

Victoria Park Probation Centre Manchester

Noise Impact Assessment Report

30113/NIA1

23 September 2022

For:
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Document Control

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Appendix A – Acoustic Terminology



1.0 Introduction

Hann Tucker Associates Limited (Hann Tucker) has been commissioned by Britannia Victoria Limited to undertake a noise assessment for a site in Longsight, Manchester.

The site, which is located on Laidon Road, is being considered for residential development.

The site is subject to road noise from the surrounding roads of Laidon Road and Daisy Bank Road.

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

2.0 Objectives

- To inspect the site to familiarise ourselves with its layout and surroundings in order to identify suitable accessible locations for environmental noise measurements.
- To establish by means of an unmanned 24-hour survey the existing L_{Amax} , L_{Aeq} and L_{A90} environmental road, rail and air traffic noise levels at up to 2No. secure and accessible on-site positions, using fully computerised noise monitoring equipment.
- Based on the results of the survey, to undertake a noise assessment to assess the suitability of the proposed development for residential use in accordance with the Noise Policy Statement for England (NPSE), National Planning Policy Framework (NPPF), Planning Practice Guidance (ProPG), British Standards BS8233:2014, BS4142:2014 and Local Authority guidance/requirements.
- To present our methodology and findings in a detailed Environmental Noise Survey and Noise Impact Assessment Report to accompany the planning application.

3.0 Acoustic Terminology

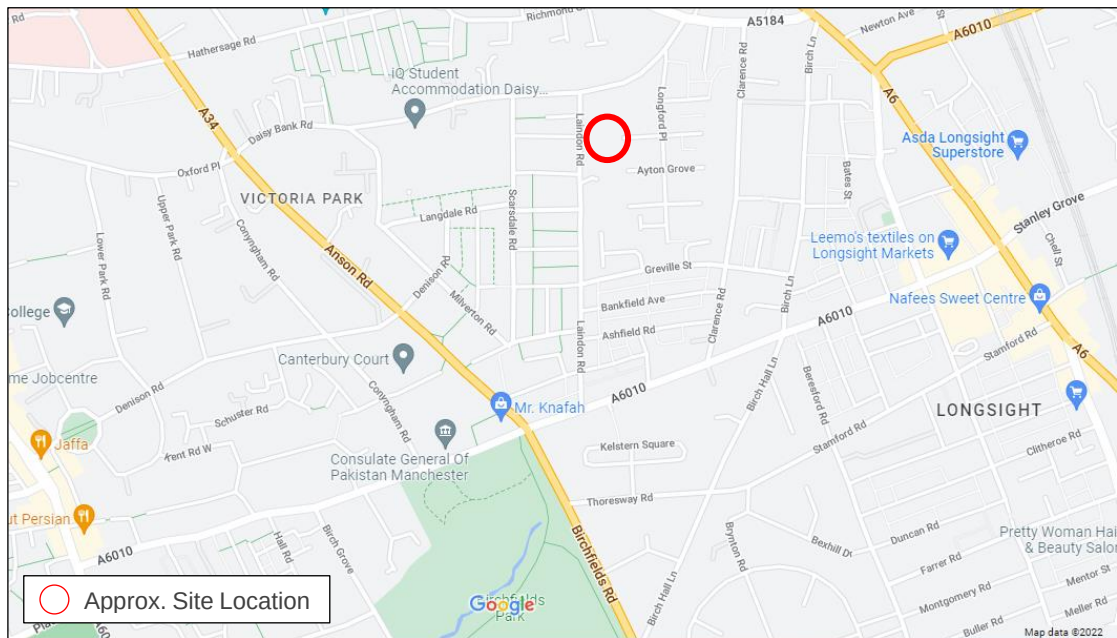
For an explanation of the acoustic terminology used in this report please refer to Appendix A enclosed.



4.0 Site Description

4.1 Location

The site is located in Longsight and falls within the jurisdiction of Manchester. See Location Map below.



Location Map (© Google Maps)

4.2 Description

The site, highlighted in red, lies on Laidon Road, shown in red. The site also lies off Daisy Bank Road, shown in blue, to the south. The site is surrounded by residential buildings, highlighted in green. The nearest commercial building is approximately 245 meters northeast from the site, highlighted in blue. There is a school, highlighted in pink, approximately 220m northwest of the site. There are also various churches: 1 approximately 120m northeast from the site, and another approximately 200m southeast from the site, both highlighted in orange.

See Site Plan below.



Site Plan (© Google Maps)

5.0 Proposed Development

Proposed building elevations are as illustrated in the figures below for context.



Proposed Site Plan (c/o Ollier Smurthwaite Architects)



Proposed Street Elevations (c/o Ollier Smurthwaite Architects)

6.0 Planning Policy, Standards & Guidance

6.1.1 National Planning Policies

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

- The National Planning Policy Framework (NPPF), 2021
- The Noise Policy Statement for England (NPSE), 2010
- Planning Practice Guidance – Noise (PPGN), 2019

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

A detailed summary of each of the above National Planning Policies is provided in Appendix B for reference.



