SYNTEGRA CONSULTING

The Blue Lion,
133 Gray's Inn Road,
London,
WC1X 8TU

Noise Impact Assessment

January 2024

Ref: 23-12460
Rev A

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY 5
2. INTRODUCTION 7
3. PLANNING POLICY 8
4. GUIDANCE DOCUMENTS 10
5. BASELINE NOISE LEVELS 17
6. INITIAL SITE RISK ASSESSMENT 19
7. FULL ASSESSMENT 20
8. PLANT NOISE ASSESSMENT – MAXIMUM SOUND POWER LEVEL 23
9. INTERNAL SOUND INSULATION 24
10. CONCLUSION 25
11. APPENDIX 1: GLOSSARY OF ACOUSTIC TERMINOLOGY 26
12. APPENDIX 2: PROFESSIONAL STATEMENT 27
13. APPENDIX 3: LIST OF EQUIPMENT 27
14. APPENDIX 4: DETAILED NOISE MEASUREMENT RESULTS 28

Quality Standards Control

The signatories below verify that this document has been prepared in accordance with our quality control requirements. These procedures do not affect the content and views expressed by the originator.

This document must only be treated as a draft unless it has been signed by the originators and approved by a director.

Revision	-	*Rev. A*
Date	08.01.2024	24.01.2024
Prepared by	J. Willmott MIOA	D. Yates MIOA
Checked by	A. Gonzales	-
Authorised by	D. Yates MIOA	D. Yates MIOA

Limitations

Syntegra Consulting Ltd ("SC") has prepared this report for the sole use of the client in accordance with the agreement under which our services were performed. No other warranty, expressed or implied, is made as to the professional advice included in this report or any other services provided by SC.

The conclusions and recommendations contained in this report are based upon information provided by others and upon the assumption that all relevant information has been provided by those parties from whom it has been requested and that such information is accurate. Information obtained by SC has not been independently verified by SC, unless otherwise stated in the report.

The methodology adopted and the sources of information used by SC in providing its services are outlined in this report. The work described in this report was undertaken in **April and May 2022, and January 2024** and is based on the conditions encountered and the information available during the said period of time. The scope of this report and the services are accordingly factually limited by these circumstances.

Where assessments of works or costs identified in this report are made, such assessments are based upon the information available at the time and where appropriate are subject to further investigations or information which may become available.

SC disclaim any undertaking or obligation to advise any person of any change in any matter affecting the report, which may come or be brought to SC's attention after the date of the report.

Certain statements made in the report that are not historical facts may constitute estimates, projections or other forward-looking statements and even though they are based on reasonable assumptions as of the date of the report, such forward-looking statements by their nature involve risks and uncertainties that could cause actual results to differ materially from the results predicted. SC specifically does not guarantee or warrant any estimate or projections contained in this report.

Costs may vary outside the ranges quoted. Whilst cost estimates are provided for individual issues in this report these are based upon information at the time which can be incomplete. Cost estimates for such issues may therefore vary from those provided. Where costs are supplied, these estimates should be considered in aggregate only. No reliance should be made in relation to any division of aggregate costs, including in relation to any issue, site or other subdivision.

No allowance has been made for changes in prices or exchange rates or changes in any other conditions which may result in price fluctuations in the future. Where assessments of works or costs necessary to achieve compliance have been made, these are based upon measures which, in SC's experience, could normally be negotiated with the relevant authorities under present legislation and enforcement practice, assuming a pro-active and reasonable approach by site management.

Forecast cost estimates do not include such costs associated with any negotiations, appeals or other non-technical actions associated with the agreement on measures to meet the requirements of the authorities, nor are potential business loss and interruption costs considered that may be incurred as part of any technical measures.

Copyright

1. Executive Summary

An assessment has been carried out of the present noise climate at **The Blue Lion, 133 Gray's Inn Road, London, WC1X 8TU** and the impact of that noise on the proposed development. The proposed development comprises the refurbishment of the existing pub, at the basement and ground floor level, and extension of the residential accommodation to provide four new residential units at the upper levels.

The site is located on Gray's Inn Road in a mixed commercial and residential area. It is noted that customers are able to utilise the area of cobbled street directly behind the pub (on Brownlow Mews) for external trading however this is restricted under the Premises Licence to 1200 hrs to 1430 hrs and 1730 hrs to 2030 hrs on Thursdays and Fridays. Accordingly, significant noise impacts would not be expected due to the reduced days and hours of use.

The assessment is based on the results of a noise measurement survey that has been carried out over a 4 day period at the proposed development site and has considered the advice of local and national planning policy and best practice guidance.

The initial site risk assessment identified that the site has a *medium* risk in terms of noise at the front of the site and a *medium-low* risk in terms of noise at the rear of the site.

It has been identified that the requirements of the Local Authority in respect of internal noise levels can only be achieved through careful consideration of the building envelope. The construction assumptions that have led to this conclusion are:

- **The façade build-up will be a standard brick and block construction (or equivalent) to achieve an R_w of approximately 55 dB.**
- **At the front of the site:**
    - **A typical double-glazing system in a 6/16/6.8 (with acoustic laminate) configuration (or equivalent) will be installed to give a Sound Reduction Index (SRI) of 38 dB R_w.**
    - **An alternative means of ventilation, such as MVHR or appropriately specified acoustic vents, with a $D_{n,e,w}$ of at least 44 dB, will be installed to allow adequate ventilation without the requirement to open windows.**
- **At the rear of the site:**
    - **A typical double-glazing system in a 4/12/6 configuration (or equivalent) will be installed to give a Sound Reduction Index (SRI) of 30 dB R_w.**
    - **Appropriately specified acoustic trickle vents, with a $D_{n,e,w}$ of at least 36 dB, or an alternative means of ventilation will be installed to allow adequate ventilation without the requirement to open windows.**
- **Purge ventilation (as defined by ADF) through open windows.**
- **Mitigation of overheating (where required) through means other than open windows.**

The assessment has also shown that the external noise level criteria would be achieved within the proposed amenity areas.

Achievement of the ProPG criteria also demonstrates compliance with Camden Council policy, in that it has been demonstrated that significant adverse impacts will be avoided, and in most cases noise levels are below the LOAEL value given in **Table 3.1** and should therefore be considered acceptable.

A maximum plant noise level has been provided for any plant installations.

Outline advice has been provided in order to ensure that sufficient sound insulation is provided between the ground floor public house and first floor flats. **A detailed sound insulation assessment will be carried out during the detailed design stage to ensure that a sufficient level of sound insulation will be achieved to ensure adverse impacts are avoided. This can be ensured as a planning condition.**

Overall, it has been shown that, through careful consideration of the building envelope construction, plant noise and internal sound insulation, the proposed development will avoid future residents being exposed to harmful levels of noise. It can therefore be concluded that significant adverse impacts on the health or quality of life of those future residents would be avoided, in line with the aims of the NPPF, NPSE and PPG-Noise.

2. Introduction

This report has been prepared to support the planning application for the proposed development at **The Blue Lion, 133 Gray's Inn Road, London, WC1X 8TU**. The proposed development comprises the refurbishment of the existing pub, at the basement and ground floor level, and extension of the residential accommodation to provide four new residential units at the upper levels.

The report assesses, through on-site noise measurements, the impact of the existing noise climate on the proposed development.

A glossary of acoustic terminology is provided in **Appendix 1**.

The site is located on Gray's Inn Road in a mixed commercial and residential area. It is noted that customers are able to utilise the area of cobbled street directly behind the pub (on Brownlow Mews) for external trading however this is restricted under the Premises Licence to 1200 hrs to 1430 hrs and 1730 hrs to 2030 hrs on Thursdays and Fridays. Accordingly, significant noise impacts would not be expected due to the reduced days and hours of use and therefore this has been discounted from this noise assessment. The location of the proposed development site is provided in **Figure 2.1**.

