

London Borough of Haringey
Partridge Way, Wood Green

Noise Impact Assessment Report



MLM.

Group

Part of Sweco

Notice

This document and its contents have been prepared and intended solely for the information of the London Borough of Haringey and use in relation to the Partridge Way project in Wood Green, London.

MLM Consulting Engineers Limited assumes no responsibility to any other party in respect of, arising out of, or in connection with this document and/or its contents.

Certifying Body

MLM are full members of the ANC:



Document History

Client: London Borough of Haringey
Project: Partridge Way, Wood Green
Document Title: Noise Impact Assessment Report
Document Reference: 103464-MLM-ZZ-ZZ-RP-YA-0001
MLM Reference: SL/103464/SL

Revision	Status	Description	Author	Checked/Approved	Date
C01	S2	For information	Sam Laws	Mark Scaife	28/10/2020
C02	S2	For information	Sam Laws	Mark Scaife	20/05/2021
C03	S2	For information	Sam Laws	Mark Scaife	27/05/2021

Contents

1	Executive Summary	1
2	Introduction	3
3	Guidance & Assessment Criteria	4
4	Proposed Development	5
4.1	Site Description	5
4.2	Proposed Development	6
5	Baseline Conditions	9
5.1	Surveys	9
5.2	Noise Survey Results.....	11
5.3	Calculation of Assessment Levels from Short-form Environmental Noise Measurements.....	12
6	Noise Modelling	13
7	ProPG Stage 1 – Initial Noise Risk Assessment.....	14
8	ProPG Stage 2 – Full Noise Assessment.....	15
8.1	Good Acoustic Design Process	15
8.2	Predicted Façade Noise Conditions	15
8.3	Internal Noise Level Guidelines	16
8.4	External Amenity Area Noise Assessment.....	18
8.5	Assessment of Other Relevant Issues.....	19
9	Overheating Assessment.....	20
10	Control of Building Services Noise	21
10.1	External Plant Noise Limits (at Nearest Noise Sensitive Receptor)	21
10.2	Nearest External Noise Sensitive Receptors (NNSR)	21
11	Conclusion	38
Appendix A - Glossary of Acoustic Terminology		
Appendix B - Policy and Assessment Methodology		
Appendix C - Environmental Noise Survey		
Appendix D – Noise Maps		

1 Executive Summary

MLM Consulting Engineers Limited has been commissioned by the London Borough of Haringey to assess the impact of noise at the proposed residential development site at Partridge Way, Wood Green, London N22 6DT. The assessment has been carried out in accordance with ProPG: Professional Practice Guidance on Planning & Noise, following a 'Good Acoustic Design' process. The key acoustic issues are summarised below:

Noise Survey

The Assessment has been based on detailed noise measurements made at the Proposed Development site. Environmental sound conditions at the site are mainly affected by mixed road traffic noise from the adjacent Bounds Green Road and Trinity Road, with minor contributions from the nearby rail lines.

Initial Site Noise Risk Assessment

During the daytime period (07:00 – 23:00), most of the site falls within the 'Low/Medium' risk category when considering noise from external environmental sources. However, as a worst case, the area of the site facing directly onto Trinity Road is predicted to fall within the 'Medium' risk category. The remainder of the site, which benefits from both increased distance from the major noise sources and acoustic screening by the adjacent buildings, is predicted to fall into the 'Low' and or 'Negligible' risk categories during the daytime period.

During the night-time period (23:00 – 07:00), most of the site falls within the 'Medium' risk category when considering noise from external environmental sources. However, as a worst case, the area of the site facing directly onto Trinity Road is predicted to fall within the 'Medium/High' risk category. The remainder of the site, which benefits from both increased distance from the major noise sources and acoustic screening by the adjacent buildings, is predicted to fall into the 'Low/Medium' or 'Low' risk categories during the night-time period.

Open site noise risk assessment maps for the daytime and night-time periods are presented in Appendix D.

Good Acoustic Design

Outline recommendations on the Masterplan Design and other suitable mitigation measures are provided to enable a good acoustic design of the Proposed Development. Based on the constraints of the site, in this instance reliance is to be placed on the façade of the development to mitigate noise impacts.

Internal Noise Levels

The Assessment demonstrates that appropriate internal ambient noise levels can be achieved across the Proposed Development with the provision of suitable façade treatments.

External Amenity Areas

Noise levels in external amenity areas are expected to exceed the upper limit in the worst cases, but much of the site is expected to experience acceptable levels. Quiet alternative communal spaces will be available as an alternative for the worst-affected dwellings.

Acoustics and Overheating

Following initial advice relating to the potential noise risks during the overheating condition if windows needed to be opened, the adopted ventilation strategy means that windows will not need to be opened to alleviate overheating and, as such, noise levels within the apartments are expected to satisfy the BS-8233-led thresholds during the overheating condition.

Other Relevant Issues

Consideration has been given to other relevant policy and design issues which may have an implication on the outcome of this assessment.

2 Introduction

MLM Consulting Engineers Limited has been commissioned by the London Borough of Haringey to assess the impact of noise at the proposed residential development site at Partridge Way, Wood Green, London N22 6DT in respect of the site's suitability for residential development, in support of a planning application.

Accordingly, this report presents an Acoustic Design Statement for the above site, including a 'Stage 1: Initial Site Noise Risk Assessment' and a 'Stage 2: Full Assessment', in line with advice on Professional Practice Guidance (ProPG) – Planning & Noise.

The assessment in Stage 1 is based on a detailed environmental noise survey undertaken at the Site and the surrounding area. A noise model validated at the monitoring positions has been used to predict the noise levels across the site and to inform the subsequent assessment in accordance with ProPG Stage 2.

The report also includes an Initial Site Noise Risk Assessment during Overheating Condition, identifying the risk category due to break-in noise if windows need to be open to mitigate overheating.

The report also assesses the predicted noise levels across the site and provides outline advice on good acoustic design options to achieve suitable ambient noise levels within habitable rooms and within external amenity areas.

The report also provides noise emission limits for any services associated with the development in line with the standard requirements of the London Borough of Haringey.

Whilst every effort has been made to ensure that this report is easily understood, it is technical in nature; a glossary of terms is included in Appendix A to assist the reader.

3 Guidance & Assessment Criteria

A summary of the relevant policy, standards and guidance documents used to inform the noise impact assessment of the scheme is provided below. Further details are provided in Appendix B.

- National Planning Policy Framework;
- Noise Policy Statement for England;
- National Planning Practice Guidance;
- Haringey Local Plan;
- London Plan;
- British Standard BS 8233:2014;
- ProPG Professional Practice Guidance on Planning & Noise;
- ANC – Acoustics Ventilation and Overheating – Residential Design Guide; and
- British Standard BS 4142:2014+A1:2019.

4 Proposed Development

4.1 Site Description

The proposed development site is located on a parcel of land located at the junction of Partridge Way, Trinity Road and Bounds Green Road in Wood Green, London. The site currently comprises an area of hard-standing and council garages.

