289 Gray's Inn Road London

Environmental Noise Survey and Noise Impact Assessment Report

31841/NIA1

30 October 2024

For: Trans-world Investments Ltd c/o Fresson & Tee Queens House 55-56 Lincoln's Inn Fields London WC2A 3LJ



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Environmental Noise Survey and Noise Impact Assessment Report 31841/NIA1

Conte	ents	Page
1.0	Introduction	1
2.0	Objectives	1
3.0	Acoustic Terminology	2
4.0	Site Description	2
5.0	Proposed Development	3
6.0	Planning Policies, Standards & Guidance	4
7.0	Baseline Noise Survey	6
8.0	Achieving Internal Noise Levels	9
9.0	External Amenity Area	12
10.0	Operational Noise Impacts	14
11.0	Conclusions	18

Attachments

- Appendix A Acoustic Terminology
- Appendix B Relevant Planning Policies and Guidance
- Appendix C Time History Graphs

1.0 Introduction

Hann Tucker Associates Limited (Hann Tucker) has been commissioned by Trans-world Investments Ltd to undertake a noise assessment for a site in London.

The site, which is located at 289 Gray's Inn Road, is proposed to undergo redevelopment. The redevelopment includes commercial use at basement and ground floor. The commercial unit will require extract and intake ductwork to the rear of the building to serve the unit. A single residential unit is proposed at first floor, and a duplex residential unit is proposed at second and third floor.

The site is subject to road noise, pedestrian noise, as well as some existing industrial noise from pre-existing plant items.

Baseline noise conditions have been established by means of a detailed noise survey, presented herein. The findings have subsequently been used to assess the suitability of the site for residential use. Measures required to mitigate noise impacts for the proposed development (when operational) have been discussed in context with relevant national & local planning policies, design standards and good practice guides.

Suitable plant noise emission criteria based on the requirements of the of the Local Authority and/or the application of BS 4142: 2014+ A1:2019 have been established, and a plant noise impact assessment undertaken.

Measures required to mitigate noise impacts for the proposed development (when operational) have been discussed in context with relevant national & local planning policies, design standards and good practice guides.

2.0 Objectives

To undertake a detailed environmental noise survey to establish the existing L_{Amax} , L_{Aeq} and L_{A90} environmental noise levels at selected accessible positions.

To obtain data that can be used to determine the requirements for sound insulation of the external facades at a later date.

Based on the results of the survey, to undertake a noise assessment to assess the suitability of the site for residential use in accordance with the Noise Policy Statement for England (NPSE), National Planning Policy Framework (NPPF), Planning Practice Guidance (ProPG), British Standard BS8233:2014 and Local Authority requirements.

Page 2

To discuss noise mitigation and acoustic design solutions to achieve acceptable noise levels in residential areas.

To assess the noise emissions from the proposed plant, based upon data with which we are provided, and comment upon the acceptability.

To advise on noise control measures if required.

3.0 Acoustic Terminology

For an explanation of the acoustic terminology used in this report please refer to Appendix A enclosed.

4.0 Site Description

4.1 Location

The site is located on Gray's Inn Road, in London, and falls within the jurisdiction of London Brough of Camden.



Location Map (Drawing provided by Fresson & Tee)

Page 3

4.2 Description

289 Gray's Inn Road is an existing terraced building, consisting of sui generis use at basement and ground levels, and existing residential units across first, second, and third floor.

The surrounding area consists of similar mixed use developments with commercial use at ground level and residential and/or office use at upper levels.

The site is shown in the Site Plan below.



Site Plan (maps.google.co.uk)

5.0 Proposed Development

The proposal is to redevelop 289 Gray's Inn Road, so as to provide commercial use at ground and basement level, and new residential units at first, second, and third floors.

New intake and extract plant is proposed to be installed to serve the ground and basement commercial use.

An extension to the ground, first, second, and third floors is proposed to the rear of the development site.

The existing and proposed site layouts are shown in the drawings overleaf provided by Fresson & Tee.



Existing floorplans (drawings provided by Fresson & Tee



Proposed floorplans (drawings provided by Fresson & Tee

6.0 Planning Policies, Standards & Guidance

6.1 Policies & Guides

In order to provide a suitable assessment a number of national planning policies have been considered, including:

- The National Planning Policy Framework (NPPF), 2023
- The Noise Policy Statement for England (NPSE), 2010
- Planning Practice Guidance Noise (PPGN), 2019

The above documents highlight the importance of considering the potential noise effects on any new residential development and provide a qualitative approach to assessment. However, each of the above does not provide any quantitative guidance. As such, all quantitative guidance used to form a noise impact assessment is taken from various other standards, guidance, and

Local Authority requirements as summarised below:

- Local Planning Policy
- The London Plan (2021)
- London Plan Sustainable Design and Construction SPG
- World Health Organisation: 2018
- British Standard BS8233: 2014
- ProPG : Planning & Noise: 2017
- British Standard 4142:2014 + A1:2019

Detailed information for relevant planning policies and guidance can be found within Appendix B.