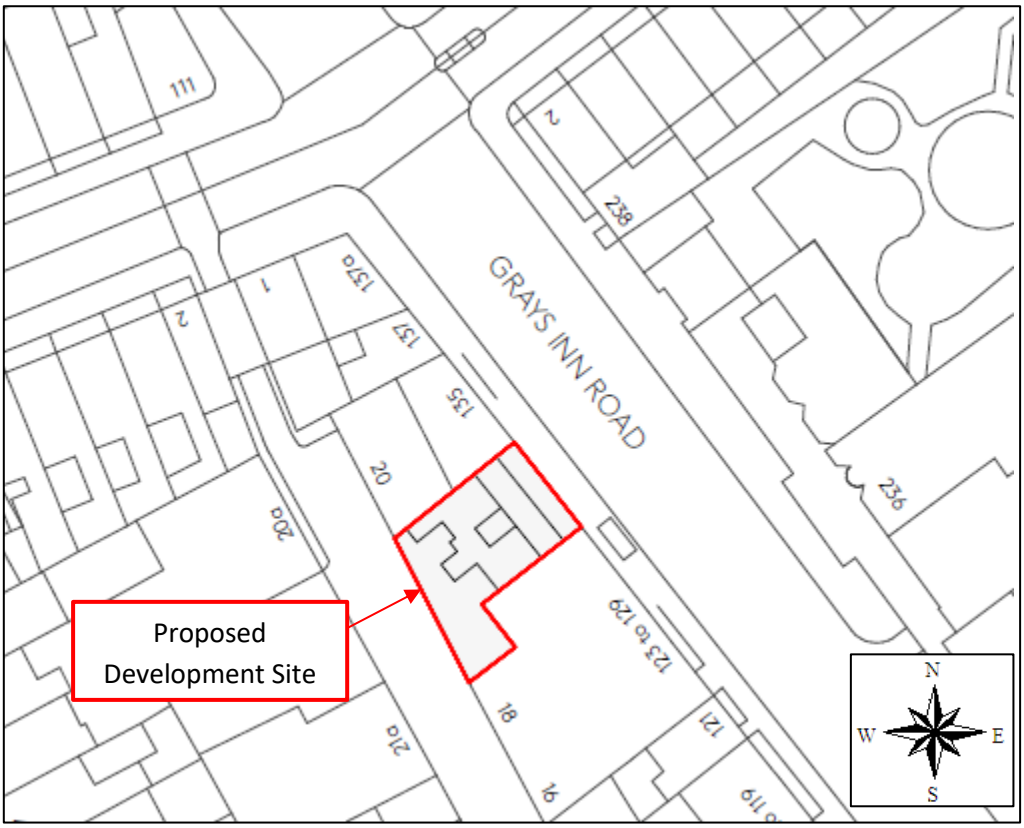


Figure 2.1: Site Location

3. Planning Policy

3.1. National Planning Policy Framework

The National Planning Policy Framework (NPPF) was released in March 2012 and last updated in December 2023. The purpose of the planning system is to contribute to the achievement of sustainable development and to encourage good design. There are three dimensions to sustainable development: economic, social and environmental.

Central to the NPPF, paragraph 10 states: *'At the heart of the National Planning Policy Framework is a **presumption in favour of** **[permitting]** **sustainable development**'*. This is expanded upon in paragraph 11, where it is stated:

*'…For **decision-taking** this means:*

- *approving development proposals that accord with an up-to-date development plan without delay; or*
- *where there are no relevant development plan policies, or the policies which are most important for determining the application are out-of-date, granting permission unless:*
    - *the application of policies in this Framework that protect areas or assets of particular importance provides a clear reason for refusing the development proposed; or*
    - *any adverse impacts of doing so would significantly and demonstrably outweigh the benefits, when assessed against the policies in this Framework taken as a whole'*

Paragraph 174 states '*Planning policies and decisions should contribute to and enhance the natural and local environment by… preventing new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by, unacceptable levels of… noise pollution…*'.

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:*

- *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 (see Explanatory Note to the Noise Policy Statement for England (DEFRA)).*
- *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*
- *limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.'*

3.2. Noise Policy Statement for England

The Noise Policy Statement for England (NPSE) aims to '*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'.*

3.3. **Local Planning Policy**

The site is located within the administrative boundary of Camden Council.

The Camden Local Plan (adopted June 2017) contains Appendix 3, which sets out their required noise criteria in terms of the adopted *Lowest Observed Adverse Effect Level (*LOAEL) and *Significant Observed Adverse Effect Level* (SOAEL), in line with the PPG-Noise guidance. In respect of the proposed development, the most appropriate noise criteria are set out in Table B of the Appendix and reproduced in this report as **Table 3.1**.

Dominant Noise Source	Assessment Location	Design Period	LOAEL	LOAEL to SOAEL	SOAEL
Anonymous noise such as general environmental noise, road traffic and rail traffic	Noise at 1 metre from noise sensitive façade	Day	<50 dB $L_{Aeq,16hr}$	50 dB to 72 dB $L_{Aeq,16hr}$	>72 dB $L_{Aeq,16hr}$
		Night	<45 dB $L_{Aeq,8hr}$	45 dB to 62 dB $L_{Aeq,8hr}$	>62 dB $L_{Aeq,8hr}$
	Inside a bedroom	Day	<35 dB $L_{Aeq,16hr}$	35 dB to 45 dB $L_{Aeq,16hr}$	>45 dB $L_{Aeq,16hr}$
		Night	<30 dB $L_{Aeq,8hr}$ 42 dB $L_{Amax,fast}$	30 dB to 40 dB $L_{Aeq,8hr}$ 40 dB to 73 dB $L_{Amax,fast}$	>40 dB $L_{Aeq,8hr}$ >73 dB $L_{Amax,fast}$
	Outdoor living space (free field)	Day	<50 dB $L_{Aeq,16hr}$	50 dB to 55 dB $L_{Aeq,16hr}$	>55 dB $L_{Aeq,16hr}$

Table 3.1: Noise Levels Applicable to Noise Sensitive Residential Development Proposed in Areas of Existing Noise

4. Guidance Documents

4.1. Planning Practice Guidance for Noise

The Planning Practice Guidance for Noise (PPG-Noise) was published in March 2014 and last updated in July 2019. The PPG provides advice on how to determine the noise impact on development:

'Plan-making and decision making need to take account of the acoustic environment and in doing so consider:

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

In line with the Explanatory Note of the Noise Policy Statement for England, this would include identifying whether the overall effect of the noise exposure (including the impact during the construction phase wherever applicable) is, or would be, above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation. As noise is a complex technical issue, it may be appropriate to seek experienced specialist assistance when applying this policy.'

The document goes on to provide a definition for the levels of noise exposure at which an effect may occur:

*'**Significant observed adverse effect level:** this is the level of noise exposure above which significant adverse effects on health and quality of life occur.*

***Lowest observed adverse effect level:** this is the level of noise exposure above which adverse effects on health and quality of life can be detected.*

***No observed effect level:** this is the level of noise exposure below which no effect at all on health and quality of life can be detected.'*

It is important to understand that as the PPG-Noise does not provide any advice with respect to specific noise levels/ limits for different sources of noise, it is appropriate to consider other sources of advice and guidance documents when considering whether new developments would be sensitive to the prevailing acoustic environment.

4.2. Professional Practice Guidance on Planning & Noise.

The Professional Practice Guidance (ProPG) on Planning and Noise for New Residential Development was published in May 2017 by the Association of Noise Consultants (ANC), Institute of Acoustics (IOA) and Chartered Institute of Environmental Health (CIEH). The document has been produced to provide practitioners with guidance on a recommended approach to the management of noise within the planning system in England and provides numerical acoustic standards in line with the objectives of the Government's planning and noise policy. As a collaboration between the ANC, IOA and CIEH the document has been designed to encourage a good acoustic design process and aims to protect people from the harmful effects of noise.

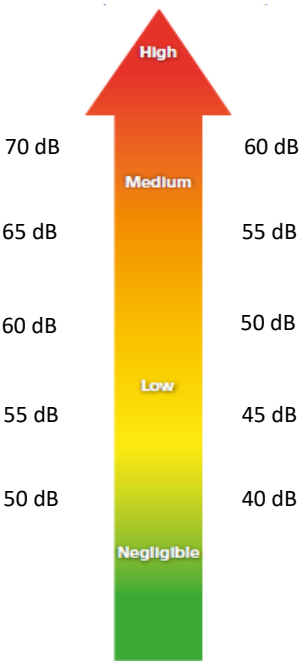
The ProPG notes that it '*does not constitute an official government code of practice and neither replaces nor provides an authoritative interpretation of the law or government policy on which users should take their own advice as appropriate'.*

The ProPG advocates a two-stage approach, first providing an initial noise risk assessment of the proposed development site before undertaking a systematic approach to the noise impact assessment. The results of the initial noise risk assessment are an indication as to how detailed the noise impact assessment will need to be in order to satisfactorily assess all acoustic challenges.