The site location and proposed site boundary (i.e. blue line) is shown in Figure 1.

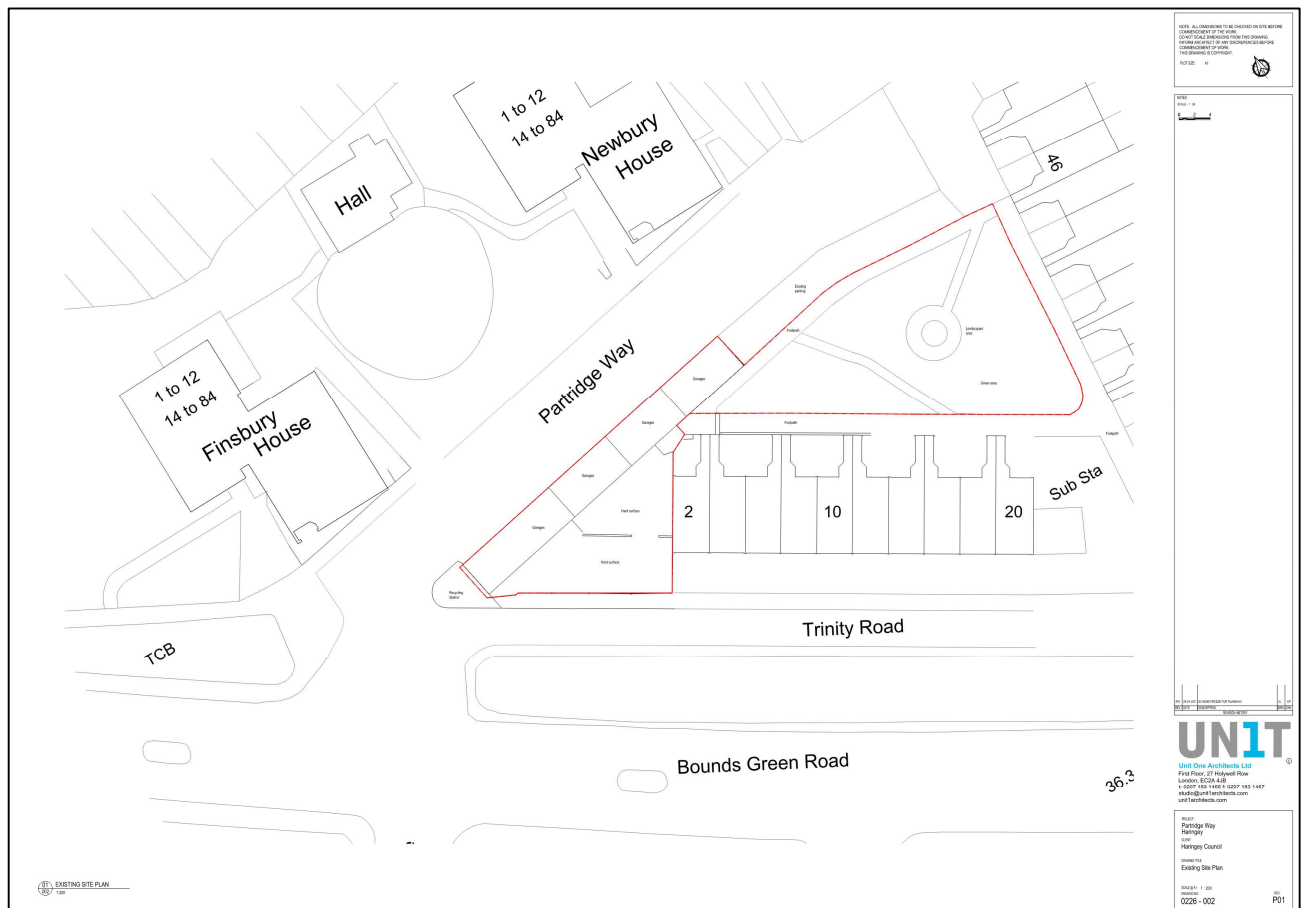


Figure 1: Site Location (red line)

The nearest existing noise-sensitive receptors (NNSRs) are expected to be the residential properties within the adjacent residential properties located along Trinity Road and the existing residential apartments within the adjacent Finsbury House and Newbury House to the north.

The dominant noise source affecting the site is mixed road traffic noise from the adjacent Bounds Green Road and Trinity Road to the south and, to a lesser extent, rail movements along the national rail lines, some 300m to the south. It is noted that the site lies above the London Underground's Piccadilly Line.

The site is also subject to noise from the wider road network, pedestrians, occupants of the existing estate, emergency services movements and occasional aircraft flyovers.

4.2 Proposed Development

The Proposed Development is understood to comprise the construction of a new residential block, providing a total of 23 dwellings.

Figures 2, 3 and 4 below show the proposed ground, first and typical upper floor plans for the proposed development.

