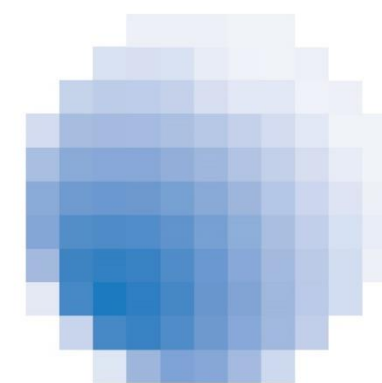




sol
acoustics

Lawrence Street, Bury
Environmental & Noise Intrusion Study
P2427-REP01-MFH P01 Environmental and Intrusive Noise Study
26 June 2024

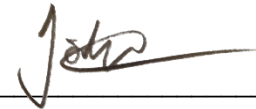


PROJECT: Lawrence Street, Bury
Greater Manchester
Environmental & Noise Intrusion Study

CLIENT: Ecoscape UK Ltd
Higher Broadfield Farm
Heywood
Greater Manchester
OL10 2TA

DOCUMENT P2427-REP01-MFH P01 Environmental and
REFERENCE: Intrusive Noise Study

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1 INTRODUCTION

Sol Acoustics Ltd ("Sol") has been commissioned by Ecoscape UK Ltd ("Ecoscape") to undertake an acoustic design assessment of the proposed development on the site of the former industrial premises of 5 Lawrence Street, Bury. The redevelopment of the site involves the full clearance of the existing building and erection of 10no. 3 storey 4 bed townhouses with associated private terrace gardens.

The purpose of this report is as follows:

- To assess the scheme in terms of intrusive noise and to determine an appropriate acoustic performance specification for the building envelope and glazing.
- To undertake an Acoustics, Ventilation and Overheating assessment for the residential development, including to enable compliance with the acoustic requirements of Building Regulations Approved Document O.
- To set appropriate environmental noise limits for building services plant.

2 DESCRIPTION OF SITE

The development site is located on land off of Lawrence Street in Bury, Greater Manchester. The site is bound by Lawrence Street to the south, Chelsea Street to the east and is set back from Manchester Road (A56).

Although the development site is set back from Manchester Road, this still forms the main environmental noise source impacting the development. The site is also subject to industrial noise from the adjacent commercial car dealership and maintenance garages. The general wider surrounding area is predominantly residential properties with associated private gardens, with the exception of a restaurant and car dealership south of the development site.

The nearest identified existing residential noise sensitive receptors ("NSRs") are the residential houses located circa 15 meters to the east of the development site.

Figure 1 overleaf indicates the development site in relation to the above site description, and the corresponding locations of the noise monitoring positions that have been used in order to inform this acoustic assessment.



Figure 1: Site location and noise monitoring positions (Google 2024)

2.1 Development Proposals

The proposed development will provide 10no. new 4 bedroom residential townhouses across 3no floors with associated parking facilities at ground floor level and private terraces on both level 1 and level 2. A plan of the proposed site is shown in Figure 2 below:



Figure 2: Proposed site plan (c/o Four Architects)

3 DETAILS OF INVESTIGATION

3.1 Basis of Assessment

In order to inform the environmental and intrusive noise study, it will be necessary to determine the potential noise impact expected from the key identified noise sources, principally road traffic from the local road network and adjacent industrial premises.

3.2 Noise Survey Methodology

3.2.1 Procedure

Unattended noise level measurements were undertaken at 1no. location at the site from approximately 15:30 hours on Monday 17 June 2024 to 16:15 hours on Thursday 20 June 2024 to establish typical incident noise levels across the extent of the site.

Supplementary attended measurements were also undertaken on Monday 17 June 2024 from 14:45-15:00 hours and on Wednesday 19 June 2024 from 11:40-14:40 hours, in order to establish typical noise levels from the surrounding roads and the adjacent commercial units.

The attended measurements were used to determine the prevailing ambient noise levels (at the attended measurement position) in accordance with the shortened measurement procedure detailed in the Department of Transport document Calculation of Road Traffic Noise (CRTN) 1988 and Method 3 in the Transport Research Laboratory (TRL) Project Report PR/SE/451/02 'Converting the UK traffic noise index $LA_{10,18h}$ to EU noise indices for noise mapping'. The purpose of these measurements was to aid in the calibration of a computer noise model of the site so as to better understand how sound propagates across the extent of the site. The approach can be summarised as follows:

- Measure three consecutive $LA_{10,1h}$ as per the CRTN shortened procedure;
- Determine the average of the three $LA_{10,1h}$ values;
- Convert $LA_{10,3h}$ to $LA_{10,18h}$ by subtracting 1 dB;
- Apply TRL Method 3 equations to generate the $LA_{eq,16h}$ & $LA_{eq,8h}$.

All measurements were taken of the A-weighted (dBA) L_{10} , L_{90} , L_{eq} and L_{Fmax} sound pressure levels over discrete 15 minute periods. Measurements were undertaken in general accordance with BS 7445-1:2003 Description and Measurement of Environmental Noise.

3.2.2 Measurement Positions

The unattended and attended measurement positions at the development site as shown on Figure 1 and described in Table 1:

Measurement Position	Description
MP1 (Unattended)	A tripod-mounted microphone was positioned towards the north of the site c.2 metres from the existing facade. The microphone was c.1.5m above ground level, c.38m from the near edge of Manchester Road and in “free-field” conditions. The soundscape at this position was dominated by road traffic noise from Manchester Road and noise from the adjacent commercial premises.
MP2 (Attended)	A tripod-mounted microphone was positioned to the south of Lawrence Street overlooking Manchester Road. The microphone was c.1.5m above local ground level, c.4m from the near edge of Manchester Road in “free-field” conditions. The microphone had clear line of sight to Manchester Road.

Table 1: Noise monitoring measurement positions summary

The prevailing weather conditions were suitable for the purposes of environmental noise measurements throughout the noise survey. Average wind speeds were below 5m/s and rainfall remained below 1mm/h for the entirety of the survey period.

Notwithstanding the weather conditions, the microphone systems were entirely weatherproofed and fitted with all-weather environmental windshields, each with a bird spike.

Type 1 Precision Grade sound measuring instrumentation was exclusively used for all surveys. Full details of all the instrumentation used, and corresponding traceable calibration records, are retained on file by Sol and available for inspection if required.

3.3 Environmental Noise Survey Results

3.3.1 Unattended Environmental Noise Survey Results

Table 2 provides a basic summary of the average, free field environmental noise levels measured at Positions MP1:

Date	Typical Measured Noise Level (L_{Aeq} , Highest Typical L_{Amax} , Typical L_{A90})				
	Daytime (07:00 – 23:00 hrs)		Night time (23:00 – 07:00 hrs)		
	dB $L_{Aeq,16h}$	dB $L_{A90,15min}$	dB $L_{Aeq,8h}$	dB $L_{Amax,T}$	dB $L_{A90,15min}$
17/06/24	53	45	48	70	34
18/06/24	59*	50	Data Unavailable		
19/06/24	54	46	47	70	35
20/06/24	59	50	-	-	-

*Incomplete measurement period

Table 2: Summary of typical, measured environmental noise levels, broadband terms

Table 3 summarises the corresponding unweighted, time-averaged ($L_{Aeq,T}$) daytime and night time period ambient noise levels, used for the assessment, in linear octave band frequency terms:

Measurement Location	Broadband Noise Level, dB $L_{Aeq,T}$	Sound Pressure Level (dB) @ Octave Band Centre Frequency (Hz)						
		63	125	250	500	1k	2k	4k
Position MP1								
Daytime	54	59	52	49	48	49	46	45
Night time	48	53	44	44	42	44	40	38

Table 3: Summary of time-averaged environmental noise levels, in octave band terms

Table 4 specifies the determined typical background noise levels at the identified NSR:

Typical Background Sound Level, dB $L_{A90,15min}$	
Daytime (07:00 hours – 23:00 hours)	Night Time (23:00 hours – 07:00 hours)
45	35

Table 4: Summary of typical Background Sound Levels applicable at each noise sensitive residential receptor

Appendix A provides further information and a full summary of the measurement data and BS4142:2014+A1:2019 background noise level histograms.



Review of the noise survey data ass seen on Graph A1, indicates the impact of commercial activity during the daytime period (07:00-23:00). However, there is no evidence of this impact occurring during the nighttime period (23:00-07:00). This has also been confirmed by the operator of the site that commercial/industrial activities do not occur during night-time periods. As such, our commercial and industrial noise impact assessment shall consider the daytime (07:00-23:00) period only.

