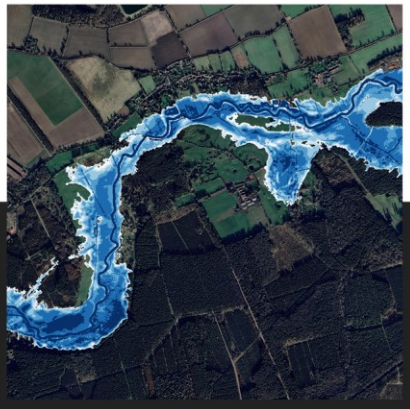
Appendix 11.3 Acoustic Assessment



Crest Nicholson Ltd

LAND NORTHEAST OF HARPENDEN BETWEEN LOWER LUTON ROAD, BOWERS HEATH LANE AND COMMON LANE

Acoustic Assessment

Revision F

Independent, multidisciplinary engineering and environmental consultants

LAND NORTHEAST OF HARPENDEN BETWEEN LOWER LUTON ROAD, BOWERS HEATH LANE AND COMMON LANE

Acoustic Assessment

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DOCUMENT AND QUALITY CONTROL

Revision/Date	Writer	Approver	Nature of Revision
First Issue July 2025	Mat Tuora, BSc (Hons), MIoA	Jody Blacklock, BEng (Hons), CEng, MIOA, MCIBSE	-
Revision A August 2025	Jody Blacklock, BEng (Hons), CEng, MIOA, MCIBSE	Jody Blacklock, BEng (Hons), CEng, MIOA, MCIBSE	Amended following client comments.
Revision B 17/10/2025	Mat Tuora, BSc (Hons), MIoA	Jody Blacklock, BEng (Hons), CEng, MIOA, MCIBSE	Revised to consider proposed layout and Sports Pitches.
Revision C 24/10/2025	Jody Blacklock, BEng (Hons), CEng, MIOA, MCIBSE	Jody Blacklock, BEng (Hons), CEng, MIOA, MCIBSE	Paragraph 1.2 updated.
Revision D 18/11/2025	Jody Blacklock, BEng (Hons), CEng, MIOA, MCIBSE	Jody Blacklock, BEng (Hons), CEng, MIOA, MCIBSE	Paragraph 1.2 updated.
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Revision F 23/02/2026	Mat Tuora, BSc (Hons), MIoA	Jody Blacklock, BEng (Hons), CEng, MIOA, MCIBSE	Revised to consider new proposed layout.

CONTENTS

APPENDICES

1.0 INTRODUCTION

1.1 Create Consulting Engineers Ltd have been appointed by Crest Nicholson Ltd to undertake a Noise Impact Assessment at the Land Northeast of Harpenden between Lower Luton Road, Bowers Heath and Common Lane.

1.2 The application is for an Outline Application for demolition of existing buildings and structures and construction of a mixed-use development comprising residential dwellings (including affordable housing), children's home, elderly extra care facility, local centre (flexible retail/health/community use), sports pitches and associated building, green infrastructure and landscaping works (to include public open space and community growing space); primary school with early years provision, vehicular and active travel infrastructure (including pedestrian and cycle access) and diversion of Bower Heath Lane; drainage works; and related infrastructure. All matters reserved save for access from Lower Luton Road.

1.3 This report contains:

- a description of the site and the proposed work to be carried out,
- a summary of international and local policy and standards relevant to this project,
- the results of the measurement undertaken on site,
- an assessment of external and internal sound against the relevant standards
- a discussion of mitigation requirements,
- an outline assessment of construction works associated with the site to the surrounding areas.

1.4 Recommendations given in this report are for acoustic purposes only. It is the Client's responsibility to ensure that any work carried out complies with other regulations.

1.5 A glossary of acoustic terms used in this report is provided in Appendix A.

2.0 EXISTING ENVIRONMENT AND SITE PROPOSALS

2.1 The application site is located to the northeast extent of Harpenden and comprises 32.5 hectares of land. The site is primarily agricultural/greenfield land. There is an active Equestrian Centre located in the western corner of the site, a number of the fields are used for horse grazing. A telecommunication mast and Electrical Substation is located near the centre of the Site.

2.2 The Site is located adjacent to the north-east built up boundary of Harpenden and is bounded by the B652/Bower Heath Lane to the northwest and fields directly north. Common Lane runs adjacent to the eastern boundary. To the south of the site is Porters Hill Park and residential development. The B653/Lower Luton Road and fields are located on the western boundary.

2.3 The B652 and Common Lane were noted as having low volumes of vehicle movements on during our survey.

2.4 To the east of the site is the Lower Luton Road which is a 30 mph road with reasonable traffic flow noted during our visit.

2.5 The M1 is located approximately 5 km to the east of the site.

2.6 The proposed site location and surrounding area is shown below.

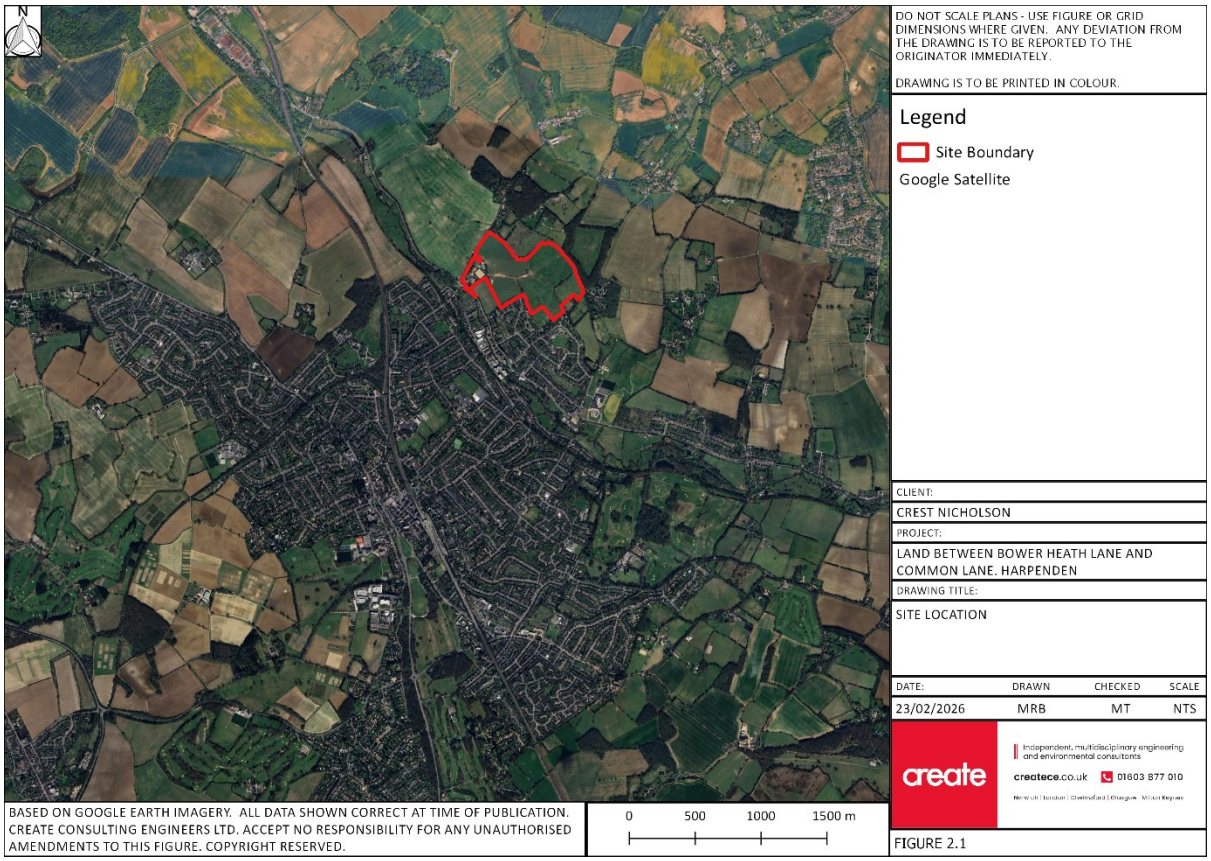

Figure 2.1: Site Location

2.7 The information provided shows a mixed development proposal comprising of up to 500 residential dwellings (Class C3), children's home (Class C2), elderly extra care facility (Class C2), local centre (up to 1200 sq.m GIA of flexible Class E(a) to E(f) and F2(b)), sports pitches, and associated building,

primary school with early years provision, public open space, community growing space, vehicular access from Lower Luton Road, pedestrian and cycle access, landscaping and related infrastructure.

2.8 The site boundary and proposed parameter plan have been shown below.

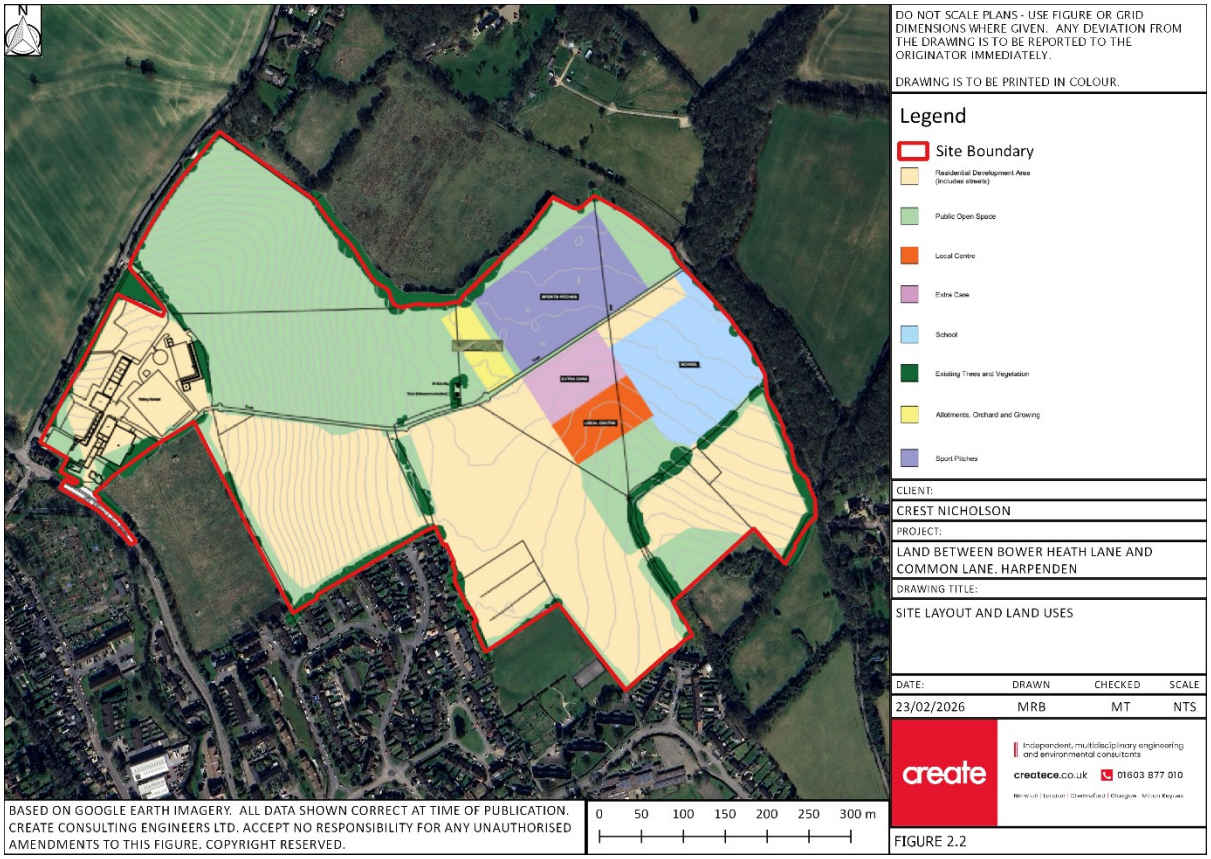

Figure 2.2: Site Boundary with Illustrative Parameter Plan Shown

2.9 There are a number of existing properties and proposed properties which are the closest noise sensitive receptors associated with the site. These are shown in Figure 2.3 below:

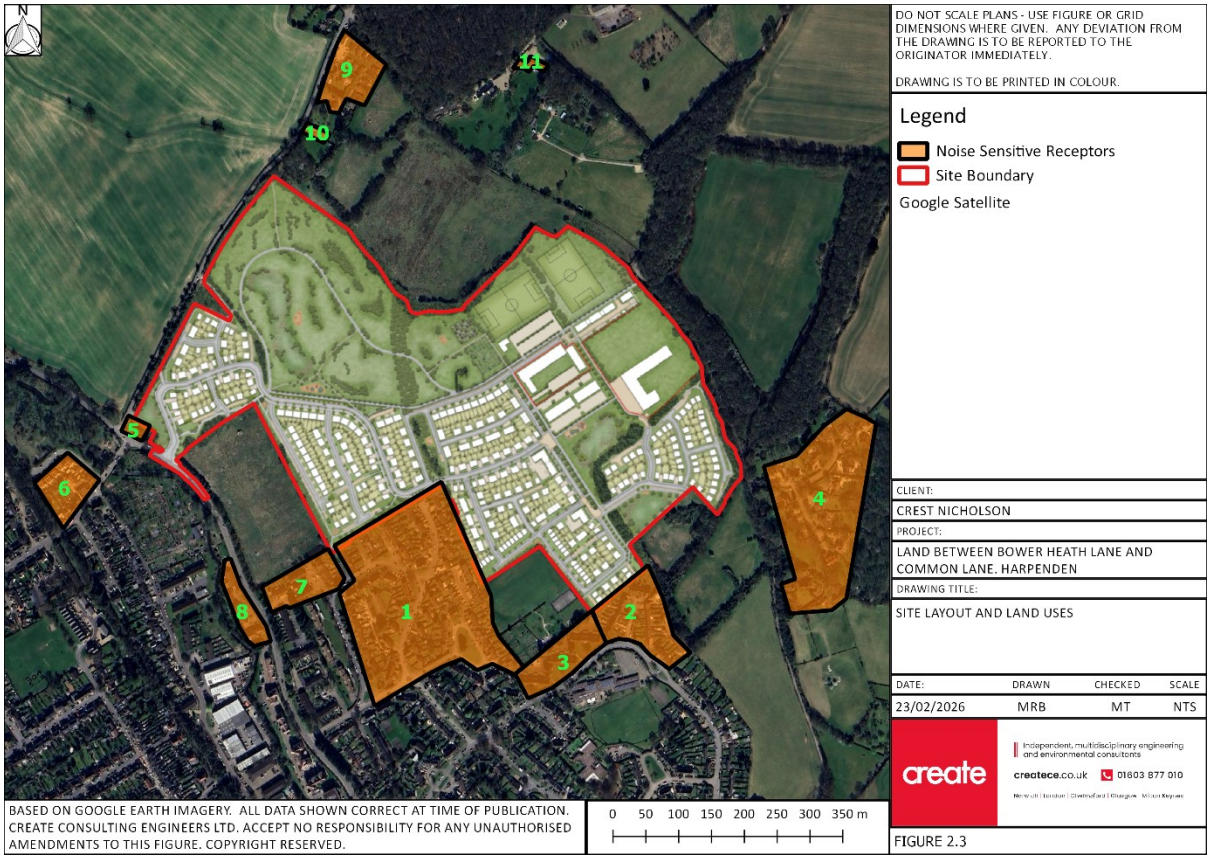

Figure 2.3: Closest Noise Sensitive Receptors

3.0 POLICY, STANDARDS AND CRITERIA

National Policy

3.1 A summary of the National Planning Policy Framework, National Planning Practice Guidance and the Noise Policy Statement for England is provided in Appendix B of this report.

Local Policy

3.2 The site falls under the St Alban's District Council (SADC) the adopted Development Plan comprises of the District Local Plan Review 1994 (Adopted 30 November 1994) Saved and Deleted Policies Version (July 2020), and supporting maps, the Harpenden Neighbourhood Plan 2018-2033 (2018); and the Wheathampstead Neighbourhood Plan (2023).

3.3 The SADC is preparing a new emerging draft Local Plan. The Regulation 19 version is the latest version and weight can be given to it due to the advanced stage in preparation (i.e., it is progressing towards Stage 2 Hearing in Autumn 2025). It is anticipated that the new Local Plan will be adopted in March 2026. The Draft Local Plan comprises the Draft Local Plan 2041 – Regulation 19 Publication (September 2024) and the Draft Policies Map.

3.4 The following policies are contained within the adopted Local Plan and considered relevant to this application. There are no noise specific policies within either the Harpenden or Wheathampstead Neighbourhood Plans.

Policy 9 Non - Residential Uses Within Residential Areas

Within areas primarily residential in character, the Council will not normally disturb lawfully existing non-residential uses, provided such activities are environmentally acceptable in terms of their visual impact, noise, smell, safety, health or traffic generation.

Within towns and specified settlements (see Policy 2), small scale new non-residential development and redevelopment or extensions to existing sites will normally be permitted in residential areas, where they will not adversely affect their amenity and character by reason of such factors as noise, smell, safety or excessive traffic (see also Policy 24).

Acceptable uses may include:

(i) public open space and leisure uses (see Policy 90) which do not generate unacceptable vehicular traffic;
(ii) local shops and services;
(iii) schools;
(iv) community facilities such as libraries and small scale doctors and dentists surgeries serving the health care needs of the neighbourhood and small scale facilities serving the religious needs of the neighbourhood;
(v) small scale residential accommodation for people in need of care and other uses within use class C2 (residential institutions) - (see Policies 10 and 62).

Within Green Belt settlements (see Policy 2), non-residential uses will not normally be permitted unless they are required to meet the local facilities and service needs of the settlement.

Footnote (1) Doctors and dentists surgeries will be encouraged to: a) locate as near as possible to neighbourhood or local shopping centres which possess a dispensing chemist and adequate car parking; b)provide a dispensary only where the surgery adjoins or forms part of a neighbourhood or local shopping centre.

Policy 57 Service Uses

Applications for service uses (i.e., Use Classes A2 and A3 and other uses appropriate to shopping areas) will be assessed against the following criteria:

(i) General acceptability of service uses

Primary shopping frontages (1) Secondary shopping frontages (1) Class 'A' frontages (1) Local Centres (2)	Acceptable if proposals do not involve the loss of dwelling space contrary to Policy 10 or retail floorspace contrary to Policy 56
Elsewhere in towns and specified settlements (3)	Not normally acceptable except for changes of use from B1 (except on employment areas listed in Policy 20); from AI (subject to Policy 56); and from A2 to A3
Green Belt settlements (4)	Acceptable if meets the service needs of the settlement

(ii) Car parking may be required. See Policies 46 and 47;
(iii) A window display should be provided;
(iv) Use Class A3 (food and drink). Proposals should not detract from the visual character of areas or cause serious problems in respect of the following:

a) traffic and parking;
b) noise, fumes, smell and general disturbance;
c) litter;
d) residential amenity;
e) impact on conservation areas (see Policy 85), in particular in the vicinity of the Cathedral (i.e., - the George Street, Heritage Close, High Street, Holywell Hill area) but without prejudicing conservation areas in general.

Furthermore, the Council will seek to ensure that serious problems do not arise from an over-concentration of A3 uses in a particular area.

Planning conditions (for example, to control hours of opening or to require provision of a litter bin outside the premises) may be imposed to render a proposal environmentally acceptable. Arrangements for the ventilation of working areas must be shown in planning applications and must not detract from the appearance of the building or the visual or other amenity of nearby residents;

Amusement Centres will not be permitted if noise and disturbance is likely to affect nearby housing, including flats above shops, or if the proposal is likely to affect the visual amenity of a conservation area.

Footnotes
(1) As defined in Policies 52 (St. Albans City Centre), 53 (Harpenden Town Centre) and 54 (neighbourhood centres).

(2) As defined in Policy 55.
(3) Refers to individual shops and small groups of shops outside the defined local centres.
(4) As defined in Policy 2.

Policy 65 Education Facilities

Proposals for new schools, extensions to existing schools or changes of use to schools will be assessed against the following:

A. Within towns and specified settlements (see Policy 2)

(i) where a loss of dwellings is proposed, Policy 10 (iv) shall be complied with;
(ii) the impact on the amenity of the surrounding area in terms of visual impact, design, noise and disturbance, road access and traffic generation;
(iii) sufficient on-site parking and servicing shall be provided;
(iv) provision shall be made for the setting down and picking up of pupils, by car or public transport, in a safe and acceptable manner.

B. Within the Metropolitan Green Belt (see Policy 1) including Green Belt settlements (see Policy 2)

(i) criteria A. (i)-(iv) above shall be complied with;
(ii) the impact on the ecology, natural beauty and amenity of the countryside will be assessed. In particular, the siting and scale of new buildings or extensions shall be modest in size and well related to existing buildings. New landscaping will normally be required, particularly where proposals involve the development of urban edge sites;
(iii) New schools will be permitted only if very special circumstances can be demonstrated. It must be shown that no suitable location is available in areas excluded from the Green Belt and that there is an overriding need for the proposal to cater primarily for children living within the District;
(iv) Changes of use will be assessed against Policy 77.

Footnote
(1) PM = Proposals Map Sheet. See Preface (Figure 1).

3.5 We understand that Policy 82 and 83 have been withdrawn but were previously directly relevant to the impact of noise from noise generating sites and from road traffic on to new houses.