6.2 Specific Local Authority Criteria

The site lies within the jurisdiction of London Borough of Camden. The council have requirements pertaining to commercial/industrial noise sources as follows:

"Industrial and Commercial Noise Sources

A relevant standard or guidance document should be referenced when determining values for LOAEL and SOAEL for non-anonymous noise. Where appropriate and within the scope of the document it is expected that British Standard 4142:2014 'Methods for rating and assessing industrial and commercial sound' (BS 4142) will be used. For such cases a 'Rating Level' of 10 dB below background (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 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 88dBLAmax

*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."

7.0 Baseline Noise Survey

7.1 Procedure

Fully automated environmental noise monitoring was undertaken by Nick Russell MIOA and assisted by James Corbey from approximately 14:45 hours on Friday 20 September 2024 to 14:45 hours on Monday 23 September 2024, to establish full daytime and night-time noise levels over a typical weekday and weekend period. Measurements were taken continuously of the A-weighted (dBA) L₉₀, L_{eq}, and L_{max} sound pressure levels over discrete 2 and 15-minute periods.

7.2 Measurement Positions

The noise level measurements were undertaken at 2No. positions as described in the table below.

Position	Description		
	The microphone was located at second floor level overlooking Gray's Inn Road.		
1	The sound level meter was located within an environmental case and connected to the microphone via an extension cable.		
	The microphone was positioned approx. 1m from the façade.		
	The microphone was located at second floor level overlooking the rear lightwell.		
2	The sound level meter was located within an environmental case and connected to the microphone via an extension cable.		
	The microphone was positioned approx. 1m from the façade.		

The positions are shown on the plan below.



Plan Showing Measurement Positions (maps.google.co.uk)

7.3 Weather Conditions

Local weather reports indicated no notable periods of prolonged and/or heavy rainfall, with temperatures ranging from 9°C (night) to 23°C (day) and wind speeds generally less than 6m/s. During our time on site, skies were largely clear with patchy cloud cover, wind conditions were moderate and road surfaces were largely dry.

7.4 Instrumentation

Position	Description	Manufacturer	Туре	Serial Number	Calibration
	Type 1 ½" Condenser Microphone	ACO Pacific	7052E	71786	Calibration on 03/01/2024
1	Preamp	Svantek	SV18	135659	Calibration on 03/01/2024
	Type 1 Data Logging Sound Level Meter	Svantek	971	87087	Calibration on 03/01/2024
	Type 1 ½" Condenser Microphone	ACO Pacific	7052E	75560	Calibration on 01/08/2024
2	Preamp	Svantek	SV18	83547	Calibration on 01/08/2024
	Type 1 Data Logging Sound Level Meter	Svantek	971	72538	Calibration on 01/08/2024
All Type 1 Calibrator		Bruel & Kjaer	4230	1411668	Calibration on 26/07/2024

The instrumentation used during the survey is presented in the table below:

Each sound level meter, including the extension cable, was calibrated prior to and on completion of the surveys. No significant changes were found to have occurred (no more than 0.1 dB).

Each sound level meter was located in an environmental case with the microphone connected to the sound level meter via an extension cable. Each microphone was fitted with a windshield.

7.5 Results

The results have been plotted on Time History Graphs 31841/TH1 and 31841/TH2 enclosed presenting the 15 minute A-weighted (dBA) L₉₀, L_{eq} and L_{max} levels at each measurement position throughout the duration of the survey.

In order to compare the results of our survey with the relevant guidelines it is necessary to convert the measured $L_{Aeq(15 \text{ minute})}$ noise levels into single figure daytime $L_{Aeq(16 \text{ -hour})}$ (07:00-23:00 hours) and night-time $L_{Aeq(8 \text{ -hour})}$ (23:00-07:00 hours) levels.

A summary of the results, as used to inform subsequent assessments against current guidelines, is presented in the table below. The L_{A90} values presented are the lowest 15-minute readings as required by London Borough of Camden. L_{Afmax} values are the '10th highest' 2-minute values.