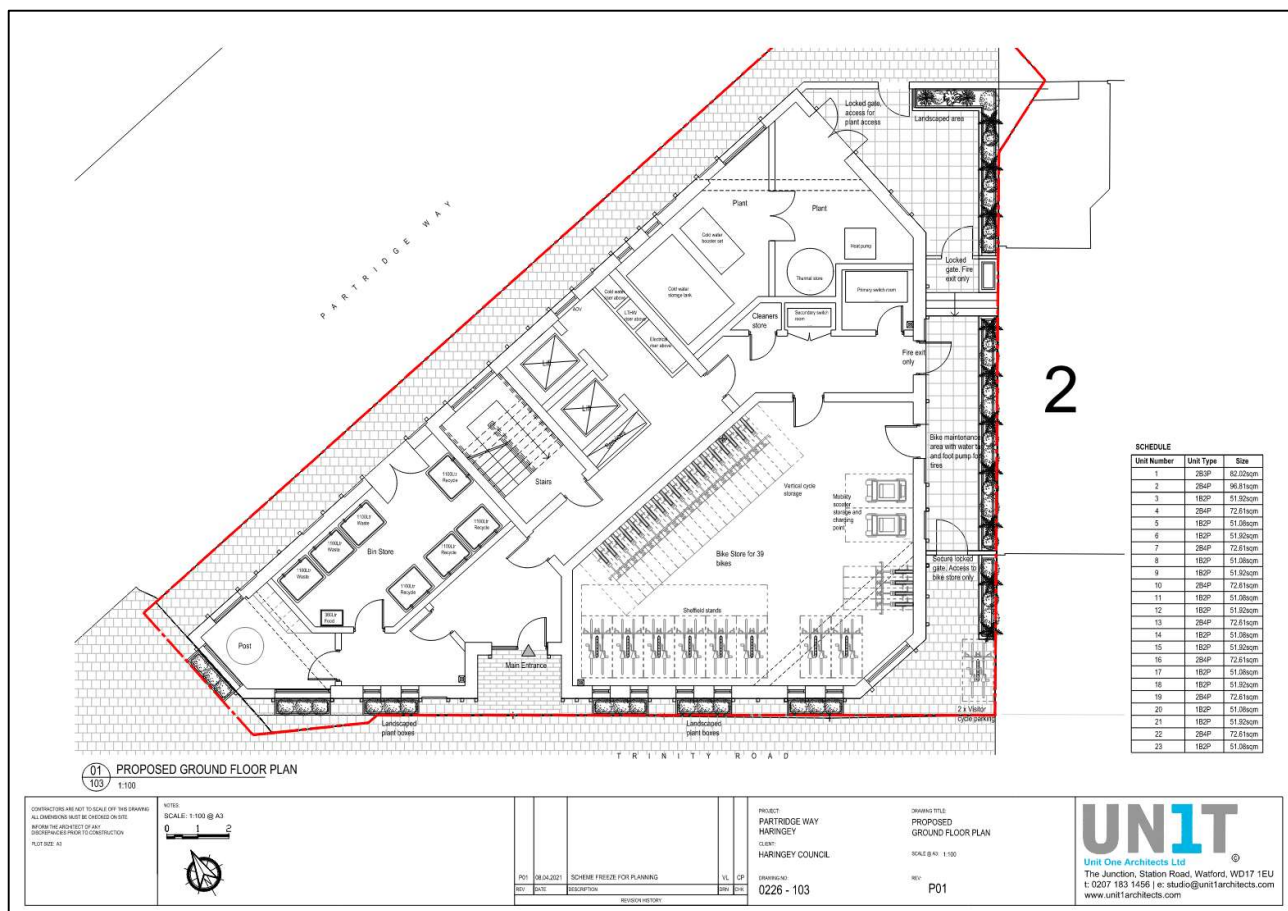


Figure 2: Proposed Ground Floor Level Layout

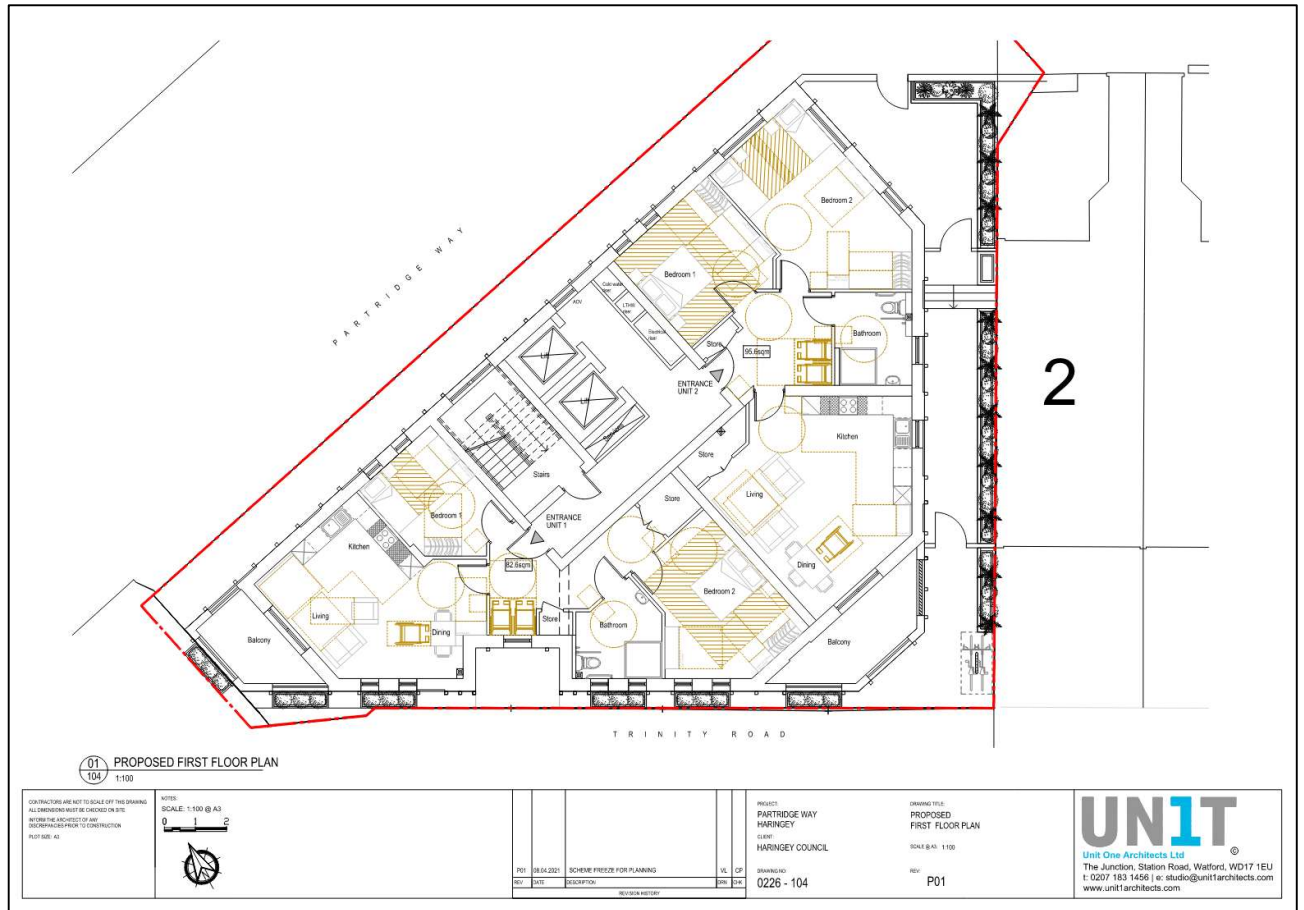


Figure 3: Proposed First Floor Layout

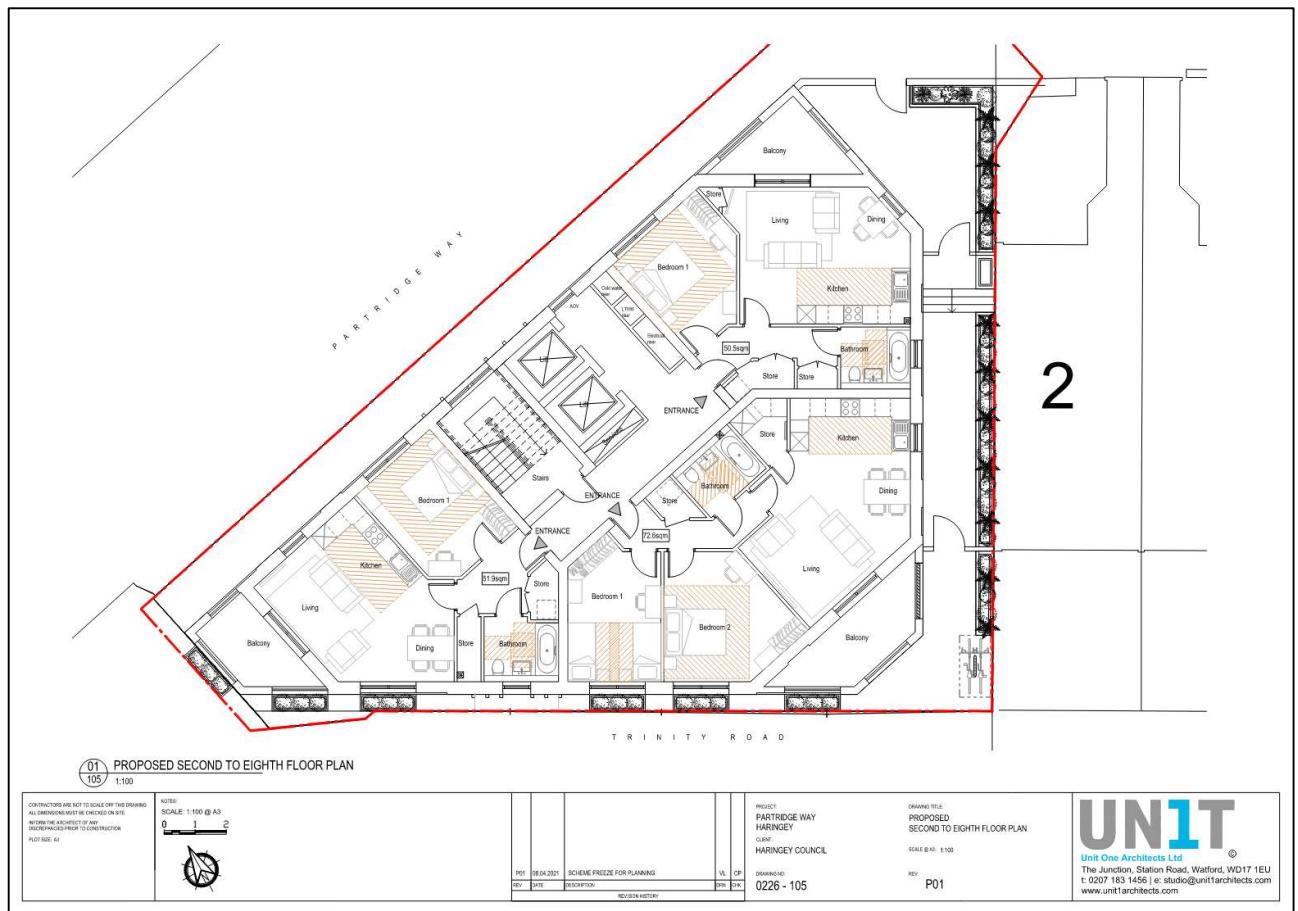


Figure 4: Proposed Typical Upper Floor Layout

5 Baseline Conditions

5.1 Surveys

The prevailing noise conditions affecting the proposed development site have been determined by a detailed environmental sound survey. The survey was conducted during both the daytime and night-time periods between Monday 19th and Tuesday 20th October 2020.

As a result of the open and unsecure nature of the proposed development site, it was not appropriate to undertake unattended continuous 24-hour noise monitoring.

Similarly, it was not appropriate to undertake unattended ground-borne vibration monitoring due to site security issues and inappropriate ground conditions. With regards to ground-borne vibration from the passage of London Underground trains, it should be noted that subjectively it is not perceptible at ground level; however, once a foundation/pile cap is in place vibration should be measured to check whether there is a ground-borne noise and/or vibration issue.

A series of short-form attended noise measurements were undertaken at a single ground level measurement position, close to the major road noise sources affecting the site. The short-form measurements were undertaken over a continuous three-hour period during the daytime and a continuous three-hour period during the night-time period, as follows:

- Daytime – 11:00 – 14:00 hours on 20th October 2020;
- Night-time – 23:00 – 02:00 hours on 19th/20th October 2020.

The results of the short-form daytime measurements can be used to undertake a CRTN assessment of noise levels. The three-hour daytime period was chosen to represent the typical, worst case noise levels that the site is likely to be exposed to during the daytime period. Based upon our previous experience the above is considered sufficient for our analysis.

The results of the short night-time measurements can be considered to represent a worst-case night-time noise climate, therefore allowing for the assessment of the worst-case maximum and period averaged noise levels encountered over this critical period. The three-hour night-time period was chosen to represent the typical worst-case noise levels that the site is likely to be exposed to during the night-time period. Based upon our previous experience the above is considered sufficient for our analysis. As a result of the short-form nature of the survey, in terms of background noise levels the lowest measured levels will be used. In our experience of similar sites in similar locations, this is considered to be sufficiently robust.

