Noise Impact Assessment

Site Address: 295 Green Lanes, North London, N13 4XS

Client Name: Project 295 Ltd.

Project Reference No: NP-010186

Authorisation and Version Control

Revision	Date	Reported By	Checked By
01	06/11/2023	P. Soler, MIOA, MIET	M. Caley, MSc, MIOA

Amendment History

Previous	Summary of Amendments
8413PL	A pre-application (23/20162/PREAPP) has been submitted seeking to amend a previous planning application (22/03249/FUL). The new report includes requests made in the Council's pre-app response.

Disclaimer

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Delivering sustainable development by promoting good health and well-being through effective management of noise.

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1. Introduction

NOVA Acoustics Ltd has been commissioned to prepare a noise assessment for a residential development ('the Proposed Development') at 295 Green Lanes, North London, N13 4XS ('the Site'). The site is primarily subject to traffic noise from Green Lanes and its surrounding network.

A noise survey has been undertaken to establish the prevailing sound levels at the proposed development site. 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 have been assessed in accordance with the relevant performance standards, legislation, policy, and guidance.

This noise assessment is necessarily technical in nature; therefore, a glossary of terms is included in Appendix A to assist the reader.

1.1 Standards, Legislation, Policy & Guidance

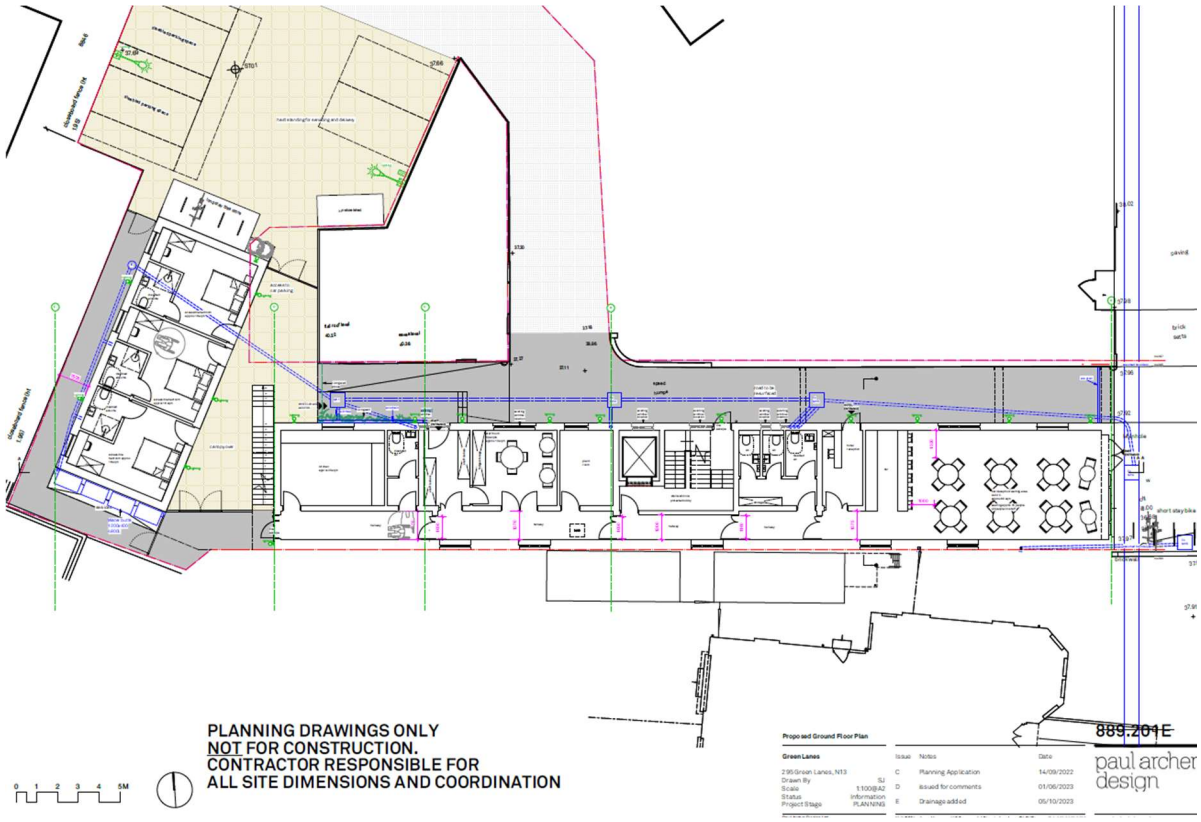
The following performance standards, legislation, policy, and guidance have been considered to ensure good acoustic design in the assessment:

- The Local Planning Authorities (LPA) pre-app (ref. 23/02162/PREAPP) response.
- National Planning Policy Framework (2023)
- Noise Policy Statement for England (2010)
- British Standard BS8233:2014 – 'Guidance on sound insulation and noise reduction for buildings'
- Approved Document F: Volume 1 Dwellings (2021)
- Acoustics Ventilation Overheating: Residential Design Guide 2020' (AVO Guide)

Further information on the legislation can be found in Appendix B.

1.2 Proposal Brief

The proposal is for the change of use from Public House (Use Class A4) to Guest house accommodation (Use Class C1), involving extension to upper levels including new rooftop extension and annex within the rear yard area, with landscaped terrace to create 35 bedrooms. The figure below shows the layout of the Proposed Development.



Drawing Ref No. 295 Green Lanes Preapp from 'Paul Archer Design'

Figure 1 – Proposed Development

1.3 Local Planning Authority

The applicant has submitted a pre-application, 23/02162/PREAPP – '*Change of use from Public House (Use Class A4) to Guest house accommodation (Use Class C1), involving extension to upper levels including new rooftop extension and annexe within the rear yard area, with landscaped terrace to create 35 bedrooms'* to Enfield Council ('the LPA'). This pre-application follows a recent approval of planning permission for 26 rooms. This application is seeking to amend this permission by adding an upper floor and a rear extension at third floor level to accommodate 9 new rooms including some alterations to the internal.

The LPA has raised concerns about the potential impact of the noise emissions of any future external plant unit:

"On balance, it is considered that the use of the building as a hotel would not unduly harm the amenity of neighbouring residential dwellings as a result of additional noise and disturbance, subject to any approval securing through condition the submission and approval of further details of noise levels from any plant that is to be installed."

2. Environmental Noise Survey

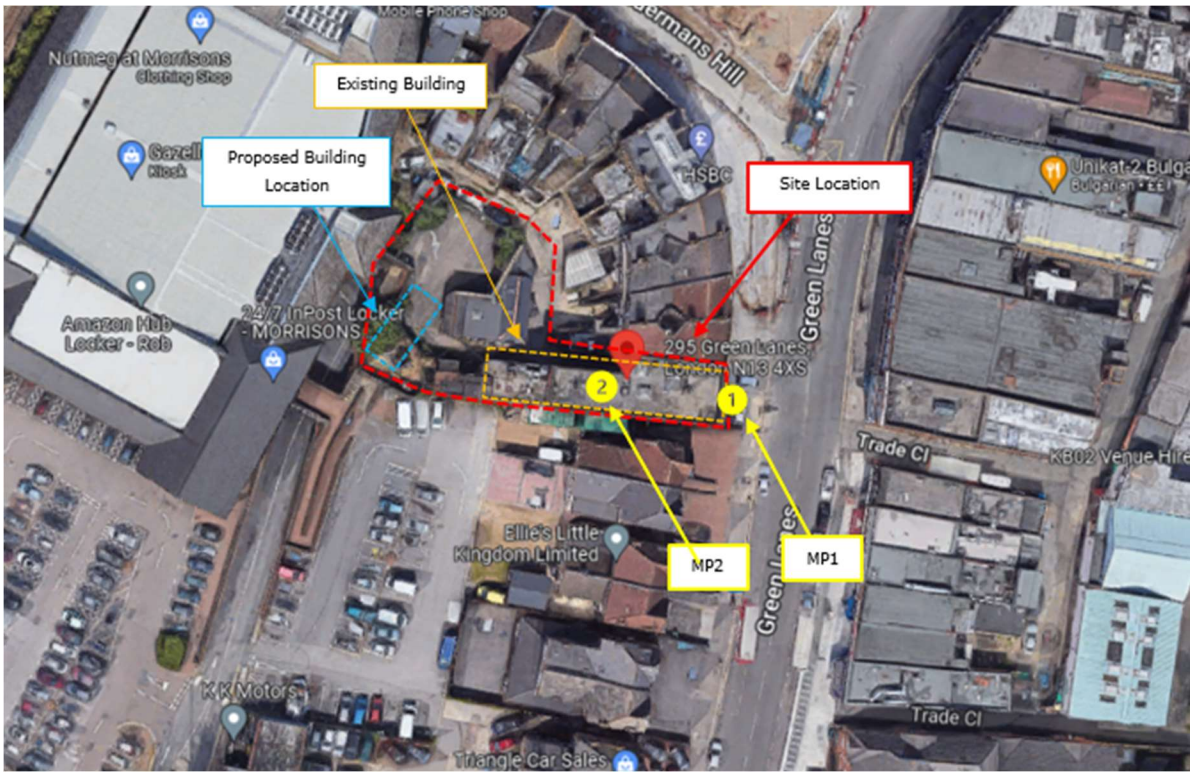
2.1 *Measurement Methodology*

An environmental noise survey was carried out by NOVA Acoustics in September of 2022 (ref. 8413PL) which was presented along with the previous planning application. The following table outlines the measurement dates and particulars. In both instances, a 130mm diameter windshield was installed to the microphones.

Location	Survey Dates	Measurement Particulars
MP1	15/09/2022 – 20/09/2022	Equipment mounted protruding from a first-floor window at 1m distance from the building façade on Green Lanes.
MP2	15/09/2022 – 21/09/2022	Equipment mounted on a tripod at 1.5m from the flat roof at the rear façade.

Table 1 – Measurement Methodology

The figure below outlines the site surroundings and measurement locations:



Imagery ©2023 Infoterra Ltd & Bluesky, Maxar Technologies, The GeoInformation Group, Map data ©2023

Figure 2 – Measurement Locations and Site Surroundings

2.2 *Context & Subjective Impression*

The area surrounding the site is mixed in nature with both residential dwellings and commercial premises. Directly to the east of the site runs Green Lanes which facilitates high levels of traffic flow. Commercial properties, including restaurants (KFC, Milk & Honey) and shops (S.H. News, Deebo's Barber Shop) are located on the road, and to the west, is a large Morrisons shopping centre car park area.

The noise profile of the area is dominated by traffic noise from the Green Lanes, as well secondary sources including patron noise and noise from Morrison's car park.

2.3 Environmental Noise Survey Results

Ambient Noise Levels Summary

The following section outlines the measured sound levels during the survey. The 'typical' $L_{AFmax,1min}$ value is determined by that which is not normally exceeded more than 10 times during the night-time. The time history results can be found in Appendix D.

Location	Measurement Period ('T')	Octave Frequency Band (Hz, $L_{eq,T}$ dB)						$L_{Aeq,T}$ (dB)	'Typical' $L_{AFmax,1min}$ (dB)
		125	250	500	1k	2k	4k		
MP1	$L_{eq,16hr}$ (Day)	67	63	62	63	60	54	67	--
	$L_{eq,8hr}$ (Night)	64	62	62	61	60	52	64	85
MP2	$L_{eq,16hr}$ (Day)	59	54	51	50	45	39	54	--
	$L_{eq,8hr}$ (Night)	54	51	47	46	42	30	50	72

Table 2 – Sound Level Results Summary

Background Sound Level Analysis

The following section outlines the measured background sound levels that have been used as the baseline for the subsequent BS4142 plant noise limit level assessment. The figures below show histogram graphs of the background sound levels measured during day and night-time periods when external fixed plant is expected to operate.