		Daytime (07:00 – 23:00 hrs)		Night-time (23:00 – 07:00 hrs)		
Position	Day/Period	L _{Aeq,16hr}	Lowest L _{A90,15min}	L _{Aeq,8hr}	Lowest L _{A90,15min}	10 th Highest L _{Amax,2min}
	Friday 20 September 2024	71*	58	70	51	87
4	Saturday 21 September 2024	70	57	69	52	81
1	Sunday 22 September 2024	70	58	70	51	83
	Monday 23 September 2024	70*	62	-	-	-
	Friday 20 September 2024	51*	44	50	41	68
	Saturday 21 September 2024	50	43	55	41	66
2	Sunday 22 September 2024	53	42	58	40	69
	Monday 23 September 2024	55*	47	-	-	-

*Denotes an incomplete period

The above levels are as measured at the measurement positions and include local reflections.

7.6 Discussion of Noise Climate

Due to the nature of the survey, i.e. unattended, it is not possible to accurately describe the dominant noise sources, or specific noise events throughout the entire survey period. However, at the beginning and end of the survey period the noise climate at Position 1 was noted to be dominated by road traffic noise on Gray's Inn Road, and Position 2 was noted to consist of noise sources including existing plant and road traffic.

8.0 Achieving Internal Noise Levels

There are 3No ventilation conditions applicable to proposed residential dwellings. These are Background Ventilation as described in Approved Document F (Part F), Overheating as described in Approved Document O (Part O), and Purge Ventilation (odour and smells).

It should be noted that the internal noise level guidelines are generally not applicable under *"purge ventilation"* conditions as defined by Part F, as this should only occur occasionally (e.g. to remove odour from painting and decorating or from burnt food).

As such, acoustic conditions are generally not a concern during purge ventilation.

Additionally, ADO only applies to new buildings so does not apply in the context of this application.

8.1 Background Ventilation Condition

8.1.1 Criteria

With reference to the acoustic standards and guidelines as reviewed in Appendix B, the external noise intrusion levels from environmental sources should be controlled so as to not exceed the following criteria.

Activity	Location	Desirable Internal Ambient Criteria		
Activity	Location	07:00 - 23:00	23:00 - 07:00	
Resting	Living Rooms	35 dB LAeq,16hour	-	
Dining	Dining Room/Area	40 dB LAeq,16hour	-	
Sleeping (Daytime Resting)	Bedroom	35 dB L _{Aeq,16hour}	30 dB L _{Aeq,8hour} 45 dB ^[1] L _{Amax}	

[1] regular noise events such as loud road traffic, trains, aircraft (10th highest)

Note: For this site the $L_{Aeq,T}$ noise parameter alone is not considered to be sufficient given the character of the noise climate we have measured. Therefore, a criterion in accordance with ProPG of 45dB L_{Amax} during night-time has been considered. This is consistent with Section 2.2.2 of The World Health Organisation Environmental Noise Guidelines for the European Region and Note 4 of Section 7.7.2 of BS8233:2014)

Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target noise levels may be relaxed (subject to the requirements of any planning conditions) by up to 5 dB and reasonable internal conditions still achieved.

8.1.2 Outline Specifications

Based on the prevailing noise climate at the site, open windows as a means of background ventilation would not be suitable on any façade across the development. As such, alternative ventilation measures would be required.

Allowance should be made to provide appropriate sound insulation solutions as required including, where necessary, suitably specified glazing and attenuated ventilators/mechanical ventilation systems. Preliminary calculations have been carried out to determine the likely façade sound insulation performance requirements for each façade. Calculation methods follow those outlined in BS 8233:2014 Section G.2 and are based on the following:

- Conventional brick/block cavity external wall
- typical room volume as per latest drawings
- typical window area as per latest drawings
- Reverberation time of 0.5 seconds.

From the results of the assessment, the following minimum preliminary acoustic performance specifications are recommended. These are intended for planning use only, and detailed design stage octave band acoustic specifications will need to be developed for tender.

Façade Zone		Façade Element	Preliminary Minimum Sound Reduction Specification
		Window	43 dB R _w + C _{tr}
A	Red	Ventilator	42 dB D _{new} + C _{tr} or Mechanical ventilation
	Blue	Window	28 dB R _w + C _{tr}
В		Ventilator	33 D _{new} + C _{tr} or Mechanical ventilation

The following plans show the location of each façade zone noted in the table above.



Plan showing Façade Zones as outlined in the table above (drawing provided by Fresson & Tee)

8.1.3 Example Glazing Configurations

Example glazing configurations commensurate with achieving the sound insulation specifications noted in Section 8.1.2 are given below.

Glazing Specification, $R_w + C_{tr}$ (dB)	Example Configuration
43	10mm secondary glazing installed internally to existing or new 6mm sash windows with minimum 150mm cavity between panes e.g. 10/150/6 mm
28	double glazed system e.g 6/16/6 mm.