All noise measurements were undertaken by a consultant certified as competent in environmental noise monitoring, and, in accordance with the principles of BS 7445¹.

The results of the noise survey are used to:

- Determine the sound insulation performance of the building envelope based on the acoustic criteria, Local Authority and any Client specific requirements;
- Assess overheating risks
- Establish acceptable building services plant noise emission limits in accordance with the proposed acoustic criteria, Local Authority and any Client specific requirements;

¹ British Standard 7445: 2003: *Description and measurement of environmental noise*. BSI

Noise Survey Methodology

As detailed above, the noise survey comprised attended measurements undertaken at one fixed measurement position, as shown in Figure 5 below. Noise monitoring was undertaken over sequential 15-minute periods at each measurement position for the duration of the surveys.

Sound Indices

The sound indices measured during the sound survey are shown below:

- $L_{Aeq,T}$ - The A-weighted equivalent continuous sound pressure level over a period of time, T;
- $L_{Amax,T}$ - The A-weighted maximum sound pressure level that occurred during a given measurement period; Measured using the fast time weighting in accordance with the requirements of BS8233:2014;
- $L_{A10,T}$ - The A-weighted sound pressure level exceeded for 10% of the measurement period;
- $L_{A90,T}$ - The A-weighted sound pressure level exceeded for 90% of the measurement period. Indicative of the background sound level.

All noise measurements were undertaken by a consultant certified as competent in environmental noise monitoring, and, in accordance with the principles of BS 7445².

Measurement Equipment

All acoustic measurement equipment used during the noise survey conformed to Type 1 specification of British Standard 61672³. A full inventory of this equipment is shown in Table 1 below:

Table 1: Inventory of Acoustic Measurement Equipment		
Equipment	Manufacturer-Model Type	Serial Number
1- Sound Level Meter	01dB Fusion	11051
1 - Preamplifier	01dB PRE-22N°	1507093
1 - Microphone	GRAS 40CE	217662
Calibrator	Rion NC-74	34662223

The microphone was fitted with a protective windshield for the measurements, which are described in detail below and shown in Figure 5.

The noise measurement equipment used during the survey was calibrated at the start and end of each measurement. The calibrator used had itself been calibrated by a UKAS accredited calibration laboratory within the twelve months preceding the measurements. No significant drift in calibration was found to have occurred.

