



Noise Assessment:

Hanns Way, Eastleigh

Doswell Projects

20th April 2023

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Doswell Projects • 20th April 2023 • H3813 – NV – v1



Report Details:

Report Title	Noise Assessment
Site	Hanns Way, Eastleigh
Client	Doswell Projects
Report No.	H3813 – NV – v1

Version History:

Version	Date	Notes	Author	Checked
V1	20 th April 2023	Original Issue	Mathew Vaughan MSc AMIOA Nick Hawkins MSc MIOA MIAQM	Nick Hawkins MSc MIOA MIAQM

This report has been prepared by Hawkins Environmental Limited for the sole purpose of assisting in gaining planning consent for the proposed development described in the introduction of this report.

This report has been prepared by Hawkins Environmental Limited with all reasonable skill, care and diligence, and taking account of the manpower and resources devoted to it by agreement with the client. Information reported herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid.

This assessment takes into account the prevailing conditions at the time of the report and assesses the impact of the development (if applicable) using data provided to Hawkins Environmental Limited by third parties. The report is designed to assist the developer in refining the designs for the proposed development and to demonstrate to agents of the Local Planning Authority that the proposed development is suited to its location. This should be viewed as a risk assessment and does not infer any guarantee that the site will remain suitable in future, nor that there will not be any complaints either from users of the development or from impacts emanating from the development site itself.

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1. INTRODUCTION

1.1. Overview

Hawkins Environmental Limited has been instructed by Doswell Projects to undertake a noise assessment for the proposed redevelopment of Hanns Way Car Park, situated in the Borough of Eastleigh in Hampshire.

In November 2022, planning consent was refused for the “erection of three storey building consisting of 4no. one-bedroom and 2no. two-bedroom apartments with ancillary bin and cycle storage, landscaping and parking” (reference F/22/92349).

In the decision notice, Reason for Refusal 1 noted:

“The proposed development, by reason of its close proximity to existing commercial uses would subject future residents of the development to unacceptable levels of noise and odour disturbance, including from associated plant, servicing and deliveries. Furthermore, the proposed mitigation would result in a poor quality living environment due to the need for mechanical ventilation and odour neutralization equipment and closed/sealed windows. The development is therefore considered to be contrary to Policies DM1 and DM8 of the adopted Eastleigh Borough Local Plan 2016-2036, the ‘Internal Space’ section of the Council’s ‘Quality Places’ Supplementary Planning Document, and Paragraphs 130 f), 185 and 187 of the National Planning Policy Framework (2021)”.

Hawkins Environmental provided the original noise report “H3626 - Hanns Way, Eastleigh - Noise Assessment - v1” dated 7th September 2022 that was submitted with the planning application. This new assessment builds upon the 2022 survey and assessment and considers the impact of noise from the neighbouring commercial premises and the broader environment and determines whether noise is a constraint upon the development of the site.

The assessment adheres to the principles of Government planning policy in relation to noise, specifically enacted by the *National Planning Policy Framework (NPPF)*, the *National Planning Practice Guidance (NPPG) on Noise* and the *Noise Policy Statement for England (NPSE)*.

The recommended approach for assessing noise in relation to residential development has been adopted, which is currently the *Professional Practice Guidance on Planning and Noise: New Residential Development* (the “ProPG”), which adopts the criteria contained within *BS 8233: 2014 ‘Guidance on sound insulation and noise reduction for buildings’*. Consideration has also been given to the *Association of Noise Consultants’ Acoustics, Ventilation and Overheating (AVO) Guide*.

All noise measurements were conducted in accordance with *BS 7445-2: 1991 ‘Description and measurement of environmental noise Part 2: Guide to the acquisition of data pertinent to land use’*.

1.2. The Nature, Measurement and Effect of Noise

Noise is often defined as sound that is undesired by the recipient. Whilst it is impossible to measure nuisance caused by noise directly, it is possible to measure the loudness of that noise. ‘Loudness’ is related to both sound pressure and frequency, both of which can be measured. The human ear is sensitive to a wide range of sound levels. The sound pressure level of the threshold of pain is over a million times that of the quietest

audible sound. In order to reduce the relative magnitudes of the numbers involved, a logarithmic scale of decibels (dB) is normally used, based on a reference level of the lowest audible sound.

The response of the human ear is not constant over all frequencies. It is therefore usual to weight the measured frequencies to approximate the human response. The resulting 'A' weighted decibel, dB(A), has been shown to correlate closely to the subjective human response.

When related to changes in noise, a change of ten decibels from say 60 dB(A) to 70 dB(A) would represent a doubling in 'loudness'. Similarly, a decrease in noise from 70 dB(A) to 60 dB(A) would represent a halving in 'loudness'. A change of 3 dB(A) is generally considered to be just perceptible. **Table 1.1** details typical noise levels. A glossary of acoustic terms can be found in **Appendix 1**.

Table 1.1: Typical Noise Levels

Approximate Noise Level (dB(A))	Example
0	Limit of hearing
30	Rural area at night
40	Library
50	Quiet office
60	Normal conversation at 1 m
70	In car noise without radio
80	Household vacuum cleaner at 1 m
100	Pneumatic drill at 1 m
120	Threshold of pain

1.3. Site Description

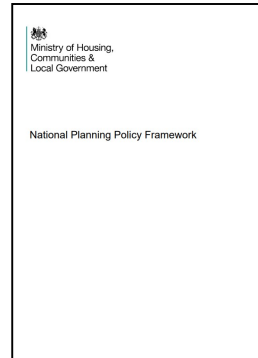
The proposed development site is situated on the corner of Hanns Way and Wells Place in the town centre of Eastleigh. The site is currently a small hard standing public car park with 19 spaces. The proposed development will see the construction of 6 flats over a ground and two upper storeys. A location plan of the proposed site can be seen in **Figure 1.1**.

Figure 1.1: Site Location Plan**Development Site**

2. PLANNING POLICY & GUIDANCE

2.1. National Planning Policy Framework (2021)

The National Planning Policy Framework (NPPF) was first published on the 27th March 2012 and revised July 2018, February 2019 and again in July 2021. The NPPF outlines the Government's environmental, economic and social policies for England. The NPPF sets out a presumption in favour of sustainable development which should be delivered with three main dimensions: economic; social and environmental (Paragraphs 7, 8, 10 and 11). The NPPF aims to enable local people and their councils to produce their own distinctive local and neighbourhood plans, which should be interpreted and applied in order to meet the needs and priorities of their communities.



The NPPF states that in the planning system *"Planning policies and decisions should 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 or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans"* (Paragraph 174).

Paragraph 185 of the NPPF talks specifically about noise stating that *"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should: a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life; b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason..."*

Specifically in relation to noise from existing commercial premises, Paragraph 187 of the NPPF notes: *"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".*

2.2. Noise Policy Statement for England (2010)

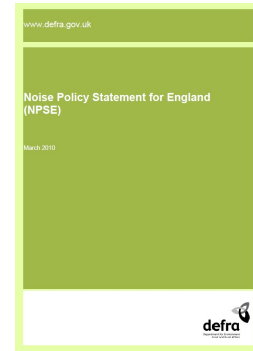
The Noise Policy Statement for England (NPSE) provides further guidance on the interpretation of Section 123 of the NPPF and states that: *“Within the context of sustainable development:*

- *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.”*

NPSE introduces established concepts originally from the field of toxicology that are now being applied to noise impacts. They are:

- **NOEL – No Observed Effect Level** - This is the level of noise below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.
- **LOAEL – Lowest Observed Adverse Effect Level** - This is the level of noise 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.

NPSE goes on to state 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 acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available.”*

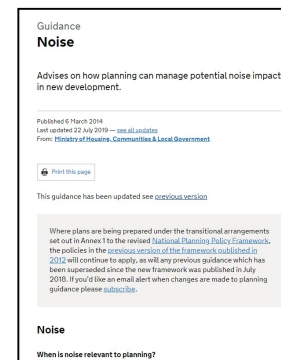


2.3. Planning Practice Guidance

The Planning Practice Guidance was launched on 6th March 2014 and provides additional guidance and interpretation to the Government's strategic policies, outlined within the NPPF, in a web-based resource. This is updated regularly.

The NPPG provides more guidance on the assessment of noise for planning purposes and builds on the concepts of NOEL, LOAEL and SOAEL introduced in NPSE to establish whether noise is a factor that needs to be taken into account. It states: *“Local planning authorities’ plan-making and decision taking should take account of the acoustic environment and in doing so consider:*

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



In line with the Explanatory Note of the Noise Policy Statement for England, this would include identifying whether the overall effect of the noise exposure (including the impact during the construction phase wherever applicable) is, or would be, above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation."

However, it goes into more detail about the subjective nature of noise and how the results of any assessment must be treated flexibly and pragmatically. The guidance states: "The subjective nature of noise means that there is not a simple relationship between noise levels and the impact on those affected. This will depend on how various factors combine in any particular situation. These factors include:

- *the source and absolute level of the noise together with the time of day it occurs. Some types and level of noise will cause a greater adverse effect at night than if they occurred during the day – this is because people tend to be more sensitive to noise at night as they are trying to sleep. The adverse effect can also be greater simply because there is less background noise at night;*
- *for non-continuous sources of noise, the number of noise events, and the frequency and pattern of occurrence of the noise;*
- *the spectral content of the noise (i.e. whether or not the noise contains particular high or low-frequency content) and the general character of the noise (i.e. whether or not the noise contains particular tonal characteristics or other particular features). The local topology and topography should also be taken into account along with the existing and, where appropriate, the planned character of the area.*

More specific factors to consider when relevant include:

- *the cumulative impacts of more than one source of noise;*
- *whether any adverse internal effects can be completely removed by closing windows and, in the case of new residential development, if the proposed mitigation relies on windows being kept closed most of the time (and the effect this may have on living conditions). In both cases a suitable alternative means of ventilation is likely to be necessary. Further information on ventilation can be found in the Building Regulations.*
- *In cases where existing noise sensitive locations already experience high noise levels, a development that is expected to cause even a small increase in the overall noise level may result in a significant adverse effect occurring even though little to no change in behaviour would be likely to occur.*
- *Noise Action Plans (where these exist), and, in particular the Important Areas identified through the process associated with the Environmental Noise Directive and corresponding regulations should be taken into account. Defra's website has information on Noise Action Plans and Important Areas. Local authority environmental health departments will also be able to provide information about Important Areas.*
- *the effect of noise on wildlife. Noise can adversely affect wildlife and ecosystems. Particular consideration needs to be given to the potential effects of noisy development on international, national and locally designated sites of importance for biodiversity;*
- *where external amenity spaces are an intrinsic part of the overall design, the acoustic environment of those spaces should be considered so that they can be enjoyed as intended.*

- *some commercial developments including restaurants, hot food takeaways, night clubs and public houses can have particular impacts, not least because activities are often at their peak in the evening and late at night. Local planning authorities will wish to bear in mind not only the noise that is generated within the premises but also the noise that may be made by customers in the vicinity”.*

Table 2.1 shows examples of the noise hierarchy (adapted from the PPG) and shows that the aim is to identify where the overall effect of the noise exposure falls in relation to SOAEL, LOAEL and NOEL. The implication of the advice is that only noise that is ‘noticeable and very disruptive’ would be considered unacceptable and therefore, should be prevented. The inference, therefore, is that all other outcomes can be acceptable, depending upon the specific circumstances and level of mitigation.

Table 2.1: Noise Exposure Hierarchy

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

Increasing Noise Levels
↓

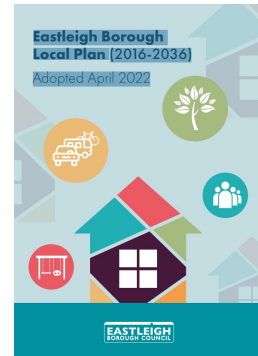
2.4. Eastleigh Borough Local Plan (2022)

Eastleigh Borough's Local Plan (2016-2036), adopted in April 2022 notes in Section 1,a,i of Policy DM1, *General criteria for new development*:

"All new development should...not have an unacceptable impact on, and where possible should enhance... residential amenities of both new and existing residents; the character and appearance of urban areas, the countryside and the coast"

Policy DM8, *Pollution* provides more specific guidance in relation to pollution. It notes:

1. "Development will not be permitted if it is likely to cause loss of amenity or impact on public health or other unacceptable environmental impacts through:
 - a. air pollution (including odours or particulate emissions);
 - b. pollution of surface, underground, coastal waters or other watercourses;
 - c. noise or vibration;
 - d. light intrusion, both generally and with respect to the South Downs National Park's status as an International Dark Night Skies reserve; or
 - e. land contamination.
2. Development susceptible to particular forms of pollution will not be permitted:
 - a. where it will be adversely affected by such pollution, unless measures can be taken that adequately mitigate the polluting effects; or
 - b. where it would inhibit existing economic or other activities giving rise to acceptable polluting effects".



Section 5.43 provides additional guidance noting:

"Government advice in the NPPF makes it clear that the prevention of pollution is a planning concern. The Borough Council will give considerable weight to ensuring that new development does not give rise to new pollution, suffer from existing sources of pollution, or inhibit legitimate economic activities giving rise to otherwise acceptable polluting effects (e.g. noise)".

Specifically in relation to noise. Section 5.49 notes

"The adverse effects of exposure to excessive noise and vibration on health and quality of life are well documented and recognised as a material planning consideration. The Council supports the approach of the Noise Policy Statement for England in relation to the effective control of noise within the context of sustainable development. Any proposals likely to generate noise (including demolition and construction noise) will be expected to take account of the impact of this on any noise sensitive population, including those using recreational areas. Similarly, in assessing proposals for noise sensitive development, the Council will expect the developer to take into account existing noise levels and foreseeable changes to these. In doing so, developers must avoid significant adverse noise impacts to residential amenities. Development proposals should ensure that they mitigate and minimise adverse noise impacts and, where possible, contribute to the

improvement of health and quality of life. Where necessary, the Council will require a noise assessment which will be expected to:

- *identify all significant sources of noise;*
- *assess the likely short and long term impacts of noise generated or exposure to noise; and*
- *propose noise protection measures.*

Wherever possible, developments should use site and building layout and design to manage levels of noise on development sites. Where acceptable internal noise levels cannot be met with open windows, alternative ventilation will be required. Where the development site is affected by air pollution in addition to noise, early consideration of the location of air ventilation inlets is recommended”.