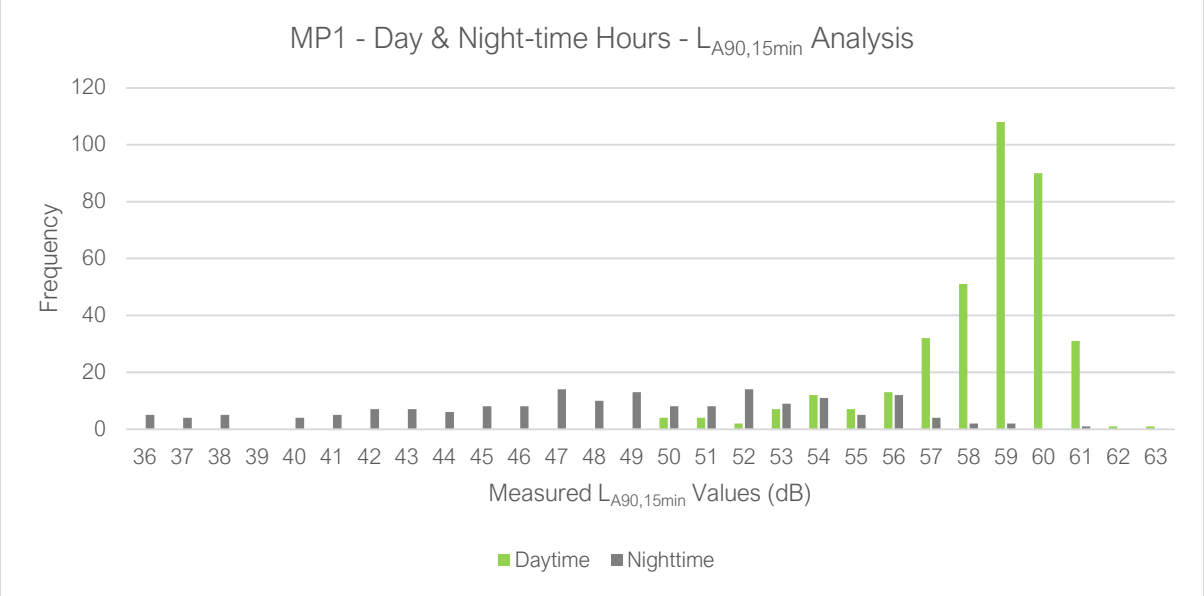


Figure 3 – MP1 $L_{A90,15min}$ Background Sound Level Analysis

As can be seen in the figure above, the modal $L_{A90,15min}$ values measured during the day and night-time periods are 59 dB and 47 dB, respectively.

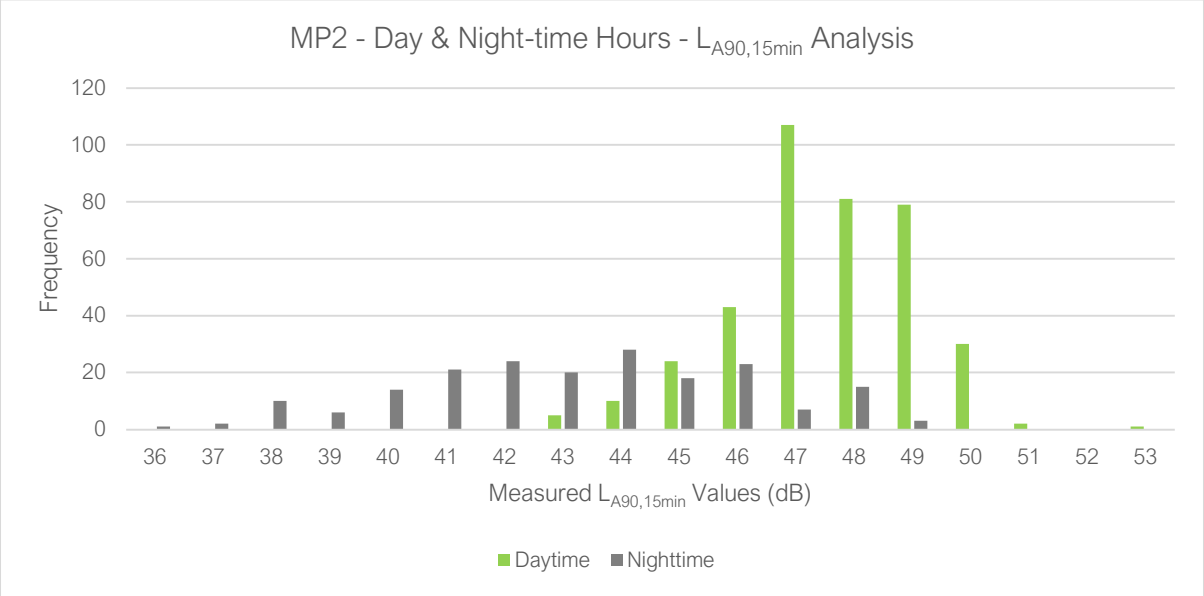


Figure 4 – MP2 $L_{A90,15min}$ Background Sound Level Analysis

As can be seen in the figure above, the modal $L_{A90,15min}$ values measured during the day and night-time are **47 dB** and **44 dB** respectively at the rear of the site.

3. Noise Modelling

The environmental noise survey has allowed the sound levels incident on the proposed development to be modelled within SoundPlan 9.0 software. The modelling particulars are outlined in Appendix F. The proposed development has been separated into façade colours for the specification of building elements and mitigation measures as shown below.

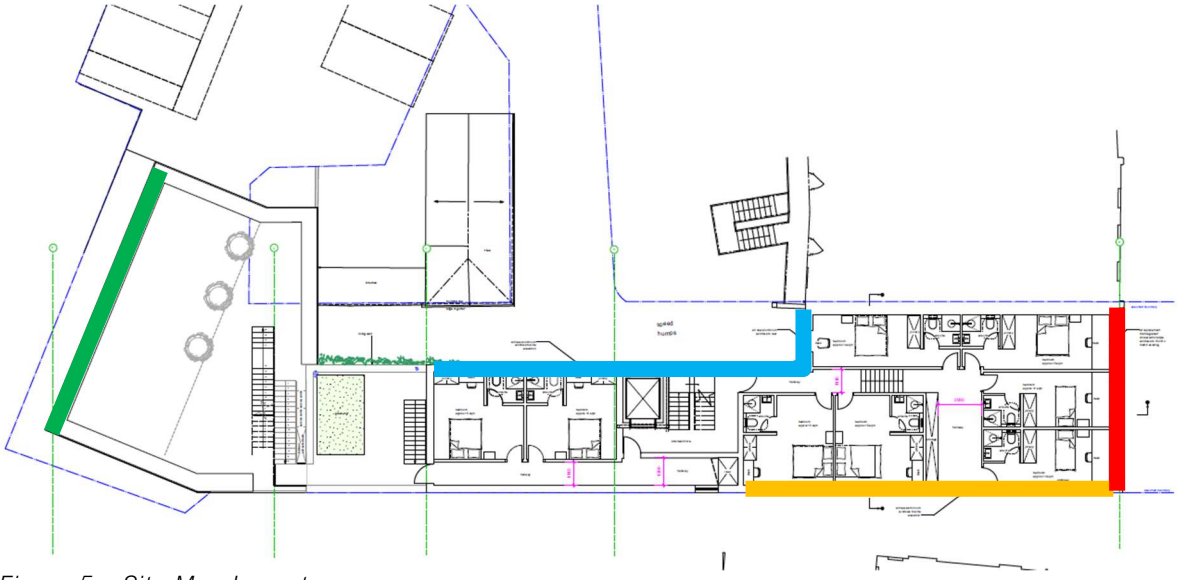


Figure 5 – Site Map Layout

The sound maps showing the daytime $L_{Aeq,T}$, night-time $L_{Aeq,T}$ and night-time $L_{AFmax,1min}$ sound levels incident upon the Proposed Development can be seen in the figures below.

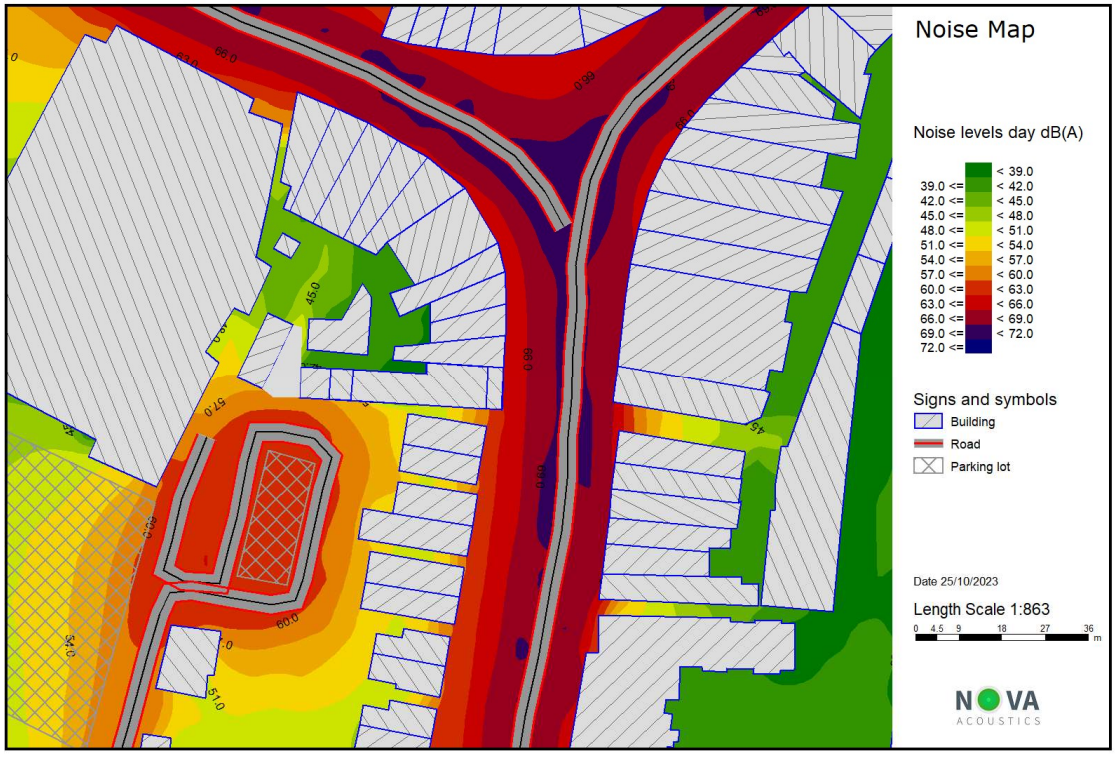


Figure 6 – $L_{Aeq,16hr}$ Ambient Sound Map (1.5m Grid Map Height)

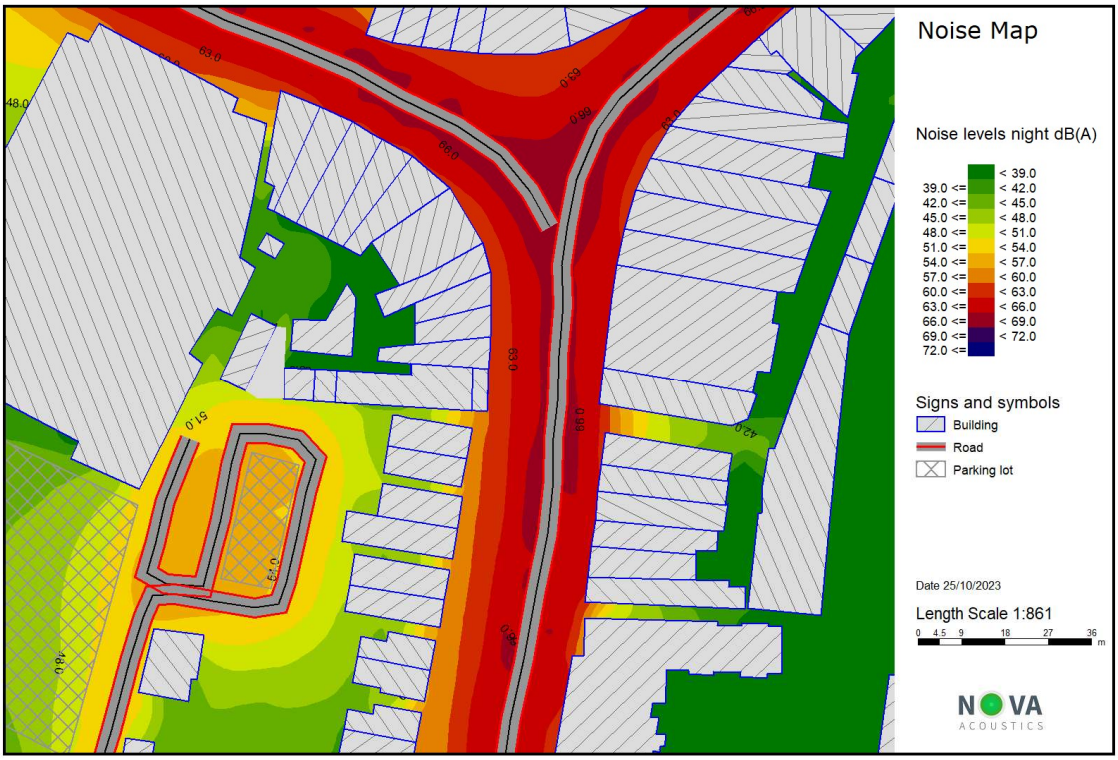


Figure 7 – $L_{Aeq,8hr}$ Ambient Sound Map (1.5m Grid Map Height)