3.3.2 *Attended Industrial Noise Measurements*

To better understand the implications of the presence of noise from the industrial units to the east of the site specific manned measurements were undertaken to supplement the automated survey data to allow a suitably robust assessment to be undertaken in line with BS 4142:2014.

Sol attended the BCC Hyundai – Bury to undertake “at source” noise level measurements of noise-generating site operations on Monday 17 June 2024, as summarised in Table 5. These noise levels were significantly above the residual noise level at the source location and are considered specific noise levels for each attributed noise source.

Source	Description	Broadband Noise Level, dBA
Jet Wash	External Jet Wash pump to north of site	77
Vacuum Cleaner	Vacuum Cleaner noise in open doorway to north of site	63
Internal Garage Ambient Noise	Internal reverberant sound pressure level inside garage to south west of site	83

Table 5: Summary of measured noise levels, broadband terms

3.3.3 *Attended CRTN Survey Results*

The results of the manned measurements are appended to this report. A summary of the results from the manned noise survey is presented in Table 6 below, along with the subsequent derivation of the $L_{Aeq,16h}$, all results are free-field levels.

Description	Broadband Noise Level, dBA
$L_{A10,3h}$	75
$L_{A10,18h}$	74
$L_{Aeq,16h}$	71

Table 6: Summary of measured and calculated CRTN parameters

4 LEGISLATION, PLANNING POLICY, & GUIDANCE

The following national, regional, and local planning policy and guidance is of relevance to the assessment in relation to noise:

- National Planning Policy Framework, 2023
- Noise Policy Statement for England, 2010
- Planning Practice Guidance on Noise, 2019

4.1 National Planning Policy

4.1.1 National Planning Policy Framework (2023)

The National Planning Policy Framework (“NPPF”) took effect to define the Government’s planning policies for England. Key to this assessment are paragraphs 180, 191 and 193 of NPPF.

Paragraph 180 requires the planning system to:

‘... contribute to and enhance the natural and local environment by

e) 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’

With regard to noise, Paragraph 191 of NPPF states that:

‘... Planning policies and decisions should aim to...

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; and

identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.’

Importantly, paragraph 193 states:

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

4.1.2 Noise Policy Statement for England (2010)

The planning objectives of the NPPF are linked and reflect the policies and objectives set out in the Noise Policy Statement for England (“NPSE”). The NPSE introduces the key phrases “Significant Observed Adverse Effect Level” (“SOAEL”), “Lowest Observed Adverse Effect Level” (“LOAEL”), and “No Observed Adverse Effect Level” (“NOAEL”).

The NPSE however does not provide any quantitative thresholds for each identified level of “adverse effect” and notes that it is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations.

Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is for a project to identify relevant SOAELs taking account of the different sources of exposure and different receptors.

Where the noise level from the Proposed Development is between LOAEL and SOAEL, the NPSE states:

‘... all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development. This does not mean that such adverse effects cannot occur.’

Other factors, such as the number of dwellings affected and the magnitude of noise change, can result in impacts between LOAEL and SOAEL being reported as likely adverse effects.

4.1.3 Planning Practice Guidance on Noise (2019)

The Observable Adverse Effect Level terms presented in the NPSE are adopted in the Government's Planning Practice Guidance on noise ("PPG-N") which presents a table of example outcomes to help characterise the level of effect as show in Figure 3.

The PPG-N gives advice on the 'Agent of Change' principal and states:

'... Development proposed in the vicinity of existing businesses, community facilities or other activities may need to put suitable mitigation measures in place to avoid those activities having a significant adverse effect on residents or users of the proposed scheme.

In these circumstances the applicant (or 'agent of change') will need to clearly identify the effects of existing businesses that may cause a nuisance (including noise, but also dust, odours, vibration and other sources of pollution) and the likelihood that they could have a significant adverse effect on new residents/users. In doing so, the agent of change will need to take into account not only the current activities that may cause a nuisance, but also those activities that businesses or other facilities are permitted to carry out, even if they are not occurring at the time of the application being made.

The agent of change will also need to define clearly the mitigation being proposed to address any potential significant adverse effects that are identified. Adopting this approach may not prevent all complaints from the new residents/users about noise or other effects, but can help to achieve a satisfactory living or working environment, and help to mitigate the risk of a statutory nuisance being found if the new development is used as designed (for example, keeping windows closed and using alternative ventilation systems when the noise or other effects are occurring).

It can be helpful for developers to provide information to prospective purchasers or occupants about mitigation measures that have been put in place, to raise awareness and reduce the risk of post-purchase/occupancy complaints.'

Response	Examples of outcomes	Increasing effect level	Action
No Observed Effect Level			
Not present	No Effect	No Observed Effect	No specific measures required
No Observed Adverse Effect Level			
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

Figure 3: PPG-N Noise Exposure Hierarchy table

5 **PROPG: PLANNING AND NOISE (RESIDENTIAL DEVELOPMENT)**

5.1 **Stage 1 Assessment**

Professional Planning Guidance: Planning and Noise (“ProPG”), provides a risk-based assessment framework to assist with delivering high-quality sustainable development by promoting good health and wellbeing by the effective management of noise through good acoustic design.

ProPG provides a 2-stage systematic approach as follows:

- Stage 1 – An initial noise risk assessment of the proposed development;
- Stage 2 – Systematic consideration of four key elements:-
 - Good Acoustic Design Process
 - Internal Noise Levels
 - External Amenity Noise Levels
 - Consideration of other relevant issues

5.1.1 *Stage 1 Assessment*

The Stage 1 assessment provides an early indication if noise levels across a proposed development site are likely to provide greater acoustic challenges based on a sliding scale of Risk of Adverse Effect, as shown in Figure 4, in accordance with the National Planning Policy Framework and the Noise Policy Statement for England.

Based on the as measured environmental noise levels and the calculated daytime and night-time noise levels across the façades of the proposed development (the latter as shown in **Appendix B**), the worst-case affected façades of the development are designated as **“Medium Risk”** as indicated on Figure 4.

Therefore, for a medium risk site, the Pre-planning application advice states the following:

‘... 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.’

