BARWICK ROAD SITE

DOVER, KENT

PROPOSED RESIDENTIAL DEVELOPMENT

NOISE IMPACT ASSESSMENT

Report No. MRL/100/1929.1v1
November 2022

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1.0 INTRODUCTION

1.1 MRL Acoustics Limited was commissioned by Oliver Davis Homes to assess the impact of noise on a proposed residential development scheme at Barwick Road, Dover, Kent.

1.2 The scheme comprises the demolition of several large disused commercial buildings on the site and the construction of 137 no. new homes (73 no. houses, 64 no. flats) in a mixed residential/light industrial area on a brownfield site. There will be associated parking spaces for all the new dwellings and private rear garden amenity spaces for the houses.

1.3 The assessment has included:-

- Measurements of the existing ambient noise climate at the site over a full 24-hour period for road traffic noise and any industrial noise;
- Assessment of the noise impact on the development in accordance with the National Planning Policy Framework; the Noise Policy Statement For England; the WHO Guidelines; BS 8233 : 2014; and ProPG : Planning & Noise – May 2017;
- Recommendation of an appropriate noise mitigation scheme for the new dwellings, if necessary.

1.4 This report outlines our findings and our recommendations.

1.5 All recommendations are given for acoustic reasons only and compliance with other requirements (e.g. fire protection/structural integrity, etc.) must be checked by other specialist members of the design team.

1.6 The noise survey and report were carried out and prepared by Matthew Lawrence who has over 29 years' experience in the acoustic industry and an MSc and Diploma in Acoustics & Noise Control, and who is a Member of the Institute of Acoustics (IOA).

1.7 MRL Acoustics Ltd is also a member of the Association of Noise Consultants (ANC).

1.8 Noise levels referred to in the text have been rounded to the nearest whole decibel (dB), as fractions of decibels are imperceptible.

1.9 An explanation of the various noise units, indices and acoustical terms used in this report is provided in Appendix I.

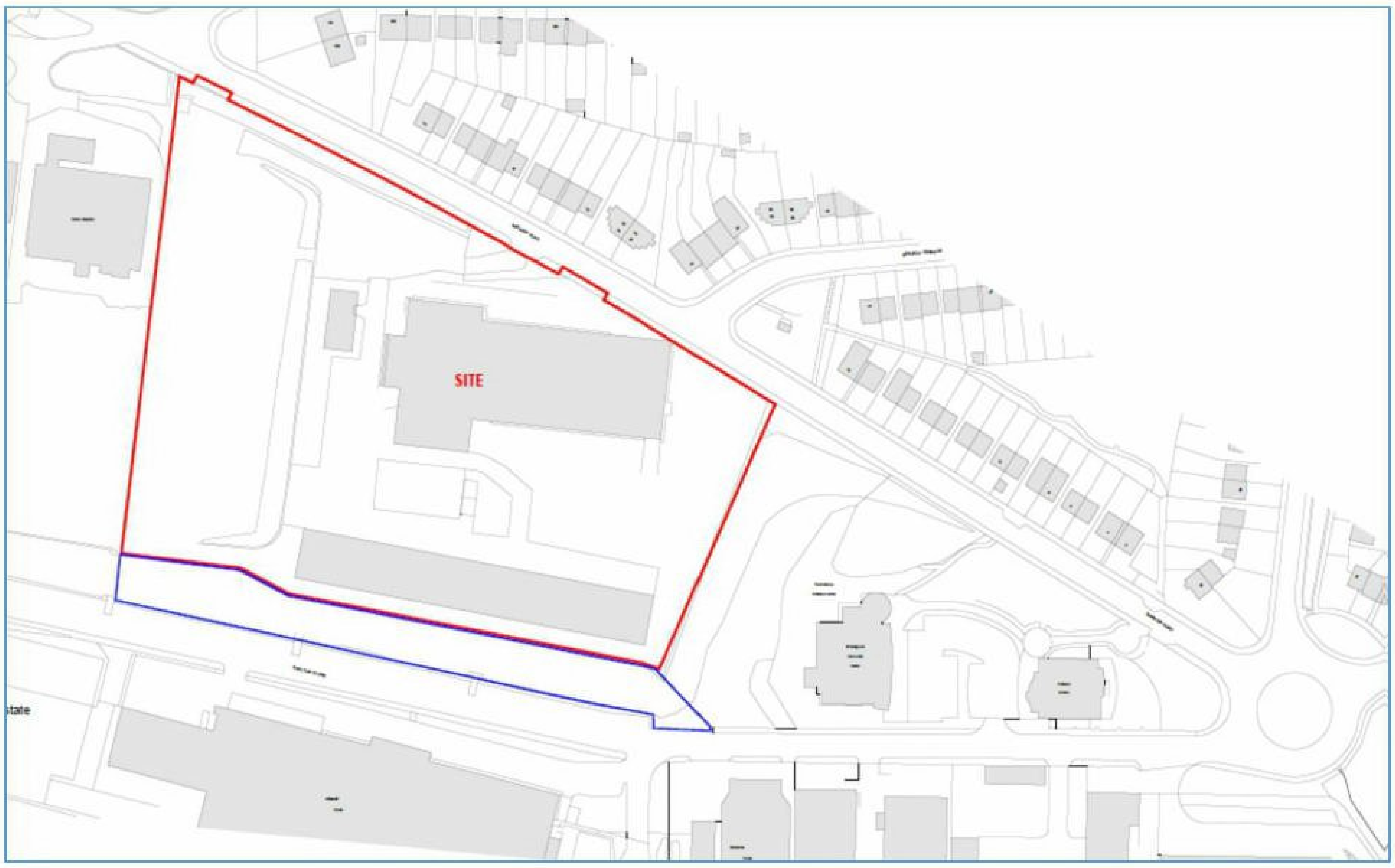
2.0 DESCRIPTION OF THE SITE

2.1 The development site is on the western side of Dover on a parcel of land between Barwick Road and Poulton Close. Barwick Road has fairly low levels of intermittent road traffic and Poulton Close is similar, albeit with slightly lower traffic flows.

2.2 To the north and north-east of the site there are existing residential properties located on the opposite side of Barwick Road. To the east of the site is the St. Radigunds Community Centre and an external play park area. To the west and south of the site are various industrial units and commercial businesses including a gym, offices, vehicle rental, plant hire, a scaffolding business and a taxi business. The site at the Poulton Close end is considerably higher than the road level at this point and as such, the various commercial premises here are not directly visible from the majority of the site.

2.3 It was observed whilst setting up the noise monitoring equipment, that the site is affected mainly by noise from intermittent local road traffic and low-level sporadic industrial noise during the daytime period.

