



PLANNING NOISE IMPACT ASSESSMENT

OLD ROAD EAST, GRAVESEND

GALLIARD (GRAVESEND) LIMITED

DECEMBER 2023

PLANNING NOISE IMPACT ASSESSMENT OLD ROAD EAST, GRAVESEND

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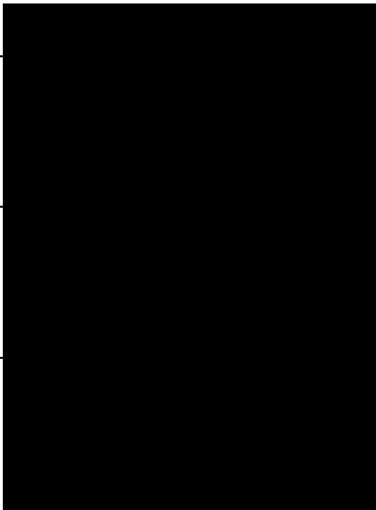
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1 INTRODUCTION

Anderson Acoustics Ltd was commissioned by Galliard (Gravesend) Limited in September 2023 to undertake a noise assessment, in support of a planning application, pertaining to the redevelopment of the St Joeseph's Convent Preparatory School site. The development comprises 54 new residential dwellings, associated parking and green space, as well as the establishment of a new general practitioner (GP) clinic.

This report presents the results of an environmental noise survey undertaken at the site and provides guidance on appropriate façade elements to ensure that an acceptable internal noise environment within dwellings is capable of being achieved.

In addition to the assessment of noise impact from existing noise sources on the future development, consideration of noise impact on the nearby noise-sensitive receptors (NSRs), due to noise generated by the proposed development, is considered.

Environmental noise criteria relevant to the assessment have been presented and discussed in Section 2 of this report.

A brief description of the site and proposed development is given in Section 3.

The methodology and results of an environmental noise survey undertaken at the site are given in Section 4.

Sections 5 and 6 provide the full ProPG assessment, following guidance detailed within BS 8233 to meet the relevant condition set out by the local authority.

Section 7 provides an assessment of potential noise impacts generated by the development.

The report is concluded in Section 8.

Noise survey time history graphs are detailed in Appendix A.

National Planning Legislation are summarised in Appendix B.

Unavoidably, this report references some technical terminology. A glossary explaining the terminology used can be found on our [website](#).

2 RELEVANT GUIDANCE AND CRITERIA

Assessment guidance is summarised below. These should be read in conjunction with the government's overarching planning principles with respect to noise including: Noise Policy Statement for England [1]; National Planning Practice Framework [2] and Planning Practice Guidance – Noise [3].

2.1 Gravesham Borough Council (GBC)

The Gravesham Local Plan Core Strategy was adopted in 2014. The following policy from the 2014 Local Plan, which relates to noise, has been extracted and can be seen below.

“Policy CS19: Development and Design Principles –

New development will be located, designed and constructed to:...

... avoid adverse environmental impacts from pollution, including noise, air, odour and light pollution, and land contamination.”

2.2 ProPG: Planning & Noise

The Professional Practice Guidance on Planning & Noise [3] for New Residential Development was produced to provide practitioners with guidance on a recommended approach to the management of noise within the planning system in England.

The ProPG acknowledges and reflects the Government's overarching Noise Policy Statement for England (NPSE), the National Planning Policy Framework (NPPF) and the associated Planning Practice Guidance on Noise, as well as other authoritative sources of guidance.

The two sequential stages of the overall approach are:

- Stage 1 – an initial noise risk assessment of the proposed development site; and
- Stage 2 – a systematic consideration of four key elements.

Where sites are deemed to be “negligible” risk under Stage 1, there would not normally be a need for a Stage 2 assessment.

The four key elements to be undertaken in parallel during Stage 2 of the recommended approach are:

- Element 1 – demonstrating a “Good Acoustic Design Process”
- Element 2 – observing internal “Noise Level Guidelines”
- Element 3 – undertaking an “External Amenity Area Noise Assessment”
- Element 4 – consideration of “Other Relevant Issues”

ProPG recommends that the details of the assessment(s) are presented in an Acoustic Design Statement (ADS). An ADS should not be necessary for a site assessed as negligible risk.

Stage 1: Initial Site Noise Risk Assessment

The noise risk assessment is intended to provide an indication of the likely risk of adverse effects from noise without any measures in place. It may be based on measurement or prediction (or a combination) as appropriate and should aim to describe noise levels over a “typical worst case” 24-hour day either now or in the foreseeable future.

The noise risk assessment categories are presented in Figure 1 of the ProPG, which is reproduced in Table 2-1 below. It illustrates how an initial noise risk assessment is linked with an increasing risk of adverse effect from noise, and how this in turn is broadly associated with indicative noise levels derived from current guidance and experience.

The indicative noise levels are intended to provide a sense of the noise challenge at a potential residential development site. Whilst it is noted that they “...should be interpreted flexibly having regard to the locality, the project and the wider context...”, there is considered to be no need to amend them for the purposes of this assessment.

In the final column, the initial noise risk assessment is aligned with pre-planning application guidance that highlights the increasing importance of good acoustic design as the noise risk increases.

Table 2-1: Stage 1 initial site noise risk assessment (as per ProPG Figure 1)

Noise risk assessment		Potential effect without noise mitigation	Pre-planning application advice
Indicative Daytime Noise Levels $L_{Aeq,16h}$	Indicative Night-time Noise Levels $L_{Aeq,8h}$		
	70 dB	Increasing risk of adverse effect 	High noise levels indicate that there is an increased risk that development may be refused on noise grounds. This risk may be reduced by following a good acoustic design process that is demonstrated in a detailed ADS. Applicants are strongly advised to seek expert advice.
	65 dB		As noise levels increase, the site is likely to be less suitable from a noise perspective and any subsequent application may be refused unless a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised, and which clearly demonstrate that a significant adverse noise impact will be avoided in the finished development.
	60 dB		At low noise levels, the site is likely to be acceptable from a noise perspective provided that a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised in the finished development.
	55 dB		
	50 dB		
	60 dB		
	55 dB		
	50 dB		
	45 dB		
	40 dB	No adverse effect	These noise levels indicate that the development site is likely to be acceptable from a noise perspective, and the application need not normally be delayed on noise grounds.

Notes:

- 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”.
- $L_{Aeq,16h}$ is for daytime 0700 – 2300, $L_{Aeq,8h}$ is for night-time 2300 – 0700.
- An indication that there may be more than 10 noise events at night (2300 – 0700) with $L_{Amax,F} > 60$ dB means the site should not be regarded as negligible risk.

ProPG states that “It is important that the assessment of noise risk at a proposed residential development site is not the basis for the eventual recommendation to the decision maker”. Though, presumably, this would be acceptable for sites/noise levels deemed negligible risk (when a Stage 2 assessment or ADS would not normally be required).

It is noted that the categories (negligible, low, medium, and high) do not necessarily correspond with a given threshold. This is perhaps understandable since these may vary in practice due to various acoustic and non-acoustic factors (which may vary from site to site); however, it is not helpful when it comes to consistently determining the degree of risk.

To determine thresholds for this purpose, it is logical in the first instance to take from the table above that 50 dB and 40 dB represent the thresholds between negligible and low for the day and night-time periods respectively. As discussed subsequently, the daytime level of 50 dB is the bottom of the criteria range applied to external amenity areas, whilst the equivalent level inside a dwelling based on a window being partially open (providing 10-15 dB reduction) would be 35-40 dB, which is in keeping with the relevant criteria, also discussed subsequently. The same is broadly the case in terms of the night-time period; although, since the day and night internal criteria are only 5 dB apart (shown later), and the external thresholds are 10 dB apart, the external night threshold is more stringent relative to the daytime equivalent.

Applying a banding of 10 dB results in the following thresholds in Table 2-2, which correspond well with the ProPG table reproduced above.

Table 2-2: Interpretation of the Level 1 initial site noise risk assessment thresholds

Noise risk category	L _{Aeq,16h} (07-23)	L _{Aeq,8h} (23-07)	L _{AFmax} (23-07)	Level 2 assessment?	Pre-planning application advice
High	> 70 dB	> 60 dB	> 10 events > 60 dB	Required	“...an increased risk that development may be refused on noise grounds. This risk may be reduced by following a good acoustic design process...”
Medium	61 – 70 dB	51 – 60 dB			“...application may be refused unless a good acoustic design process is followed and is demonstrated... how the adverse impacts of noise will be mitigated and minimised, and... a significant adverse noise impact will be avoided...”
Low	51 – 60 dB	41 – 50 dB			“...the site is likely to be acceptable from a noise perspective provided that a good acoustic design process is followed...”
Negligible	≤ 50 dB	≤ 40 dB	Less than the above	Not normally required	“...the development site is likely to be acceptable from a noise perspective, and the application need not normally be delayed on noise grounds.”

As noted above, the rating or categorisation at this stage is not to be taken as the final word on the site, but rather an initial guide as to the degree of measures likely to be required to achieve an acceptable development.