2.5. Quality Places Supplementary Planning Document (2011)

Eastleigh Borough's Quality Places Supplementary Planning Document notes that site constraints must be considered in the design of the development. It notes “*site constraints can be physical, visual or social in nature. Many of the environmental constraints may need detailed survey reports, (e.g. noise, air and soil contamination, biodiversity). Constraints may lead to a reduction in the developable area of the site, special design solutions, specific construction techniques, or mitigation measures to overcome or minimise them*”. It notes that “*mitigation may take the form of restricting different forms of development to certain parts of the site; preventing openable windows nearest the pollution source*”.



Specifically in relation to noise, it notes “*noise disturbance, both from inside and outside the home, is a particular issue for residents, causing stress, affecting sleep and causing problems between neighbours. Potential noise sources will need to be identified as part of the site constraints*” and that “*a Design and Access Statement will need to demonstrate that: noise from external sources has been mitigated against*”.

Specifically in relation to windows, it notes: “*not only do windows allow natural light to enter a building, provide ventilation, and offer opportunities for natural surveillance, windows often form the most prominent elements in the elevations of the building. If a property has been designed to take account of the surrounding buildings, the windows should also reflect this, in form and material...Windows should be able to be opened, where appropriate as noise and air quality issues may need to be addressed*”. The Quality Places Supplementary Planning Document has no specific requirements regarding ventilation.

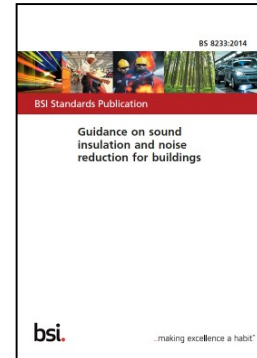
3. ASSESSMENT METHODOLOGY & GUIDANCE

3.1. BS 8233: 2014 'Guidance on Sound Insulation and Noise Reduction for Buildings'

Originally published in 1999, the 2014 edition of BS 8233, significantly updates the guidance in light of the policy changes as a result of the advent of the NPPF and the withdrawal of PPG 24. The 2014 edition of BS 8233 sees a change in the title of the Standard, moving from a 'Code of Practice' to 'Guidance', as the text '*largely comprises guidance that does not support claims of compliance*'.

BS 8233:2014 indicates that to control external noise ingress into a proposed development, a number of planning stages should occur as follows:

- "Assess the site, identify significant existing and potential noise sources, measure or estimate noise levels, and evaluate layout options."
- Determine design noise levels for spaces in and around the building(s).
- Determine sound insulation of the building envelope, including the ventilation strategy".



BS 8233:2014 suggests design noise levels for various types of building. The recommended noise levels for dwelling houses, flats and rooms in residential use (when unoccupied) can be seen in **Table 3.1** below. This is replicated from Table 4 of Section 7.7.2 of BS 8233:2014. The guidance suggests that "*In general, for steady external noise sources, it is desirable that the internal ambient noise level does not exceed the guideline values*". The noise levels in **Table 3.1** are marginally different to those published in BS 8233:1999 'Sound insulation and noise reduction for buildings – Code of practice', but are based on the existing guidance from the current World Health Organisation (WHO) "Guidelines on Community Noise".

Table 3.1: Summary of Noise Criteria: BS 8233: 2014

Activity	Location	07:00 To 23:00	23:00 To 07:00
Resting	Living room	35 dB L _{Aeq,16hour}	-
Dining	Dining room/area	40 dB L _{Aeq,16hour}	-
Sleeping	Bedroom	35 dB L _{Aeq,16hour}	30 dB L _{Aeq,8hour}

When considering the noise level criteria considered in **Table 3.1**, the following points should be noted:

- BS 8233: 2014 suggests that the above criteria should be adopted flexibly and that "*where development is considered necessary or desirable... the internal target level may be relaxed by up to 5 dB and reasonable internal conditions still achieved*".
- The noise levels quoted above are annual averages and "*do not need to be achieved in all circumstances*" e.g. New Year's Eve or fireworks night.

- The noise levels in **Table 3.1** are “for steady external noise sources” such as traffic noise or plant noise. This is a departure from the 1999 version of BS 8233, where the recommended internal noise levels were irrespective of the external noise source and therefore included the suggestion that in order to achieve “reasonable” noise levels within bedrooms at night, L_{AFmax} noise levels should not exceed 45 dB. Whilst this has been omitted from the 2014 version of BS 8233, it does state that “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.” Therefore, at sites which may be affected by individual noise events, it is more appropriate to use the guidance contained within the WHO “Guidelines on Community Noise” which suggest that good sleep will not generally be affected if internal levels of L_{AFmax} 45 dB are not exceeded more than 10-15 times per night.
- BS 8233:2014 notes that if the design of the building is “relying on closed windows to meet the guide values, there needs to be appropriate alternative ventilation that does not compromise the facade insulation or resulting noise level”.
- BS 8233 provides guidance for noise in gardens and outdoor amenity space. It suggests that “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.” The guidance does go on to say that these guideline values are not achievable in all circumstances and in some 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.”

3.2. World Health Organisation Guidelines for Community Noise (1999)

The 1999 World Health Organisation (WHO) guidance “Guidelines for Community Noise”, provides recommendations on maximum internal and external noise levels in a range of situations. The WHO guidelines are a consequence of a comprehensive review of the scientific evidence in relation to community noise exposure and the health and social aspects of such exposure. Whilst not adopted policy, the recommendations within the WHO Guidelines are often quoted and form the basis of the recommendations within BS 8233 and other similar guidance. A summary of the noise criteria can be seen in **Table 3.2**.

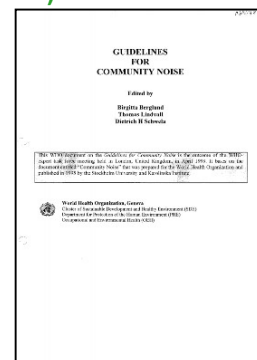


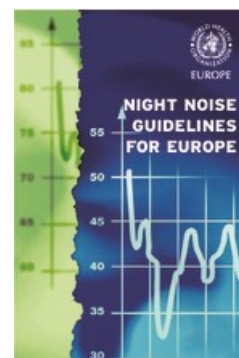
Table 3.2: Summary of Noise Criteria: WHO

Residential Environment	Critical Health Effect	L_{Aeq}	L_{AFmax}	Time Base
Outdoor living	Serious annoyance, daytime and evening	55	-	07:00-23:00

Residential Environment	Critical Health Effect	L _{Aeq}	L _{AFmax}	Time Base
area	Moderate annoyance, daytime and evening	50	-	07:00-23:00
Dwelling, indoors	Speech intelligibility and moderate annoyance, daytime and evening	35	-	07:00-23:00
Inside bedrooms	Sleep disturbance, night-time	30	45	23:00-07:00
Outside bedrooms	Sleep disturbance, window open (outdoor values)	45	60	23:00-07:00

3.3. WHO Night Noise Guidelines for Europe (2009)

In 2009, the World Health Organisation published the “Night Noise Guidelines for Europe” as a partial update and extension to the “Guidelines for Community Noise”, specifically in relation to development on the scientific evidence of night noise exposure. The 2009 guidance suggests that a “ $L_{night,outside}$ of 40 dB should be the target of the night noise guideline (NNG) to protect the public, including the most vulnerable groups such as children, the chronically ill and the elderly”. However, since that target would be impossible to achieve in many situations, a “ $L_{night,outside}$ value of 55 dB is recommended as an interim target for the countries where the NNG cannot be achieved in the short term for various reasons, and where policy-makers choose to adopt a stepwise approach”.

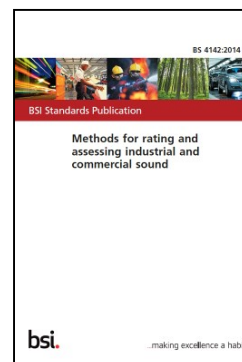


3.4. BS 4142: 2014 +A1:2019 Methods for Rating and Assessing Industrial and Commercial Sound

British Standard BS 4142: 2014 +A1:2019 “Methods for rating and assessing industrial and commercial sound” provides a method for the measurement and rating of industrial noise or noise of an industrial nature and background noise levels outside dwellings in mixed residential and industrial areas. The rating level (defined in the BS) is used to rate the industrial noise source outside residential dwellings (this is defined as the “specific noise source”).

The procedure defined in BS 4142 for predicting the likelihood of complaints is based on establishing the difference between the rating level and the background level outside the residential property of interest. The greater the difference the greater the likelihood of complaints and more specifically:

- “A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context;
- A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context;



- *The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.*
- *Adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact.”*

The guidance goes on to state that “where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night.” Consequently, when considering the impact of a BS 4142 assessment, it is often also necessary to consider the absolute noise levels experienced at the receptor location in relation to BS 8233 and World Health Organisation guidelines.

3.5. Possible Options for the Identification of SOAELs and NOAELs in Support of the NPSE (2014)

Published by Defra, based on a Research Project prepared by AECOM, “Possible Options for the Identification of SOAELs and NOAELs in Support of the NPSE” attempts to give values to the concepts of SOAELs and NOAELs, introduced by the Noise Policy Statement for England (NPSE). After the withdrawal of PPG24: Planning and Noise in 2012, which included Noise Exposure Categories, with specific numerical boundaries, the NPSE was heavily criticised for having no specific numerical guidance. Whilst the NPSE and NPPF encourage the development of location-specific criteria, in the context of the specific environment, the absence of guidance meant the implementation of the NPSE was difficult. Consequently, the project identifies both specific possible values and possible ranges of values for SOAELs and NOAELs for different noise sources. These values can be seen in **Table 3.3**.

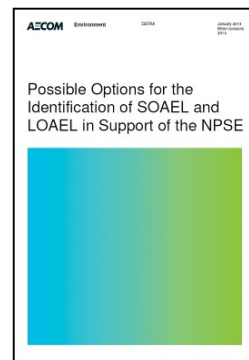


Table 3.3: Possible Value & Ranges of Values for LOAEL & SOAEL

Source	Effect	LOAEL	SOAEL
Road	Annoyance (Daytime)	56 (53-59)	66 (64-68)
	Sleep (Night-time)	46 (43-52)	56 (51-64)
Rail	Annoyance (Daytime)	63 (61-66)	72 (70-74)
	Sleep (Night-time)	55 (52-63)	68 (61-77)

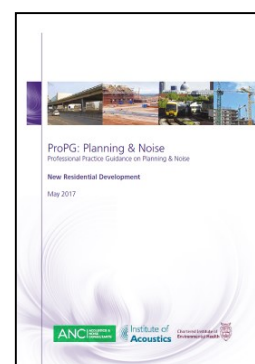
Source	Effect	LOAEL	SOAEL
Air	Annoyance (Daytime)	52 (50-54)	60 (58-62)
	Sleep (Night-time)	41 (40-49)	53 (47-60)

3.6. ProPG: Planning & Noise Professional Practice Guidance (2017)

Planning & Noise: Professional Practice Guidance on Planning and Noise: New Residential Development (the “ProPG”), published May 2017, provides a recommended approach for dealing with noise within the planning process, specifically in relation to new residential developments.

The ProPG follows a systematic, proportionate, risk-based, 2-stage approach. The two stages of the approach are:

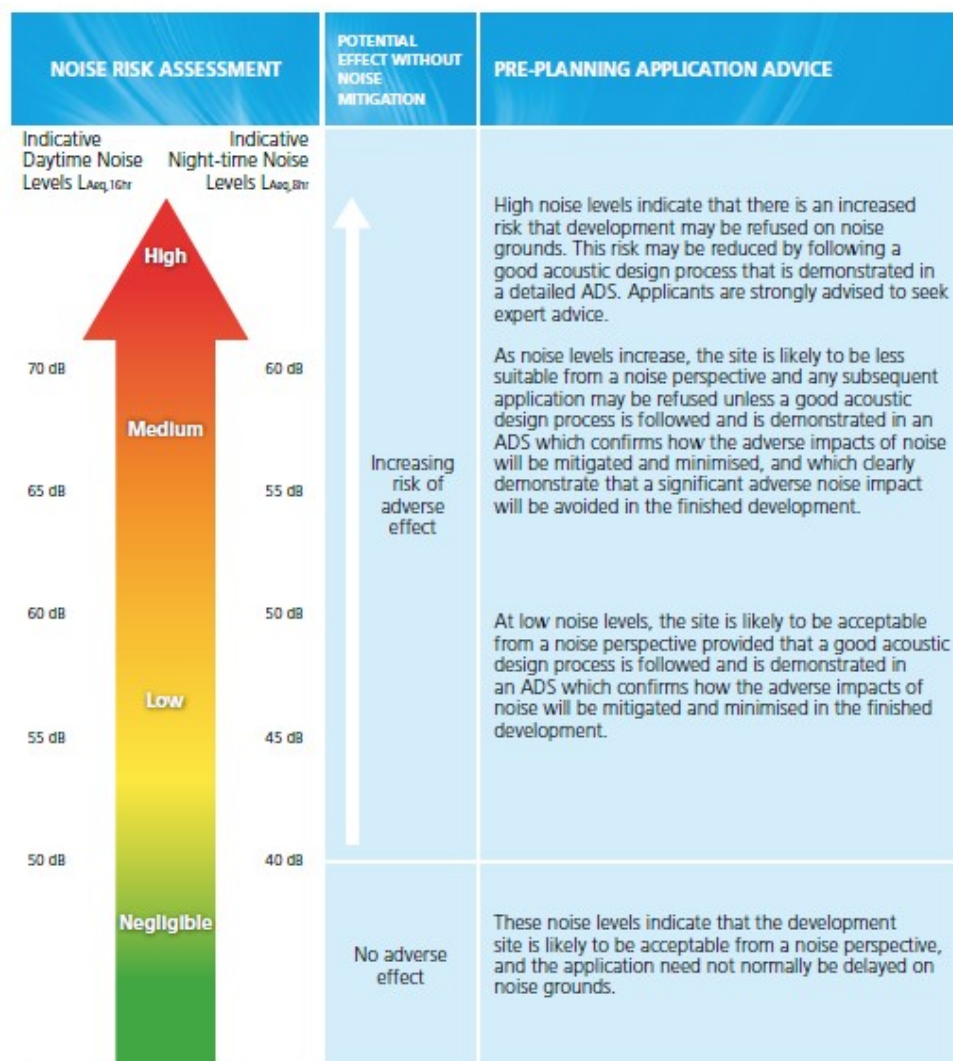
- Stage 1 – an initial assessment where external noise is rated against the risk of adverse effect; and
- Stage 2 – a systematic consideration of four key elements to determine the suitability of the site for housing.