2.4 The site location plan is shown below:-

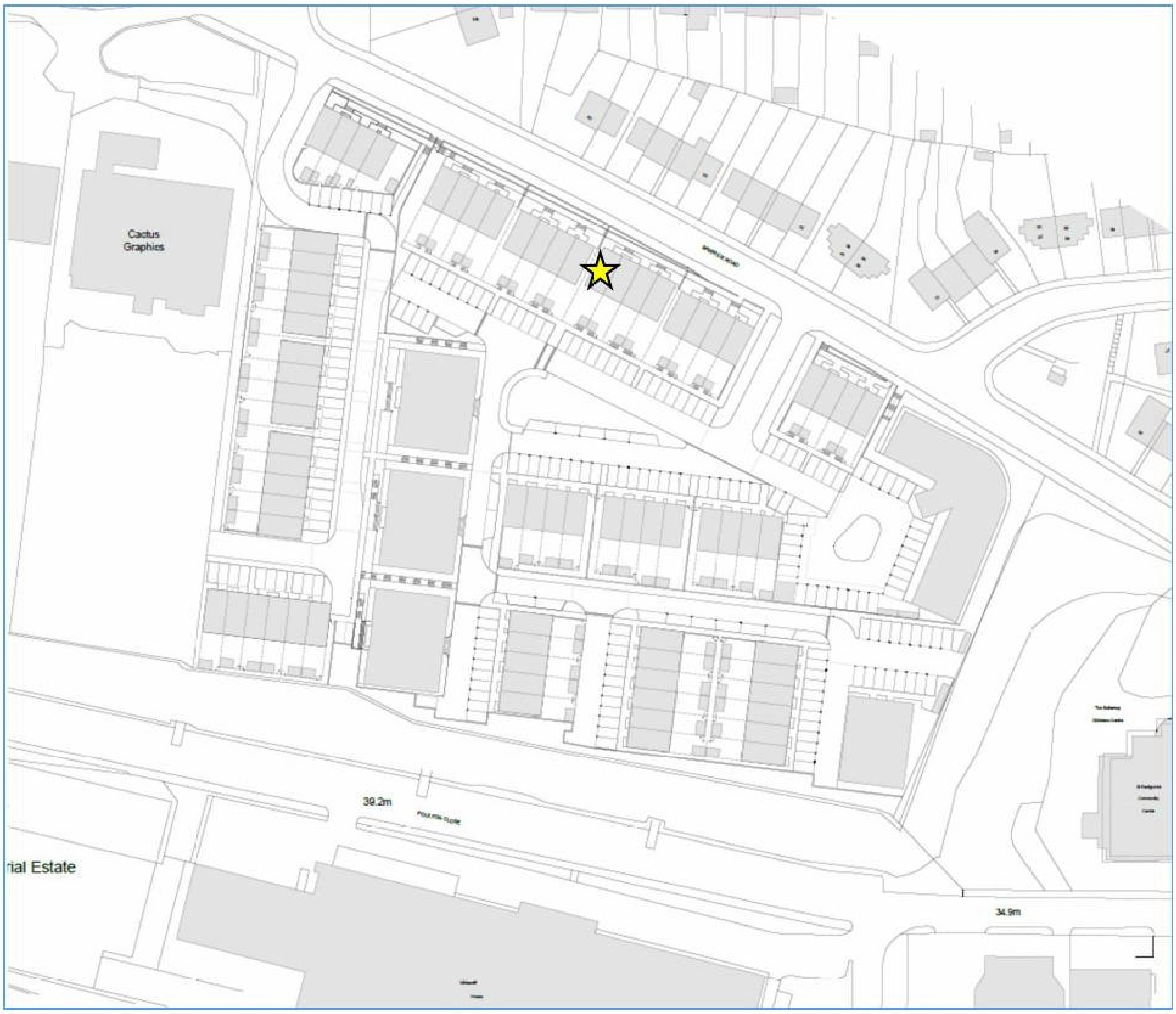


3.0 NOISE LEVEL SURVEY

3.1 A noise level survey was carried out at the site over a full 24-hour period from 10:45 hours on Wednesday 9th November until 11:30 hours on Thursday 10th November 2022 in order to establish the general daytime and night-time ambient noise climate of the area in terms of road traffic noise and general industrial noise.

3.2 The noise measurements were taken at northern part of the site near to Barwick Road to represent the residential windows of the proposed dwellings that will be exposed to the highest levels of environmental noise.

3.3 The noise monitoring location is shown in the site plan below:-



Noise Measurement Location ☆

3.4 The noise survey was carried out using a Rion NA-28 'Class 1' Sound Level Meter (serial no. 01291241) fitted within an environmental weather-proof case.

3.5 The calibration level of the meter was checked before and after the survey to a level of 94.0 dB with a Rion NC-74 sound calibrator (serial no. 35094450) with no variation in the levels observed.

3.6 The microphone was mounted on a tripod approximately 1.6m height above ground level and was fitted with a Rion WS-15 weather-proof windshield at all times.

3.7 The noise measurements consisted of consecutive 15-minute samples of noise over a continuous 24-hour period.

3.8 Details of the equipment used during the noise level survey are shown in Table 1. Current calibration certificates for the equipment can be provided if required.

Table 1: Details of Equipment Used During Noise Survey

Equipment Description	Manufacturer	Type/Number	Serial Number	Date of Expiration of Calibration	Calibration Certification Number
Sound Level Meter	Rion	Type NA-28	01291241	12/06/2024	TCRT20/1224
Microphone	Rion	UC-59	01683	12/06/2024	TCRT20/1224
Pre-Amplifier	Rion	NH-23	81273	12/06/2024	TCRT20/1224
Calibrator	Rion	Type NC-74	35094450	12/06/2024	TCRT20/1223

3.9 The weather conditions for the survey were generally mild and dry with a light breeze throughout and are shown in Table 2 overleaf:-

Table 2: Weather Conditions During Noise Survey

Date	Temperature (°C)		Wind Speed (m/s)	Wind Direction	Rainfall (mm)	Cloud Cover (%)	Acceptable Conditions
	Day	Night					
09/11/2022	15	13	0.9	SW	0	20	Yes
10/11/2022	14	-	1.9	SW	0	75	Yes

3.10 The weather conditions were measured on-site using a Kestrel 2000 hand-held weather meter and supported by weather data from the Meteorological Office weather app relating to local weather conditions for this area.

3.11 The noise survey was carried out in general accordance with the requirements outlined in BS 7455 – 1 : 2003 for environmental noise surveys.

3.12 The measured results are 'free-field' levels as the microphone was not within 3.5m of a reflective surface (other than the ground) and therefore a -2.5 dB façade correction is not applicable to the measured results to convert them to 'free-field' levels in order to assess the noise impact in accordance with BS 8233 : 2014.

3.13 Once the noise monitoring survey had been completed, some brief additional noise measurements were carried out between 11:30 hours and 12:00 hours at the southern end of the site overlooking Poulton Close just to check the typical ambient noise climate at this end of the site.

3.14 The results indicated an ambient noise level of approximately 53 dB $L_{Aeq\ (30\ Minutes)}$ as a result from intermittent local road traffic and some light industrial noise.

3.15 Therefore, it would be reasonable to assume that any noise mitigation measures required for the dwellings on the Barwick Road end of the site would be applicable to the proposed dwellings across the entire development site.

Results

3.16 The measured 'free-field' levels are detailed in Appendix II at the end of this report and are summarised in Table 3 below:-

Table 3: Measured 'Free-Field' Noise Levels

Location	Time Period	Noise Levels (dB)		
		L_{Aeq}		$L_{Amax\ (Average)}$
		Day (07:00 – 23:00)	Night (23:00 – 07:00)	Night (23:00 – 07:00)
Barwick Road: At Position of Proposed Dwellings	24-Hours	54	46	64

4.0 ASSESSMENT OF NOISE IMPACT

National Planning Policy Framework (NPPF)

4.1 National Government Guidance is available in the form of the National Planning Policy Framework (NPPF) – July 2021. The NPPF sets out the Government's planning policies for England and how these are expected to be applied. It provides a framework within which locally-prepared plans for housing and other development can be produced.