In achieving ‘Good Acoustic Design’ ProPG states: “Designing the site layout and the dwellings so that the internal target levels can be achieved with open windows in as many properties as possible demonstrates good acoustic design. Where it is not possible to meet internal target levels with windows open, internal noise levels can be assessed with windows closed, however any façade openings used to provide whole dwelling ventilation (e.g. trickle ventilators) should be assessed in the “open” position and, in this scenario, the internal L_{Aeq} target levels should not normally be exceeded, subject to the further advice in Note 7”.

Note 7 states that “Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal L_{Aeq} target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved. The more often internal L_{Aeq} levels start to exceed the internal L_{Aeq} target levels by more than 5 dB, the more that most people are likely to regard them as “unreasonable”. Where such exceedances are predicted, applicants should be required to show how the relevant number of rooms affected

has been kept to a minimum. Once internal L_{Aeq} levels exceed the target levels by more than 10 dB, they are highly likely to be regarded as “unacceptable” by most people, particularly if such levels occur more than occasionally. Every effort should be made to avoid relevant rooms experiencing “unacceptable” noise levels at all and where such levels are likely to occur frequently, the development should be prevented in its proposed form.”

In summary, exceeding the WHO guideline internal values (which are the same as those in BS 8233 [3] presented below) by up to 5 dB is likely to be acceptable, but where they are exceeded by more than 10 dB, then this may be unacceptable to occupants. It is at this point, therefore, where occupants may wish to close windows, and where, therefore, alternative means of ventilation and/or overheating control may be required.

Stage 2: Full Assessment

The requirements of the Stage 2: Full Assessment are covered in Section 6 of this report.

2.3 British Standard 8233

British Standard BS 8233:2014: *Guidance on sound insulation and noise reduction for buildings* [5] provides guideline values for internal noise levels within a number of building types including residential dwellings.

In general, for steady external noise sources, it is desirable that the internal ambient noise level does not exceed the guideline values in Table 2-3:

Table 2-3: British Standard 8233 Indoor Noise Levels

Activity	Location	Daytime (07:00 – 23:00 hours)	Night-time (23:00 – 07:00 hours)
Resting	Living room	35 dB $L_{Aeq, 16\text{hour}}$	-
Dining	Dining room/area	40 dB $L_{Aeq, 16\text{hour}}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq, 16\text{hour}}$	30 dB $L_{Aeq, 8\text{hour}}$

In respect of external noise levels, the guidance in BS 8233:2014 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”. BS 8233:2014 however acknowledges that “these guideline values are not achievable in all circumstances where development might be desirable”, and that “...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”.

In respect of balconies, roof gardens and terraces, BS 8233:2014 states that “In these locations, specification of noise limits is not necessarily appropriate. Small balconies may be included for uses such as drying, washing or growing pot plants, and noise limits should not be necessary for these uses; however, the general guidance on noise in amenity space is still appropriate for larger balconies, roof gardens and terraces, which might be intended to be used for relaxation. In high-noise areas, consideration should be given to protecting these areas by screening or building design to achieve the lowest practicable levels. Achieving levels of 55 dB $L_{Aeq,T}$ or less might not be possible at the outer edge of these areas but should be achievable in some areas of the space”.

BS 8233:2014 suggests that proposed development within noisy environments should be designed to ensure that the recommended internal design standards are achieved, and that noise levels in external amenity areas are designed to effectively control and reduce noise levels; although it acknowledges that in certain circumstances meeting the external design recommendations may not be feasible, or necessary, especially where the provision of such spaces is desirable for other technical, planning or policy reasons.

2.4 World Health Organisation Guidelines

The following guideline values for community ambient noise levels in specific environments are presented in the World Health Organization (WHO) Guidelines for Community Noise.

Table 2-4: WHO Guideline Noise Values

Specific Environment	Critical Health Effect(s)	dB $L_{Aeq,T}$	Time Base hours	dB $L_{Amax,F}$
Dwelling indoors	Speech intelligibility and moderate annoyance, daytime and evening	35	16	-
Inside bedrooms	Sleep disturbance, night-time	30	8	45

The 45 dB $L_{Amax,F}$ criterion applies to “single sound events” within bedrooms at night. This guideline is generally interpreted as the value that individual noise events should not normally exceed more than 10 times a night.

2.5 British Standard 4142

BS 4142 [6] provides methods for rating and assessing sound/noise of an industrial or commercial nature in relation to residential premises, hence its relevance here. The assessment methodology evaluates the “specific sound level” of each industrial or commercial sound source, corrects for distinguishable features to derive the “rating level”, and compares this with the “background sound level”.

The advice is that the background sound level ($L_{AF90,T}$) should be derived from continuous measurement of normally not less than 15-minute intervals over the period of interest, and that it should not be the lowest level, but representative of typical conditions at the noise-sensitive receiver(s) relevant to the periods of operation.

The specific sound level ($L_{Aeq,T}$) is obtained (by measurement or calculation) over a reference period of 1 hour in terms of the daytime (07:00 to 23:00) and 15 minutes during the night-time (23:00 to 07:00).

The rating level ($L_{Ar,Tr}$) is the specific sound level corrected to account for any acoustic features present in the sound in question, as experienced at the receptor, such as distinguishable, discrete, continuous note (a whine, hiss, screech or hum etc.) or distinct impulses (bangs, clatters or thumps etc.). Where no correction is warranted, the rating level is equal to the specific level.

The “subjective method” to calculate the rating level incorporates the following corrections (particularly appropriate for new sources that cannot be measured in-situ):

- Up to +6 dB due to tonality, subjectively this might be +2 for a tone that is just perceptible, +4 where it is clearly perceptible and +6 where it is highly perceptible.
- Up to +9 dB for impulsivity, subjectively this might be +3 for impulsivity that is just perceptible, +6 where it is clearly perceptible and +9 where it is highly perceptible; and
- Up to +3 dB for other acoustic features that are neither tonal nor impulsive, though readily distinctive at the receptor.

An “initial estimate” of the impact of the specific sound is calculated by subtracting the measured background sound level from the rating level. The following advice applies:

- Typically, the greater this difference, the greater the magnitude of the impact.

- b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
- d) 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.

The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs.

2.6 Acoustics, Ventilation and Overheating Guide

The Acoustics, Ventilation and Overheating Residential Design Guide (AVO Guide) [7] has been prepared with contributions from members of the Association of Noise Consultants' (ANC) Acoustics, Ventilation and Overheating (AVO) Group. As stated in the Introduction to the AVO Guide, *"It recommends an approach to acoustic assessments for new residential development that take due regard of the interdependence of provisions for acoustics, ventilation, and overheating. Application of the AVO Guide is intended to demonstrate good acoustic design as described in the ProPG: Planning & Noise, May 2017 ('ProPG'), when considering internal noise level guidelines."* Whilst, *"Provisions for both ventilation and mitigation of overheating may include façade openings that permit external noise ingress, and/or mechanical equipment that generates noise. In both cases, there is potential for noise impact."*

The scope is further clarified as, *"...for the consideration of new residential development that will be exposed predominantly to airborne sound from transport sources, and to sound from mechanical services that are serving the dwelling in question. Other sources of noise, such as noise from industrial, commercial or entertainment premises, and of ground-borne noise and vibration, are outside the scope of the AVO Guide. New apartments, flats and houses are the most common type of new residential development. The approach may also be used for other types of residential development such as residential institutions, care homes etc, although it needs to be remembered that some of the occupants of these types of premises can be more sensitive to indoor environmental conditions."*

Whilst *"The contribution to internal noise levels from transport sources and from mechanical services are considered separately and independently, because there is evidence that occupants have a different tolerance to each."*

Despite detailed assessments of the inherently linked acoustics, ventilation and overheating fields may not be required at the early stages of the design of a development; the principles relating to the key aspects that will need careful attention later on have been used to assess potential impacts on areas of the site that may present mitigation challenges to achieve suitable conditions within dwellings on the above 3 fields.

External and Internal Ambient Noise Levels due to Transport Noise Sources

The AVO Guide notes that *"the over-arching aspiration of good acoustic design is that residents may open windows without any adverse acoustic impact (ProPG paragraph 2.33); where a site layout achieves these conditions, the portion of the AVO Guide relating to environmental noise is not applicable."* Whilst, *"Good acoustic design may be considered as a component of sustainable design. Other aspects of sustainable design include a response to climate change, in terms of aiming to minimise use of energy and other resources."*

It is also noted, *“There are other benefits for occupants from opening windows, such as the connection with the outside, sense of fresh air, experience of draughts when overheating, and sense of control over one’s environment. Consideration of these factors is also beyond the scope of the AVO Guide.”*

The AVO Guide highlights that in the context of sustainable development, good practice should be adopted to minimise noise levels within dwellings with windows open as far as practicable.