The results of the initial Site noise risk assessment will determine the appropriate risk of developing the Site from a noise perspective. This approach is intended to give the developer, the noise practitioner, and the decision maker an indication only of the likely suitability of the site for new residential development from a noise perspective. Thus, a site with a higher risk will be recognised as presenting more acoustic challenges than a site with a low or negligible risk.

Figure 3.1 outlines the initial site risk assessment. Stage 2 of the approach looks to determine whether a site is suitable for housing based on the noise risk of the site. Stage 2 essentially attempts to determine that good acoustic design principles have been incorporated into the design from the outset, that suitable internal noise levels can be achieved in habitable rooms and that suitable external noise levels can be achieved in gardens and outdoor amenity space.

Figure 3.1: Initial Site Risk Assessment (from the ProPG)

**Figure 1 Notes:**

- Indicative noise levels should be assessed without inclusion of the acoustic effect of any scheme specific noise mitigation measures.
- Indicative noise levels are the combined free-field noise level from all sources of transport noise and may also include industrial/commercial noise where this is present but is "not dominant".
- $L_{Aeq,15hr}$ is for daytime 0700 – 2300, $L_{Aeq,8hr}$ is for night-time 2300 – 0700.
- An indication that there may be more than 10 noise events at night (2300 – 0700) with $L_{Amax,5}$ > 60 dB means the site should not be regarded as negligible risk.

The ProPG encourages good acoustic design for all developments with the aim of protecting future residents from the effects of noise. Para 2.21 of the ProPG notes that in the first instance, it would be necessary to try to achieve suitable internal noise levels with windows open:

“Using fixed unopenable glazing for sound insulation purposes is generally unsatisfactory and should be avoided; occupants generally prefer the ability to have control over the internal environment using openable windows, even if the acoustic conditions would be considered unsatisfactory when open. Solely relying on sound insulation of the building envelope to achieve acceptable acoustic conditions in new residential development, when other methods could reduce the need for this approach, is not regarded as good acoustic design.”

However, the ProPG notes that in some instances it is not possible to achieve suitable internal noise levels when windows are open. The notes to Figure 2 of the ProPG note *“designing the site layout and the dwellings so that the internal target levels can be achieved with open windows in as many properties as possible demonstrates good acoustic design. Where it is not possible to meet target internal levels with windows open, internal noise levels can be assessed with windows closed...”*. In these instances, one must consider the impacts of ventilation and overheating, with the need to provide a good acoustic environment. The ProPG notes in Para 2.36 that where a *“scheme is reliant on open windows to mitigate overheating, it is also necessary to consider the potential noise impact during the overheating condition. In this case a more detailed assessment of the potential impact on occupants should be provided”*.

3.7. Acoustics, Ventilation and Overheating Residential Design Guide (2020)

Published by the Association of Noise Consultants; the Acoustics, Ventilation and Overheating (AVO) Guide recommends an approach for acoustic assessments to take due regard of the interdependence of acoustics, ventilation and overheating. The approach ensures that the ventilation strategy of a building becomes an integral part of the acoustic design process.

The AVO Guide notes that *“The starting position when considering mitigation of noise impact on new residential development is to apply good acoustic design, site-wide, as described in the ProPG”*. Since the ProPG advocates the importance of at least attempting to achieve suitable internal noise levels with windows open, the starting point of the AVO Guide is to first see whether windows can be opened; therefore, it is clear that the AVO Guide should be applied after good acoustic design principles have been applied.

The AVO Guide makes it clear that as part of the acoustic design process, one needs to consider both whole house ventilation (which the AVO calls the *“ADF ventilation condition”*) and provisions for ventilation cooling to mitigate overheating (the *“overheating condition”*). The Guide notes that *“In terms of noise effect, the important distinction between these two situations is that the ADF ventilation condition applies for the entire time whereas the overheating condition applies only for part of the time”*.



The AVO Guide suggests it is a three-step process when considering noise for residential developments:

1. Quantify external noise levels – as one would in a standard noise assessment in accordance with the ProPG.
2. Access noise & ventilation - consider the effect of the proposed or potential ventilation strategies on the acoustic conditions in living rooms and bedrooms.
3. Assess noise & overheating. - Rooms may be grouped by Negligible, Low, Medium and High-risk categories to determine the extent of further analysis or mitigation required. Consider noise from mechanical systems associated with controlling overheating.

Regarding Step 2, the ventilation condition, suitable internal noise levels must be achievable when providing adequate ventilation. **Figure 3.2** and **Figure 3.3** provides guidance on suitable ventilation strategies based on the external noise level.

It should be noted that the AVO Guide describes ventilation systems in line with those described in Approved Document F of the Building Regulations which state:

- System 1 – Background ventilators and intermittent extract fans
- System 2 – Passive stack ventilation
- System 3 – Continuous mechanical extract (MEV)
- System 4 – Continuously mechanical supply and extract with heat recovery (MVHR)

It should be noted that in **Figure 3.2** and **Figure 3.3** ADF Systems 1/2 would have 2 trickle vents, System 3 would have 1 trickle vent and System 4 would not have any trickle vents.

Regarding Step 3, the overheating condition, *“it is considered reasonable to allow higher levels of internal ambient noise from transport sources when higher rates of ventilation are required in relation to the overheating condition. The basis for this is that the overheating condition occurs for only part of the time. During this period, occupants may accept a trade-off between acoustic and thermal conditions, given that they have some control over their environment. In other words, occupants may, at their own discretion, be more willing to accept higher short-term noise levels in order to achieve better thermal comfort. The importance of control is relevant to daytime exposure, but not to night time exposure where the consideration is sleep disturbance”.*

To estimate the potential impact in the overheating condition, a two-stage approach has been taken. The two levels of the approach are:

- Level 1 - an initial assessment where external noise is rated against the risk of adverse effect based on the assumption that opening windows are the primary means of mitigating overheating; and
- Level 2 – a systematic consideration of the potential for adverse effect of occupants on internal ambient noise levels.

A Level 1 assessment looks at the external noise levels to determine whether a partially open window can be used to manage overheating, assuming a 13 dB attenuation for an open window. **Figure 3.4** outlines the initial site risk assessment stage. For “negligible” sites, no further action is required and open windows will be

sufficient to manage overheating. For “high” risk sites, a Level 2 assessment is required. This is also recommended for “low” and especially “medium” risk sites.

For a Level 2 assessment, the internal noise levels are calculated with windows open to determine the likely impact when windows are open to satisfy the overheating condition. **Figure 3.5** replicates the guidance with regards to the overheating condition.

It is important to also consider noise from mechanical services, both for ventilation and to manage overheating. **Table 3.4** and **Table 3.5** provides desirable noise levels for the ventilation and overheating conditions respectively.

Table 3.4: Indoor ambient noise levels from mechanical services - ADF ventilation condition

Ventilation condition	Possible system or design solution	Desirable internal ambient noise levels from mechanical services
ADF – Whole House Ventilation	System 3: Continuous mechanical extract (MEV), minimum low ventilation rates System 4: Continuous mechanical supply and extract with heat recovery (MVHR), minimum low ventilation rates	Bedrooms $\leq L_{Aeq}$ 26 or 30 dB* Living Rooms $\leq L_{Aeq}$ 30 dB
ADF – Extract Ventilation	System 1: Intermittent extract fans System 3: Continuous mechanical extract (MEV), minimum high ventilation rates System 4: Continuous mechanical supply and extract with heat recovery (MVHR), minimum high ventilation rates	Bedrooms $\leq L_{Aeq}$ 26 or 30 dB* Living / Dining Rooms $\leq L_{Aeq}$ 35 dB Bathroom / WC / Kitchen $\leq L_{Aeq}$ 45 dB
ADF – Purge Ventilation	Manually controlled fan exchanging a minimum 4 air changes per hour	No desirable noise levels are currently proposed based on the lack of evidence of acceptable noise levels when providing purge ventilation for the purpose of rapidly diluting indoor pollutants.

* = AVO notes that “a more prudent limit for mechanical services noise around 24 – 26 dB(A) is likely to be required to prevent an adverse reaction from most occupants while falling asleep.”

Table 3.5: Indoor ambient noise levels from mechanical services - Overheating condition

Possible system or design solution	Desirable internal ambient noise levels from mechanical services
Ventilative cooling or Comfort cooling	Bedrooms L_{Aeq} 30 ($\pm$ 5) dB Living / Dining Rooms L_{Aeq} 35 ($\pm$ 5) dB

Noise Assessment:

Hanns Way, Eastleigh

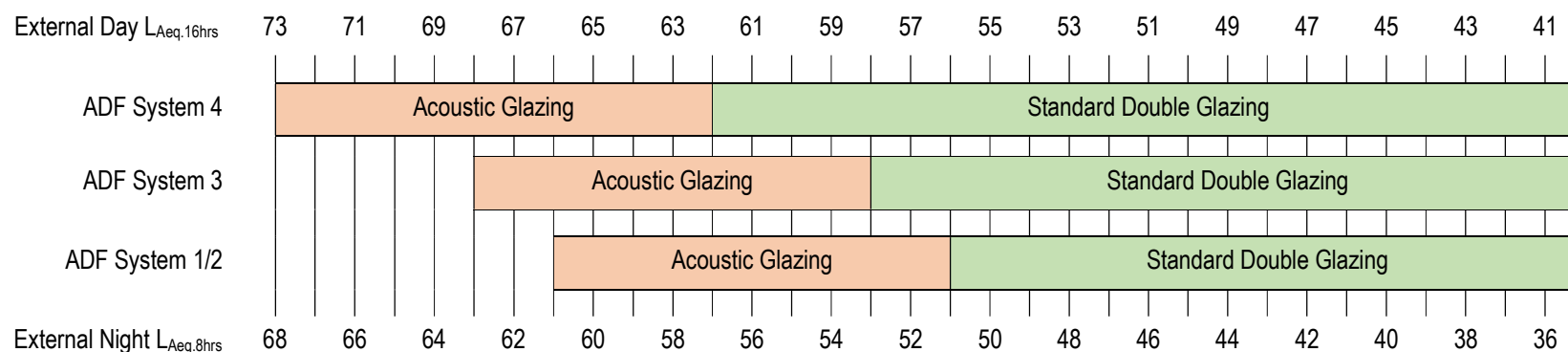
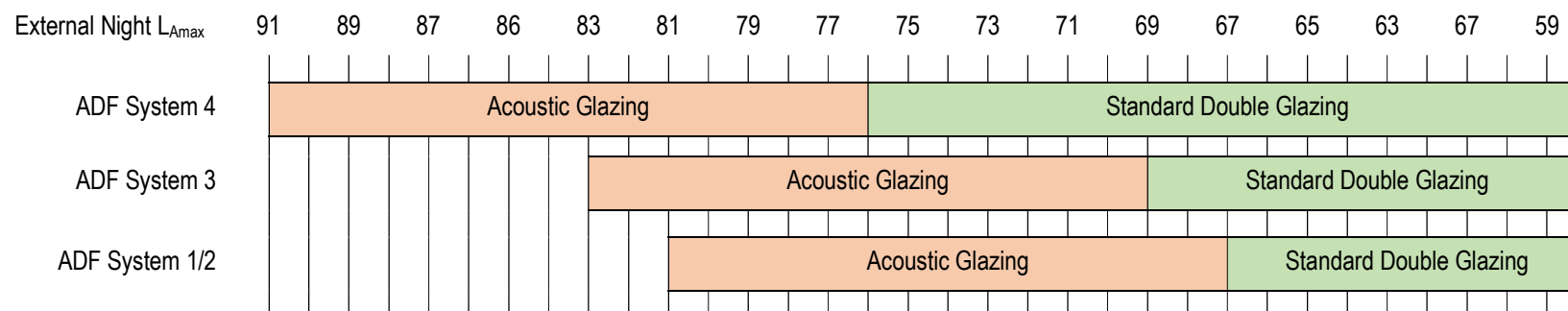
Doswell Projects • 20th April 2023 • H3813 – NV – v1**Figure 3.2: Guideline Values for Ventilation Strategies Described in Approved Document F – External L_{Aeq} Values****Figure 3.3: Guideline Values for Ventilation Strategies Described in Approved Document F – External L_{Amax} Values**Note: The above external L_{Amax} values should not be exceeded more than 10 times per day.

Figure 3.4: Initial Site Risk Assessment (from the AVO Guide)

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

Note 1 The noise levels suggested assume a steady road traffic noise source but may be adapted for other types of transport. All levels are external free-field noise levels.

Note 2 The values presented in this table should not be regarded as fixed thresholds and reference can also be made to relevant dose-response relationships, ^[15, 17].

Note 3 A decision must be made regarding the appropriate averaging period to use. The averaging period should reflect the nature of the noise source, the occupancy profile and times at which overheating might be likely to occur. Further guidance can be found within the 2014 IEMA Guidelines ^[23].

Note 4 Refer also to references ^[1, 17, 18, 24] for further guidance regarding individual noise events. Where 78dB LA_{Fmax} is normally exceeded during the night-time period (23:00-07:00), a Level 2 assessment is recommended.

Note 5 The risk of an adverse effect occurring will also depend on how frequently and for what duration the overheating condition occurs. Refer to Figure 3-2.

Note 6 To evaluate the risk category for a dwelling, all three aspects of external noise exposure (i.e. daytime, night-time and individual noise events) should be evaluated. The highest risk category for any of the three aspects applies.

Figure 3.5: Guidance for Level 2 Assessment Relating to the Overheating Condition (from the AVO Guide)

Internal ambient noise level ^[Note 2]			Examples of Outcomes ^[Note 5]	
$L_{Aeq,T}$ ^[Note 3] during 07:00 – 23:00 ^[Note 6]	$L_{Aeq,th}$ during 23:00 – 07:00	Individual noise events during 23:00 – 07:00 ^[Note 4]		
> 50 dB	> 42 dB	Normally exceeds 65 dB $L_{A,F,max}$	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 7]
≤ 35 dB	≤ 30 dB	Do not normally exceed $L_{A,F,max}$ 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 8] . Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.

Note 1 The noise levels suggested in Tables 3-2 and 3-3 assume a steady road traffic noise source but may be adapted for other types of transport.

3.8. Joint Guidance on the Impact of COVID-19 on the Practicality and Reliability of Baseline Sound Level Surveying and the Provision of Sound & Noise Impact Assessments (2021)

This joint guidance, published by the Association of Noise Consultants (ANC) and the Institute of Acoustics (IOA), provides a unified approach to conducting noise assessments during the Covid-19 pandemic.