4.2.1. **Stage 1: Initial Site Noise Risk Assessment**

The initial noise risk assessment compares the site noise levels (which can be obtained by measurement or prediction, or a combination of the two, as appropriate) against a risk scale and determines the risk of adverse effects from noise at the site. The purpose of the initial noise risk assessment is to provide an indication of the level of acoustic challenges at the site. In general, the higher the level of risk identified, the greater the level of detail that will be required within the noise impact assessment in order to satisfactorily demonstrate that adverse impacts will be minimised to an acceptable level.

The initial risk assessment and associated notes are provided in Figure 1 of the ProPG and reproduced in **Table 4.1**.

Noise Risk Assessment		Potential Effect Without Noise Mitigation	Pre-Planning Application Advice
Indicative Daytime Noise Levels, $L_{Aeq,16hr}$	Indicative Night-time Noise Levels, $L_{Aeq,8hr}$		
		Increasing risk of adverse effect No adverse effect	High noise levels indicate that there is an increased risk that development may be refused on noise grounds. This risk may be reduced by following a good acoustic design process that is demonstrated in a detailed Acoustic Design Statement (ADS). Applicants are strongly advised to seek expert advice. As noise levels increase, the site is likely to be less suitable from a noise perspective and any subsequent application may be refused unless a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised, and which clearly demonstrate that a significant adverse noise impact will be avoided in the finished development. At low noise levels, the site is likely be acceptable from a noise perspective provided that a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised in the finished development. These noise levels indicate that the development site is likely to be acceptable from a noise perspective, and the application need not normally be delayed on noise grounds.

Notes:

a. Indicative noise levels should be assessed without inclusion of the acoustic effect of any scheme specific noise mitigation measures.

b. Indicative noise levels are the combined free-field noise level from all sources of transport noise and may also include industrial/commercial noise where this is present but is "not dominant".

c. $L_{Aeq,16hr}$ is for daytime 0700 hrs – 2300 hrs, $L_{Aeq,8hr}$ is for night-time 2300 hrs – 0700 hrs.

d. An indication that there may be more than 10 noise events at night (2300 hrs – 0700 hrs) with $L_{Amax,F}$ > 60 dB means that the site should not be regarded as negligible risk.

Table 4.1: Stage 1: Initial Site Risk Assessment

Where sites are exposed to industrial or commercial noise that is considered to be "dominant" then an assessment in line with BS 4142:2014 '*Methods for rating and assessing industrial and commercial sound'* should be carried out.

4.2.2. **Stage 2: Full Assessment**

4.2.2.1. **Stage 2: Element 1 – Good Acoustic Design Process**

Following a good acoustic design process is an implicit part of achieving good design as required by Government planning and noise policy. It is imperative that acoustic design is considered at an early stage of the development process and the aim should be to avoid "unreasonable" acoustic conditions and prevent "unacceptable" acoustic conditions.

Good acoustic design does not simply mean compliance with the recommended internal and external noise criteria. Instead, an integrated solution should be provided whereby the optimal acoustic outcome is achieved, without design compromises that will adversely affect living conditions and the quality of life of residents or other sustainable design objectives and requirements.

A good acoustic design should consider (in this order):

- *'Maximising the spatial separation of noise sources and receptors.*
- *Investigating the necessity and feasibility of reducing existing noise levels and relocating existing noise sources.*
- *Using topography and existing structures (that are likely to last the expected life of the noise-sensitive scheme) to screen the proposed development site from significant sources of noise.*
- *Incorporating noise barriers as part of the scheme to screen the proposed development site from significant sources of noise.*
- *Using the layout of the scheme to reduce noise propagation across the site.*
- *Using the orientation of buildings to reduce the noise exposure of noise-sensitive rooms.*
- *Using the building envelope to mitigate noise to acceptable levels.'*

4.2.2.2. **Stage 2: Element 2 – Internal Noise Level Guidelines**

The ProPG contains Figure 2, which is a table with associated notes drawing on the advice contained within BS 8233:2014 '*Guidance on sound insulation and noise reduction for buildings'*, the World Health Organization's Guidelines for Community Noise 1999 (WHO guidelines) and current best practice. This table is reproduced in **Table 4.2**.

Activity	Location	07:00 – 23:00	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 $L_{Amax,F}$ (Note 4)

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 internal 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 45 dB $L_{Amax,F}$ 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 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 5 dB 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 5 dB, 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 10 dB, they are highly 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.

Table 4.2: ProPG Internal Noise Level Guidelines

4.2.2.3. Stage 2: Element 3 – External Amenity Area Noise Assessment

The ProPG considers the advice provided within BS 8233:2014 and the PPG-Noise in respect of external amenity areas, and presents the following advice, which is selected from both documents, in order to carry out a full assessment of noise levels:

i. *'If external amenity spaces are an intrinsic part of the overall design, the acoustic environment of those spaces should be considered so that they can be enjoyed as intended.'*

ii. *'The acoustic environment of external amenity areas that are an intrinsic part of the overall design should always be assessed and noise levels should ideally not be above the range 50 – 55 dB $L_{Aeq,16hr}$.'*

iii. *'These guideline values may not be achievable in all circumstances where development might*

be desirable. In such a situation, development should be designed to achieve the lowest practicable noise levels in these external amenity spaces.'

iv. *'Whether or not external amenity spaces are an intrinsic part of the overall design, consideration of the need to provide access to a quiet or relatively quiet external amenity space forms part of a good acoustic design process'*

v. *'Where, despite following a good acoustic design process, significant adverse noise impacts remain on any private external amenity space (e.g. garden or balcony) then that impact may be partially off-set if the residents are provided, through the design of the development or the planning process, with access to:*

- *A relatively quiet façade (containing openable windows to habitable rooms) or a relatively quiet externally ventilated space (i.e. an enclosed balcony) as part of their dwelling; and/or*
- *a relatively quiet alternative or additional external amenity space for sole use by a household, (e.g. a garden, roof garden or large open balcony in a different, protected, location); and/or*
- *a relatively quiet, protected, nearby external amenity space for sole use by a limited group of residents as part of the amenity of their dwellings; and/or*
- *a relatively quiet, protected, publically accessible, external amenity space (e.g. a public park or a local green space designated because of its tranquillity) that is nearby (e.g. within a 5 minute walking distance). The local planning authority could link such provision to the definition and management of Quiet Areas under the Environmental Noise Regulations.'*

4.2.2.4. Stage 2: Element 4 – Assessment of Other Relevant Issues

The final element of Stage 2 is an assessment of '*other relevant issues*' and the ProPG suggests that the following issues are considered before making any final conclusions with respect to noise impacts:

i. *'compliance with relevant national and local policy'*

ii. *'magnitude and extent of compliance with ProPG'*

iii. *'likely occupants of the development'*

iv. *'acoustic design v. unintended adverse consequences'*

v. *'acoustic design v. wider planning objectives'.*

The ProPG notes that '*not all of the issues listed above will arise in every planning application and some may already have been addressed as an inherent part of good acoustic design. In addition, LPAs* [Local Planning Authorities] *may wish to add other relevant issues depending on local circumstances and priorities.'*

4.3. Acoustics, Ventilation and Overheating Residential Design Guide

The Acoustics, Ventilation and Overheating Residential Design Guide (AVOG) was published in January 2020 by the Association of Noise Consultants (ANC). The document has been produced to provide practitioners with guidance on how to determine the impact of internal noise levels during both normal (background) ventilation conditions and during overheating conditions. It is recognised that a slightly relaxed set of noise criteria is appropriate during periods of overheating and this is readily accepted by residents of dwellings to counter-balance the discomfort of overheating and exposure to noise through opening windows. The document suggests a balanced approach, protecting against significant impacts of noise exposure whilst allowing for slightly relaxed criteria. This in practice means

that windows can be opened on more occasions to mitigate overheating (when compared to normal background ventilation conditions) without creating an unacceptable significant impact from exposure to noise.