The following three key statements are quoted from ProPG:

- *“...special care must be taken to design the accommodation so that it provides good standards of acoustics, ventilation and thermal comfort without unduly compromising other aspects of the living environment. In such circumstances, internal noise levels can be assessed with windows closed but with any façade openings used to provide “whole dwelling ventilation” in accordance with Building Regulations Approved Document F (e.g. trickle ventilators).”*
- *“It should also be noted that the internal noise level guidelines are generally not applicable under “purge ventilation” conditions as defined by Building Regulations Approved Document F [8], as this should only occur occasionally (e.g. to remove odour from painting and decorating or from burnt food).”*
- *“In addition to providing purge ventilation, open windows can also be used to mitigate overheating. Therefore, should the LPA accept a scheme is to be assessed with windows closed, but this 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 in the ADS [Acoustic Design Statement].”*

In other words, there is no requirement to assess external noise ingress during purge ventilation, but there is during whole dwelling ventilation (usually with windows closed but trickle vents open, and referred to as the ‘ADF ventilation condition’) and the provision of ventilative cooling (usually with windows open, and referred to as the ‘overheating condition’). With the first condition being essentially a constant requirement, and the second an occasional requirement, subject to various factors associated with internal heat generation, hence different noise criteria are deemed to apply.

Like the ProPG two-stage assessment approach, the AVO Guide also provides Levels 1 and 2 overheating assessments to determine potential areas of noise impact risks in residential developments. The Level 1 site risk assessment is performed by comparing the relevant ambient noise levels for the site/representative location of the key dwellings (as measured or otherwise determined) with Table 3-2 of the AVO Guide, as reproduced in Table 2-5.

Table 2-5: Guidance for Level 1 site risk assessment of noise from transport noise sources [NOTE 1] relating to overheating condition (as per AVO Guide Table 3-2)

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

- 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.
- 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.
- Note 4 Where 78 dB L_{AFmax} 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 ProPG's 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.

It is noted that, again, the categories (negligible, low, medium, and high) do not necessarily correspond with a given threshold. These can be established, however, with help from the explanatory notes given in the AVO Guide. A core factor is the assumption that the level difference between outside and inside conditions with a window open for ventilative cooling is 13 dB, and that a Level 2 assessment is not required if "reasonable" internal conditions are achieved, which are taken to be the BS 8233:2014 [5] criteria relaxed by 5 dB. For the most noise-sensitive spaces of living rooms and bedrooms, therefore, the thresholds are 53 dB (i.e. 35+5+13) and 48 dB (i.e. 30+5+13) for the daytime and night-time periods, respectively. Applying a banding of 5 dB results in the following thresholds shown in Table 2-6, which correspond well with the table above.

Table 2-6: Interpretation of the Level 1 site assessment noise thresholds relating to overheating condition

Risk category for Level 1 assessment	$L_{Aeq, 16h}$ (07-23 hours)	$L_{Aeq, 8h}$ (23-07 hours)	Level 2 assessment?	L_{AFmax} (23-07 hours)
High	> 63 dB	> 58 dB	Recommended	> 78 dB ("normally exceeded")
Medium	59 – 63 dB	54 – 58 dB	Optional/Recommended	n/a
Low	54 – 58 dB	49 – 53 dB	Optional	n/a
Negligible	≤ 53 dB	≤ 48 dB	Not required	n/a

2.7 Adopted Criteria

The ProPG and AVO Guide have been considered in this assessment, in line with national planning guidance to determine suitable noise criteria for the development. For transportation sources, it is considered that the BS 8233 and WHO levels detailed in Sections 2.3 and 2.4, respectively, of this report should apply, in line with the ProPG L_{AFmax} approach.

Where building services plant installations are proposed, the noise impact from these should be assessed using the guidance methodology presented in BS 4142.

3 SITE DESCRIPTION

3.1 Existing Site

The site lies within a predominantly residential area, along with the likes of small restaurants, a café and bar located approximately 100m to the west. An auto repair shop (ACM Autos) is located 30m to the south-west of the site boundary, whilst the Convent of Mercy and Christ's Church are situated 90m to the east and 25m to the north, respectively.

An aerial view of the site location is shown in Figure 3-1, which highlights the proposed site and surrounding area.

Figure 3-1: Site location (highlighted in red) and noise monitoring positions (unattended in yellow, attended in blue)



Image source: Imagery ©2023 Google, Imagery ©2023 Getmapping plc, Infoterra Ltd & Bluesky, Maxar Technologies, Map data ©2023
Image annotations: Andersons Acoustics

During site visits, dominant noise source on site was noted to be road traffic from Old Road East, along with infrequent overhead aircraft noise and some birdsong.

3.2 Proposed Development

The project comprises the construction of 54 new residential dwellings with associated parking and green space, as well as the establishment of a new general practitioner (GP) clinic. It is understood that existing buildings associated with St. Joseph's Preparatory School are to be demolished, with the exception of 46 Old Road East, which is due to be refurbished and converted into apartments. Access to the new dwellings is proposed to be from Old Road East.

The proposed site plan can be seen in Figure 3-2 below.

Figure 3-2: Proposed site plan



4 NOISE SURVEY

The prevailing noise conditions at the development have been determined by detailed continuous unattended environmental noise surveys.

4.1 Instrumentation

All noise measurements were undertaken by a consultant certified as competent in environmental noise monitoring. All acoustic measurement equipment used during the noise survey conformed to Type 1 specification of British Standard 61672 [9]. A full inventory of this equipment is shown in Table 4-1 below. All equipment's calibration certificates are available on request.

Table 4-1: Inventory of Measurement Equipment

Measurement type	Equipment	Make and Model	Serial Number	Calibration	
				Certificate number	Expiry Date
Noise UP1	Sound Level Meter	Svan SV 971A	113238	113238 ¹	30/12/2024
	Preamplifier	Svan SV 18A	135033		
	Microphone	ACO Pacific 7152	85863		
Noise UP2	Sound Level Meter	Rion NL-52	00342836	UCRT22/2004	12/08/2024
	Preamplifier	Rion NH-25	42864		
	Microphone	Rion UC-59	06357		
Noise UP3	Sound Level Meter	Rion NL-52	00643027	TCRT23/1566	08/01/2025
	Preamplifier	Rion NH-25	43055		
	Microphone	Rion UC-59	06807		
Calibrator		RION NC-74	34134186	TCRT23/1528	19/07/2024

¹Equipment is under one years old and therefore covered under manufacturer's warranty

The noise measurement equipment used during the survey was calibrated at the start and end of each measurement. The calibrator used had itself been calibrated by a UKAS accredited calibration laboratory within the twelve months preceding the measurements. No significant drift in calibration was found to have occurred.

4.2 Weather Conditions

Weather conditions during the survey period have been obtained from www.timeanddate.com using a weather station in Northolt. Weather during the first two days of the survey (Tuesday 19th and Wednesday 20th) pertained periods of adverse weather, including strong winds and heavy rain, which have been excluded from the assessment.

Conditions during the remainder of the survey were generally dry with a light south-westerly breeze and noise survey results indicate that measurements are unlikely to have been affected by periods of adverse weather.

At the time of setting up the monitors, conditions were noted to be wet and windy. At the time of collecting the monitors, conditions were noted to be dry and still.

4.3 Unattended Noise Survey

The unattended survey was undertaken at three locations, which are shown in detail in Figure 3-1, whilst the details are summarised in Table 4-2. Photographs of each measurement positions can be found in Appendix A.

Table 4-2: Summary of measurement positions

Ref.	Type	Description	Period	Notes
UP1	Unattended/ continuous	4m above ground level in free-field conditions located on the northern site boundary. Representative of road traffic on Old Road East.	13:45 19/09 to 12:15 22/09 (69hrs)	Noise environment was dominated by road traffic on Old Road East, with infrequent and insignificant contribution from pedestrians
UP2		1.5m above ground level in free-field conditions located on the south-western site boundary.	14:30 19/09 to 12:00 22/09 (69hrs)	Noise environment was dominated by distant road traffic from the surrounding road network, with infrequent contribution from aircraft and birdsong.
UP3		1.5m above ground level in free-field conditions located on the eastern site boundary.	15:00 19/09 to 11:45 22/09 (69hrs)	Noise environment was dominated by distant road traffic from the surrounding road network, with infrequent contribution from aircraft and birdsong.

Consecutive measurements of $L_{Aeq,T}$, L_{Amax} and $L_{A90,T}$ noise indices were obtained using the 'Fast' time weighting. A summary of the measured daytime ambient $L_{Aeq,16hr}$ and night-time ambient $L_{Aeq,8hr}$ noise levels is presented in Tables 4-3 – 4-5 below along with the derived typical night-time L_{AFmax} level. Full time history results are shown in Appendix A.

Spectral measurements were also undertaken in order to obtain the frequency content of the noise impacting on the proposed development, needed to determine the sound insulation performance requirements of the building envelope.

To establish a typical night-time L_{AFmax} value the eleventh highest measured $L_{AFmax,2mins}$ event was identified on a night-by-night basis.

The modal $L_{A90, 15min}$ background sound level value measured at each measurement position has been presented for each assessment period.

