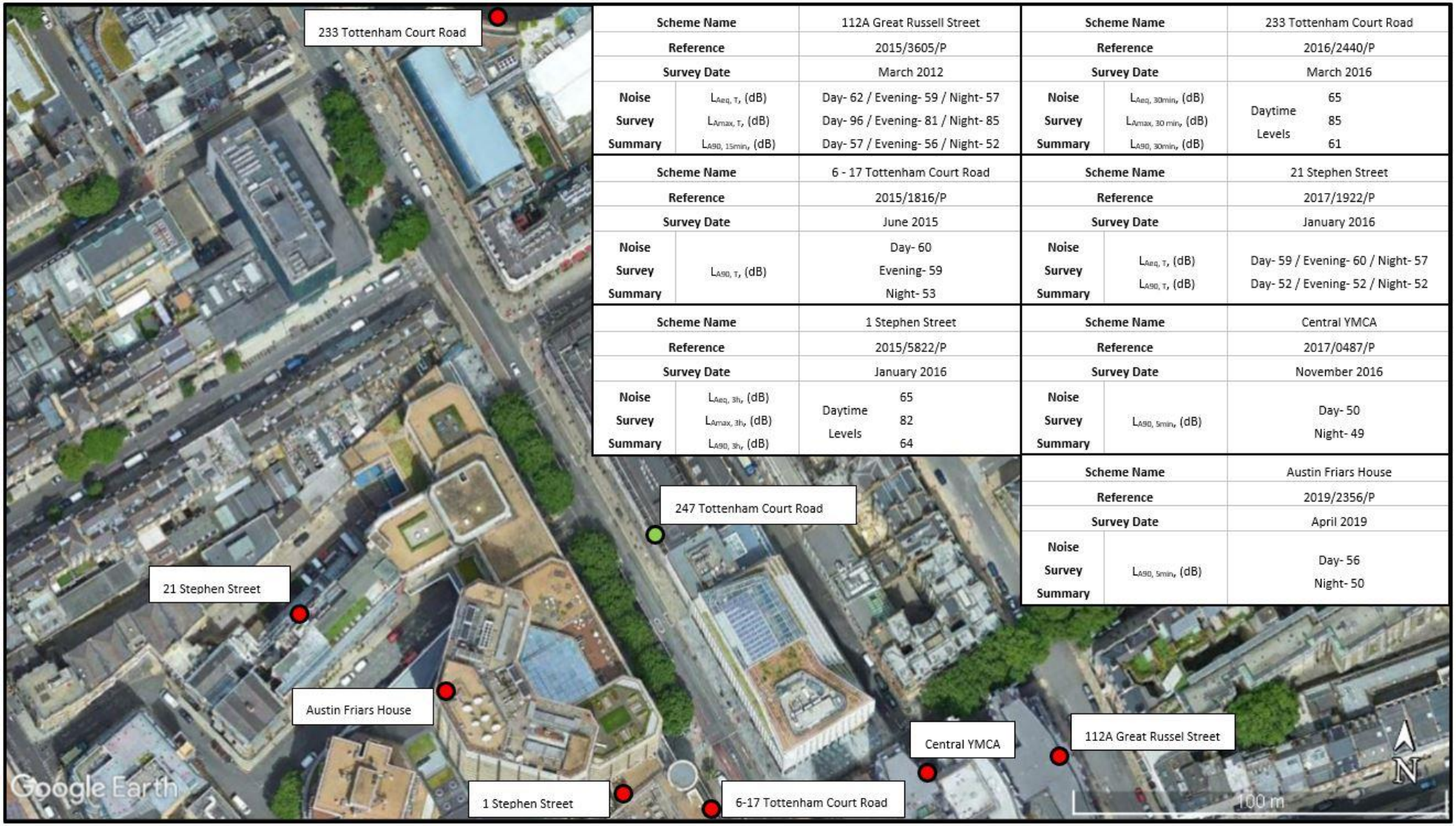
- Austin Friars House 1 Stephen Street, ref. 2019/2356/P[1] – survey undertaken in April 2019
- Central YMCA, 112 Great Russell Street ref. 2017/0487/P[2] – survey undertaken in November 2016
- 21 Stephen Street, ref. 2017/1922/P[3]– survey undertaken in May 2017;
- 233 Tottenham Court Road, ref. 2016/2440/P[4] – survey undertaken in March 2016
- 1 Stephen Street ref. 2015/5822/P[5] – survey undertaken in January 2016
- Units 6 - 7, 6 - 17 Tottenham Court Road ref. 2015/1816/P[6] – survey undertaken in June 2015; and
- 112A Great Russell Street, ref. 2015/3605/P[7] – survey undertaken in March 2012

Further information about these surveys can be found in Appendix C.

Figure 4-1 on the next page shows these surveys marked up on a location map with a summary of the measured noise levels.

[1] http://camdocs.camden.gov.uk/HPRMWebDrawer/PlanRec?q=recContainer:"2019/2356/P"
[2] http://camdocs.camden.gov.uk/HPRMWebDrawer/PlanRec?q=recContainer:"2017/0487/P"
[3] http://camdocs.camden.gov.uk/HPRMWebDrawer/PlanRec?q=recContainer:"2017/1922/P"
[4] http://camdocs.camden.gov.uk/HPRMWebDrawer/PlanRec?q=recContainer:"2016/2440/P"
[5] http://camdocs.camden.gov.uk/HPRMWebDrawer/PlanRec?q=recContainer:"2015/5822/P"
[6] http://camdocs.camden.gov.uk/HPRMWebDrawer/PlanRec?q=recContainer:"2015/1816/P"
[7] http://camdocs.camden.gov.uk/HPRMWebDrawer/PlanRec?q=recContainer:"2015/3605/P"

Figure 4-1 Historic Survey Locations and Summaries



Scheme Name		112A Great Russell Street
Reference		2015/3605/P
Survey Date		March 2012
Noise Survey Summary	$L_{Aeq,\,T}$, (dB)	Day- 62 / Evening- 59 / Night- 57
	$L_{Amax,\,T}$, (dB)	Day- 96 / Evening- 81 / Night- 85
	$L_{A90,\,15min}$, (dB)	Day- 57 / Evening- 56 / Night- 52