4.2 Paragraph 174 of Section 15 of the NPPF, 'Conserving and enhancing the natural environment' provides general guidance regarding planning and noise. It states:-

"Planning policies and decisions should contribute to and enhance the natural and local environment by:-

a) protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan);

b) recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services – including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland;

c) maintaining the character of the undeveloped coast, while improving public access to it where appropriate;

d) minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures;

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; and

f) remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate."

4.3 Paragraph 185 of Section 15 of the NPPF, 'Conserving and enhancing the natural environment' goes on to state:-

"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:-

a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;

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

c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation."

The Noise Policy Statement for England 2010 (NPSE)

4.4 The NPSE sets out the long term vision for 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."

4.5 This is supported by the following 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."

4.6 The first aim of the NPSE should be read in the context of Government policy on sustainable development indicating that significant adverse effects on health and quality of life should be avoided while accommodating the principles of sustainable development.

4.7 The second aim of the NPSE is applicable where the impact falls between LOAEL and SOAEL (see Section 4.9 below) requiring that all reasonable measures to mitigate and minimise adverse impacts on health and quality of life be implemented while accommodating the principles of sustainable development. This does not imply that any adverse effects cannot occur.

4.8 The third aim of the NPSE is to actively improve health and quality of life through effective management of noise within the context of Government policy on sustainable development wherever it is possible and reasonable to do so.

4.9 The NPSE applies the following concepts adapted from toxicology:-

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.

SOAEL – Significant Observed Adverse Effect Level

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

4.10 It should be noted that there are no numerical values for these concepts defined in the NPSE. There is also no single objective noise-based measure that defines Observed Effect Levels that is applicable to all sources of noise in all situations and consequently, the levels are likely to be different for different noise sources, for different receptors and at different times.

Professional Practice Guidance On Planning & Noise (ProPG)

4.11 The Professional Practice Guidance on Planning and Noise (ProPG) has been produced to provide practitioners with guidance on a recommended approach to the management of noise within the planning system in England. The National Planning Policy Framework (NPPF) encourages improved standards of design. The CIEH, IOA and the ANC have worked together to produce this guidance which encourages better acoustic design for new residential development and aims to protect people from the harmful effects of noise.

4.12 This ProPG provides advice for Local Planning Authorities (LPAs) and developers, and their respective professional advisers. It aims to complement Government planning and noise policy and guidance. In particular, it strives to:

- advocate full consideration of the acoustic environment from the earliest possible stage of the development control process;
- encourage the process of **good acoustic design** in and around new residential developments;
- outline what should be taken into account in deciding planning applications for new noise-sensitive developments;
- improve understanding of how to determine the extent of potential noise impact and effect; and assist the delivery of sustainable development.

4.13 Based on the measured free-field indicative daytime noise level of 54 dB $L_{Aeq\ (16\text{-}Hour)}$ and the free-field indicative night-time noise level of 46 dB $L_{Aeq\ (8\text{-}Hour)}$, the site can be classified as being of 'Low' Risk according to Figure 1 of the ProPG document.

4.14 Figure 1 of the ProPG document and also Figure 2 of the ProPG document indicating the internal noise level guidelines are reproduced on the following pages.

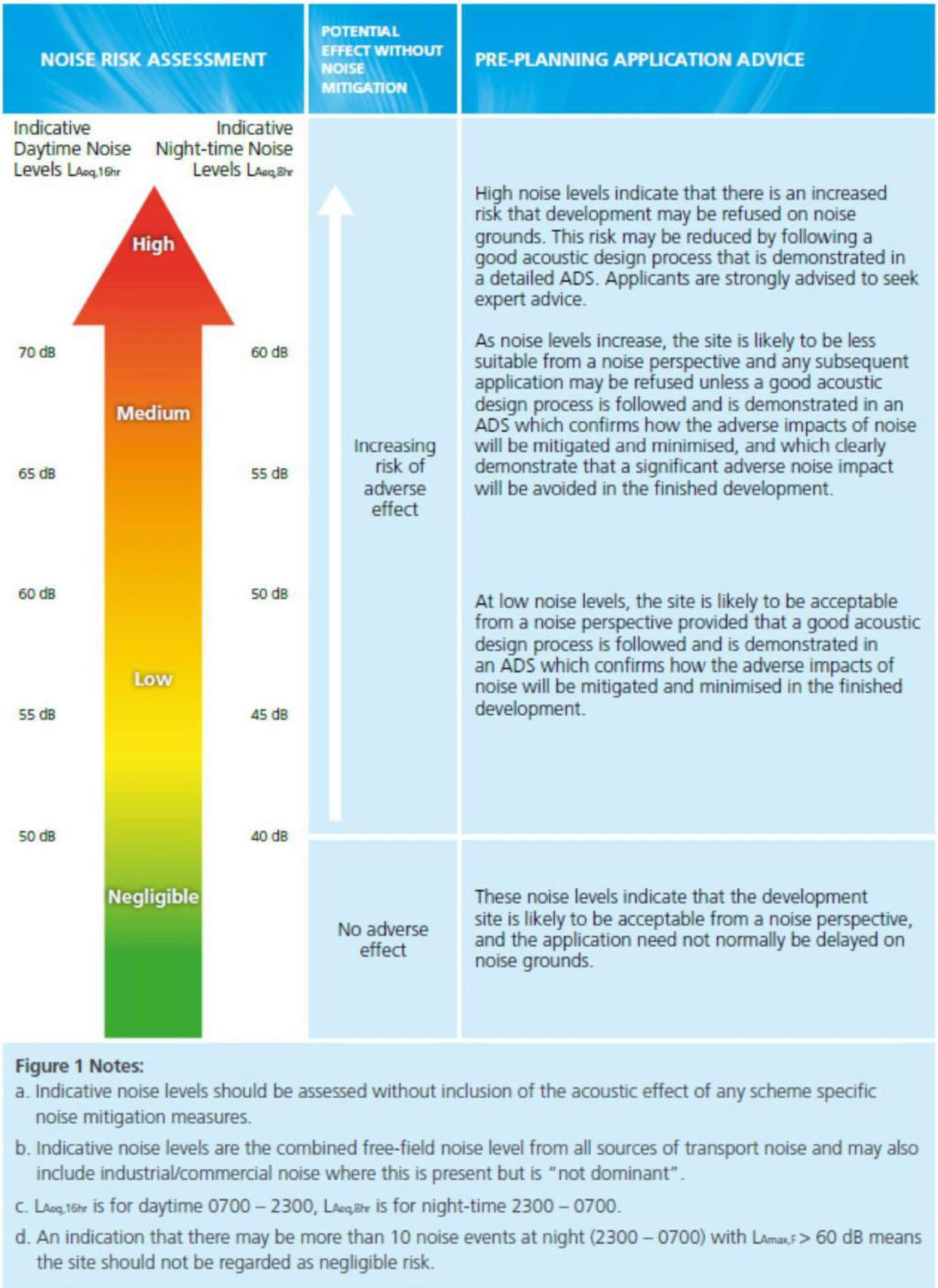


Figure 1. Stage 1– Initial Site Noise Risk Assessment

ACTIVITY	LOCATION	07:00 – 23:00 HRS	23:00 – 07:00 HRS
Resting	Living room	35 dB $L_{Aeq,16\,hr}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16\,hr}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16\,hr}$	30 dB $L_{Aeq,8\,hr}$ 45 dB $L_{Amax,F}$ (Note 4)

NOTE 1 The Table provides recommended internal L_{Aeq} target levels for overall noise in the design of a building. These are the sum total of structure-borne and airborne noise sources. Ground-borne noise is assessed separately and is not included as part of these targets, as human response to ground-borne noise varies with many factors such as level, character, timing, occupant expectation and sensitivity.