6.2 Standards & Guides

6.2.1 ProPG: Planning & Noise

ProPG: Planning & Noise ‘Professional Practice Guidance on Planning & Noise’ was issued in May 2017 with the primary goal of assisting the delivery of sustainable residential development by promoting good health and well-being through the effective management of noise. It seeks to do that through encouraging a good acoustic design process in and around proposed new residential development having regard to national policy on planning and noise.

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

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

The two sequential stages of the overall approach are:

- **Stage 1** – an initial noise risk assessment of the proposed development site; and
- **Stage 2** – a systematic consideration of four key elements.
 - Element 1 – demonstrating a “Good Acoustic Design Process”;
 - Element 2 – observing internal “Noise Level Guidelines”;
 - Element 3 – undertaking an “External Amenity Area Noise Assessment”; and
 - Element 4 – consideration of “Other Relevant Issues”.

The ProPG considers suitable guidance on internal noise levels found in BS 8233 (see below) with the addition of an $L_{Amax,f}$ requirement for bedrooms at night, as below.

“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.”



6.2.2 BS 8233:2014

British Standard 8233: 2014 “Sound insulation and noise reduction for buildings” recommends design criteria for internal ambient noise levels for dwellings providing a reasonable or good level of protection from external noise. It states that it is desirable that ambient noise levels do not exceed the following guidelines:

Activity	Location	Desirable Internal Ambient Noise Levels	
		07:00 – 23:00	23:00 – 07:00
Resting	Living Rooms	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 $L_{Aeq,8hour}$

Note 1: the above provides recommended levels for overall noise in the design of a building. However, 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: If relying on closed windows to meet the guide values, there needs to be an appropriate alternative ventilation that does not compromise the façade insulation or the resulting noise level.

Note 3: Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved.

Note 4: The levels detailed in the table above are based on the existing guidelines issued by the WHO and assume normal diurnal fluctuations in external noise and are not appropriate in all locations. Where atypical external noise levels are measured (ie high levels of traffic during certain times of the night) an appropriate alternative assessment period (eg 1 hour) and an assessment of individual night time events in terms of SEL or $L_{Amax,F}$ may be more suitable.

For outdoor living spaces, BS 8233 states For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable and 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.



6.2.3 World Health Organisation (WHO)

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

Noise Source	CNG guideline indoors all sources	ENG guideline outdoors noise from specific source only
Road traffic	35 dB $L_{Aeq, 16h}$	53 dB L_{den}
	30 dB $L_{Aeq, 8h}$	45 dB L_{night}
Railway	35 dB $L_{Aeq, 16h}$	54 dB L_{den}
	30 dB $L_{Aeq, 8h}$	44 dB L_{night}
Aircraft	35 dB $L_{Aeq, 16h}$	45 dB L_{den}
	30 dB $L_{Aeq, 8h}$	40 dB L_{night}

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

“In many situations, average noise levels like the L_{den} or L_{night} indicators may not be the best to explain a particular noise effect. Single-event noise indicators – such as the maximum sound pressure level (L_{Amax}) and its frequency distribution – are warranted in specific situations, such as in the context of night-time railway or aircraft noise events that can clearly elicit awakenings and other physiological reactions that are mostly determined by $L_{A,max}$. Nevertheless, the assessment of the relationship between different types of single-event noise indicators and long-term health outcomes at the population level remains tentative. The guidelines therefore make no recommendations for single-event noise indicators.”

6.2.4 Acoustics, Ventilation & Overheating Residential Design Guide

The Acoustics, Ventilation and Overheating Residential Design Guide (Version 1.1) was issued in January 2020 by the Association of Noise Consultants (ANC) and the Institute of Acoustics (IOA). This document provides guidance on the interdependence between acoustics, ventilation and overheating.

The AVO guide recommends a two-level approach to assess the potential impact of noise ingress through windows that have been opened to mitigate overheating and also noise from any mechanical services used to provide comfort cooling. The level 1 assessment relates to incident environmental noise levels across a proposed site, it is used to define “risk categories” for each building façade based on these levels. These categories are set out below:



Risk category for Level 1 assessment ^[Note 5]	Potential Effect without Mitigation	Recommendation for Level 2 assessment
$L_{Aeq, T}$ ^[Note 3] during 07:00 - 23:00 65 dB 60 dB 55 dB 50 dB 45 dB High Medium Low Negligible $L_{Aeq, 8hr}$ during 23:00 - 07:00 55 dB 50 dB 45 dB	↑ Increasing risk of adverse effect Use of opening windows as primary means of mitigating overheating is not likely to result in adverse effect	Recommended Optional Not required

© ANC 2020. AVO Level 1 Assessment

Where a Level 2 assessment is recommended the AVO guide states that the Significant Observed Adverse Effect Level (SOAEL), which is the noise level above which significant adverse effects on health and quality of life occur, is dependent on how frequently and for what duration the overheating condition occurs (i.e. how often the windows need to be open to mitigate overheating). However, the document refers to the overheating condition being “rare” or “most of the time” rather than providing specific durations. Therefore this is open to interpretation.

At planning stage the level of information required to undertake a level 2 assessment in-line with the AVO guide is often not available and a level 1 assessment, which establishes the risk categories of each proposed façade would be most suitable.