Scheme Name		233 Tottenham Court Road
Reference		2016/2440/P
Survey Date		March 2016
Noise Survey Summary	$L_{Aeq,\,30min}$, (dB)	Daytime Levels: 65
	$L_{Amax,\,30\,min}$, (dB)	Daytime Levels: 85
	$L_{A90,\,30min}$, (dB)	Daytime Levels: 61

Scheme Name		6 - 17 Tottenham Court Road
Reference		2015/1816/P
Survey Date		June 2015
Noise Survey Summary	$L_{A90,\,T}$, (dB)	Day- 60 Evening- 59 Night- 53

Scheme Name		21 Stephen Street
Reference		2017/1922/P
Survey Date		January 2016
Noise Survey Summary	$L_{Aeq,\,T}$, (dB)	Day- 59 / Evening- 60 / Night- 57
	$L_{A90,\,T}$, (dB)	Day- 52 / Evening- 52 / Night- 52

Scheme Name		1 Stephen Street
Reference		2015/5822/P
Survey Date		January 2016
Noise Survey Summary	$L_{Aeq,\,3h}$, (dB)	Daytime Levels: 65
	$L_{Amax,\,3h}$, (dB)	Daytime Levels: 82
	$L_{A90,\,3h}$, (dB)	Daytime Levels: 64

Scheme Name		Central YMCA
Reference		2017/0487/P
Survey Date		November 2016
Noise Survey Summary	$L_{A90,\,5min}$, (dB)	Day- 50 Night- 49

Scheme Name		Austin Friars House
Reference		2019/2356/P
Survey Date		April 2019
Noise Survey Summary	$L_{A90,\,5min}$, (dB)	Day- 56 Night- 50

4.2 Defra Noise Maps

The 2017 (Round 3) DEFRA Strategic noise mapping dataset[8] has been used to help determine the $L_{Aeq,16h}$ and $L_{Aeq,8h}$ noise levels at the façade of the proposed developed facing Tottenham Court Road.

The DEFRA noise map data gives information on the estimated noise from major road and rail sources across England in 2017. This was developed as part of the Environmental Noise Directive. Tottenham Court Road has been included in the data. Minor roads have not been included in the data set such as that of Bedford Avenue and Bayley Street. This is not expected to have an impact on the noise level at the Façade of the proposed development facing Tottenham Court Road as noise from minor roads such as Bedford Avenue and Bayley Street will be much lower than Tottenham Court Road meaning they will have negligible impact on the overall noise level. Rail noise has been discounted from the analysis because they are no rail lines close enough to be considered to have an impact on the proposed development.

DEFRA noise mapping has predicted a daytime $L_{Aeq,16h}$ noise level of 70-75dB and a night-time $L_{Aeq,16h}$ noise level of 60-65dB at the façade of 247 Tottenham Court Road.

4.3 Summary of Noise Levels

From review of existing noise levels in the area and DEFRA noise maps the below baseline noise levels to be used in the assessments have been predicted.

L_{Amax} noise levels have been determined by using past noise surveys AECOM has undertaken in similar noise environments e.g. dominated by road traffic and similar L_{Aeq} levels as that experienced by the site.

Table 4-1 below shows the summary L_{Aeq} and L_{Amax} noise levels experienced at the façade of the Site facing Tottenham Court Road these levels were predicted by using the DEFRA Noise Maps. Physical screening provided by buildings typically provides 10 dB of noise attenuation; as such noise levels on the opposite side of the building along Morwell Street have also been estimated. Façades along Bayley Street have direct line of sight to Tottenham Court Road as such noise levels are expected to be similar to that of Façades facing Tottenham Court Road.

Table 4-1 Summary noise Levels at the Site (Free field)

Side of Buildling	Daytime (07:00 – 23:00) $L_{Aeq,16h}$ dB	Night-time (07:00 – 23:00) $L_{Aeq,8h}$ dB	Maximum noise level L_{Amax} dB
Facades facing Tottenham Court Road	70-75	60-65	85
Facades facing Morwell Street	60-65	50-55	75

Table 4-2 below shows the L_{A90} noise levels experienced at nearby noise sensitive receptors. These noise levels will be used in the assessment of plant and building services noise found in Section 6. Properties along Morwell Street have had the noise levels at these receptors determined by using the Central YMCA historic survey. Properties adjacent to site and opposite along Tottenham Court Road have had the noise levels at these receptors determined by the 6-17 Tottenham Court Road historic survey.

Table 4-2 Summary background noise levels of nearby residential receptors (Free field)

Location	Planning Application Data Source	Daytime (07:00 – 23:00) L_{A90}, dB	Night-time (07:00 – 23:00) L_{A90}, dB
Properties behind the Site (Morwell Street)	Central YMCA*	47	46
Properties adjacent to the Site	6-17 Tottenham Court Road	60	53

[8] https://www.gov.uk/government/publications/strategic-noise-mapping-2019

Properties opposite along Tottenham Court Road	6-17 Tottenham Court Road	60	53

* Measured levels included façade reflection therefore a -3dB correction has been made to convert to free field

4.4 Limitations

The use of DEFRA Noise mapping and historic noise surveys as a method to determine the baseline noise levels in the vicinity of the site does have some limitations compared to a background noise survey. Firstly, a background noise survey provides recent up to date information on the background noise as measured at a representative location for the site. This undoubtably is the most accurate method. However due to the current situation this would not be accurate at all if a survey was to be undertaken at this time.

DEFRA Noise Mapping was undertaken in 2017. This is considered recent enough to provide accurate noise levels at the site. Due to the fact there has been no major development in the local area that would increase the amount of road users in the area or no change to the road layout since these maps where created it is unlikely that the noise levels have changed by a significant amount. Therefore, the use of the DEFRA noise maps can provide an accurate estimate for noise levels at the Façade of the site facing Tottenham Court Road. The prediction of noise levels at the façade of the site facing Morwell Street was estimated by subtracting 10dB from the DEFRA Noise Maps as screening typically provides 10dB of noise attenuation. This method of estimation is a limitation as the total amount of screening is unknown without taking site measurements. However, the 10dB noise attenuation estimation has been assigned using technical experience and provides a good estimate for noise levels along Morwell Street.

The use of historic noise surveys provides the same limitation as above in that a background noise survey at the desired location would provide more accurate results. The survey used to predict the noise levels at properties opposite the site along Tottenham Court Road was undertaken in 2015. A comparison of this survey with the 2017 DEFRA Noise Maps shows a strong correlation between the noise levels. Due to the correlation between these levels it is likely noise levels haven't changed by a significant amount in the two years between them. Also due to there not being any significant developments in the area after 2017 it can be said that in 2020 noise levels are most likely not to have changed by a significant amount either from when the historic surveys where undertaken.