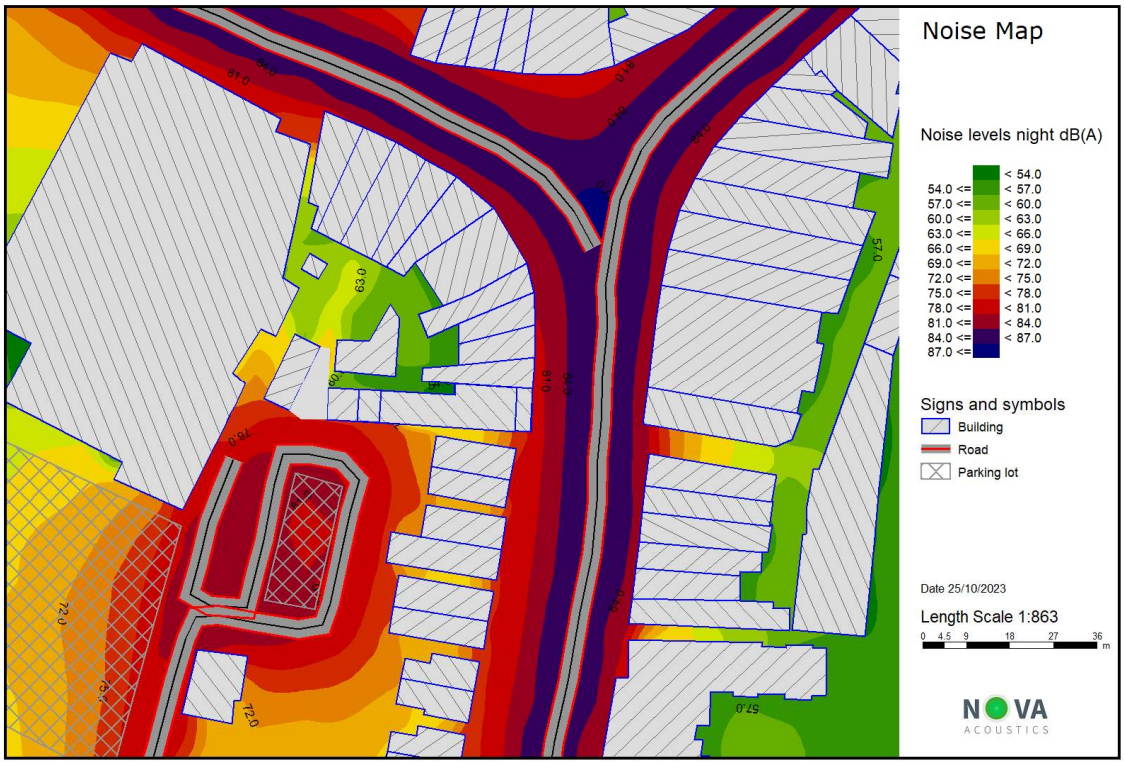


Figure 8 – $L_{AFmax,1min}$ Sound Map (1.5m Grid Map Height)

4. Noise Break-in Assessment and Sound Insulation Scheme

4.1 Internal Noise Level Criteria

The noise profile of the area is predominantly "anonymous" steady state noise sources e.g., traffic noise from Green Lanes. The following table outlines the internal and external acoustic design criteria used in the following assessment.

Activity	Location	Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
Resting	Living Room	35 dB $L_{Aeq,16hr}$ / NR30	--
Dining	Dining Room/Area	40 dB $L_{Aeq,16hr}$ / NR35	--
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hr}$ / NR30	30 dB $L_{Aeq,8hr}$/ NR25 45 dB L_{AFmax*}

**NOTE 1: The maximum criteria have been taken from the World Health Organisation (WHO) Guidelines for Community Noise.*

**NOTE 2: ProPG:2017 which is relevant to 'New Residential' states; "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".*

Note 3: BS8233:2014 states: "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".

Note 4: BS8233:2014 states: "The levels shown in Table 4 (criteria shown above) 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 Table 4.

Note 5; BS8233:2014 states: "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.

Table 3 – Acoustic Design Criteria

The modelled sound levels at the proposed development are assessed against the relevant criteria and a sound insulation scheme is provided to achieve a good internal acoustic environment.

4.2 Glazing and Background Ventilation Specification

The following section provides a glazing and background ventilation specification that achieves the relevant internal noise criteria. The calculations considering the following sound insulation scheme can be found in Appendix E.

Rooms	Description	Octave Frequency Band (Hz, dB)						Overall (dB)	Overall (dB)
		125	250	500	1k	2k	4k		
Bedrooms	6mm Glass / 16mm Argon Cavity / 8.8mm Optiphon Glass (SRI)	25	27	38	48	47	55	41 (R_W)	34 (R_W + C_{tr})
	Greenwoods MA3051 (Through Wall Vent) ($D_{n,e}$)	46	45	50	55	65	67	55 ($D_{n,e}$)	52 ($D_{n,e,W}$ + C_{tr})

Table 4 – Glazing and Ventilation Specification – Red Façades

Rooms	Description	Octave Frequency Band (Hz, dB)						Overall (dB)	Overall (dB)
		125	250	500	1k	2k	4k		
Bedrooms	8mm Glass / 16mm Air Cavity / 4mm Glass (SRI)	22	21	28	38	40	47	33 (R_W)	28 (R_W + C_{tr})
	Greenwoods 2500EA.AC1 (Through Frame Trickle Vent) ($D_{n,e}$)	41	40	37	47	43	46	42 ($D_{n,e}$)	40 ($D_{n,e,W}$ + C_{tr})

Table 5 – Glazing and Ventilation Specification – Orange Façades

Rooms	Description	Octave Frequency Band (Hz, dB)						Overall (dB)	Overall (dB)
		125	250	500	1k	2k	4k		
Living Rooms & Bedrooms	4mm Glass / 16mm Air Cavity / 4mm Glass (SRI)	21	17	25	35	37	31	29 (R_W)	25 (R_W + C_{tr})
	Titon Standard Vent + C75 (Through Frame Trickle Vent) ($D_{n,e}$)	38	36	35	42	39	42	35 ($D_{n,e}$)	34 ($D_{n,e,W}$ + C_{tr})

Table 6 – Glazing and Ventilation Specification – Blue & Green Façades

Any other window or ventilation specification capable of providing this attenuation will be suitable provided the glazing suppliers can provide an acoustic test report in accordance with BS EN ISO 10140-2:2010 or an evidence-based calculation.

5. Open Window Noise Break-in Assessment

5.1 Internal Noise Levels with Open Windows Criteria

BS8233:2014 states that when relying on closed windows to achieve the internal acoustic design criteria, appropriate alternative ventilation should be provided. Approved Document F states: "*Account should be taken of outside noise when considering whether openable windows are appropriate for purge ventilation"*. If windows are open regularly to provide higher rates of ventilation to mitigate overheating, this will lead to elevated internal noise levels which could lead to undesirable living conditions. If windows are opened rarely the occupants may be able to tolerate elevated noise levels due to the inherent benefits of natural ventilation. To advise if openable windows can be used as the ventilation strategy (whilst maintaining reasonable internal noise levels), an open window assessment will be provided. The suitability of the internal noise levels will be based upon a 5 dB relaxation of the internal noise criteria and an open window providing 13 dB attenuation. If required, an alternative ventilation strategy compliant with Approved Document F will be proposed.

5.2 Open Window Assessment

This assessment will firstly consider whether the internal noise level criteria can be achieved with open windows. The criteria from Table 3 – 3 of the AVO Guide 'Windows Rarely Open'* is shown in the table below for reference.

Façade	External Noise Levels	AVO Guide Windows Open Often	Exceedance	AVO Guide Windows Rarely Open	Exceedance
Red	67 $L_{Aeq,16hr}$ (Day)	53	+14	63	+4
	66 $L_{Aeq,8hr}$ (Night)	48	+18	55	+11
	85 L_{AFmax} (Night)	58	+27	78	+7
Orange	62 $L_{Aeq,16hr}$ (Day)	53	+9	63	-1
	59 $L_{Aeq,8hr}$ (Night)	48	+11	55	+4
	79 L_{AFmax} (Night)	58	+21	78	+1
Blue	53 $L_{Aeq,16hr}$ (Day)	53	+0	63	-10
	49 $L_{Aeq,8hr}$ (Night)	48	+1	55	-6
	69 L_{AFmax} (Night)	58	+11	78	-9
Green	50 $L_{Aeq,16hr}$ (Day)	53	-3	63	-13
	44 $L_{Aeq,8hr}$ (Night)	48	-4	55	-11
	70 L_{AFmax} (Night)	58	+12	78	-8

Table 7 – Open Window Assessment

For rooms with windows on the red and orange façades, the external noise levels exceed the AVO Guides 'Rarely Open' criteria which means that windows cannot be used for the primary means of ventilation and an alternate ventilation strategy is required that is capable of a higher rate of ventilation. A mechanical extract ventilation system should be installed to provide 'Whole Dwelling Ventilation' in accordance with Approved Document F. It is understood that continuous MEV extract fans installed in accordance with the specified trickle ventilators to allow the ingress of fresh air will be adequate. The ventilation system should be designed by an appropriately qualified person to ascertain compliance with the relevant Building Regulations. Special consideration should be given to 1.5 to 1.7 of Approved Document F to assist in the design of the ventilation system and to ensure the self-generated noise levels from the MEV extract fans to not exceed the specified criteria.

For rooms with windows on the blue and green façades, the noise levels exceed the AVO Guides 'Windows Open Often' criteria which means that windows being used for the primary means of ventilation (whilst maintaining reasonable internal noise levels) could vary depending on the outcome of a TM59 overheating assessment. To assist in the design of the alternative ventilation strategy a TM59 overheating assessment should be undertaken to ascertain how frequently open windows will be required to mitigate overheating. The TM59 assessor should be provided with this report to base their study. Note that if the TM59 is not undertaken, the ventilation strategy proposed for the red and orange façades could also be applied to the rear.

6. Noise Breakthrough Assessment

The proposed development will include a bar/reception/waiting area on the ground floor along with the hotel reception, staff room, kitchen, toilets and plant room. Consequently, there is the potential for the noise breaking through the adjoining floor partition to adversely impact the future residents on the first floor. The following section analyses the predicted level of noise breakthrough from the ground floor compared with the internal noise level criteria presented within BS8233:2014. Where octave band sound levels have been assessed, these have been compared to the appropriate night-time Noise Rating Curve (NR25 and Moorhouse criteria).

The predicted noise levels associated with the ground floor are based on the noise measurements undertaken within comparable developments from a busy restaurant & bar with background ambient music. To account for the low-frequency noise intrinsic to any amplified music, the Moorhouse curve will be used as the lower frequency criteria in the 63 and 125Hz Octave Bands. The noise emissions and minimum sound reduction required for the adjoining floor are shown in the table below.

Description	Octave Band (Hz, dB)							Overall (dB)
	63	125	250	500	1k	2k	4k	
Busy Bar with Background Music (L_{eq})	62	69	72	78	77	72	68	80 (A)
Night-time NR25 Curve Criteria (L_{eq})	47*	41*	35	29	25	22	20	30 (A)
Min. Sound Reduction (L_{eq})	15	28	37	49	52	50	48	50 ($D_{nT,W}$ + C_{tr})

Table 8 – Noise Breakthrough Minimum Sound Reduction

(*) Moorhouse Curve criteria.

The level of sound insulation provided by the existing floor has been predicted using INSUL 9.0 Sound Insulation Prediction Software. The existing floor is a concrete base; however, the exact build-up is unknown. A typical 150mm concrete slab will be assumed as a worst-case scenario.

The following table compares the predicted airborne sound insulation to the required minimum sound reduction of the adjoining floor to see if the adjoining floor requires additional sound insulation. It is recommended that the partition should score approximately 10 dB above the minimum required sound reduction to ensure the amenity of future residents is fully protected.

Description	Octave Band (Hz, dB)							Overall (dB)
	63	125	250	500	1k	2k	4k	
Predicted Airborne Sound Reduction	40	42	40	48	55	61	66	45 ($D_{nT,W}$ + C_{tr})
Min. Sound Reduction	15	28	37	49	52	50	48	50
Exceedance of Criteria	-25	-14	-3	+1	-3	-11	-18	+5

Table 9 – Noise Breakthrough Assessment

As can be seen in the table above, some values do not meet the recommended levels of insulation.

In order to achieve the necessary attenuation, the following upgrades are recommended:

Install an MF suspended ceiling with a minimum drop of 150mm. Partially fill the cavity with 100mm of mineral wool insulation with a density of 10 kg/m^3 e.g. Isover APR1200. Finally, close the ceiling with 1 No. sound/fire-rated plasterboard. Ensure all holes and gaps within the existing partition floor are fully sealed to an airtight condition.