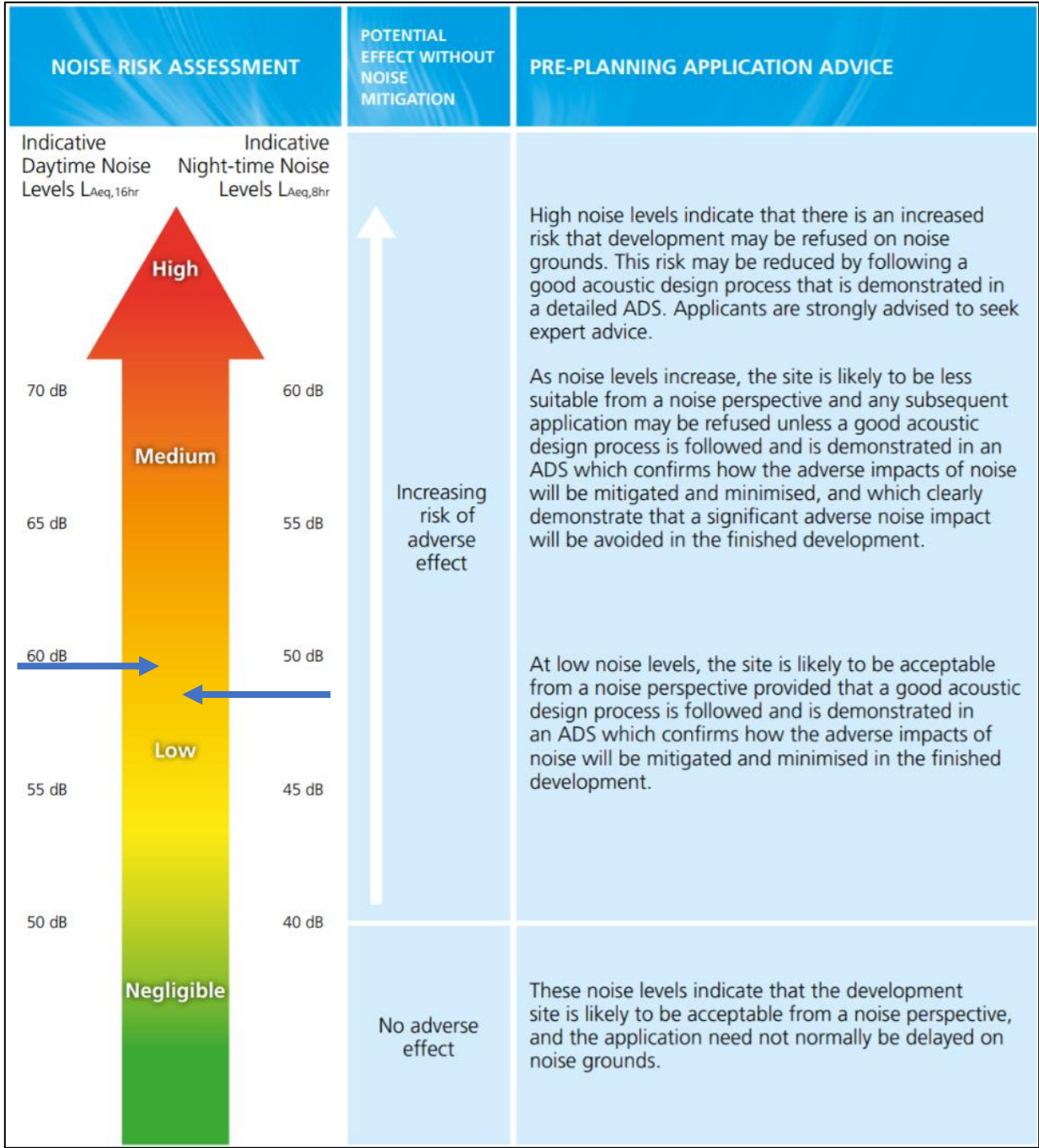


Figure 4: ProPG initial site noise risk assessment

5.2 Stage 2 Assessment

5.2.1 Element 1 – Good Acoustic Design Process

A good acoustic design process is an implicit part of achieving good design as required by Government and Local Planning Policies. Good acoustic design should avoid “unreasonable” acoustic conditions and entirely prevent “unacceptable” acoustic conditions.

Evidence that good acoustic design principles have been followed are presented in the following sections of this report.

5.2.2 Element 2 – Internal Noise Level Guidelines

BS 8233:2014 ‘Guidance on sound insulation and noise reduction for buildings’ provides appropriate criteria for acceptable levels of noise ingress within dwellings.

In particular, Section 7.2.2 of the Standard, entitled ‘Internal ambient noise levels in dwellings’ states that ‘... In general, for steady external noise sources, it is desirable that the internal ambient noise level does not exceed the guideline values in Table 4 [of BS 8233]’ as duplicated below in Table 7:

BS 8233:2014 – Indoor ambient noise levels for dwellings			
Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35dB $L_{Aeq,16hr}$	-
Dining	Dining room / area	40dB $L_{Aeq,16hr}$	-
Sleeping (daytime resting)	Bedroom	35dB $L_{Aeq,16hr}$	30dB $L_{Aeq,8hr}$

Table 7: Internal ambient noise level requirements as per BS8233

Note 7 of BS 8233:2014 states that: ‘... Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed up to 5dB and reasonable internal conditions still achieved.’

No specific performance recommendation is given within BS 8233:2014 regarding maximum (L_{Amax}) intrusive noise levels within bedrooms. ProPG expands on the guidance presented in BS 8233:2014. Section 2.31 states that ‘... In noise sensitive rooms at night (e.g. bedrooms) individual noise events (from all sources) should not normally exceed 45dB $L_{Amax,F}$ more than 10 times a night as this represents a threshold below which the effects of individual noise events on sleep can be regarded as negligible.’

5.2.3 Element 3 – External Amenity Area Noise Levels

Regarding outdoor amenity spaces, BS 8233:2014 states the following (emphases added):

‘... For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50dB $L_{Aeq,T}$, with an upper guideline value of 55dB $L_{Aeq,T}$...

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

Other locations, such as balconies, roof gardens and terraces, are also important in residential buildings where normal external amenity space might be limited or not available, i.e. in flats, apartment blocks etc. In these locations, specification of noise limits is not necessarily appropriate.

Small balconies may be included for uses such as drying washing or growing pot plants, and noise limits should not be necessary for these uses. However, the general guidance on noise in amenity space is still appropriate for larger balconies, roof gardens and terraces, which might be intended to be used for relaxation. In high-noise areas, consideration should be given to protecting these areas by screening or building design to achieve the lowest practicable levels. Achieving levels of 55dB $L_{Aeq,T}$ or less might not be possible at the outer edge of these areas, but should be achievable in some areas of the space.’

Further guidance provided in ProPG states that:

‘... 3(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.

3(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 facade (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, publicly 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.'

Therefore, it is further considered that any potential adverse impact to residential small balconies will be suitably mitigated by access to nearby external amenity areas.

In summary therefore, the “upper guideline” noise level for external amenity spaces, as recommended by the Standard, is 55dB $L_{Aeq(16 \text{ hour})}$, albeit it is duly recognised that this may be exceeded for urban developments and is not applicable to “small balconies” and should ultimately not prohibit development if exceeded in other external amenity areas.

Any adverse impact in outdoor amenity areas facing transport noise sources can be further mitigated by providing access to other relatively quiet residential facades and additional amenity areas.

5.2.4 Element 4 - Other Relevant Issues

It is pertinent that the **overheating mitigation strategy** for the development is developed with consideration of the environmental noise impact from an early stage of the design development. The relevant statutory requirements and current design guidance is introduced below.

5.2.5 Approved Document O

The development is required to comply with the mandatory requirements of ‘Approved Document O – Overheating 2021’ (“ADO”).

Section 3 of ADO requires that the overheating mitigation strategy is useable and thus if the overheating strategy is to rely on open windows, suitable noise conditions within bedrooms at night should be achieved under such conditions to sure the “reasonable enjoyment” of the residence as reproduced below:

‘...the overheating mitigation strategy should take account of the likelihood that windows will be closed during sleeping hours (11pm to 7am).

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

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

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

5.2.6 AVO Assessment Framework

The ‘Acoustics, Ventilation and Overheating Guide’ (“AVO Guide”) published by the Association of Noise Consultants in 2020 provides a recommended framework for the early design stage assessment of new residential development that takes due regard of the interdependence of provisions for acoustics, ventilation, and overheating.

Typically, new residential developments in urban environments require closed windows for reasonable internal noise conditions in accordance with BS 8233:2014. Until recently, this has often been assessed separately from the overheating strategy, which may require windows open for reasonable thermal conditions. This can result in residential accommodation in which the occupants may choose either acoustic comfort or indoor air quality and thermal comfort, but not achieve both simultaneously.

The AVO Guide provides a two-stage assessment, as shown in Figure 5, to highlight at the planning stage residential facades which may result in adverse or significant adverse noise impact when using an open window ventilation strategy, and to help the design team identify suitable overheating mitigation strategies.