The guidance suggests that *“site survey measurements of the existing noise climate continue to be the default position for obtaining baseline sound level data”*. However, *“the prevailing sound environment must be reasonably representative and not affected by local restrictions”*. Consequently, *“where necessary, the measured data should be supplemented by other sources”*. The guidance notes that *“there remain some instances where the manner in which acoustic assessment and reporting is carried out needs to be adapted. We have, therefore, reiterated below some changes in working practices in the production of such reports, where these may be necessary. In so doing, it is still important to minimise uncertainties when determining baseline conditions, in a clear and transparent way”*.

The guidance notes that road, rail and air traffic has been reduced by the pandemic. Other noise sources may also be different, for example *“local factories may not be working at full output, shift patterns may have changed to allow for social distancing, and places of entertainment may be closed”*. However, the guidance states that *“data from other sources can be used such as existing data (for example, from previous local surveys and noise maps) or undertaking baseline sound predictions to establish an appropriate robust estimate of baseline conditions”*.

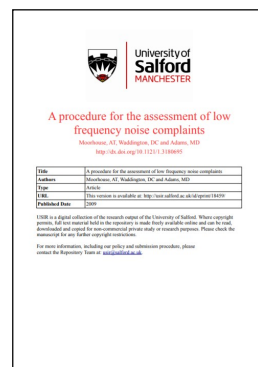
The guidance goes on to note that *“the safety of staff is paramount and it must be safe to undertake such measurements”*. Any *“site visits must comply with any restrictions on movement and ensure that social distancing is embedded within the site visit methodology”*.



3.9. Procedure for the Assessment of Low Frequency Noise Disturbance (NANR45) (2011)

NANR45 was a Defra research document designed to assist with the investigation of low frequency noise complaints. The documents includes a measurement procedure to determine whether noise at frequencies between 10 hertz and 160 hertz are likely to be considered a nuisance. A criterion curve is provided for frequencies between 10 hertz and 160 hertz. If noise in these frequencies are below the criterion curve, noise should not be classes as a nuisance. This criterion curve can be relaxed by 5 dB if the noise only occurs during the day.

Whilst originally intended for complaint investigation, the document can equally be applied for investigations of likely nuisance in relation to new developments.



4. ENVIRONMENTAL NOISE SURVEY

In order to determine the extent to which the site is affected by noise, two detailed noise measurement studies have been carried out on the proposed development site. Noise measurements have been carried out in order to determine the overall $L_{Aeq,16hrs}$ and $L_{Aeq,8hrs}$ for the day and night time periods. In addition, the L_{Amax} , L_{A10} , L_{A50} , and L_{A90} noise levels have also been measured. A secondary survey was also conducted

All noise monitoring was conducted using a Norsonic 140 sound level meter, which conforms to BS EN IEC 61672-1: 2003 as a Class 1 precision measurement system. A Norsonic 1251 field calibrator was used before and after the measurement periods in order to ensure that the equipment had remained within reasonable calibration limits (± 0.5 dB).

All of the equipment used has been calibrated in accordance with the procedures set out in BS EN IEC 61672-2: 2003 and for the electrical testing of frequency filters as set out in BS EN IEC 61260. The equipment was calibrated at Campbell Associates Limited, in Great Dunmow, Essex. Campbell Associates Limited meets the laboratory accreditation requirements of the United Kingdom Accreditation Service (UKAS Lab No. 0789). Sound level meters are laboratory calibrated every two years, with field calibrators laboratory calibrated every twelve months. **Appendix 2** summarises the equipment used including serial numbers and calibration certificates.

All noise monitoring has been conducted in accordance with the guidance set out in BS 7445-2: 1991 'Description and measurement of environmental noise Part 2: Guide to the acquisition of data pertinent to land use'. This standard details information that should be recorded in addition to the actual measured levels such as meteorological data, and a description of the noise source itself.

4.1. January 2022 Noise Survey

The original noise survey was conducted on the 13th and 17th of January 2022. The noise monitoring was conducted by Nick Hawkins and Mathew Vaughan of Hawkins Environmental Limited. Nick is a Member of the Institute of Acoustics and holds the Institute of Acoustic's Certificate of Competence in Environmental Noise Measurement. Mathew is an Associate Member of the Institute of Acoustics and holds a Master of Science in Applied Acoustics from Solent University. Weather conditions were conducive to successful monitoring. **Table 4.1** details the weather conditions of the measurement period.

Table 4.1: Summary of Weather Conditions during the Noise Measurements

General Description	The measurement periods were cool, mostly cloudy with some sunshine during the day and a light breeze.
Windspeed	Average wind speeds were low, typically less than 0.5 m/s.
Temperature	The temperature went down to around -3°C at night, with daytime temperatures up to 6°C.
Precipitation	The measurement period remained dry.

Noise measurements were conducted at a ground floor position. The measurement location is considered representative of the worst affected façade of the proposed development. The measurement location is considered to be a free field position. A map showing the measurement location in relation to the new site layout can be seen in **Figure 4.2**.

BS 8233:2014 requires the assessment of both the daytime and nighttime noise levels. Ideally noise measurement equipment is left onsite for twenty-four hours to characterise the noise environment; however, at many sites, this is not possible and an alternative measurement regime must be employed. Typically, when an existing structure exists onsite, a sound level meter is attached to the building at first-floor level or above, so that the equipment cannot be tampered with or stolen. At this site, there was no existing structure. Therefore, to ensure that the results are representative, it was necessary to conduct attended noise measurements at a location representative of the closest part of the proposed residential building to Hanns Way and Wells Place. It should be noted that the measurements were at ground floor level, whereas the proposed residential accommodation will be on the first floor and above; therefore the noise measurements are likely to represent a worst-case noise level.

The Calculation of Road Traffic Noise (CRTN) describes a shortened measurement procedure for road traffic dominated sites, which is an acceptable alternative for a full 16-hour daytime monitoring survey. The shortened measurement procedure requires L_{A10} noise levels to be measured during three consecutive hours between 10:00 and 17:00. The shortened measurement procedure requires that the measured L_{A10} noise levels to be arithmetically averaged to provide an assumed $L_{A10,3hr}$ noise level, from which the $L_{A10,18hr}$ can then be estimated, using the approximation:

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

The $L_{A10,18hr}$ can then be used to calculate the $L_{Aeq,16hr}$ using the conversion factor given in PPG 24:

$$L_{Aeq,16hr} \approx L_{A10,18hr} - 2\text{dB}$$

However, the conversion factor given in PPG 24 should only be utilised when the noise levels are within NECs C or D, as it may otherwise underpredict the noise levels in this noise assessment. Consequently, in certain circumstances it is more appropriate to convert from $L_{A10,18hr}$ to a $L_{Aeq,16hr}$ using the conversion formula in the TRL document “*Converting the UK traffic noise index $L_{A10,18hr}$ to EU noise indices for noise mapping*”.

In order to characterise night time noise, the Hawkins Approximation of night time noise measurement has been utilised (Hawkins, NC. (2015) ‘*The use of short duration night-time noise measurements to estimate $L_{Aeq,8hour}$* .’ Proceedings of Acoustics 2015, Harrogate, UK. The Institute of Acoustics. Vol. 37. Pt. 2.). The Hawkins Approximation determines that for sites where noise is primarily attributed to road traffic noise, the $L_{Aeq,11pm-1am}$ is a very accurate approximation to determine the nighttime $L_{Aeq,8hour}$. Comparisons show that on average this approximation over predicts $L_{Aeq,8hour}$ by just 0.6 dB, yet the instances of underprediction are reduced to less than 10% of noise measurements, ensuring that this Approximation is a valid alternative when full unattended night time noise measurements are not possible.

FENCING & BOUNDARY DETAILS

- Application Site
- Boundary Line
- Fence Line
- Proposed Footpath
- 1.8m Closeboard Fence

LANDSCAPING DETAILS

- Proposed Trees
- Proposed Planting / Hedging
- Proposed Defensible Planting
- Reconstructed Stone Paving / Edging
- Grove Wall Mesh Applied to Adjacent Screen Fencing
- Removable Bollards (Set in Concrete Pockets)
- Large Removable Bollards

Note 1
All information is based on OS Import only - all subject to level survey and confirmation on site.

The noise measurement study has identified that the primary noise source is road traffic noise attributed to Hanns Way and Wells Place. Road traffic noise was observed to be periodic although it was noted that nearby restaurants such as Pizza Hut and McDonalds operate delivery services where it was often observed that vehicles would idle regularly. Pizza Hut is the closest restaurant at circa 15 metres from the nearest façade. It is also worth noting that HVAC units above the McDonalds and behind the Pizza Hut restaurants produce audible noise. Particularly during the night, a nearby railway line approximately 275 metres east from the site is audible although not a significant contribution to the soundscape.

Hawkins
environmental

Table 4.2: Summary of the Noise Level Measurements

Period (hours)	Measured Noise Level dB			
	$L_{Aeq,T}$	Range $L_{Aeq,5mins}$	Range $L_{Amax,5mins}$	Range $L_{A90,5mins}$
11am to 2pm	59.6	49.2 – 63.5	53.0 – 88.5	45.5 – 53.4
11pm to 1am	49.4	39.8 – 55.0	44.7 – 74.1	38.7 – 40.6

4.1.2. Summary of Plant Noise Measurements

Secondary to road traffic noise, plant noise particularly from behind the nearby Pizza Hut and above the McDonalds was noticeable. This was also in addition to audible noise propagating from the electrical substation in addition to the flower store A/C units. During the night-time noise survey, the plant was discretely measured and is represented in **Table 4.3** below where values are normalised to 10 metres from the noise source.

Table 4.3: Summary of the Plant Noise Level Measurements

Summary of Plant Noise Sources	$L_{Aeq,T}$ @ 10m
Substation	32.9
Flower Store A/C	45.8
McDonalds/Swan Centre Plant	49.6
Pizza Hut – All Plant	45.8
Pizza Hut – All Plant Except Fan	43.9
Pizza Hut – Refrigeration Only	39.2

4.2. July/August 2022 Noise Survey

Further data during a typical period between 11pm and 10am was requested by Eastleigh Borough Council, the local planning authority for the proposed development site. Therefore, an additional environmental noise survey was conducted on the 4th and 5th of August 2022.

The noise monitoring was conducted by Mathew Vaughan and Will Totty of Hawkins Environmental Limited. Mathew is an Associate Member of the Institute of Acoustics and holds a Master of Science in Applied Acoustics. Will holds the Institute of Acoustic's Certificate of Competence in Environmental Noise Measurement. Weather conditions were conducive to successful monitoring. **Table 4.1** details the weather conditions of the measurement period.

Table 4.3: Summary of Weather Conditions during the Noise Measurements

General Description	The measurement periods were warm for the time of year with minimal cloud cover and a light breeze.
Windspeed	Average wind speeds were low, typically less than 0.5 m/s.
Temperature	The temperature went down to around 13°C at night, with morning temperatures up to 21°C.
Precipitation	The measurement period remained dry.

Noise measurements were conducted at the same ground floor measurement position as the original environmental noise survey detailed in **Section 4.1**. The measurement location is considered representative of the worst affected façade of the proposed development. The measurement location is considered to be a free field position. A map showing the measurement location in relation to the new site layout can be seen in **Figure 4.2**.

4.2.1. July/August 2022 Noise Survey Results

When reviewing the measurement data of the additional noise survey, there is very little variation within the data between the L_{Aeq} , and the three L_{AN} values (L_{A10} , L_{A50} and L_{A90}) particularly between the 1am to 7am period. This is suggestive that the noise climate is dominated by noise from few but constant noise sources. Whilst onsite, it was noted in particular that the site was dominated by plant noise from the plant situated above the nearby McDonalds restaurant within the Swan Centre shopping complex. Towards the start (11pm to 1am) and end (7am to 10am) of the measurement period, it was noted that road traffic noise attributed to Hanns Way and Wells Place is the dominant noise source.

Throughout the survey, there was also occasional pedestrian activity near to the Swan Centre where from approximately 4:30am and onwards, employees in uniform of nearby establishments would begin to arrive for work. Subsequently, it is noted that there is an increase in plant noise from approximately 5:30am as indicated within **Figure 4.3**.

Moreover, it was observed that during the survey, the nearby substation did not significantly contribute to the onsite noise complex and that plant behind the Pizza Hut restaurant was not audible after the Pizza Hut

restaurant had closed towards midnight. Noise from the refrigerator behind the Flower Shop was also faintly audible. Distant rail noise from the nearby railway line approximately 275 metres east from the site is also audible although not a significant contribution to the soundscape. Aircraft noise was audible only after 7am.

The noise measurement data is detailed in **Appendix 3** and summarised in **Table 4.4** below.