Weather Conditions

Weather conditions were dry with negligible wind during the monitoring period.

² British Standard 7445: 2003: *Description and measurement of environmental noise*. BSI

³ British Standard 61672: 2003: *Electroacoustics. Sound level meters. Part 1 Specifications*. BSI.

Measurement Positions & Noise Climate

Measurement Position 1 (MP1) – At a point on the southern extent of the proposed development site, facing onto Trinity Road and Bounds Green Road, approximately 1.4m above local ground level. Measurements undertaken in this position were free-field and were intended to provide a source level for the adjacent roads and other significant sources affecting the site. During our time on-site it was noted that the prevailing noise climate at this position was dominated by road traffic movements along Bounds Green Road and, to a lesser extent, vehicular movements along the adjacent Trinity Road. During lulls in road traffic, noise from the nearby rail lines to the south, and resident activities associated with the adjacent Finsbury House and Newbury House were also audible at this location.



Figure 5: Noise Monitoring Locations

5.2 Noise Survey Results

The measured daytime and night-time L_{Aeq} , L_{A90} , L_{A10} and L_{Amax} noise levels at spot measurement position 1 are detailed in Tables 2 and 3 below.

Table 2: Summary of Daytime Short-form Measurements

Position	Period	Measured Noise Level, dB			
		Average L_{Aeq}	Highest L_{Amax}	Lowest L_{A90}	Average L_{A10}
MP1	11:00 - 12:00	62.7	82.7	56.7	65.2
	12:00 - 13:00	62.4	77.5	55.6	65.0
	13:00 - 14:00	62.2	74.6	56.3	64.4

Table 3: Summary of Night-time Short-form Measurements

Position	Period	Measured Noise Level, dB			
		Average L_{Aeq}	Highest L_{Amax}	Lowest L_{A90}	Average L_{A10}
MP1	23:00 – 00:00	56.1	70.9	43.2	60.1
	00:00 – 01:00	56.4	74.7	42.4	60.3
	01:00 – 02:00	54.0	72.6	39.0	58.7

Typical daytime and night-time spectral noise levels are shown in graphical format in Figure C1 in Appendix C.

5.3 Calculation of Assessment Levels from Short-form Environmental Noise Measurements

The “Calculation of Road Traffic Noise” describes the following method by which a shortened survey can be used to obtain an equivalent daytime L_{Aeq} .

Measurements of L_{A10} are made over any three consecutive hours between 10:00 hours and 17:00 hours. Using L_{A10} (3 hour) as the arithmetic mean of the three consecutive values of hourly L_{A10} , the value of L_{A10} (18 hour) can be calculated from the following relationship:

- L_{A10} (18 hour) = L_{A10} (3 hour) – 1 dBA

The now superseded Planning Policy Guidance (PPG24) also described the relationship between L_{A10} (18 hour) and L_{Aeq} (16 hour) for road traffic noise, as shown below:

- L_{Aeq} (16 hour) = L_{A10} (18 hour) – 2 dBA

The above methodology is primarily intended for use at sites affected by road traffic noise only, so given the location of the site directly adjacent to Bounds Green Road and Trinity Road, it is considered appropriate to use such a method in this instance.

Accordingly, the calculated daytime $L_{Aeq,16hr}$ noise levels at each position are detailed in Table 4 below, along with the adopted night-time noise levels. For the night-time noise levels, please note that the highest average hourly L_{Aeq} , maximum $L_{Amax,15 mins}$ and minimum $L_{A90,15 mins}$ noise levels have been selected, to ensure a reasonable worst-case assessment.

Table 4: Calculated Daytime L_{Aeq} & Adopted Night-time L_{Aeq} , L_{Amax} & L_{A90} Noise Levels

Measurement Position	Calculated Daytime $L_{Aeq,16 hour}$ Noise Level, dBA	Adopted Night-time $L_{Aeq,8 hour}$ Noise Level, dB *	Adopted Night-time L_{Amax} Noise Level, dB *	Adopted Night-time L_{A90} Noise Level, dB **
MP1	61.8	56.4	74.7	39.0
* note: maximum of all discrete measurements				
** note: minimum of all discrete measurements				

6 Noise Modelling

In order to predict the impact of noise on the proposed development, the baseline noise measurement results presented in Section 4 have been used to produce a detailed 3-dimensional geo-referenced noise model, which allows us to predict the propagation of noise from the nearby roads and rail sources across the site using a tried and tested, industry standard methodology.

The predictions have been carried out using the noise-modelling suite Cadna/A, in accordance with the CRN, CRTN and ISO 9613 prediction methodologies (where appropriate), which allows us to model the various road and rail noise sources, whilst taking consideration of the effects of the acoustic screening provided by the as-built structures of the proposed development.

The results of the noise survey have been processed to determine appropriate noise emission rates for the adjacent roads/noise sources, as required to populate the model. For the road and most other off-site noise sources the calculated $L_{Aeq,16hr}$ daytime (07:00-23:00) and $L_{Aeq,8hr}$ night-time (23:00-07:00) noise levels have been determined by calculation and with reference to the short-form measurements undertaken during the survey.

The noise model was then run to validate the assumptions and ensure that the predicted noise levels matched the measured noise levels across the site.

In addition to the road and rail source noise levels used in the predictions, the model also considers the effects of the topographical conditions throughout the area, ground absorption, atmospheric absorption, acoustic reflections and acoustic screening, as well as applying a light downwind propagation correction to represent a worst-case.

As detailed in the following Sections of this report, in the first instance the noise model has been used to determine typical worst-case daytime (07:00 - 23:00) and night-time (23:00 to 07:00) L_{Aeq} noise levels across the existing site. For reference, the daytime and night-time L_{Aeq} noise levels affecting the site are shown in Figures D1 and D2 of Appendix D. Please note the noise maps depict the predicted noise levels at 1.5m above ground level.

7 ProPG Stage 1 – Initial Noise Risk Assessment

The noise model has been used to determine the daytime and night-time $L_{Aeq,T}$ noise levels across the proposed development site, on an open site basis. It must be noted that, as required for a ProPG Stage 1 Assessment, the results do not include the impact of any new or additional mitigation measures to be included in the development proposals.

Figures D3 and D4 in Appendix D identify the likely off-site noise risks affecting the site, which is based on the guidance contained within ProPG and the predicted site-wide noise levels as shown in Figures D1 and D2 in Appendix D.

The noise maps shown in Figures D3 and D4 of Appendix D identify that during the daytime period (07:00 – 23:00), most of the site falls within the 'Low/Medium' risk category when considering noise from external environmental sources. However, as a worst case, the area of the site facing directly onto Trinity Road is predicted to fall within the 'Medium' risk category. The remainder of the site, which benefits from both increased distance from the major noise sources and acoustic screening by the adjacent buildings, is predicted to fall into the 'Low' and or 'Negligible' risk categories during the daytime period.