NOTE 2 The internal L_{Aeq} target levels shown in the Table are based on the existing guidelines issued by the WHO and assume normal diurnal fluctuations in external noise. In cases where local conditions do not follow a typical diurnal pattern, for example on a road serving a port with high levels of traffic at certain times of the night, an appropriate alternative period, e.g. 1 hour, may be used, but the level should be selected to ensure consistency with the internal L_{Aeq} target levels recommended in the Table.

NOTE 3 These internal L_{Aeq} target levels are based on annual average data and do not have to be achieved in all circumstances. For example, it is normal to exclude occasional events, such as fireworks night or New Year's Eve.

NOTE 4 Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$, depending on the character and number of events per night. Sporadic noise events could require separate values. In most circumstances in noise-sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45dB $L_{Amax,F}$ more than 10 times a night. However, where it is not reasonably practicable to achieve this guideline then the judgement of acceptability will depend not only on the maximum noise levels but also on factors such as the source, number, distribution, predictability and regularity of noise events (see Appendix A).

NOTE 5 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 6 Attention is drawn to the requirements of the Building Regulations.

NOTE 7 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 **(see Section 3.D)**.

Figure 2. ProPG Internal Noise Level Guidelines (additions to BS8233:2014 shown in blue)

British Standard 8233 : 2014

4.15 Guidance on acoustic design goals for new residential developments is set out in British Standard 8233 : 2014 *'Guidance on sound insulation and noise reduction for buildings'*. The World Health Organisation *'Guidelines for Community Noise'* and the ProPG guidance generally concurs with the recommendations of BS 8233 : 2014. The criteria are summarised in Table 4 below:-

Table 4: BS 8233 Recommended Acoustic Design Criteria

Location	**Internal Noise Levels**	
	Daytime (07:00 – 23:00)	**Night-time (23:00 – 07:00)**
Living Room	35 dB L_{Aeq}	-
Dining Room	40 dB L_{Aeq}	-
Bedroom	35 dB L_{Aeq}	30 dB L_{Aeq}
Garden	Desired Limit Not Exceeding 50 dB L_{Aeq} Upper limit of 55 dB L_{Aeq}	

Assessment of Noise Impact

4.16 The results of the noise level survey indicate that at the noise monitoring position at the approximate front elevation of the nearest proposed dwellings facing onto Barwick Road, the site is exposed to a daytime external noise level of 54 dB L_{Aeq}.

4.17 For the night-time period, the site is exposed to an external noise level of 46 dB L_{Aeq} and an average maximum noise level of 64 dB L_{Amax}.

4.18 Allowing -13 dB attenuation for an open window, based on the measured daytime noise level of 54 dB L_{Aeq}, the resultant internal noise level within habitable rooms during the daytime will be 41 dB L_{Aeq} (54 dB – 13 dB).

4.19 For the night-time period, allowing -13 dB attenuation for an open window, based on the measured night-time noise level of 46 dB L_{Aeq}, the resultant internal noise level within bedrooms will be 33 dB L_{Aeq} (46 dB – 13 dB).

4.20 Therefore, with windows open, the internal noise limits outlined within BS 8233 : 2014 of 35 dB L_{Aeq} within living rooms and bedrooms and 40 dB L_{Aeq} within dining rooms during the daytime will be exceeded.

4.21 At night-time with the windows open the 30 dB L_{Aeq} criteria in bedrooms will be exceeded by around 3 dB(A).

4.22 Therefore, due to the exceedance of the recommended internal noise limits, it is necessary to provide a scheme of noise mitigation measures in order to fully protect the amenity of the future residents in order to achieve both the daytime and night-time internal noise levels.

4.23 Our recommendations are set out in Section 5.0.

5.0 RECOMMENDED SCHEME OF NOISE MITIGATION MEASURES

5.1 Table 5 below provides information on the typical sound insulation performance of various glazing specifications:-

Table 5: Sound Insulation of Typical Windows

Description	Weighted Sound Reduction Index, R_w
Any type of window in a facade when partially open	15
Single glazed windows (4mm glass)	29
Single glazed windows (6mm glass)	31
Double glazed units (4-16-4)	33
Double glazed units (4-16-6)	35
Double glazed units (6-16-6)	36
Double glazed units (4-16-6.4mm laminated glass)	39
Secondary glazed windows (4-100-4)	35 - 40
Secondary glazed windows (6-200-6)	40 - 45

5.2 Therefore, **for the windows to habitable rooms on all elevations of the dwellings,** we would recommend that the glazing should consist of minimum construction of 4mm glass – nominal 16mm air gap – 4mm glass.

5.3 Based on the measured daytime external noise levels and the typical Sound Reduction Index for the recommended glazing (4/16/4), we have calculated that the external daytime noise climate of 54 dB L_{Aeq} should be attenuated to 23 dB L_{Aeq} in lounges, dining rooms and bedrooms with the windows closed.

5.4 Based on the measured night-time external noise levels and the typical Sound Reduction Index for the recommended glazing (4/16/4), we have calculated that the external night-time noise climate of 46 dB L_{Aeq} should be attenuated to 15 dB L_{Aeq} in bedrooms with the windows closed.

5.5 The noise break-in calculations are shown in Appendix III at the end of this report.

Night-time Maximum Noise Levels

5.6 With regard to individual event maximum noise levels BS 8233 states:-

"Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F,}$ depending on the character and number of events per night. Sporadic noise events could require separate values."

5.7 The WHO Guidelines for Community Noise give a specific maximum internal noise level of 45 dB L_{Amax} that should not normally be exceeded more than 10 -15 times per night.

5.8 The ProPG guidance states that in noise-sensitive rooms at night, e.g. bedrooms, individual noise events (from all sources) should not normally exceed 45 dB L_{Amax} more than 10 times per night as this represents a threshold below which the effects of individual noise events on sleep can be regarded as negligible.

5.9 If we therefore remove the 10 no. highest measured L_{Amax} noise levels obtained between 23:00 – 07:00 hours from the results table shown in Appendix II, the 11th highest recorded night-time level is 65 dB L_{Amax}.

5.10 External maximum noise levels of 65 dB(A) would result in internal maximum levels of around 34 dB(A) with the bedroom windows closed (based on 4mm glass – 16mm air gap – 4mm glass configuration).

5.11 The detailed noise survey results in Appendix II indicate that for the rest of the night-time period, the maximum levels did not exceed the 11th highest recorded level of 65 dB(A).

5.12 Therefore, for this particular development scheme, the WHO criteria and ProPG guidance limits for L_{Amax} levels at night should be achieved with windows closed.

Ventilation

5.13 Since opening the windows would reduce the sound insulation of the building envelope, it is considered that an acoustically treated alternative method of ventilation should be provided for all affected living rooms, dining rooms and bedrooms.

