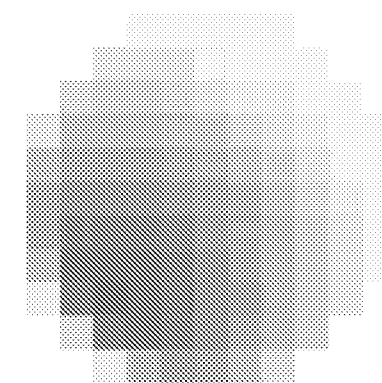
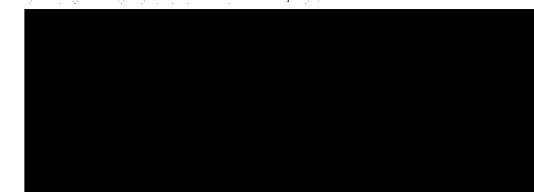




sol
acoustics

Unit 11, Brunel Court, Gadbrook Park, CW9 7LP



Former Bartons Infant School
North Bersted
Stage 2 Environmental & Intrusive Noise Assessment Report

P1998-REP01-REV A-TW
23 March 2022



PROJECT: Former Bartons Infant School
North Bersted
Stage 2 Environmental & Intrusive Noise
Assessment Report

CLIENT: Lovell
100 St. John Street
London
EC1M 4EH

DOCUMENT
REFERENCE: P1998-REP01-REV A-TW

SIGNED: 
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CHECKED: 
THOMAS LEACH

DATE: 23 March 2022

SUMMARY

Sol Acoustics Limited has been commissioned by West Sussex Property Development LLP to undertake an acoustic design assessment of the proposed development on the site of the former Bartons Infant School, North Bersted, in support of the Planning Application. The development will provide twenty one new-build residential dwellings, ranging from two-bed to four-bed units, with a mixture of private, affordable and shared-ownership housing.

The purpose of this acoustic report is to assess the suitability of the development site as based on the pre-existing environmental noise climate on-site as measured by Sol during December 2021, together with reference to the guidance presented in '*Professional Planning Guidance: Planning and Noise*' and BS8233: 2014 '*Guidance on sound insulation and noise reduction for buildings*'.

Acoustic guidance is also presented concerning the impact of mitigating residential summertime overheating using a natural ventilation strategy in accordance with the assessment framework provided in '*Acoustics, Ventilation and Overheating, Residential Design Guide 2020*'.

Appropriate daytime and night time environmental noise limits for M&E plant (and associated louvres, cowls etc.) have been set herein, all as based on the results obtained from the environmental noise surveys undertaken, and all as discussed within this report.

This report demonstrates that the proposed development site can be categorised as a “negligible risk to low risk” site as defined by '*Professional Planning Guidance: Planning and Noise*', and therefore the development site is acceptable from a noise perspective.

Appropriate indoor ambient noise levels can be achieved within all proposed internal habitable rooms across the development with an open-window background ventilation strategy and standard non-acoustic glazing. It is further considered that the proposed scheme provides high-quality external amenity spaces for the residents of the development.



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1 INTRODUCTION

Sol Acoustics Limited (“Sol”) has been commissioned by West Sussex Property Development LLP to undertake an acoustic design assessment of the proposed development on the site of the former Bartons Infant School, North Bersted, in support of the Planning Application.

The proposed development will provide twenty one new-build residential dwellings, ranging from two-bed to four-bed units, with a mixture of private, affordable and shared-ownership housing.

The purpose of this acoustic report is as follows:

- To assess the residential scheme in accordance with ‘*ProPG: Planning & Noise 2017*’
- To determine outline acoustic performance specifications for the building envelopes based on the pre-existing environmental noise climate on-site and appropriate internal ambient noise levels stated within the relevant design guidance.
- To provide acoustic guidance concerning the impact of mitigating residential summertime overheating using a natural ventilation strategy in accordance with the assessment framework provided in ‘*Acoustics, Ventilation and Overheating, Residential Design Guide 2020*’.
- To specify appropriate daytime and night-time environmental noise limits for M&E plant based on the results obtained from the environmental noise survey undertaken at site.

2 DESCRIPTION OF SITE

2.1 General Overview of the Site and Surroundings

The development site is located on the grounds of the former Bartons Infant School within the town of North Bersted and lies within Arun District Council. The site has an area of approximately 0.61 hectares and is bounded to the west by Romey Broadwalk, and to the north, east and south by existing residential properties. The greater area surrounding the site predominantly comprises residential properties.

The principal environmental noise source at the site is road traffic noise from the surrounding road traffic network, with primary roads including Chichester Road, c.260 metres distance to the west and Rowan Way, c.85 metres distance to the north.

Figure 1 overleaf shows the proposed development site location in relation to the current existing surrounding area.

2.2 Development Proposals

As shown in Figure 2, the proposed development comprises twenty one new-build residential dwellings, ranging from two-bed to four-bed units, with a mixture of private, affordable and shared-ownership housing.

The proposed properties consist of detached and semi-detached houses set out around a central communal green area and access road, with access to the development from Romney Broadwalk. It is understood that all properties will have access to private gardens plus a central communal green area.



Figure 1: Proposed development and surroundings (Google Earth, 2021)



Figure 2: Plan of proposed development (c/o Lovell, March 2022)



3 **DETAILS OF INVESTIGATION**

3.1 **Basis of Acoustic Assessment**

In order to inform the environmental and intrusive noise study, it will be necessary to determine the potential noise impact expected from the key identified noise sources, namely road traffic noise from the surrounding road network, including Rowan Way and Chichester Road.

3.2 **Environmental Noise Surveys**

A long-term unattended environmental noise survey was conducted by Sol between 8th December and 10th December 2021. This consisted of a single measurement position, as shown in Figure 3 and described in Table 1:

Measurement Position	Description
MP1 (Unattended)	Mast mounted microphone sited in free field conditions, at a height of 2m in the centre of the development site, approximately 10m distance to the east of the pre-existing school building.