5. Outline Façade Requirements and Recommendations

Based on the external noise levels presented in Table 4-1, the following sound reduction performance is required to mitigate against external ambient noise and achieve the Camden Local Plan internal ambient noise criteria and BS 8233 criteria given in Table 3-1.

Glazing recommendations are provided using the R_w+C_{tr} index, a commonly used single figure term used to specify the sound insulation requirements of façades affected by traffic noise (i.e. urban road traffic and low speed rail noise). All recommendations refer to the performance post installation of the entire construction (i.e. frame and glazing).

Table 5-1 Façade Minimum Reduction Performance Requirements for Residential Dwellings (dB)

Proposed Façade	Period	Predicted External Noise Level (dB)	Internal Noise Requirement (dB)	Sound Reduction Performance Requirement R_w (dB)
Facades of the Site facing Tottenham Court Road and Bayley Street	Daytime (07:00-19:00)	75 $L_{Aeq,16h}$	35	43
	Night-time (23:00-07:00)	65 $L_{Aeq,8h}$	30	
	Night-time (23:00-07:00)	85 L_{AFmax}	42	
Facades of the Site facing Morwell Road	Daytime (07:00-19:00)	65 $L_{Aeq,16h}$	35	33
	Night-time (23:00-07:00)	55 $L_{Aeq,8h}$	30	
	Night-time (23:00-07:00)	75 L_{AFmax}	42	

Table 5-2 Façade Minimum Reduction Performance Requirements for Offices (dB)

Proposed Façade	Predicted External Noise Level (dB)	Internal Noise Requirement (dB)	Sound Reduction Performance Requirement R_w (dB)
Facades of the Site facing Tottenham Court Road and Bayley Street	75 $L_{Aeq,16h}$	45-50	30
Facades of the Site facing Morwell Road	65 $L_{Aeq,16h}$	45-50	20

For residential facades directly fronting onto Tottenham Court Road and Bayley Street, internal noise criteria can be achieved using a high performance acoustic glazing such as 12.8mm Pilkington Optiphon[9] / 20 mm argon / 16.8 mm Pilkington Optiphon, which will achieve 43 dB $R_w + C_{tr.}$

For office facades directly fronting onto Tottenham Court Road and Bayley Street internal noise criteria can be achieved using double pane units of 10 mm glass / (6-16) mm air cavity / 4 mm glass which will achieve 30 dB $R_W + C_{tr}$.

For residential facades directly fronting onto Morwell Street, internal noise criteria can be achieved using an acoustic glazing such as 6mm Pilkington Optiphon / 16 mm argon / 6.8 mm Pilkington Optiphon, which will achieve 33 dB $R_w + C_{tr.}$

For office facades directly fronting onto Morwell Street internal noise criteria can be achieved using double pane units of 4 mm glass / (6-16) mm air cavity / 4 mm glass which will achieve 20 dB $R_W + C_{tr}$.

[9] Pilkington United Kingdom Limited, Optiphon Brochure, https://www.pilkington.com/en-gb/uk/products/product-categories/noise-control/pilkington-optiphon#brochures

Note that the glazing performance requirements apply to the whole window unit. Window performance is dependent on elements of the glazing unit including the frames, seals, wall interface, etc. Weak non-glass elements will require the use of higher performance glass units to maintain the required sound insulation. Test reports of a typical framed element performance from independent test authorities are required to substantiate the performance.

Due to the ambient noise levels along Tottenham Court Road, Bayley Street and Morwell Street, windows directly facing this road to lead to habitable rooms would be required to be closed to achieve internal noise criteria. When windows are opened (e.g. for purge ventilation) then internal ambient noise criteria may be exceeded, although opening windows for the purposes of ventilation would be at the discretion of the room occupant.

To comply with Building Regulations (Part F) (Ref 16)[10], it will be necessary to provide ventilation so that occupants can ventilate their property without breaking the acoustic seal of the building envelope. Mechanical ventilation has been chosen for the base build scheme. Mechanical ventilation will negate the need to open windows for ventilation and keep the building façade sealed so maintaining the attenuation performance of the glazed element of the façade.

The sound reduction performance requirements provided refer to the worst case. As the design progresses, glazing and ventilation performance requirements will be refined and determined for all facades of the development buildings.

The Camden Local Plan states that noise in amenity areas should not exceed 50dB $L_{Aeq,\ 16h}$ in order to achieve the Lowest Observed Adverse Effect Level (LOAL) Green condition. The $L_{Aeq,16h}$ level at the façade facing Tottenham Court Road has been predicted to be 65 dB $L_{Aeq,16h}$. Due to the amenity area being located on the roof a 10dB noise attenuation can be applied from screening from the building. This results in a level of 55dB $L_{Aeq,16h}$. This is 5db above the Camden Local Plan LOAL condition and sits in the LAOL to Significant Observed Adverse Effect (SOAL) Amber condition. In order to meet the Green condition further noise attenuation may be required in areas of Amenity.

[10] HM Government, The Building Regulations 2010, Ventilation; Approved Document F, f1 Means of Ventilation.

6. Fixed Plant and Building Service Noise

Table 6-1 presents a list of nearby noise sensitive receptors and recommended operational limits, expressed as rating levels, for proposed building services plant noise levels affecting these nearby sensitive receptors. Limits have been determined using the summary of measured noise levels presented in section 4.3 of this report.

Table 6-1 Fixed plant and building services - Recommended operational noise limits

Sensitive receptor locations	Receptor Type	Daytime 07:00 – 23:00		Night-time 23:00 – 07:00	
		Predicted background levels dB $L_{A90,T}$	Operational limit rating level dB $L_{Ar,Tr}$	Predictedbackground levels dB $L_{A90,T}$	Operational limit rating level dB $L_{Ar,Tr}$
Properties behind Tottenham Court Road (Morwell Street)	Residential and Office	47	37	46	36
Properties adjacent to the Site	Office	60	50	53	43
Properties opposite along Tottenham Court Road	Residential and Office	60	50	53	43

The specification of plant machinery with low noise emission and properly attenuated supply and extract terminations will help to ensure that noise emissions are minimised. The use of enclosures, local screening, mufflers and silencers will also be used as appropriate.