5.14 This approach, which is recommended in BS 8233 : 2014, would provide the new residents with the option of ventilating rooms whilst maintaining the sound insulation of the building envelope. It should be noted that all windows will remain openable to allow the occupants the choice to still have windows open if they desire.

5.15 Therefore, **for the windows to habitable rooms on all elevations of the dwellings,** acoustically treated ventilation will be required to meet the required internal noise limits without the need to open the windows for ventilation and cooling.

5.16 Standard slot-frame trickle-vents **should not** be fitted to the windows outlined above. If trickle-vent are fitted they should be acoustically rated with a minimum sound reduction performance level of **at least 35 dB $D_{n,e,w}$ + C_{tr} with the vent open**.

5.17 We therefore recommend provision of one of the following acoustic ventilation options:-

- acoustically screened wall mounted mechanical (i.e. powered) acoustic ventilators such as Titon 'Sonair F+' or Silavent Energex SHHRV units; or
- Brink Climate Systems Air 70 (Plus) wall mounted ventilators;
- a fully ducted passive or mechanical ventilation system with appropriate sound attenuation measures incorporated into the design; or
- Xcell QVW or QVI Mechanical Ventilation with Heat Recovery Units; or

- Titon – HRV 2 Q Plus (MVHR) system 4 - This system is a 'whole house' continuous ventilation system that does not use trickle vents and is considered to be acceptable for this development; or
- Silavent HRX MVHR 'whole house' Heat Recovery Unit; or
- Domus Ventilation HXRE MVHR Unit; or
- Brink Climate Systems MVHR Units (Flair; Excellent; or Sky units); or
- Envirovent Whole House Positive Ventilation System ventilation system that does not use trickle vents and is considered to be acceptable for this development; or
- any other similar performing acoustic ventilators or ventilation system.

5.18 However, we would recommend that the ventilation requirements are checked with the Local Authority Building Control Officer at an early stage.

5.19 It is considered that provision of any one of the above ventilation schemes should provide sufficient sound insulation from road traffic noise and any industrial noise to ensure that the required internal noise limits are achieved.

External Areas

5.20 The measured average outdoor daytime noise level at the north part of the site was 54 dB L_{Aeq}.

5.21 It is reasonable to assume that the actual houses themselves will provide a significant amount of acoustic screening for any rear garden areas. This, combined with the acoustic screening provided by any 1.8m high perimeter garden screening, should provide at least 5 dB(A) attenuation in the noise from road traffic.

5.22 The expected general outdoor daytime noise level in the rear gardens of the new houses fronting onto Barwick Road would therefore be approximately 49 dB L_{Aeq}.

5.23 This level is 6 dB(A) lower than the recommended upper limit general daytime outdoor noise level of 55 dB L_{Aeq} and 1 dB)A) lower than the desired level of 50 dB L_{Aeq} outlined within BS 8233 and the WHO Guidelines.

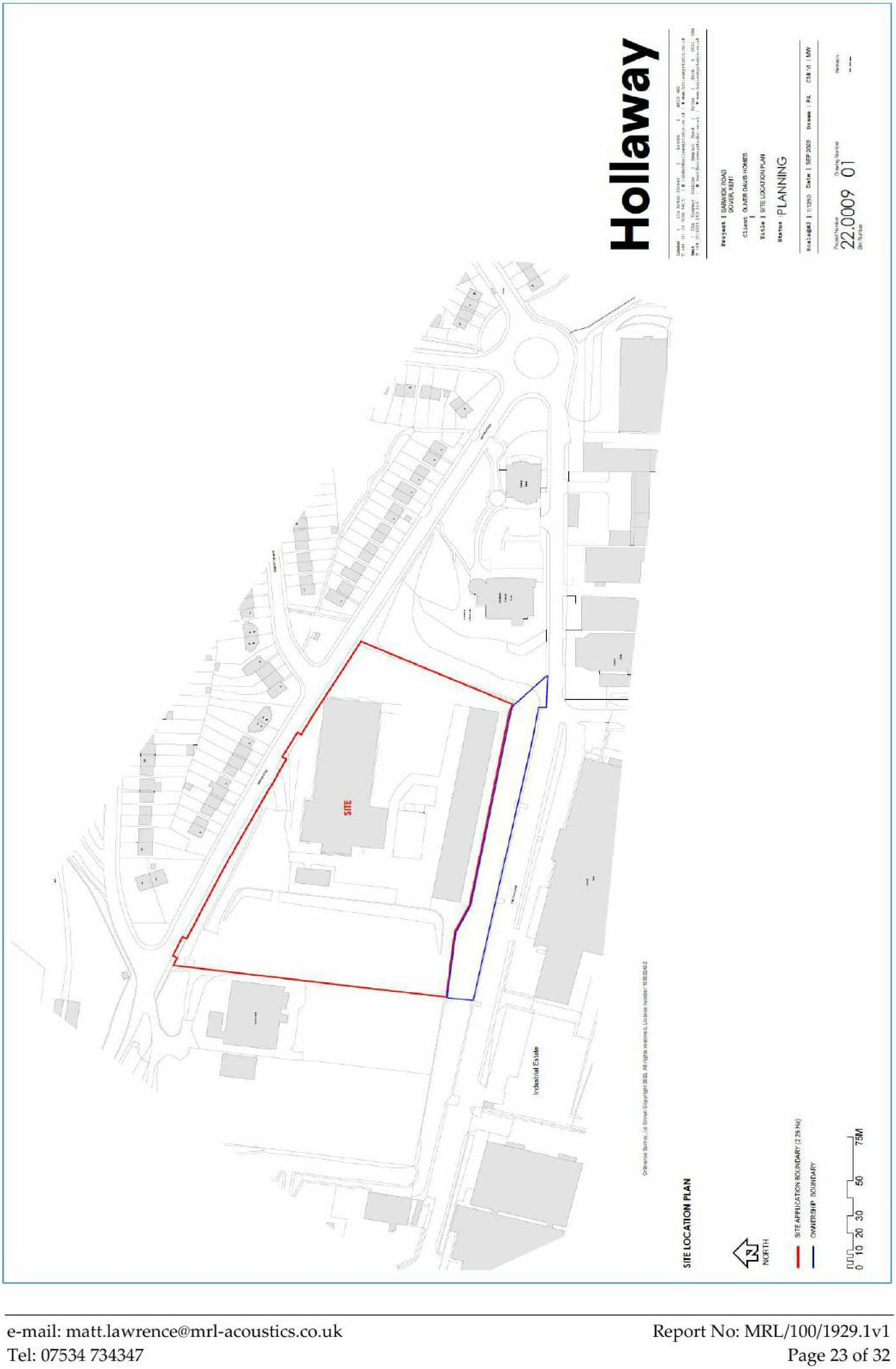
5.24 Therefore, it is considered that the provision of good quality 1.8m high close-boarded timber fencing (or 1.8m high brick walls) around all rear garden amenity areas will be sufficient to ensure that the general outdoor daytime noise climate for any amenity spaces is achieved.

6.0 SUMMARY AND CONCLUSIONS

6.1 The impact of noise has been assessed for the proposed residential development scheme at Barwick Road, Dover, Kent.

6.2 The results of the noise level survey and assessment indicate that the development site is exposed to moderate levels of external environmental noise during both the daytime and the night-time periods due to noise from local road traffic and sporadic light industrial noise.