3.6 Paragraphs 8.40 and 8.41 within the supporting text remain within the document and state the following:

8.40 The District Council will advise on noise levels in accordance with British Standard BS 4142 in relation to proposals for noise sensitive developments. For example, dwellings, schools, hospitals, churches and hotels in locations where they are likely to be subject to excessive noise annoyance from industrial premises or other fixed installations. The Council will also advise on noise in relation to new commerce and industry in accordance with Circular 10/73 and the standards established in BS.4142.

8.41 Noise from roads, railways, aircraft and some industrial and commercial premises has a detrimental effect on the quality of the environment, particularly in housing and other noise sensitive areas. Aircraft noise levels in the District do not at present justify refusal of planning applications (see Policy Intention 9). Circular 10/73 provides guidance on road noise and this forms the basis for Policy

83. There is no official guidance on rail noise, but proposed developments close to railways will be considered on their merits.

St Albans City & District Council Draft Local Plan 2041 (Under Review)

3.7 Within the Draft Local Plan, there is a section specifically on Air and Noise Pollution, paragraphs 13.6 through to 13.11, with Policy HW1 being particularly pertinent to this project. It states;

> *"Development proposals, including those for new residential dwellings, schools, nurseries and care homes and other uses which are noise and pollution sensitive, or in areas which may exceed national legislative air quality pollution limits, must carry out suitable assessments for noise / air pollution.*
> *Proposals which are found to be affected by noise or air pollution must demonstrate suitable mitigation, including as required:*
> *a) Maintaining distances between road and other sources of noise and air pollution (including odour pollution) and people;*
> *b) Using green infrastructure, in particular trees, where this can create a barrier or maintain separation between sources of pollution and receptors;*
> *c) Appropriate means of filtration, ventilation and soundproofing on affected buildings;*
> *d) Effective control of dust and emissions from construction, operation and demolition;*
> *e) Use of optimal layout and orientation to promote avoidance of elevated pollution without mitigation which will reduce the level of mitigation where necessary;*
> *f) Air quality and/or noise assessments at the earliest stage of development.*
> *Development proposals that would generate new noise and air pollution in proximity to residential and other noise-sensitive uses must demonstrate and put in place measures to avoid or mitigate any such impacts."*

3.8 Review of the Luton Airport noise contour plots show the site is significantly outside of the lowest contour boundary. Based on this and the site walk over, it is clear that the primary source of noise impacting the site is from the surrounding road network and not aircraft. Although the measurement survey would include the impact from any aircraft activities, it has not been specifically assessed as it is considered unlikely to alter the outcome of our assessment, particularly as mitigation is based on worst case assumptions relating to the road network.

Standards and Guidance

3.9 In addition to the local policy there are a number of national standards and guidance which are accepted as appropriate for the rating and assessment of impact from noise to and from development.

3.10 These are summarised below:

ProPG: Planning & Noise – New Residential Development (2017)

3.11 The Professional Practice Guidance on Planning and Noise (ProPG) has been developed by a working group consisting of representatives of the Association of Noise Consultants (ANC), Institute of Acoustics (IOA) and Chartered Institute of Environmental (CIEH).

3.12 The approach detailed in this guidance includes a framework to clearly determine situations where noise is not an issue, and to help identify the extent of risk at noisier sites.

3.13 This ProPG advocates a systematic, proportionate, risk based, 2-stage approach to assessing the risk of noise to future development, as follows:

- Stage 1 – an initial noise risk assessment of the proposed development site, considered to support wider Government planning and noise policy; and
- Stage 2 – a systematic consideration of four key elements;
  - Element 1 – demonstrating a "Good Acoustic Design Process";
  - Element 2 – observing internal "Noise Level Guidelines";
  - Element 3 – undertaking an "External Amenity Area Noise Assessment"; and
  - Element 4 – consideration of "Other Relevant Issues

3.14 The document advocates an assessment in a graduating manner from Negligible to High Risk as shown in the following figure:

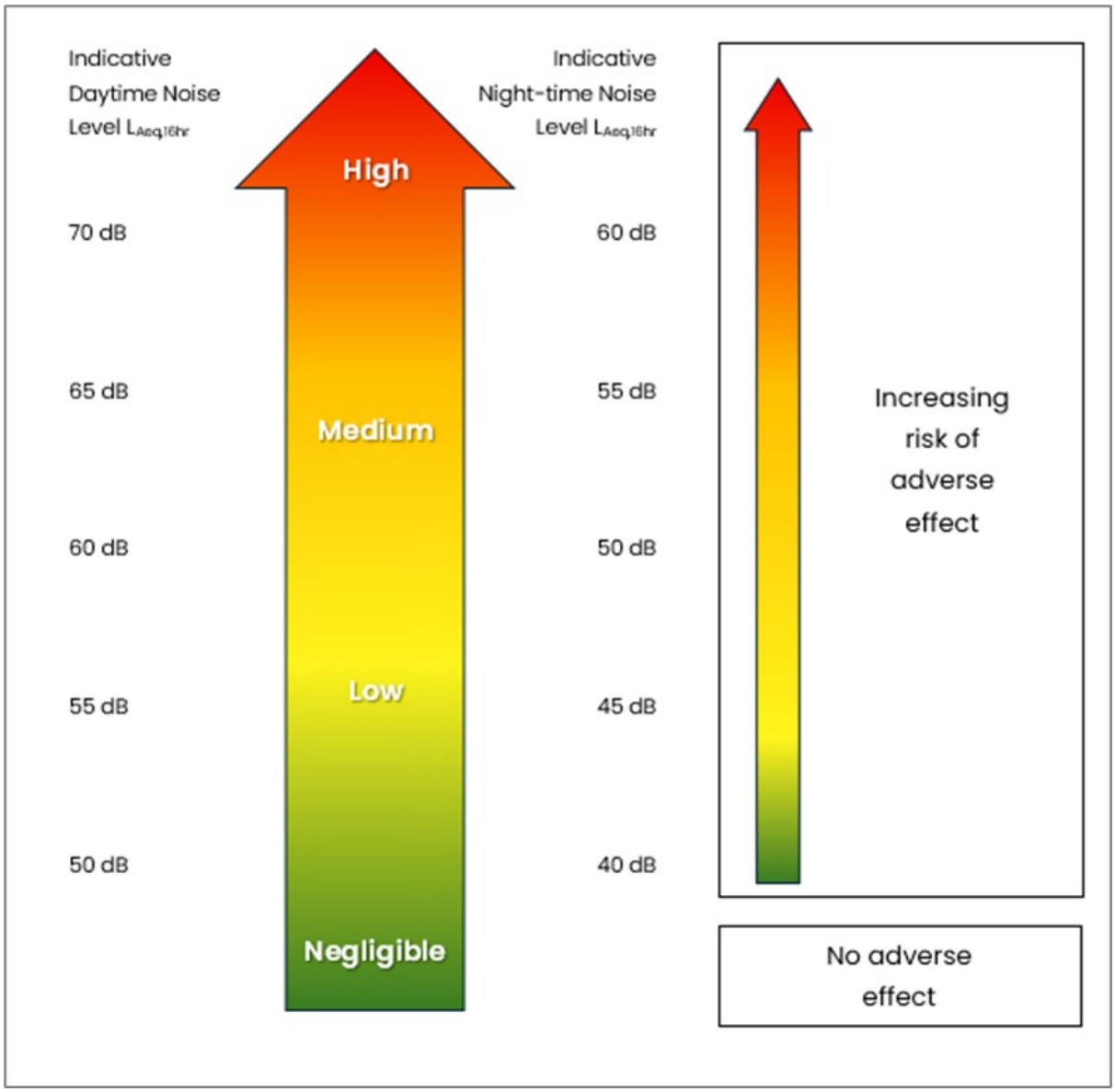

Figure 3.1: Initial Site Risk Assessment Using Fig. 1 of ProPG

3.15 This document states that "an indication that there might be more than 10 noise events at night (23:00 – 07:00) with $L_{Amax,F}$ > 60 dB means the site should not be regarded as negligible risk."

3.16 The approach outlined above, is underpinned by the preparation of an Acoustic Design Statement (ADS). This ADS should be more detailed for a site assessed as being 'high-risk', and less detailed for a site assessed as being 'low-risk'. This approach will result in one of four recommendations for the site; "grant without conditions", "grant with conditions", "avoid" or "prevent".

WHO: Environmental Noise Guidelines (2019)

3.17 In 2019 WHO Environmental Noise Guidelines was released. This document provides recommendations for protecting human health from exposure to environmental noise originating from various noise sources, such as:

- Transportation (road traffic, railway & aircraft);
- Wind Turbine; &
- Leisure Noise

3.18 Although the document addresses these issues in broad terms, it does not supersede the 1999 community noise guidelines which are more applicable in this instance.

WHO: Guidelines on Community Noise (1999)

3.19 The WHO Guidelines for Community Noise state the following guideline values for noise in specific environments, as can be seen in Table 3.1.

Specific Environment	Critical Health Effects	$L_{Aeq,T}$ (dB)	$L_{AMAX,fast}$ (dB)
Dwelling, indoors	Speech intelligibility and moderate annoyance	35	-
Inside bedrooms	Sleep disturbance, night-time	30	45
Outdoor living area	Serious annoyance, daytime and evening	55	-
	Moderate annoyance, daytime and evening	50	-

Table 3.1: WHO Guideline Values for Community Noise

3.20 The document also states:

> *'For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45dB L_{AMAX} more than 10-15 times per night (Vallet & Varnet, 1991).'*

3.21 These levels are reflected in the guidance provided in BS 8233 (2014).

BS 8233 (2014) Guidance on Sound Insulation and Noise Reduction for Buildings

3.22 British Standard 8233 (2014) 'Guidance on sound insulation and noise reduction for dwellings' provides contains guidance on limits for internal noise in common types of domestic and non-domestic buildings. The guidance is primarily intended for steady, continuous sources (such as noise from road traffic), but are also commonly used to provide a reasonable basis for assessing the suitability of noise levels within a dwelling. Careful interpretation and application of the guideline noise levels is often necessary.

3.23 The standard suggests the following internal ambient noise levels for dwellings:

Activity	Location	Day-Time Period 07:00 – 23:00	Night-Time Period 23:00 – 07:00
Resting	Living Room	35 dB $L_{Aeq,16hour}$	
Dining	Dining Room/Area	40 dB $L_{Aeq,16hour}$	
Sleeping	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

NOTE 7 – Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved

Table 3.2: BS 8233 (2014) Indoor Ambient Noise Levels

3.24 Note 4 of Section 7.7.2 of 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."

3.25 Note 5 of BS 8233 states:

> "If relying on closed windows to meet the guide values, there needs to be appropriate alternative ventilation that does not compromise the façade insulation or the resulting noise level."