4.3.1 Unattended Position 1 (UP1)

Table 4-3: Daily results of the unattended noise survey at UP1

Date	Period	Ambient Noise Level $L_{Aeq, T}$, dB ¹	Typical Night-time $L_{Amax, F}$ Level dB (Top 10 excluded) ²	Modal Background Noise Level $L_{A90, 5min}$ dB
Tuesday 19 th Sept 2023	Daytime (07:00-23:00) ^{3, 4}	66	79	59
	Night-time (23:00-07:00) ⁴	62		42
Wednesday 20 th Sept 2023	Daytime (07:00-23:00) ⁴	70	80	58
	Night-time (23:00-07:00) ⁴	63		36
Thursday 21 st Sept 2023	Daytime (07:00-23:00)	70	80	55
	Night-time (23:00-07:00)	64		40
Friday 22 nd Sept 2023	Daytime (07:00-23:00) ³	64	-	57
	Night-time (23:00-07:00)	-		-
Overall	Daytime (07:00-23:00)⁵	70	80	55
	Night-time (23:00-07:00)⁵	64		40

¹Based on the logarithmic average of the measured levels in this period.

²Based on the 11th highest of the 2-minute values.

³Part-period data after the equipment was installed.

⁴Periods of adverse weather (excluded from overall average).

⁵Excluding part data and/ or periods of adverse weather

4.3.2 Unattended Position 2 (UP2)

Table 4-4: Daily results of the unattended noise survey at UP2 (free-field levels)

Date	Period	Ambient Noise Level $L_{Aeq, T}$, dB ¹	Typical Night-time $L_{Amax, F}$ Level dB ²	Modal Background Noise Level $L_{A90, 15min}$ dB
Tuesday 19 th Sept 2023	Daytime (07:00-23:00) ^{3, 4}	52	64	45
	Night-time (23:00-07:00) ⁴	48		38
Wednesday 20 th Sept 2023	Daytime (07:00-23:00) ⁴	53	55	43
	Night-time (23:00-07:00) ⁴	45		32
Thursday 21 st Sept 2023	Daytime (07:00-23:00)	46	58	36
	Night-time (23:00-07:00)	44		35
Friday 22 nd Sept 2023	Daytime (07:00-23:00) ³	65	-	37
	Night-time (23:00-07:00)	-		-
Overall⁵	Daytime (07:00-23:00)⁵	46	58	36
	Night-time (23:00-07:00)⁵	44		35

¹Based on the logarithmic average of the measured levels in this period.

²Based on the 11th highest of the 2-minute values.

³Part-period data after the equipment was installed.

⁴Periods of adverse weather (excluded from overall average).

⁵Excluding part data and/ or periods of adverse weather

4.3.3 Unattended Position 3 (UP3)

Table 4-3: Daily results of the unattended noise survey at UP3 (free-field levels)

Date	Period	Ambient Noise Level $L_{Aeq, T}$, dB ¹	Typical Night-time $L_{Amax, F}$ Level dB ²	Modal Background Noise Level $L_{A90, 15min}$ dB
Tuesday 19 th Sept 2023	Daytime (07:00-23:00) ^{3, 4}	53	68	48
	Night-time (23:00-07:00) ⁴	49		41
Wednesday 20 th Sept 2023	Daytime (07:00-23:00) ⁴	53	60	46
	Night-time (23:00-07:00) ⁴	45		36
Thursday 21 st Sept 2023	Daytime (07:00-23:00)	46	61	43
	Night-time (23:00-07:00)	44		39
Friday 22 nd Sept 2023	Daytime (07:00-23:00) ³	57	-	44
	Night-time (23:00-07:00)	-		-
Overall⁵	Daytime (07:00-23:00)	46	61	43
	Night-time (23:00-07:00)	44		39

¹Based on the logarithmic average of the measured levels in this period.

²Based on the 11th highest of the 2-minute values.

³Part-period data after the equipment was installed.

⁴Periods of adverse weather (excluded from overall average).

⁵Excluding part data and/ or periods of adverse weather

4.4 Noise Modelling

To predict the impact of road noise across the development, the baseline noise measurement results presented in Section 4.3 were used to produce a detailed 3D environmental noise model, which was calibrated to match the measured levels summarised above.

Figure 4-6: Example 3D view of the environmental noise model - Old Road East (south-east facing) (daytime L_{Aeq} free-field levels)



The predictions were carried out using the noise-modelling suite Cadna/A 2023, in accordance with the CRTN, CRN and ISO 9613 prediction methodologies, which allow consideration of the effects of the acoustic screening provided by both existing buildings surrounding the site and buildings of the development itself.

The results of the noise modelling were used to determine the likely noise levels incident on each building across the completed site. These predictions have formed the basis of the mitigation proposals.

In addition to the road source noise levels used in the predictions, the model considers the effects of the topographical conditions throughout the area, ground absorption, atmospheric absorption, acoustic reflections, and acoustic screening, as well as applying light downwind propagation correction to represent a worst-case.

The model was used to determine typical worst-case daytime (07:00 – 23:00) and night-time (23:00 to 07:00) L_{Aeq} and $L_{Amax,F}$ noise levels across the site.

5 PRO-PG STAGE 1 ASSESSMENT

An initial site noise risk assessment has been undertaken in line with the proposed criteria detailed in Section 2 Table 5-1. This is determined by the measured free-field sound levels from the survey.

Table 5-1: ProPG Stage 1 initial site noise risk assessment

Measurement Position	ProPG Noise Risk Category	
	Daytime (07:00 – 23:00 hours)	Night-time (23:00 – 07:00 hours)
UP1: North Site Boundary	High	High
UP2: South-west Site Boundary	Negligible	Negligible
UP3: East Site Boundary	Negligible	Negligible

The above table shows that the $L_{Aeq,T}$ noise levels measured during the daytime and night-time periods at UP2 and UP3 fall into the “negligible” risk category. Whereas, position UP1 falls into the “high” risk category, during the daytime and night-time periods.

According to the ProPG, therefore, there is “...an increased risk that development may be refused on noise grounds. This risk may be reduced by following a good acoustic design process...”.

6 PRO-PG STAGE 2: FULL ASSESSMENT

6.1 Stage 2: Element 1 – Good Acoustic Design Process

As presented in the ProPG, Section 5 of BS 8233 contains guidance on the sequence of stages to be followed in the planning and early acoustic design of a new development. Section 5.4 of BS 8233 outlines a general approach to determining appropriate noise control measures including the following suggested steps (which may be iterative):

- i. Check the feasibility of reducing noise levels and/or relocating noise sources.
- ii. Consider options for planning the site or building layout.
- iii. Consider the orientation of proposed building(s).
- iv. Select construction types and methods for meeting building performance requirements.
- v. Examine the effects of noise control measures on the requirements for ventilation, fire regulation, health and safety, cost, CDM (construction, design and management) etc.
- vi. Assess the viability of alternative solutions.

The designer should then decide which of the following options can be applied to reduce noise levels:

- i. Quietening or removing the source of noise.
- ii. Attenuating the sound on its path to the receiver.
- iii. Obstructing the sound path between source and receiver.
- iv. Improving the sound insulation of the building envelope.
- v. Using agreements to manage noise.

Various mitigation opportunities to alter the sound propagation path between source and receiver have been identified, which should in turn, reduce façade incident noise levels. These are presented below:

6.1 Element 2: Internal Noise Level Guidelines

An assessment of internal noise levels has been based on a set of nominal sound reduction performances relative to varying glazing and ventilation elements.

6.1.1 Assumptions

Drawings Used

Our assessment has been based on the following drawings produced by Hollaway Studio (architect).

Table 6-1: Drawings used in the assessment

Drawing Title	Project Number	Drawing Number	Date
Site Location Plan	22.112	001	July 2023
Proposed Site Plan		040	August 2023
Proposed Conversion Flats		070	July 2023
Proposed New Build Flats		071	August 2023
House Type A- Level		080	August 2023
House Type A- Stepped		081	August 2023
House Type B & C		082	August 2023
House Type D		083	August 2023
House Type E		084	August 2023

Room Reverberation

In order to calculate the internal ambient noise levels within habitable rooms, our analysis has assumed typical reverberation times in furnished bedrooms and living rooms, which have been based on a flat reverberation time of 0.5 seconds across the frequency spectrum between 125 Hz and 4kHz.

External Noise Levels

Predicted average noise levels at the façade due to road traffic are shown in Figures 6-2 to 6-5. According to the predictions provided by the noise model, the worst affected rooms are likely to be those on the northern facades of the development, which are expected to experience a maximum level of 66 dB $L_{Aeq,16hrs}$ during the day, and 61 dB $L_{Aeq,8hrs}$ and 77 dB $L_{Amax,F}$ at night. Whereas façade-incident level on elevations for the remainder of site are significantly lower.

Figure 6-2: Predicted daytime $L_{Aeq,16hr}$ (daytime) due to road traffic noise (predictions are free-field and indicate the highest level across all floors)



Figure 6-3: Predicted night-time $L_{Aeq,8hr}$ (night-time) due to road traffic noise (predictions are free-field and indicate the highest level across all floors)



Non-glazed External Wall Areas

It has been advised that the external wall construction of the residential aspect of the development will be formed of a traditional brick / block cavity wall. The below sound reduction performances of similar constructions have been assumed in our analyses.