Table 4.4: Summary of the Noise Level Measurements

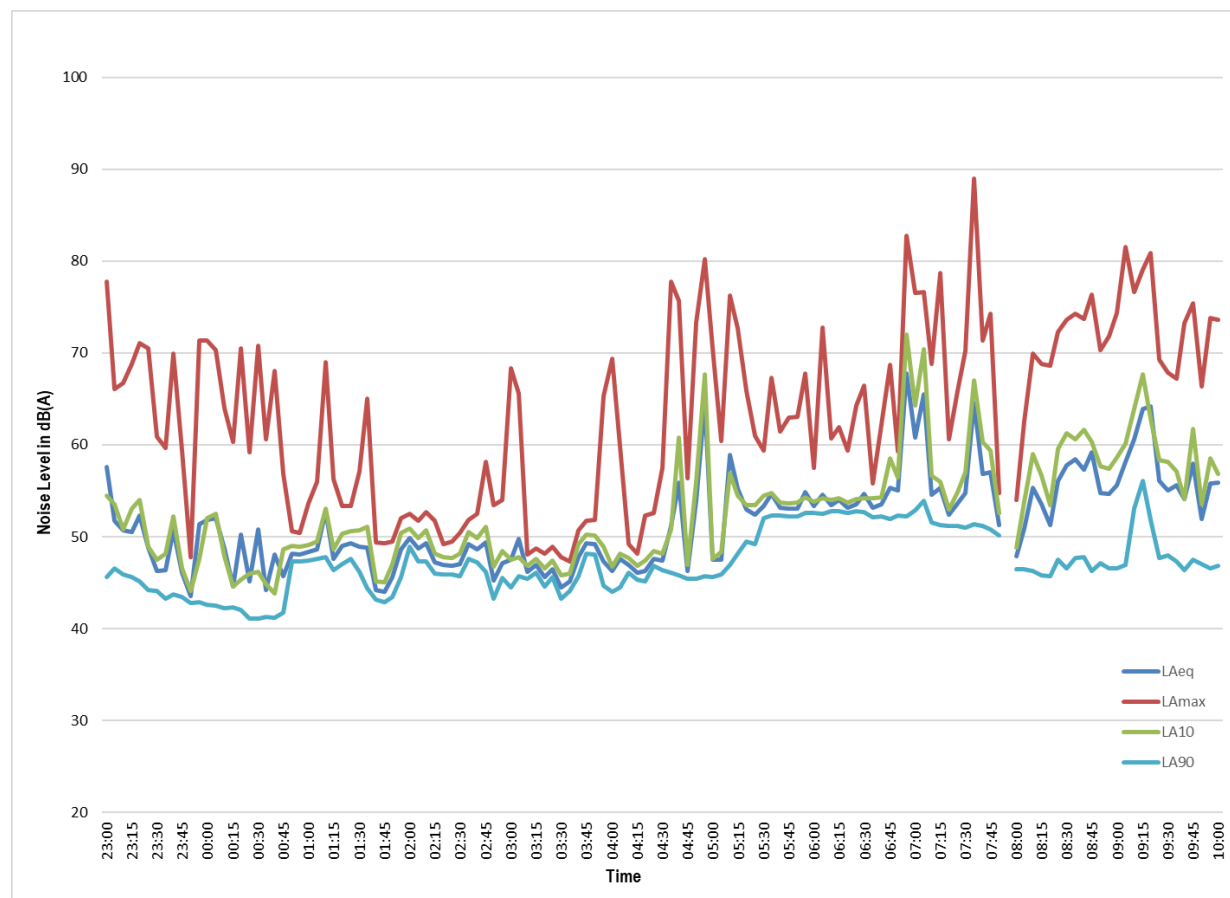
Period (hours)	Measured Noise Level dB			
	$L_{Aeq,T}$	Range $L_{Aeq,5mins}$	Range $L_{Amax,5mins}$	Range $L_{A90,5mins}$
11pm to 7am	53.4	43.5 – 67.8	47.3 – 82.8	41.1 – 52.8
7am to 10am	58.5	47.9 – 65.5	54.0 – 89.0	45.7 – 56.1

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Figure 4.2: Noise Measurements



4.2.2. Summary of Additional Plant Noise Measurements

During the daytime and evening of the 19th July 2022, observations and additional noise measurements were conducted in relation to the plant. The 19th July 2022 was the hottest day on the record in many place in the UK. Whilst onsite, Hawkins Environmental measured temperatures of around 37°C during the daytime and 22°C at night.

The site was visited on that particularly hot day to see whether the electricity substation to the north was louder than had been measured in January 2022. Eastleigh Borough Council had hypothesised that the substation generates significantly more noise in warmer weather. In addition, the A-Plan Insurance building (adjacent to Pizza Hut) has a large number of air conditioning units that the Council were concerned could increase plant noise levels in the area.

Noise measurements in relation to the substation were very marginally higher in July when compare to the January 2022 results. In January 2022, the $L_{Aeq,T}$ from the substation was 33 dB. In July it was measured to be 34.5 dB $L_{Aeq,T}$. However, onsite observations note that the same plant (located in the far southeast corner of the substation plot) was the source of the noise on both occasions. It has been observed that there is significantly more plant located within the substation, some of which appears to have cooling fans. However, during both the site visits in January and July/August 2022, none of this plant has been observed to be operational. Given that it is assumed that the fans would be required for cooling, given that the observations and measurements were conducted on literally the hottest day on record in the UK, it is assumed that the plant at the substation (other than the plant located in the far southeast corner of the substation plot) is no longer operational and now redundant. Attempts have been made to confirm this with Scottish and Southern Electricity Networks (SSE); however, no response was forthcoming.

Additional noise measurements noted very little variation in noise levels in relation to the Flower Shop air conditioning unit and the Pizza Hut plant. Noise measurements conducted on the roof of the Swan Centre car park and noted that the McDonalds plant was approximately 3 dB louder in July when compared to January, presumably since the McDonald's restaurant is air conditioned.

It was observed that whilst noise from Pizza Hut is unchanged, a large number of air conditioning units on the rear façade of the A-Plan Insurance building were operational in July, but were not observed in January. However, it was observed that these air conditioning units were only operation during business hours and not in the evening or night time. In January 2022, the cumulative noise from the Pizza Hut and A-Plan plant was approximately 46 dB at the entrance to the car park to the rear of both premises. In July 2022, this increased to around 49 dB. Whilst this is a significant increase, it is important to reiterate that this plant is only operational during the daytime when the L_{Aeq} is generally around 59 dB; therefore, whilst these additional units were observed close to the plant, noise from these units were only rarely noticeable above the general traffic noise in the area, and lower still when considering the attenuation due to distance on the development site itself.

5. PROPG STAGE 1: INITIAL SITE NOISE RISK ASSESSMENT

5.1. Site Classification - ProPG

The noise measurement surveys have determined the on-site noise levels. For the purposes of the assessment, the LOAEL and SOAEL levels have been determined from the Defra/AECOM research on LOAEL and SOAEL levels for road traffic sources. The Defra/AECOM research indicates that the typical average LOAEL would be around 56 dB(A) for the onset of daytime annoyance, with the SOAEL around 66 dB(A). For the onset of night time sleep disturbance, the LOAEL would be around 46 dB(A) and the SOAEL around 56 dB(A).

Table 5.1: Initial Site Noise Risk Assessment

Criteria	Daytime $L_{Aeq,16hr}$	Night time $L_{Aeq,8hr}$
Result	59	53
ProPG Noise Risk	Low	Low to Medium
Effect Level	Between LOAEL & SOAEL	Between LOAEL & SOAEL
Action	Mitigate and reduce to a minimum	Mitigate and reduce to a minimum

The results in **Table 5.1** make use of the original CRTN noise survey data for the Daytime $L_{Aeq,16hr}$ noise level and the recent additional noise survey data for the Night time $L_{Aeq,8hr}$.

Based on the results shown in **Table 5.1**, the noise risk of the site is “*Medium*”, with the effect level in between the LOAEL and SOAEL. This suggests that there could be an observed effect on noise on the proposed development site and as a consequence, it will be necessary to mitigate and reduce noise for the future residents to a minimum. For a “*Medium*” risk site, a Stage 2 assessment with Acoustic Design Statement will be required, demonstrating a good acoustic design process has been followed, demonstrating how the adverse impacts of noise have been mitigated and minimised.

5.2. Impact of Existing Plant

5.2.1. Noise Model of Plant Impact

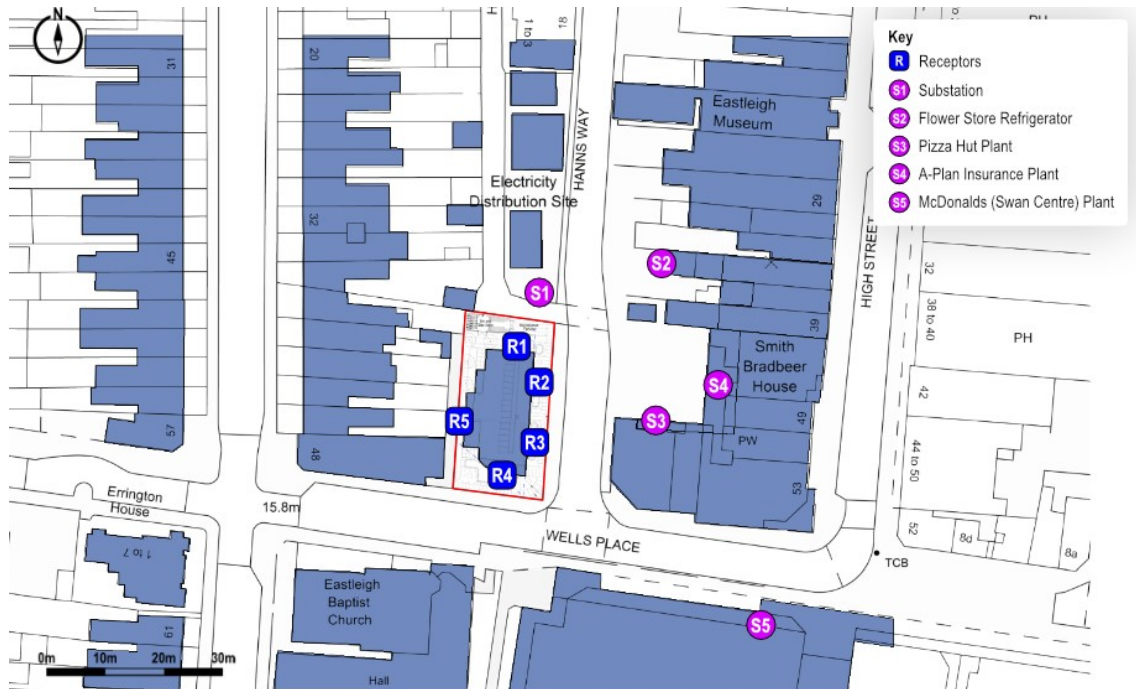
Existing plant in the surrounding environment is an acoustical consideration for this development. Five key noise sources were identified during the day and night short-duration noise surveys – the worst-case noise level from both the January and July/August surveys have been considered.

As a result of the closure of Pizza Hut (S3) and A-Plan Insurance (S4) at night, some plant was turned off and therefore noise levels were reduced during the night survey. It is understood that despite establishments which occupy other noise sources, noise produced by the substation (S1), flower shop (S2) and McDonalds plant (S5) did not change at night. Therefore, two noise models were produced to further understand the impact of

existing plant during the day and night periods respectively as shown in **Figures 5.2 and 5.3** where an annotated model of the receptors and sources are shown in **Figure 5.1**.

The results of the model pertaining to the identified receptors surrounding the ground floor of the premises are detailed in **Table 5.2**. Results presented in **Table 5.3** represent sound pressure level estimations of the noise model at the identified receptors.

Figure 5.1: Noise Model (Annotated)



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Figure 5.2: Noise Model Contours (Day)

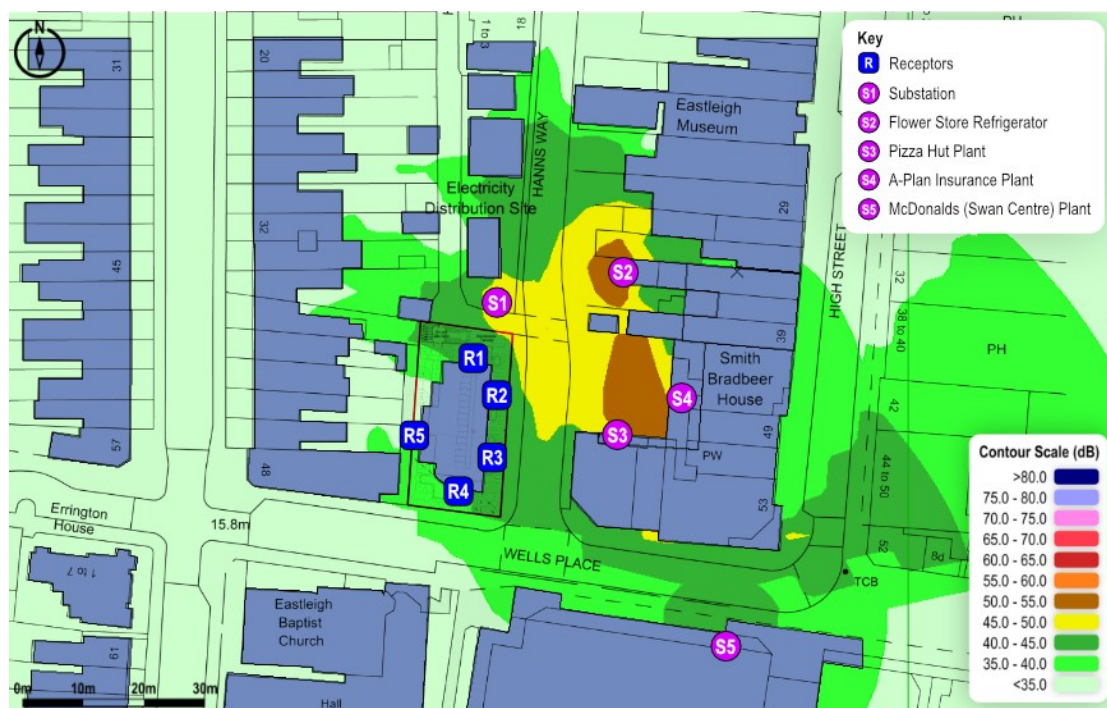


Figure 5.3: Noise Model Contours (Night)

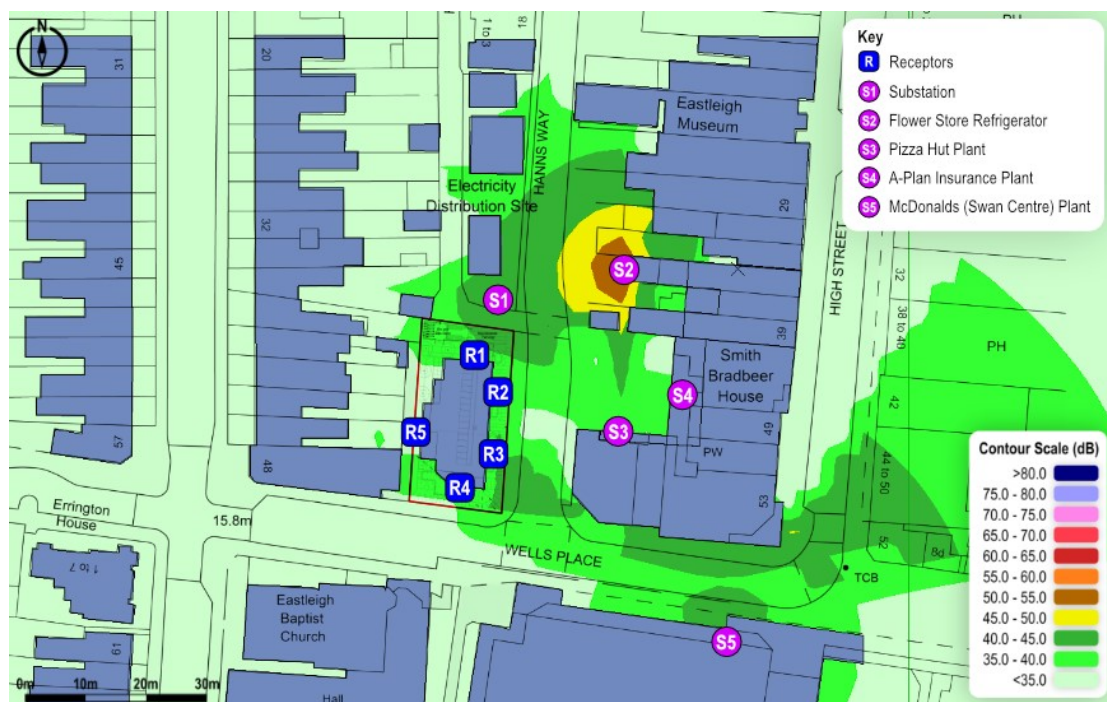


Table 5.2: Plant Noise Sources

Noise Sources	$L_{Aeq,T}$ @ 10m
S1 – Substation	34.5
S2 – Flower Store	45.8
*S3 – Pizza Hut (Day)	45.8
*S3 – Pizza hut (Night)	39.2
*S4 – Insurance Rear (Day)	52.6
S5 – McDonalds Plant	52.7

*S3 – Pizza Hut (Day) is represented within 'Figure 5.2: Noise Model Contours (Day)' whilst 'S3 – Pizza Hut (Night)' is represented within 'Figure 5.3: Noise Model Contours (Night)'. S4 – Insurance Rear is only represented within Figure 5.2.