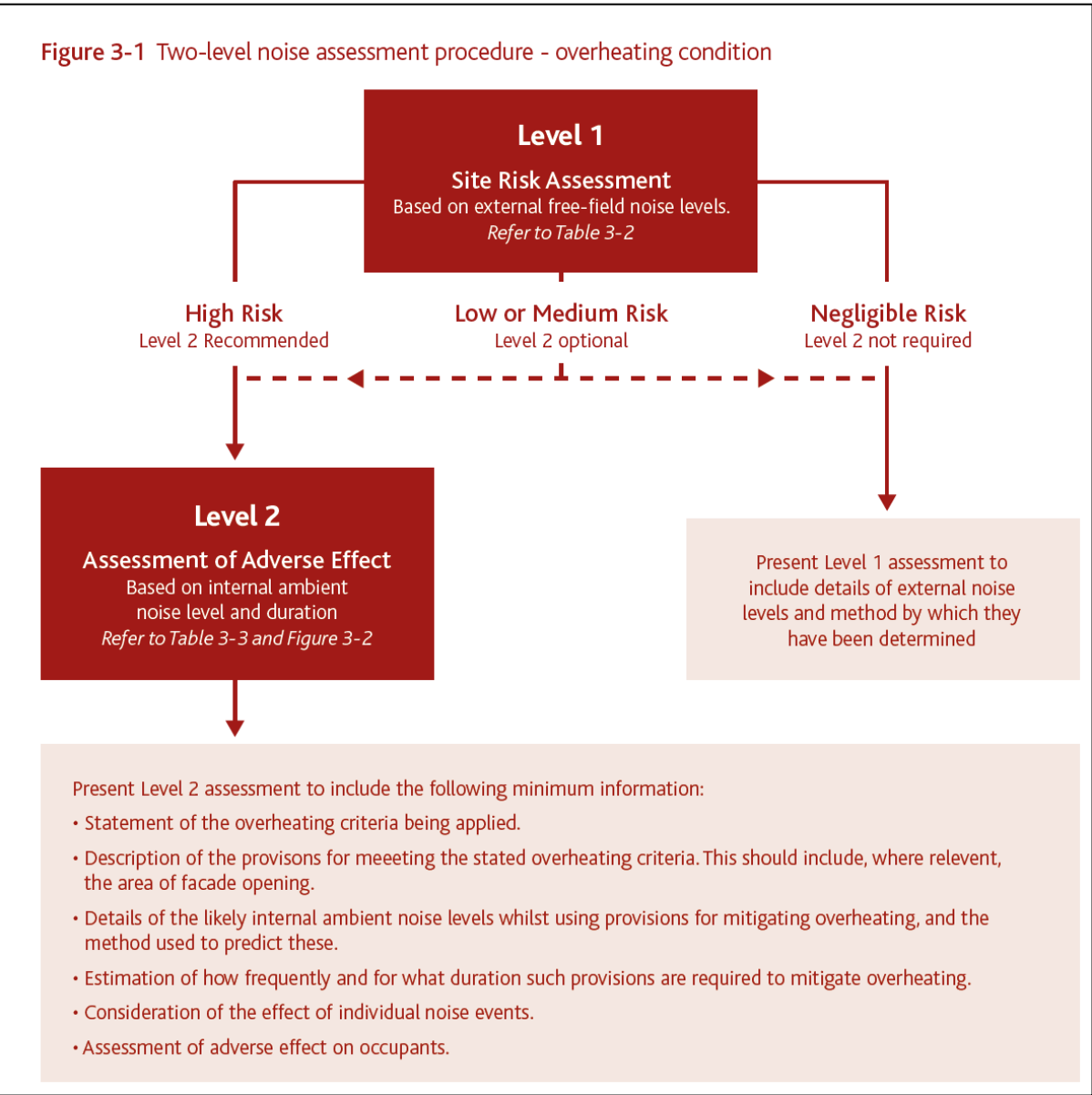


Figure 5: AVO Guide two stage assessment framework

6 INTERNAL NOISE LEVELS - INTRUSIVE NOISE ASSESSMENT

By taking account of the levels of ambient and maximum noise levels as measured and predicted at the site façade locations, the proposed areas of façade elements and their intended constructions, as well as the likely acoustic characteristics of the noise sensitive receiving space (i.e., living rooms, bedrooms), the required sound reduction performance specification of glazing has been determined through acoustic calculation.

For all residential facades and external amenity areas where the impact is considered adverse or significant adverse in line with BS 4142 guidance, it is key that a good Acoustic Design Process is followed in order to ensure the best practicable approach is applied to minimise the impact of noise arising from the industrial and commercial sites on future residents. The following sections will present noise mitigation in outline terms which can be further developed with the wider design team.

Acoustic glazing will be specified for impacted habitable rooms. A recommended criteria is for noise from industrial and commercial sources not to exceed NR20 $L_{eq,1hr}$ in the daytime and NR15 $L_{eq,15mins}$ during the night time.

The window areas and room dimensions used in the calculations have been taken from the planning drawings provided by Four Architects in June 2024.

6.1 Acoustic Criteria Summary

Based upon the above ProPG Stage 2 Elements, the noise criteria listed in Table 8 have been adopted as the basis of the acoustic assessment:

Noise Source	Location	07:00 to 23:00	23:00 to 07:00
Anonymous (e.g. Road Traffic Noise)	Living rooms (internal)	35dB $L_{Aeq,16hr}$	-
	Bedrooms (internal)	35dB $L_{Aeq,16hr}$	30dB $L_{Aeq,8hr}$ 45dB L_{Amax}^*
	Gardens and outdoor amenity spaces	55dB $L_{Aeq,16 hr}$	
	Balconies	No noise criteria applied	
Industrial / Commercial Noise Sources	Living rooms (internal)	NR20dB $L_{Aeq,1hr}$	-
	Bedrooms (internal)		NR15dB $L_{Aeq,15mins}$
* Not normally greater than 10 exceedances per night time period.			

Table 8: Summary of adopted noise criteria

7 INDUSTRIAL NOISE IMPACT ASSESSMENT

7.1 Overview

This section considers the potential noise impact of the existing adjacent car wash and associated activities on proposed residential receptors. The assessment follows methodology set out within BS 4142:2014.

Our assessment has been carried out at 1 m from the worst affected window of the proposed development and considers a +3 dB penalty for intermittency and a +3 dB penalty for being readily distinctive against the residual acoustic environment.

Incident noise levels from daytime industrial activities have been calculated using CadnaA software and are shown in Figure 6 and Figure 7 below.

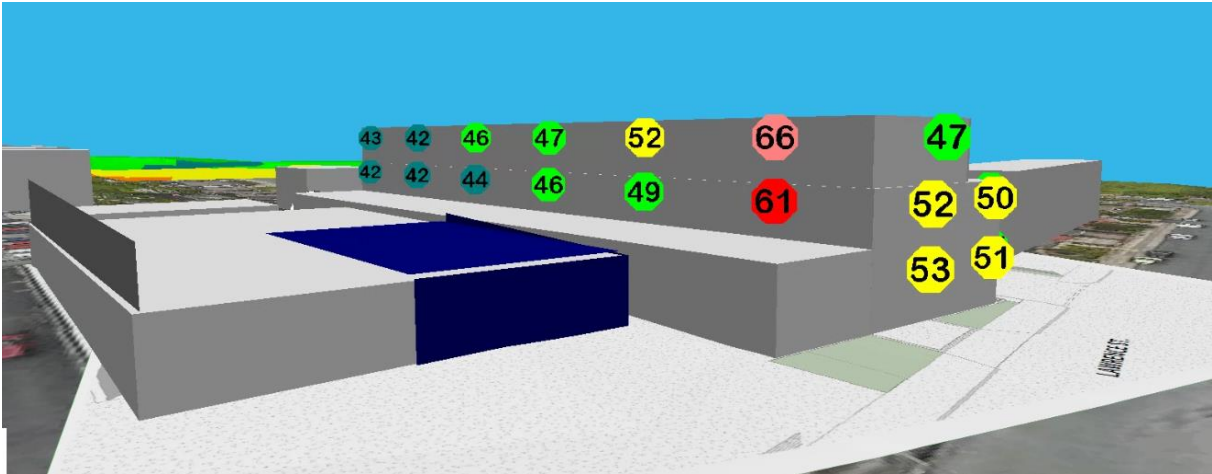


Figure 6: Incident industrial/commercial noise levels across the development



Figure 7: Incident industrial/commercial noise levels across the development

7.2 Assessment Summary

The following table presents the results of a BS 4142:2014 assessment for a typical worst-case period. Fully detailed calculation sheets are available upon request.

Results		Relevant Clause	Commentary
Specific sound level at receptor	66dB	7.3.8 7.3.9 7.3.10	Calculated specific sound level using Equation 4. No distance loss applied as measurement undertaken and proposed façade location.
Background sound level	45dB	8.1.1 8.1.3 8.3	The typical background sound level measured at the proposed development site during operational hours of the car wash.
Assessment made during the daytime, so reference period is 1 hour		7.2	
Acoustic feature correction	+6dB	9.2	The noise emanating from the car wash premises was noted to be intermittent in nature and distinctive against the residual acoustic environment. Pessimistic worst-case feature correction has been added.
Rating level	72dB	9.2	Calculated by adding acoustic feature corrections to the specific sound level.
Excess of rating over background sound level	27dB	11	
Assessment indicates a significant adverse impact is likely on receptor		11	The rating level is 27 dB above the background sound level indicating a significant adverse impact to nearby receptors.
Uncertainty of the assessment	Low	10	The excess of the rating level over the background sound level is large and in this instance the uncertainty of the measurements does not have any significance to the outcome of the assessment.

Table 9: BS4142:2014 assessment of industrial impacts.

Table 9 indicates there is a likelihood of significant adverse impact to the proposed development, however, the context of the site must be considered to enable a full assessment.

Where the initial estimate of the impact needs to be modified due to the context, BS 4142:2014 states that all pertinent factors should be taken into consideration, including “the sensitivity of the receptor and whether dwellings will already incorporate design measures that secure good internal acoustic conditions”.

Clearly, therefore, an initial estimate of a significant adverse impact does not imply that development may not be permitted, provided that proposed dwellings can incorporate design measures that secure good internal acoustic conditions.

The wider context of the site should also be considered as MOT garages /car washes are often situated within mixed residential areas similar to that of the proposed development, where there are also numerous other existing residential dwellings.

In light of the above, we recommend that appropriate mitigation measures are incorporated into the design of proposed dwellings to safeguard any future residents from the potential noise impacts of the industrial units.