The following table compares the predicted airborne sound insulation to the required minimum sound reduction of the adjoining floor with the proposed upgrade.

Description	Octave Band (Hz, dB)							Overall (dB)
	63	125	250	500	1k	2k	4k	
Predicted Airborne Sound Reduction	33	51	53	60	67	73	81	60 ($D_{nT,w}$ + C_{tr})
Min. Sound Reduction	15	28	37	49	52	50	48	50
Exceedance of Criteria	-18	-23	-16	-11	-15	-23	-33	-10

Table 10 – Noise Breakthrough Assessment – Upgrade

As shown in the table above, providing all music in the ground floor areas is for background purposed only, the criteria should be achieved.

Another area of concern could be the partition floor between the plant room and the first-floor bedrooms. No detailed information regarding the plant room equipment is currently finalised; however, it is understood that the noise emissions from the plant room are likely to be lower than what is expected from the bar. Therefore, it is recommended that the proposed floor upgrade is also installed within the plant room and further assessment is undertaken once detailed info for the plant rooms specification is available.

7. BS4142 Plant Noise Limit Levels

The proposed external plant equipment specification has not yet been finalised. As such, plant noise limit levels have been defined to ensure that the noise emissions do not exceed the background sound levels at the closest NSRs. The limit levels are inclusive of any rating penalties that should be applied to account for audible characteristics of the noise which could be deemed to cause increased annoyance, such as intermittency, impulsivity, or tonality. The limit levels have been calculated for both the daytime and night-time periods, depending on when the plant will be operational. As a worst-case, the noise levels measured at the rear of the site (MP2) have been used for establishing the limit levels as it assumed that any plant will be installed to the rear side of the building.

The calculated plant noise limit levels are shown in the table below.

Description	Daytime Period (dB)	Night-time Period (dB)
Background Sound Level (MP2)	47	41
Cumulative Plant Noise Limit Level at NSR	42	36
BS4142 Assessment Outcome	'Low Impact'	
NPSE & NPPF Assessment Outcome	'No Observed Effect Level' ('NOEL')	

Table 11 – BS4142 External Plant Noise Limit Levels

Discussion:

As can be seen in the assessment above, provided the plant limit levels are adhered to all noise emissions from the external plant units would not exceed the existing background sound levels. When assessed in accordance with BS4142 this indicates 'low impact', and when assessed with the NPPF and NPSE this is classed as 'No Observed Effect Level' ('NOEL'). Once the plant units are specified, the noise emissions should be calculated by an appropriately qualified person to ensure that the limit levels are achieved.

8. Conclusion and Action Plan

The proposed development has been assessed against the acoustic design criteria and a sound insulation scheme has been provided to ensure the criteria are achieved.

The following 'Action Plan' is outlined to ensure the design considerations and specifications from this report are duly implemented:

1. The proposed glazing and background ventilation systems, or suitable alternatives, should be installed as shown in Section 4.2.
2. The ventilation strategy provided in Section 5.2 should be implemented.
3. The separating floor between the proposed ground floor bar/reception/waiting area and the hotel rooms on the first floor should be designed to achieve the required sound insulation. An indicative specification has been provided in Section 6. Further design assistance can be provided by NOVA Acoustics Ltd if required.
4. Once the plant equipment has been specified contact NOVA Acoustics Ltd to undertake calculations to ensure the plant noise limit levels can be achieved.

The findings of this report will require written approval from the Local Authority prior to work commencing.

Appendix A – Acoustic Terminology

A-weighted sound pressure level, L_{pA}	Quantity of A-weighted sound pressure given by the following formula in decibels (dBA). $L_{pA} = 10 \log_{10} (pA/p_0)^2$. Where: pA is the A-weighted sound pressure in pascals (Pa) and $p0$ is the reference sound pressure (20 µPa)
Background Sound	Underlying level of sound over a period, T, which might in part be an indication of relative quietness at a given location
Equivalent continuous A-weighted sound pressure level, $L_{Aeq,T}$	Value of the A-weighted sound pressure level in decibels (dB) of a continuous, steady sound that, within a specified time interval, T, has the same mean-squared sound pressure as the sound under consideration that varies with time
Facade level	Sound pressure level 1 m in front of the facade
Free-field level	Sound pressure level away from reflecting surfaces
Indoor ambient noise	Noise in a given situation at a given time, usually composed of noise from many sources, inside and outside the building, but excluding noise from activities of the occupants
Noise Criteria	Numerical indices used to define design goals in a given space
Noise Rating (NR)	Graphical method for rating a noise by comparing the noise spectrum with a family of noise rating curves
Octave Band	Band of frequencies in which the upper limit of the band is twice the frequency of the lower limit
Percentile Level, $L_{AN,T}$	A-weighted sound pressure level obtained using time-weighting "F", which is exceeded for N% of a specified time interval
Rating Level, $L_{Ar,Tr}$	Equivalent continuous A-weighted sound pressure level of the noise, plus any adjustment for the characteristic features of the noise
Reverberation time, T	Time that would be required for the sound pressure level to decrease by 60 dB after the sound source has stopped
Sound Pressure, p	root-mean-square value of the variation in air pressure, measured in pascals (Pa) above and below atmospheric pressure, caused by the sound
Sound Pressure Level, L_p	Quantity of sound pressure, in decibels (dB), given by the formula: $L_p = 10\log_{10}(p/p_0)^{2.}$ Where: p is the root-mean-square sound pressure in pascals (Pa) and $p0$ is the reference sound pressure (20 µPa)
Weighted sound reduction index, R_w	Single-number quantity which characterizes the airborne sound insulating properties of a material or building element over a range of frequencies

Appendix B – Standards, Legislation, Policy, and Guidance

This report is to be primarily based on the following standards, legislation, policy and guidance.

B.1 – National Planning Policy Framework (2023)

Government policy on noise is set out in the National Planning Policy Framework (NPPF), published in 2023. This replaced all earlier guidance on noise and places an emphasis on sustainability. In section 15, Conserving and enhancing the natural and local environment, paragraph 174e, it states:

Preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans;

Paragraph 185 states:

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 impact 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.*

B.2 – Noise Policy Statement for England (2010)

Paragraph 185 of the NPPF also refers to advice on adverse effects of noise given in the Noise Policy Statement for England (NPSE). This document sets out a policy vision 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.

To achieve this vision the Statement identifies the following three aims:

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

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

In achieving these aims the document introduces significance criteria as follows:

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur. It is stated that "significant adverse effects on health and quality of life should be avoided while also considering the guiding principles of sustainable development".

LOAEL – Lowest Observed Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected. It is stated that the second aim above lies somewhere between LOAEL and SOAEL and requires that: "all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also considering the guiding principles of sustainable development. This does not mean that such adverse effects cannot occur."

NOEL – No Observed Effect Level

This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise. This can be related to the third aim above, which seeks: "where possible, positively to improve health and quality of life through the pro-active management of noise while also considering the guiding principles of sustainable development, recognising that there will be opportunities for such measures to be taken and that they will deliver potential benefits to society. The protection of quiet places and quiet times as well as the enhancement of the acoustic environment will assist with delivering this aim."

The NPSE recognises that it is not possible to have a single objective noise-based measure that is mandatory and applicable to all sources of noise in all situations and provides no guidance as to how these criteria should be interpreted. It is clear, however, that there is no requirement to achieve noise levels where there are no observable adverse impacts but that reasonable and practicable steps to reduce adverse noise impacts should be taken in the context of sustainable development and ensure a balance between noise sensitive and the need for noise generating developments.

Any scheme of noise mitigation outlined in this report will, therefore, aim to abide by the above principles of the NPPF and NPSE whilst recognizing the constraints of the site.

B.3 – BS8233:2014 'Guidance on Sound insulation and noise reduction for buildings'

BS8233 provides guidance on noise levels from sources without specific character in the built environment, based on the recommendations of the World Health Organization; specifically, 'WHO Guidelines on Community Noise, 1999'. The Guidelines on Community Noise (1999) document defines community noise to include noise from "industries" and "construction". The desirable criteria levels of steady state, "anonymous" noise in unoccupied spaces within dwellings, from sources such as road traffic, mechanical services and other continuously running plant, are tabulated below.

BS8233:2014 Internal Ambient Noise Level Criteria			
Activity	**Location**	**Daytime (07:00 – 23:00)**	**Night-time (23:00 – 07:00)**
Resting	Living Room	35 dB $L_{Aeq,16hour}$	--
Dining	Dining Room/Area	40 dB $L_{Aeq,16hour}$	--
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$ 45 dB L_{AFmax}*

Table 12 – BS8233:2014 Internal Ambient Noise Level Criteria

**ProPG:2017 states that's good acoustic design can be used so that individual noise events do not normally exceed 45 dB L_{AFmax} more than 10 time a night within noise sensitive rooms such as bedrooms. However, where it is not reasonably practicable to achieve the guideline then the judgment 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.*

It is noted, however, that where development is considered necessary or desirable, despite external noise level above WHO guidelines, the above target levels may be relaxed by up to 5 dB.

General recommendations for mitigation to enable these targets to be achieved are provided, including the use of bunds and barriers to reduce external noise and space planning and sound insulation for the control of internal noise levels.

For this assessment, the above criteria are considered to be the 'LOAEL' as defined in the NPSE in Appendix B.

B.4 – Approved Document F Volume 1: Dwellings (2021)

Approved Document F states the following in relation to noise:

- Mechanical ventilation systems, including both continuous and intermittent mechanical ventilation, should be designed and installed to minimise noise. This includes doing all of the following.
    a) Correctly sizing and jointing ducts.
    b) Ensuring that equipment is appropriately and securely fixed, such as using resilient mountings where noise carried by the structure of the building could be a problem.
    c) Selecting appropriate equipment, including following paragraph
- For mechanical ventilation systems, fan units should be appropriately sized so that fans operating in normal background ventilation mode are not overly noisy. This might require fans to be sized so that they do not operate near maximum capacity when in normal background ventilation mode.
- Account should be taken of outside noise when considering whether openable windows are appropriate for purge ventilation.
- If an exposed façade is close to an area of sustained and loud noise (e.g. a main road), then a noise attenuating background ventilator should be fitted.

B.5 – Acoustics Ventilation and Overheating – Residential Design Guide 2020

It is suggested that the desirable internal noise criteria within BS8233:2014 should be achieved considering adequate ventilation as defined by Building Regulations 'Approved Document F' ('ADF') whole dwelling ventilation. However, for a whole dwelling ventilation system such as MVHR it is considered reasonable to allow higher levels of internal ambient noise from transport sources when higher rates of ventilation are required in relation to the overheating condition.

The 'Institute of Acoustics' ('IOA') and the 'Association of Noise Consultant's ('ANC') have published 'The AVO Guide: 2020' document 2020. It provides guidance for those acousticians involved in the design of buildings to prevent noise ingress to and achieve reasonable internal levels. This provides valuable guidance on ventilation and overheating in support of the "Good Acoustic Design" principle advocated by ProPG. Along with guidance showing an acoustic assessment during the overheating condition, the AVO Guide (2020) provides a framework that has a two-level assessment procedure to estimate the potential impact on occupants:

Level 1 Risk Assessment

AVO 'Level 1' risk assessment criteria guide based on external free field ambient noise levels for dwellings relying on purge ventilation (e.g., opening windows) to prevent summertime overheating. AVO Guide Table 3-2 detailed in the figure below. To assess the possibility of overheating it is reasonable to relax the BS 8233:2014 internal ambient noise levels from opening a window by 5 decibels (5 dB). Also, it is assumed that a partially open window will provide a sound reduction of 13 dB. Therefore, to achieve internal noise levels in line with BS 8233:2014 the façade external noise levels should fall inside the levels shown in Table 3-2.