Table 6-2: Assumed sound reduction index (dB) of the external wall construction

External Wall Construction	Sound Reduction (dB) at Octave-band Frequency (Hz)						$R_w / R_w + C_{tr}$
	125	250	500	1k	2k	4k	
Brick-block cavity wall	41	45	45	54	58	58	52 / 48

In order to achieve the internal noise guidelines as set out in Section 2, it is necessary to estimate internal noise levels with windows closed using glazing and ventilation products.

An assessment of the external building fabric elements has been undertaken based on the unattended spectral data of $L_{Aeq,T}$ and L_{AFmax} levels measured during daytime and night-time periods. Guidance is given in the following sections regarding suitable glazing, ventilation, and external wall configurations to achieve the required internal ambient noise levels within the proposed dwellings. Calculations have been undertaken following the general method set out in BS EN 12354-3:2017 [10].

6.1.2 Glazing

Based upon the drawings provided by the architect, detailed calculations have been undertaken in accordance with BS 12354-3 to determine the required worst-case acoustic performances for the glazed elements of the façade, in order to provide appropriate internal noise levels in habitable rooms, during both daytime and night-time periods. The resulting worst-case performance requirements are presented in Table 6-4.

Table 6-3: Example glazing configurations

Glazing Reference	Glazing Configuration Example	$R_w / R_w + C_{tr}$
G1	Medium specification acoustically rated double glazing configuration with differing pane thicknesses e.g. 10mm glass / 12mm cavity / 6mm glass	37 / 33
G2	Acoustically-rated standard thermal double-glazing configuration with differing pane thicknesses e.g. 4mm glass / 12mm cavity / 6mm glass	31 / 27

Table 6-4: Minimum sound reduction performance (dB) for the glazed elements of habitable rooms in the development

Glazing Reference	Minimum Sound Reduction (dB) at Octave-band Frequency (Hz)						$R_w / R_w + C_{tr}$
	125	250	500	1k	2k	4k	
G1	26	27	34	40	38	46	37 / 33
G2	24	20	25	34	37	35	31 / 27

The sound insulation requirements of the glazing are applicable to the window system as a whole, including frames, mullions and panels. They are based on BS EN ISO 10140: 2010 "Acoustics - Laboratory measurement of sound insulation of building elements" and rated in accordance with BS EN ISO 717-1:2013 "Acoustics – Rating of sound insulation in buildings and of building elements Part 1. Airborne sound insulation".

All glazing systems (including glazed doors) should be capable of meeting the performance specifications detailed above, with test certificates being made available in support. Glazing proposals which only reflect the guidance constructions indicated in this report have been provided for costing purposes only and will not be sufficient evidence that a glazing system will achieve the required performance specification.

6.1.3 Ventilation

We have assumed that any of the following ventilation systems could be used to provide whole-dwelling ventilation to all habitable rooms:

- Background ventilation and intermittent extract fans, or
- A continuous mechanical extract MEV system.

In any of the above instances, inlet air is provided via trickle ventilators.

Our calculations have therefore allowed for two trickle ventilators in the living rooms and a single trickle ventilator in each bedroom, with a minimum required normalised level difference shown in Table 6-5. Should the number of required tickle vents be different to achieve compliance with Building Regulations AD-F, Anderson Acoustics should be advised as it may have an impact on specified performances.

Table 6-5: Element normalised level difference $D_{n,e}$ (dB) of trickle ventilators

Ventilation Ref.	Description	125	250	500	1k	2k	4k	$R_w / R_{w+} + C_{tr}$
V1	High performance through-the-frame acoustic trickle ventilator e.g. Renson Invisivent EVO AK Ultra	47	38	36	41	55	62	41/40
V2	Medium acoustically rated through-the-frame trickle ventilator	30	33	38	37	36	36	38/36
V3	Low acoustically rated through-the-frame trickle ventilator	30	31	31	32	28	28	31/30

For unit ventilators, the measurements are based on BS EN ISO 10140-2:2010 Acoustics. *Laboratory measurement of sound insulation of building elements. Measurement of airborne sound insulation and rated in accordance with BS EN ISO 717-1:2013 "Acoustics – Rating of sound insulation in buildings and of building elements"*.

Windows should still be openable for purge or rapid ventilation, as requested by ADF. Internal noise level guidelines are generally not applicable under these exceptional events, which should only occur occasionally (i.e., to remove odour from painting, cooking etc.).

6.2 Summary of Façade Zoning

The blocks have been assigned the following zones which correspond to the different glazing and ventilation specifications.

Table 6-6: Proposed facade zoning and glazing specification

Façade Zone	Room Type	Glazing Ref.	Ventilator Ref.
Zone A	Bedroom	G1	V1
	Living room	G1	V2
Zone B	Bedroom	G2	V3
	Living room	G2	V3

The following Table 6-1 shows the proposed façade zoning summarised above for dwellings in Buildings A and B, along Old Road East, where higher noise levels are anticipated.

Figure 6-1: Proposed site plan markup showing proposed facade zones



Conversely, the remaining dwellings located to the south and rest of site are expected to incur lower levels of noise, and as such, the **Zone B** glazing and ventilator specifications will be applicable for these areas.

6.3 Element 3 – External Amenity Area Noise Assessment

As detailed in Section 2.3, BS 8233 states 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 measured noise levels presented in Section 4.3 indicate that some private balconies may be exposed to noise levels above the recommended 55 dB $L_{Aeq, 16hr}$, e.g. those overlooking Old Road East. It should be noted that most of the balconies and gardens with no line of sight to Old Road East across the proposed development, will generally be exposed to external noise levels below the 55 dB $L_{Aeq, 16hr}$ target.

As stated in BS 8233, “the external noise levels in amenity areas may not be achievable in all circumstances where development might be desirable and... a compromise between elevated noise levels and other factors, such as 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”.

Based on the exceedances expected in the balconies overlooking Old Road East of the development, other guidance in ProPG referring to this subject has been looked into; which suggests four alternatives to alleviate the potential impact of noisy external amenity areas in developments located in busy, urban areas.

The Stage 2 - Element 3 of the ProPG guidance document states that:

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

- *a relatively quiet facade (containing openable windows to habitable rooms) or a relatively quiet externally ventilated space (i.e. an enclosed balcony) as part of their dwelling; and/or*
- *a relatively quiet alternative or additional external amenity space for sole use by a household, e.g. a garden, roof garden or large open balcony in a different, protected, location); and/or*

- *a relatively quiet, protected, nearby, external amenity space for sole use by a limited group of residents as part of the amenity of their dwellings; and/or*
- *a relatively quiet, protected, publicly accessible, external amenity space (e.g. a public park or a local green space designated because of its tranquillity) that is nearby (e.g. within a 5 minutes walking distance). The local planning authority could link such provision to the definition and management of Quiet Areas under the Environmental Noise Regulations.*

As mentioned in BS8233 and summarised in Section 2, a balance is needed between the provision of private external amenity areas for enjoyment of residents and the acceptance of periodically noisier balconies, where development is desirable. It is likely that most residents would prefer a balcony, regardless of the external noise levels it is exposed to, rather than no balcony at all.

Bearing all the above in mind, given the development includes communal green space located within the south-eastern area of the development, the possibility of accessing such quiet external amenity area should partially offset the localised noise impact on the private balconies exposed to higher noise levels (mostly those facing Old Road East). It is therefore considered that external noise levels in amenity areas of the development are acceptable for residential use.

6.4 Element 4 – Assessment of Other Relevant Issues – Overheating

The AVO Guide has been used to assess the suitability of the development to use openable windows as a means of controlling overheating. As detailed in Section 2.6, guidance includes target internal ambient noise levels, operational noise levels for mechanical services and details on ventilation methods including their suitability for mitigating overheating within dwellings. A Level 1 site risk assessment of noise from transport noise sources relating to the overheating condition indicates a potential medium to high risk on the most exposed bedrooms (generally those on the north façades facing Old Road East), based on external noise levels measured during the unattended survey. The remaining façades will be exposed to levels indicative of a lower risk.

6.4.1 Overheating: Approved Document O

Overheating: Approved Document O (AD-O) of the Building Regulations has been used to set appropriate acoustic criteria for bedrooms during the overheating condition, as defined by the regulations. AD-O provides the following guidance where open windows are used to mitigate the overheating condition:

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

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

Please note that this AD-O criteria only applies to the new build aspects of the development.

6.4.2 Façade Incident Noise Levels

The development has been split into two separate façade zones. An indicative assessment of façade incident noise levels has been carried out which are based on the measured noise levels summarised in Section 4.3 and the façade zones shown in Figure 6-1. The following initial strategy applies to bedrooms only, aimed at achieving the night-time noise criteria stipulated in Approved Document O:

Table 6-7: Recommended development cooling strategy

Façade Zone	Recommended Cooling Strategy
Zone A*	Alternative ventilative cooling likely to be required, e.g. louvres or mechanical cooling
Zone B*	Fully open windows / no constraints
Rest of site	Fully open windows / no constraints
*Only applies to new buildings i.e. not refurbished	

At the time of writing this report, it is understood that a thermal/ overheating specialist is yet to be appointed, and as such, outlined advice is indicative. Should a thermal/ overheating specialist be appointed in the future, we recommend a coordinated strategy to be finalised at a later stage.