8.1.4 Example Ventilation Solutions

Example ventilation solutions commensurate with achieving the elemental sound insulation performances noted in Section 8.1.2 are discussed below.

Ventilator Specification, D _{new} + C _{tr} (dB)	Example Configuration
42	High Performance Acoustic trickle vent per habitable room, or a mechanically assisted supply & extract solution (e.g. local MVHR).
33	1 x 2,500mm ² standard hit-miss trickle vent per habitable room, or a mechanically assisted supply & extract solution (e.g. local MVHR).

The preliminary performance specifications included above are based on the provision of either full MVHR for rooms or 1no. ventilator only per habitable room as required. If additional numbers of ventilators are required to achieve the ventilation rates, the performance requirement for the individual ventilators will need to increase.

The table below provides guidance on the increase in performance specification required for additional numbers of ventilators.

Number of Ventilators	Performance Increase on Ventilator Specifications Stated Above
1	+0 dB
2	+3 dB
3	+5 dB
4	+6 dB

9.0 External Amenity Area

An external amenity area serving one of the residential units is proposed to the rear of the development at first floor flat roof level, as shown in the drawing below.



Proposed first floor plan showing rear terrace (drawing provided by Fresson & Tee)

Noise levels in external amenity areas should ideally not be above the range of 50 to 55 dB L_{Aeq,16hr}, as stated in BS8233:2014.

Based on the results of the noise survey this is achievable without any additional mitigation measures.

It should be noted that new items of plant are proposed to be installed serving the ground and basement level commercial unit, and these plant items are located adjacent to the terrace. To mitigate noise from the plant a solid wall separating the area is proposed as shown below:



Rear elevation shown terrace/plant separating wall (drawing provided by Fresson & Tee)

The plant will also be limited to comply with LA requirements (30 dBA) at the first and second floor residential windows of the site, and as such should below the BS8233:2014 target noise levels for external amenity areas. Therefore, provided the plant complies with the requirements outlined in Section 10.0, no impact to the external terrace is anticipated.

10.0 Operational Noise Impacts

10.1 Fixed Plant & Equipment

New items of plant are proposed to be installed to serve the commercial unit at ground/basement level of 289 Gray's Inn Road, London. Plant will only be installed to the rear of the development.

Based on the results of the noise survey and the requirements of the Local Authority, we propose that the following plant noise emission criteria be achieved incident at the nearest noise sensitive residential windows with all plant operating simultaneously.

	Plant Noise Emission Criteria (L _{Ar,Tr} dB)			
Location	Daytime (07:00 – 23:00 hours)	Night-time (23:00 – 07:00 hours)		
Neighbouring noise sensitive windows to the rear of 289 Gray's Inn Road	32	30		

Noise shall be assessed in accordance with BS 4142:2014, as required by London Borough of Camden, with corrections applied for any plant emitting noise of a tonal or irregular quality.

The above limits shall be subject to the final approval of the Local Authority.

10.2 Proposed Plant

10.2.1 Plant Location

The intake and extract plant serving the commercial unit at ground/basement level of 289 Gray's Inn Road is proposed to be installed to the rear of the development. The extract duct will run to high level (approx. 2nd floor level and terminate), while the intake ductwork will terminate just above ground level.

An additional external condenser unit, also serving the commercial unit, is being considered for installation at first floor level on the rear façade.

The elevation drawing, and floor plan overleaf show the plant locations:



Rear elevation shown plant elevations (drawing provided by Fresson & Tee)



Proposed first floor plan showing plant locations (drawing provided by Fresson & Tee)

10.2.2 Nearest noise Sensitive Receptors

The nearest noise sensitive receptors to the plant will be the residential units located on the rear façade of 289 Gray's Inn Road.

The most affected window will differ however depending on the plant item.

For the intake duct and condenser unit, the nearest noise sensitive window is located at first floor level, and for the extract duct the nearest noise sensitive window is at second/third floor level. Therefore, each should be considered in the assessment.

10.2.3 Plant Operation

The plant will serve the commercial unit at ground and basement level, and as such the operating hours are dependent on the specific use of the commercial unit.

Our current understanding is that the unit will be either a café or restaurant, and we have been asked to assess on this basis.

While a café is only likely to operate during daytime hour (07:00 - 23:00), it is possible that a restaurant could operate beyond these hours in some circumstances, and as such we have considered both daytime and night-time criteria for our assessment to ensure a robust outcome.

10.2.4 Plant Noise Data

Plant has not yet been selected, and we have therefore set limiting noise levels for each item of plant, so as to achieve the Local Authority requirements.

No characteristic qualities in accordance with BS4142:2014 are anticipated for the type of plant proposed to be installed.