Table 1: Noise monitoring measurement positions summary

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

The prevailing weather conditions were generally suitable for the purposes of environmental noise measurements during the noise survey. A meteorological logging weather station was used and a period of heavy rainfall and wind speeds greater than 5m/s, occurring during 16:30 hours to 22:30 hours on 9th December, has been identified and excluded from the dataset.

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

3.3 **DEFRA Noise Exposure Data – Round 3 (2017)**

As part of the European Commission Environmental Noise Directive (Directive 2002/49/EC), DEFRA undertook strategic noise mapping in 2017 of the major road and rail transport sources across England. The daytime (L_{DE} in $L_{Aeq,16hr}$ terms) and night time (L_N in $L_{Aeq,8hr}$ terms) road noise map OGC data, as shown in Figure 4 and Figure 5, has been used to inform the acoustic assessment.

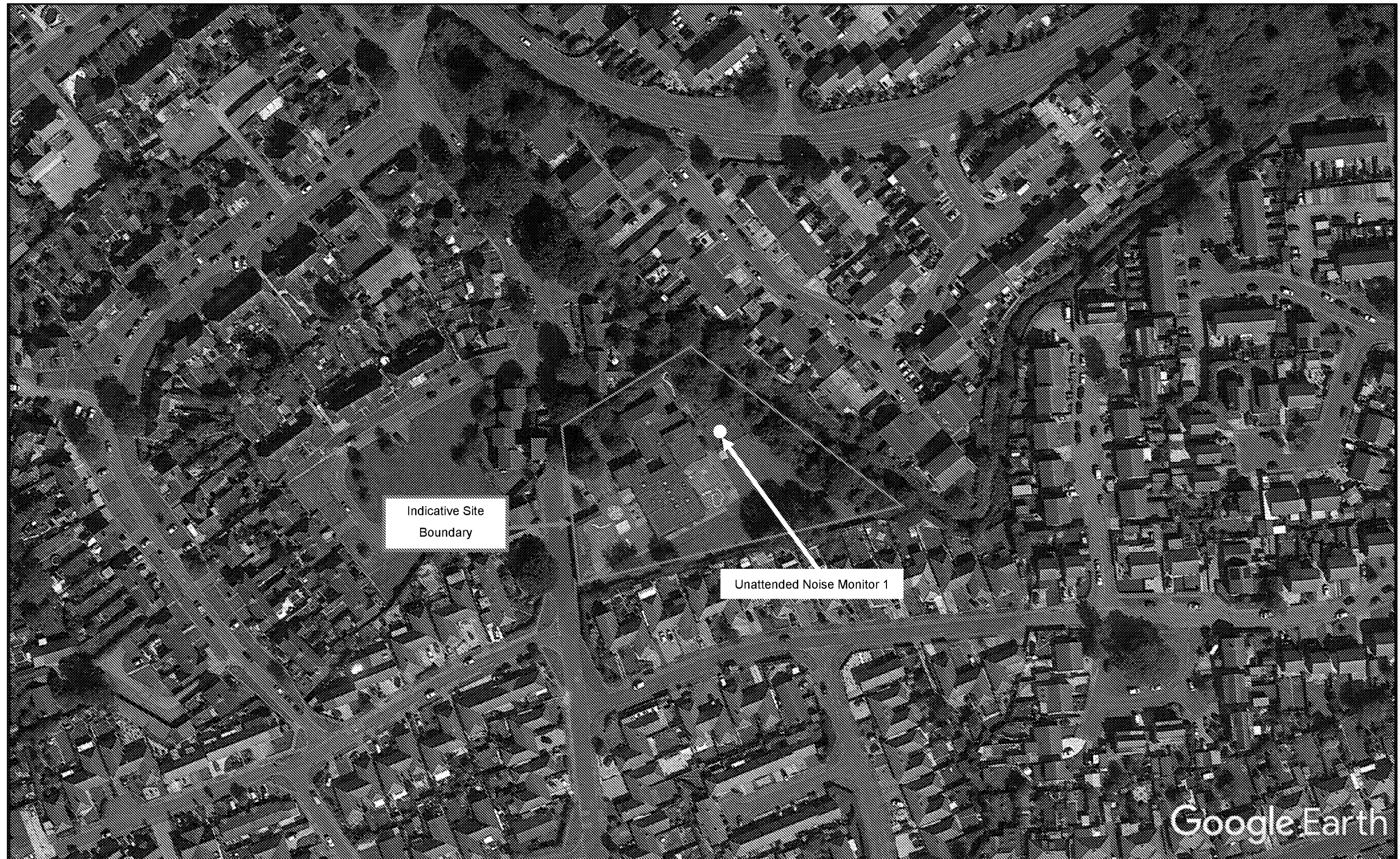


Figure 3: Aerial image showing environmental noise monitoring position (Google Earth 2021)