8 ENVIRONMENTAL NOISE IMPACT ASSESSMENT

8.1 Predicted Development Environmental Noise Levels

In order to predict the likely resultant environmental noise levels across the future façades of the proposed development, a 3D computer-based environmental noise model has been created using the proprietary DataKustik “CadnaA” Noise Mapping software. The following assumptions have been made in the generation of the noise model:

- The noise model was set up to apply the noise prediction methodology set out in ISO 9613-2: ‘Acoustics – Attenuation of Sound propagation outdoors – Part 2: General Method of Calculation’.
- The model was set to include up to second-order reflected noise from solid structures;
- Ground absorption was set to G=0 (hard ground).
- Acoustic screening and reflections afforded by nearby buildings and solid structures.
- The existing land topography has been taken into consideration in the assessment. Topographical information has been obtained using the open source LiDAR data made available by the Department for Environmental Food and Rural Affairs.

Based upon the above and the measured environmental noise levels, the daytime and night time free field environmental noise levels have been predicted across all proposed external facades of the development, as presented in **Appendix B, Figure B1 and Figure B2**.



8.2 Building Envelope Acoustic Specification

8.2.1 External wall

Table 10 provides the recommended minimum acoustic performance requirements for the external building envelope, in terms of a single weighted sound reduction index:

Wall Construction	Weighted Sound Reduction Index dB ($R'_w + C_{tr}$)
External Wall	50

Table 10: Minimum building fabric acoustic airborne sound insulation performance requirements

At present, the façade build-up of the proposed masonry façade is understood to comprise the following:

Ground floor approx. 347.5mm thickness:

- 102.5mm Facing Brickwork
- 100mm cavity with 90mm insulation
- 100mm Concrete Blockwork
- 20mm insulated plasterboard on Dabs
- 12.5mm plasterboard with skimmed finish

Top floor approx. 324mm thickness:

- Ecoscape cladding on batten
- 9mm OSB Substrate
- 100mm cavity with 90mm insulation
- 100mm Concrete Blockwork
- 20mm insulated plasterboard on Dabs
- 12.5mm plasterboard with skimmed finish

It is expected that the above proposed constructions would be capable of meeting the required acoustic performance and it is therefore not expected to restrict development.

8.2.2 Background (Part F) Ventilation Strategy

The background ventilation strategy of the development understood to comprise of Mechanical Ventilation Heat Recovery (“MVHR”) units within each residential apartment. Therefore, there is no reliance on open windows for the Part F background ventilation strategy.

9 PRELIMINARY ACOUSTIC SPECIFICATIONS FOR GLAZING TO HABITABLE ROOMS

Table 11 provides preliminary acoustic performance requirements for the glazing (and any glazed doors) for residential dwellings forming part of the development that are needed to meet the requirements for suitable internal ambient noise levels. The location of these zones are shown in Figure 8 overleaf.

Note: Glazing specifications are provided to demonstrate site suitability only and final specifications must be reviewed and confirmed with accompanying laboratory test data during the detailed design stage.

Façade Zone (Figure 6)	Room Type	Weighted Sound Reduction Index dB ($R'_w + C_{tr}$)	Example Glazing Core Configuration
Zone A	All	34	8mm / 16mm / 8mm laminated double glazing
Zone B	All	32	6mm / 16mm / 4mm laminated double glazing
Zone C	All	29	6mm / 16mm / 4mm standard double glazing

Table 11: Recommended minimum glazing system acoustic specification

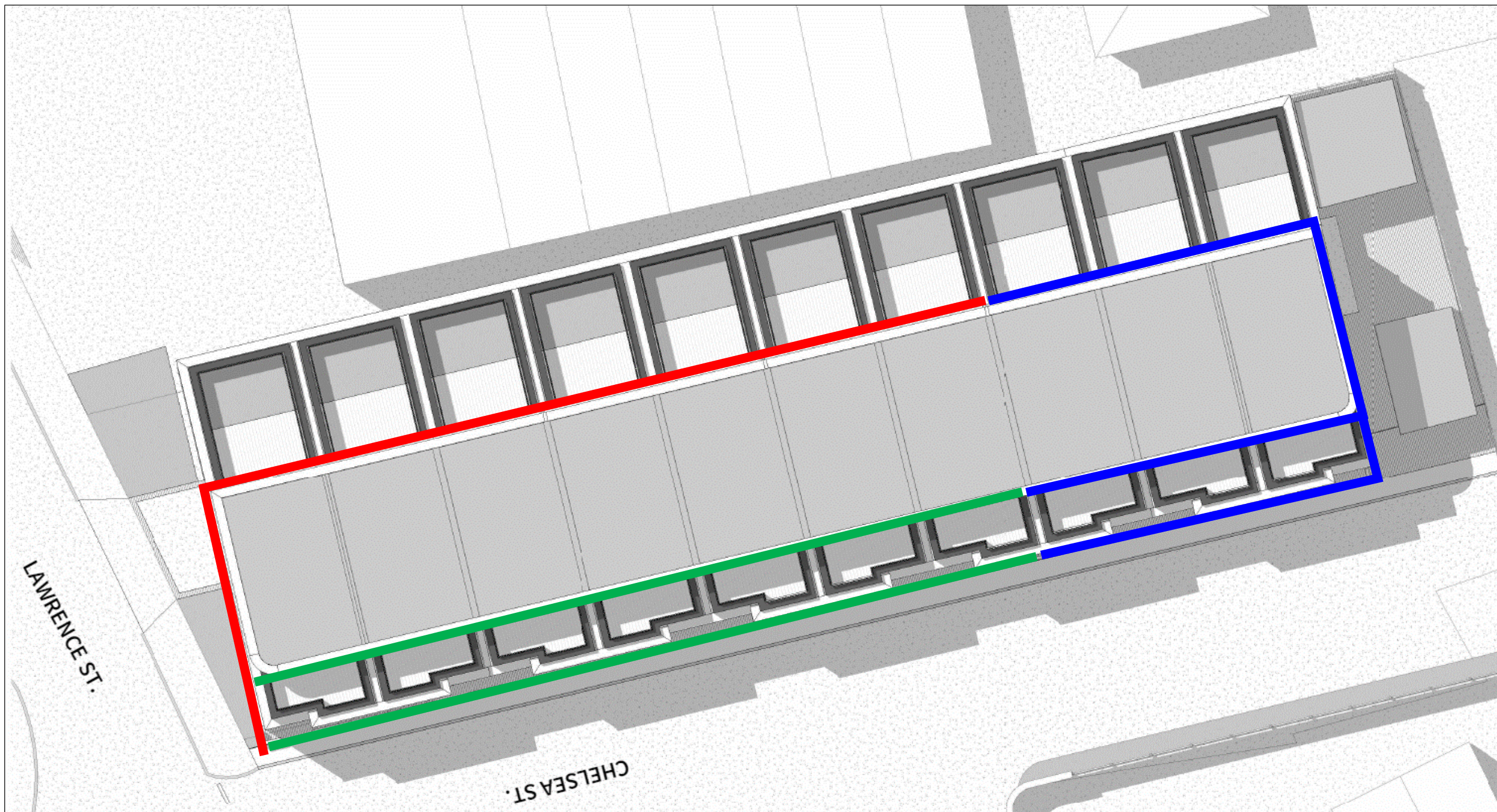


Figure 8: Residential Façade Acoustic Performance Zones

10 EXTERNAL AMENITY NOISE LEVELS – INTRUSIVE NOISE ASSESSMENT

10.1 Predicted Daytime Environmental Noise at External Amenity Areas

Based upon the results of the 3D environmental noise model, daytime noise levels are predicted to be below the BS 8233:2014 desirable noise limit 50dB $L_{Aeq,16h}$ within the Chelsea Street second floor roof terraces. However, noise levels are expected to exceed the BS 8233:2014 the upper noise limit of 55dB $L_{Aeq,16h}$ within the first floor private terraces overlooking Manchester Road.

Also, ProPG states that where despite following a good acoustic design, adverse noise impacts remain on any private external amenity space (i.e. garden or balcony), the impact may be partially off-set if residents are provided through the design of the development or the planning process, with access to:

“a relatively quiet, protected, publicly accessible, external amenity space (e.g. a public park or local green space designated because of its tranquillity) that is nearby (e.g. within a 5 minutes walking distance). The local planning authority could link such provision to the definition and management of Quiet Areas under the Environmental Noise Regulations.”

It is therefore deemed that, from an environmental noise perspective, residents will have access to suitable external amenity space and no further environmental noise mitigation is deemed to be required.