6.2.5 Building Regulations Approved Document O (ADO)

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



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

- Limiting unwanted solar gains in summer.
- Providing an adequate means of removing excess heat from the indoor environment.

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

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

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

- 40 dB $L_{Aeq,T}$, averaged over 8 hours (between 11pm and 7am).
- 55 dB L_{AFmax} , more than 10 times a night (between 11pm and 7am)."

6.2.6 BS 4142:2014

BS 4142: 2014 describes methods for rating and assessing the effects of outdoor sound levels, of an industrial and/or a commercial nature, *"on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident"*.

The impact of a specific sound is indicated by subtracting the existing background noise level from the rating level (i.e. noise level from the proposed items of plant/machinery/etc plus any acoustic feature corrections). The standard states that:

- "a difference of around +10dB or more is likely to be an indication of a significant adverse impact";
- "a difference of around +5dB is of marginal significance is likely to be an indication of an 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".

The noise from the new development is expressed in terms of a rating level and given as a $L_{Aeq,T}$ noise level. The existing background noise level is expressed in terms of a $L_{A90,T}$ noise level. T is the assessment time interval, which is 1-hour for operations during daytime hours (07:00 to 23:00) and 15-minutes for operations during night-time hours (23:00 to 07:00).



BS 4142:2014 states that if a noise source contains an 'acoustic feature', such as tonality, intermittency or impulsiveness, an appropriate penalty should be applied.

6.3 Local Planning Guidance

Manchester City Council requirements are outlined in Manchester City Council's Planning & Noise Technical Guidance document (June 2022).

The document aims to provide help and advice in relation to noise in a planning context to encourage good acoustic design. It outlines what is expected in relation to current guidance and policy with the aspiration that new developments achieve the highest possible standards without compromising the health and wellbeing of people that live and work within the City of Manchester.

The following sections summarise the relevant section of the above document that relate to this site.

6.3.1 Residential Developments

Section 7.3.1.1 states that The Council has adopted the following noise limits for residential properties:

- *"Bedrooms (night time - 23.00 - 07.00) 30 dB L_{Aeq} (individual noise events should not normally exceed 45 dB $L_{Amax,F}$ by more than 10 times)*
- *Living Rooms (daytime - 07.00 - 23.00) 35 dB L_{Aeq}*
- *Gardens and terraces (daytime) 55 dB L_{Aeq} "*

7.0 Baseline Noise Survey

7.1 Procedure

Unattended noise monitoring was undertaken on site over a 48-hour period to establish full daytime and night-time noise levels over a typical weekday period. The monitoring was carried out between 11:00 on Monday 12th September 2022 and 15:00 on Friday 16th September 2022 with equipment set up to record broadband and spectral (octave band) sound pressure levels over discrete 2 and 15-minute periods.

Additional manned measurements were performed between 10:00 and 12:30 on Wednesday 21st September 2022.



The survey was performed by Alex Jang BEng(Hons) and Michael Hartley MEng(Hons) MIOA. All measurements were collated in general accordance with BS 7445-1:2003 *Description and Measurement of Environmental Noise*.

7.2 Measurement Positions

The measurement positions were as described and illustrated below.

Position	Type	Description
1	Unattended	To the southwest of the site, on Laindon Road. Attached to a lamp post box, approximately 2.5m above ground level. Free field conditions.
2	Attended	To the north of the site, on Daisy Bank Road. Attached to a tripod, approximately 1.5m above ground level. Free field conditions.
3	Attended	To the southwest of the site, on Laindon Road. Attached to a tripod, approximately 1.5m above ground level. Free field conditions.



Site Plan showing measurement positions (© Google Maps)



7.3 Weather Conditions

For the unattended survey between Monday 12th September 2022 and Friday 16th September 2022, local weather reports indicated prolonged and/or heavy rainfall on Monday. However, this day's data has been removed from our assessment. Temperatures ranged from 7°C (night) to 18°C (day) and wind speeds were less than 5 m/s. During our time on site, skies were largely clear with patchy cloud cover, wind conditions were calm and from a southerly direction and road surfaces were dry.

For the manned survey on Wednesday 21st September 2022, the skies were clear, wind conditions were calm and from a southerly direction and road surfaces were dry.

Weather conditions were deemed suitable for obtaining representative noise readings.

7.4 Instrumentation

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

Position	Description	Manufacturer	Type	Serial Number	Last Calibration
MP1	Sound Level Meter	Larson Davis	LxT	5111	10/06/2022
MP1 & MP2	Calibrator	Larson Davis	Cal200	3083	06/05/2021
MP3	Sound Level Meter	Brüel and Kjaer	2250	2600445	14/12/2020
MP4	Sound Level Meter	Brüel and Kjaer	2250	2600445	14/12/2020
MP3 & MP4	Calibrator	Brüel & Kjaer	4231	2115545	13/12/2021

Each unattended sound level meter was housed in a weatherproof case with the microphone connected via an extension cable. Manned measurements were taken with a handheld sound level meter mounted onto a tripod. All microphones were fitted with a windshield.

Each sound level meter was calibrated prior to and on completion of the survey. No significant deviations occurred (not more than 0.3 dB).