3.26 Section 7.7.3.2 recommends that noise levels in external amenity areas should ideally not exceed 50 dB $L_{Aeq,T}$ and that 55 dB $L_{Aeq,T}$ should be considered as an upper limit. BS 8233 does, however, note that these values are guidelines and may not be achievable in all circumstances where development might be desirable.

Design Manual for Roads and Bridges – LA111 Rev 2 (May 2020)

3.27 Guidance for acceptable increases in road traffic noise is contained in the Design Manual for Roads and Bridges Part 7.

3.28 This guidance is given in terms of the $L_{A10\ 18\text{-}hour}$, although we would consider the principle and guidance based on the magnitude of impact to be a useful reference in this case.

3.29 The guidance considering the short-term impact and long-term impact are given below in tables 3.3 and 3.4 respectively.

Noise change, $L_{A10,18h}$	Magnitude of Impact
0	No change
0.1 – 0.9	Negligible
1 – 2.9	Minor
3 -4.9	Moderate
5+	Major

Table 3.3: Classification of magnitude of noise impacts in short term

Noise change, $L_{A10,18h}$	Magnitude of Impact
0	No change
0.1 – 2.9	Negligible
3 – 4.9	Minor
5 -9.9	Moderate
10+	Major

Table 3.4: Classification of magnitude of noise impacts in long term

BS 4142 (2014) +A1 (2019) Methods for Rating and Assessing Industrial and Commercial Sound

3.30 The British Standard 4142 (2014) describes methods for rating sound of an industrial and/or commercial nature to assess its likely effects on people who might be inside or outside a dwelling or premises used for residential purposes upon which the sound is incident.

3.31 BS 4142 specifies that an initial estimate of the impact of the specific sound can be obtained by subtracting the measured background sound level from the rating level and then considering the following:

- *Typically, the greater this difference, the greater the magnitude of the impact;*
- *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context;*
- *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context; and*
- *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.*

3.32 The rating level is defined in BS 4142 as the sound level of the source plus any penalties for the characteristic features of the sound, such as tonality and impulsivity among others. Acoustical characteristics and associated penalties are shown in Table 3.5:

Acoustic Character	Subjective Level	Correction
Tonality	Just perceptible	+2 dB
	Clearly perceptible	+4 dB
	Highly Perceptible	+6 dB
Impulsivity	Just perceptible	+3 dB
	Clearly perceptible	+6 dB
	Highly Perceptible	+9 dB
Intermittency	Readily distinctive	+3 dB
Other sound characteristics	Readily distinctive	+3 dB

Table 3.5: Acoustical Characteristics for Determining the Rated Sound Level

3.33 The above correction values are based on the subjective nature of the sound, however BS 4142 also provides detailed guidance on objectively calculating the correction factors, which are included within Annexes C, D and E of the British Standard.

3.34 This latest version of the British Standard states that the most relevant background sound level should be applied for the most relevant time period and should reflect the period which is being assessed. This could include the use of statistical analysis or averaging to calculate the most applicable background sound level.

BS 5228-1 (2009) +A1 (2014) Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1: Noise

3.35 The British Standard 5228 – Part 1 (2009) gives recommendations for basic methods of noise control relating to construction sites, including sites where demolition, remediation, ground treatment or related civil engineering works are being carried out, and open sites, where work activities/operations generate significant noise levels, including industry-specific guidance.

3.36 The legislative background to noise control is described and recommendations are given regarding procedures for the establishment of effective liaison between developers, site operators and local authorities. This part of BS 5228 provides guidance concerning methods of predicting noise and assessing its impact on those exposed to it.

3.37 The document contains a method of setting noise limits to surrounding areas, referred to as the 'ABC Method'. In essence, the residual ambient noise level ($L_{Aeq,T}$) is determined and rounded to the nearest 5 dB, this is then compared against the category A threshold. A site operating above the defined threshold has the potential to generate a significant effect.

3.38 The threshold values and method to determine these is shown in Table 3.7 below:

Assessment category and theshold value period	Threshold value (dB)		
	Category A [A)]	Category B [B)]	Category C [C)]
Night-time (23:00 - 07:00)	45	50	55
Evenings and weekends [D)]	55	60	65
Daytime (07:00 - 19:00) and Saturdays (07:00 - 13:00)	65	70	75
NOTE 1 - A potential signigicant effect is indicated if the $L_{Aeq,T}$ noise level arising from the site exceeds the threshold level for the category appropriate to the ambient noise level. NOTE 2 - If the ambient noise level exceeds the category Category C threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a potential signifigcant effect is indicated if the total $L_{Aeq,T}$ noise level for the period increases by more than 3 dB due to site noise. NOTE 3 - Applied to residential receptors only.			
[A)] Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values. [B)] Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as Category A values. [C)] Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are greater than Category A values. [D)] 19:00 - 23:00 weekdays, 13:00 - 23:00 Saturdays and 07:00 - 23:00 Sundays			

Table 3.6: The ABC Method

Sport England – Artificial Grass Pitch (AGP) Acoustics – Planning Implications (2015)

3.39 The Sport England document provides useful guidance on assessing noise from a variety of sports on artificial grass pitches. In absence of any other dedicated guidelines, this guidance is often applied to grass pitches.

3.40 In our experience the noise levels from sporting activities on grass pitches are unlikely to be higher than those from artificial grass pitches.

3.41 The Sport England guidance mimics the recommendations in the WHO guidelines and BS 8233 and suggests that noise levels from sports pitches should not exceed 50 dB $L_{Aeq,\ 1\text{-}hour}$ at any residential property or in an external living space.

3.42 The guidance also sets out noise levels for sports pitches of 58 dB $L_{Aeq,1\text{-}hour}$ 10 metres from the centreline of the pitch, which have been used for the basis of this assessment.

4.0 MEASUREMENT SURVEY

4.1 We attended site on the 18th of July 2024 to undertake a site survey. We left two logging sound levels meters on site for a period of five days.

4.2 During the site visit we also undertook a series of attended measurements to determine the propagation around the site and to support the Noise Impact Assessment.

4.3 We noted a cell tower with some supporting plant as being audible during our survey. Although this was measured, we have since been informed that this is to be removed as part of the works and therefore has not been considered further in this report.

4.4 The measurement locations used for our survey are shown in the figure below:

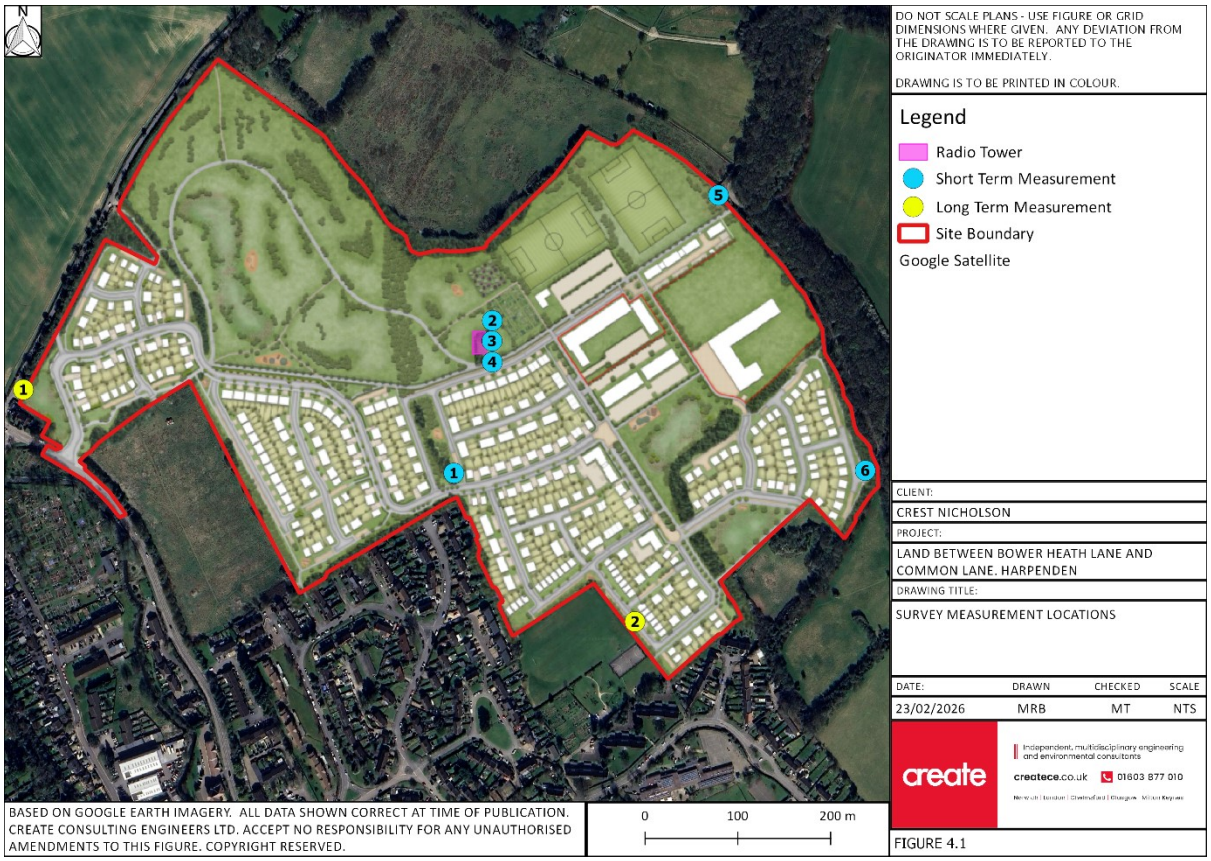

Figure 4.1: Measurement locations

4.5 All measurements were taken at a height of 1.5 m above ground in terms of, L_{eq}, L_{90}, L_{max} and A-weighted levels. The results of our survey are summarised in Section 5.0.

4.6 The equipment was calibrated at 113.9 dB at 1 kHz before the survey and both units calibrated at 114.1 dB upon collection. This is considered a low variation in the context of environmental noise measurements. A summary of equipment used, and calibration information is contained in Appendix C of this report.

4.7 Weather was logged on a ClimeMET CM2000 weather station over the duration of the survey. Wind levels remined below 5 m/s throughout our survey. Rain was noted from 6:00 on the 23rd of July 2024. Data after this time has been excluded from our data processing to minimise impact of unfavourable

weather conditions from our survey results. Temperatures throughout the survey ranged from 10 degrees Celsius to 31 degrees Celsius.

4.8 With the exception of the period of rain noted towards the end of the survey, the weather conditions were considered acceptable in the context of environmental surveys.

5.0 RESULTS

Ambient

Daytime

5.1 Ambient noise levels measured during the daytime ranged between 53 dB $L_{Aeq,16\text{-}hour}$ and 55 dB $L_{Aeq,16\text{-}hour}$ in measurement position 1 and ranged between 45 dB $L_{Aeq,16\text{-}hour}$ and 48 dB $L_{Aeq,16\text{-}hour}$ in measurement position 2.