11 CONSIDERATION OF OTHER ISSUES – ACOUSTICS, VENTILATION & OVERHEATING (RESIDENTIAL DEVELOPMENT)

11.1 Acoustics, Ventilation and Overheating Guide

11.1.1 Level 1 Site Risk Assessment

The AVO Level 1 Site Risk Assessment framework is shown in Figure 9. The framework dictates whether a Level 2 assessment is recommended based on daytime and night time transportation source noise levels at the development site:

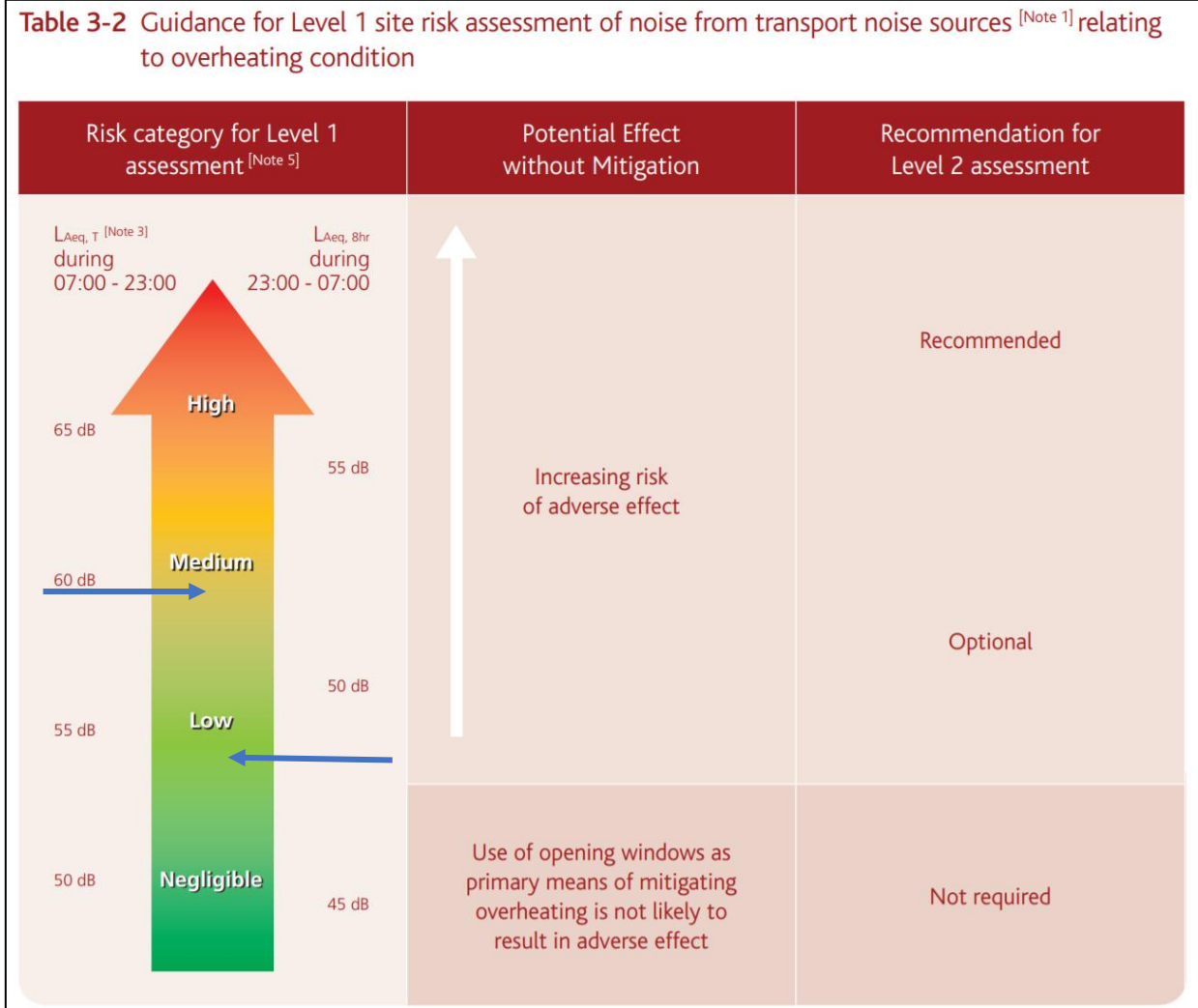


Figure 9: AVO Guide Level 1 site risk transportation noise levels thresholds

Based on the environmental noise survey results and the 3D environmental noise model of the site, the noise level from transportation noise sources at the most exposed residential facades of the development is predicted to be c.60dB $L_{Aeq,16h}$ during the daytime and c.47dB $L_{Aeq,8h}$ during the night time, as shown on Figure 9.

In line with the AVO Level 1 Site Risk Assessment framework, the worst-case facades fall into the “High Risk” category during the night time and therefore a more detailed Level 2 assessment is recommended.

11.1.2 Level 2 Assessment of Adverse Effects

The Level 2 Assessment provides a detailed assessment of the likely adverse effects on occupants relating to the magnitude of indoor ambient noise levels. Table 3-3 of the AVO Guide, as shown in Figure 10, provides a table of typical outcomes for occupants with regards to changes in noise level.

11.1.3 Planning Practice Guidance on Noise

Planning Practice Guidance on Noise (“PPGN”) provides a summary of the noise exposure hierarchy, and links the significance of effect based on the likely average response to noise levels to the Noise Policy Statement for England, 2010 defined categories for Observed Adverse Effect Levels:

- No Observed Effect Level (“NOEL”) which is the level below which no effect can be detected;
- Lowest Observed Adverse Effect Level (“LOAEL”) which is the level above which adverse effects on health and quality of life can be detected;
- Significant Observed Adverse Effect Level (“SOAEL”) which is the level above which significant adverse effects on health and quality of life occur.

Table 11 provides the significance of effect based on the internal ambient noise level presented in the AVO Level 2 Assessment Guide:

Indoor Ambient Noise Levels			Significance of Effect
Daytime $L_{Aeq,16h}$	Night Time $L_{Aeq,8h}$	Individual Night Time Noise Events	
> 50dB	> 42dB	Normally exceeds 65dB L_{AmaxF}	SOAEL
Between 36dB and 50dB	Between 31dB and 42dB	Normally in between 45dB and 65dB L_{AmaxF}	LOAEL
≤ 35dB	≤ 30dB	Do not normally exceed 45dB more than 10 times a night	NOEL

Table 11: Internal ambient noise level significance of effect, AVO Guide

Table 3-3 Guidance for Level 2 assessment of noise from transport noise sources^[Note 1] relating to overheating condition

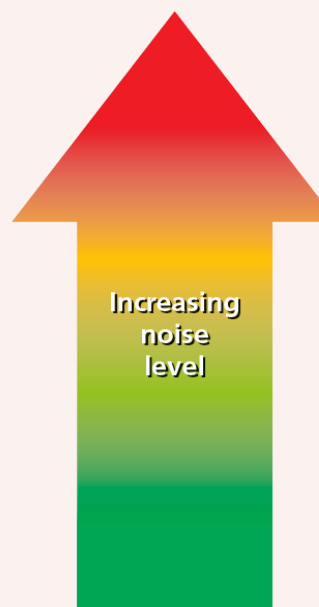
Internal ambient noise level ^[Note 2]			Examples of Outcomes ^[Note 5]	
$L_{Aeq,T}$ ^[Note 3] during 07:00 – 23:00 ^[Note 6]	$L_{Aeq,8h}$ during 23:00 – 07:00	Individual noise events during 23:00 – 07:00 ^[Note 4]		
> 50 dB	> 42 dB	Normally exceeds 65 dB $L_{AF,max}$	Noise causes a material change in behaviour e.g. having to keep windows closed most of the time	Avoiding certain activities during periods of intrusion. Having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.
			Increasing likelihood of impact on reliable speech communication during the day or sleep disturbance at night	At higher noise levels, more significant behavioural change is expected and may only be considered suitable if occurring for limited periods. As noise levels increase, small behaviour changes are expected e.g. turning up the volume on the television; speaking a little more loudly; having to close windows for certain activities, for example ones which require a high level of concentration. Potential for some reported sleep disturbance. Affects the acoustic environment inside the dwelling such that there is a perceived change in quality of life. At lower noise levels, limited behavioural change is expected unless conditions are prevalent for most of the time. ^[Note 8]
≤ 35 dB	≤ 30 dB	Do not normally exceed $L_{AF,max}$ 45 dB more than 10 times a night	Noise can be heard, but does not cause any change in behaviour	Noise can be heard, but does not cause any change in behaviour, attitude, or other physiological response ^[Note 9] . Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.

Figure 10: AVO Guide IANL assessment of effect from transport noise sources



11.2 Acoustic Criteria Summary

Based upon the Approved Document O requirements and the AVO Guide Level 2 assessment guidance, the noise criteria listed in Table 12 have been adopted as the basis of the acoustic assessment.