7 NOISE GENERATED BY THE DEVELOPMENT

7.1 Assessment of Road Traffic Noise Impact

An outline assessment of road traffic noise impact generated by the development has been carried out and the methodology and results are presented in this section. Road traffic noise impact assessments have been undertaken for the following areas:

- Cumulative traffic increase from site
- Doctors surgery car park
- Residential Car park to north-west of site

7.1.1 Noise Impact Criteria

The first two aims of the NPSE and the table from NPPG-Noise (Table B.1 in Appendix B) require that no significant adverse impact should occur and that, where a noise level which falls between a level which represents the lowest observable adverse effect and a level which represents a significant observed adverse effect, then according to the explanatory notes in the statement:

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

Therefore, taking an overview of national policy it is clear that when considering the impact of noise, one must consider the significance of any impact.

With the above in mind, along with relevant national policies (Appendix B), the following NPSE effect level categories are proposed.

Table 7-1: Noise Policy Statement for England effect level categories

Change in L_{eq} Ambient Noise Level (dBA)	Impact Classification	NPSE Assessment
0.1 – 2.9	Slight or Insignificant Impact	No Observed Adverse Effect
3.0 – 4.9	Moderate Impact	Lowest Observed Adverse Effect
4.9 – 9.9	Substantial Impact	Significant Observed Adverse Effect
> 10	Severe Impact	Unacceptable Observed Adverse Effect

7.1.2 Environmental Noise Model

To provide a detailed assessment of the potential transportation noise impact generated by the proposed site, a 3D environmental noise model has been produced using the CadnaA Datakustik software, which includes all proposed buildings and existing surrounding buildings.

The results of the noise modelling are used to determine the likely impact of development sound levels incident on each NSR surrounding the site.

The following general settings pertinent to the road traffic noise impact assessment were used in the model:

- A horizontal area source was used for vehicle movements within the car parks.
- A line source was used for the site access road to assess peak hourly vehicle passbys at the worst affected NSRs.

7.1.3 Noise Sensitive Receptors (NSRs) Used in Assessment

The following NSRs have been considered, these are also shown on the site plan markup in Figure 7-1. It is assumed that these windows belong to bedrooms, to provide a worst-case assessment.

- NSR 1: Front facing first floor windows of 48 Old Road East.
- NSR 2: Rear facing first floor windows of 48 Old Road East.
- NSR 3: Rear facing first floor windows of 44 Old Road East.

Figure 7-1: Proposed site plan showing NSR locations for traffic noise impact assessment



7.1.4 Noise Reduction Provided from Site Boundary Treatment

Hollaway Architects has advised that sections of the site boundary treatment to both the doctors surgery car park and the residential car park to north-west of site will comprise a solid timber fence, with minimal perforations; a minimum height of 1.7 m above ground level and a minimum surface density of 10 kg/m². These structures have been included in the environmental noise model such that acoustic screening provided by these is considered in the assessment. For the remaining site boundaries, it is understood that these will be formed of grass and/or hedgerows, which will provide minimal to no acoustic reduction.

Figure 7-2: Site plan markup showing proposed extent of solid boundary treatment (green)



7.1.5 Existing Background Sound Levels

The noise impact from the development have been assessed to the existing period averaged $L_{Aeq,T}$ ambient sound levels summarised in Section 4.3 of this report. Where the cumulative increase of the existing $L_{Aeq,T}$ ambient levels has been assessed. The calibrated environmental noise model has been used to determine the existing ambient noise levels at NSRs 1, 2 and NSR 3. These levels are summarised below.

It should be noted that the assessment has only been carried out for the daytime period which includes the opening hours of the doctors surgery and where a majority of the traffic movements occur.

Table 7-2: Existing $L_{Aeq,T}$ ambient noise levels at NSR locations

NSR Location	Existing $L_{Aeq,T}$ Ambient Noise Level (dB)
	Daytime (07:00 to 23:00 hours)
NSR 1	66.4
NSR 2	46.6
NSR 3	49.5

7.1.6 Proposed Traffic Flow Data

Mode Transport Planning has provided the Annual Average Weekday Traffic (AAWT) traffic flow data for the proposed site, which are summarised below:

Table 7-3: AAWT traffic flows for proposed site

Location	Peak Hour Annual Average Weekday Traffic Flow (One-way Vehicle Movements)	
	08:00 – 09:00 hours	17:00 – 18:00 hours
Cumulative traffic increase from site (site entrance)	51	54
Doctors surgery car park	80	84
Residential Car park to north-west of site	7	8

AAWT flows have not been provided for vehicle movements during the night-time period (23:00 – 07:00 hours). Following a review of the 24-hour AAWT flow data for the overall scheme, it is anticipated that there will typically be no more than 8 one-way movements per-hour at the site entrance.

There is no split of vehicle types in the traffic flow data. However, it has been confirmed that there will be no new HGV movements, except for weekly refuse collection trucks where it is expected that there should be no more than two, two-way refuse truck trips per week. Accordingly, the assessment of these have been scoped out due being so infrequent.

Given the residential nature of the development, it would be reasonable to assume that a majority of vehicle movements will comprise cars where there will be occasional van movements. It is also expected that staff and patients of the GP surgery will travel to site by car.

7.1.7 Vehicle Source Noise Data

The source data used in the assessment has been extracted from Anderson Acoustics in-house database. The source data used for vehicles is shown in the table below:

Table 7-4: Vehicle source noise data used in assessment

Source	L_{AE} Sound Pressure Level (dB)	Measurement Distance (m)
Car accelerating away	67	10

7.1.8 Assessment Results

Table 7-5 shows the results of the assessment when considering traffic noise impact from the peak hour and the increase to the prevailing ambient noise level at each NSR.

Table 7-5: Results of traffic noise impact assessment

Location	NSR Location	Predicted Peak Hour $L_{Aeq,T}$ at NSR Window (dB)	Existing $L_{Aeq,T}$ Ambient Noise Level (dB)	Resultant Cumulative Ambient Noise Level (dB)	Increase to Existing Daytime $L_{Aeq,T}$ Ambient Noise Level (dB)
Cumulative traffic increase from site (site entrance)	NSR 1	35.6	66.4	66.4	0.0
Doctors surgery car park	NSR 2	38.7	46.6	47.3	0.7
Residential Car park to north-west of site	NSR 3	42.8	49.5	50.3	0.8

When comparing the increase in noise level change, the subjective significance of the worst-case increase of 0.8 dBA is considered to be a slight impact, whilst it falls into the No Observed Adverse Effect Level NPSE category shown in Table 7-1.

7.2 Assessment of Atmospheric Plant Noise Impact

At this early stage of the design process, full details of the proposed external building services equipment have not yet been developed. Therefore, it is not possible to provide a full and detailed assessment of plant noise impact. Environmental plant noise limits should be set to protect the amenity of nearby noise sensitive receptors, as well as future residents of the development itself. Limits should be set in accordance with BS 4242: 2014 'Methods for rating and assessing industrial and commercial sound' and relevant criteria stipulated by local planning policy. The results of the background sound survey data presented in Section 4.3 of this report could be used to set plant limits, e.g. via planning condition.

It is understood that externally located building services equipment serving the doctors surgery will be installed on the roof of this building. Noise breakout from air conditioning condenser and air source heat pump units can be mitigated by acoustic screening. Whereas noise breakout from ducted fan units can be mitigated by in-duct attenuators. It is recommended that detailed advice on the plant noise mitigation strategy is provided during the detailed design stages.

8 CONCLUSIONS

Anderson Acoustics Ltd was commissioned by Galliard (Gravesend) Limited to provide a planning stage noise impact assessment for the proposed redevelopment of the Galliard (Gravesend) Limited, which will involve the demolition of existing buildings and the construction of 54 new residential dwellings, associated parking and green space, as well as the establishment of a new general practitioner (GP) clinic.

The assessment has been undertaken following the guidance in the Professional Planning Guidance on Planning & Noise: New Residential Development (the ProPG), whilst cognisant of the relevant national and local noise policies.

The measured noise levels were used to carry out calculations in accordance with BS EN 12354-3 to estimate internal ambient noise levels within dwellings. The noise levels calculated should not exceed BS 8233 guidelines if the following measured are adhered to:

- The external building fabric of the scheme should include glazing capable of achieving minimum sound reduction performance of 33 dB $R_w + C_{tr}$ in habitable rooms of Façade Zone A; 27 dB $R_w + C_{tr}$ in habitable rooms of Zone B and the remainder of site.
- Ventilation will be provided, which will require acoustic trickle ventilators to be fitted to all bedrooms and living rooms, to achieve a minimum element normalised level difference ranging between 36 $D_{n,e,w} + C_{tr}$ and 40 $D_{n,e,w} + C_{tr}$ for Façade Zone A); and 30 $D_{n,e,w} + C_{tr}$ for Façade Zone B and rest of site.