5.2 The average daytime noise levels measured over the course of the survey were **54 dB $L_{Aeq,16\text{-}hour}$** in measurement position 1 and **47 dB $L_{Aeq,16\text{-}hour}$** in measurement position 2.

Night-time

5.3 Ambient noise levels measured during the night-time ranged between 44 dB $L_{Aeq,8\text{-}hour}$ and 49 dB $L_{Aeq,8\text{-}hour}$ in measurement position 1 and ranged between 35 dB $L_{Aeq,8\text{-}hour}$ and 39 dB $L_{Aeq,8\text{-}hour}$ in measurement position 2.

5.4 The average night-time noise levels measured over the course of the survey were **47 dB $L_{Aeq,8\text{-}hour}$** in measurement position 1 and **37 dB $L_{Aeq,8\text{-}hour}$** in measurement position 2.

5.5 As previously discussed, a number of attended measurements were taken around the site in order to determine any variation in sound across the development.

5.6 Measurement in attended positions 1 and 5 showed differences in noise levels over 10 dB lower than those in unattended measurement position 1.

5.7 Measurement in attended position 6 showed differences in noise levels of only 3 dB lower than those in unattended measurement position 1. However, it was noted that measurements in this location were primarily impacted by local activities such as domestic deliveries and gusts of wind causing trees to rustle, although some infrequent road traffic was noted.

Max Levels

5.8 The WHO Guidance states:

"For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB L_{AFmax} more than 10 – 15 times per night."

5.9 The survey includes noise levels measured over five night-time periods. We have therefore taken the 50th highest max level as representative for this survey.

5.10 Representative night-time L_{AFmax} was found to be **68 dB $L_{AFmax,1\text{-}minute}$** in measurement position 1 and be **55 dB $L_{AFmax,1\text{-}minute}$** in measurement position 2.

5.11 It should be noted that maximum noise levels are likely to be impacted by the dawn chorus. We have note excluded this from our data processing as in practice some areas of the site will require mitigation as the B653 was found to be a reasonably significant noise source. The area of the site

which is likely to require mitigation is relatively small in relation to the overall development and we therefore do not consider further exclusion of data to alter the outcome of this assessment.