The daytime criteria have been selected to prevent SOAEL in line with Planning Policy Guidance. The night time criteria are based on the statutory acoustic requirements of Approved Document O:

Noise Source	Location	07:00 to 23:00 hrs	23:00 to 07:00 hrs
Transportation noise sources	Living rooms (internal)	50dB $L_{Aeq,16h}$	-
All environmental noise sources	Bedrooms (internal)	50dB $L_{Aeq,16h}$	40dB $L_{Aeq,8h}$ 55dB L_{Amax}^*
* Not normally greater than 10 exceedances per night time period.			

Table 12: Summary of noise criteria for overheating mitigation conditions

11.3 Overheating Noise Impact Assessment

An assessment has been undertaken based on the predicted façade noise levels, the proposed window dimensions provided by the architect, the output of the TM59 sustainability assessment, and the corresponding predicted daytime and night time internal ambient noise levels based on windows opening at various angles between fully closed and fully open.

- An “open” window (No restriction on opening angle) providing a minimum of 7dB external-to-internal sound reduction;
- A “partially open” window (15° opening angle) providing a minimum of 10dB external-to-internal sound reduction;
- A “partially open” window (6° opening angle) providing a minimum of 13dB external-to-internal sound reduction.

Based on the above, Figure 11 presents the example limitations on a passive overheating mitigation strategy via open windows for rooms in order to avoid a “SOAEL” in planning terms for residents during daytime hours (07:00 to 23:00 hours).

Based on environmental noise levels across the site there are no limitations on a passive overheating mitigation strategy to avoid exceedances of the ADO Section 3 noise criteria when using open windows to control overheating for bedrooms during night time hours (23:00 to 07:00 hours).

Final details of the proposed overheating strategy, including details of assumed window openings, are to be developed at the detailed design stage. However, it is understood that where window openings are restricted, enhanced ventilation rates will be provided in compliance with TM59 in accordance with the sustainability assessment.

Note: In accordance with the good acoustic design principles of ProPG it is still recommended that openable windows are provided for user-controlled comfort and purge ventilation, in all cases.

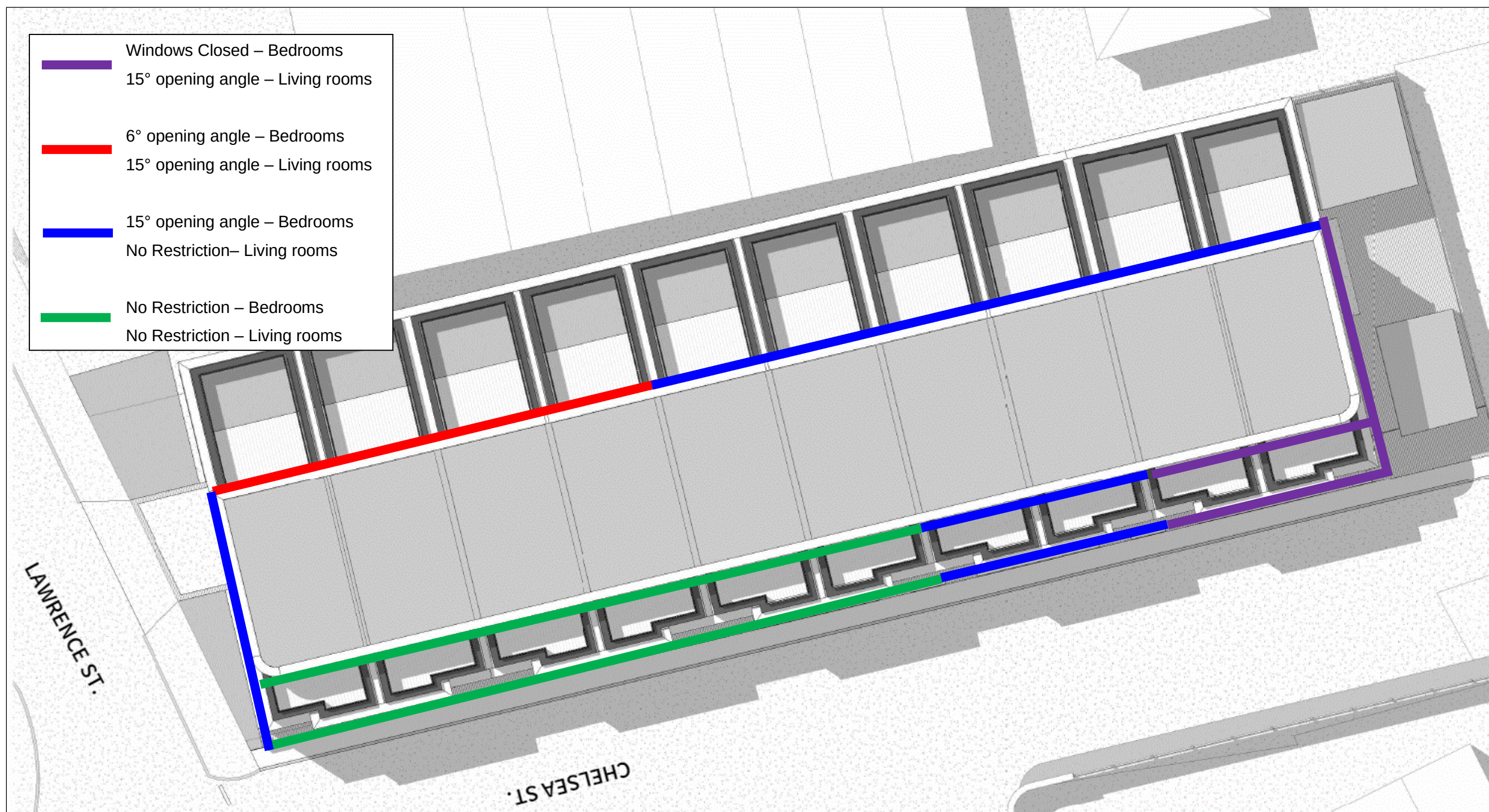


Figure 11: AVO Guide daytime overheating noise assessment – window opening angle restrictions

12 M&E PLANT NOISE LEVELS

The site lies within the planning authority of Bury Metropolitan Borough Council. E-mail communication was initiated with the Council's Environmental Health Department on 13/05/2024 to ascertain external plant noise level limits for the development. In absence of any response at the time of publishing, the plant will be assessed in accordance with BS 4142:2014+A1:2019.

12.1 BS 4142:2014+A1:2019

BS 4142:2014+A1:2019: '*Method for rating and assessing industrial and commercial sound*' ("BS 4142") is intended to be used to assess noise of an industrial nature, which includes sound from fixed installations comprising mechanical and electrical plant and equipment.

The procedure contained in BS 4142 for assessing environmental noise impact is to compare the measured or predicted noise level from the source in question, the "Specific Sound Level" immediately outside the noise sensitive premises, with the corresponding representative "Background Sound Level". Where the noise contains attention attracting characteristics such as tonal, impulsive and/or intermittent elements, it may be appropriate to apply a correction to the Specific Sound Level to obtain the "Rating Level".

BS 4142 states that the significance of sound arising from an industrial and/or commercial nature depends upon both the margin by which the Rating Level of the specific sound source exceeds the Background Sound Level, and also the context in which the sound occurs:

- Typically, the greater this difference, the greater the magnitude of the impact.
- A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context.
- The lower the Rating Level is relative to the measured Background Sound Level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the Rating Level does not exceed the Background Sound Level, this is an indication of the specific sound source having a low impact, depending on the context.

For the daytime, the assessment is carried out over a one-hour period, and over a 15-minute period at night. The daytime and night time periods are defined as occurring between 07:00 hours to 23:00 hours, and 23:00 hours to 07:00 hours, respectively.

12.2 Environmental Plant Noise Limits

At this stage proposed plant and equipment is unknown. Therefore, it is recommended to limit the total, aggregate environmental noise from all M&E plant, when operating simultaneously, to an ambient noise level (in $L_{Aeq,T}$ terms) equating to the typical, pre-existing daytime or night time background noise level at any residential property façade, in L_{A90} terms when assessed in accordance with BS 4142:2014+A1:2019. This equates to the source having a "low impact", depending on the context.

Table 13 specifies appropriate maximum permissible Rating Level limits which shall be applicable to development at the identified NSR, it is considered that this can be secured by suitable planning condition:

Maximum Permissible Noise Rating Level Limit, dB $L_{A_{R,T}}$	
Daytime (07:00 hours – 23:00 hours)	Night Time (23:00 hours – 07:00 hours)
45	35

Table 13: M&E plant environmental noise limits

The above maximum permissible noise level limits are specified in terms of the BS 4142:2014+A1:2019 defined Rating Level. The acoustic character of the sound generated from the plant must therefore be considered and where appropriate, an acoustic character correction (penalty) must be applied to the predicted Specific Sound Level when assessing compliance with the above specified receptor noise level limits.