With respect to mitigating internal noise levels during the overheating condition, the initial assessment shows that openable windows are expected to increase internal noise levels to an unacceptable level on Façade Zone A (as detailed in Figure 6-1). Therefore, an alternative ventilative cooling method to fully openable windows is likely to be required in these areas. Openable windows are likely to be suitable on Façade Zone B and the rest of site due to the lower noise levels experienced in these areas.

The proposed balconies along the northern site boundary are expected to exceed the upper guideline value of 55 dB $L_{Aeq,16hr}$, though, this is expected to be at least partially offset by the access to nearby communal green space included within the scheme. The proposed garden and balcony areas throughout the remainder of the scheme are expected to provide a good level of amenity in outdoor living areas.

The impact of transportation noise associated with the development on nearby existing noise sensitive receptors show that noise level increase is marginal and falls into the “No Observed Adverse Effect Level” NPSE category. As such, it is considered that the noise level increase as a result of the development is not likely to unduly affect the nearest noise sensitive receptors.

Details of proposed building services equipment have not yet been developed at this stage of the design. As such, it is recommended that a detailed noise impact assessment is undertaken during the detailed design stages of the development.

With the above in mind, providing the above is incorporated in the design of the development, our recommendation to the decision maker would be to grant planning consent.

9 REFERENCES

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- [12] The British Standards Institution, *Acoustics — Rating of sound insulation in buildings and of building elements — Part 1: Airborne sound insulation*, BSI, 2013.
- [13] The British Standards Institution, *Acoustics. Laboratory measurement of sound insulation of building elements - Measurement of airborne sound insulation*, 2021.
- [14] HM Government, *The Building Regulations: Ventilation - Approved Document F*, 2021.
- [15] British Standards Institution, *ISO 9613-2:1996 - Acoustics. Attenuation of sound during propagation outdoors - General method of calculation*, London: BSI, 1996.