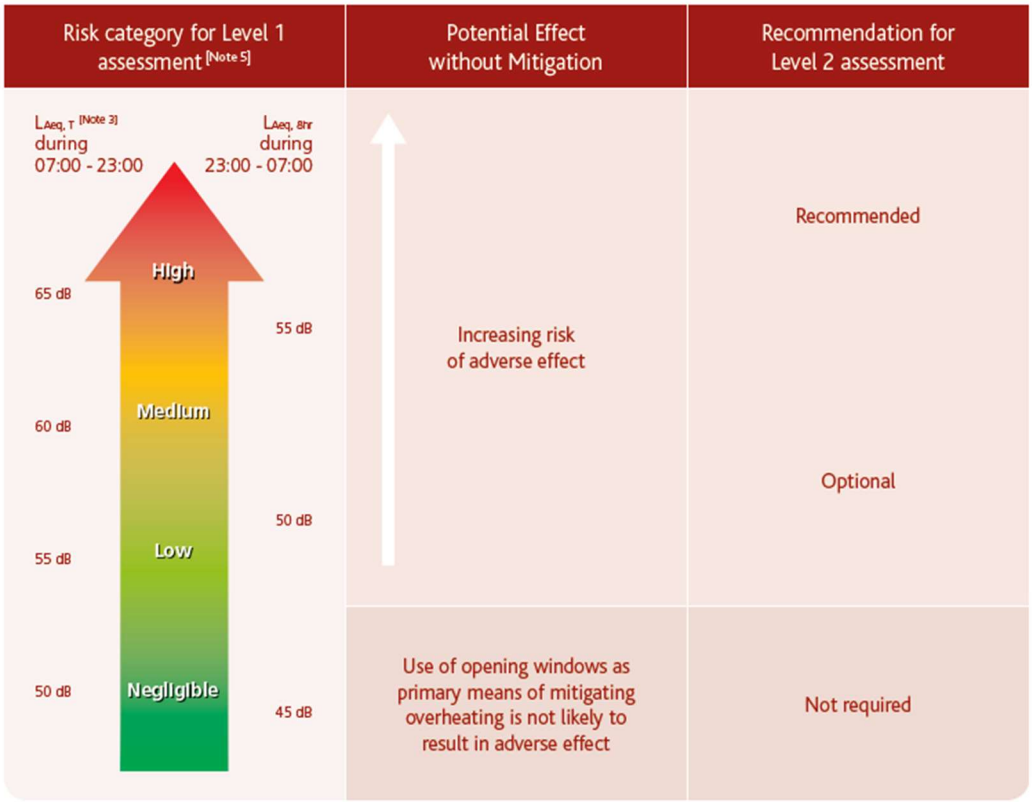


Table 3-2 of AVO Guide (2020)

Figure 9 – AVO Guide Level 1 Risk Category

The AVO Guide (2020) seeks to determine the level of risk associated with overheating in a new residential development based on the existing noise climate. The AVO risk categories are detailed in the table below with clearer categorisation.

AVO Guide (2020) Level 1 Risk Assessment			
Daytime (07:00 – 23:00)	**Night-time (23:00 – 07:00)**	**Risk Category**	**Mitigation**
≥63 dB $L_{Aeq,16hour}$	≥55 dB $L_{Aeq,8hour}$	High Risk	Level 2 assessment recommended. Windows which are unopenable on grounds of noise will inevitably create issues for the overheating strategy.
57 – 62 dB $L_{Aeq,16hour}$	52 – 54 dB $L_{Aeq,8hour}$	Medium Risk	Level 2 assessment optional to give more confidence regarding the suitability of internal noise conditions.
54 – 56 dB $L_{Aeq,16hour}$	49 – 51 dB $L_{Aeq,8hour}$	Low Risk	
≤53 dB $L_{Aeq,16hour}$	≤48 dB $L_{Aeq,8hour}$	Negligible Risk	None required – openable windows suitable for ventilation

Table 13 – AVO Guide (2020) Level 1 Risk Assessment

Level 2 Risk Assessment:

A 'Level 2' assessment of noise is recommended where a dwelling using purge ventilation (e.g., open windows) reaches Level 1 'High Risk' or 'Medium Risk'. The Level 2 assessment guidance comments that where internal ambient noise levels are >50 dB $L_{Aeq,16hr}$ (day) or >42 dB $L_{Aeq,8hr}$ (night) then the outcome might be that the noise causes a material change in behaviour, e.g., having to keep windows closed for the majority of the time, or there is the potential for sleep disturbance.

To conduct a Level 2 assessment, the following minimum information is required:

- Statement of the overheating criteria being applied.
- Description of the provisions for meeting the stated overheating criteria. This should include, where relevant, the area of façade opening.
- Details of the likely internal ambient noise levels whilst using provisions for mitigating overheating, and the method used to predict these.
- Estimation of how frequently and for what duration such provisions are required to mitigate overheating.
- Consideration of the effect of individual noise events.

- Assessment of the adverse effect on occupants.

The figure below outlines the AVO Guide (2020) guidance for a Level 2 assessment of noise from transport sources relating to the Overheating Condition.

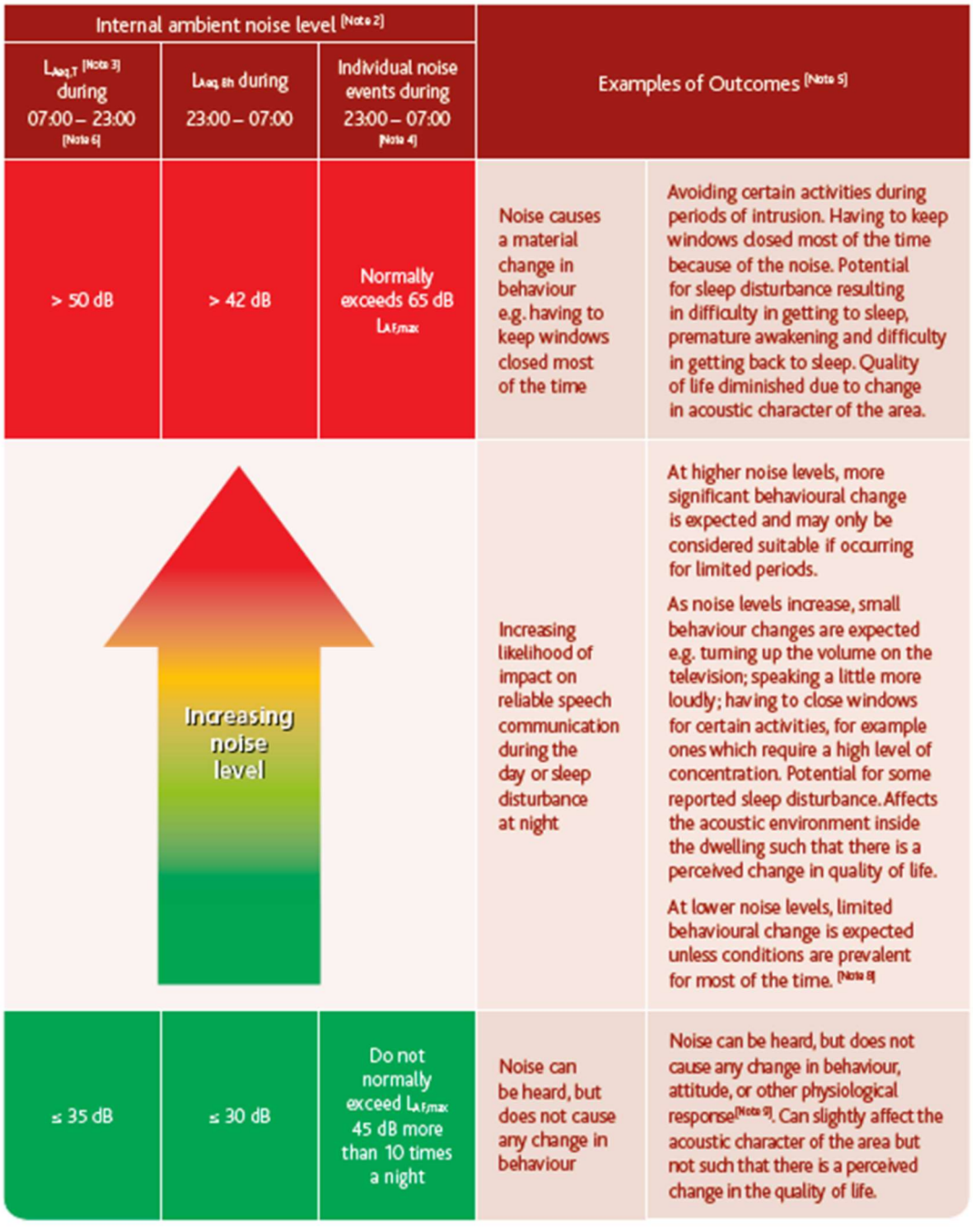
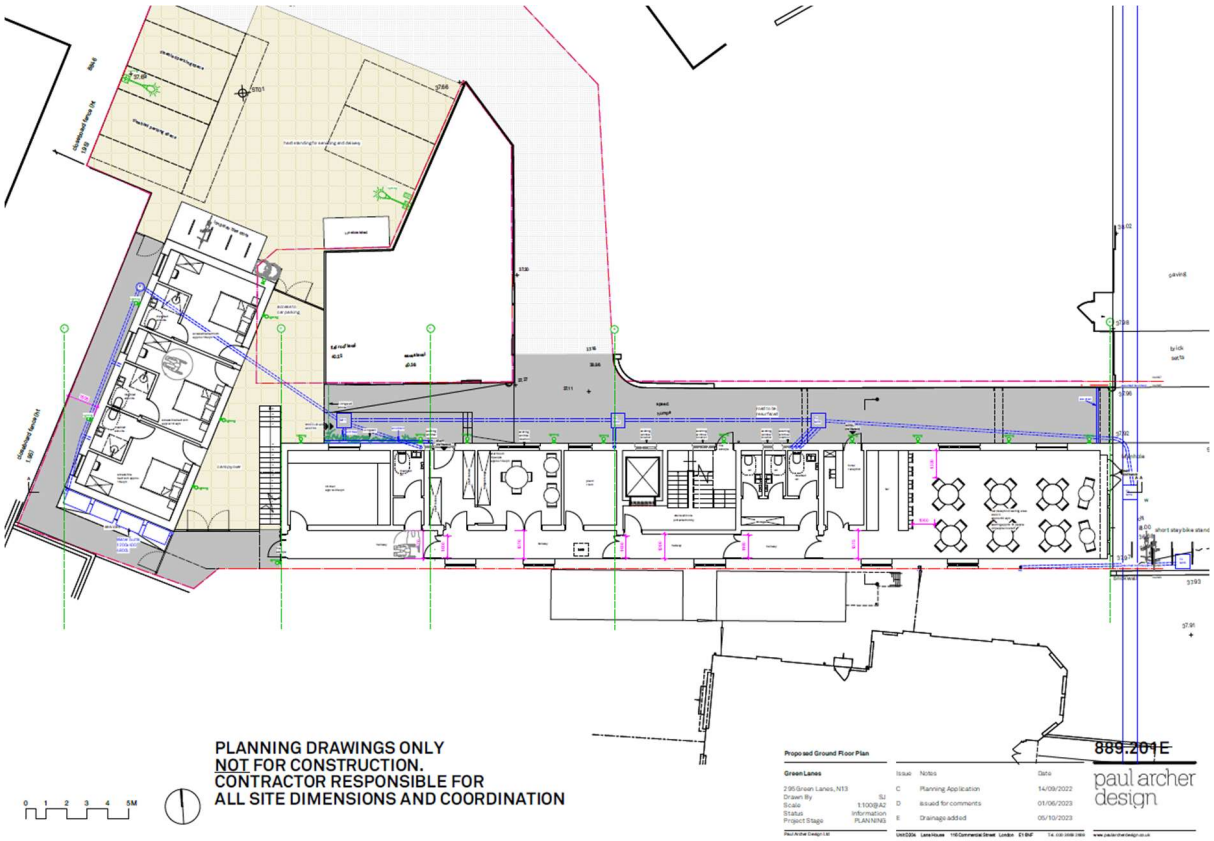
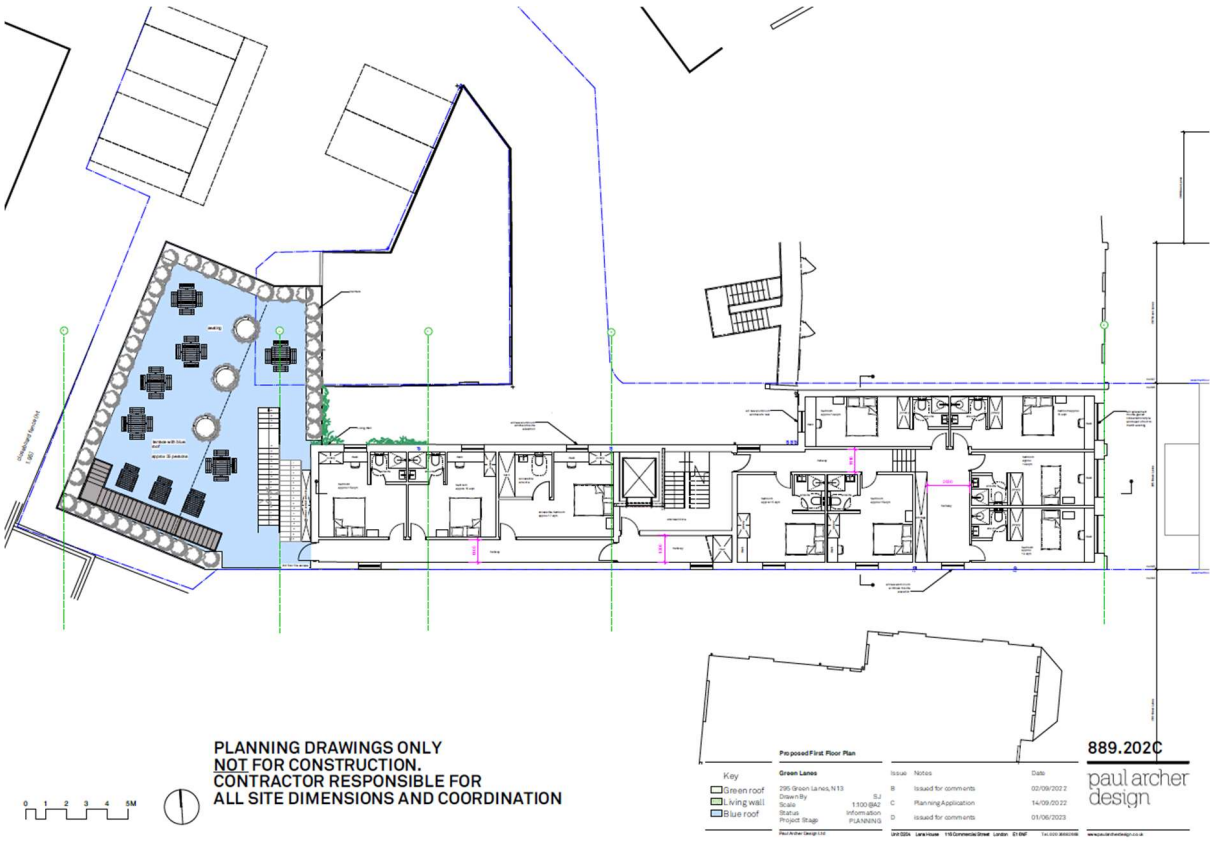