4.4. Approved Document F

The Building Regulations Approved Document F (ADF) is concerned with ventilation in dwellings. Three types of ventilation are covered in the document, which are listed below and their interaction with the internal noise level criteria presented in Tables 3.3, 3.4 and 3.6 are presented:

- Whole dwelling (background) ventilation – the internal noise level criteria should be achieved with the ventilation system in operation (e.g. window or trickle vent open, or mechanical ventilation system operational).
- Extract ventilation to remove water vapour and indoor air pollutants where they are produced in significant quantities (e.g. kitchens, utility rooms and bathrooms) – internal noise level criteria are only appropriate for habitable rooms (e.g. living rooms and bedroom) so are not normally applicable.
- Purge ventilation to rapidly dilute air pollutants and water vapour when necessary, in habitable rooms – this is normally only for a very short period of time as required and internal noise level criteria are therefore not applicable.

4.5. Approved Document O

The Building Regulations Approved Document O (ADO) is a new Approved Document (coming into force June 2022) concerned with overheating in dwellings. In terms of noise criteria, the document suggests that when internal noise levels at night would be above a certain level, open windows would not be suitable for mitigating overheating. These levels are:

- 40 dB $L_{Aeq,8hrs}$ (2300 hrs – 0700 hrs)
- 55 dB L_{AFmax} more than 10 times per night (2300 hrs – 0700 hrs).

4.6. British Standard 4142:2014

British Standard 4142:2014 "*Methods for rating and assessing industrial and commercial sound*" provides a method for the measurement and rating of industrial type noise sources and background noise levels outside dwellings. The rating level (defined in the BS) is used to rate the noise source outside residential dwellings (this is defined as the "specific sound level").

The rating level is determined by assessing the character of the noise and applying an acoustic feature correction if appropriate. Corrections are applied for the tonality and intermittency of the noise source which can both make noise more noticeable.

The initial assessment described in BS 4142 to determine whether an adverse impact is likely is based on establishing the difference between the rating level and the background noise level outside the residential property of interest. The British Standard states that the following points should be considered:

- *Typically, the greater this difference, the greater the magnitude of the impact.*
- *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.*
- *A difference of around +5 dB 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.*

4.7. The Calculation of Road Traffic Noise

The Technical Memorandum *Calculation of Road Traffic Noise* (CRTN) produced by the Department of Transport in 1988, sets out standard procedures for calculating noise levels from road traffic. The calculation method uses a number of input variables, including traffic flow volume, average vehicle speed, percentage of heavy goods vehicles and type of road surface to predict the L_{A10} noise level for any receptor point at a given distance from the road. Additionally, the document describes a '*shortened measurement procedure'* which allows for measurement of the L_{A10} over three hours, between 1000 hrs and 1700 hrs. The measured $L_{A10,3h}$ can then be converted to $L_{A10,18h}$ by use of the simple formula:

$$L_{A10,18hr} = L_{A10,3hr} - 1 \text{ dB}$$

The relationship between $L_{A10,18hr}$ and both the $L_{Aeq,16hr}$ and $L_{Aeq,8hr}$ has been defined by TRL and Casella Stanger on behalf of Defra in their report 'Method for converting the UK road traffic noise index $L_{A10,18h}$ to the EU noise indices for road noise mapping' dated 24th January 2006 and are utilised to calculate the period noise levels.

5. Baseline Noise Levels

In order to determine the extent to which the site is currently affected by noise, a detailed measurement study has been carried out at the site. Measurements have been carried out in order to characterise the existing noise climate over a 4 day period. The noise climate at the front of the site consisted of road traffic noise on Gray's Inn Road and distant road traffic noise, as well as deliveries to The Blue Lion. At the rear of the site, the noise climate consisted of distant road traffic noise, plant noise associated with The Blue Lion and delivery noise for The Blue Lion and other nearby businesses.

The noise measurements utilised two Type 1 Precision Sound Level Meter, a Norsonic 140 and a Svantek 977A. Both meters have a current certificate of calibration and the full list of equipment is detailed in **Appendix 3**. Before and after the measurement period the equipment was calibrated in order to ensure that the equipment had remained within reasonable calibration limits (+/- 0.5 dB). Noise Measurements were carried out in consecutive 5 minutes periods with a 1 second resolution.

Measurements were carried out between 1100 hrs on Friday 1st April 2022 and 1320 hrs on Tuesday 5th April 2022.

During the noise measurement survey, the temperature ranged between 15°C during the daytime and -3°C overnight. There was a moderate (2-4 m/s) wind throughout the survey, from a predominantly northerly direction on Friday 1st April and Saturday 2nd April, changing to a predominantly westerly direction on Sunday 3rd April to the end of the survey period.

Noise measurements were carried out over a 4 day period at Measurement Position 1 (MP1) in a free-field location approximately 1.2m above a 1st floor balcony (approximately 4.2m height in total) at the rear of the site overlooking Brownlow Mews.

As no secure measurement location was available, a short-term (three hour) noise measurement survey was also carried out at the front of the site at MP2 in line with *shortened measurement procedure* detailed in CRTN. MP2 was located in a free-field location at a height of approximately 1.2m above the pavement at the front of the site by Gray's Inn Road. The average L_{Amax} measured has been presented, which is representative of passing vehicles including heavier vehicles, and this is therefore likely to be representative of the typical L_{Amax} noise level at night.

The noise monitoring positions are shown in **Figure 5.1**.

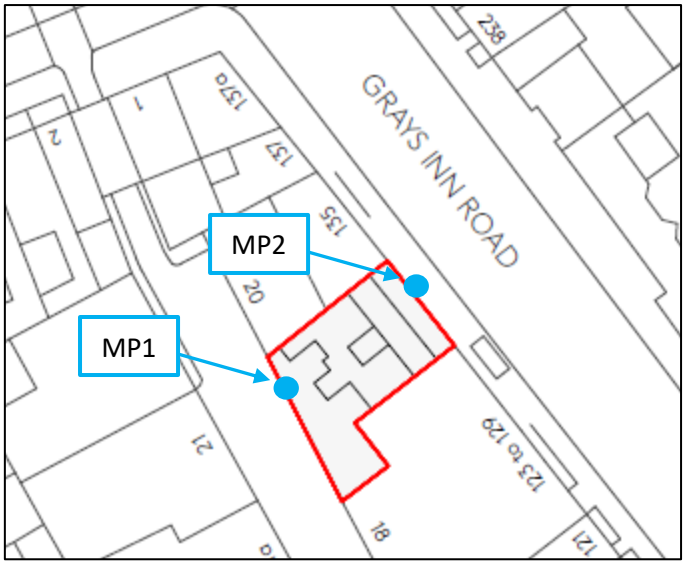


Figure 5.1: Noise Monitoring Location

Table 5.1 below displays a summary of the measured noise levels and detailed measurement results are presented in **Appendix 4**.

Measurement Position	Period (hours)	$L_{Aeq,T}$ (dB)	L_{Amax} (dB)	L_{A10} (dB)
MP1	Daytime (0700 – 2300)	57	77	58
	Night-time (2300 – 0700)	53	74	55
MP2	1115-1415	69	82	71

Table 5.1: Summary of Free Field Semi-Permanent Noise Levels

Note: The average noise levels stated are logarithmic for L_{Aeq}. The $L_{Amax,F}$ noise levels stated are the arithmetic average of the hourly noise levels during the daytime (0700 hrs – 2300 hrs) and the 10th highest $L_{Amax,F,5min}$ noise level at night (2300 hrs – 0700 hrs), as noted in Table 4.2.

The measured noise levels at MP2 have been utilised to calculate the $L_{Aeq,18h}$, $L_{Aeq,12h}$, $L_{Aeq,4h}$, $L_{Aeq,16h}$ and $L_{Aeq,8h}$ as detailed in **Section 4.4** and the derived noise levels are presented in **Table 5.2** below.

Receptor	$L_{A10,3hr}$	$L_{A10,18hr}$	L_{day}	$L_{evening}$	$L_{Aeq,16hr}$	$L_{Aeq,8hr}$
MP2	71	70	68	65	**67**	**59**

Table 5.2: Summary of Derived Road Traffic Noise Levels at MP2

6. Initial Site Risk Assessment

The initial site risk assessment has been carried out by comparing the results of the noise measurement survey against the criteria presented in **Table 4.1**. The outcome of the initial site risk assessment is presented in **Table 6.1**.