7.5 Results

7.5.1 Unattended Survey

The results of the unattended survey have been plotted on Time History Graphs 30113/TH1 enclosed. These graphs present the 15-minute A-weighted (dBA) L_{90} , L_{eq} and L_{max} levels at Positions MP1 throughout the duration of the survey.



A summary of the results, as used to inform subsequent assessments against current guidelines, is presented in the table below. The L_{A90} values presented are the 'representative' levels determined through statistical analysis of the 15-minute readings, in line with BS 4142. L_{Amax} values are the '10th highest' 2-minute value. All results are free-field levels.

Position	Daytime (07:00 – 23:00 hrs)		Night-time (23:00 – 07:00 hrs)			
	$L_{Aeq,16hr}$	L_{A90}	$L_{Aeq,8hr}$	L_{A90}	10 th Highest L_{Amax}	Highest Typical L_{Amax}
MP1	55	37	47	30	72	78

7.5.2 Manned Survey

The following tables summarises noise levels recorded at each of the manned measurement positions.

Position	Start Time	Time Period	Sound Pressure Level (dB)			
			$L_{Aeq,T}$	$L_{A10,T}$	$L_{A90,T}$	$L_{Amax,T}$
3	10:25	15 minutes	55	56	43	82
3	11:00	15 minutes	56	54	41	73
3	12:00	15 minutes	52	55	40	81
4	10:44	10 minutes	53	55	37	70
4	11:18	15 minutes	51	52	37	71
4	12:18	15 minutes	55	58	39	78

7.6 Discussion of Noise Climate

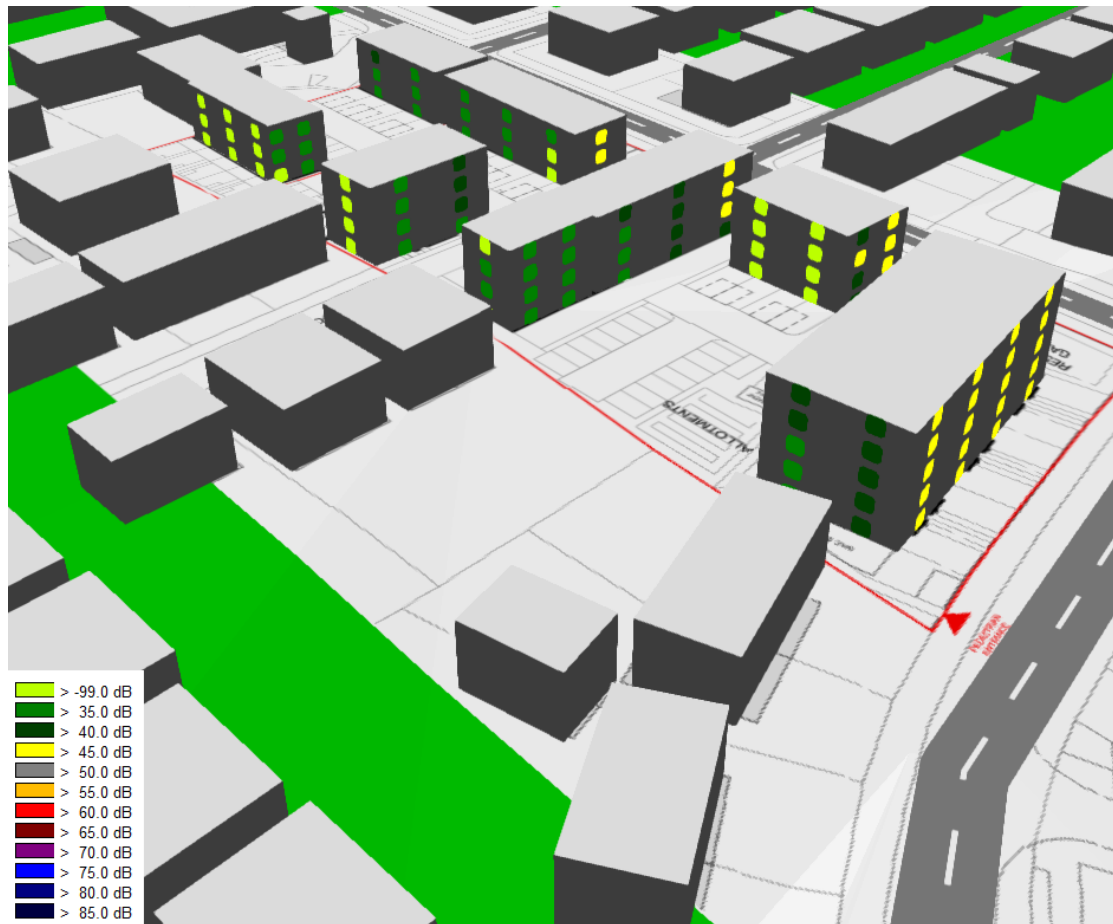
Due to the nature of the survey, i.e., unattended, it is not possible to accurately describe the dominant noise sources, or specific noise events throughout the entire survey period. However, at the beginning and end of the survey period the noise climate was noted to be dominated by road traffic noise from Laindon Road and Daisy Bank Road. There were also infrequent planes passing over the site.