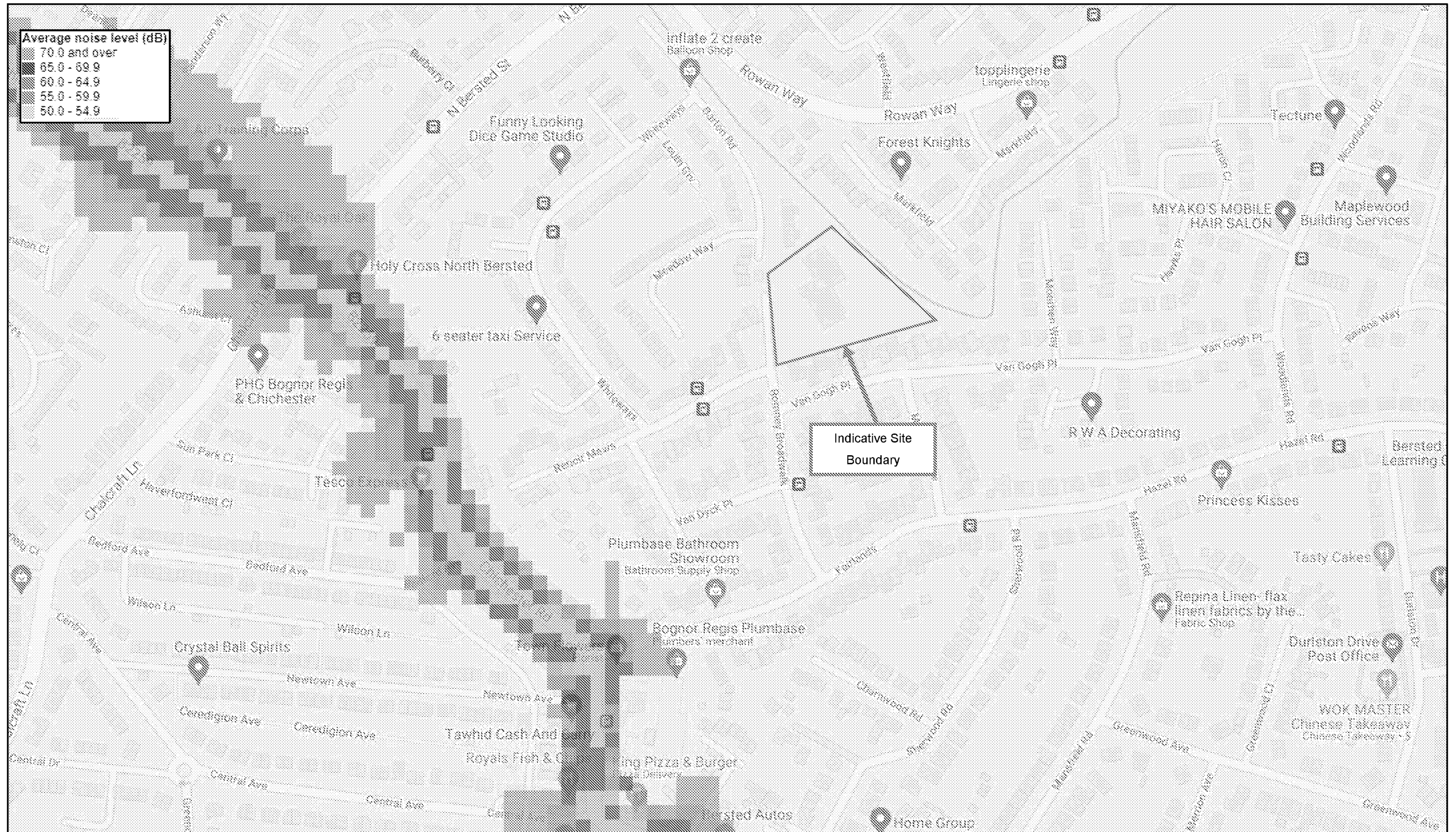


Figure 4: DEFRA strategic noise mapping – daytime road noise $L_{Aeq,16hr}$ (Extrium, 2021)