APPENDIX A

NOISE SURVEY TIME HISTORY GRAPHS



Figure A-1: Unattended monitoring UP1 – time history results

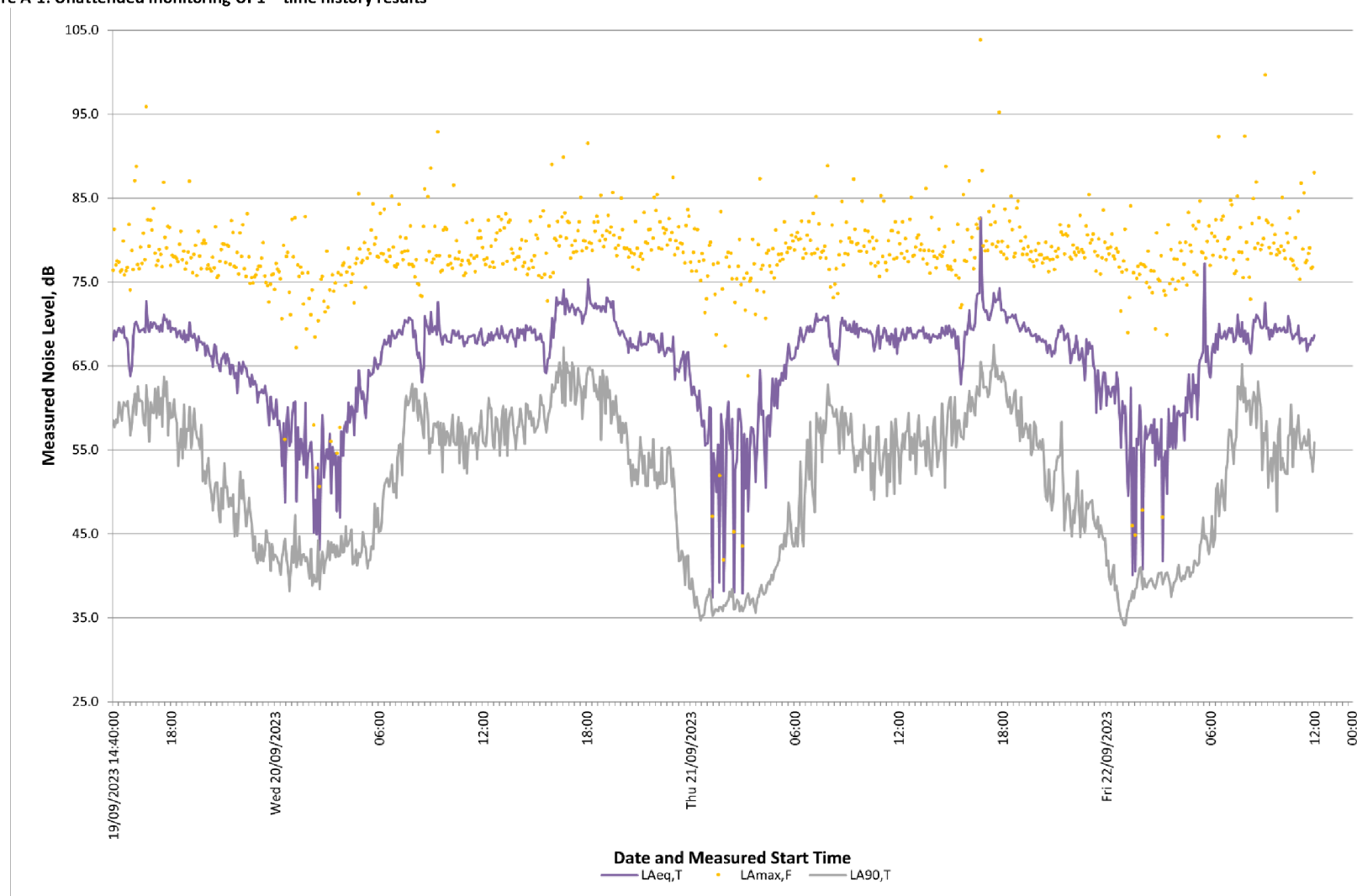


Figure A-2: Unattended monitoring UP2 – time history results

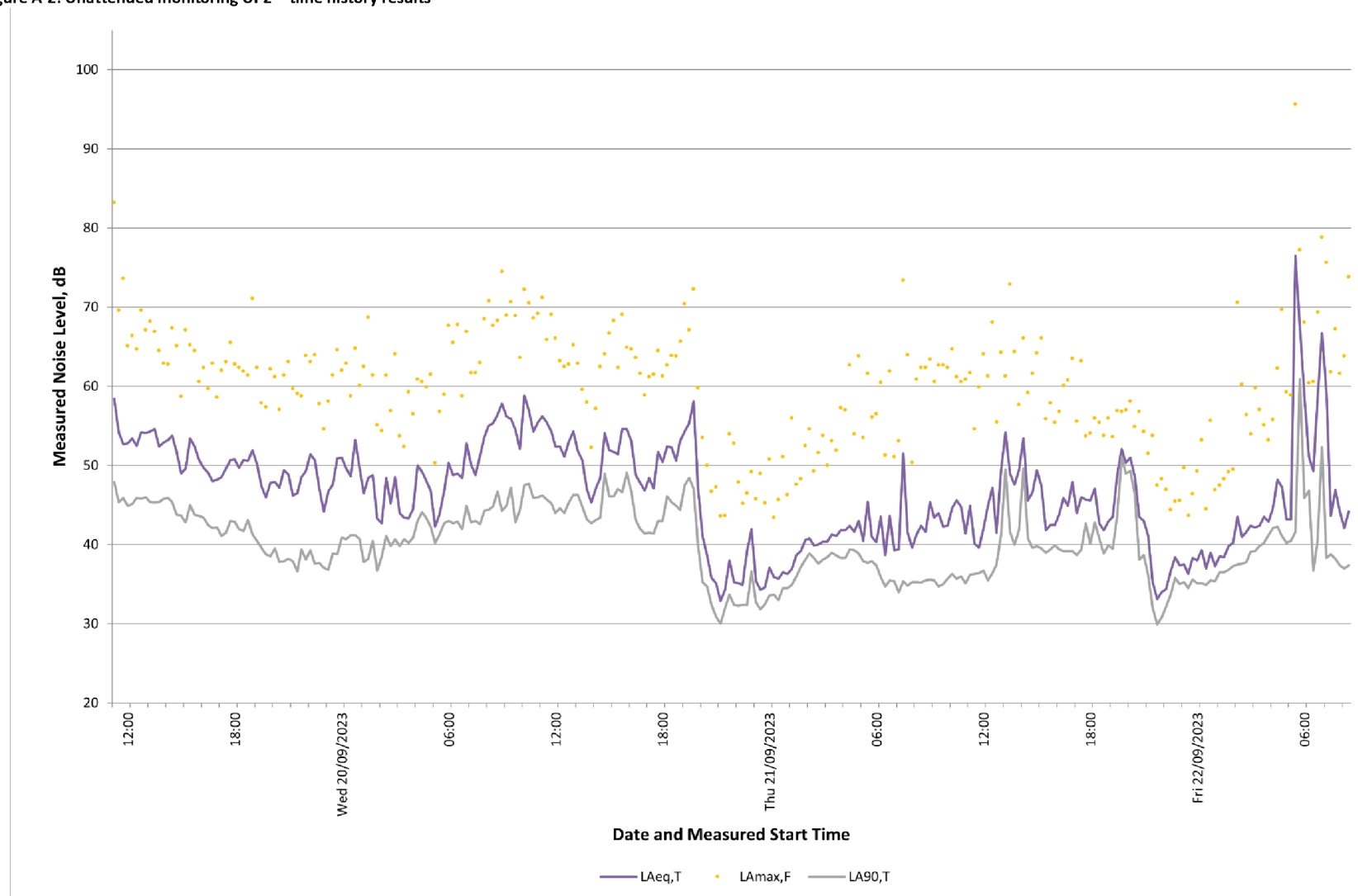
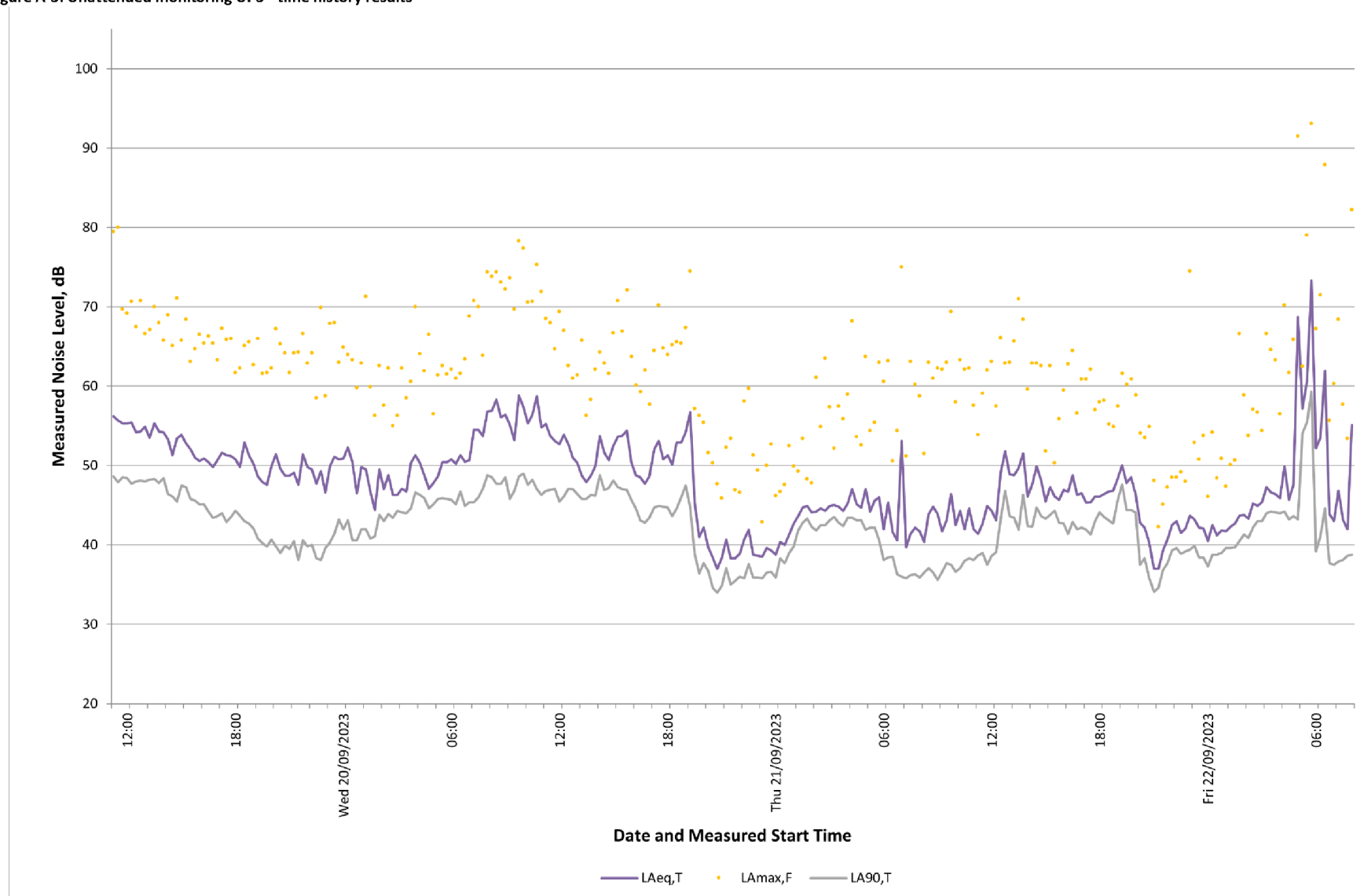


Figure A-3: Unattended monitoring UP3 - time history results



APPENDIX B

NATIONAL PLANNING GUIDANCE

B.1 National Policy

The national policy of relevance comprises the Noise Policy Statement for England (NPSE, 2010) and the online National Planning Policy Framework (NPPF, regularly updated) and its associated planning practice guidance on “Noise” (also regularly updated). The guidance is necessarily generic and primarily geared towards local authorities preparing their own policies and associated guidance. The documents are described below.

B.2 Noise Policy Statement for England (NPSE)

The NPSE is the Government’s overarching statement on noise policy for England, and applies to all forms of noise other than occupational noise, setting out the long-term vision of Government noise policy, which is to:

Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.

Which is supported by the following noise policy aims:

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

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

When discussing the meaning of significant adverse and adverse within an Explanatory Note, the NPSE states:

There are two established concepts from toxicology that are currently being applied to noise impacts for example, by the World Health Organisation. They are

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

LOAEL – Lowest Observed Adverse Effect Level - This is the level above which adverse effects on health and quality of life can be detected.

To which the NPSE added the following related concept:

SOAEL – Significant Observed Adverse Effect Level - This is the level above which significant adverse effects on health and quality of life occur.

The Explanatory Note continues:

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.

The NPSE concludes by explaining in a little more detail how the LOAEL and SOAEL relate to the three aims listed above. Logically, it starts with the aim of avoiding significant adverse effects on health and quality of life, then addresses the situation where the noise impact falls between the LOAEL and the SOAEL, when “all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development.” The final aim envisages proactive management of noise to improve health and quality of life, again taking into account the guiding principles of sustainable development.

B.3 National Planning Policy Framework (NPPF, 2023)

First published in 2012, and most recently updated in July 2023, the NPPF sets out the Government's planning policies for England, and how these are expected to be applied. Noise is referenced within the NPPF as follows. These are effectively the NPPF's policies on noise.

"174. Planning policies and decisions should contribute to and enhance the natural and local environments 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...

185. 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 life⁶⁰..."

Reference number 60 of the above quotation points to the Explanatory Note to the NPSE (see above).

The following policy is also relevant to noise.

"187. 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."

As mentioned above, the Government has published accompanying web-based planning guidance for a number of categories, including noise (see below).

B.4 NPPF Planning Practice Guidance, Noise (PPG-N, 2019)

Following initial release in 2014, the planning practice guidance now forms part of the NPPF, referred to as relevant planning practice guidance, which includes guidance on the category of Noise. The guidance is often referred to as PPG-Noise, PPG-N or PPG(N).

In keeping with the NPSE and NPPF, no values (in dB) are presented; however, guidance is provided as to the issues to consider in assessing noise and determining suitable thresholds.

A noise exposure hierarchy table is provided, which summarises the noise exposure hierarchy based on the likely average response of those affected, and is reproduced below. It includes examples of outcomes relevant to the NOEL, LOAEL and SOAEL effect thresholds described in the NPSE. These outcomes are in descriptive form; there is no numerical definition of the NOEL, LOAEL and SOAEL.

Table B.1: NPPG Noise Exposure Hierarchy

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

It is left to other guidance documents and professional opinion to determine thresholds where required.

B.5 Noise Level Change

The below Table B-2 shows the range of responses to changes in noise levels; this table was included in the *“Institute of Acoustics / Institute of Environmental Management & Assessment - Working Party Consultation – Draft (2002)”* draft publication.

It should be noted that this document has since been superseded by *“Institute of Environmental Management & Assessment – Guidelines for Environmental Noise Impact Assessment”* (IEMA). The Institute of Acoustics (IOA) is no longer associated with the publication and the categories shown in Table B-2 have been removed from the guidance.

Instead, a similar table is presented within IEMA - Table 7.14. However, a caveat is provided noting that it is part of an example from the *“HS2 Phase 1 Environmental Statement”*. This table is often used to determine the magnitude of impact of travel infrastructure projects and a further example can be found in the *“Design Manual for Roads &*

Bridges". It is, therefore, clear that such an impact assessment has been developed to assess impacts of travel infrastructure.

Table B.2: Noise Policy Statement for England effect level categories

Change in Equivalent Noise Level (dBA)	Subjective Impression of Loudness	Impact Classification
0 – 3	Imperceptible	Slight impact
3.1 – 5	Perceptible change	Moderate impact
5.1 – 10	Up to doubling of loudness	Substantial impact
> 10	Greater than doubling of loudness	Severe impact