During the manned survey, the noise climate was noted to be dominated by road traffic noise along Laindon Road and Daisy Bank Road, as well as birdsong. There were also infrequent planes passing over the site, and light construction work. At the beginning of the manned survey, there was a delivery truck for the construction site on Daisy Bank Road, offloading goods to the construction site.

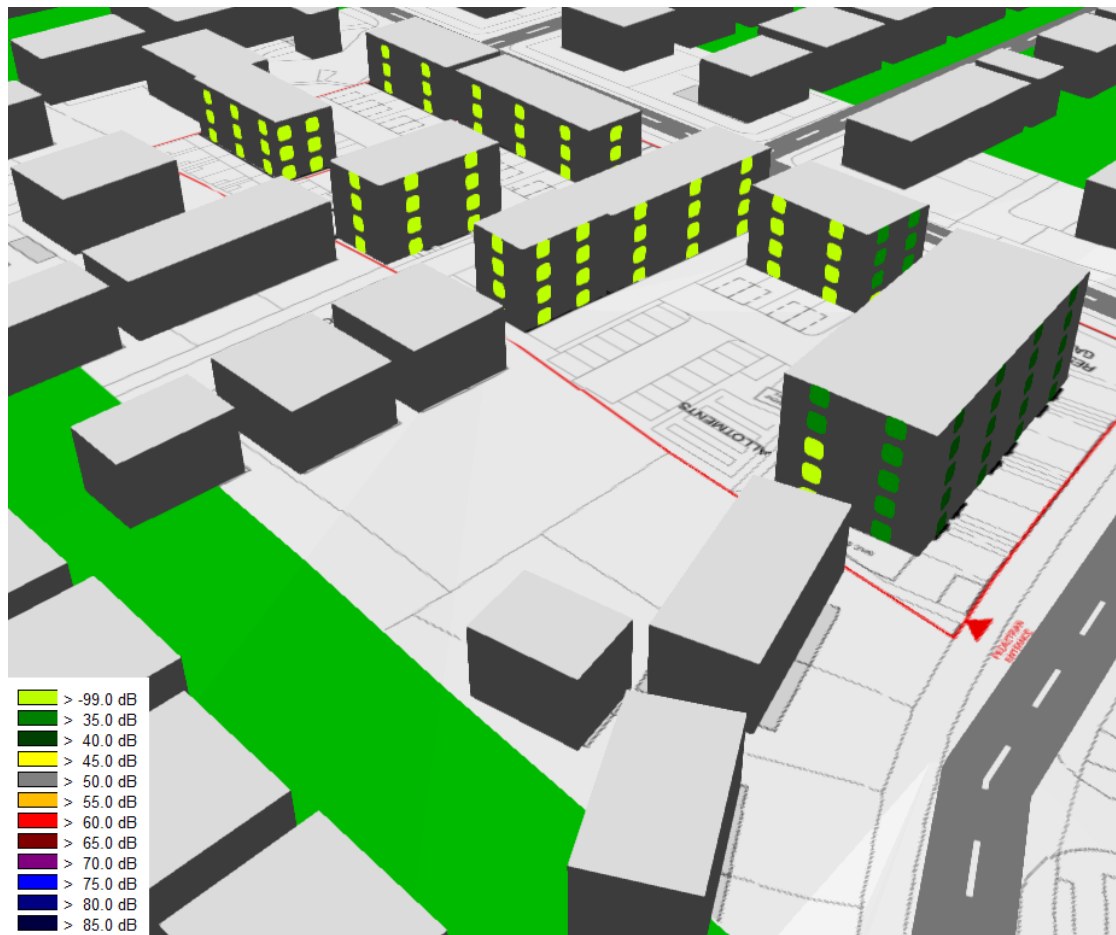


8.0 Incident Noise Levels