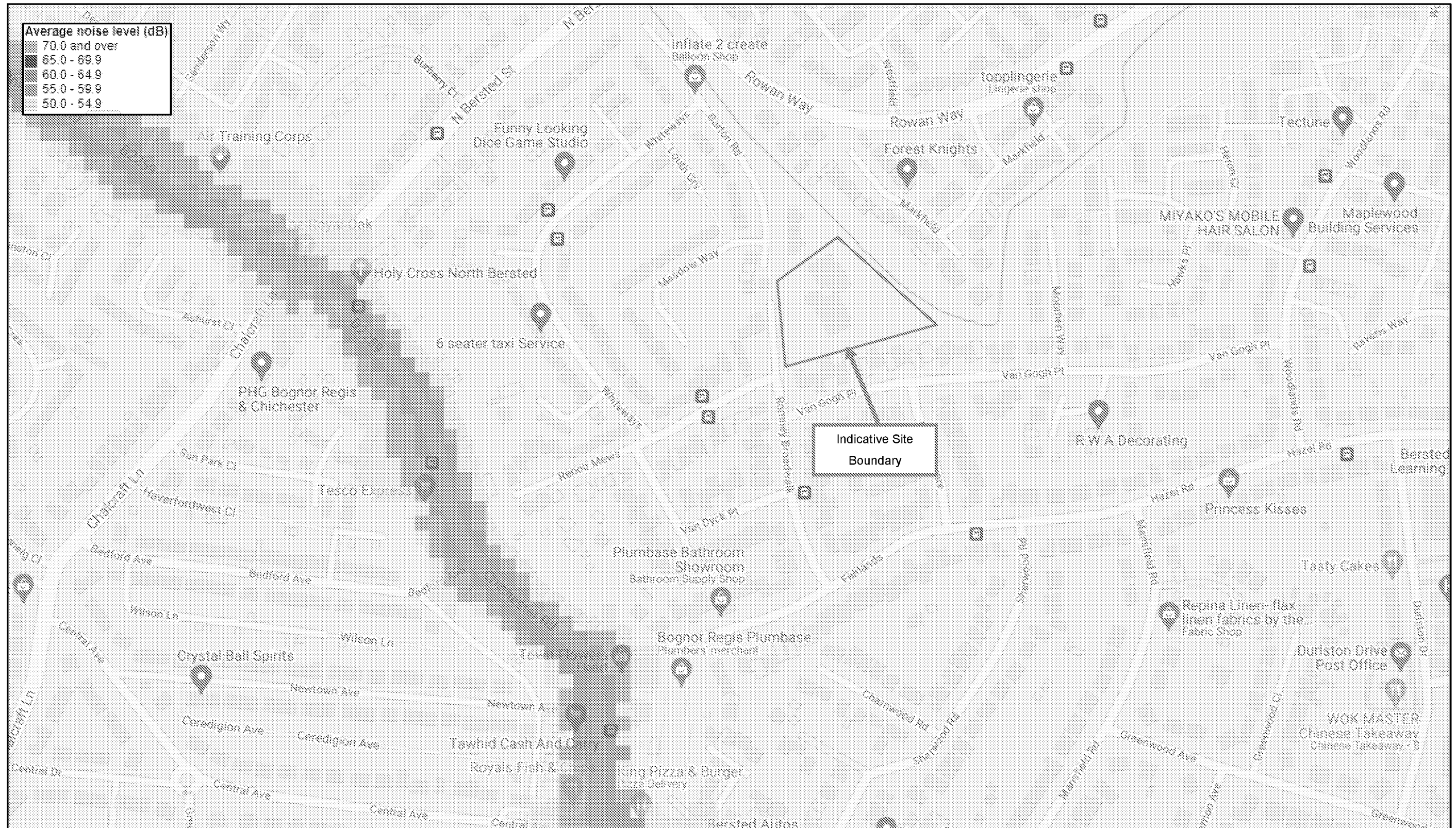


Figure 5: DEFRA strategic noise mapping – night time road noise $L_{Aeq,8hr}$ (Extrium, 2021)



4 ENVIRONMENTAL NOISE SURVEY RESULTS

4.1 Sol Environmental Noise Survey

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

Measurement Location	Typical Measured Noise Level (dB, Range L_{Aeq} , L_{Amax} and L_{A90})				
	Daytime		Night time		
	$L_{Aeq,16h}$	$L_{A90,15min}$	$L_{Aeq,8h}$	L_{Amax}	$L_{A90,15min}$
MP1	46	35 - 47	38 - 42	62 - 71	29 - 44

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

Appendix A provides further information and a full summary of the measurement data.

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

Measurement Period	A-weighted Broadband Noise Level, dB $L_{Aeq,T}$	Unweighted Sound Pressure Level (dB $L_{eq,T}$) @ Octave Band Centre Frequency (Hz)						
		63	125	250	500	1k	2k	4k
Daytime	46	54	47	45	42	41	37	35
Night time	42	56	46	41	38	38	32	28

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

5 PROPG: PLANNING AND NOISE (NEW RESIDENTIAL DEVELOPMENTS)

5.1 Stage 1 Assessment

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

ProPG provides a 2-stage systematic approach as follows:

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

5.1.1 Stage 1 Assessment

The Stage 1 assessment provides an early indication if noise levels across a proposed development site are likely to provide greater acoustic challenges based on a sliding scale of Risk of Adverse Effect, as shown in Figure 6, in accordance with the National Planning Policy Framework and the Noise Policy Statement for England.

Based on the as measured environmental noise levels and the calculated daytime and night-time noise levels across the façades of the proposed development, the worst-case affected façades of the development are designated as “negligible risk” (daytime) to “low risk” (night-time).

Therefore, for a “low risk” site, the Pre-planning application advice states the following:

‘... 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...’.