Assessment Location	Daytime Ambient Noise Level $L_{Aeq,16hr}$ (dB)	Initial Noise Risk Assessment (Daytime)	Night-time Ambient Noise Level $L_{Aeq,8hr}$ (dB)	Initial Noise Risk Assessment (Night-time)
Rear of Site	57	*Low*	53	*Low-Medium*
Front of Site	67	*Medium*	59	*Medium*

Table 6.1: Initial Site Risk Assessment

The results of the initial site risk assessment based on the measured noise levels indicate that the site has a *medium* risk in terms of noise at the front of the site and a *medium-low* risk in terms of noise at the rear of the site. Plant and delivery noise was audible at the measurement location, but not dominant and therefore the ProPG process is suitable for the measured noise levels at the rear of the site, in line with **note b** of **Table 4.1**. The pre-application advice associated with these risk categories is:

Medium and Low-Medium: '*As noise levels increase, the site is likely to be less suitable from a noise perspective and any subsequent application may be refused unless a good acoustic design process is followed and is demonstrated in an Acoustic Design Statement (ADS) which confirms how the adverse impacts of noise will be mitigated and minimised, and which clearly demonstrate that a significant adverse noise impact will be avoided in the finished development.'*

Low: '*At low noise levels, the site is likely be acceptable from a noise perspective provided that a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impact will be mitigated and minimised in the finished development.'*

7. Full Assessment

7.1. Internal Noise Level Assessment

Note 5 of **Table 4.2** suggests that internal noise levels should ideally be achieved in as many properties as possible with windows open. Due to the relatively high noise levels present at the site, the proposals will not be able to achieve the requirement with windows open, and therefore the sound insulation of the building façade will be required to mitigate noise levels. We note that this does not necessitate that the windows be sealed shut but requires that an alternate primary means of ventilating the properties is provided (as defined by the Building Regulations Approved Document F). In carrying out our assessment, Syntegra have therefore made the following assumptions:

- The façade build-up will be a standard brick and block construction (or equivalent) to achieve an R_w of approximately 55 dB.
- At the front of the site:
  - A typical double glazing system in a 6/16/6.8 (with acoustic laminate) configuration (or equivalent) will be installed to give a Sound Reduction Index (SRI) of 38 dB R_w.
  - An alternative means of ventilation, such as MVHR or appropriately specified acoustic vents, with a $D_{n,e,w}$ of at least 44 dB, will be installed to allow adequate ventilation without the requirement to open windows.
- At the rear of the site:
  - A typical double glazing system in a 4/12/6 configuration (or equivalent) will be installed to give a Sound Reduction Index (SRI) of 30 dB R_w.
  - Appropriately specified acoustic trickle vents, with a $D_{n,e,w}$ of at least 36 dB, or an alternative means of ventilation will be installed to allow adequate ventilation without the requirement to open windows.

Table 7.1 identifies the likely L_{Aeq} and L_{Amax} internal noise levels, assuming windows closed, utilising the *Simple Calculation Method* described in BS 8233:2014. It can be seen that habitable rooms will achieve the requirements of the ProPG with closed windows.

Assessment Location	Period (hrs)	External Noise Levels (dB) (ref. **Section 5**)	Sound Insulation of Glazing (dBA)	Internal Noise Levels (dB)	Compliance with ProPG Criteria
Ambient Noise Level L_{Aeq} (dB)					
Rear of Site	Daytime (0700 – 2300)	57	30	27	✓
Rear of Site	Night-time (2300 – 0700)	53	30	23	✓
Front of Site	Daytime (0700 – 2300)	67	38	29	✓
Front of Site	Night-time (2300 – 0700)	59	38	21	✓

Assessment Location	Period (hrs)	External Noise Levels (dB) (ref. Section 5)	Sound Insulation of Glazing (dBA)	Internal Noise Levels (dB)	Compliance with ProPG Criteria
Maximum Noise Level L_{AFmax} (dB)					
Rear of Site	Night-time (2300 – 0700)	74	30	44	✓
Front of Site	Night-time (2300 – 0700)	82	38	44	✓

Table 7.1: Internal Noise Levels

7.2. Internal Noise Level Assessment – Overheating Conditions

Table 7.2 identifies the likely night-time L_{Aeq} and L_{Amax} internal noise levels assuming windows open and identifies whether open windows are suitable for the mitigation of overheating.

Assessment Location	Period (hrs)	External Noise Levels (dB) (ref. Table 5.2)	Sound Reduction from Open Window (dBA)	Predicted Internal Noise Levels (dB)	ADO Noise Level Criteria (dB)	Open Windows Suitable for the Mitigation of Overheating
Rear of Site	Night-time $L_{Aeq,8hr}$ (2300 – 0700)	53	10-15	37-42	40	No
	Night-time L_{Amax} (2300 – 0700)	74		59-64	55	
Front of Site	Night-time $L_{Aeq,8hr}$ (2300 – 0700)	59	10-15	44-49	40	No
	Night-time L_{Amax} (2300 – 0700)	82		67-72	55	

Table 7.2: Internal Noise Levels – Overheating Conditions

7.3. External Noise Level Assessment

The site layout plans indicate balcony amenity areas for three of the new flats, all of which are located at the rear of the site.

Noise levels on the balconies are likely to be reduced by 5 dB – 10 dB compared to the measured noise level at MP2, assuming a solid balustrade.

Accordingly, balcony noise levels would be expected to be between 47 dB $L_{Aeq,16hr}$ and 52 dB $L_{Aeq,16hr}$. This would achieve the higher guideline value set out in the ProPG and is likely to achieve the lower guideline value. Amenity area noise levels should therefore be acceptable.

7.4. Assessment of Other Relevant Issues

The assessment has shown that a reasonable internal noise environment can be achieved, in line with the requirements of the Local Authority, BS 8233 and the ProPG through careful consideration of the building envelope and ventilation requirements. Whilst it would be ideal to achieve the internal level criteria with open windows, it is common to achieve the criteria relying on closed windows in noisier areas. Such as an approach is advocated in the PPG-Noise.

The assessment has also shown that the external noise level criteria would be achieved within the proposed amenity areas.

Achievement of the ProPG criteria also demonstrates compliance with Camden Council policy, in that it has been demonstrated that significant adverse impacts will be avoided, and in most cases noise levels are below the LOAEL value given in **Table 3.1** and should therefore be considered acceptable.

Overall, it has been shown that, through careful consideration of the building envelope construction and overheating mitigation, the proposed development should avoid future residents being exposed to harmful levels of noise. It can therefore be concluded that significant adverse impacts on the health or quality of life of those future residents would be avoided, in line with the aims of the NPPF, NPSE and PPG-Noise.

8. Plant Noise Assessment – Maximum Sound Power Level

The precise details of the proposed plant types are not yet available; therefore, the maximum sound power level has been derived utilising the background noise level from the noise measurements at MP1 presented in **Section 5** and the basic methodologies presented in BS 4142:2014. This derivation is summarised in **Table 8.1**. The aim is to meet the requirements of the Local Authority which is to be 10 dB below the existing background noise level.

Results	Daytime (0700 hrs – 2300 hrs)	Night-time (2300 hrs – 0700 hrs)	Relevant Clauses of BS 4142:2014	Commentary
Typical Background Sound Level L_{A90} (dB)	42	42	8.1, 8.2	Refer to **Appendix 4**
Required Difference between Rating Level and Background Sound Level	-10	-10	9.2	LA requirement: 10 dB below background noise level
Rating Level	32	32	9.2	(Specific Sound Level + Acoustic Feature Correction)
Acoustic Feature Correction	*Unknown*	*Unknown*	9.2	No acoustic feature correction has been applied to account for the specific acoustic features as the precise plant specifications are unknown.
Specific Sound Level, L_{Aeq} (dB), at 1m from nearest noise sensitive receptor	**32**	**32**	7.3.7, 7.3.9, 7.3.11	Derived from the typical background sound level

Table 8.1: Total Sound Level of Plant Equipment

It will be important to ensure that the selected plant does not exceed the specific noise levels identified in this section of the report at 1m from the nearest window to a habitable room. If the plant is tonal, intermittent, or contains any other acoustic features, this would reduce the maximum specific noise levels identified in **Table 8.1**. Careful consideration is required as to the specification and siting of any plant. The total allowable noise level emitted from the plant will increase with distance and shielding from the nearest noise sensitive receptor.