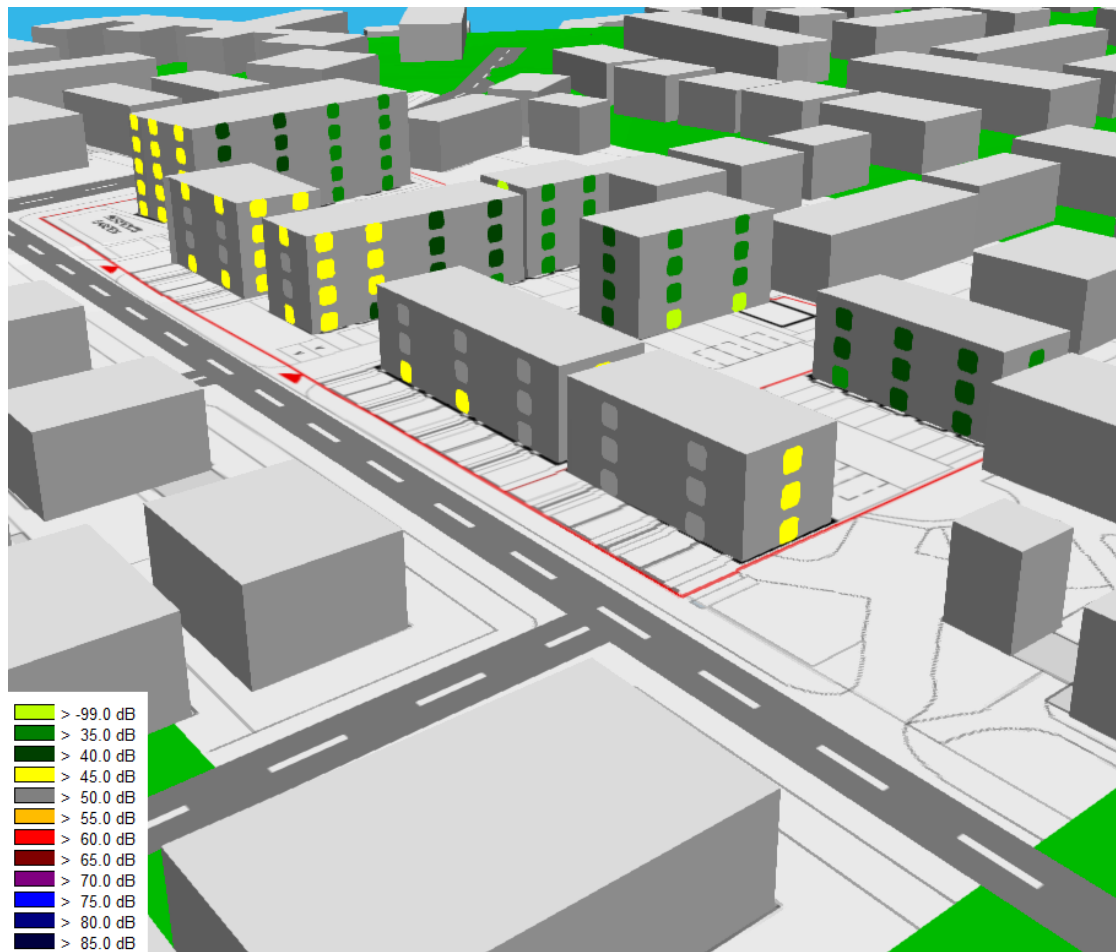
The noise levels incident on each building façade have been calculated based on the results of the noise survey. The calculated noise levels have been used in the subsequent assessment of external noise intrusion and are presented below.



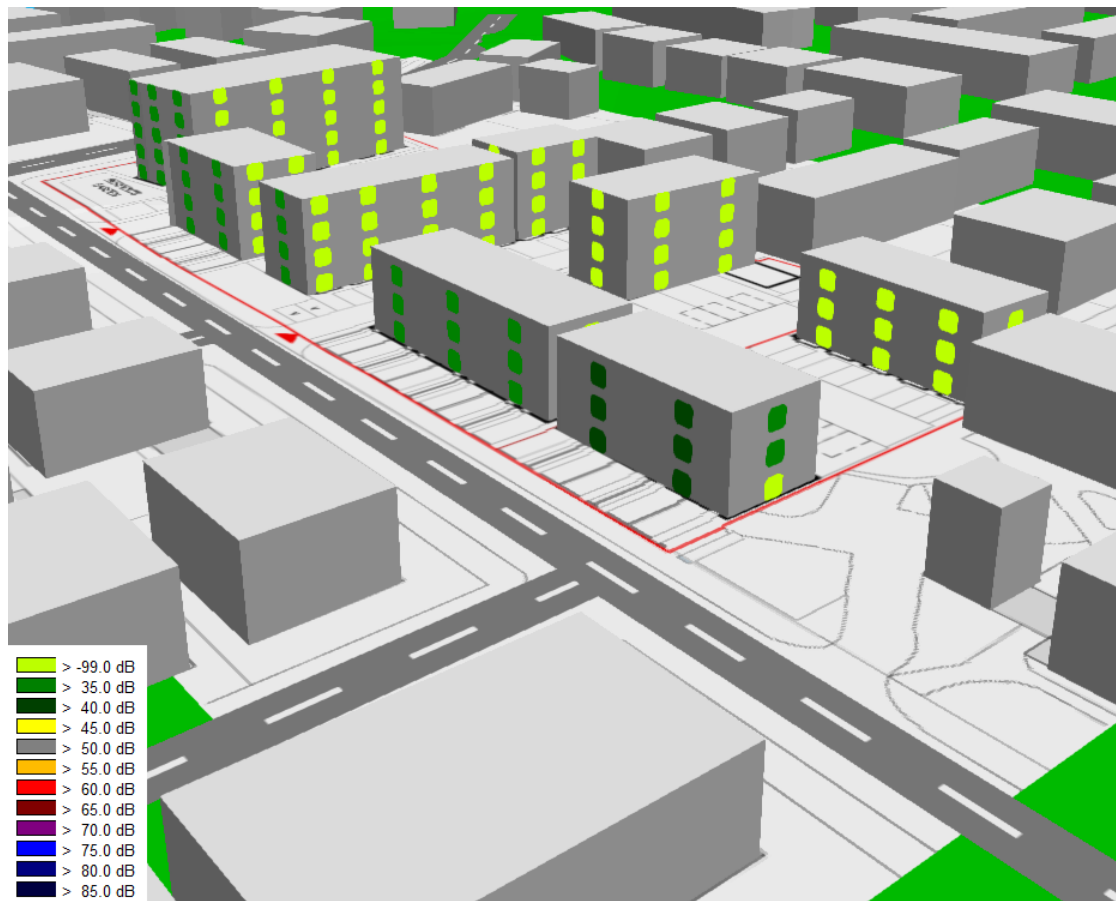
Incident Noise Levels – Daytime looking south



Incident Noise Levels – Night-time looking south



Incident Noise Levels –Daytime looking north.