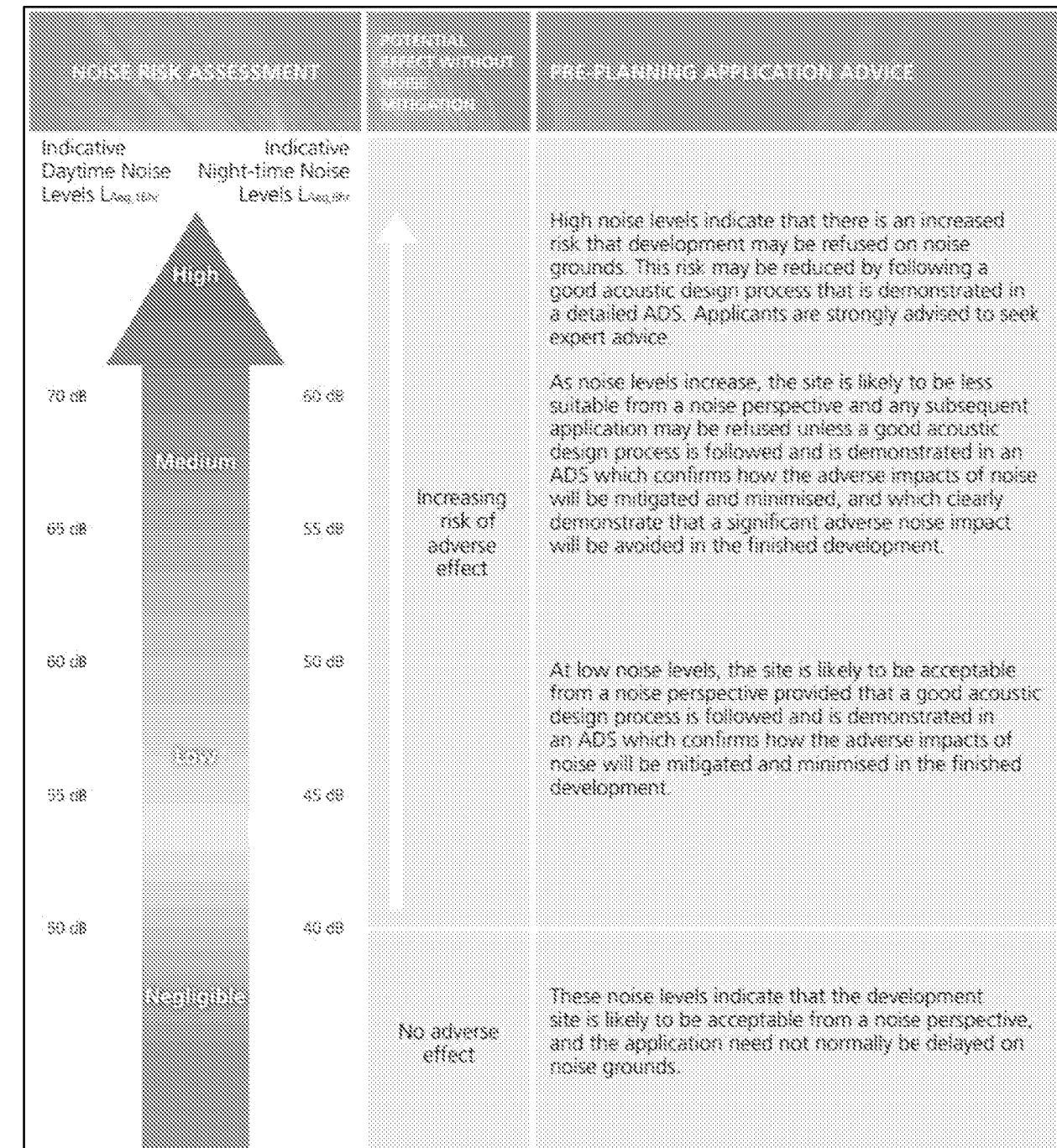


Figure 6: ProPG initial site noise risk assessment

5.2 Stage 2 Assessment

5.2.1 Element 1 – Good Acoustic Design Process

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

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

5.2.2 Element 2 – Internal Noise Level Guidelines

BS8233: 2014 ‘Guidance on sound insulation and noise reduction for buildings’ provides appropriate criteria for acceptable levels of noise ingress within dwellings.

In particular, Section 7.2.2 of the Standard, entitled ‘Internal ambient noise levels in dwellings’ states that ‘... In general, for steady external noise sources, it is desirable that the internal ambient noise level does not exceed the guideline values in Table 4 [of BS8233]’ as duplicated below in Table 4:

BS8233: 2014 – Indoor ambient noise levels for dwellings			
Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35dB $L_{Aeq,16hr}$	-
Dining	Dining room / area	40dB $L_{Aeq,16hr}$	-
Sleeping (daytime resting)	Bedroom	35dB $L_{Aeq,16hr}$	30dB $L_{Aeq,8hr}$

Table 4: Internal ambient noise level requirements as per BS8233

Note 7 of BS8233: 2014 states that: ‘... Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed up to 5dB and reasonable internal conditions still achieved.’

No specific performance recommendation is given within BS8233: 2014 regarding maximum (L_{Amax}) intrusive noise levels within bedrooms. ProPG expands on the guidance presented in BS8233: 2014.

Section 2.31 states that ‘... In noise sensitive rooms at night (e.g. bedrooms) individual noise events (from all sources) should not normally exceed 45dB $L_{Amax,F}$ more than 10 times a night as this represents a threshold below which the effects of individual noise events on sleep can be regarded as negligible.’

By taking account of the actual levels of ambient noise specifically measured at the future site façade locations, the proposed areas of façade elements and their intended constructions (i.e. glazing and walls), as well as the likely acoustic characteristics of the noise sensitive receiving space (i.e. living rooms, bedrooms), the sound reduction properties needed from each of the various building façade elements can be determined through acoustic calculation.

5.2.3 Element 3 – External Amenity Area Noise Levels

Regarding outdoor amenity spaces, BS8233: 2014 states the following:

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

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

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

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

Guidance provided in ProPG states that:

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

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

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

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

In summary therefore, the “upper guideline” noise level for external amenity spaces, as recommended by the Standard, is 55dB $L_{Aeq(16 \text{ hour})}$, albeit it is duly recognised that should ultimately not prohibit development if exceeded.

Any adverse impact can be further mitigated by providing access to other relatively quiet residential amenity areas.

5.2.4 Element 4 – Other Relevant Issues

5.2.4.1. Impact of Noise from Fixed Plant and Equipment

Whilst planning permission for the development is currently being sought, in line with the guidance outlined in Arun District Council's document 'Local Plan Policy QE DM1 – Noise Pollution', it is expected that the Arun District Council Planning Authority will impose a Planning Condition limiting the environmental noise level from fixed plant and equipment.

5.2.4.2. Acoustics, Ventilation & Overheating

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

Typically, new residential developments in urban environments require closed windows for reasonable internal noise conditions in accordance with BS8233: 2014. Until recently, this has often been assessed separately from the overheating strategy, which may require windows open for reasonable thermal conditions. This can result in residential accommodation in which the occupants may choose either acoustic comfort or indoor air quality and thermal comfort, but not achieve both simultaneously.

The AVO Guide provides a two-stage assessment, as shown in Figure 7, to highlight at the planning stage residential facades which may result in adverse or significant adverse noise impact when using an open window ventilation strategy, and to help the design team identify suitable overheating mitigation strategies.