Building services and fixed plant will be designed to achieve appropriate operational noise limits. Noise emissions from proposed building plant will be considered during detailed design in order to ensure that operational noise does not adversely affect nearby residents (both existing residents as well as future occupants of the proposed development).

7. Conclusion

AECOM were appointed to carry out a noise assessment to support a planning application for the proposed 247 Tottenham Court Road mixed use office led development.

Noise levels at the façades across the proposed development have been predicted based on use of historic baseline noise levels in the area and from DEFRA noise maps. Outline façade sound insulation performance requirements have been determined.

The use of high-performance acoustic glazing is recommended for residential windows facing Tottenham Court Road, Bayley Street and Morwell Street. Example configurations for glazing have been provided in order to mitigate against external ambient noise and achieve LBC's ambient noise criteria. Final building facade configurations will be determined during detailed design.

Outdoor amenity areas where found to be 5db above LBC's criteria as such it is recommended further noise screening is provided for these areas.

Based on this assessment and the recommended mitigation measures, the site is considered suitable for the intended use. The required mitigation strategy covering glazing and ventilation performance will be finalised during detailed design.

Appendix A – Acoustic Glossary

Term	Definition
Decibel (dB)	The range of audible sound pressures is approximately 2 x 10^{-5} Pa to 200 Pa. Using decibel notation presents this range in a more manageable form, 0dB to 140dB. Mathematically Sound Pressure level = 20 log {p(t)/p_0} Where P_0 = 2 x 10^{-5} Pa.
A" Weighting (dB(A))	The human ear does not respond uniformly to different frequencies. "A" weighting is commonly used to simulate the frequency response of the ear. It is used in the assessment of risk of damage of hearing due to noise.
Frequency (Hz)	The number of cycles per second, for sound this is subjectively perceived as pitch.
Frequency Spectrum	Analysis of the relative contributions of different frequencies that make up a noise.
Ambient Noise	Totally encompassing noise in a given situation at a given time usually composed of noise from many sources near and far (*The ambient noise comprises the residual noise and the specific noise when present)*.
Ambient Sound Level $L_a = L_{Aeq,T}$	Equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time, usually from many sources near and far, at the assessment location over a given time interval, T.
Background Sound Level $L_{A90,T}$	A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels.
Equivalent Continuous A-weighted Sound Pressure Level $L_{Aeq,T}$	Value of the A-weighted sound pressure level in decibels of continuous steady sound that, within a specified time interval, T = $t_2 - t_1$, has the same mean-squared sound pressure as a sound that varies with time, and is given by the following equation: $$L_{Aeq,T} = 10lg_{10}\left\{\left(\frac{1}{T}\right)\int_{t1}^{t2}\left[p_A\frac{(t)^2}{p_0{}^2}\right]dt\right\}$$ Where p_0 is the reference sound pressure (20μPA); and $P_A(t)$ is the instantaneous A-weighted sound pressure level at time t
Measurement Time Interval T_m	Total time over which measurements are taken (*This may consist of the sum of a number of non-contiguous, short-term measurement time intervals)*
Rating level $L_{Ar,Tr}$	Specific sound level plus any adjustment for the characteristic features of the sound
Reference Time Interval, T_r	Specified interval over which the specific sound level is determined (*This is 1 h during the day from 07:00 h to 23:00 h and a shorter period of 15 min at night from 23:00 h to 07:00 h*)
Residual Sound	Ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound
Residual sound level L_r = $L_{Aeq,T}$	Equivalent continuous A-weighted sound pressure level of the residual sound in a given situation at the assessment location over a given time interval, T.
Specific sound level L_s = $L_{Aeq,Tr}$	Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given time interval, T.
Specific Sound Source	Sound source being assessed
$L_{A10,T}$	The A-weighted sound pressure level of the residual noise in decibels exceeded for 10% for a given time interval. This is the parameter defined by the government to describe road traffic noise
L_{AFmax}	The maximum RMS A-weighted sound pressure level occurring within a specified time period. Fast time weighting indicates sound pressure level measurements undertaken using a 125-millisecond moving average time weighting period
Weighted sound reduction index R_w	A single-figure value of sound reduction index, derived according to procedures given in BS5821, used for rating and comparing partitions and based on the values of sound reduction index at different frequencies.

Appendix B – Planning Policy Context / Noise Guidance

B.1 National Policy

National Planning Policy Framework (2019)

The revised National Planning Policy Framework (NPPF) was published in February 2019[11]. The NPPF sets out the Government planning policies for England and how these are expected to be applied. This NPPF supersedes the previous NPPF published in July 2018.

Policies and objectives which are of particular relevance to noise and vibration include:

Paragraph 170

> "planning policies and decisions should contribute to and enhance the natural and local environment by:…
>
> *"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…*

Paragraph 180 also relates to noise through the following statement:

> *"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"*

With regards to 'adverse effects' and 'significant adverse effects', the NPPF refers to the Noise Policy Statement for England (NPSE) [12]; see below.

Noise Policy Statement for England (2010)

The NPSE seeks to clarify the underlying principles and aims in existing policy documents, legislation and guidance that relate to noise. The statement applies to all forms of noise, including environmental noise, neighbour noise and neighbourhood noise.

The statement sets out the long term vision of the government's noise policy, which is to "*promote good health and a good quality of life through the effective management of noise within the context of policy on sustainable development*".

This long term vision is supported by three aims:

- *'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 improvements of health and quality of life.'*

[11] Department for Communities and Local Government (DCLG), (2019); National Planning Policy Framework..
[12] Noise Policy Statement for England (2010); Department for Environment Food and Rural Affairs.

The long term policy vision and aims are designed to enable decisions to be made regarding what is an acceptable noise burden to place on society.

The Explanatory Note within the NPSE provides further guidance on defining 'significant adverse effects' and 'adverse effects' using the following concepts:

- No Observed Effect Level (NOEL) – the level below which no effect can be detected. Below this level no detectable effect on health and quality of life due to noise can be established;
- Lowest Observable Adverse Effect Level (LOAEL) – the level above which adverse effects on health and quality of life can be detected; and
- Significant Observed Adverse Effect Level (SOAEL) – the level above which significant adverse effects on health and quality of life occur.

With reference to the SOAEL, the NPSE states:

> *"It is recognised that it is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available."*

For situations where noise levels are between the LOAEL and SOAEL, all reasonable steps should be taken to mitigate and minimise the effects. However, this does not mean that such adverse effects cannot occur.