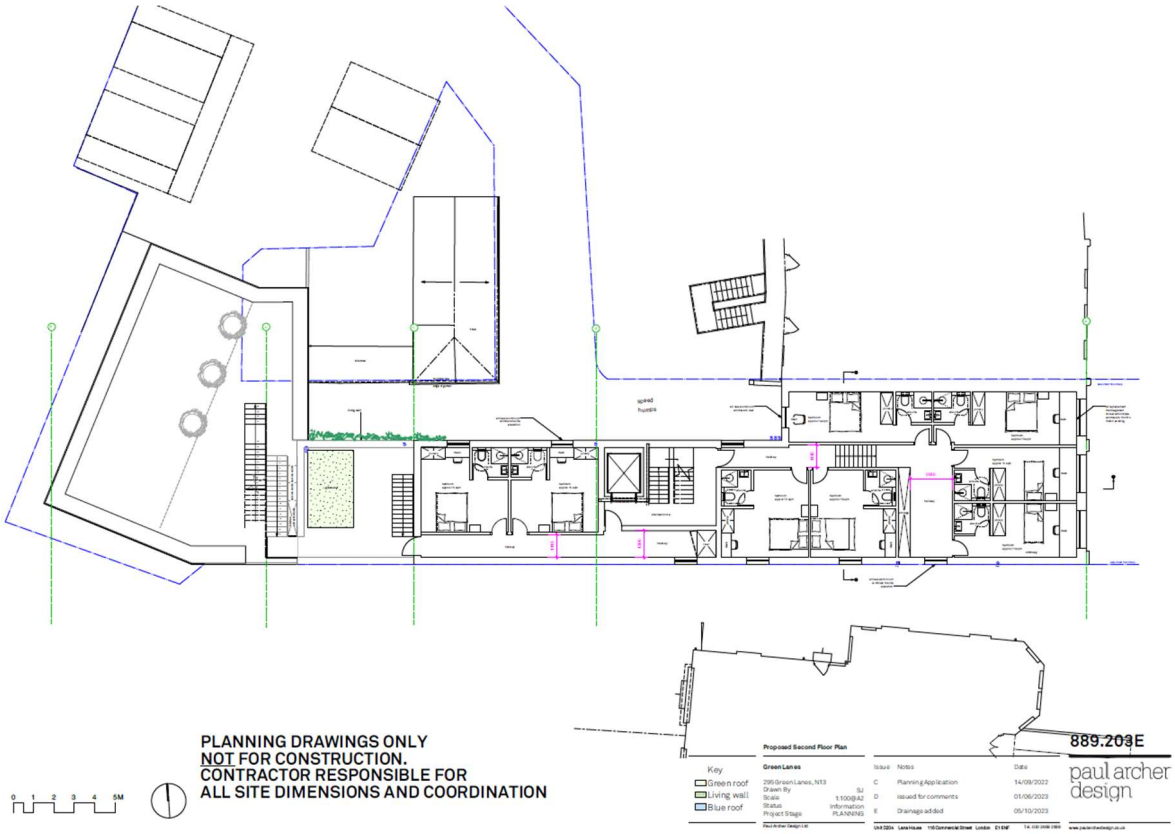
Table 3-3 of AVO Guide (2020)

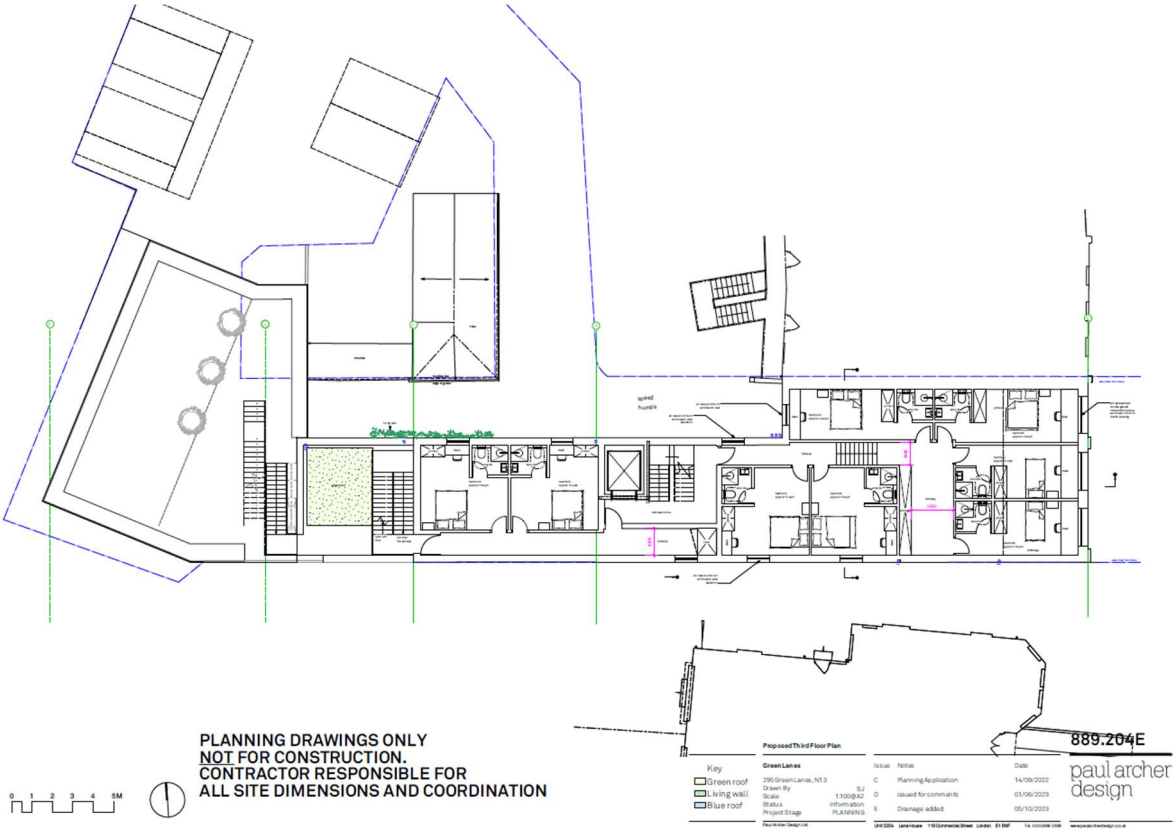
Figure 10 – AVO Guide Level 2 Internal Ambient Noise Levels