Background

5.12 Histograms of the daytime and night-time measurement results are shown in the following figures:

Daytime

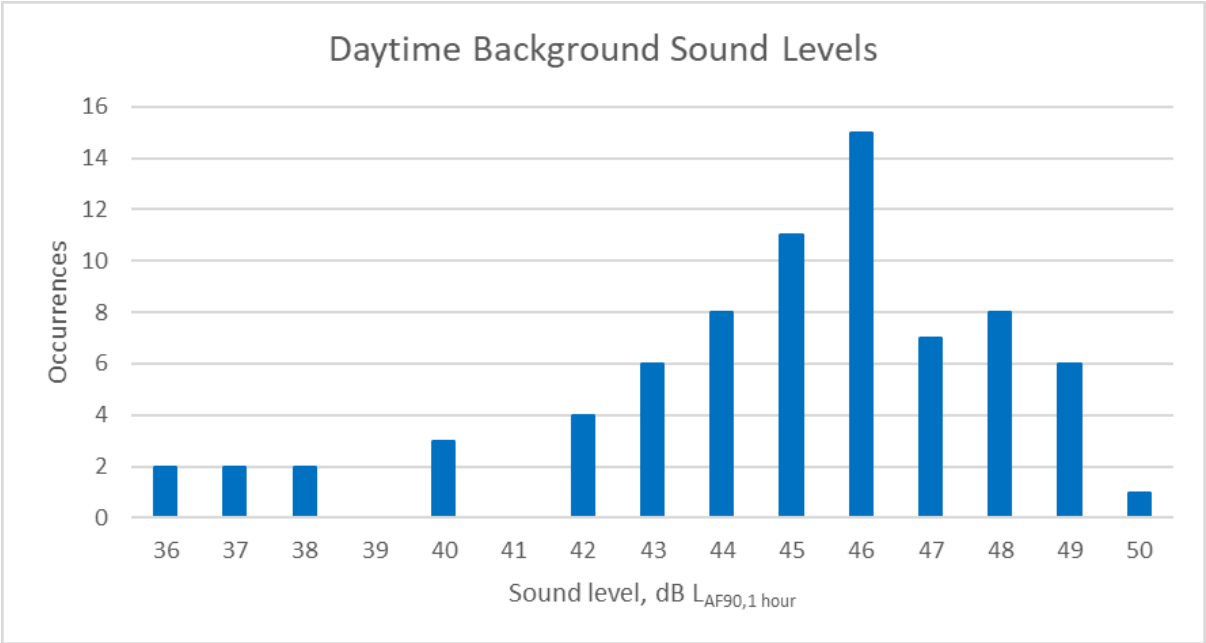

Figure 5.1: Histogram Of Daytime Background Sound Level In Position 1

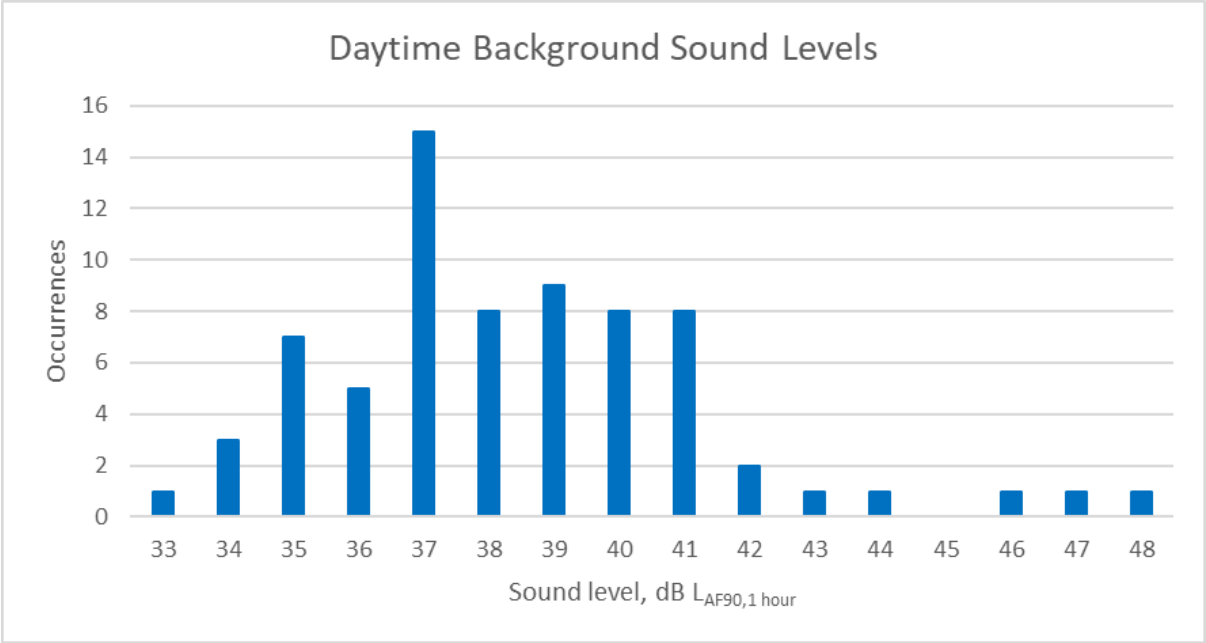

Figure 5.2: Histogram Of Daytime Background Sound Level In Position 2

Night-time

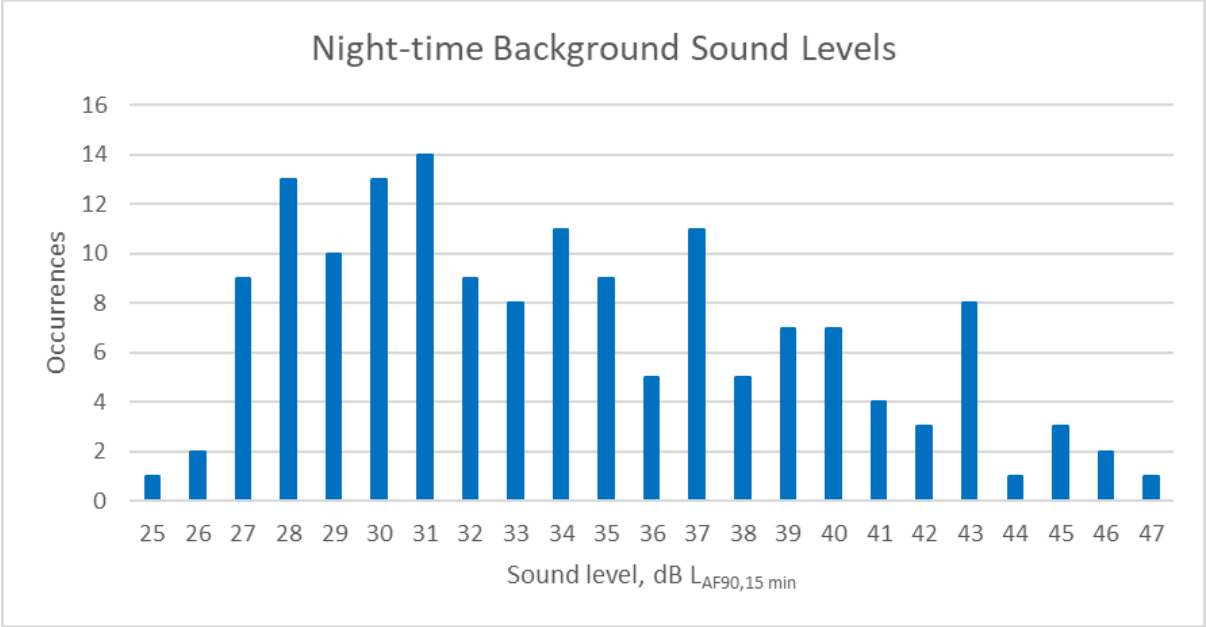

Figure 5.3: Histogram Of Night-time Background Sound Level In Position 1

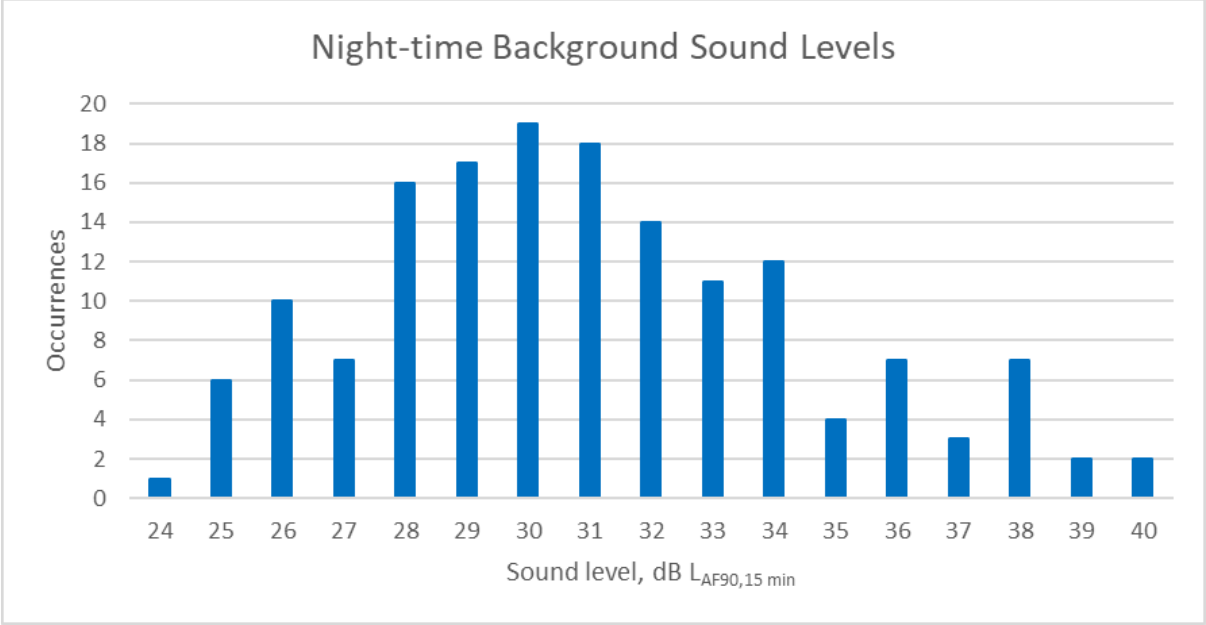

Figure 5.4: Histogram Of Night-time Background Sound Level In Position 2

5.13 During the daytime we have considered **46 dB $L_{A90,1hour}$** to be representative of background sound levels in measurement position 1 and **37 dB $L_{A90,1hour}$** to be representative of daytime background sound level in measurement position 2.

5.14 During the night-time representative background levels are closer together which indicates that the background sound is dominated by distant noise sources such as road traffic on distant major roads rather than vehicle movement on local roads.

5.15 We have considered background sound levels of **30 dB $L_{A90,15mins}$** to be representative during the night-time at both locations.

6.0 ASSESSMENT

Assessment of Road Traffic

6.1 Overall the site is considered to have a negligible to low risk when considered against the guidance noise levels suggested in the Initial Site Risk Assessment within ProPG.

6.2 It is typically considered that a 15 dB level difference is achieved across a partially open window.

6.3 Measurements obtained at long term measurement position 1 would be considered above the point at which a partially open window could be used to naturally ventilate the property during normal background ventilation conditions.

6.4 In addition to the above, some houses are located closer to the B635 which means noise levels are likely to be higher than those captured through the measurements alone.

6.5 Measurements taken to the northeast extent of the site are borderline with the requirement with windows partially open for ventilation and calculations show internal noise levels would exceed the requirements of BS 8233 by only 1 dB. In practice, measurements over this relatively short measurement duration were impacted by other non-constant or infrequent events, and we do not expect long term noise levels from road traffic in this location to justify more stringent façade mitigation.

6.6 Based on the survey measurements and our observations on site, we consider the primary source of noise impacting the site to be from road traffic on the B635.

6.7 In order to determine at what point the site may start to benefit from using open windows to support the ventilation strategy we have generated a computer model of the site. This allows us to consider the impact of sound from the road to the development. It is worth noting that due to the way in which sound sums it is important to ensure noise levels from the B635 are not considered in isolation. We have therefore ensured that our recommendation considered the potential for summed noise levels to ensure a robust assessment of noise break in.

6.8 Ground conditions have been considered mixed with 50% acoustically soft and 50% acoustically hard. 4 orders of reflections have been used. Existing and proposed properties have been considered over the site to inform the effects of shielding. Garden fences have not been considered in this assessment and the propagation of sound across the site is therefore likely to represent a worst case scenario over much of the site.

6.9 The information provided shows a mix of 3 story houses and 2.5 story houses. Mapping height was set to 5.5 metres as this represented the worst case propagation height and should ensure a worst case estimate for sound propagation and mitigation proposals.

6.10 The geometry, daytime and night-time maps are shown in Figures 6.1, 6.2 and 6.3 below.

Figure 6.1: Daytime Sound Propagation From B635 (Grid Height 5.5m)

Figure 6.2: Night-time Ambient Sound Propagation From B635 (Grid Height 5.5m)

Figure 6.3: Night-time Maximum Sound Propagation From B635 (Grid Height 5.5m)

6.11 The following areas of the site should not rely on openable windows to support the background ventilation strategy and will require acoustically rated glazing and, if applicable, acoustically rated ventilation elements.

Figure 6.4: Areas Where Mitigation Is Required

6.12 Windows to habitable rooms should be favoured on facades facing away from the road. Revised façade recommendation can be considered once detailed plots layouts are available.

6.13 It should be noted that windows need not be sealed shut and can be opened at the discretion of the occupants.

6.14 We have based our calculations on rooms with dimensions of 4 m by 3 m by 2.5 m, with each room having at least 2 m^2 of glazing to provide a worst-case scenario.

6.15 Properties shown in the red area of Figure 6.4 should have glazing capable of achieving at least 34 dB R_W and a ventilation elements with a combined normalised levels difference of 39 dB $D_{n,e,w}$.

6.16 For our calculations we have used data for Pilkington Insulight units comprising 6 mm glass - 12 mm airgap – 6.4 mm laminated glass and two Titon SFX 2500EA trickle vents with V75 / C50 canopies capable of achieving 42 dB $D_{n,e,w}$ each.

6.17 Where multiple trickle vents are used each one should achieve a normalised levels difference of 39 dB $D_{n,e,w}$ + 10 x log (N), where N is the number of units in the space.

6.18 Alternative products should be reviewed on a case by case basis as in addition to the single figure rating, it is important to ensure that sufficient mitigation can be provided across the frequency range.

6.19 With the proposed mitigation measure the following internal noise levels are calculated in the worst affected properties.

Period of assessment	Parameter	Calculated internal noise level	Meets design criteria
Daytime	Ambient	32 dB $L_{Aeq,\ 16\text{-}hour}$	Yes
Night-time	Ambient	23 dB $L_{Aeq,\ 8\text{-}hour}$	Yes
	Maximum	45 dB L_{AFmax}	Yes

Table 6.1: Calculated Internal Noise Levels

6.20 It can be seen with the proposed mitigation reasonable internal noise levels can be achieved is the worst effected location.

6.21 We would expect much of the development to benefit from lower noise levels if the above recommendations are implemented.

6.22 For the benefit of the reader, it should be noted that optimising site layout and reducing the number of habitable rooms facing towards the B635 would constitute good acoustic design practice.

6.23 We would recommend that a detailed review is undertaken once the site layout is finalised.

Assessment of Plant Noise

6.24 Commercial units are included in this development proposal. This relates to any plant associated with the scheme, including that connected with the care home, the community centre and the school.

6.25 It is also likely that an assessment of noise from any mechanical plant proposed as part of the residential development, for example air source heat pumps or MVHR units will need to be assessed.

6.26 It will be for the Council to confirm suitable limits in keeping with local policy.

6.27 BS 4142 states that where plant noise rating levels are 5 dB above the local background noise levels this may indicate that an adverse impact may start to begin.

6.28 In our opinion controlling plant noise levels so that they do not exceed 42 dB $L_{Ar,Tr}$ during the daytime and 35 dB $L_{Ar,Tr}$ during the night-time at the closest noise sensitive receptors, when assessed in accordance with BS 4142, would result in reasonable acoustic conditions across the site.

6.29 Again, we would expect the Council to confirm suitable criteria based on the recommendations and evidence provided in this report.

External Noise Levels (Residential)

6.30 The measurements undertaken for this project demonstrate that external noise levels across the majority of the site are below the lower limit proposed in the WHO guidance and in BS 8233.

6.31 The B635 was identified as the primary noise source impacting the site. Levels from the B635 across the site at 1.5 metres above ground are shown in Figure 6.5.

Figure 6.5: External Noise Levels (Grid Height 1.5m)

6.32 Areas in yellow and green are below the point at which the lower limits proposed in the WHO guidelines and BS 8233 for external amenity.

6.33 Areas in grey are above the lower limits, but below the upper limits proposed in the WHO guidelines and BS 8233 for external amenity.

6.34 Areas in orange and red are above the upper limits proposed in the WHO guidelines and BS 8233 for external amenity.

6.35 A close view of areas of the site which are above the lower external ambient limit are shown in Figure 6.5.

Figure 6.6: External Noise Levels (Grid Height 1.5m)

6.36 It can be seen that sound levels are below the upper limit proposed in the guidance with only a few areas above the lower limit.

6.37 Installing close boarded fences in gardens which exceed the lower limits would likely reduce external noise levels to below the lower threshold. However the necessity of this should be discussed and agreed with the Local Council, as this area of the site is relatively small and a significant degree of alternative amenity is available. Should fences be installed they should be at least 1.8 metres high, imperforate, and meet a mass per unit at least 10 kg/m^2. This can normally be achieved with a 20 mm solid timber fence.

External Noise Levels (School)

6.38 The sound propagation model only considered sound propagation from the B635. Due to general ambient sound from the surrounding area, sound levels in short term measurement position 5 is considered more representative of the school site, while the model is likely to underestimate the degree of impact.

6.39 Sound levels in short term measurement position 5 were found to typically be 10 dB below those recorded in long term measurement position 1. The school site is therefore expected to be subject to sound levels below 44 dB $L_{Aeq,16\text{-}hour}$.

6.40 The design guide for BB93 states that at least one area should be provided where noise levels are below 50 dB $L_{Aeq,30\ mins}$ to allow for outdoor teaching activities. We would expect this to be achieved across the site for the majority of the time.

6.41 External noise levels not exceeding 50 dB $L_{Aeq,30\text{-}minutes}$ would allow for open windows to be used for all use cases described with in BB93 when the relaxation to the ambient noise criteria is applied.

6.42 This is a preliminary assessment, and we recommend a review of the proposed school site layout at the Reserved Matters stage to determine if the school will require specific mitigation measures.

Increase In Noise Levels Due To Traffic Increase From The Development

6.43 We have been provided with average traffic counts and predictions for the following scenarios:

- 2022 Baseline
- 2036 Baseline + Committed Development
- 2036 Baseline + Proposed Development

6.44 Based on the data provided the decibel increase on each road network is shown to vary by between 0 dB and 0.9 dB when comparing the proposed development scenario with the committed development scenario, with the highest increase seen along Westfield Road.