6.3 An appropriate noise mitigation scheme has been recommended for the new dwellings which should provide sufficient noise attenuation to meet the required internal acoustic criteria and fully protect the amenity of future residents in accordance with the standards outlined in the WHO Guidance, BS 8233 : 2014 and the ProPG guidance document.


Hollaway
Project | BARWICK ROAD DOVER, KENT
Client OLIVER DAVIS HOMES
Title | SITE LOCATION PLAN
Status PLANNING
Date | SEP 2022
22.0009
01
SITE
Industrial Estate
SITE LOCATION PLAN
NORTH
SITE APPLICATION BOUNDARY (2.29 Ha)
OWNERSHIP BOUNDARY
0 10 20 30 50 75M


Hollaway
PROPOSED SITE BLOCK PLAN
SITE
EXISTING SITE BLOCK PLAN

APPENDIX I – NOISE UNITS AND INDICES

a) Sound Pressure Level and the decibel (dB)

A sound wave is a small fluctuation of atmospheric pressure. The human ear responds to these variations in pressure, producing the sensation of hearing. The ear can detect a very wide range of pressure variations. In order to cope with this wide range of pressure variations, a logarithmic scale is used to convert the values into manageable numbers. Although it might seem unusual to use a logarithmic scale to measure a physical phenomenon, it has been found that human hearing also responds to sound in an approximately logarithmic fashion. The dB (decibel) is the logarithmic unit used to describe sound (or noise) levels. The usual range of sound pressure levels is from 0 dB (threshold of hearing) to 120 dB (threshold of pain).

Due to the logarithmic nature of decibels, when two noises of the same level are combined together, the total noise level is (under normal circumstances) 3 dB(A) higher than each of the individual noise levels e.g. 60 dB(A) plus 60 dB(A) = 63 dB(A). In terms of perceived 'loudness', a 3 dB(A) variation in noise level is a relatively small (but nevertheless just noticeable) change. An increase in noise level of 10 dB(A) generally corresponds to a doubling of perceived loudness. Likewise, a reduction in noise level of 10 dB(A) generally corresponds to a halving of perceived loudness.

b) Frequency and Hertz (Hz)

As well as the loudness of a sound, the frequency content of a sound is also very important. Frequency is a measure of the rate of fluctuation of a sound wave. The unit used is cycles per second, or hertz (Hz). Sometimes large frequency values are written as kilohertz (kHz), where 1 kHz = 1000 Hz.

Young people with normal hearing can hear frequencies in the range 20 Hz to 20,000 Hz. However, the upper frequency limit gradually reduces as a person gets older.

c) A-weighting

The ear is not equally sensitive to sound at all frequencies. It is less sensitive to sound at low and very high frequencies, compared with the frequencies in between. Therefore, when measuring a sound made up of different frequencies, it is often useful to 'weight' each frequency appropriately, so that the measurement correlates better with what a person would actually hear. This is usually achieved by using an electronic filter called the 'A' weighting, which is built into sound level meters and is denoted dB(A) or dBLA.

d) Glossary of Terms

When a noise level is constant and does not fluctuate over time, it can be described adequately by measuring the dB(A) level. However, when the noise level varies with time, the measured dB(A) level will vary as well. In this case it is therefore not possible to represent the noise climate with a simple dB(A) value. In order to describe noise where the level is continuously varying, a number of other indices, including statistical parameters, are used. The indices used in this report are described below:-

L_{Aeq} The A-weighted 'equivalent continuous noise level' which is an average of the total sound energy measured over a specified time period. L_{Aeq} is the level of a continuous noise which has the same total (A-weighted) energy as the real fluctuating noise, measured over the same time period.

L_{Amax} The maximum A-weighted noise level recorded during the monitoring period.

L_{A10} The A-weighted noise level exceeded for 10% of the specified time period. L_{A10} is most often used as a measure of traffic noise.

L_{A90} The A-weighted noise level exceeded for 90% of the specified time period. L_{A90} is used as a measure of 'background noise'.

SEL The 'sound exposure level' of a single event (such as a passing train) and is the L_{Aeq} value of the whole event normalised to a 1 second period level of a sound.

RT Measured reverberation time in receiver room in seconds.

RT_0 Standard reverberation time of 0.5 seconds.

D Level difference, effectively D = source level - (receiver level corrected for background level).

D_{nT} Standardised level difference, standardised to a receiver room reverberation time of 0.5 seconds, $D_{nT} = D + 10 \log (RT/RT_0)$.

$D_{nT,w}$ Weighted standardised level difference, a single figure generated by comparing the D_{nT} with a reference curve. The reference curve is shifted in 1 dB steps until the sum of adverse deviation of the test curve, compared to the reference curve, is as large as possible, but no more than 32.0 dB. The value of the shifted reference curve at 500 Hz is taken as the $D_{nT,w}$. N.B. As $D_{nT,w}$ for airborne transmission represents a level difference, an improvement generates a larger figure.

C_{tr} A 'spectrum adaptation term' used to correct the $D_{nT,w}$ in order to reflect low frequency performance of the wall or floor tested.

APPENDIX II – RESULTS OF NOISE LEVEL SURVEY

Date: Wednesday 9th November – Thursday 10th November 2022

Equipment: Rion NA-28 'Class 1' sound level meter, Rion NC-74 acoustic calibrator, environmental weather case, Rion WS-15 windshield, microphone, tripod

Weather: Generally mild and dry with a light breeze throughout

Results: All values in dB(A)

Table A1: Results of 24-Hour Ambient Noise Level Survey

Date	Time	Run Time	Leq	Lmax	L10	L90	SPL Time Weighting	Frequency Weighting
09/11/2022	10:45	00:14:59	54.60	67.40	57.10	44.20	Fast	A
09/11/2022	11:00	00:15:00	51.20	65.30	55.10	43.10	Fast	A
09/11/2022	11:15	00:14:59	52.60	77.10	56.10	43.50	Fast	A
09/11/2022	11:30	00:14:59	50.90	66.50	54.80	41.50	Fast	A
09/11/2022	11:45	00:15:02	55.50	83.30	55.40	42.00	Fast	A
09/11/2022	12:00	00:15:01	51.40	64.70	55.30	40.70	Fast	A
09/11/2022	12:15	00:14:59	51.10	69.10	55.20	39.10	Fast	A
09/11/2022	12:30	00:15:00	51.20	63.50	55.00	41.10	Fast	A
09/11/2022	12:45	00:14:59	51.10	63.20	55.00	39.80	Fast	A
09/11/2022	13:00	00:15:00	51.30	67.80	55.10	41.30	Fast	A
09/11/2022	13:15	00:15:01	51.60	73.30	55.00	42.80	Fast	A
09/11/2022	13:30	00:15:00	51.40	62.40	55.10	41.70	Fast	A
09/11/2022	13:45	00:15:00	51.20	63.70	54.90	40.50	Fast	A
09/11/2022	14:00	00:14:59	50.30	68.90	53.80	40.40	Fast	A
09/11/2022	14:15	00:15:00	50.80	65.20	54.40	41.80	Fast	A
09/11/2022	14:30	00:15:00	52.10	65.50	55.40	42.90	Fast	A
09/11/2022	14:45	00:15:00	53.20	63.90	57.10	44.30	Fast	A
09/11/2022	15:00	00:14:59	53.40	65.40	56.70	46.30	Fast	A
09/11/2022	15:15	00:15:00	52.70	64.80	56.10	44.30	Fast	A
09/11/2022	15:30	00:15:01	54.60	65.10	57.70	49.30	Fast	A
09/11/2022	15:45	00:15:01	55.00	66.40	58.10	49.60	Fast	A
09/11/2022	16:00	00:14:59	54.80	67.90	57.90	49.50	Fast	A
09/11/2022	16:15	00:14:59	54.20	64.90	57.20	49.50	Fast	A
09/11/2022	16:30	00:15:01	54.70	66.40	57.70	50.60	Fast	A
09/11/2022	16:45	00:15:01	56.20	69.80	59.00	53.00	Fast	A
09/11/2022	17:00	00:14:59	56.00	67.00	58.60	53.80	Fast	A
09/11/2022	17:15	00:14:59	56.30	69.20	58.80	54.00	Fast	A
09/11/2022	17:30	00:15:01	55.40	64.70	58.20	51.90	Fast	A
09/11/2022	17:45	00:14:59	55.50	65.30	58.20	52.00	Fast	A
09/11/2022	18:00	00:15:00	55.00	65.10	58.00	50.90	Fast	A
09/11/2022	18:15	00:14:59	55.30	65.10	58.30	51.00	Fast	A
09/11/2022	18:30	00:14:59	54.80	68.50	58.00	48.60	Fast	A
09/11/2022	18:45	00:14:59	54.10	66.80	57.80	44.90	Fast	A