Planning Practice Guidance Noise (July 2019)

The national Planning Practice Guidance (PPG) for noise[13] advises that "*Noise needs to be considered when development may create additional noise, or would be sensitive to the prevailing acoustic environment (including any anticipated changes to that environment from activities that are permitted but not yet commenced)*" and provides guidelines that are designed to assist with the implementation of the NPPF.

The PPG states that local planning authorities should take account of the acoustic environment and in doing so consider:

- *'whether or not a significant adverse effect is occurring or likely to occur;*
- *whether or not an adverse effect is occurring or likely to occur; and*
- *whether or not a good standard of amenity can be achieved.'*

Factors to be considered in determining whether noise is a concern are identified including the absolute noise level of the source, the existing ambient noise climate, time of day, frequency of occurrence, duration, character of the noise and cumulative effects.

Further details on the hierarchy of noise effects are presented in Table 7-1, which has been reproduced from PPGN

Table 7-1 Planning Practice Guidance Noise Exposure Hierarchy

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not present	No effect	No Observed Effect	No specific measures required
No Observed Adverse Effect Level			
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life	No Observed Adverse Effect	No specific measures required

[13] https://www.gov.uk/guidance/noise--2

Perception	Examples of Outcomes	Increasing Effect Level	Action
Lowest Observed Adverse Effect Level (LOAEL)			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level (SOAEL)			
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

B.2 Local Policy

Camden Local Plan

LBC's Local Plan was adopted in 2017[14] and provides a planning framework for the borough. The policy which is relevant to noise affecting residential dwellings and industrial noise is found in 'Appendix 3: Noise thresholds' of the Local Plan. This appendix provides the following information for noise:

'The significance of noise impact varies dependent on the different noise sources, receptors and times of operation presented for consideration within a planning application. Therefore, Camden's thresholds for noise and vibration evaluate noise impact in terms of various 'effect levels' described in the National Planning Policy Framework and Planning Practice Guidance:

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

Three basic design criteria have been set for proposed developments, these being aimed at guiding applicants as to the degree of detailed consideration needed to be given to noise in any planning application. The design criteria outlined below are defined in the corresponding noise tables. The values will vary depending on the context, type of noise and sensitivity of the receptor:

- *Green – where noise is considered to be at an acceptable level.*

[14] Camden Borough Council, (2017); Camden Local Plan

- *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.*
- *Red – where noise is observed to have a significant adverse effect.*

Proposed Developments Likely to be Sensitive to Noise

Special consideration will need to be given to noise sensitive developments that are proposed in areas which are, or expected to become, subject to levels of noise likely to have an adverse effect. The threshold of acceptability of the noise will primarily depend on two factors: the intended use of the noise sensitive development and the source of the noise experienced, or likely to be experienced.

Table B: Noise levels applicable to noise sensitive residential development proposed in areas of existing noise

Dominant Noise Source	Assessment Location	Design Period	LOAEL (Green)	LOAEL to SOAEL (Amber)	SOAEL (Red)
Anonymous noise such as general environmental noise, road traffic and rail traffic ~	Noise at 1 metre from noise sensitive façade/free field	Day	<50dB$L_{Aeq,16hr}$*	50dB to 72dB$L_{Aeq,6hr}$*	>72dB$L_{Aeq,16hr}$*
		Night	<45dB$L_{Aeq,8hr3}$ <40 dB$L_{Aeq,8hr}$**	45dB to 62dB$L_{Aeq,8hr}$* >40dBL_{night}**	>62dB$L_{Aeq,8hrs}$*
	Inside a bedroom	Day	<35dB$L_{Aeq,16hr}$	35dB to 45dB$L_{Aeq,16hr}$	>45dB$L_{Aeq,16hr}$
		Night	<30dB$L_{Aeq,8hr}$ 42dB$L_{Amax,fast}$	30dB to 40dB$L_{Aeq,16hr}$ 40dB to 73dB$L_{Amax,fast}$	>40dB$L_{Aeq,8hr}$ >73dB$L_{Amax,fast}$
	Outdoor living space (free field)	Day	<50dB$L_{Aeq,16hr}$	50dB to 55dB$L_{Aeq,6hr}$	>55dB$L_{Aeq,16hr}$
Non-anonymous noise	See guidance note on non-anonymous noise				

*LAeq, T values specified for outside a bedroom window are façade levels
**Lnight values specified for outside a bedroom window are free field levels

The levels given above are for dwellings, however, levels are use specific and different levels will apply dependent on the use of the premises. The Council will also take into account the likely times of occupation for types of development and will be amended according to the times of operation of the establishment under consideration.

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 Camden Local Plan | Appendices 347 commercial sound' (BS 4142) will be used. For such cases a 'Rating Level' of 10 dB below background (15dB if tonal components are present) should be considered as the design criterion).

Table C: Noise levels applicable to proposed industrial and commercial developments (including plant and machinery)

Existing Noise sensitive receptor	Assessment Location	Design Period	LOAEL (Green)	LOAEL to SOAEL (Amber)	SOAL (Red)
Dwellings**	Garden used for main amenity (free field) and Outside living or dining or bedroom window (façade)	Day	'Rating level' 10dB* below background	'Rating level' between 9dB below and 5dB above background	'Rating level' greater than 5dB above background
Dwellings**	Outside bedroom window (façade)	Night	'Rating level' 10dB* below background and no events exceeding 57dB L_{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 88dB L_{Amax}

*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.

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

The periods in Table C correspond to 0700 hours to 2300 hours for the day and 2300 hours to 0700 hours for the night. The Council will take into account the likely times of occupation for types of development and will be amended according to the times of operation of the establishment under consideration. 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.'

B.3 Other Relevant Standards and Guidance

BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings

BS 8233:2014[15] provides criteria for the assessment of internal and external noise levels for various uses including dwellings and commercial properties. Criteria for provision of suitable living conditions inside dwellings are provided in Table 4 of BS 8233:2014 presents the desirable internal noise levels for dwellings that should not be exceeded in new developments. Table 2 in BS8233:2014 presents the indoor ambient noise level in other noise sensitive buildings including offices.