Incident Noise Levels – Night-time looking north

9.0 Achieving Internal Noise Levels

9.1 Proposed Criteria

With reference to the acoustic standards and guidelines as reviewed in Section 6.0, we propose external noise intrusion levels from environmental sources be controlled so as to not exceed the following criteria.

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

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

The above shall be subject to the final approval of Manchester City Council.



9.2 Preliminary Guidance for Windows & Ventilators

9.2.1 Overview

The current façade design proposals allow for cavity masonry external walls with punched-in double glazed windows. Background ventilation will be provided to each apartment by means of whole-house MVHR. Windows will be openable for purge ventilation.

Our calculations follow BS 8233 procedures and consider the typical apartment room dimensions and window sizes, as per the latest design drawings (at the time of writing).

9.2.2 Preliminary Specifications

Preliminary sound insulation calculations have been carried out in order to specify the minimum sound insulation performance of windows and ventilators. From the results of our assessment, the following minimum preliminary acoustic performance specifications are recommended:

Room	Preliminary Minimum Sound Reduction Specification	Example Configuration (For Guidance Only)
Living Room/Kitchen/Dining Room	27 dB $R_w + C_{tr}$	- 6 / 16 / 6 mm conventional double glazing
Bedroom	29 dB $R_w + C_{tr}$	- 8 / 16 / 4 mm conventional double glazing

Note: At detailed design stage octave band acoustic specifications will need to be developed, and it will be essential that the prospective glazing/cladding system suppliers can demonstrate compliance with these specifications, rather than simply offering generic glazing configurations as described above.

9.3 Ventilation & Overheating

9.3.1 Acoustics, Ventilation & Overheating Residential Design Guide

The above presents solutions to satisfy the proposed internal ambient noise limits within dwellings during normal ventilation conditions where windows are closed but ventilators or MVHR systems, to meet Part F minimum ventilation requirements, are operational.

Based on the guidance set out in Section 6.2.4 a level 1 assessment of the site has been carried out to establish the “risk categories” for each of the proposed building façades.

The table below sets out the risk categories and provides guidance as to whether opening windows as a means of overheating control would be suitable.



Incident Day-time Noise Level $L_{Aeq,16h}$	Incident Night-time Noise Level $L_{Aeq,8h}$	Incident Night-time L_{AFmax}	Risk Category	Comments
Below 50 dB	Below 45 dB	Does not normally exceed 58 dB ¹	Negligible	Opening windows likely suitable
50 dB to 55 dB	45 to 49 dB	-	Low	
55 dB to 65 dB	49 dB to 55 dB	-	Medium	Level 2 Assessment Recommended
Above 65 dB	Above 55 dB	Normally Exceeds 78 dB ²	High	Level 2 Assessment Recommended Opening Windows Unlikely Suitable

¹External L_{AFmax} noise level not normally exceeded more than 10 times a night. This is considered to be the SOAEL ventilation design case when considering opening windows as a means of background ventilation.

²Not normally exceeded absolute night-time maximum events should be calculated in-line with the paper *Assessing L_{max} for residential developments: the AVO Guide Approach*. This is considered to be the SOAEL overheating design case when assessing opening windows as a means of overheating control.

Based on the above and the calculated noise levels across the site the following mark-ups have been produced which show the risk categories across each façade of the proposed development.



Plan Indicating AVO Façade Zone Risk Categories



Based on the above it would be prudent to ensure habitable rooms in the **Yellow** zone are designed so as to remove (or severely restrict) the reliance on openable windows to satisfy overheating targets. This can be achieved by use of solar rated glazing, black out blinds, or through fenestration design. It can be assisted with mechanical ventilation too, such as MVHR with a manual summer boost function. Air conditioning can also be considered for quality developments. However, the introduction of mechanical solutions should be considered carefully; not only with regard to cost and maintenance, but sustainability and the environment, which are likely to be more prominent drivers for any new development with the LPA's jurisdiction.

9.3.2 Building Regulations Approved Document O (ADO)

When considering the requirements of AD-O. Based on the required free area for the medium risk zones the resulting outside-to-inside level difference for window openings are expected to be approximately 9 dB for "medium" risk locations.

Based on the above and the external noise levels calculated across the site the following table sets out the external noise levels that would be commensurate with having open windows as a means of overheating control.

Façade Zone	Incident Noise Level (dB)		Notes
	$L_{Aeq,8h}$	$L_{AFmax,2min}$	
Green	<= 49	<= 64	Open windows based on simplified model should be suitable
Red	50+	65+	Open windows based on simplified model not suitable. Detailed modelling required. However, opening windows unlikely suitable to achieve AD-O compliance.

Based on the table above, the following mark-ups show the locations in which the external noise are in the Red façade zones.