9. Internal Sound Insulation

The sound insulation of walls and floors between adjacent dwellings should be designed to achieve the requirements of the Building Regulations Approved Document E (2010) *Resistance to the passage of sound* (ADE). For new build properties, the requirements are:

- Airborne Sound Insulation of walls separating dwellings must be at least 45 dB $D_{nT,w} + C_{tr}$.
- Airborne Sound Insulation of floors separating dwellings must be at least 45 dB $D_{nT,w} + C_{tr}$.
- Impact Sound Insulation of floors separating dwelling must not be greater than 62 dB $L'_{nT,w}$.

The sound insulation of the walls and floors between dwellings and non-residential units (e.g. the ground floor) should be assessed in detail as the level of noise that is likely to be produced in the non-residential units will need to be considered. **Typically for a public house, a sound insulation rating that is at least 10 dB better than the requirements of ADE should provide sufficient noise reduction.** The following sound insulation criteria could therefore be adopted:

- Airborne Sound Insulation of walls should be at least 55 dB $D_{nT,w} + C_{tr}$.
- Airborne Sound Insulation of floors should be at least 55 dB $D_{nT,w} + C_{tr}$.
- As the non-residential units are located below the proposed dwellings, there is no impact sound insulation criterion.

It is understood that the floor will be a timber joist system, with mineral wool type sound insulation in between the joists, with a floating floor above and a plasterboard suspended ceiling mounted on resilient bars. **A detailed sound insulation assessment will be carried out during the detailed design stage to ensure that a sufficient level of sound insulation will be achieved to ensure adverse impacts are avoided. This can be ensured as a planning condition.**

It is important to note that, as with any construction project, the ability to meet the specification will rely upon the quality of the built structure. As such the works should be carried out to a high standard of workmanship to ensure that any sound insulation measures are not breached, for example by installing a rigid connection across an isolated connection (such as resilient bars or floating floors). Additionally, any joints between different walls and the party wall and the ceiling/floor should be carefully filled with acoustic mastic.

10. Conclusion

An assessment has been carried out of the present noise climate at **The Blue Lion, 133 Gray's Inn Road, London, WC1X 8TU** and the impact of that noise on the proposed development. The assessment is based on the results of a noise measurement survey that has been carried out over a 4-day period at the proposed development site and has considered the advice of local and national planning policy and best practice guidance. The initial site risk assessment identified that the site has a *medium* risk in terms of noise at the front of the site and a *medium-low* risk in terms of noise at the rear of the site.

It has been identified that the requirements of the Local Authority in respect of internal noise levels can only be achieved through careful consideration of the building envelope. The construction assumptions that have led to this conclusion are:

- **The façade build-up will be a standard brick and block construction (or equivalent) to achieve an R_w of approximately 55 dB.**
- **At the front of the site:**
  - **A typical double-glazing system in a 6/16/6.8 (with acoustic laminate) configuration (or equivalent) will be installed to give a Sound Reduction Index (SRI) of 38 dB R_w.**
  - **An alternative means of ventilation, such as MVHR or appropriately specified acoustic vents, with a $D_{n,e,w}$ of at least 44 dB, will be installed to allow adequate ventilation without the requirement to open windows.**
- **At the rear of the site:**
  - **A typical double-glazing system in a 4/12/6 configuration (or equivalent) will be installed to give a Sound Reduction Index (SRI) of 30 dB R_w.**
  - **Appropriately specified acoustic trickle vents, with a $D_{n,e,w}$ of at least 36 dB, or an alternative means of ventilation will be installed to allow adequate ventilation without the requirement to open windows.**
- **Purge ventilation (as defined by ADF) through open windows.**
- **Mitigation of overheating (where required) through means other than open windows.**

The assessment has also shown that the external noise level criteria would be achieved within the proposed amenity areas.

Achievement of the ProPG criteria also demonstrates compliance with Camden Council policy, in that it has been demonstrated that significant adverse impacts will be avoided, and in most cases noise levels are below the LOAEL value given in **Table 3.1** and should therefore be considered acceptable.

A maximum plant noise level has been provided for any plant installations.

Outline advise has been provided in order to ensure that sufficient sound insulation is provided between the ground floor public house and first floor flats. **A detailed sound insulation assessment will be carried out during the detailed design stage to ensure that a sufficient level of sound insulation will be achieved to ensure adverse impacts are avoided. This can be ensured as a planning condition.**

Overall, it has been shown that, through careful consideration of the building envelope construction, plant noise and internal sound insulation, the proposed development will avoid future residents being exposed to harmful levels of noise. It can therefore be concluded that significant adverse impacts on the health or quality of life of those future residents would be avoided, in line with the aims of the NPPF, NPSE and PPG-Noise.

11. Appendix 1: Glossary of Acoustic Terminology

Term	Description
'A'-Weighting	*This is the main way of adjusting measured sound pressure levels to take into account human hearing, and our uneven frequency response.*
Decibel (dB)	*This is a tenth (deci) of a bel. The decibel can be a measure of the magnitude of sound, changes in sound level and a measure of sound insulation. Decibels are not an absolute unit of measurement but are an expression of ratio between two quantities expressed in logarithmic form.*
$L_{Aeq,T}$	*The equivalent steady sound level in dB containing the same acoustic energy as the actual fluctuating sound level over the given period, T. T may be as short as 1 second when used to describe a single event, or as long as 24 hours when used to describe the noise climate at a specified location.* $L_{Aeq,T}$ *can be measured directly with an integrating sound level meter.*
L_{A10}	*The 'A'-weighted sound pressure level of the residual noise in decibels exceeded for 10 per cent of a given time and is the* L_{A10T}*. The* L_{A10} *is used to describe the levels of road traffic noise at a particular location.*
L_{A50}	*The 'A'-weighted sound pressure level of the residual noise in decibels exceeded for 50 per cent of a given time and is the* L_{A50T}*.*
L_{A90}	*The 'A'-weighted sound pressure level of the residual noise in decibels exceeded for 90 per cent of a given time and is the* L_{A90T}*. The* L_{A90} *is used to describe the background noise levels at a particular location.*
L_{Amax}	*The 'A'-weighted maximum sound pressure level measured over a measurement period.*

12. Appendix 2: Professional Statement

David Yates

David Yates is a full member of the Institute of Acoustics (MIOA) and has over ten years' experience in acoustic consultancy. David has particular expertise in environmental noise providing acoustic consultancy for residential and mixed-use planning applications, plant noise and vibration, construction noise and the design of acoustic, noise and vibration control. David is also experienced in providing sound insulation testing and design advice. David is familiar with the application of all relevant standards associated with his work, including but not limited to, BS 4142, BS 8233, BS 7445, BS 6472, BS 5228, BS 140 series, BS 16283 series and BS 717 series. David manages the acoustic department and is responsible for maintaining Syntegra's ANC membership.

13. Appendix 3: List of Equipment

Equipment Type	Manufacturer	Serial Number	Calibration Certification Number	Date of Last Calibration Check
Nor-140 Type 1 Sound Level Meter	Norsonic	1406389	TCRT21/1767	November 2021
Nor-1225 Microphone	Norsonic	225519	TCRT21/1767	November 2021
Nor-1209 Preamplifier	Norsonic	20598	TCRT21/1767	November 2021
Nor-1251 Sound Calibrator	Norsonic	35115	TCRT21/1761	November 2021
SVAN 977A	Svantek	67915	36313	November 2020
7052E Microphone	ACO PACIFIC	70760	36312	November 2020
SV12L Preamplifier	Svantek	73668	36313	November 2020
SV36 Sound Calibrator	Svantek	73463	36311	November 2020

14. Appendix 4: Detailed Noise Measurement Results

Measured Noise levels – MP1 – 01.04.2022

Time	$L_{Aeq,T}$ (dB)	$L_{AF(max)}$ (dB)	L_{A10} (dB)	L_{A90} (dB)
1000-1100	56	84	59	54
1100-1200	55	86	56	51
1200-1300	55	80	56	53
1300-1400	52	75	54	50
1400-1500	53	76	56	50
1500-1600	57	83	62	51
1600-1700	54	76	55	52
1700-1800	57	92	59	52
1800-1900	56	81	60	51
1900-2000	54	84	57	49
2000-2100	52	81	52	47
2100-2200	49	68	51	47
2200-2300	51	72	51	48
2300-0000	50	74	52	47
0700-2300	**54**	**80**	**56**	**50**
2300-0700	**50**	**74**	**52**	**47**