10.3 Recommended Mitigation Measures

If, once selected, plant can achieve the limiting noise levels in Section 10.4 then no mitigation measures should be necessary. However, given our understanding of the plant items, this is unlikely.

It would therefore be prudent to ensure scope for mitigation is considered within the design prior to selection i.e. allowing space for attenuators for the intake/extract fans, and allowing space to provide mitigation to the condenser unit on the first floor flat roof.

10.4 Plant Noise Impact Assessment

The following table outlines our calculations for maximum permissible plant noise levels so as to achieve the LA requirements at both the first floor and second floor windows.

Assessment to first floor	Sound Pressure Level (dBA)				
window	Intake fan grille	Extract fan ductwork	Extract fan grille	Condenser unit	
Criteria to be achieved at window	30	30	30	30	
Correction for cumulative plant	-6	-6	-6	-6	
Distance correction	+5	+4	+13	0	
BS4142 tonal/impulsive correction	0	0	0	0	
Limiting noise level at 1m	29	29	37	25	

Assessment to second floor	Sound Pressure Level (dBA)				
window	Intake fan grille	Extract fan ductwork	Extract fan grille	Condenser unit	
Criteria to be achieved at window	30	30	30	30	
Correction for cumulative plant	-6	-6	-6	-6	
Distance correction	+13	+13	+5	+12	
BS4142 tonal/impulsive correction	0	0	0	0	
Limiting noise level at 1m	37	37	29	36	

Based on the above assessments to both first and second floor windows, the applicable (lowest) limiting noise level for each plant item are summarised below:

	Limiting Noise Level at 1m Sound Pressure Level (dBA)
Intake fan grille	29
Extract fan ductwork	29
Extract fan grille	29
Condenser unit	25

11.0 Conclusions

A detailed environmental noise survey has been undertaken in order to establish the currently prevailing environmental noise climate around the site.

The environmental noise impact upon the proposed dwellings has been assessed in the context of building regulations, and national and local planning policies.

Appropriate target internal noise levels have been proposed. These are achievable using conventional mitigation measures.

Preliminary acoustic performance specifications for the external building fabric elements have been recommended such that appropriate internal noise levels should be achieved. These are intended for planning use only, and detailed design stage octave band acoustic specifications will need to be developed for tender.

The assessment shows the site, subject to appropriate mitigation measures, is suitable for residential development in terms of noise.

Plant noise emission criteria have been recommended based on the results of the noise survey and with reference to the Local Authority's advice requirements.

An assessment has been carried out to determine limiting noise levels for the proposed plant.

We have recommended consideration be made for mitigation measures in order to achieve the LA requirements.

Appendix A

Acoustic Terminology

The acoustic terms used in this report are defined as follows:

- dB Decibel Used as a measurement of sound level. Decibels are not an absolute unit of measurement but an expression of ratio between two quantities expressed in logarithmic form. The relationships between Decibel levels do not work in the same way that non-logarithmic (linear) numbers work (e.g. 30dB + 30dB = 33dB, not 60dB).
- dBA The human ear is more susceptible to mid-frequency noise than the high and low frequencies. The 'A'-weighting scale approximates this response and allows sound levels to be expressed as an overall single figure value in dBA. The A subscript is applied to an acoustical parameter to indicate the stated noise level is A-weighted

It should be noted that levels in dBA do not have a linear relationship to each other; for similar noises, a change in noise level of 10dBA represents a doubling or halving of subjective loudness. A change of 3dBA is just perceptible.

- $L_{90,T}$ L_{90} is the noise level exceeded for 90% of the period T (i.e. the quietest 10% of the measurement) and is often used to describe the background noise level.
- $L_{eq,T}$ $L_{eq,T}$ is the equivalent continuous sound pressure level. It is an average of the total sound energy measured over a specified time period, *T*.
- L_{max} L_{max} is the maximum sound pressure level recorded over the period stated. L_{max} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the L_{eq} noise level.
- L_p Sound Pressure Level (SPL) is the sound pressure relative to a standard reference pressure of 2 x 10⁻⁵ Pa. This level varies for a given source according to a number of factors (including but not limited to: distance from the source; positioning; screening and meteorological effects).
- L_w Sound Power Level (SWL) is the total amount of sound energy inherent in a particular sound source, independent of its environment. It is a logarithmic measure of the sound power in comparison to a specified reference level (usually 10⁻¹² W).

Appendix B

Planning Policies, Standards & Guidance

B.1 Noise Policy Statement for England

The Noise Policy Statement for England (NPSE) was published in March 2010 (i.e. before the NPPF). The NPSE is the overarching statement of noise policy for England and applies to all forms of noise other than occupational noise, setting out the long term vision of Government noise policy which is to:

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

That vision is supported by the following NPSE noise policy aims which are reflected in three of the four aims of planning policies and decisions in paragraph 123 of the NPPF (see paragraph 8.2 (b) below):

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

- avoid significant adverse impacts on health and quality of life;
- mitigate and minimise adverse impacts on health and quality of life; and
- where possible, contribute to the improvement of health and quality of life."