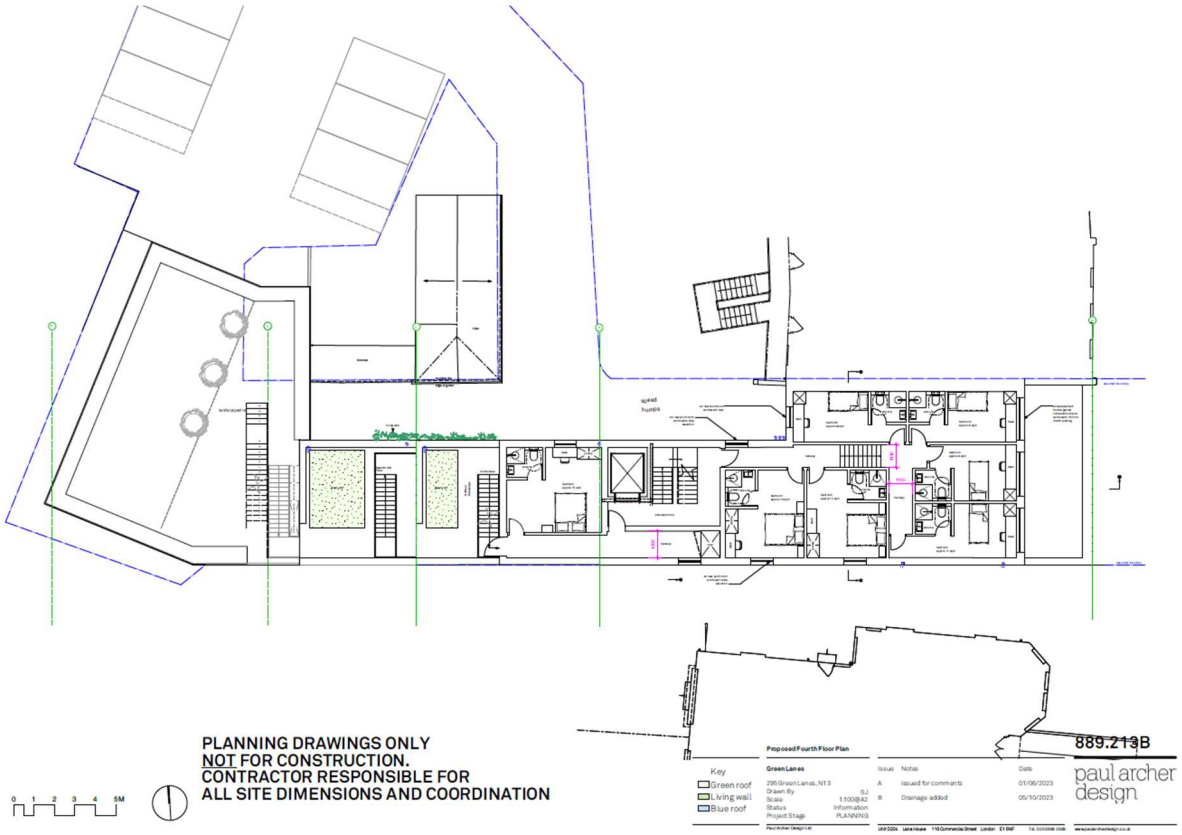
Appendix C – Location and Site Plans

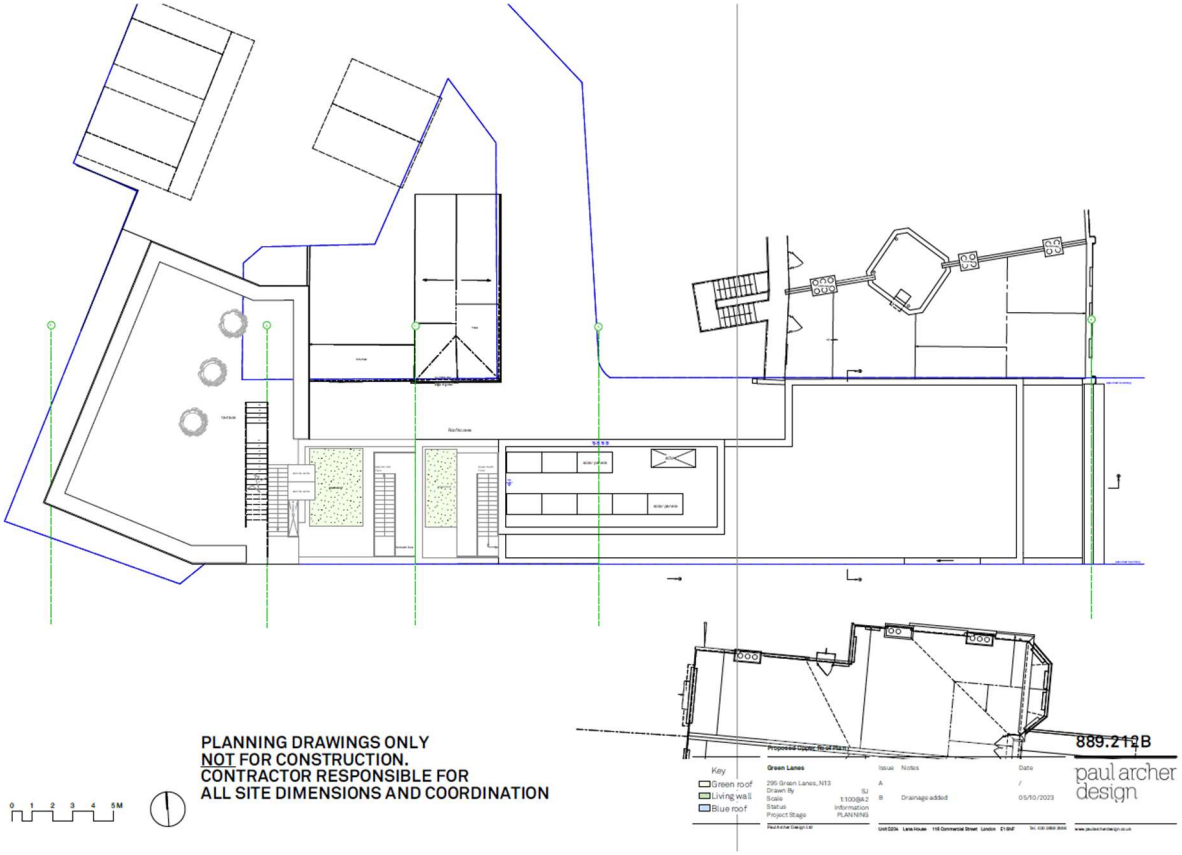





PLANNING DRAWINGS ONLY
NOT FOR CONSTRUCTION.
CONTRACTOR RESPONSIBLE FOR
ALL SITE DIMENSIONS AND COORDINATION
0 1 2 3 4 5M
Proposed Second Floor Plan
Green Lanes
Key
Green roof
Living wall
Blue roof
889.203E
paul archer design


PLANNING DRAWINGS ONLY
NOT FOR CONSTRUCTION.
CONTRACTOR RESPONSIBLE FOR
ALL SITE DIMENSIONS AND COORDINATION
0 1 2 3 4 5M
Proposed Third Floor Plan
Green Lanes
Key
Green roof
Living wall
Blue roof
889.204E
paul archer design


PLANNING DRAWINGS ONLY
NOT FOR CONSTRUCTION.
CONTRACTOR RESPONSIBLE FOR
ALL SITE DIMENSIONS AND COORDINATION
0 1 2 3 4 5M
Proposed Fourth Floor Plan
889.213B
paul archer design
Key
Green roof
Living wall
Blue roof
Green Lanes
Issue
Notes
Date
A
Issued for comments
01/06/2023
B
Drainage added
05/10/2023


PLANNING DRAWINGS ONLY
NOT FOR CONSTRUCTION.
CONTRACTOR RESPONSIBLE FOR
ALL SITE DIMENSIONS AND COORDINATION
0 1 2 3 4 5M
889.212B
paul archer design
Key
Green roof
Living wall
Blue roof
Green Lanes
Issue
Notes
Date
A
B
Drainage added
05/10/2023

Appendix D – Environmental Survey

D.1 – Time History Noise Data

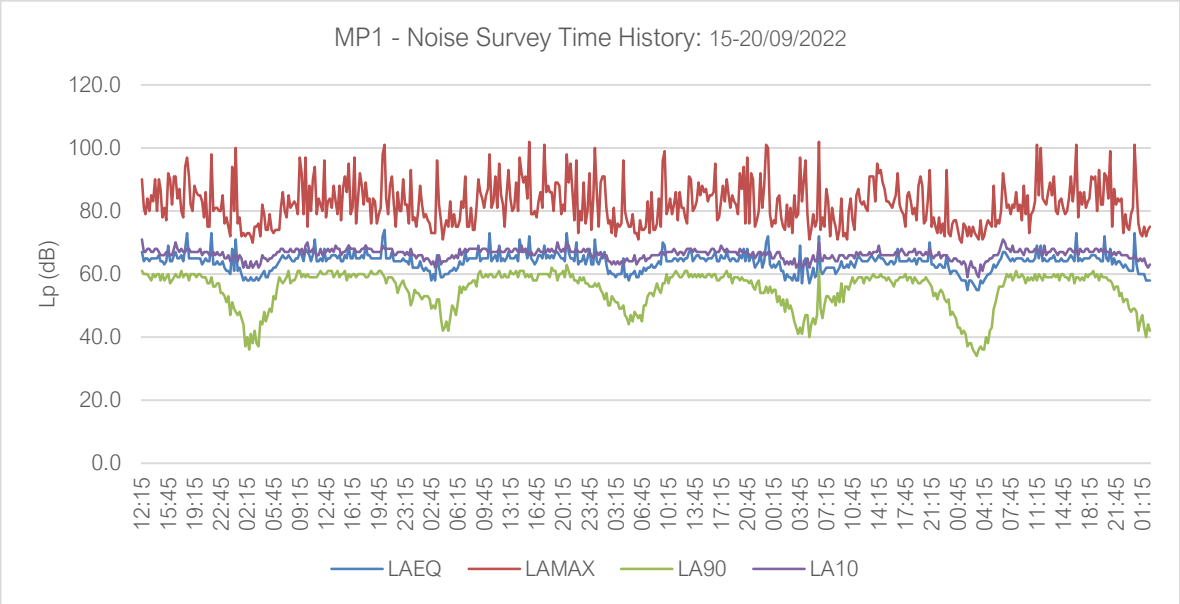


Figure 11 – MP1 Noise Survey Time History

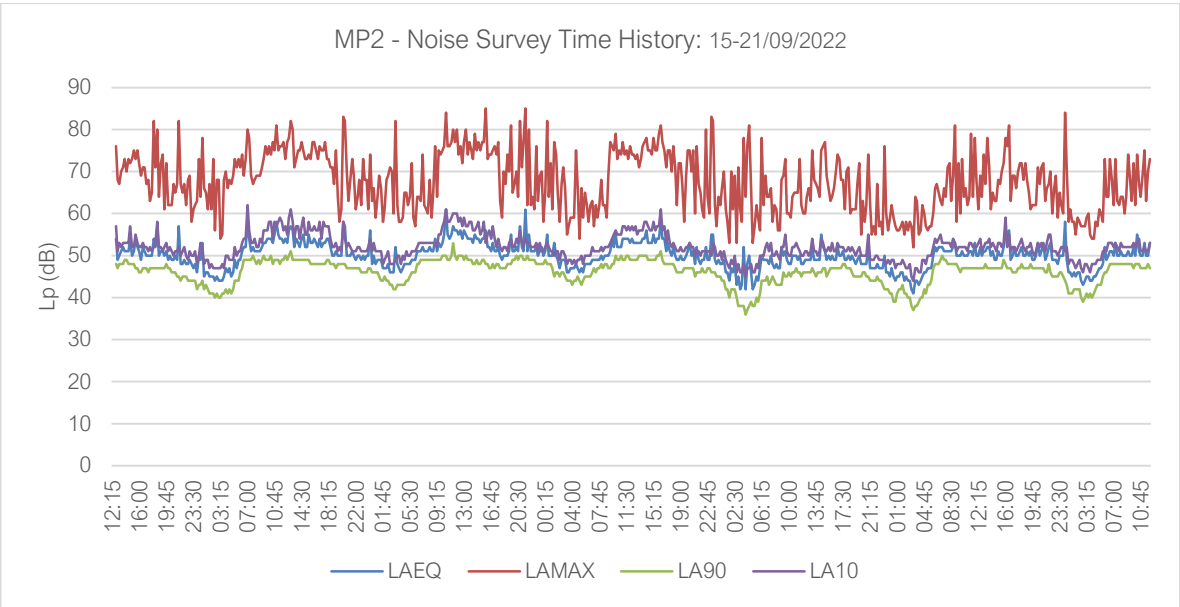


Figure 12 – MP2 Noise Survey Time History

D.2 – Surveying Equipment

Piece of Equipment	Serial No.	Calibration Deviation
CESVA SC420 Class 1 Sound level meter	T238593	≤0.5
CESVA CB006 Class 1 Calibrator	901013	
CESVA SC420 Class 1 Sound level meter	T250680	≤0.5
CESVA CB006 Class 1 Calibrator	902441	

Table 14 – Surveying Equipment

All equipment used during the survey was field calibrated at the start and end of the measurement period with a negligible deviation of ≤0.5 dB. All sound level meters are calibrated every 24 months and all calibrators are calibrated every 12 months, by a third-party calibration laboratory. All microphones were fitted with a protective windshield for the entire measurements period. Calibration certificates can be provided upon request.

D.3 – Meteorological Conditions

As the environmental noise survey was carried out over a long un-manned period no localised records of weather conditions were taken. However, all measurements have been compared with met office weather data of the area, specifically the closest weather station, and the data from the weather station is outlined in the table below. When reviewing the time history of the noise measurements, any scenarios that were considered potentially to be affected by the local weather conditions have been omitted. The analysis of the noise data includes statistical and percentile analysis and review of minimum and maximum values, which aids in the preclusion of any periods of undesirable weather conditions. The weather conditions were deemed suitable for the measurement of environmental noise in accordance with BS7445 Description and Measurement of Environmental Noise. The table below presents the average temperature, wind speed and rainfall range for each 24-hour period during the entire measurement.

Weather Conditions – Hilton (Approx. 4.2km NNW of Site)				
Time Period	Air Temp (^{0}C)	Rainfall (mm/h)	Prevailing Wind Direction	Wind Speed (m/s)
15/09/2022 – 00:00 – 23:59	11.2 – 20.7	0.0	WNW	0.0 – 2.05
16/09/2022 – 00:00 – 23:59	9.1 – 17.4	0.0	W	0.0 – 2.9
17/09/2022 – 00:00 – 23:59	7.3 – 18.0	0.0	W	0.0 – 3.2
18/09/2022 – 00:00 – 23:59	8.9 – 17.6	0.0	SW	0.0 – 3.2
19/09/2022 – 00:00 – 23:59	9.4 – 19.9	0.0	W	0.0 – 1.5
20/09/2022 – 00:00 – 23:59	8.2 – 21.1	0.0	WNW	0.0 – 2.2
21/09/2022 – 00:00 – 23:59	13.5 – 20.8	0.0	SW	0.0 – 0.85

Table 15 – Weather Conditions

Appendix E – Noise Break-in Calculations

The façade sound reduction and predicted internal noise levels are calculated assuming the following:

- The calculation method for façade sound reduction is in accordance with BS8233:2014 and BS EN 12354-3.
- The reverberation time is typically 0.3 seconds across the relevant frequency range for a furnished bedroom in the UK.
- Windows areas and room volumes have been taken from the technical drawings provided to NOVA Acoustics Ltd. Detailed details can be provided upon request.
- The acoustic performance of the façade elements is taken from the relevant manufacturer's technical information, or the sound reduction has been predicted using INSUL 9.0.
- For background trickle ventilation a total Equivalent Area of 5000mm^2 per habitable room has been used in the calculations, which equates to 2 No. trickle vents (2500mm^2 each).

It should be noted that assessment against the equivalent Noise Rating (NR) curves are included in the noise break calculations. In certain locations there are slight exceedances of the NR criteria however, the single-figure values (as provided in BS8233) are achieved and therefore the recommended glazing and ventilation specification are considered suitable.