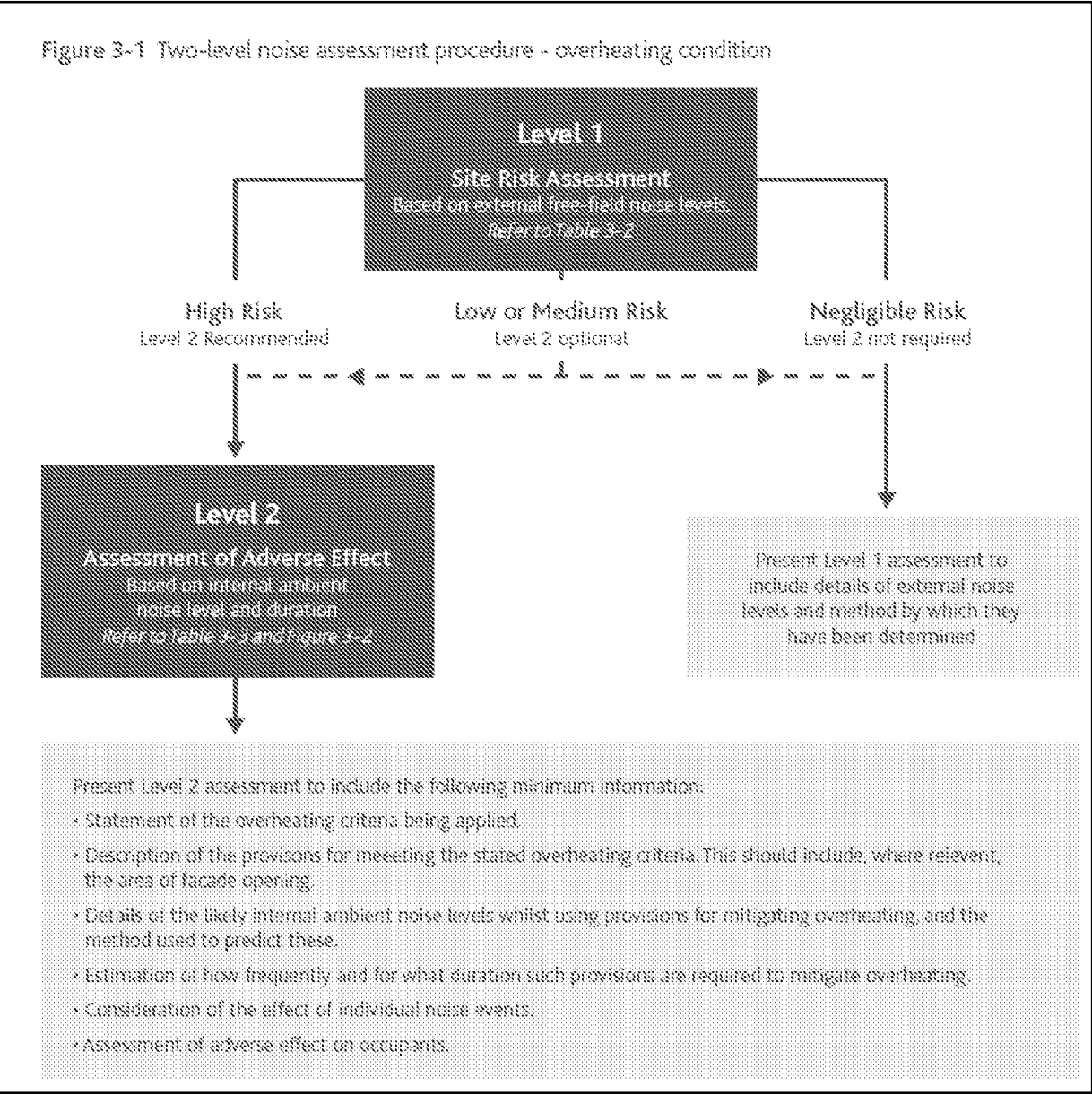


Figure 7: AVO Guide two stage assessment framework

6 RESIDENTIAL INTRUSIVE NOISE ASSESSMENT

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

For the Stage 2 intrusive noise assessment presented herein, typical window areas and room dimensions have been used in the absence of detailed plans, along with site layouts as provided by Lovell to Sol during December 2021.

6.1 Ventilation Strategy

6.1.1 Part F Background Ventilation

The Building Regulations Part F background ventilation strategy for the development is currently unknown, however, based on the as measured daytime and night-time noise levels of c.46dB $L_{Aeq,15h}$ and c.42dB $L_{Aeq,8h}$ respectively, representative 10th highest night-time L_{Amax} levels of 60dB $L_{Aeq,1s}$, and assuming an open-window transfer function of 15dB, it is concluded that an open-window background ventilation strategy is suitable for the proposed development, as based on predicted internal ambient noise levels.

If an open-window background ventilation strategy is unsuitable for other reasons, such as air quality, non-acoustic trickle vents (e.g. Titon Trimvent) in the building façade will be suitable to achieve the required internal ambient noise levels.

6.2 Building Envelope

6.2.1 Acoustic Specification for Glazing to Habitable Rooms

As based on the measured daytime and night-time noise levels, and assuming that the required internal ambient noise levels can be achieved with an open-window background ventilation strategy as discussed above, it is considered that suitable internal ambient noise levels can be achieved with standard non-acoustic glazing.

6.2.2 External Walls

The external façade build-up of the proposed development is unknown; however, considering the measured daytime and night-time noise levels, it is expected that any typical residential facade construction would easily satisfy the acoustic performance requirements.



7 EXTERNAL AMENITY AREAS NOISE LEVEL ASSESSMENT

7.1 Communal External Amenity Areas

Based upon the results of the environmental noise survey, the predicted daytime noise levels from road traffic noise within the communal garden and private residential gardens is c.46dB $L_{Aeq,16hr}$. It is therefore considered that the proposed scheme provides high-quality external amenity spaces for the residents of the development and that no further mitigation measures are required.

8 ACOUSTICS VENTILATION & OVERHEATING

8.1 Level 1 Site Risk Assessment

Based on the environmental noise survey results, the noise level from transportation noise sources at the most exposed residential façades of the development is predicted to be c.46dB $L_{Aeq,16h}$ during daytime periods, and c.42dB $L_{Aeq,8h}$ during night time periods.

In line with the AVO Level 1 Site Risk Assessment framework, as shown in Figure 8, the worst-case façades fall into the “Negligible Risk” category, for which the guidance states:

‘... Use of opening windows as primary means of mitigating overheating is not likely to result in adverse impact...’.