It must also be noted that the M&E plant noise limits identified above are applicable to all plant serving all areas of the Development, when operating simultaneously. The allowable individual noise contribution from all plant items and atmospheric terminations such as louvres and cowls must be determined based on these overall noise limits - and consequently will be lower.

12.3 Emergency Operation and Testing of Standby Generators

It is recommended that the operation of emergency plant, and noise from Standby Generators under testing (daytime only) and emergency use, should not exceed a Specific Sound Level ($L_{Aeq,T}$) 10dB above the representative Background Sound Level ($L_{A90,15min}$) at the façade of the closest NSR. It is considered that this can be secured by suitable planning condition.

13 CONCLUSION

Sol Acoustics Ltd has been commissioned by Ecoscape to undertake an acoustic design assessment of the proposed development on land off of Lawrence Street, Bury.

An assessment of the proposed residential development has been undertaken in line with the guidance within ProPG. This report demonstrates that appropriate indoor ambient noise levels, in line with the requirements of BS 8233:2014, can be achieved within all proposed internal habitable spaces across the project with the implementation of the glazing strategy, and ventilation strategy, recommended within this report.

Noise levels within a portion of the proposed external amenity areas will be below the identified 'desirable' BS 8233:2014 design criteria, with some areas exceeding the upper limit however consideration should be given to the proximity of publicly accessible externally amenity areas.

An Acoustics and Overheating assessment has been undertaken to enable compliance with the acoustic requirements of Building Regulations Approved Document O and the Acoustics, Ventilation and Overheating Guide. It is considered that for specific façade areas, the use of a natural ventilation strategy to mitigate overheating may result in an exceedance of identified noise levels and therefore an alternative overheating mitigation strategy has been developed.

Additionally, appropriate M&E plant daytime and night time environmental noise limits have also been prescribed herein that can be secured by means of a reasonable planning condition, all as based on the environmental noise survey undertaken at site.

It is considered that with the implementation of the outline scheme of mitigation measures presented in this report that the development complies with all National, Regional, and Local Planning Policy.



APPENDIX A. NOISE SURVEY DETAILS AND SUMMARY RESULTS

LOCATION

Lawrence Street, Bury

DATES & TIMES

15:30 hours on Monday 17 June 2024 to 16:15 hours on Thursday 20 June 2024.

WEATHER CONDITIONS

Date	Daytime (07:00 hours – 23:00 Hours)				Night Time (23:00 hours – 07:00 hours)			
	Temp, °C	Rain, mm/h	Wind Direction	Average Wind Speed, m/s	Temp, °C	Rain, mm	Wind Direction	Average Wind Speed, m/s
17/06/2024	17	0	W	0.9	13	0	SW	0.5
18/06/2024	13	0	SW	0.7	-	-	-	-
19/06/2024	18	0	W	0.5	11	0	E	0.2
20/06/2024	19	0	W	0.6	-	-	-	-

PERSONNEL PRESENT DURING MEASUREMENTS

Chris Downing MMath – Sol Acoustics Ltd

INSTRUMENTATION

Measurement Position 1

01dB Cube Sound level meter (serial no. 12070)
01dB Pre22 Microphone preamplifier (serial no. 1915040)
GRAS 40CD Microphone capsule (serial no. 288057)
01dB Cal21 Acoustic calibrator (serial no. 34375244)

Measurement Position 2

01dB Cube Sound level meter (serial no. 11348)
01dB Pre22 Microphone preamplifier (serial no. 1805362)
GRAS 40CD Microphone capsule (serial no. 260642)
01dB Cal21 Acoustic calibrator (serial no. 34375244)

Industrial Noise Measurements

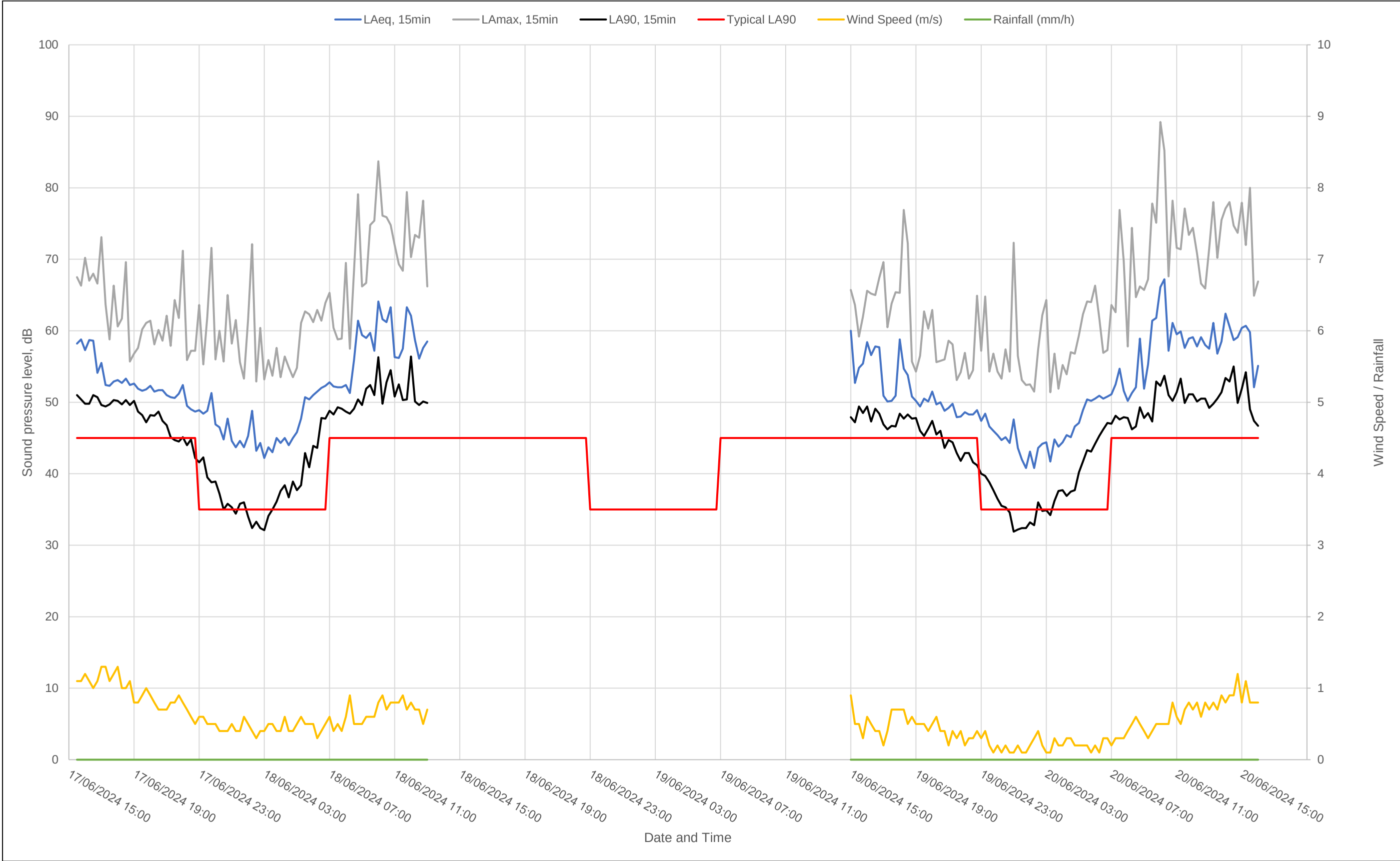
Norsonic 118 sound level meter (serial no. 28260)
Norsonic 1206 microphone preamplifier (serial no. 30962)
Norsonic 1225 microphone capsule (serial no. 285614)
Norsonic 1251 acoustic calibrator (serial no. 29917)

METHODOLOGY

Before and after the measurements the sound level meters were checked and calibrated to an accuracy of ±0.3dB using the 01dB CAL 21 Calibrator. The calibrator produces a sound pressure level of 94 dB re 2x10-5 Pa @ 1kHz.

MEASUREMENT RESULTS

Graph A1 summarises the results obtained at Measurement Position 1



Graph A1: Graph showing measured environmental noise levels at Measurement Position 1

APPENDIX B. CADNAA NOISE MAPS



Figure B1: Predicted **daytime** maximum environmental facade noise levels ($L_{Aeq,16h}$)



Figure B2: Predicted **night time** maximum environmental noise levels ($L_{Aeq,8h}$)