Table 5.3: Noise Model Receiver Sound Pressure Level Estimations

Receivers	SPL - Day (dB)	SPL - Night (dB)
R1	43.1	39.0
R2	43.7	37.9
R3	43.9	39.9
R4	39.4	38.5
R5	32.9	28.6

Table 5.2 shows that noise attributed to plant will be at worst 44 dB during the daytime or 40 dB during the night-time period. It is known that during the daytime, background noise levels are typically 49 to 50 dB, i.e. well in excess of the plant noise levels. Therefore, in all likelihood, based on the guidance contained within BS 4142, even with penalties for tonality and intermittency, the Rating level will be below the background noise level giving a positive indications that complaints would be unlikely. However, at night, it has been observed that background noise levels dip below 40 dB; therefore, it is possible that noise from plant would not meet the recommendations contained within BS 4142 at this site.

BS 4142 notes that "where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night." Consequently, when considering the impact of a BS 4142 assessment, it is often also necessary to consider the absolute noise levels experienced at the receptor location in relation to BS 8233 and World Health Organisation guidelines. Given that an opened window achieves around 13 dB of attenuation, plant noise of 40 dB externally would be in the region of 27 dB internally. This level is approaching the maximum internal noise levels recommended by BS 8233 of 30 dB. As a consequence, it is strongly recommended that mechanical

ventilation is fitted to all rooms used for sleeping, such that windows do not need to be opened at night. This is likely to significantly reduce the likelihood of complaints in relation to plant noise.

5.2.2. Low Frequency Plant Noise Impact Assessment

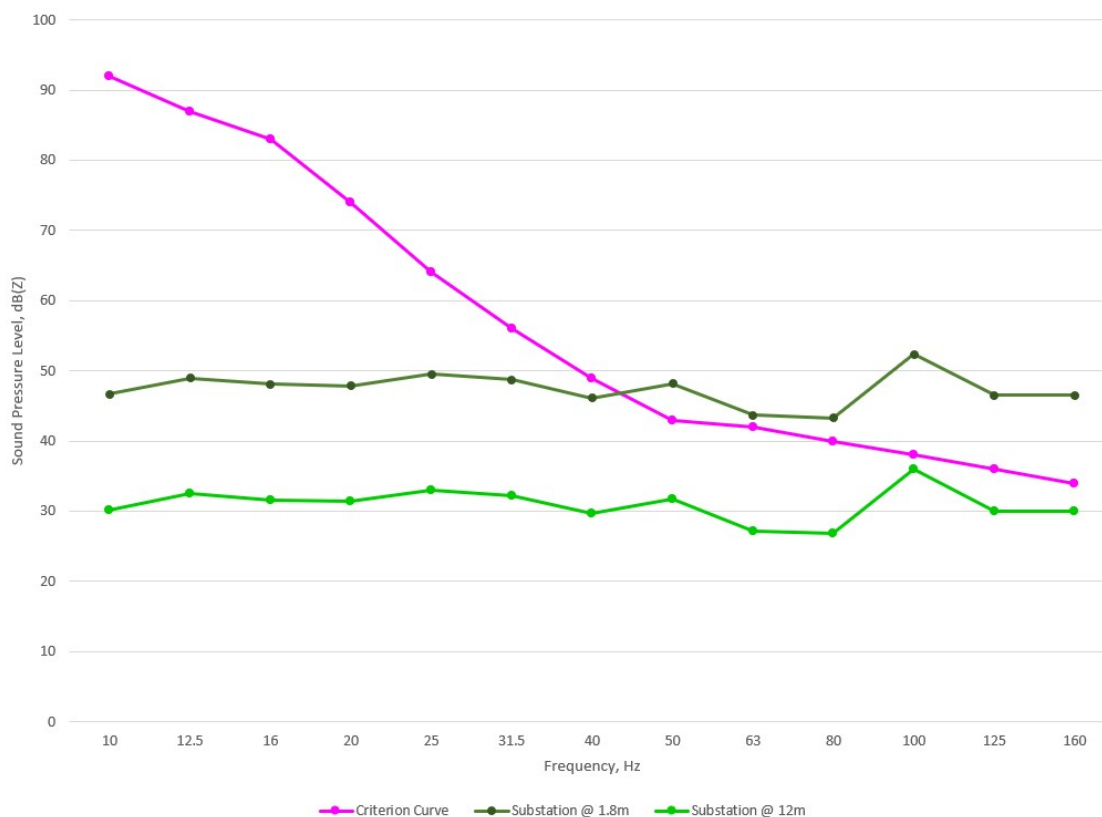
Concern has been raised in relation to noise from the substation to the north of the site, specifically in relation to low frequency noise. Using the methodology contained within 'Procedure for the Assessment of Low Frequency Noise', third octave frequency data from 10 to 160 Hz has been analysed for the substation and compared against the criterion reference curve presented in the guidance. **Figure 5.4** shows this comparison.

Figure 5.4 notes that at the measurement location (1.8m from the substation), noise from the substation exceeds the criterion curve at 50 Hz and above. However, with respect to the proposed development, it is of greater interest to understand the low frequency noise at the nearest affected (north) façade. Calculations have therefore been applied so to account for distance attenuation where the measurement position was 1.8 metres from the source and façade is estimated to be approximately 12 metres from the source:

$$20 \cdot \log(12/1.8) = 16.5 \text{ dB}$$

Based on the distance attenuation correction being applied to the measured 1/3 octave band sound pressure levels, external low frequency noise levels do not exceed the reference curve.

It should be noted that the reference curve is used to assess internal noise levels, whereas the predicted noise level at the façade of the proposed development as shown in **Figure 5.4** is for external noise levels. As a consequence, if one were to carry out a direct comparison, one needs to consider the attenuation afforded by the façade of the building. Consequently, internally the measured noise levels would be even lower than the reference curve shown in **Figure 5.4**. As a consequence, it is considered that complaints in relation to low frequency noise are unlikely.

Figure 5.4: Measured Low Frequency 1/3 Oct. Band Noise Levels vs Criterion Curve

5.2.3. Vibration

Whilst vibration measurements have not been undertaken either adjacent to the substation or on the proposed development site, observations of vibration was undertaken during the site visits. At no point during any of the site visits was perceptible levels of vibration noticeable adjacent to the substation or on the development site.

5.2.4. Discussion Comparing Winter and Summer Results

In February 2022, Eastleigh Borough Council provided feedback on the original report submitted to the 2022 application. In relation to the noise assessment the Council noted:

"Sample noise measurements have been undertaken by the applicant on the site and close to sources of ambient noise including transformer and fans. With the use of appropriate noise prediction modelling, the result for the proposed dwelling facades exceeds daytime and night-time limits. The applicant recommends sound insulation and mechanical ventilation."

Having the option to open windows or use mechanical ventilation is sensible. But if dwelling holders wish to keep windows open and be disturbed by noise or odour, any complaint will have to be investigated by the Council according to the Environmental Protection Act 1990. This would place the Council in a difficult position because abatement at source would have cost to an operating business."

It is a widely acknowledged principle that control at the source of pollution is effective. Considering the 'agent of change' matter here, the applicant should approach operating businesses to investigate if this would be feasible and effective. Planning colleagues should ask for this and a full attended night-time and morning noise survey (2300 to 1000 hours). We recommend this is done prior to further consideration of the application".

Further discussions with John Pyke at Eastleigh Borough Council indicated that the Council would be looking for additional noise monitoring from 11pm through the time until 10am. In particular, Mr Pyke is concerned about the fact that the original January 2022 noise survey was conducted in colder weather – there was concern that in warmer weather, both the electricity substation to the north, plus the commercial units to the east, may generate significantly more noise due to the presence of cooling plant.

Consequently, this noise assessment report summarises the original January 2022 assessment, but also includes additional observations and noise measurements conducted during a period of hot weather in July and August 2022.

The overnight summer noise survey returned marginally higher noise levels than was previously measured; however, since night-time noise levels remain below the LOAEL in both surveys, this did not affect the conclusions or recommendations within the report.

Observations of plant noise in the summer months noted that some plant was marginally louder during the summer than during the winter. For example, noise from the substation and McDonalds where both marginally higher when investigated in July. In addition, air conditioning units in relation to the A-Plan insurance office were observed in July that weren't observed in January. However, on the development site itself, night-time plant noise is predicted to be no louder during the summer when compared to the winter and whilst there is an increase in plant noise levels on the proposed development site during the daytime during the summer months when compared to the winter months, plant noise levels are expected to still be well below the ambient noise levels on the site. Consequently, the additional noise measurements conducted during the summer months have not significantly changed the conclusions of the original assessment.

6. ProPG STAGE 2: ACOUSTIC DESIGN STATEMENT

The Stage 1 Initial Site Risk Assessment has identified that the noise risk is “*Medium*” and therefore, a Stage 2 assessment will be required, demonstrating a good acoustic design process has been followed, demonstrating how the adverse impacts of noise have been mitigated and minimised.

6.1. Element #1: Good Acoustic Design Process

Following a good acoustic design process is an implicit part of Government planning and noise policy and it is imperative that acoustic design is considered at an early stage of the development control process.

The ProPG requires the consideration of acoustic design and requires considerations such as checking the feasibility of relocating, or reducing noise levels from, relevant sources; considering options for planning the site or building layout; considering the options for screening buildings or sources; and considering the orientation of proposed buildings. These considerations will then inform how best to deal with excessive noise by either:

- Quietening or removing the source of noise;
- Attenuating the sound on its path to the receiver;
- Obstructing the sound path between the source and receiver; or
- Improving the sound insulation of the building envelope.

Since the refusal of the 2022 application, noise has been a major consideration in the design and layout of the revised proposed development.

Based on the noise surveys and analysis noted in **Section 5** of this report, the main areas of concern are:

- Noise from Pizza Hut’s extract fan and the A-Plan Insurance air conditioning units, during the daytime only;
- Noise from the florists air conditioning units and McDonalds plant during both the day and night; and
- Uncertainty in relation to whether the substation is operating at full capacity.

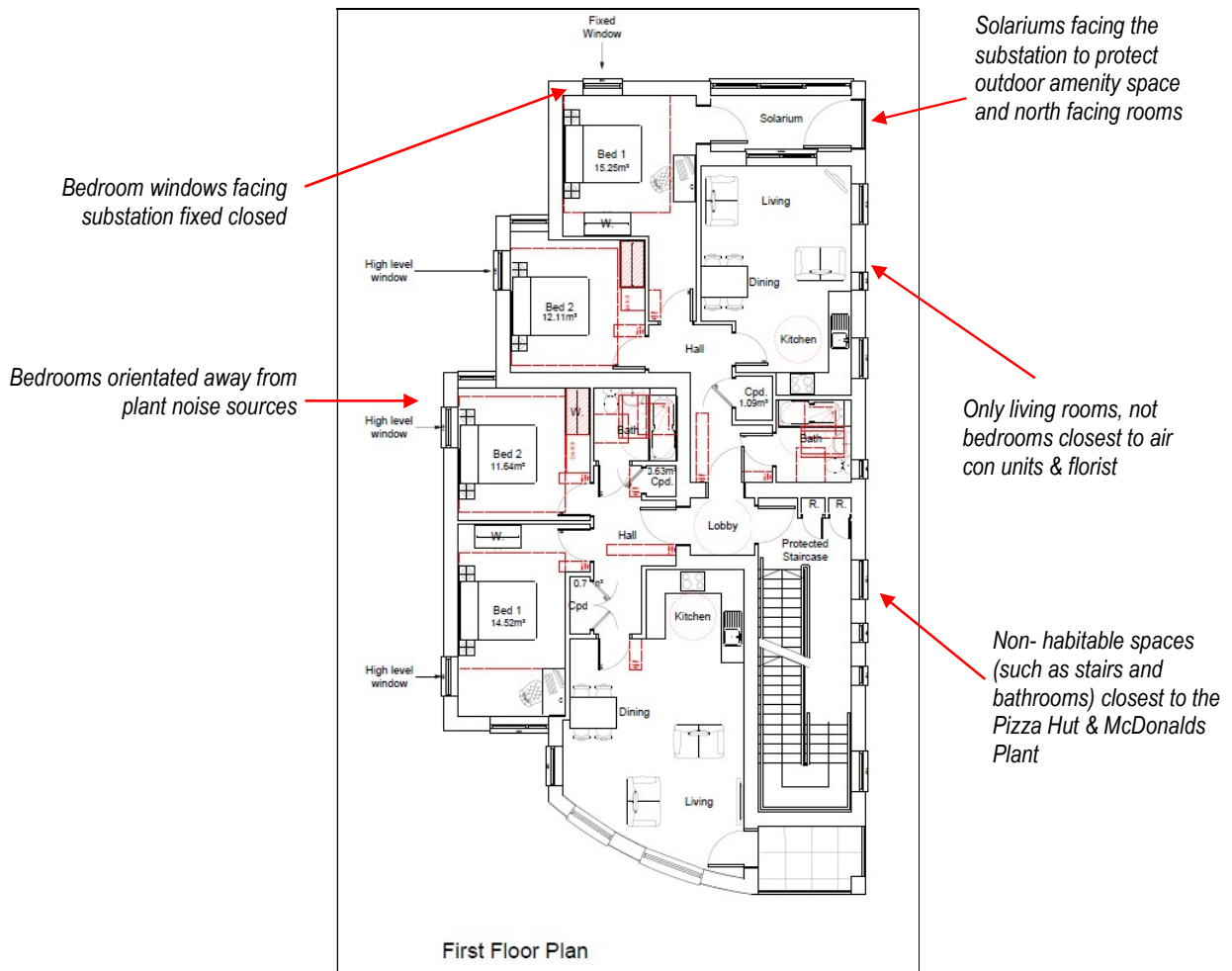
As a consequence of the above concerns, the following design principles were agreed in relation to noise:

- The ventilation system shall be designed such that windows will not need to be opened. Windows will generally be openable, but residents should not have to rely on opening the windows to ensure that conditions in the rooms are comfortable;
- The glazing shall be designed such that internal noise levels will achieve the recommendations within BS 8233;
- All bedrooms are to be orientated away from the plant, i.e. they should be west facing;
- Non-habitable spaces, such as the entrance, stairs and bathrooms should be located wherever possible on the eastern façade of the building to limit the amount of habitable space facing commercial noise sources;

- Living rooms/kitchens should be the only habitable rooms facing commercial noise sources to limit night time impacts;
- In order to take into account uncertainty in relation to whether the substation is operating at full capacity, windows facing north (i.e. directly facing the substation), will either be sealed closed, or where this will not be practical, protected via a double layer of windows, i.e. via a solarium or winter garden.