Therefore, a more detailed Level 2 assessment is not required for the proposed development.

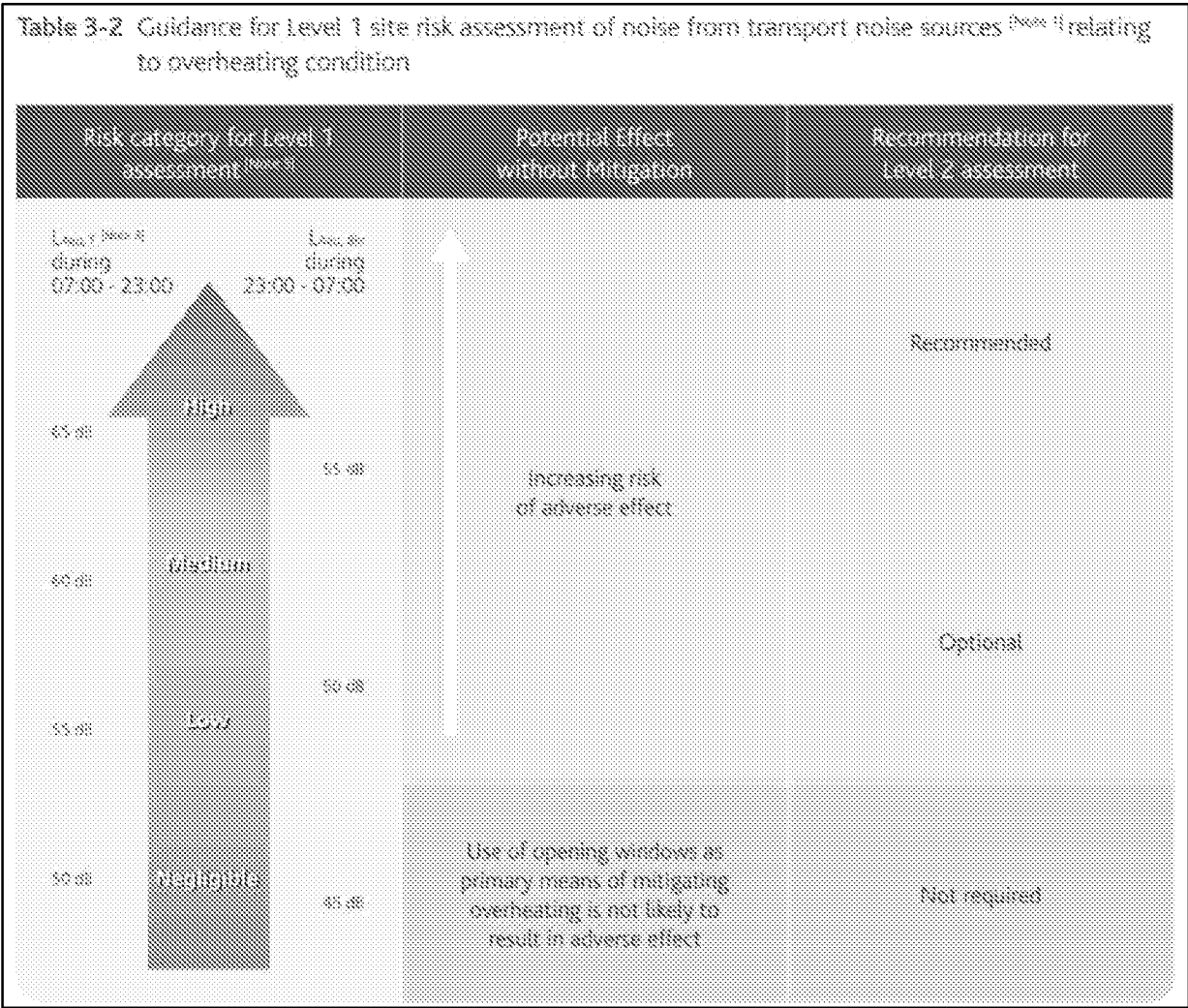


Figure 8: AVO Guide Level 1 Site Risk transportation noise levels thresholds



10 M&E PLANT NOISE LEVELS

10.1 Environmental Plant Noise Limits

Whilst planning permission for the development is currently being sought, in line with the guidance outlined in Arun District Council’s document ‘*Local Plan Policy QE DM1 – Noise Pollution*’, it is expected that the Arun District Council Planning Authority will impose a Planning Condition limiting the environmental noise level from fixed plant and equipment.

Accordingly, and in anticipation of the likely conditioned acoustic requirements, it is likely to be necessary to limit the total, aggregate environmental noise from all M&E plant, when operating simultaneously, to an ambient noise level (in $L_{Aeq,T}$ terms) equating to the typical, pre-existing daytime or night time background noise level at any residential property façade, in L_{A90} terms, *less a further 5dB* when assessed in accordance with BS4142: 2014.

Therefore, based on the results of an environmental noise study undertaken in December 2021, it is recommended that the total, aggregate environmental noise from all M&E plant at a distance of 1 metre externally from any residential window façade must be controlled to not exceed the rating noise levels (L_{A,r,T_r}) presented in Table 5:

Zone	Cumulative Plant Noise Limit 1m from any Façade dB L_{A,r,T_r} (free field)	
	Daytime (07:00 – 23:00hrs)	Night Time (07:00 – 23:00hrs)
All	38	27

Table 5: Maximum permissible noise level limits for all M&E plant

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

11 CONCLUSION

This report demonstrates that the proposed development site can be categorised as a “negligible risk to low risk” site as defined by ProPG, and therefore the development site is likely to be acceptable from a noise perspective.

Appropriate indoor ambient noise levels can be achieved within all proposed internal habitable rooms across the development with an open-window background ventilation strategy and standard non-acoustic glazing. It is further considered that the proposed scheme provides high-quality external amenity spaces for the residents of the development.