The Explanatory Note to the NPSE has three concepts for the assessment of noise in this country:

NOEL – No Observed Effect Level

This is the level below which no effect can be detected and below which there is no detectable effect on health and quality of life due to noise.

LOAEL – Lowest Observable Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected.

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur.

None of these three levels are defined numerically and for the SOAEL the NPSE makes it clear that the noise level is likely to vary depending upon the noise source, the receptor and the time of day/day of the week, etc. The need for more research to investigate what may represent an SOAEL for noise is acknowledged in the NPSE and the NPSE asserts that not stating specific SOAEL levels provides policy flexibility in the period until there is further evidence and guidance.

The NPSE concludes by explaining in a little more detail how the LOAEL and SOAEL relate to the three NPSE noise policy aims listed above. It starts with the aim of avoiding significant adverse effects on health and quality of life, then addresses the situation where the noise impact falls between the LOAEL and the SOAEL when *"all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development."* The final aim envisages pro-active management of noise to improve health and quality of life, again taking into account the guiding principles of sustainable development which include the need to minimise travel distance between housing and employment uses in an area.

B.2 National Planning Policy Framework (NPPF)

The following paragraphs are from the NPPF (published December 2023):

- 191. 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; and
 - c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.

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

Paragraph 185 also references the Noise Policy Statement for England (NPSE). This document does not refer to specific noise levels but instead sets out three aims:

- "Avoid significant adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.
- Mitigate and minimise adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.
- Where possible, contribute to the improvement of health and quality of life through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development."

B.3 Planning Practice Guidance on Noise

Planning Practice Guidance (PPG) under the NPPF has been published by the Government as a web based resource at http://planningguidance.planningportal.gov.uk/blog/guidance/. This includes specific guidance on Noise although, like the NPPF and NPSE the PPG does not provide any quantitative advice. It seeks to illustrate a range of effect levels in terms of examples of outcomes as set out in the following table:

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

Perception	Examples of Outcomes	Increasing effect level	Action
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, 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.	Observed Adverse Effect	Mitigate and reduce to a minimum
		Significant Observed Adverse Effect Level	
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, 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
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable hard, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

B.4 World Health Organisation

The current Environmental Noise Guidelines 2018 for the European Region (ENG) supersede the Guidelines for Community Noise from 1999 (CNG). Nevertheless, the ENG recommends that all CNG indoor guideline values and any values not covered by the current guidelines (such as industrial noise and shopping areas) remain valid.

A summary of the guidance from the ENG and CNG is shown in the table below.

Source	CNG guideline indoors all sources	ENG guideline outdoors noise from specific source only
Road traffic poice	35 LAeq, 16h	53 dB L _{den}
Road traffic hoise	30 LAeq, 8h	45 dB Lnight
Deilwov neize	35 LAeq, 16h	54 dB L _{den}
Rallway holse	30 LAeq, 8h	44 dB Lnight
Aircraft poice	35 L _{Aeq, 16h}	45 dB L _{den}
Allcraft hoise	30 LAeq, 8h	40 dB L _{night}

With regard to single-event noise indicators, Section 2.2.2 of the WHO Environmental Noise Guidelines 2018 state:

"In many situations, average noise levels like the L_{den} or L_{night} indicators may not be the best to

explain a particular noise effect. Single-event noise indicators – such as the maximum sound pressure level ($L_{A,max}$) and its frequency distribution – are warranted in specific situations, such as in the context of night-time railway or aircraft noise events that can clearly elicit awakenings and other physiological reactions that are mostly determined by $L_{A,max}$. Nevertheless, the assessment of the relationship between different types of single-event noise indicators and long-term health outcomes at the population level remains tentative. The guidelines therefore make no recommendations for single-event noise indicators."

B.5 British Standard BS8233: 2014

British Standard 8233: 2014 "Guidance on sound insulation and noise reduction for buildings" provides guidance for the control of noise in and around buildings.