Bedroom (Red Facade) Day Time Leq

Item / Description	dB(A)	63	125	250	500	1k	2k	4k
Measured Leq,T	67	72	67	63	62	63	60	54
Glazing Noise Ingress	23	40	34	28	16	7	5	-9
Ventilation Noise Ingress	18	42	21	18	12	8	-5	-13
Wall Noise Ingress	10	29	19	13	2	2	-1	-7
Roof Noise Ingress								
Room Absorption Correction		1	1	1	0	0	0	-1
Total Noise Ingress	**28**	**49**	**38**	**32**	**21**	**14**	**9**	**-2**
NR30	35	59	48	39	33	30	26	24
Exceedance of Criteria	-7	-10	-10	-7	-12	-16	-17	-26

Bedroom (Red Facade) Night Time Leq

Item / Description	dB(A)	63	125	250	500	1k	2k	4k
Measured Leq,T	66	69	64	62	62	61	60	52
Glazing Noise Ingress	21	37	31	27	16	5	5	-11
Ventilation Noise Ingress	16	39	18	17	12	6	-5	-15
Wall Noise Ingress	9	26	16	12	2	0	-1	-9
Roof Noise Ingress								
Room Absorption Correction		1	1	1	0	0	0	-1
Total Noise Ingress	**26**	**46**	**35**	**31**	**21**	**12**	**9**	**-4**
NR25	30	55	43	35	28	25	21	19
Exceedance of Criteria	-4	-9	-8	-4	-7	-13	-12	-23

Bedroom (Red Facade) Night Time Max

Item / Description	dB(A)	63	125	250	500	1k	2k	4k
Corrected Lmax Spectrum	84	87	82	80	80	79	78	70
Glazing Noise Ingress	39	55	49	45	34	23	23	7
Ventilation Noise Ingress	34	57	36	35	30	24	13	3
Wall Noise Ingress	27	44	34	30	20	18	17	9
Roof Noise Ingress								
Room Absorption Correction		1	1	1	0	0	0	-1
Total Noise Ingress	**45**	**64**	**53**	**49**	**39**	**31**	**27**	**14**
NR40	45	67	56	49	43	40	37	34
Exceedance of Criteria	0	-3	-3	0	-4	-9	-10	-20

Figure 13 – Noise Break-in Calculation – Red Facades

Bedroom (Orange Facade) Day Time Leq

Item / Description	dB(A)	63	125	250	500	1k	2k	4k
Corrected Leq,T Spectrum	62	67	62	58	57	58	55	49
Glazing Noise Ingress	25	39	33	30	22	13	8	-5
Ventilation Noise Ingress	23	39	24	21	23	14	15	6
Wall Noise Ingress	5	24	14	8	-3	-3	-6	-12
Roof Noise Ingress								
Room Absorption Correction		-1	-2	-2	-3	-3	-3	-4
Total Noise Ingress	**28**	**44**	**35**	**31**	**26**	**17**	**16**	**5**
NR30	35	59	48	39	33	30	26	24
Exceedance of Criteria	-7	-15	-13	-8	-7	-13	-10	-19

Bedroom (Orange Facade) Night Time Leq

Item / Description	dB(A)	63	125	250	500	1k	2k	4k
Corrected Leq,T Spectrum	59	62	57	55	55	54	53	45
Glazing Noise Ingress	22	34	28	27	20	9	6	-9
Ventilation Noise Ingress	21	34	19	18	21	10	13	2
Wall Noise Ingress	2	19	9	5	-5	-7	-8	-16
Roof Noise Ingress								
Room Absorption Correction		-1	-2	-2	-3	-3	-3	-4
Total Noise Ingress	**25**	**39**	**30**	**28**	**24**	**13**	**14**	**1**
NR25	30	55	43	35	28	25	21	19
Exceedance of Criteria	-5	-16	-13	-7	-4	-12	-7	-18

Bedroom (Orange Facade) Night Time Max

Item / Description	dB(A)	63	125	250	500	1k	2k	4k
Corrected Lmax Spectrum	79	82	77	75	75	74	73	65
Glazing Noise Ingress	42	54	48	47	40	29	26	11
Ventilation Noise Ingress	41	54	39	38	41	30	33	22
Wall Noise Ingress	22	39	29	25	15	13	12	4
Roof Noise Ingress								
Room Absorption Correction		-1	-2	-2	-3	-3	-3	-4
Total Noise Ingress	**45**	**59**	**50**	**48**	**44**	**33**	**34**	**21**
NR40	45	67	56	49	43	40	37	34
Exceedance of Criteria	0	-8	-6	-1	1	-7	-3	-13

Figure 14 – Noise Break-in Calculation – Orange Facades

Bedroom (Blue Facade) Day Time Leq

Item / Description	dB(A)	63	125	250	500	1k	2k	4k
Corrected Leq,T Spectrum	53	62	58	53	50	49	44	38
Glazing Noise Ingress	19	33		26	15	4	-3	-3
Ventilation Noise Ingress	19		22	15	14	17	7	-1
Wall Noise Ingress	-1	19	10	3	-10	-12	-17	-23
Roof Noise Ingress								
Room Absorption Correction		3	3	3	2	2	2	1
Total Noise Ingress	**28**	**40**	**28**	**32**	**23**	**23**	**12**	**5**
NR30	35	59	48	39	33	30	26	24
Exceedance of Criteria	-7	-19	-20	-7	-10	-7	-14	-19

Bedroom (Blue Facade) Night Time Leq

Item / Description	dB(A)	63	125	250	500	1k	2k	4k
Corrected Leq,T Spectrum	49	58	53	50	46	45	41	29
Glazing Noise Ingress	16	29		23	11	0	-6	-12
Ventilation Noise Ingress	15		17	12	10	13	4	-10
Wall Noise Ingress	-5	15	5	0	-14	-16	-20	-32
Roof Noise Ingress								
Room Absorption Correction		3	3	3	2	2	2	1
Total Noise Ingress	**24**	**36**	**23**	**29**	**19**	**18**	**9**	**-4**
NR25	30	55	43	35	28	25	21	19
Exceedance of Criteria	-6	-19	-20	-6	-9	-7	-12	-23

Bedroom (Blue Facade) Night Time Max

Item / Description	dB(A)	63	125	250	500	1k	2k	4k
Corrected Lmax Spectrum	69	78	73	70	66	65	61	49
Glazing Noise Ingress	36	49		43	31	20	14	8
Ventilation Noise Ingress	35		37	32	30	33	24	10
Wall Noise Ingress	15	35	25	20	6	4	0	-12
Roof Noise Ingress								
Room Absorption Correction		3	3	3	2	2	2	1
Total Noise Ingress	**44**	**56**	**43**	**49**	**39**	**38**	**29**	**16**
NR40	45	67	56	49	43	40	37	34
Exceedance of Criteria	-1	-11	-13	0	-4	-2	-8	-18

Figure 15 – Noise Break-in Calculation – Blue Facades

Bedroom (Green Facade) Day Time Leq

Item / Description	dB(A)	63	125	250	500	1k	2k	4k
Corrected Leq,T Spectrum	50	59	55	50	47	46	41	35
Glazing Noise Ingress	15	28	22	21	10	-1	-8	-8
Ventilation Noise Ingress	14		17	10	9	12	2	-6
Wall Noise Ingress	-3	16	7	0	-13	-15	-20	-26
Roof Noise Ingress								
Room Absorption Correction		5	5	4	4	4	3	2
Total Noise Ingress	**24**	**36**	**31**	**29**	**19**	**19**	**9**	**1**
NR30	35	59	48	39	33	30	26	24
Exceedance of Criteria	-11	-23	-17	-10	-14	-11	-17	-23

Bedroom (Green Facade) Night Time Leq

Item / Description	dB(A)	63	125	250	500	1k	2k	4k
Corrected Leq,T Spectrum	44	53	48	45	41	40	36	24
Glazing Noise Ingress	9	22	15	16	4	-7	-13	-19
Ventilation Noise Ingress	8		10	5	3	6	-3	-17
Wall Noise Ingress	-9	10	0	-5	-19	-21	-25	-37
Roof Noise Ingress								
Room Absorption Correction		5	5	4	4	4	3	2
Total Noise Ingress	**19**	**30**	**24**	**24**	**13**	**13**	**4**	**-10**
NR25	30	55	43	35	28	25	21	19
Exceedance of Criteria	-11	-25	-19	-11	-15	-12	-17	-29

Bedroom (Green Facade) Night Time Max

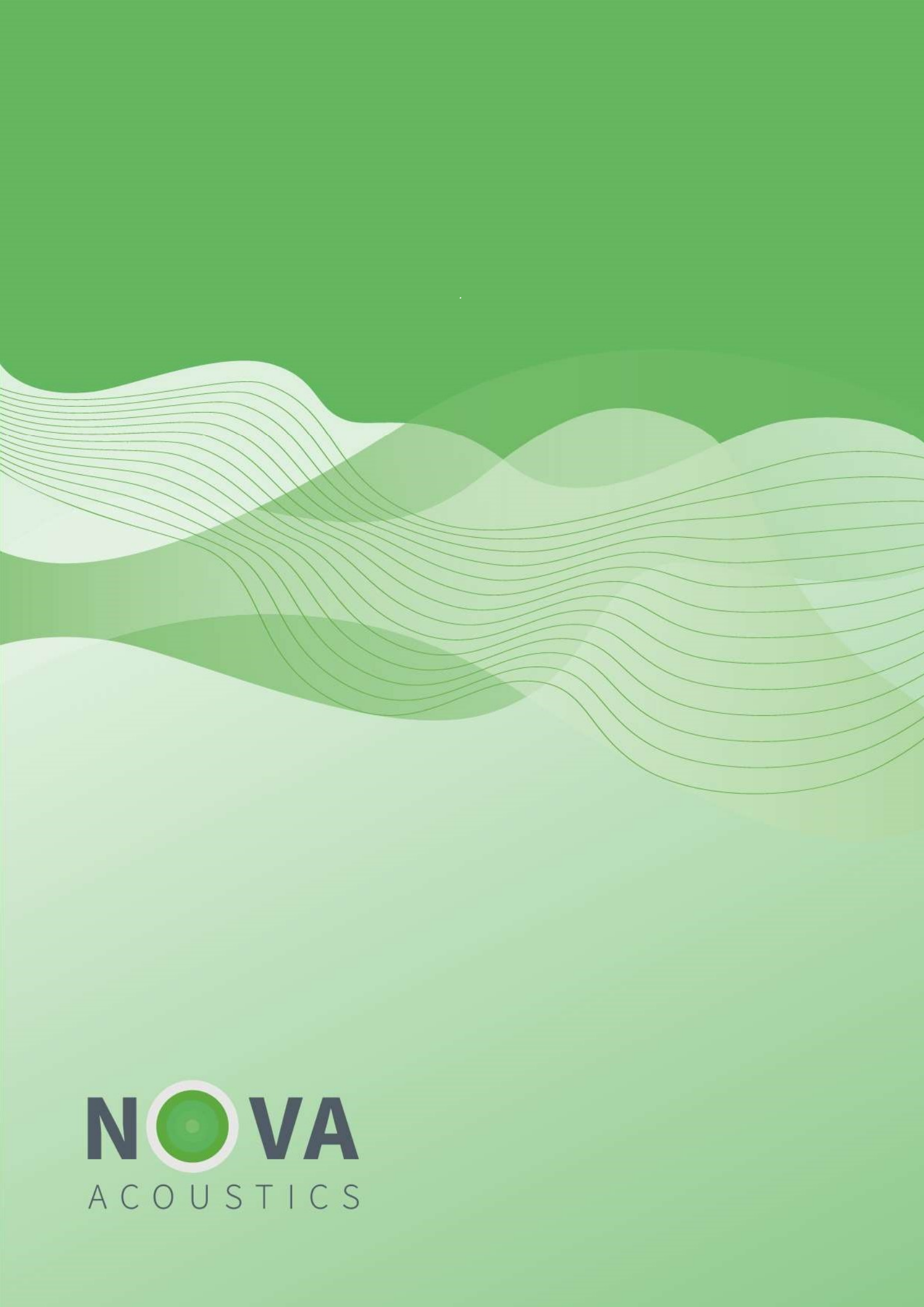
Item / Description	dB(A)	63	125	250	500	1k	2k	4k
Corrected Lmax Spectrum	70	79	74	71	67	66	62	50
Glazing Noise Ingress	35	48	41	42	30	19	13	7
Ventilation Noise Ingress	34		36	31	29	32	23	9
Wall Noise Ingress	17	36	26	21	7	5	1	-11
Roof Noise Ingress								
Room Absorption Correction		5	5	4	4	4	3	2
Total Noise Ingress	**45**	**56**	**50**	**50**	**39**	**39**	**30**	**16**
NR40	45	67	56	49	43	40	37	34
Exceedance of Criteria	0	-11	-6	1	-4	-1	-7	-18

Figure 16 – Noise Break-in Calculation – Green Facades

Appendix F – Noise Modelling Particulars

The SoundPlan 9.0 noise model has been setup with the following inputs and assumptions:

- To accurately model the land surrounding the development the topographical data has been taken from the EAs 'National LIDAR Programme' on the DEFRA Data Services Platform.
- For the purpose of the assessment, the ground between the source and receiver is considered to consist primarily of acoustically 'soft' surfaces.
- The sound map grid height has been set to 1.5m, however, the noise levels used in the assessment will be taken form the most exposed point on each NSR façade.
- All buildings and any intervening objects have been modelled according to the technical drawings provided by the applicant, and those provided by the LIDAR data.
- The noise levels presented in Table 2 have been used to calibrate the noise model.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