Figure 6.1 notes the acoustic features incorporated into the design.

Figure 6.1: Typical Floor Layout Noting Good Acoustic Design Elements



Alternative approaches to the layout were explored as part of a rigorous design process. The proposed scheme has been designed to deliver high quality accommodation that appropriately considers functionality, amenity, privacy, daylight and outlook as well as the ability to obstruct the sound path from external sources. Therefore, the optimum layout has been achieved in terms of acoustic design.

The site is currently occupied by a public car park where it was observed to have been used frequently for people visiting nearby commercial establishments. Upon attending the site, it was also noted that delivery drivers for nearby restaurants would also use this car park whilst awaiting and collecting orders. It is therefore acknowledged that this proposed development would see the cease of use for this car park and therefore may impose benefits such as less noise produced by idling and moving vehicles.

6.2. Element #2: Internal Noise Levels

6.2.1. Criteria

The Initial Site Risk Assessment and good acoustic design process indicates that the sound insulation of the building envelope requires improvement and noise does need to be taken into account in the design of the building in order to meet the internal noise criteria contained within BS 8233 and the ProPG, and to comply with the guidance contained within the NPPF.

The appropriate design noise levels at this site are those identified in **Table 6.1** below.

Table 6.1: Summary of Noise Criteria: BS8233:2014 and ProPG

Activity	Location	07:00 to 23:00	23:00 to 0700
Resting	Living room	35 dB L _{Aeq,16hour}	-
Dining	Dining room/area	40 dB L _{Aeq,16hour}	-
Sleeping (daytime resting)	Bedroom	35 dB L _{Aeq,16hour}	30 dB L _{Aeq,8hour} 45 dB L _{Amax} ^{NOTE}

Note: For a reasonable standard in noise-sensitive rooms at night (e.g. bedrooms) individual noise events should not normally exceed 45dB L_{Amax} more than 10 times a night.

Annex G of BS 8233 provides a rigorous calculation method for determining the internal noise levels within a proposed development.

6.2.2. Glazing Specification

The Sound Reduction Index (R_w sometimes noted as SRI) is the level of sound attenuation afforded by a particular material. It is possible to calculate the R_w of a particular facade to determine the internal noise level based on the noise survey results. It is widely known that a masonry wall will have a R_w of at least 50 dB, sometimes as high as 55 to 60 dB. The R_w of individual glazing solutions will vary considerably. However, BS 8233 notes that good quality insulating double glazed window units will typically have an R_w of 33 dB.

Using the equation in Annex G of BS 8233, it is possible to calculate the internal noise levels based on typical construction details. However, Annex G first suggests conducting simple calculations, to determine whether more detailed calculations are required.

The simple calculation procedure in Annex G notes that:

“The windows, and any trickle ventilators, are normally the weakest part of a brick and block facade. Insulating glass units have an insulation of approximately 33 dB R_w ... assuming suitable sound attenuating trickle ventilators are used...”. Consequently, it is possible to arithmetically subtract 33 dB from the external (freefield)

noise levels to determine internal noise levels. The results of these calculations can be seen in **Table 6.2** below.

Table 6.2: The Simple Calculation Procedure from Annex G of BS 8233: 2014

Criteria	Daytime $L_{Aeq,16hr}$	Night time $L_{Aeq,8hr}$
External (free field)	59 dB	53 dB
Criteria	35 dB	30 dB
Internal Noise Level (assuming R_w of 33)	26 dB	20 dB
Comparison to Criteria	-9 dB	-10 dB
Action	More detailed calculation will not be required. Suitable internal noise levels can be achieved with a standard double glazed window system with a R_w of 33.	

The above approximation includes a certain margin of error, since the R_w is based on insulation values relating to a pink noise spectrum - actual values achieved are lower for traffic noise. In addition, the above simple calculations do not take account of absorption, such as furnishings in the room. Consequently, the above is only a rough calculation which could underestimate noise levels by as much as 5 dB. Therefore, more detailed calculations may be required if the predicted internal noise levels higher than 30 dB daytime and 25 dB night-time.

The results of the calculations in **Table 6.2** show that the internal noise levels will be more than 5 dB lower than the criteria; consequently, suitable internal noise levels can be achieved with standard double-glazed windows, which would typically have an R_w of 33 dB.

It should be noted that the acoustic performance of the façade is dependent upon the relative performance of each element. For example, it may be possible to have a lower acoustic rated glazing system if the acoustic performance of the ventilation system is improved. Similarly, it may be necessary to have an improved glazing and ventilation package, if the walls of the proposed development are not typical brick and blockwork. It is also important to note that acoustic performance is frequency dependent and other window specifications may be suitable providing that they perform well in the frequencies pertinent to the noise levels measured at this particular site.

The R_w is the rating sound insulation of a building element. BS 8233: 2014 notes that “these single-figure ratings are generally good predictors of subjective assessments of insulation of similar constructions. However, this is not always the case for different constructions, for example the low-frequency performance of a lightweight partition might be significantly different from that of a masonry partition with the same single-number rating, so it is prudent to examine the full measurement data in critical situations”. One way that can be used to check for variations in frequency performance is to consider the C_{tr} correction quoted for glazing. The $R_w + C_{tr}$ is the dB insulation value against a standardised road traffic noise spectrum. For example, where a window is

quoted as $R_w(C_{tr}) = 33 (-3)$, this will perform better in the frequencies pertinent to traffic noise, when compared to a window quoted $R_w(C_{tr}) = 33 (-7)$, despite the same R_w .

As a consequence of the above, it is always strongly recommended that any glazing solution is tested within the parameters of BS 8233: 2014, using full octave band data to determine suitability.

6.2.3. Ventilation & Overheating

As noted in Section 6.1, it is proposed that the ventilation system shall be designed such that windows will not need to be opened. Windows will generally be openable, but residents should not have to rely on opening the windows to ensure that conditions in the rooms are comfortable.

6.3. Element #3: External Amenity Areas

BS 8233 provides guidance for noise in gardens and outdoor amenity space. It suggests that *“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.”* The guidance does go on to say that these guideline values are not achievable in all circumstances and in some 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.”*

The development consists of six dwellings, two on each floor. The building will be orientated on the north/south axis, with one dwelling on each floor occupying the northern half of the floor, one dwelling occupying the southern half. The three southern dwellings will all be provided with a terrace or balcony facing south – the noise levels likely to be experienced in these spaces are likely to be in the region of 59 $L_{Aeq,16hours}$ as noted by the noise survey. This will be in excess of the upper guideline value of 55 dB. The three dwellings at the northern end of the development will be provided with solariums, which with windows closed, will experience noise levels less than the recommended upper guideline value of 55 dB.

The ProPG goes on to say that in some *“circumstances, a 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 minutes walking distance)”* could be used to offset the lack of onsite quiet amenity space. It has been observed that Eastleigh Park, situated on Leigh Road is less than 200m from the development site. This amenity area is considered to be relatively quiet and tranquil and could be considered a suitable proxy outdoor amenity space.

6.4. Element #4: Other Relevant Issues

Good acoustic design principles which have been followed mean that the proposed development is in general compliance of the ProPG.

The proposed façade sound insulation performances mean that internal noise levels when windows are closed will be in line with ProPG internal noise criteria. However, to adopt a precautionary approach and to ensure that the existing commercial premises are protected from any potential future noise complaints from the proposed residents (however unlikely), it is proposed that the development will have a Mechanical Ventilation with Heat

Recovery (MVHR) system. The system shall be design such that the future residents will never need to open their windows to ensure their own comfort.

It is considered that this precautionary approach is congruous with Paragraph 187 of the NPPF, which notes that *“Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses...(and they) should not have unreasonable restrictions placed on them as a result of development permitted after they were established”*. This is commonly referred to as the Agent of Change Principle.

Furthermore, this approach is endorsed by Eastleigh Borough’s Local Plan (2016-2036) which notes in Policy DM8, *“Development susceptible to particular forms of pollution will not be permitted...where it will be adversely affected by such pollution, unless measures can be taken that adequately mitigate the polluting effects; or where it would inhibit existing economic or other activities giving rise to acceptable polluting effects”*.

It should be noted that Eastleigh Borough’s Quality Places Supplementary Planning Document (2011) and in particular the *“Internal Spaces”* section, does not preclude the use of mechanical ventilation, nor does it endorse the requirement for natural ventilation. In fact, the SPD notes that when considering site restraints such as noise or odour, *“mitigation may take the form of restricting different forms of development to certain parts of the site; preventing openable windows nearest the pollution source”*, although it does not that *“Windows should be able to be opened, where appropriate as noise and air quality issues may need to be addressed”*.

As a consequence, it is considered that this mitigation strategy, i.e. ensuring that ventilation is sufficient such that residents should not have to rely on opening the windows to ensure that conditions in the rooms are comfortable, is in line with both the NPPF and local planning policy.

6.5. Recommendations to the Decision Maker

Since the internal and external noise criteria contained within BS 8233 and the ProPG guidance framework can be achieved and a reasonable level of acoustic design has been demonstrated, it is recommended to the decision maker that planning consent may be granted, subject to the inclusion of suitable noise conditions, to ensure suitable internal and external noise levels.

7. CONSTRUCTION NOISE

Due to the size of the development and early outline stage of the proposals, a quantitative construction noise and vibration assessment has not been carried out. Instead, a qualitative assessment focussing on best practicable means has been completed. In general, the construction works with the greatest potential to generate noise are initial earthworks to level out the site, demolition and the piling of foundations. Building construction itself generally results in lower noise levels.

It is proposed that to minimise construction noise impacts, all construction work should take place in standard construction hours, which are:

Monday – Friday: 08:00 – 18:00

Saturdays: 08:00 - 13:00; and

Sundays and Public Holidays: No construction

It is recommended that the contractor would be required to follow Best Practicable Means to reduce the noise impact upon the local community including the following:

- Operating hours should be adhered to, with local residents being notified of any changes to the operating hours of the site;
- All construction plant and equipment should comply with EU noise emission limits;
- Where practicable, design and use of site hoardings and screens to provide acoustic screening of noise emitting equipment;
- Proper use of plant with respect to minimising noise emissions and regular maintenance. All vehicles and mechanical plant used for the purpose of the works should be fitted with effective exhaust silencers and should be maintained in good efficient working order;
- Selection of inherently quiet plant where appropriate. All major compressors should be 'sound reduced' models fitted with properly lined and sealed acoustic covers which should be kept closed whenever the machines are in use and all ancillary pneumatic percussive tools should be fitted with mufflers or silencers of the type recommended by the manufacturers;
- Machines in intermittent use should be shut down in the intervening periods between work or throttled down to a minimum;
- Plant and equipment such as flatbed lorries, skips and chutes should be lined with noise attenuating materials. Materials should be handled with care and be placed, not dropped. Materials should be delivered during normal working hours.
- All ancillary plant such as generators, compressors and pumps should be positioned so as to cause minimum noise disturbance, i.e. furthest from receptors or behind close boarded noise barriers. If necessary, acoustic enclosures should be provided and/or acoustic shielding;

- Making positive contact with local residents and providing information on the construction can be the most effective method of reducing the impact of construction noise on sensitive receptors. If appropriate, the above measures can be incorporated into a construction environmental management plan;
- Construction contractors should be obliged to adhere to the codes of practice for construction working given in BS 5228 and the guidance given therein regarding minimising noise emissions from the site; and
- Reference should be made to the Building Research Establishment, BRE 'Pollution Control' guidelines, Parts 1-57.Noise Monitoring.

8. OVERALL CONCLUSIONS AND RECOMMENDATIONS

A detailed noise measurement study has been carried out at the site in order to determine whether as a result of noise, there are any significant constraints on developing the site for residential purposes.

The two surveys have shown that due to noise from surrounding roads and the wider environment, the site is considered a “Medium” risk site under the Pro-PG, with noise levels between the Lowest Observed Adverse Effect Level (LOAEL) and the Significant Observed Adverse Effect Level (SOAEL); therefore, if the site is to come forward for residential development, noise must be considered and it must be mitigated and reduced to a minimum.

The noise surveys have determined that during the day the ambient noise levels from all noise sources would be 59 dB $L_{Aeq,16hours}$ during the day and 53 $L_{Aeq,8hours}$ at night. Noise on site is primarily affected by road traffic noise, plus less frequent rail, pedestrian and aircraft noise. In addition, the site is affected by some plant noise, specifically from the Pizza Hut and McDonalds takeaways close to the development site, air conditioning units in relation to the Flower Shop and A-Plan Insurance, plus noise from the adjacent electricity substation. However, the cumulative noise levels from all plant is significantly below the ambient noise levels when considering the cumulative noise levels from all noise sources (traffic, rail, aircraft and plant), with daytime plant noise levels on site less than 44 dB and night-time plant noise levels less than 40 dB.

Using the guidance and calculation methods contained within BS 8233: 2014 ‘Guidance on sound insulation and noise reduction for buildings’, it has been shown that the recommended maximum internal noise levels for each room use under BS 8233 can be achieved through the provision of suitable glazing and ventilation. A summary of the recommendations can be seen in **Table 8.1** below.

Table 8.1: Summary of Recommendations to Achieve Suitable Internal Noise Levels

	All façades	
	Bedrooms	Living Rooms
Minimum Sound Reduction of the Glazing in Relation to Noise	Standard double glazing, which would typically have a R_w of 33 dB or more.	
Ventilation Recommendations in Relation to Noise	Based on the onsite noise levels, ventilation will need to be sufficient such that windows do not need to be opened.	