6.45 In the worst impacted area of the site a 0.9 dB increase in noise levels may be present. When considered in the context of DMRB there would be a negligible change to the worst impacted areas during the short term and long term, and to some assessment locations no change will be present.

6.46 The impact due to future growth of traffic is therefore considered insignificant and no further mitigation measures are considered necessary.

Assessment of Sound From Sports Pitches

6.47 We understand that the two sports pitches are proposed for the school, but will be available for public use.

6.48 As previously discussed, the Sports England Guidelines provides typical sound levels and criteria which is considered acceptable for sports pitches.

6.49 It is normal for sports pitches to have limitations on hours of use, so that they only operate during the daytime, i.e. no later than 10 pm or 11 pm subject to suitable conditions from the council.

6.50 The pitches have been included in the model, considering the same modelling parameters, but with soft intervening ground conditions.

6.51 The model output at 4 metres is shown in Figure 6.6 below:

Figure 6.7: External Noise Levels From Sport Pitches At 4 Metres

6.52 The houses directly to the southeast of the pitches and the extra care building are the only receptors which exceed the Sports England Guidance.

6.53 At the worst impacted window the calculated sound level would be in the order of 58 dB $L_{Aeq,1\text{-}hour}$.

6.54 This is 8 dB above the criteria proposed by Sports England.

6.55 Due to the geometry of the pitches relative to the houses a barrier on the boundary is unlikely to reduce sound levels to windows without being significantly high to block the line of site from all windows to the pitches.

6.56 Alternatively the pitches could have a barrier installed to the southeast extent of the pitches, but this would need to be reviewed in detail to determine the effectiveness and practicality given the use of the pitches.

6.57 Given the location of the pitches to the dwellings, it is therefore recommended that mitigation in the form of housing layout and acoustically rated façade elements is considered.

6.58 As a starting point the plot layout should favour habitable rooms facing away from the sports pitches. Where this is not possible, habitable rooms should have windows and, if used, trickle vents rated to reduce sound to reasonable levels. The Sports England Guidance sets external limits of 50 dB on the basis that a 15 dB level difference across a partially open window can be achieved. Hence, this implies that an internal level of 35 dB $L_{Aeq,1\text{-}hour}$ is acceptable in line with BS 8233.

6.59 We are of the opinion that given the nature of the sound, i.e. people shouting and balls being kicked or hit a reduced internal level can be considered appropriate to promote more suitable internal levels during the daytime to promote reasonable conditions for daytime and late evening rest.

6.60 We have, therefore, designed the internal sound levels so as not to exceed 30 dB $L_{Aeq,1\text{-}hour}$ internally during sporting events, when considered in line with the Sport England Guidance levels.

6.61 The Sports England Guidance does not contain a typical sound spectrum, but states that the primary source of sound is from the voice of players with the exception of hockey, where ball impact was considered more significant. For the purposes of this assessment we have considered the voice spectrum provided in IEC 60268-16 as suitable for the purposes of this assessment.

6.62 To achieve the proposed 30 dB $L_{Aeq,1\text{-}hour}$ inside during sporting events, our calculations show that properties directly to the southeast and the extra care building should have glazing capable of achieving at least 40 dB R_w and ventilation elements with a combined normalised levels difference of 39 dB $D_{n,e,w}$. For the extra care building these should be installed on the north and east facades and for the houses the north, west and east facades, i.e. all facades expect those facing directly away from the pitches.

6.63 For our calculations we have used data for Pilkington Insulight units comprising 10 mm glass - 12 mm airgap – 6.4 mm laminated glass and two Titon SFX 2500EA trickle vents with V75/C50 canopies capable of achieving 42 dB $D_{n,e,w}$ each.

6.64 Where multiple trickle vents are used each one should achieve a normalised levels difference of 39 dB $D_{n,e,w}$ + 10 x log (N), where N is the number of units in the space.

7.0 OUTLINE CONSTRUCTION NOISE ASSESSMENT

7.1 This section contains an outline assessment of construction noise associated with the proposed development.

7.2 We have used the guidance contained in BS 5228-1 as the basis of this assessment. Noise levels across the site are shown to be relatively low, and we therefore consider the site to fall with in the Category A Threshold.

7.3 This assessment has considered the existing ambient sound levels and the likely significant effects on existing receptors around the site and surrounding area in terms of:

- existing baseline conditions.
- noise impacts expected during construction.

7.4 The potential effects of vibration have not been considered within this assessment, as it is anticipated that major vibratory works, if any, will not take place within a distance that is likely to cause nuisance or damage to nearby residents. Once site layouts have been confirmed and construction RAMS have been produced, a detailed assessment should be undertaken to confirm the impact of noise and vibration on the nearby areas.

7.5 The site is currently undeveloped land, with no existing structures. Therefore, it is anticipated that there will be little demolition and site preparation works undertaken prior to construction works commencing. The following figure indicates the representative construction sources and noise sensitive receptor locations used in the subsequent assessment.

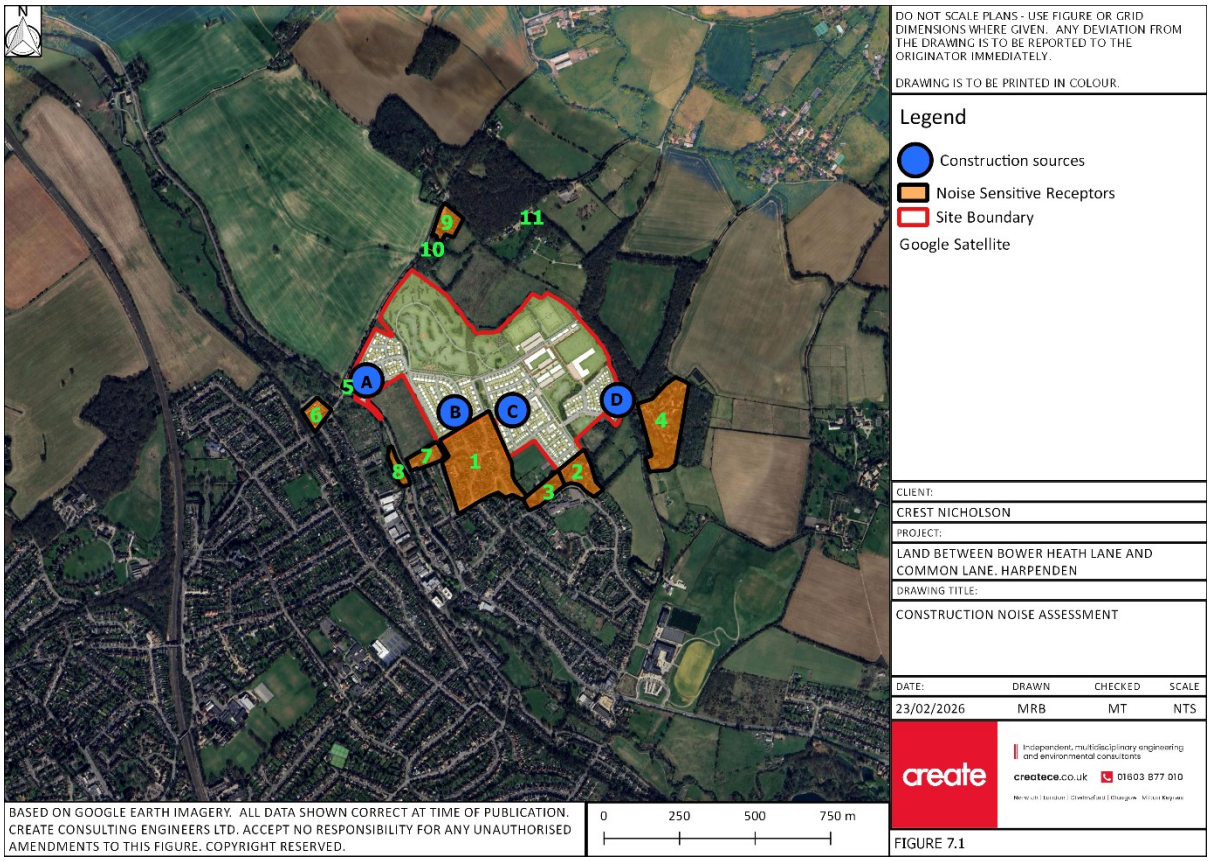

Figure 7.1: Representative Construction Noise Source and NSR Locations

7.6 In the absence of a site-specific Method Statement, prior experience on similar projects has been used to inform the selection of likely plant and machinery that will be used.

7.7 The processes and details as described within this report have been deemed as representative and reflect the processes that could be used on this project. Should the supplied method statement differ, then further analysis to reflect any changes would be required.

7.8 The Tables show the indicative impact of each assessment location to the surrounding receptors without mitigation.

BS 5228-1 Calculation Method	Location A			Category Threshold (dB):	65		
Equipment Type	dB at 10m	Number of Units	Percent on Time	dB Result at 10m	NSR 5	NSR 7	NSR 8
					30 mtrs	300 mtrs	250 mtrs
13-ton excavator	70	5	30%	72	62	42	44
8-ton excavator	68	3	30%	68	58	38	40
6-ton dumper	79	2	50%	79	69	49	51
Compressor	65	5	15%	64	54	34	36
Dump Truck (Empty)	87	2	25%	84	74	54	56
Dump Truck (Tipping Fill)	79	2	25%	76	66	46	48
Rollers	74	1	20%	67	57	37	39
Concrete Pump	75	1	50%	72	62	42	44
		Cumulative dB Sum at NSR			76	56	58

Table 7.1: Construction Noise From Locations A ($L_{Aeq,T}$ dB)

BS 5228-1 Calculation Method	Location B			Category Threshold (dB):	65		
Equipment Type	dB at 10m	Number of Units	Percent on Time	dB Result at 10m	NSR 1	NSR 7	NSR 8
					24 mtrs	100 mtrs	200 mtrs
13-ton excavator	70	5	30%	72	64	52	46
8-ton excavator	68	3	30%	68	60	48	42
6-ton dumper	79	2	50%	79	71	59	53
Compressor	65	5	15%	64	56	44	38
Dump Truck (Empty)	87	2	25%	84	76	64	58
Dump Truck (Tipping Fill)	79	2	25%	76	68	56	50
Rollers	74	1	20%	67	59	47	41
Concrete Pump	75	1	50%	72	64	52	46
		Cumulative dB Sum at NSR			78	66	60

Table 7.2: Construction Noise From Locations B ($L_{Aeq,T}$ dB)