Note that BS 8233 does not specify maximum (L_{AFmax}) noise level criterion within bedrooms during night-time periods; this criterion has been taken from ProPG which advises the following:

[15] British Standards Institution (2014) BS 8233: 2014 Guidance on sound insulation and noise reduction for buildings, BSI

> *"In most circumstances in noise-sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45dB $L_{Amax,F}$ more than 10 times a night. However, where it is not reasonably practicable to achieve this guideline then the judgement of acceptability will depend not only on the maximum noise levels but also on factors such as the source, number, distribution, predictability and regularity of noise events."*

While there is no national requirement for external noise levels to be achieved in garden spaces, BS 8233 also advises that: *"For traditional external areas that are used for amenity space, such as gardens and 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."*

ProPG: Planning & Noise (2017)

ProPG: Planning & Noise - Professional Practice[16] has been produced by the Institute of Acoustics (IoA), the Association of Noise Consultants (ANC) and the Chartered Institute of Environmental Health (CIEH) to provide practitioners with guidance on a recommended approach to the management of noise within the planning system in England. ProPG provides planning guidance for the consideration of new residential development that will be exposed predominantly to airborne noise from transport sources.

Recommended ProPG indoor ambient noise levels are identical to those within BS8233:2014. In addition, with regards to sleep quality and well-being, a noise level of 45 dB L_{Amax} inside bedrooms has been identified as a threshold value above which sleep is disturbed.

[16] ProPG: Planning & Noise - Professional Practice Guidance on Planning & Noise – New Residential Development (May 2017)

Appendix C Review of Historic Surveys

Austin Friars House 1 Stephen Street

A noise survey was carried out as part of the noise assessment for the planning application to install a new roof plant at Austin Friars House 1 Stephen Street, London, W1T 1AL (planning ref. 2019/2356/P).

Long term unattended measurements were carried out between 10:57 on Wednesday 17th April 2019 and 11:52 on Thursday 18th April 2019. The measurements included L_{Aeq}, L_{A90} and L_{Amax} sound level indicators over daytime and night-time periods. However only the L_{A90} noise level indicator was tabulated with the other noise indicators shown graphically in a time history plot. The noise monitor was located on the 12th floor rooftop in free-field conditions. Noise levels from Tottenham court road would have been screened. The noise climate during the measurements was observed to be existing plant and road traffic from the surrounding road network.

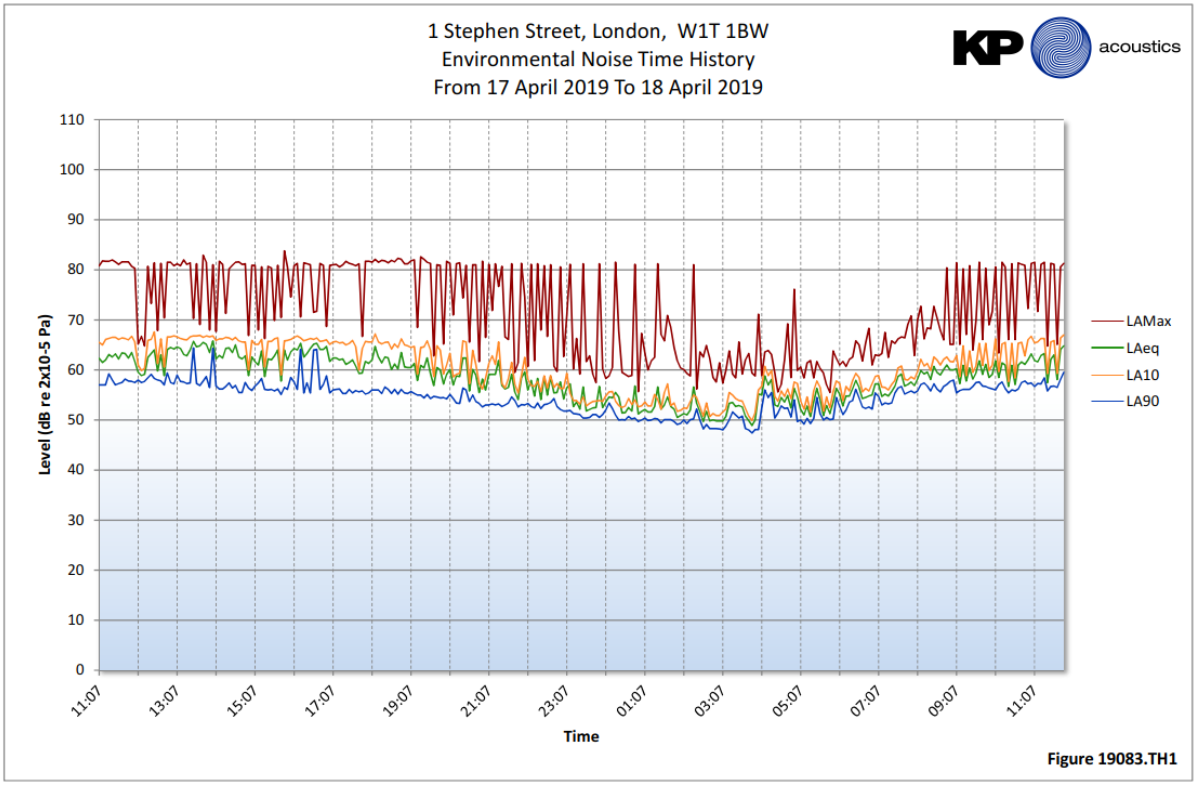
Noise measurement data is summarised in Table C-1.

Table C-1 Survey Results, Austin Friars House 1 Stephen Street

Measurement Period	Time	Typical Background Noise Level ($L_{A90, 5mins}$, dB)
Daytime	(07:00 – 23:00)	56
Night-time	(23:00 – 07:00)	50

Figure C-2 shows the time history of the measurements at Austin Friars House.

Figure C-2. Austin Friars House 1 Stephen Street Time History



Central YMCA, 112 Great Russell Street

A noise survey was carried out as part of the noise assessment for the planning application to install replacement heat pump units at the Central YMCA, 112 Great Russell Street, London, WC1B 3NQ (planning ref. 2017/0487/P).

long term attended measurements were carried out between 12:30 on Friday 25th November 2016 and 17:00 on Saturday 26th November 2016. The measurements included L_{Aeq}, L_{A90} and L_{Amax} sound level indicators over daytime (07:00 – 23:00) and night-time (23:00 – 07:00) periods. However only the L_{A90} noise level indicator was tabulated with the other noise indicators shown graphically in a time history plot. The noise monitor was located on a first-floor balcony facing Bedford Avenue in non-free field conditions. Noise from Tottenham Court Road would not have been screened at this location. The noise climate during the measurements was observed to be dominated by road traffic with some small contribution from existing plant on the balcony area where the sound level meter was located.