Internal Areas

BS8233:2014 Section 7.7.2 titled "Internal ambient noise levels for dwellings" states:

"In general for steady external noise sources, it is desirable that internal ambient noise levels do not exceed the following guideline values:

Δούνμα	Location	Desirable Internal Ambient Criteria		
Activity	Location	07:00 – 23:00	23:00 to 07:00	
Resting	Living Rooms	35 dB LAeq, 16hour	-	
Dining	Dining Room/Area	40 dB LAeq, 16hour	-	
Sleeping (Daytime Resting)	Bedroom	35 dB LAeq, 16hour	30 dB LAeq,8hour	

Note 1 The above table provides recommended levels for overall noise in the design of a building. These are the sum total of structure-borne and airborne noise sources. Groundborne noise is assessed separately and is not included as part of these targets, as human response to groundborne noise varies with many factors such as level, character, timing, occupant expectation and sensitivity.

Note 2 The levels shown in the above table are based on the existing guidelines issued by the WHO and assume normal diurnal fluctuations in external noise. In cases where local conditions do not follow a typical diurnal pattern, for example on a road serving a port with high levels of traffic at certain times of the night, an appropriate alternative period, e.g. 1 hour, may be used, but the level should be selected to ensure consistency with the levels recommended in the above table.

Note 3 These levels are based on annual average data and do not have to be achieved in all circumstances. For example, it is normal to exclude occasional events, such as fireworks nigh or News Year's Eve.

Note 4 Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$ depending on the character and

number of events per night. Sporadic noise events could require separate values.

Note 5 If relying on closed windows to meet the guide values, there needs to be an appropriate alternative ventilation that does not compromise the façade insulation or the resulting noise level.

If applicable, any room should have adequate ventilation (e.g. trickle ventilators should be open) during assessment.

Note 6 Attention is drawn to the Building Regulations.

Note 7 Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved."

External Amenity Areas

BS8233:2014 Section 7.7.3.2 titled "Design criteria for external noise" states:

"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. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.

Other locations, such as balconies, roof gardens and terraces, are also important in residential buildings where normal external amenity space might be limited or not available, i.e. in flats, apartment blocks, etc. In these locations, specification of noise limits is not necessarily appropriate. Small balconies may be included for uses such as drying washing or growing pot plants, and noise limits should not be necessary for these uses. However, the general guidance on noise in amenity space is still appropriate for larger balconies, roof gardens, and terraces, which might be intended to be used for relaxation. In high-noise areas consideration should be given to protecting these areas by screening or building design to achieve the lowest practicable levels. Achieving levels of 55dB $L_{Aeq,T}$ or less might not be possible at the outer edge of these areas, but should be achievable in some areas of the space."

B.6 ProPG : Planning & Noise : 2017

The primary goal of the ProPG is to assist the delivery of sustainable development by promoting good health and well-being through the effective management of noise. It seeks to do that through encouraging a good acoustic design process in and around proposed new residential development having regard to national policy on planning and noise. It is applicable to noise

from existing transport sources (noting that good professional practice should have regard to any reasonably foreseeable changes in existing and/or new sources of noise). The recommended approach is also considered suitable where some industrial or commercial noise contributes to the acoustic environment provided that is "not dominant".

This ProPG advocates a systematic, proportionate, risk based, 2-stage, approach. The approach encourages early consideration of noise issues, facilitates straightforward accelerated decision making for lower risk sites, and assists proper consideration of noise issues where the acoustic environment is challenging.

The two sequential stages of the overall approach are:

- Stage 1 an initial noise risk assessment of the proposed development site; and
- Stage 2 a systematic consideration of four key elements.

The four key elements to be undertaken in parallel during Stage 2 of the recommended approach are:

- Element 1 demonstrating a "Good Acoustic Design Process";
- Element 2 observing internal "Noise Level Guidelines";
- Element 3 undertaking an "External Amenity Area Noise Assessment"; and
- Element 4 consideration of "Other Relevant Issues".

The ProPG considers suitable guidance on internal noise levels found in "BS8233:2014: Guidance on sound insulation and noise reduction for buildings".Table 4 in Section 7.7.2 of the standard suggests that "in general, for steady external noise sources, it is desirable that the internal ambient noise level does not exceed the guideline values". The standard states (Section 7.7.1) that "occupants are usually more tolerant of noise without a specific character" and only noise without such character is considered in Table 4 of the standard.

Activity	Location	07:00 – 23:00 Hours	23:00 – 07:00 Hours
Resting	Living Room	35dB LAeq,16hr	-
Dining	Dining Room / Area	40dB LAeq,16hr	-
Sleeping (daytime resting)	Bedroom	35dB L _{Aeq,16hr}	30dB L _{Aeq,16hr} 45dB L _{Amax,F}

NOTE 1 the Table provides recommended internal L_{Aeq} target levels for overall noise in the design of a building. These are the sum total of structure-borne and airborne noise sources.

Ground-borne noise is assessed separately and is not included as part of these targets, as human response to ground-borne noise varies with many factors such as level, character, timing, occupant expectation and sensitivity.