The noise maps also identify that during the night-time period (23:00 – 07:00), most of the site falls within the 'Medium' risk category when considering noise from external environmental sources. However, as a worst case, the area of the site facing directly onto Trinity Road is predicted to fall within the 'Medium/High' risk category. The remainder of the site, which benefits from both increased distance from the major noise sources and acoustic screening by the adjacent buildings, is predicted to fall into the 'Low/Medium' or 'Low' risk categories during the night-time period.

From this initial noise risk assessment, it can be concluded that the proposed development site is subject to relatively typical levels of off-site environmental noise for a site in this setting, being in an urban environment close to transport infrastructure. It should also be noted that the noise levels (and hence, risk levels) would not be expected to reduce significantly as height above ground increases. Accordingly, it will be important to ensure that a good acoustic design is adopted in order to avoid adverse noise impacts on the completed development.

8 ProPG Stage 2 – Full Noise Assessment

In accordance with Stage 2 of Professional Practice Guidance (ProPG) – Planning & Noise, a full noise Assessment of the proposed development has been undertaken. Elements 1 to 4 of the Stage 2 Assessment have been addressed in this section of the report.

8.1 Good Acoustic Design Process

The following recommendations are provided to facilitate a development having a good acoustic design. ProPG states that '*Good acoustic design should provide an integrated solution whereby the optimum acoustic outcome is achieved, without design compromises.*'

Where feasible and practical, the following measures would provide an acoustic benefit to the scheme and would constitute good acoustic design.

- Maximise the distance between the proposed dwellings and the nearby roads;
- Provide screening between the adjacent roads and the proposed dwellings;
- Locate sensitive habitable rooms such as bedrooms and living rooms on the side of the dwellings which do not face the surrounding roads;
- Locate external amenity space behind the proposed dwellings, away from the surrounding roads;
- Provide an appropriate ventilation strategy, as detailed later in this Report; and
- Provide enough building envelope sound reduction, as detailed later in this Report.

It is essential to note that the above recommendations will not be possible in all cases, and that it is possible and acceptable to provide suitable acoustic conditions without having to implement all the guidelines set out above.

Further to the above, in this case maximising spatial separation of noise sources and receptors is not considered feasible, given the shape and location of the site, adjacent to the busy road network in a city centre location. The existing topography of the site would not be expected to result in significant reduction in noise levels at the proposed façade locations and the erection of large noise barriers would not be feasible, would be considered visually detrimental to the scheme and wider area, as well as being largely ineffective in providing any significant reduction to the façade incident noise levels affecting the proposed development.

Similarly, given the proposal comprises the erection of a mid-rise block of flats within a constrained site, reorientation of the flats and/or the site as a whole is not expected to prove possible or to be capable of providing a significant reduction of site-wide noise levels.

As such, in this instance it is considered that placing reliance on the building envelope and ventilation system/strategy to mitigate noise is the most feasible solution to ensure the occupants are provided with suitable internal ambient noise levels during the daytime and night-time periods.

8.2 Predicted Façade Noise Conditions

In order to assess the impact of noise on the proposed dwellings, the noise model was updated to include the proposed new building and the necessary calculations were re-run, thus providing cumulative daytime and night-time $L_{Aeq,T}$ noise level predictions at the proposed façade locations.

As shown in Figures D5 – D10 in Appendix D, the noise model has been used to determine typical worst-case daytime (07:00 - 23:00) and night-time (23:00 to 07:00) L_{Aeq} and L_{Amax} noise levels at various façade locations around the site, for use in the following assessment. Please note that the façade incident noise level indicators shown in Figures D5 – D10 indicate the relevant daytime $L_{Aeq,16\text{ hour}}$ and/or night-time $L_{Aeq,8\text{ hour}}$ noise levels respectively.

Night-time L_{Amax} noise levels at the proposed building façade have been assessed by using a point source located at approximately 1m from the nearside carriageway edge of the adjacent road, directly in front of the various receivers. The point sources have each been calibrated to meet the typical worst-case typical measured night-time L_{Amax} level. Once calibrated to meet the measured noise levels, the point sources have then been moved around the curtilage of the site to enable an assessment of the likely maximum noise levels at each façade location. Accordingly, we have predicted night-time maximum noise levels of circa 66 dB L_{Amax} at facades overlooking Bounds Green Road and Trinity Road.

As can be seen from Figures D5 – D10, as a worst case the noise modelling exercise has predicted a façade incident level of 63 dB $L_{Aeq,16 \text{ hour}}$ during the day and 57 dB $L_{Aeq,8 \text{ hour}}$ during the night. These levels are predicted on the southern façade, with the remaining façades expected to experience marginally lower noise exposure levels as a result of the screening provided by the built form of the development. As a worst case, maximum levels of 66 dB L_{Amax} are predicted during the night-time period at the worst-case southern façade location.

Predicted Noise Risks

In order to aid understanding of the level of noise risk at each proposed façade location, Figures D11 – D16 in Appendix D indicate the worst-case predicted L_{Aeq} noise level at each façade location for the daytime and night-time periods respectively, presented in terms of the identified ProPG risk categories.

As may be seen with reference to Figures D11 – D16, as a worst case, the southern, western and eastern façades of the proposed development which face onto Trinity Road and Bounds Green Road are expected to be subject to a Medium risk during the daytime period and a Medium/High risk during the night-time period as a worst-case. The northern façade is expected to be subject to a Low/Negligible risk during the daytime and a Low/Medium risk during the night-time period.

8.3 Internal Noise Level Guidelines

In order to achieve appropriate noise levels within internal living spaces, the dwellings themselves need to be considered regarding the level of façade mitigation required. BS 8233:2014 states internal noise level criteria of <35 dB(A) in living rooms and bedrooms during the daytime (07:00 – 23:00) and <30 dB(A) in bedrooms during the night-time (23:00 – 07:00). In addition, ProPG recommends that individual noise events should not normally exceed 45 dB $L_{Amax,F}$ more than 10 times a night in bedrooms and no event higher than 55 dB $L_{Amax, F}$ should be permitted.

In order to achieve the target daytime and night-time internal noise levels, it is necessary to determine the minimum acoustic performance requirements of the ventilation system (i.e. for normal background ventilation provisions) and the building envelope. As such, the open site constraints model referred to earlier in this report has been amended to include the proposed development, in order to permit the assessment of noise impacts on the completed development.

Accordingly, Figures D17 – D22 in Appendix D identify the predicted site-wide noise levels in the context of key internal amenity L_{Aeq} benchmarking criteria, as set out in BS 8233 for the daytime 16-hour (07:00 to 23:00) and night-time 8-hour (23:00 to 07:00) periods.

As may be seen with reference to Figures D17 – D22, our assessment has shown that the majority of the development site will require double glazed window units and an alternative form of (background) ventilation (i.e. as opposed to opening windows) to ensure the appropriate internal ambient noise levels can be achieved.