However, whilst plant noise levels and low frequency noise will be below the maximum recommended levels within dwellings, even with windows open, it is recommended that in order to reduce the likelihood of complaints – specifically in relation to plant noise – rooms should be fitted with mechanical ventilation such that windows will not need to be opened to ensure comfortable conditions. By reducing the likelihood of plant noise being audible inside dwellings at night, this significantly reduces the already low likelihood of complaints in relation to noise (and odour) from surrounding existing businesses and respecting the “agent of change principle”.

Since the internal noise criteria contained within BS 8233 and the ProPG guidance framework can be achieved and a reasonable level of acoustic design has been demonstrated, it is recommended to the decision maker that planning consent may be granted, subject to the inclusion of suitable noise conditions, to ensure suitable internal and external noise levels.

Since it has been shown that the proposed development meets the guidance contained within BS 8233: 2014, it is considered that the proposed development adheres to the principles of the National Planning Policy Framework since the new development will not be *“put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution”*. Since it has been shown that in terms of noise, the proposals adhere to local and national planning policy, it is considered that the noise environment of the site should not be a constraint on the proposed residential development.

Appendix 1

Glossary of Acoustic Terms

Appendix 1: Glossary of Acoustic Terms

Decibel (dB)	This is a tenth (deci) of a bel. Decibel can be a measure of the magnitude of sound, changes in sound level and a measure of sound insulation. Decibels are not an absolute unit of measurement but are an expression of the ratio between two quantities expressed in logarithmic form.
dB(A)	A-weighted decibels, i.e. decibel level incorporating a frequency weighting (A-weighting), which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB(A) broadly agree with people's assessment of loudness.
Freefield	A situation in which the radiation from a sound source is completely unaffected by the presence of any reflecting boundaries.
Hertz (Hz)	Unit of frequency, equal to one cycle per second. The frequency of sound waves refers to the number of pressure fluctuations per second. Frequency is related to the pitch of a sound.
$L_{Aeq,T}$	The equivalent steady sound level in dB(A) containing the same acoustic energy as the actual fluctuating sound level over the given period, T. For example, daytime noise is generally measured over a 16 hour period, so T is 16 hours. $L_{Aeq,T}$ can be measured directly with an integrating sound level meter.
L_{A10}	The 'A'-weighted sound pressure level of the residual noise in decibels exceeded for 10 percent of a given time and is the $L_{A10,T}$. The L_{A10} is used to describe the levels of road traffic noise at a particular location.
L_{A50}	The 'A'-weighted sound pressure level of the residual noise in decibels exceeded for 50 percent of a given time and is the $L_{A50,T}$.
L_{A90}	The 'A'-weighted sound pressure level of the residual noise in decibels exceeded for 90 percent of a given time and is the $L_{A90,T}$. The L_{A90} is used to describe the background noise levels at a particular location.
L_{Amax}	The 'A'-weighted maximum sound pressure level measured over a measurement period.
R_w (or SRI)	The weighted sound reduction index as a single number laboratory measured rating used to describe the sound insulation of building elements.

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Appendix 2 Schedule of Equipment

Noise Assessment:

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Appendix 2: Schedule of Equipment

Equipment Set 5199:

Equipment Type	Manufacturer	Serial Number	Calibration Certification Number	Calibration Type	Date of Last Calibration Check	Date of Next Calibration Check
Nor-140 Type 1 Sound Level Meter	Norsonic	1405199	U35957	UKAS Calibration: 0789	8 th October 2020	October 2022
Nor-1209 Pre-amplifier	Norsonic	15117	U35957	UKAS Calibration: 0789	8 th October 2020	October 2022
Nor-1225 Microphone	Norsonic	151240	U35957	UKAS Calibration: 0789	8 th October 2020	October 2022
Nor-1255 Sound Calibrator	Norsonic	25262	U35955	UKAS Calibration: 0789	8 th October 2020	October 2021
Nor-1284 Dehumidifier	Norsonic	222	Not Applicable			
Nor- 1212 Weather Protection Kit	Norsonic	Not Applicable				
Nor1408A/5 Extension Cable	Norsonic/Lemo	Not Applicable				

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Campbell Associates Ltd
 5b Chelmsford Road Industrial Estate
 GREAT DUNMOW, Essex, GB-CM6 1HD
www.campbell-associates.co.uk
 Phone 01371 871030 Facsimile 01371879106



CALIBRATION



0789

Certificate of Calibration and Conformance

Certificate number: U35957

Test object: Sound Level Meter, BS EN IEC 61672-1:2003 Class 1 (Precision)
Producer : Norsonic
Type : 140
Serial No.: 1405199
Customer: Hawkins Environmental
Address: The Square, Basing View,
 Basingstoke. RG21 4EB.
Contact Person: Nick Hawkins.

Method :

Calibration has been performed as set out in CA Technical Procedures TP01 & 02 as appropriate. These are based on the procedures for periodic verification of sound level meters as set out in BS EN IEC 61672-3:2006. Results and conformance statement are overleaf and detailed results are in the attached Test Report.

Tested

	Producer:	Type:	Serial No:	Certificate number
Microphone	Norsonic	1225	151240	35956
Calibrator*	Norsonic	1255	125525262	U35955
Preamplifier	Norsonic	1209	15117	Included

Additional items that also have been submitted for verification

Wind shield	Norsonic	Nor1451 (ø 60mm)
Attenuator	-	
Extension cable	-	

These items have been taken into account wherever appropriate.

Instruction manual: Im140_1Ed6R3En Firmware version: 3.0.1866 The test object is a single channel instrument.

Conditions	Pressure	Temperature	Humidity
Reference conditions:	101.325 kPa	23.0 °C	50 %RH
Measurement conditions:	100.10 ±0.06 kPa	22.7 ±0.3 °C	43.5 ±0.7 %RH

Date received for calibration: 28/09/2020

Date of calibration: 08/10/2020

Date of issue: 08/10/2020

Engineer

Supervisor

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.
 * The calibrator was complete with any required coupler for the microphone specified.

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Certificate of Calibration and Conformance

UKAS Laboratory Number 0789

Certificate number: U35957

Conformance

From markings on the sound level meter or by reference to the manufacturer's published literature it has been determined that the instrument submitted for verification was originally manufactured to BS EN IEC 61672-1:2002 and similarly that the associated sound calibrator conforms to BS EN IEC 60942.

Statement of conformance

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of BS EN IEC 61672-3:2006, for the environmental conditions under which the tests were performed. As public evidence was available¹, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with BS EN IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in BS EN IEC 61672-1:2002, and that the sound level meter submitted for testing conforms to the class 1 requirements of BS EN IEC 61672-1:2003.

¹ This evidence is held on file at the calibration laboratory

Summary of Measurement Results

Indication at the calibration check frequency - IEC 61672-3 Ed.1 Clause 9	Passed
Self-generated noise - IEC 61672-3 Ed.1 Clause 10.2	Passed
Acoustical signal tests of a frequency weighting - IEC 61672-3 Ed.1 Clause 11	Passed
Electrical signal tests of frequency weightings - IEC 61672-3 Ed.1 Clause 12	Passed
Frequency weightings: A Network - IEC 61672-3 Ed.1 Clause 12.3	Passed
Frequency weightings: C Network - IEC 61672-3 Ed.1 Clause 12.3	Passed
Frequency weightings: Z Network - IEC 61672-3 Ed.1 Clause 12.3	Passed
Frequency and time weightings at 1 kHz IEC 61672-3 Ed.1 Clause 13	Passed
Level linearity on the reference level range - IEC 61672-3 Ed.1 Clause 14	Passed
Toneburst response - IEC 61672-3 Ed.1 Clause 16	Passed
Peak C sound level - IEC 61672-3 Ed.1 Clause 17	Passed
Overload indication - IEC 61672-3 Ed.1 Clause 18	Passed

Comment

Correct level with associated calibrator is 113.9dB(A).

Observations

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a coverage probability of approximately 95 %. The uncertainty evaluation has been carried out in accordance with UKAS requirements. Details of the uncertainty for each measurement are available from the Calibration Laboratory upon request. Details of the sources of corrections and their associated uncertainties that relate to this verification are contained within the test report accompanying this certificate.

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Measurements performed at:-

Campbell Associates Ltd
 5b Chelmsford Road Industrial Estate
 GREAT DUNMOW, CM6 1HD, England
www.campbell-associates.co.uk
info@campbell-associates.co.uk
 Phone 01371 871030 Facsimile 01371879106



Certificate number: U35955

Certificate of Calibration and Conformance

Test object: Sound Calibrator
Manufacturer: Norsonic
Type: 1255
Serial no: 125525262

Customer: Hawkins Environmental
Address: The Square, Basing View,
 Basingstoke. RG21 4EB.
Contact Person: Nick Hawkins.

Measurement Results:	Level	Level Stability	Frequency	Frequency Stability	Distortion
1:	114.07 dB	0.02 dB	1000.00 Hz	0.00 %	0.35 %
2:	114.07 dB	0.02 dB	1000.00 Hz	0.00 %	0.35 %
3:	114.07 dB	0.02 dB	1000.00 Hz	0.00 %	0.35 %
Result (Average):	114.07 dB	0.02 dB	1000.00 Hz	0.00 %	0.35 %
Expanded Uncertainty:	0.10 dB	0.02 dB	1.00 Hz	0.01 %	0.10 %
Degree of Freedom:	>100	>100	>100	>100	>100
Coverage Factor:	2.00	2.00	2.00	2.00	2.00

The stated level is relative to 20µPa. The level is traceable to National Standards.

The stated level is valid at reference conditions. The following correction factors have been applied during the measurement: Pressure: 0.000 dB/kPa Temperature: 0.000 dB/°C Relative humidity: 0.000 dB/%RH Load volume: 0.00015 dB/mm³

The reported expanded uncertainty of measurements is based on a standard uncertainty multiplied by the coverage factor of k=2, providing a level of confidence of approximately 95%. Where the degrees of freedom are insufficient to maintain this confidence level, the coverage factor is increased to maintain this confidence level. The uncertainty has been determined in accordance with UKAS requirements.

Records: K:\C A\Calibration\Nor-1504\Nor-1018 CalCal2020\NOR1255_125525262_M1.nmf

Environmental conditions: Pressure: 101.325 kPa Temperature: 23.0 °C Relative humidity: 50 %RH
Reference conditions: 101.325 kPa 23.0 °C 50 %RH
Measurement conditions: 100.068 ± 0.042 kPa 22.3 ± 0.2 °C 44.9 ± 1.2 %RH

Date received for calibration: 28/09/2020
Date of calibration: 08/10/2020
Date of issue: 08/10/2020
Engineer

Supervisor

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

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Certificate number: U35955

Preconditioning

The equipment was preconditioned for more than 4 hours in the specified calibration environment.

Measurements

The calibrator has been tested as described in the following annexes to BS EN IEC60942:2003 Sound Calibrators; B3.4 for sound pressure level, B3.5 for frequency, B3.6 for total distortion and A4.4 for short term stability of the pressure level.

Method

Calibration has been performed as set out in the current version of CA Technical procedure TP01

Instruments and program

A complete list of equipment, hardware and software that has been used in this calibration is available from the calibration laboratory on request.

Comment

Calibrated as received, no adjustments made.

Statement of conformance

As public evidence was available¹, from a testing organisation responsible for approving the results of pattern evaluation tests, to demonstrate that the model of sound calibrator fully conformed to the requirements for pattern evaluation described in annex A of BS EN IEC 60942:2003, the sound calibrator tested is considered to conform to all the class 1 requirements of that BS EN IEC 60942:2003.

¹ This evidence is held on file at the calibration laboratory.

Notes:

The sound pressure level generated by the calibrator in its ½ inch configuration was measured five times and averaged by a WS2P working standard microphone for class 1 or 2 devices or a LS2P reference microphone for class 0 or LS devices as specified in the International Standard BS EN 61094-4. The results of three replications and the mean of the measurements obtained are given in the measurement results table of this certificate. The frequency and distortion were measured in a similar manner. The figures in **BOLD** are the final results; a small correction factor may need to be added to the sound pressure level quoted here if the device is used to calibrate a sound level meter that is fitted with a free field response microphone. See manufacturer's handbooks for full details of this and other corrections that may be applicable.

Decision rule:

The decision rules have been applied in accordance with the procedure as described in BS EN 60942:2003.

This certificate relates only to the items tested above.

End of Certificate

Measurements performed at

Campbell
Associates

Sonitus House, 5b Chelmsford Road Industrial Estate, Great Dunmow, GB-CM6 1HD
Tel (+44) 01371 871030 Fax (+44) 01371 879106
Email: hotline@campbell-associates.co.uk
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Appendix 3

Summary of Noise Measurements

Appendix 3: Summary of Noise Measurements

Time	L _{Aeq}	L _{Amax}	L _{A10}	L _{A50}	L _{A90}
11:00	58.3	73.5	62.0	54.4	49.6
12:00	60.7	87.1	63.4	55.2	50.0
13:00	59.4	88.5	61.7	53.8	48.9
Day	59.6	88.5	62.4	54.4	49.5
23:00	51.3	74.1	46.2	40.9	40.1
00:00	45.9	71.3	42.8	40.3	39.4
Night	49.4	74.1	44.5	40.6	39.7
L _{A10.3hr}	62.4				
L _{A10.18hr}	61.4				
L _{Aeq.16hr}	59.1				
L _{Aeq.8hr}	49.4				

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Time	L _{Aeq}	L _{Amax}	L _{A10}	L _{A50}	L _{A90}
07:00	56.2	70.6	58.0	55.4	53.1
08:00	54.7	70.3	56.5	54.3	51.7
09:00	53.5	70.7	55.4	52.5	49.9
10:00	-	-	-	-	-
11:00	-	-	-	-	-
12:00	-	-	-	-	-
13:00	-	-	-	-	-
14:00	-	-	-	-	-
15:00	-	-	-	-	-
16:00	-	-	-	-	-
17:00	-	-	-	-	-
18:00	-	-	-	-	-
19:00	-	-	-	-	-
20:00	-	-	-	-	-
21:00	-	-	-	-	-
22:00	-	-	-	-	-
23:00	51.3	77.8	50.1	45.5	44.4
00:00	48.9	71.4	47.5	43.7	42.7
01:00	48.6	69.0	49.2	47.3	45.8
02:00	48.1	58.2	49.2	47.8	46.4
03:00	47.4	68.3	47.8	46.7	45.5
04:00	55.3	80.2	51.3	48.0	45.6
05:00	54.0	76.3	53.2	50.9	49.9
06:00	58.7	82.8	56.1	53.4	52.5
Day	58.5	89.0	58.8	51.8	49.0
Night	53.4	82.8	50.6	47.9	46.6