Date	Time	Run Time	Leq	Lmax	L10	L90	SPL Time Weighting	Frequency Weighting
09/11/2022	19:00	00:15:00	52.00	64.20	56.20	40.40	Fast	A
09/11/2022	19:15	00:14:59	52.40	64.80	57.00	37.30	Fast	A
09/11/2022	19:30	00:14:59	52.10	64.90	56.60	38.30	Fast	A
09/11/2022	19:45	00:15:00	51.90	64.50	57.00	40.60	Fast	A
09/11/2022	20:00	00:15:00	52.00	67.30	56.60	40.80	Fast	A
09/11/2022	20:15	00:14:59	52.20	65.90	56.90	38.20	Fast	A
09/11/2022	20:30	00:15:00	50.30	64.30	55.50	38.60	Fast	A
09/11/2022	20:45	00:15:00	49.70	66.30	55.20	30.80	Fast	A
09/11/2022	21:00	00:14:59	49.90	64.20	55.10	35.00	Fast	A
09/11/2022	21:15	00:14:59	50.60	65.30	55.70	34.40	Fast	A
09/11/2022	21:30	00:15:00	50.10	68.10	55.30	32.00	Fast	A
09/11/2022	21:45	00:14:59	48.40	65.20	54.00	29.90	Fast	A
09/11/2022	22:00	00:14:59	48.10	66.90	53.10	31.50	Fast	A
09/11/2022	22:15	00:15:01	48.20	65.00	53.60	30.80	Fast	A
09/11/2022	22:30	00:14:59	47.80	64.70	52.80	29.30	Fast	A
09/11/2022	22:45	00:14:59	45.70	65.20	49.60	27.00	Fast	A
09/11/2022	23:00	00:14:59	47.60	64.20	52.80	29.60	Fast	A
09/11/2022	23:15	00:14:59	45.20	62.30	49.70	26.30	Fast	A
09/11/2022	23:30	00:15:00	46.20	65.40	51.30	27.70	Fast	A
09/11/2022	23:45	00:15:01	46.40	64.40	49.40	24.80	Fast	A
10/11/2022	00:00	00:14:59	45.50	65.30	48.90	25.30	Fast	A
10/11/2022	00:15	00:14:59	42.50	61.70	42.70	24.00	Fast	A
10/11/2022	00:30	00:15:02	42.10	65.40	36.00	23.40	Fast	A
10/11/2022	00:45	00:15:01	39.80	62.10	36.10	23.30	Fast	A
10/11/2022	01:00	00:15:00	39.30	61.40	37.00	23.50	Fast	A
10/11/2022	01:15	00:15:00	43.30	65.90	41.00	23.60	Fast	A
10/11/2022	01:30	00:14:59	39.40	60.70	35.50	23.10	Fast	A
10/11/2022	01:45	00:15:01	42.20	65.00	39.10	23.40	Fast	A
10/11/2022	02:00	00:14:59	35.80	58.10	30.30	23.60	Fast	A
10/11/2022	02:15	00:15:00	41.10	65.30	36.70	23.70	Fast	A
10/11/2022	02:30	00:14:59	31.10	57.20	22.30	23.30	Fast	A
10/11/2022	02:45	00:15:00	42.50	65.40	36.00	23.70	Fast	A
10/11/2022	03:00	00:14:59	36.80	58.30	36.50	23.20	Fast	A
10/11/2022	03:15	00:15:00	40.70	64.80	30.50	23.00	Fast	A
10/11/2022	03:30	00:15:01	42.20	63.10	38.60	23.30	Fast	A
10/11/2022	03:45	00:15:00	38.30	61.40	32.30	22.90	Fast	A
10/11/2022	04:00	00:15:00	37.60	62.00	26.90	22.80	Fast	A
10/11/2022	04:15	00:15:02	44.80	66.30	46.20	23.40	Fast	A
10/11/2022	04:30	00:15:01	45.20	64.90	49.10	24.80	Fast	A
10/11/2022	04:45	00:14:59	46.20	66.00	49.20	25.00	Fast	A
10/11/2022	05:00	00:14:59	46.40	64.30	51.00	24.30	Fast	A
10/11/2022	05:15	00:15:00	47.60	66.30	52.20	25.70	Fast	A
10/11/2022	05:30	00:15:01	48.20	65.70	53.10	26.60	Fast	A
10/11/2022	05:45	00:15:00	49.70	65.60	55.20	28.90	Fast	A
10/11/2022	06:00	00:15:00	48.60	67.30	54.10	28.50	Fast	A
10/11/2022	06:15	00:15:00	50.70	67.40	55.80	31.40	Fast	A
10/11/2022	06:30	00:15:01	52.30	66.80	56.80	34.10	Fast	A
10/11/2022	06:45	00:15:00	53.40	66.60	57.70	40.90	Fast	A
10/11/2022	07:00	00:14:59	55.10	66.00	58.80	44.20	Fast	A

Date	Time	Run Time	Leq	Lmax	L10	L90	SPL Time Weighting	Frequency Weighting
10/11/2022	07:15	00:15:01	55.80	65.60	59.00	49.00	Fast	A
10/11/2022	07:30	00:15:01	56.60	74.80	59.30	52.60	Fast	A
10/11/2022	07:45	00:14:59	57.20	71.50	59.60	55.80	Fast	A
10/11/2022	08:00	00:15:01	56.90	68.00	59.50	54.50	Fast	A
10/11/2022	08:15	00:15:00	56.30	65.90	59.00	54.40	Fast	A
10/11/2022	08:30	00:15:00	56.40	68.20	59.00	53.30	Fast	A
10/11/2022	08:45	00:15:00	55.90	67.00	59.00	51.20	Fast	A
10/11/2022	09:00	00:14:59	54.80	66.00	58.20	46.80	Fast	A
10/11/2022	09:15	00:15:00	54.00	64.90	57.50	46.40	Fast	A
10/11/2022	09:30	00:14:59	54.80	80.10	57.90	46.60	Fast	A
10/11/2022	09:45	00:14:59	54.30	67.20	58.10	45.90	Fast	A
10/11/2022	10:00	00:15:01	53.70	65.40	57.50	45.70	Fast	A
10/11/2022	10:15	00:15:00	54.30	69.00	57.90	45.40	Fast	A
10/11/2022	10:30	00:14:59	53.90	64.20	57.60	46.30	Fast	A
10/11/2022	10:45	00:14:59	54.40	76.60	57.70	45.90	Fast	A
10/11/2022	11:00	00:15:00	53.70	69.70	57.40	44.60	Fast	A
10/11/2022	11:15	00:14:59	54.50	74.20	57.60	45.30	Fast	A