Plan Indicating Approved Document-O Façade Zones

In the red façade zones, it is likely that opening windows as a means of overheating control would not be possible and alternative measures would be required.

10.0 Outdoor Living Spaces

Noise levels in external amenity areas should ideally not be above the range of 50-55dB $L_{Aeq,16hr}$, as stated in BS8233:2014. The design has achieved the lowest practicable noise levels. It is acknowledged that noise levels in some gardens may approach the upper noise level. However in addition to these gardens for all dwellings noise levels will be below/within the range of 50-55dB $L_{Aeq,16hr}$ as stated in BS8233:2014.

It should be noted that BS8233:2014 states: *“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.”*

11.0 Development-Generating Noise Impacts

11.1 Fixed Plant & Equipment

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



Plant Noise Emission Criteria ($L_{Aeq,T}$ dB)	
Daytime (07:00 – 23:00 hours)	Night-time (23:00 – 07:00 hours)
32	25

Noise shall be assessed in accordance with BS 4142:2014 with corrections applied for any plant emitting noise of a tonal or irregular quality. The above limits shall be subject to the final approval of the Local Authority.

11.1.1 Plant Noise Mitigation Measures

Given the nature of the development, the only significant plant items are likely to be MVHR units serving the residential dwellings. For residential spaces, noise from localised mechanical ventilation will likely be negligible.

For central plant compounds/outlets, provisions shall be made for the selection of low noise equipment, silencers, enclosures, screens and other acoustic attenuation measures where necessary. The positioning of plant areas should be carefully considered, bearing in mind the likelihood of the nearest receptors being the development's own ground/first floor residential windows.

At this stage it is envisaged that the risk of excessive building services noise can be mitigated by design and this could be secured by a suitably worded condition of planning.

12.0 Conclusions

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

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

Appropriate target internal noise levels have been proposed. These are achievable using conventional mitigation measures. Mitigation advice, including the use of suitably specified glazing and acoustically attenuated ventilation, have been recommended to reduce to a minimum the adverse impact on health and quality life arising from environmental noise.

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

Appendix A – Acoustic Terminology

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

dB	Decibel - Used as a measurement of sound level. Decibels are not an absolute unit of measurement but an expression of ratio between two quantities expressed in logarithmic form. The relationships between Decibel levels do not work in the same way that non-logarithmic (linear) numbers work (e.g. 30dB + 30dB = 33dB, not 60dB).
dBA	The human ear is more susceptible to mid-frequency noise than the high and low frequencies. The 'A'-weighting scale approximates this response and allows sound levels to be expressed as an overall single figure value in dBA. The _A subscript is applied to an acoustical parameter to indicate the stated noise level is A-weighted It should be noted that levels in dBA do not have a linear relationship to each other; for similar noises, a change in noise level of 10dBA represents a doubling or halving of subjective loudness. A change of 3dBA is just perceptible.
L _{90,T}	L ₉₀ is the noise level exceeded for 90% of the period <i>T</i> (i.e. the quietest 10% of the measurement) and is often used to describe the background noise level.
L _{eq,T}	L _{eq,T} is the equivalent continuous sound pressure level. It is an average of the total sound energy measured over a specified time period, <i>T</i> .
L _{max}	L _{max} is the maximum sound pressure level recorded over the period stated. L _{max} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the L _{eq} noise level.
L _p	Sound Pressure Level (SPL) is the sound pressure relative to a standard reference pressure of 2×10^{-5} Pa. This level varies for a given source according to a number of factors (including but not limited to: distance from the source; positioning; screening and meteorological effects).
L _w	Sound Power Level (SWL) is the total amount of sound energy inherent in a particular sound source, independent of its environment. It is a logarithmic measure of the sound power in comparison to a specified reference level (usually 10^{-12} W).

Appendix B –National Planning Policies

National Planning Policy Framework (NPPF)

The National Planning Policy Framework (NPPF) was first published in 2012, replacing the existing Planning Policy Guidance Note 24 (PPG24) “Planning and Noise”, and sets out the government’s planning policies for England and how these are expected to be applied.

The latest revision of the NPPF (July 2021) states that planning system should contribute to, and enhance, the natural and local environment by (amongst others) *“preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, water or noise pollution or land stability.”*

NPPF advises that planning policies and decisions should ensure:

“...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”* 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.”*

“...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.”

The NPPF makes reference to the Noise Policy Statement for England.

Noise Policy Statement for England (NPSE)

The Noise Policy Statement for England (NPSE) was published in March 2010 (i.e. before the NPPF). The NPSE is the overarching statement of noise policy for England and applies to all forms of noise other than occupational noise, setting out the long term vision of Government noise policy which is to “Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.”

That vision is supported by the following NPSE noise policy aims which are reflected in three of the four aims of planning policies and decisions in the NPPF as below:

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

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

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

NOEL – No Observed Effect Level

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

LOAEL – Lowest Observable Adverse Effect Level

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

SOAEL – Significant Observed Adverse Effect Level

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

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

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

Planning Practice Guidance on Noise (PPG)

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

Response	Examples of Outcomes	Increasing Effect Level	Action
No Observed Effect Level			
Not present	No effect	No Observed Effect	No specific measures required
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