NOTE 2 The internal L_{Aeq} target levels shown in the Table are based on the existing guidelines issued by the WHO and assume normal diurnal fluctuations in external noise. In cases where local conditions do not follow a typical diurnal pattern, for example on a road serving a port with high levels of traffic at certain times of the night, an appropriate alternative period, e.g. 1 hour, may be used, but the level should be selected to ensure consistency with the L_{Aeq} target levels recommended in the Table.

NOTE 3 These internal L_{Aeq} target levels are based on annual average data and do not have to be achieved in all circumstances. For example, it is normal to exclude occasional events, such as fireworks night or New Year's Eve.

NOTE 4 Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or L_{Amax,F}, depending on the character and number of events per night. Sporadic noise events could require separate values. 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 (see Appendix A).

NOTE 5 Designing the site layout and the dwellings so that the internal target levels can be achieved with open windows in as many properties as possible demonstrates good acoustic design. Where it is not possible to meet internal target levels with windows open, internal noise levels can be assessed with windows closed, however any façade openings used to provide whole dwelling ventilation (e.g. trickle ventilators) should be assessed in the "open" position and, in this scenario, the internal L_{Aeq} target levels should not normally be exceeded, subject to the further advice in Note 7.

NOTE 6 Attention is drawn to the requirements of the Building Regulations.

NOTE 7 Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal L_{Aeq} target levels may be relaxed by up to 5dB and reasonable internal conditions still achieved. The more often internal L_{Aeq} levels start to exceed the internal L_{Aeq} target levels by more than 5dB, the more that most people are likely to regard them as "unreasonable". Where such exceedances are predicted, applicants should be

required to show how the relevant number of rooms affected has been kept to a minimum. Once internal L_{Aeq} levels exceed the target levels by more than 10dB, they are likely to be regarded as "unacceptable" by most people, particularly if such levels occur more than occasionally. Every effort should be made to avoid relevant rooms experiencing "unacceptable" noise levels at all and where such levels are likely to occur frequently, the development should be prevented in its proposed form (See Section 3.D).

B.7 Building Regulations Approved Document O

Building Regulations Approved Document O relates to setting standards for overheating in new residential buildings. It aims to protect the health and welfare of occupants of the building by reducing the occurrence of high indoor temperatures.

Requirement O1 of Approved Document O is met by designing and constructing the building to achieve both of the following:

a. Limiting unwanted solar gains in summer.

b. Providing an adequate means of removing excess heat from the indoor environment.

Sections 3.2 to 3.4 of this document relate to noise and state the following:

"In locations where external noise may be an issue (for example, where the local planning authority considered external noise to be an issue at the planning stage), the overheating mitigation strategy should take account of the likelihood that windows will be closed during sleeping hours (11pm to 7am).

Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits.

a. 40dB L_{Aeq,T}, averaged over 8 hours (between 11pm and 7am).

b. 55dB L_{AFmax}, more than 10 times a night (between 11pm and 7am).

Where in-situ noise measurements are used as evidence that these limits are not exceeded, measurements should be taken in accordance with the Association of Noise Consultants' Measurement of Sound Levels in Buildings with the overheating mitigation strategy in use.

NOTE: Guidance on reducing the passage of external noise into buildings can be found in the National Model Design Code: Part 2 – Guidance Notes (MHCLG, 2021) and the Association of Noise Consultants' Acoustics, Ventilation and Overheating: Residential Design Guide (2020).

B.8 British Standard 4142:2014 + A1:2019

When setting plant noise emission criteria reference is commonly made to BS 4142:2014 *"Methods for rating and assessing industrial and commercial sound".*

The procedure contained in BS 4142:2014 provides an assessment of the likely effects of sound on people when comparing the specific noise levels from the source with representative background noise levels. Where the noise contains "a tone, impulse or other characteristic" then various corrections can be added to the specific (source) noise level to obtain the "rating level".

BS 4142 states that: "The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs". An estimation of the impact of the specific noise can be obtained by the difference of the rating noise level and the background noise level and considering the following:

• "Typically, the greater this difference, the greater the magnitude of the impact."

• "A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context."

• "A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context."

• "The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context."

The determination of the "rating level" and the "background level" are both open to interpretation, depending on the context.

Appendix C

Time History Graphs

289 Gray's Inn Road

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Position 1	
L _{eq} , L _{max} and L ₉₀ Noise Levels	■Leq
Friday 20 September 2024 to Monday 23 September 2024	L90



Date and Time

31841/TH1

289 Gray's Inn Road	Lmax
Position 2	
L _{eq} , L _{max} and L ₉₀ Noise Levels	■Leq
Friday 20 September 2024 to Monday 23 September 2024	■L90



Date and Time