Appropriate daytime and night-time environmental noise limits have also been set for M&E plant (and associated louvres, cowls etc.), all as based on the results obtained from the environmental noise surveys undertaken, and all as discussed within this report.

APPENDIX A NOISE SURVEY DETAILS AND SUMMARY RESULTS

LOCATION

Former Bartons Infant School, North Bersted

DATES & TIMES

08 December 2021 to 10 December 2021

WEATHER CONDITIONS

Date	Daytime (07:00 - 23:00)				Night Time (23:00 – 07:00)			
	Temp, °C	Rain, mm	Wind Direction	Average Wind Speed, m/s	Temp, °C	Rain, mm	Wind Direction	Average Wind Speed, m/s
08/10/2021	7	0.3	S	1.2	6	0.2	SW	1.2
09/10/2021	8	7.3	SE	1.7	7	1.1	W	1.3
10/10/2021	5	0.0	W	1.5	-	-	-	-

PERSONNEL PRESENT DURING MEASUREMENTS

Tim Walton PhD AMIOA – Sol Acoustics Ltd

Dan Reeves – Sol Acoustics Ltd

INSTRUMENTATION

01dB Cube Sound Level Meter (serial no. 11114)

01dB Pre22 Microphone Preamplifier (serial no. 1610399)

Gras 40CD Microphone Capsule (serial no. 260807)

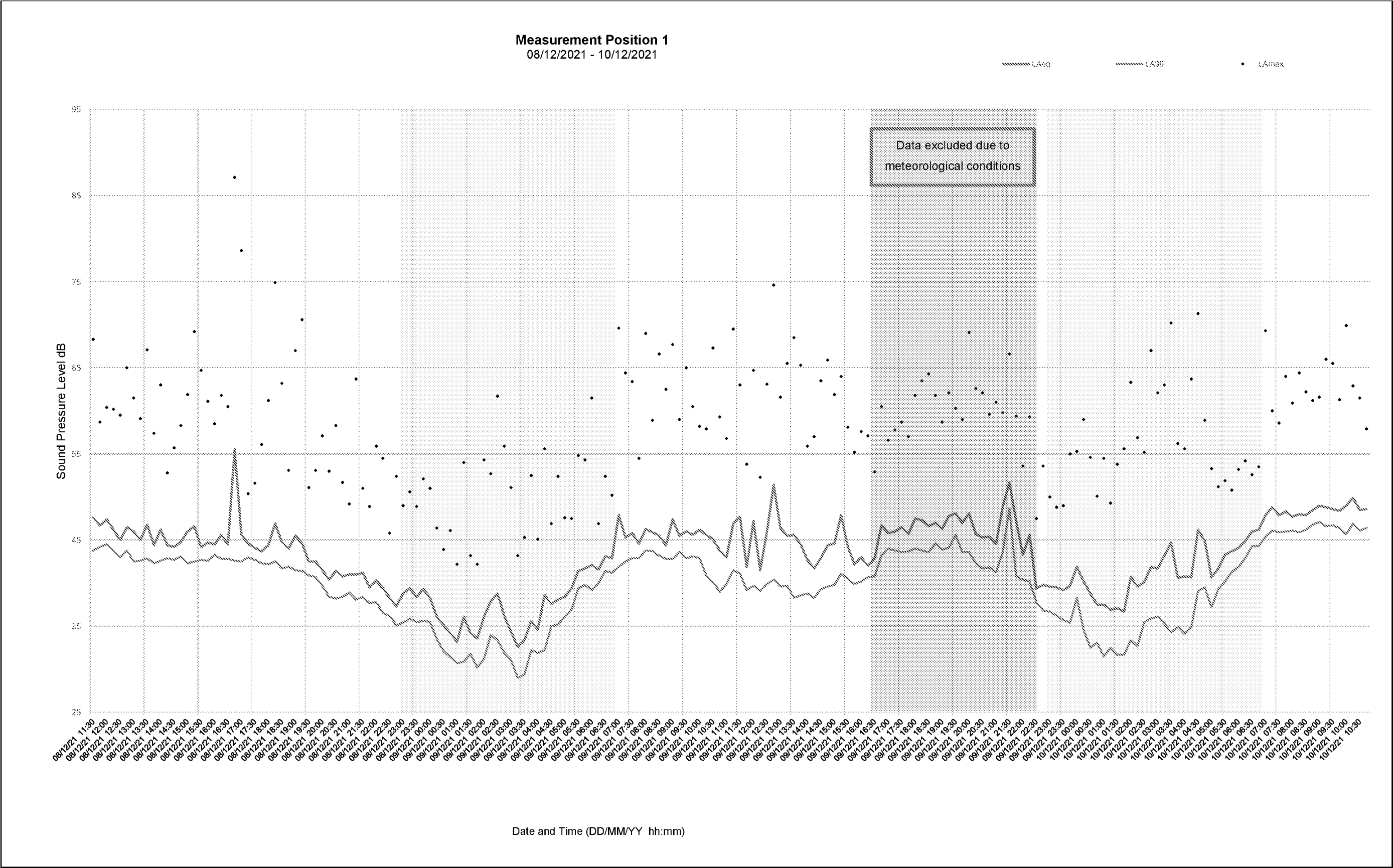
CAL21 Acoustic Calibrator (serial no. 34375244)

METHODOLOGY

Before and after the measurements the sound level meters were checked and calibrated to an accuracy of ± 0.3 dB using the 01dB CAL 21 Calibrator. The calibrator produces a sound pressure level of 94 dB re 2×10^{-5} Pa @ 1kHz.

MEASUREMENT RESULTS

Graph A1 summarises the results obtained from the noise survey at Measurement Position MP1.



Graph A1: Graph showing measured environmental noise levels as measured at Measurement Position MP1