APPENDIX III – NOISE BREAK-IN CALCULATIONS

BS8233 Calculation of Noise Break-in : Daytime

Project Number: MRL/100/1929.1v1
Description: Barwick Road, Dover, Kent
Consultant: Matt Lawrence

MRL ACOUSTICS

Term	Term Description	Value
S_f	Façade area (incl. window) (m^2)	18.0
S_{wi}	Area of the windows (m^2)	4.0
S_{rr}	Area of the ceiling (m^2)	30.0
S_{ew}	Area of the external wall (m^2)	14.0
S	Area of facade and roof	48.0
x	Room Dimension x	6.0
y	Room Dimension y	5.0
z	Room Dimension z	3.0
RT	Receiving Room RT	0.5
K	Façade correction	0.0

4mm - 16mm Air Gap - 4mm Double Glazing

BS8233 Result 22 dB(A)

L_{Aeq} Result 23 dB(A)

	Term	Term Description	Description	63	125	250	500	1000	2000	4000	8000	Broadband
				Octave Band Centre Frequency								
A	$L_{eq,ff}$	Free-field L_{eq} outside room	Enter the Octave Band L_{eq} Data	58	51	49	48	51	46	40	38	**54**
	$D_{n,e}$	Insulation of the trickle vent	Titon Type TA 5221/V25 + Standard Canopy (35 dB Dn,e,w + Ctr)	32	36	38	36	32	37	40	48	
B		$\frac{A_0}{S}10^{-\frac{D_{n,e}}{10}}$		0.00013	0.00005	0.00003	0.00005	0.00013	0.00004	0.00002	0.00000	
	R_{wi}	SRI of the window	4mm Glass - 16mm Air Gap - 4mm Glass	20	24	20	25	35	38	35	35	
C		$\frac{S_{wi}}{S}10^{-\frac{R_{wi}}{10}}$		0.00083	0.00033	0.00083	0.00026	0.00003	0.00001	0.00003	0.00003	
	R_{ew}	SRI of the external wall	BS8233 Example - Brick and block external wall	30	40	44	45	51	56	57	58	
D		$\frac{S_{ew}}{S}10^{-\frac{R_{ew}}{10}}$		0.00029	0.00003	0.00001	0.00001	0.00000	0.00000	0.00000	0.00000	
	R_{rr}	SRI of roof/ceiling	Tiled/slated roof, 25mm plasterboard ceiling, 100mm quilt above ceiling	23	27	37	43	48	52	55	56	
E		$\frac{S_{rr}}{S}10^{-\frac{R_{rr}}{10}}$		0.00313	0.00125	0.00012	0.00003	0.00001	0.00000	0.00000	0.00000	
F		10log(B + C + D + E)		-24	-28	-30	-34	-38	-42	-43	-45	
	A	Equivalent Absorption Area	$\frac{0.161\ V}{RT}$ (Includes RT rise at low frequency)	29	29	29	29	29	29	29	29	
G		10log(S/A)		2	2	2	2	2	2	2	2	

$L_{eq\ Results}$

Term	Term Description	63	125	250	500	1000	2000	4000	8000	Broadband
		Octave Band Centre Frequency								
L_{eq2}	Level in the receiver room (includes façade correction K)	40	28	24	19	18	9	2	-2	**40**
	A-weighting	-26	-16	-9	-3	0	1	1	-1	
L_{Aeq2}	A-weighted Level in the receiver room	14	12	15	16	18	10	3	-3	**23**

BS8233 Calculation of Noise Break-in : Night-time

Project Number: MRL/100/1929.1v1

Description: Barwick Road, Dover, Kent

Consultant: Matt Lawrence

4mm - 16mm Air Gap - 4mm Double Glazing

BS8233 Result 14 dB(A)

L_{Aeq} Result 15 dB(A)

Term	Term Description	Value
S_f	Facade area (incl. window) (m²)	18.0
S_{wi}	Area of the windows (m²)	4.0
S_{rr}	Area of the ceiling (m²)	30.0
S_{ew}	Area of the external wall (m²)	14.0
S	Area of facade and roof	48.0
x	Room Dimension x	6.0
y	Room Dimension y	5.0
z	Room Dimension z	3.0
RT	Receiving Room RT	0.5
K	Façade correction	0.0

	Term	Term Description	Description	Octave Band Centre Frequency 63	125	250	500	1000	2000	4000	8000	Broadband
A	$L_{eq,ff}$	Free-field L_{eq} outside room	Enter the Octave Band L_{eq} Data	49	42	41	40	43	38	30	26	**46**
	$D_{n,e}$	Insulation of the trickle vent	Titon Type TA 5221/V25 + Standard Canopy (35 dB Dn,e,w + Ctr)	32	36	38	36	32	37	40	48	
B		$\frac{A_0}{S}10^{\frac{-D_{n,e}}{10}}$		0.00013	0.00005	0.00003	0.00005	0.00013	0.00004	0.00002	0.00000	
	R_{wi}	SRI of the window	4mm Glass - 16mm Air Gap - 4mm Glass	20	24	20	25	35	38	35	35	
C		$\frac{S_{wi}}{S}10^{\frac{-R_{wi}}{10}}$		0.00083	0.00033	0.00083	0.00026	0.00003	0.00001	0.00003	0.00003	
	R_{ew}	SRI of the external wall	BS8233 Example - Brick and block external wall	30	40	44	45	51	56	57	58	
D		$\frac{S_{ew}}{S}10^{\frac{-R_{ew}}{10}}$		0.00029	0.00003	0.00001	0.00001	0.00000	0.00000	0.00000	0.00000	
	R_{rr}	SRI of roof/ceiling	Tiled/slated roof, 25mm plasterboard ceiling, 100mm quilt above ceiling	23	27	37	43	48	52	55	56	
E		$\frac{S_{rr}}{S}10^{\frac{-R_{rr}}{10}}$		0.00313	0.00125	0.00012	0.00003	0.00001	0.00000	0.00000	0.00000	
F		10log(B + C + D + E)		-24	-28	-30	-34	-38	-42	-43	-45	
	A	Equivalent Absorption Area	$\frac{0.161V}{RT}$ (Includes RT rise at low frequency)	29	29	29	29	29	29	29	29	
G		10log(S/A)		2	2	2	2	2	2	2	2	

L_{eq} Results

Term	Term Description	Octave Band Centre Frequency 63	125	250	500	1000	2000	4000	8000	Broadband
$L_{eq,2}$	Level in the receiver room (includes façade correction K)	31	19	16	11	10	1	-8	-14	**31**
	A-weighting	-26	-16	-9	-3	0	1	1	-1	
$L_{Aeq,2}$	A-weighted Level in the receiver room	5	3	7	8	10	2	-7	-15	**15**