Measured Noise levels – MP1 – 02.04.2022

Time	$L_{Aeq,T}$ (dB)	$L_{AF(max)}$ (dB)	L_{A10} (dB)	L_{A90} (dB)
0000-0100	55	91	51	47
0100-0200	48	65	51	45
0200-0300	48	65	51	46
0300-0400	48	68	51	44
0400-0500	50	72	52	47
0500-0600	50	69	52	47
0600-0700	54	73	57	50
0700-0800	51	76	52	49
0800-0900	52	77	54	50
0900-1000	50	73	51	48
1000-1100	50	72	52	48
1100-1200	51	75	54	48
1200-1300	50	78	54	46
1300-1400	49	75	50	47
1400-1500	52	77	56	46
1500-1600	50	74	51	47
1600-1700	50	74	51	49
1700-1800	51	75	51	48
1800-1900	51	84	53	48
1900-2000	68	92	53	49

Time	$L_{Aeq,T}$ (dB)	$L_{AF(max)}$ (dB)	L_{A10} (dB)	L_{A90} (dB)
2000-2100	50	73	51	47
2100-2200	50	82	49	47
2200-2300	48	64	50	47
2300-0000	50	75	50	46
0700-2300	**57**	**76**	**52**	**48**
2300-0700	**51**	**72**	**52**	**46**

Measured Noise levels – MP1 – 03.04.2022

Time	$L_{Aeq,T}$ (dB)	$L_{AF(max)}$ (dB)	L_{A10} (dB)	L_{A90} (dB)
0000-0100	48	67	50	45
0100-0200	47	66	49	43
0200-0300	46	65	49	43
0300-0400	47	79	50	43
0400-0500	48	72	50	45
0500-0600	55	85	56	51
0600-0700	54	75	56	49
0700-0800	53	83	56	48
0800-0900	52	76	52	47
0900-1000	51	76	54	46
1000-1100	50	72	53	46
1100-1200	52	82	54	46
1200-1300	50	71	52	48
1300-1400	51	76	53	47
1400-1500	48	69	50	46
1500-1600	47	65	49	45
1600-1700	50	72	51	47
1700-1800	50	72	52	47
1800-1900	48	67	49	46
1900-2000	48	72	50	46
2000-2100	48	75	49	46
2100-2200	47	71	50	45
2200-2300	46	69	48	44
2300-0000	63	72	69	45
0700-2300	**50**	**73**	**51**	**46**
2300-0700	**55**	**73**	**54**	**45**

Measured Noise levels – MP1 – 04.04.2022

Time	$L_{Aeq,T}$ (dB)	$L_{AF(max)}$ (dB)	L_{A10} (dB)	L_{A90} (dB)
0000-0100	56	71	51	45
0100-0200	47	65	49	45
0200-0300	50	73	54	46
0300-0400	53	71	55	49
0400-0500	56	76	59	53
0500-0600	60	87	61	56
0600-0700	59	83	61	56
0700-0800	59	80	60	56
0800-0900	65	96	63	57
0900-1000	70	99	74	57
1000-1100	61	92	66	55
1100-1200	62	93	65	56
1200-1300	56	75	57	55
1300-1400	55	76	57	54
1400-1500	55	81	55	52
1500-1600	56	84	59	52
1600-1700	56	78	59	53
1700-1800	54	82	57	52
1800-1900	54	73	55	52
1900-2000	51	73	52	49
2000-2100	51	73	52	48
2100-2200	51	75	52	46
2200-2300	48	66	50	45
2300-0000	48	69	50	45
0700-2300	**61**	**81**	**58**	**52**
2300-0700	**56**	**74**	**55**	**49**

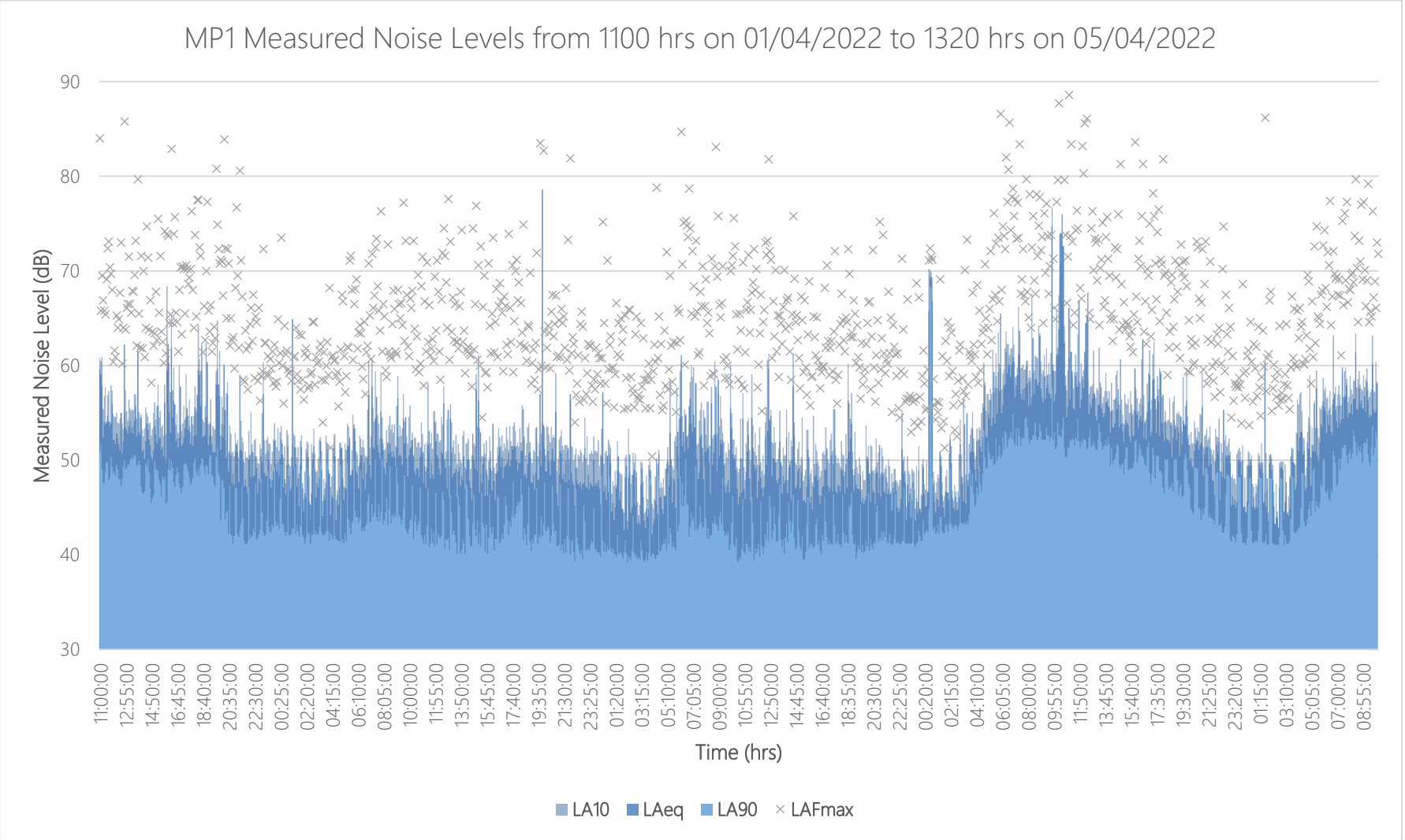
Measured Noise levels – MP1 – 05.04.2022

Time	$L_{Aeq,T}$ (dB)	$L_{AF(max)}$ (dB)	L_{A10} (dB)	L_{A90} (dB)
0000-0100	52	86	50	45
0100-0200	47	68	50	43
0200-0300	48	67	50	44
0300-0400	51	70	53	47
0400-0500	53	75	56	50
0500-0600	55	77	56	53
0600-0700	56	77	58	54
0700-0800	57	80	57	55
0800-0900	56	79	58	55
0900-1000	56	78	58	54
1000-1100	56	80	57	52
1100-1200	57	84	60	53