8.3.1 Façade Requirements

In order to achieve appropriate noise levels within external living spaces, the dwellings themselves need to be considered with regard to the level of façade mitigation required in order to achieve internal noise levels of <35 dB(A) in habitable rooms during the day and <30 dB(A) during the night.

The Building Regulations recommend on ventilation that habitable rooms in dwellings have background ventilation. Internal noise levels should be considered in the context of room ventilation requirements. In this instance, the target internal noise levels will only be achieved in most habitable rooms when windows are closed. An alternative means of background ventilation will therefore be required to comply with the requirements of the Building Regulations Approved Document F.

In order to achieve the target daytime and night-time internal noise levels, it is necessary to determine the minimum acoustic performance requirements of both the glazing and ventilation system. In this instance it is assumed that the default choice of glazing for the habitable rooms of the proposed development will be thermal triple glazing and the default choice for ventilation across the entire scheme will be via background ventilators.

As already stated; in order to provide a robust assessment and a high quality living environment for future residents, providing internal noise levels of <35 dB(A) by day and <30 dB(A) by night as defined in BS 8233 has been adopted as the design target for the proposed development. For robustness and for the purposes of planning, the façade specification provided has been determined based on the most unscreened (i.e. noisy) storey of the proposed dwellings.

To determine the glazing and ventilation requirements in order to provide an adequate level of protection against external noise intrusion, $L_{Aeq,16\text{ hour}}$ daytime and $L_{Aeq,8\text{ hour}}$ and L_{Amax} night-time noise levels have been predicted at the building façades. The predictions have been carried out at all floor levels, with the worst-case floor being considered in each instance.

Accordingly, the required composite $R_w + C_{tr}$ sound reduction performance for the worst-case dwelling façade has been determined, to provide appropriate internal noise levels during both daytime and night-time periods, as described, is identified in Table 5 below.

Location	Room	Predicted Façade Incident Noise Level, dB		Target Internal Noise Level - dB		Required Sound Reduction Performance
		Day	Night	Day	Night	
Worst-Case Dwelling (Southern Façade)	Bedroom/Living Room L_{Aeq}	63	-	35	-	28
	Bedroom L_{Aeq}	-	57	-	30	27
	Bedroom L_{Amax}	-	66	-	45	21

Table 5 identifies that the sound reduction performance requirements for the worst-case dwellings located on the Bounds Green Road façade are driven by the requirement to ensure daytime and night-time average noise levels in bedrooms are suitably controlled. However, it should be noted that the identified requirements are comfortably within the stated sound insulation performance of typically available standard thermal façade treatments.

It should be noted that sound reduction performances detailed in Table 5 apply to habitable rooms, such as living rooms and bedrooms only. For non-habitable rooms, such as kitchens, bathrooms, stairways, halls, landings etc, lower façade insulation performances would be permissible.

Based on assumed layouts, Table 6 below sets out the typical acoustic performance requirements for the worst-affected façade (i.e. Southern façade). Please note that the calculations are based on the latest layout proposals.

Table 6: Worst-Case Performance Requirement for External Residential Facades, Glazing and Ventilators					
Example Glazing	Frequency, Hz				
	125	250	500	1000	2000
	Sound Reduction Performance, R dB				
All rooms – standard thermal double glazing (4/12/6)	23	22	27	38	40
Example Ventilators					
All rooms – standard trickle vent	33	34	32	37	30
Example External Walls					
All rooms - Brick/SFS External Wall	40	47	53	62	71

The above worst-case mitigation measures are intended to demonstrate that appropriate internal ambient noise levels are achievable throughout the entire development with the use of suitable façade treatments, for the purposes of obtaining a grant of planning permission and not for the purposes of detailed design or glazing procurement.

Clearly, other solutions to those proposed above may be appropriate, and it will be the responsibility of the architect/façade engineers and glazing suppliers to recommend and provide appropriate systems.

The aspects of the detailed design that are important are the room dimensions, their location relative to the noise sources affecting the site, the room finishes, the window dimensions and the sound reduction performance of any non-glazed elements. Clearly, as the design progresses a detailed assessment will be required.

8.4 External Amenity Area Noise Assessment

It is understood that the proposed development will include private external amenity spaces in the form of private balconies.

The key significance criteria adopted for this assessment are those contained within BS 8233:2014, as summarised in Appendix B - Policy and Assessment Methodology. The standard advises that noise levels in residential external amenity areas should not generally exceed a lower guideline value of 50 dB $L_{Aeq,16\text{ hours}}$, with an upper guideline limit of 55 dB $L_{Aeq,16\text{ hours}}$ for sites in noisier areas, close to transportation infrastructure etc.

As a worst case, the proposed external amenity areas overlooking Bounds Green Road are expected to experience daytime noise levels in excess of 60 dB $L_{Aeq,16\text{ hours}}$, whilst those areas located on the northern façade are expected to experience noise levels of between 51 and 54 dB $L_{Aeq,16\text{ hours}}$.

With reference to the above, it should be noted that BS8233:2014 recognises that the recommended limits may not be always achievable, especially in situations where the proposed development is in an urban area, close to transport infrastructure. In this instance, the level of exceedance is expected to be low (i.e. no more than 60 dBA $L_{Aeq,16\text{ hours}}$). When considered in combination with the fact that the provision of several communal amenity spaces has been included in the proposed scheme along with close access to Trinity Gardens and Avenue Gardens, it is clear that future tenants of the worst-affected private balcony areas will have the opportunity to use one of the communal external amenity spaces as an alternative to their private balcony.

Given the context and setting of the proposed development, this is considered a fair compromise and as such, it is considered that the scheme should not be refused planning permission because of external amenity noise levels. Where necessary, it would be possible to further reduce noise levels in these areas with the provision of taller solid balustrades, and/or absorptive soffit treatments to the balconies, but the ongoing maintenance and general up-keep of such treatments should be carefully considered. As an alternative, consideration may need to be given to the provision of winter gardens to the worst-affected areas of the development to ensure blanket compliance across the scheme.

8.5 Assessment of Other Relevant Issues

8.5.1 Compliance with Relevant National/Local Policy

Whilst the site is exposed to medium levels of road traffic noise in the worst case, compliance with the principals of the NPPF and NPSE have been followed as far as is reasonably practicable and mitigation of such noise levels has been demonstrated by the provision of appropriate building envelope specifications and ventilation strategy.

8.5.2 Magnitude and Extent of Compliance with ProPG

The site and the proposed layout are such that a number of the proposed road fronting dwellings will fall within the Medium risk area during the daytime and within the Medium/High risk area during the night-time period, with those dwellings facing away from the main roads being limited to no more than a Low/Medium risk. No dwellings are proposed within a High-risk zone.

Some communal external amenity space can be provided with suitable daytime noise environments, but some small private balconies will experience noise levels in excess of the guideline levels; however, BS8233 states that this is not expected to cause significant adverse impact.