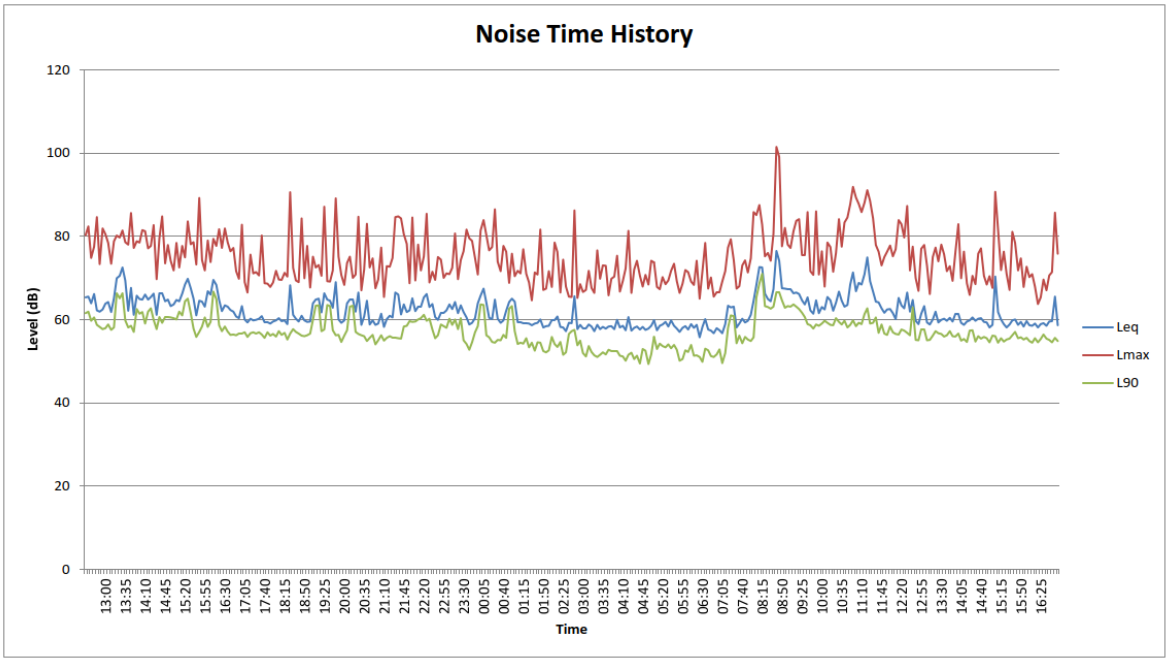
Noise measurement data is summarised in Table C-2.

Table C-2. Survey Results, Central YMCA, 112 Great Russell Street

Measurement Period	Time	Typical Background Noise Level ($L_{A90, 5mins}$, dB)
Daytime	(07:00 – 23:00)	50
Night-time	(23:00 – 07:00)	49

Figure C-3 below shows the time history at Central YMCA

Figure C-3. Central YMCA, 112 Great Russell Street Time History



21 Stephen Street

A noise survey was carried out as part of the noise assessment for the planning application for three new pieces of plant items and railing at 21 Stephen Street, London, W1T 1LN (planning ref. 2017/1922/P).

Long-term unattended measurements were carried out between 12th and 16th May 2017. The measurements included L_{Aeq} and L_{A90} sound level indicators for daytime (07:00 -19:00), evening (19:00 -23:00) and night-time (23:00 -00:00). No L_{Amax} noise levels were reported. Noise measurements were taken on the 1st floor rooftop facing Stephen Street in free field conditions. The noise climate during the measurements was observed to be dominated by mechanical plant installed on the rooftop of the first-floor level of 21 Stephen Street. Noise additions are from road traffic from Tottenham Court Road and activity of the external terrace associated with the BFI Kitchen at the rear of the building during operating hours.

Noise measurement data is summarised in Table C-3.

Table C-3. Survey Results, 21 Stephan Street

2017 Measurement Location	Measurement Period	Ambient Noise Level ($L_{Aeq,T}$,dB)	Typical Background Noise Level ($L_{A90,15mins}$, dB)
P1	Daytime (07:00 – 19:00)	59	56-57
	Evening (19:00 – 23:00)	59	56-57
	Night-time (23:00 – 00:00)	61	56-57
P2	Daytime (07:00 – 19:00)	59	52-53
	Evening (19:00 – 23:00)	60	52-53
	Night-time (23:00 – 00:00)	57	52-53

233 Tottenham Court Road

A noise survey was carried out as part of the noise assessment for the planning application to install three air conditioning units at 233 Tottenham Court Road, London, W1T 7QH (planning ref. 2016/2440/P).

Short term attended measurements were carried out on Thursday 3rd March 2016 between 19:00 and 19:30. The measurements included L_{Aeq}, L_{A90} and L_{Amax} sound level indicators over 5-minute measurement periods. Measurements were taken facing South Crescent with noise from Tottenham Court Road screened. The noise climate during the measurements was observed to be dominated by road traffic.

Noise measurement data is summarised in Table C-4.

Table C-4. Survey Results, 231-233 Tottenham Court Road

Start Time	Ambient Noise Level ($L_{Aeq, 5\ mins}$, dB)	Maximum Noise Level ($L_{Amax,5\ mins}$, dB)	Typical Background Noise Level ($L_{A90, 5mins}$, dB)
19:00	65.4	79.6	60.6
19:05	64.4	81.3	61.1
19:10	66.5	82.4	60.8
19:16	63.6	77.5	60.6
19:22	65.6	84.6	60.5
19:27	64.1	77.4	60.7
19:32	62.8	74.0	60.5
Noise Level	65	85	61

1 Stephen Street

A noise survey was carried out as part of the noise assessment for the planning application for a new air conditioning unit at 1 Stephen Street, London, W1T 1AL (planning ref. 2015/5822/P).

Short-term attended measurements were carried out between 12:00 and 15:00 on Tuesday 12th January 2016. The measurements included L_{Aeq}, L_{A90} and L_{Amax} sound level indicators. The monitor was located on a 3rd floor balcony in free field conditions. No noise climate information was given in the report although it was noted there was an existing piece of plant on the roof as well as a number of plant items on adjacent rooftops.