Time	$L_{Aeq,T}$ (dB)	$L_{AF(max)}$ (dB)	L_{A10} (dB)	L_{A90} (dB)
1200-1300	53	68	53	53
0700-2300	**56**	**78**	**57**	**54**
2300-0700	**53**	**74**	**53**	**48**

Measured Noise levels – MP2 – 05.04.2022

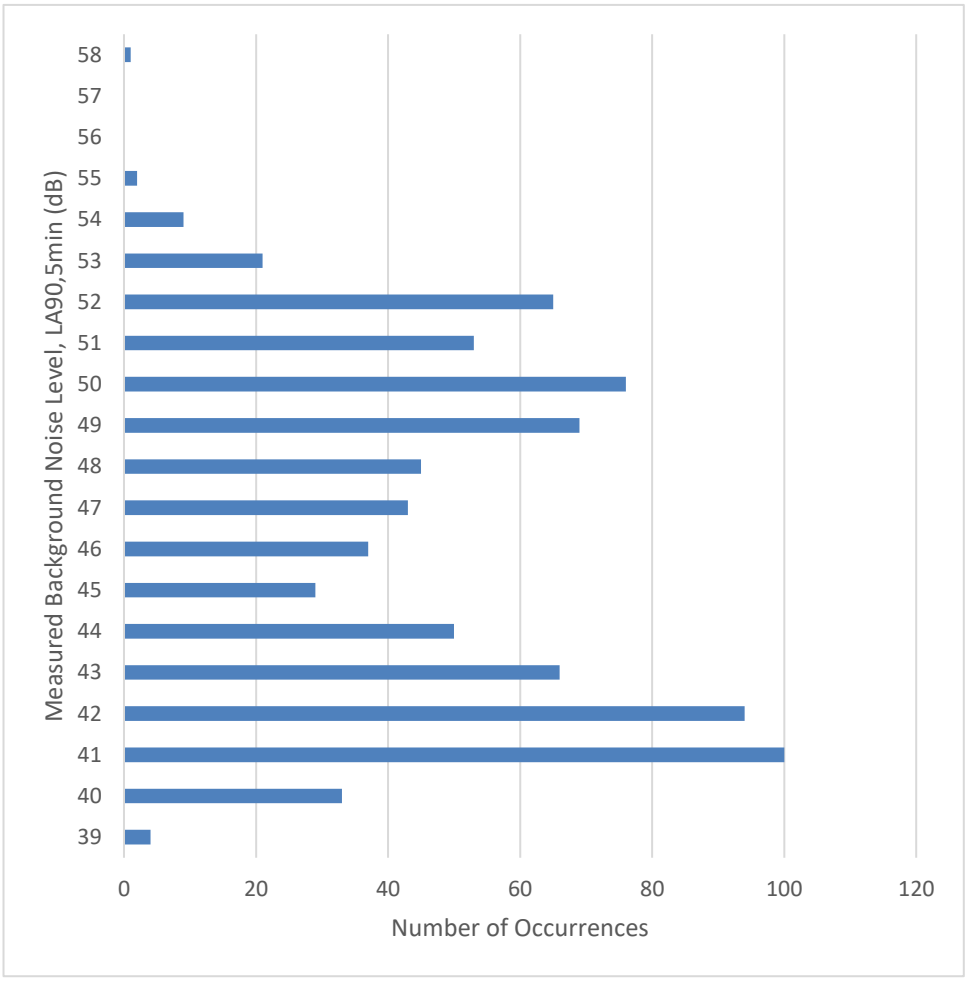
Time	$L_{Aeq,T}$ (dB)	$L_{AF(max)}$ (dB)	L_{A10} (dB)	L_{A90} (dB)
1115-1215	70	85	72	60
1215-1315	68	81	70	59
1315-1415	67	81	71	59
1115-1415	**69**	**82**	**71**	**59**


MP1 Measured Noise Levels from 1100 hrs on 01/04/2022 to 1320 hrs on 05/04/2022
Measured Noise Level (dB)
90
80
70
60
50
40
30
11:00:00
12:55:00
14:50:00
16:45:00
18:40:00
20:35:00
22:30:00
00:25:00
02:20:00
04:15:00
06:10:00
08:05:00
10:00:00
11:55:00
13:50:00
15:45:00
17:40:00
19:35:00
21:30:00
23:25:00
01:20:00
03:15:00
05:10:00
07:05:00
09:00:00
10:55:00
12:50:00
14:45:00
16:40:00
18:35:00
20:30:00
22:25:00
00:20:00
02:15:00
04:10:00
06:05:00
08:00:00
09:55:00
11:50:00
13:45:00
15:40:00
17:35:00
19:30:00
21:25:00
23:20:00
01:15:00
03:10:00
05:05:00
07:00:00
08:55:00
Time (hrs)
LA10
LAeq
LA90
LAFmax

14.1. Typical Background Noise Level Analysis for BS 4142:2014 Assessment

MP1 - Daytime (0700 hrs – 2300 hrs)

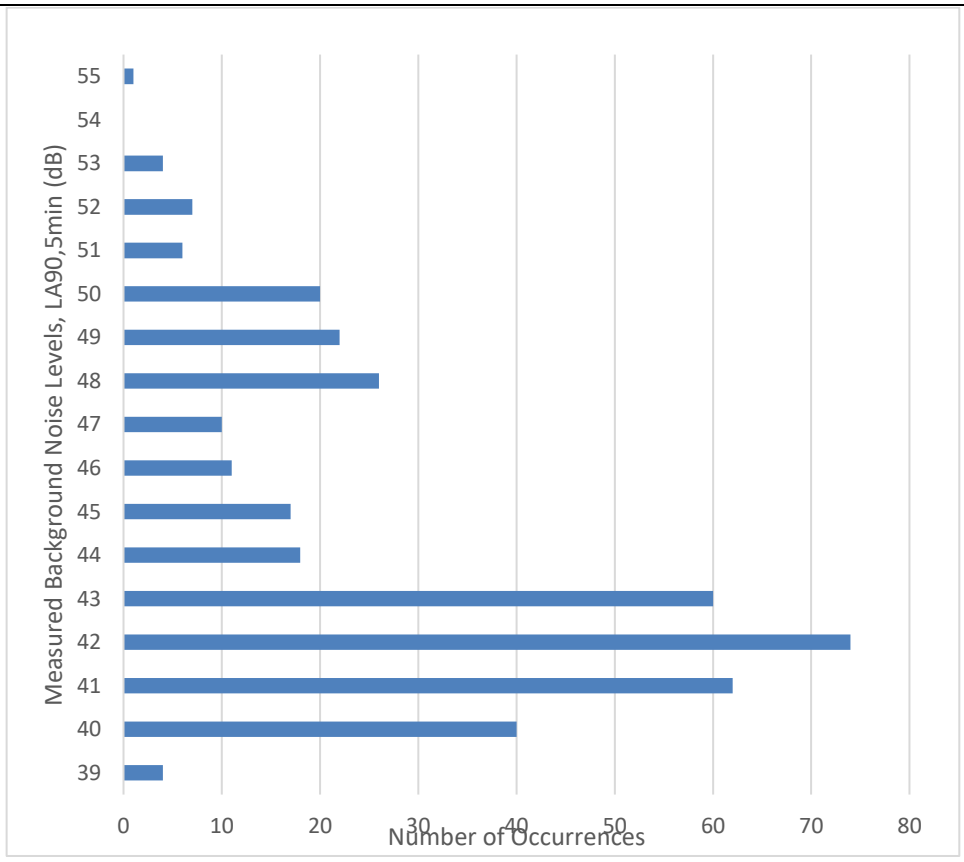
Measured $L_{A90,5min}$ (dB)	Number of Occurrences
39	4
40	33
41	100
42	**94**
43	66
44	50
45	29
46	37
47	43
48	45
49	69
50	76
51	53
52	65
53	21
54	9
55	2
56	0
57	0
58	1



Note: The row marked in bold is the chosen Typical L_{A90} for the BS 4142 plant noise assessment.

MP1 - Night-time (2300 hrs – 0700 hrs)

Measured $L_{A90,5min}$ (dB)	Number of Occurrences
39	4
40	40
41	62
42	**74**
43	60
44	18
45	17
46	11
47	10
48	26
49	22
50	20
51	6
52	7
53	4
54	0
55	1



Note: The row marked in bold is the chosen Typical L_{A90} for the BS 4142 plant noise assessment.