Guidance on the acoustic performance requirements of the worst-case façade have been provided. Appropriate acoustic conditions can be achieved following the building envelope and ventilation strategy design advice provided in this report. In the worst case, opening windows will lead to excessive internal noise levels and, as such, alternative means for the mitigation of overheating are recommended (see Section 8 of this report) in these areas.

8.5.3 Likely Occupants of the Development

Due to the varying noise levels across the site, it can be determined that there are a range of acoustic conditions which would in turn be suitable for a wide range of occupants. Families with young children would be more suited to plots in the quieter areas of the site, however, all areas are designed to achieve the best practicable acoustic conditions for all occupant types.

8.5.4 Acoustic Design versus Unintended Adverse Consequences

Consideration has been given to summer overheating in Section 8 of this report.

8.5.5 Acoustic Design versus Planning Objectives

The current need for additional houses in the area and across the country brings challenges with regards to the acoustic design of developments close to transportation networks and busy urban areas. The good acoustic design process implemented for this scheme demonstrates how appropriate acoustic conditions can be achieved through carefully considered design work.

9 Overheating Assessment

To avoid significant adverse impacts on residents, the amount of time that overheating occurs should be limited. Enhanced ventilation rates are often required to mitigate overheating and therefore it is possible that higher noise levels may be experienced in habitable rooms during this ventilation condition.

As suggested in the AVO guidance, the significance of the impact on the occupants in relation to noise ingress during the overheating condition is proportional to the duration. The guide suggests that when overheating is a rare occurrence, occupants are generally less sensitive to increased noise levels. However, in contrast, when overheating is expected to occur for prolonged periods, the occupants tend to become more sensitive to elevated noise levels.

Notwithstanding, as a worst typical case, it should be ensured that noise levels within habitable rooms do not exceed the guideline values from the ANC Acoustics, Ventilation and Overheating (AVO) guidance, whilst mitigation measures to alleviate overheating are active.

Based on the assumption that windows are to be opened to alleviate overheating, in order to determine the likely overheating noise risk across the site, graphical mark-ups have been produced which show the anticipated risk levels based on the predicted external noise level from road traffic at each façade location; this is in accordance with the AVO guidance. These are presented in Figures D23 – D28 in Appendix D, which indicate there is a range of potential risks across the site.

For the areas identified as 'Low' risk, the AVO guidance states that it is suitable to use open windows to mitigate overheating. For the identified 'Medium' and 'High' risk areas, there is potential for adverse impact if windows are required to be open to mitigate overheating for prolonged periods.

Notwithstanding the above, a detailed TM-59 overheating assessment has been undertaken by the Building Services Engineers, which has shown that with the currently selected mechanical ventilation system in place, there is no requirement for the occupants to open their windows to alleviate overheating and hence, satisfy the requirements of the TM-59.

As such, it can be reasonably concluded that with the recommended façade treatments (i.e. glazing provisions) in place, the internal noise levels resulting from external noise break-in would be expected to satisfy the thresholds detailed in BS8233:2014 during the overheating condition, which means that the noise risks associated with overheating are expected to be fully mitigated. This is considered wholly acceptable.

It will be important to ensure that internal ambient noise levels in the habitable rooms resulting from the operation of the ventilation system do not exceed the following limits when cooling is active. The recommended limits equate to a 5 dB relaxation from the BS8233 IANL limits, which is considered reasonable and appropriate. However, if BS 8233 complaint levels can be achieved, these should be targeted to further minimise impacts.

- Bedrooms: 35 dB L_{Aeq} & 55 dB L_{Amax} at night
- Living Rooms: 40 dB L_{Aeq} daytime

10 Control of Building Services Noise

10.1 External Plant Noise Limits (at Nearest Noise Sensitive Receptor)

The assessment at the nearest sensitive receptors is based on the following guidance:

- British Standard 4142:2014 Method for Rating and Assessing Industrial and Commercial Sound;

The noise criteria set out in Table 7 are proposed in accordance with the BS4142:2014. These limits are based on achieving a rated noise emission level of no greater than the existing typical background noise level at the nearest noise sensitive receptor, during a typical period.

The following plant rating noise limits are proposed.

Location	Operating Period	Minimum Measured Background Noise Level dB L _{A90,1hour}	Proposed Plant Rating Limit at the Nearest Noise Sensitive Receptor dB L _{Ar,T}
NNSR	Daytime (07:00 - 23:00)	60	60
	Night-time (23:00 - 07:00)	39	39

These limits apply to the operating hours of the installation, which may be during the day and night-time periods. The limits will apply to the total sound emission level from all static plant and processes within the proposed development. Individual plant items may need to be designed to a lower limit such that the overall total achieves the stated criteria above. Should the proposed plant items be found to be tonal, or impulsive in nature (to attract attention), an appropriate penalty correction would need to be applied to the calculated plant specific noise level.

10.2 Nearest External Noise Sensitive Receptors (NNSR)

The nearest existing noise-sensitive receptors (NNSRs) are expected to be the existing residential properties adjacent to the proposed development site, along Trinity Road and the existing residential properties within the adjacent Finsbury House and Newbury House.

11 Conclusion

MLM Consulting Engineers Limited has been commissioned by the London Borough of Haringey to assess the impact of noise at the proposed residential development site at Partridge Way, Wood Green, London, in respect of the site's suitability for residential development, in support of a planning application.

Accordingly, this report presents an Acoustic Design Statement for the above site, including a 'Stage 1: Initial Site Noise Risk Assessment' and a 'Stage 2: Full Assessment', in line with advice on Professional Practice Guidance (ProPG) – Planning & Noise.

The assessment in Stage 1 is based on a detailed environmental noise survey undertaken at the Site and the surrounding area. A noise model validated at the monitoring positions has been used to predict the noise levels across the site and to inform the subsequent assessment in accordance with ProPG Stage 2.

The report also includes a Site Noise Risk Assessment during the Overheating Condition, identifying the potential noise risk during the overheating condition.

The report assesses the predicted noise levels across the site and provides outline advice on good acoustic design options to achieve suitable ambient noise levels within habitable rooms and within external amenity areas. This has shown that appropriate internal ambient noise conditions can be achieved within the proposed dwellings with use of standard façade treatments and an alternative ventilation strategy. External noise levels are expected to exceed the recommended upper noise threshold in the worst cases, but alternative quiet communal amenity spaces are available these occupants.

The overheating noise risk assessment has shown that with the proposed ventilation strategy in place, windows will not be required to be opened to alleviate overheating and, as such, that the recommended BS 8233:2014-led internal ambient noise levels are expected to be achieved under all ventilation conditions.

The report also includes noise emission limits for any plant or processes associated with the proposed development.

Subject to the recommendations of this report and further investigation relating to ground-borne vibration, it is considered that planning permission should not be refused on noise grounds, and should therefore, be granted with appropriate conditions.