Noise measurement data is summarised in Table C-5.

Table C-5. Survey Results, 1 Stephan Street

Measurement Period	Ambient Noise Level ($L_{Aeq,T}$,dB)	Typical Background Noise Level ($L_{A90,T}$, dB)	Maximum Noise Level ($L_{Amax,T}$, dB)
12:00 – 13:00	64.9	63.2	74.3
13:00 – 14:00	65.0	63.6	81.6
14:00 – 15:00	65.2	64.1	81.2
Noise Level	65	64	82

Units 6 - 7, 6 - 17 Tottenham Court Road

A noise survey was carried out as part of the noise assessment for the planning application to install a new air conditioning unit at Barclays Bank, Tottenham Court Road, London, W1T 1AZ (planning ref. 2015/1816/P).

Long-term unattended measurements were carried out between Thursday 18th June 2015 and Monday 22nd June 2015. The measurements included L_{Aeq}, L_{A90} and L_{Amax} sound level indicators over daytime (07:00 -19:00), evening (19:00 -23:00) and night-time periods (23:00 – 07:00). However only the L_{A90} noise level indicator was tabulated with the other noise indicators shown graphically in a time history plot. The monitor was located at roof level in free field conditions. The noise climate during the measurements was observed to be dominated by road traffic noise, however existing plant building services and commercial activities also contributed to background levels. Noise levels from Tottenham Ccourt Road were screened due to location on roof.

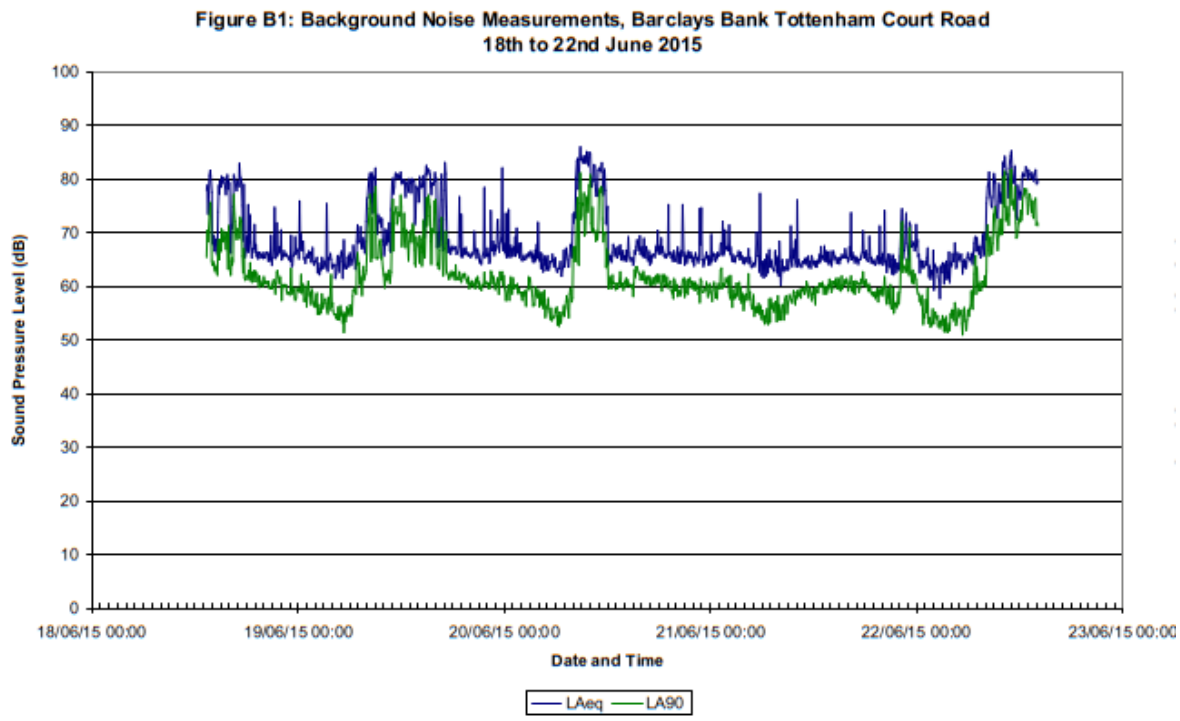
Noise measurement data is summarised in Table C-6

Table C-6. Survey Results, Units 6 - 7, 6 - 17 Tottenham Court Road

Date	Daytime Level (07:00 – 19:00) dB Minimum $L_{A90,\ 1\ hour}$	Evening Level (19:00 – 23:00) dB Minimum $L_{A90,\ 1\ hour}$	Night-time Level (23:00 – 07:00) dB Minimum $L_{A90,\ 15\ min}$
Thu 18th June	62	60	53
Fri 19th June	62	60	54
Sat 20th June	60	59	54
Sun 21st June	56	58	52
Mon 22nd June	62	-	-
Noise Level	**60**	**59**	**53**

Figure C-4 shows the time history plot for the measurement.

Figure C-4. 1 Units 6 - 7, 6 - 17 Tottenham Court Road Time History



112A Great Russell Street

A noise survey was carried out as part of the noise assessment for the planning application for redevelopment of basement levels -4 and -5 of 112 Great Russell Street, London, WC1B 3NP (planning ref. 2015/3605/P).

Long-term unattended measurements were carried out between 15th and 16th March 2012. The measurements included L_{Aeq}, L_{A90} and L_{Amax} sound level indicators for daytime (07:00 -19:00), evening (19:00 -23:00) and night-time periods (23:00 – 07:00). The noise monitor was located on a flat roof on floor two facing Adaline Place. Noise from Tottenham Court Road was screened. The noise climate during the measurements was observed to be dominated by road traffic from surrounding roads in the vicinity of the site. During the daytime is was noted that distant construction work was also occasionally audible.

Noise measurement data is summarised in Table C-7.

Table C-7. Survey Results, 21 Stephan Street

Measurement Period	Time	Ambient Noise Level ($L_{Aeq,T}$,dB)	Maximum Noise Level ($L_{Amax,T}$, dB)	Typical Background Noise Level ($L_{A90,15mins}$, dB)
Daytime	(07:00 – 19:00)	61.6	95.6	57.2
Evening	(19:00 – 23:00)	59.1	81.1	55.6
Night-time	(23:00 – 07:00)	57.3	85.3	52.2

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