BS 5228-1 Calculation Method	Location C			Category Threshold (dB):	65		
Equipment Type	dB at 10m	Number of Units	Percent on Time	dB Result at 10m	NSR 1	NSR 3	NSR 2
					30 mtrs	210 mtrs	250 mtrs
13-ton excavator	70	5	30%	72	62	45	44
8-ton excavator	68	3	30%	68	58	41	40
6-ton dumper	79	2	50%	79	69	53	51
Compressor	65	5	15%	64	54	37	36
Dump Truck (Empty)	87	2	25%	84	74	58	56
Dump Truck (Tipping Fill)	79	2	25%	76	66	50	48
Rollers	74	1	20%	67	57	41	39
Concrete Pump	75	1	50%	72	62	46	44
		Cumulative dB Sum at NSR			76	60	58

Table 7.3: Construction Noise From Locations C ($L_{Aeq,T}$ dB)

BS 5228-1 Calculation Method	Location D			Category Threshold (dB):	65		
Equipment Type	dB at 10m	Number of Units	Percent on Time	dB Result at 10m	NSR 3	NSR 2	NSR 4
					60 mtrs	210 mtrs	300 mtrs
13-ton excavator	70	5	30%	72	56	45	42
8-ton excavator	68	3	30%	68	52	41	38
6-ton dumper	79	2	50%	79	63	53	49
Compressor	65	5	15%	64	48	37	34
Dump Truck (Empty)	87	2	25%	84	68	58	54
Dump Truck (Tipping Fill)	79	2	25%	76	60	50	46
Rollers	74	1	20%	67	51	41	37
Concrete Pump	75	1	50%	72	56	46	42
		Cumulative dB Sum at NSR			70	60	56

Table 7.4: Construction Noise From Locations D ($L_{Aeq,T}$ dB)

7.9 As can be seen from the above tables, without mitigation the ABC threshold level is likely to be exceeded at several locations. The use of site hoarding can provide up to 9 dB of sound reduction to ground floor receptors when close to the noise source. However, barriers lose effectiveness the greater the source is from the barrier.

7.10 Additional mitigation methods are simple and effective to use, ranging from the use of mufflers, additional near field screening and enclosures. The efficacy of a selection of enclosures are highlighted in Table B.1 of BS 5228-1:2009 + A1:2014. For this assessment we have only assumed the use of the mitigative methods within the red section shown in the following Tables. The effect of site hoarding has not been considered in this assessment.

BS 5228-1 Calculation Method	Location A					Category Threshold (dB):	65		
Equipment Type	dB at 10m	Number of Units	Source Mitigation	dB Reduction	Percent on Time	dB Result at 10m	NSR 5	NSR 6	NSR 8
							30 mtrs	100 mtrs	180 mtrs
13-ton excavator	70	5	Exhaust Muffler	10	30%	62	52	42	37
8-ton excavator	68	3	Exhaust Muffler	10	30%	58	48	38	32
6-ton dumper	79	2	Exhaust Muffler	10	50%	69	59	49	44
Compressor	65	5	Enclosure	20	15%	44	34	24	19
Dump Truck (Empty)	87	2	Exhaust Muffler	10	25%	74	64	54	49
Dump Truck (Tipping Fill)	79	2	Exhaust Muffler	10	25%	66	56	46	41
Rollers	74	1	Exhaust Muffler	10	20%	57	47	37	32
Concrete Pump	75	1	Enclosure	20	50%	52	42	32	27
		Cumulative dB Sum at NSR					66	56	51

Table 7.5: Construction Noise From Locations A With Mitigation ($L_{Aeq,T}$ dB)

BS 5228-1 Calculation Method	Location B					Category Threshold (dB):	65		
Equipment Type	dB at 10m	Number of Units	Source Mitigation	dB Reduction	Percent on Time	dB Result at 10m	NSR 1	NSR 7	NSR 8
							24 mtrs	100 mtrs	200 mtrs
13-ton excavator	70	5	Exhaust Muffler	10	30%	62	54	42	36
8-ton excavator	68	3	Exhaust Muffler	10	30%	58	50	38	32
6-ton dumper	79	2	Exhaust Muffler	10	50%	69	61	49	43
Compressor	65	5	Enclosure	20	15%	44	36	24	18
Dump Truck (Empty)	87	2	Exhaust Muffler	10	25%	74	66	54	48
Dump Truck (Tipping Fill)	79	2	Exhaust Muffler	10	25%	66	58	46	40
Rollers	74	1	Exhaust Muffler	10	20%	57	49	37	31
Concrete Pump	75	1	Enclosure	20	50%	52	44	32	26
		Cumulative dB Sum at NSR					68	56	50

Table 7.6: Construction Noise From Locations B With Mitigation ($L_{Aeq,T}$ dB)

BS 5228-1 Calculation Method	Location C					Category Threshold (dB):	65		
Equipment Type	dB at 10m	Number of Units	Source Mitigation	dB Reduction	Percent on Time	dB Result at 10m	NSR 1	NSR 3	NSR 2
							30 mtrs	210 mtrs	250 mtrs
13-ton excavator	70	5	Exhaust Muffler	10	30%	62	52	35	34
8-ton excavator	68	3	Exhaust Muffler	10	30%	58	48	31	30
6-ton dumper	79	2	Exhaust Muffler	10	50%	69	59	43	41
Compressor	65	5	Enclosure	20	15%	44	34	17	16
Dump Truck (Empty)	87	2	Exhaust Muffler	10	25%	74	64	48	46
Dump Truck (Tipping Fill)	79	2	Exhaust Muffler	10	25%	66	56	40	38
Rollers	74	1	Exhaust Muffler	10	20%	57	47	31	29
Concrete Pump	75	1	Enclosure	20	50%	52	42	26	24
		Cumulative dB Sum at NSR					66	50	48

Table 7.7: Construction Noise From Locations C With Mitigation ($L_{Aeq,T}$ dB)

BS 5228-1 Calculation Method	Location D					Category Threshold (dB): 65			
Equipment Type	dB at 10m	Number of Units	Source Mitigation	dB Reduction	Percent on Time	dB Result at 10m	NSR 3 60 mtrs	NSR 2 210 mtrs	NSR 4 300 mtrs
13-ton excavator	70	5	Exhaust Muffler	10	30%	62	46	35	32
8-ton excavator	68	3	Exhaust Muffler	10	30%	58	42	31	28
6-ton dumper	79	2	Exhaust Muffler	10	50%	69	53	43	39
Compressor	65	5	Enclosure	20	15%	44	28	17	14
Dump Truck (Empty)	87	2	Exhaust Muffler	10	25%	74	58	48	44
Dump Truck (Tipping Fill)	79	2	Exhaust Muffler	10	25%	66	50	40	36
Rollers	74	1	Exhaust Muffler	10	20%	57	41	31	27
Concrete Pump	75	1	Enclosure	20	50%	52	36	26	22
		Cumulative dB Sum at NSR					60	50	46

Table 7.8: Construction Noise From Locations D With Mitigation ($L_{Aeq,T}$ dB)

7.11 It can be seen that even with the proposed mitigation some works close to the existing receptors may be subject to levels exceeding the proposed 65 dB $L_{Aeq,T}$ criteria.

7.12 This assessment is based on the closest working proximities to the receptors and therefore represents a worst case impact.

7.13 This emphasises the need to follow best practical means and favour the quietest working methods when working close to neighbouring properties, and the requirement to undertake a detailed assessment of construction noise impact once the equipment and working methods are known.

7.14 Despite the predicted levels above, it is crucial that 'Best Practicable Means' are adopted to keep annoyances to a minimum and a clear line of communication between the developer and nearby occupants is essential to keep relations amicable.

7.15 In addition to these methods, the most effective means of mitigation is to control the noise at source. This can be achieved in the following ways:

- Switching off plant when not in use;
- Noise emission limits for equipment used on site;
- Retrofitting plant and equipment with silencers and mufflers etc.;
- Nearfield acoustic screening at areas of noisy works; and
- Using alternative, quieter methods of working, incorporating the selection of quieter equipment/methods.

7.16 Additional, more generalised mitigation strategies could also include the following:

- Situate plant away from any party walls or ceilings and floors where practicable.
- Keep a clear and open line of communication with residents in order to keep them informed of any works being undertaken that have the potential to cause a noise disturbance.
- Keep work activities strictly within the agreed upon times.
- Work to Best Practicable Means at all times.

7.17 To reduce the impact of any plant accessing the site, the following framework should be used at all times:

- Quiet working methods should be employed where reasonably practicable, such as minimising engine revving and switching off engines whilst on site being loaded/unloaded;

- Any haulage vehicles do not leave/enter site between 18:00 and 08:00; &
- Additional nearfield screening should be utilised along access/egress routes, where practicable.

7.18 At the time of the writing of this report there was no piling methodology available.

7.19 We recommend that should piling be required, due to the proximity of the site to nearby sensitive receptors, continuous flight auger (CFA) piling be used to minimise the likelihood of both noise and vibratory impacts on nearby receptors.

7.20 If piling is to be used, and once a piling methodology has been produced, a full piling noise and vibration assessment should be undertaken to assess the likelihood of adverse impact and so that appropriate mitigation can be specified.

8.0 UNCERTAINTY

8.1 With all assessments there is a degree of uncertainty which must be considered.

8.2 Our assessment is based on measurements taken over the course of approximately five days. Given the relatively small range in noise levels, we do not expect a high degree of uncertainty to be associated with these measurements.

8.3 Any plant proposed on the scheme is currently unknown and we would recommend a detailed assessment is undertaken to consider the potential impact of any plant associated with the scheme at the detailed design stage.

8.4 Equipment calibration showed insignificant calibration drift and we do not expect uncertainty associated with this to alter the outcome of the assessment.

8.5 We have undertaken an assessment of the sport pitches in line with guidance available on noise impact. Criteria for internal sound levels from sporting activity is not available, and we have therefore set a criteria based on promoting reasonable internal acoustic conditions. This is 5 dB below the criteria which is implied to be reasonable form the Sports England Guidance, and in our view will result in reasonable internal levels. However, this method is not standardised and the uncertainty associated with the perceived impact is therefore difficult to quantify.

8.6 Calculations using our computer software are carried out in accordance with ISO 9613-2. The standard states that there is a +/- 3 dB error associated with the calculation method. In practice the assumptions used in our calculation method tend to the worst-case assumption for propagation, and we would not expect uncertainty associated with the calculation method to alter the outcome of our assessment.

8.7 It should be noted that a new version of the above standard has been released in 2024. This standard addresses reduced performances of barriers that may occur over large distances. We have utilised the 2026 version of CadnaA which uses the 2024 version of ISO 9613-2, thus adjusted our recommendations to consider the potential uncertainty associated with this change in calculation methodology. In practice this uncertainty is only applicable to a small section of the site as most of our recommendations are based on field measurements.

9.0 CONCLUSIONS

9.1 Create Consulting Engineers Ltd have been appointed by Crest Nicholson Ltd to undertake a noise impact assessment for a new housing development at the Land Northeast of Harpenden between Lower Luton Road, Bowers Heath and Common Lane.

9.2 This Acoustic Assessment has been written to support the outline permission application. Although the findings in this acoustic report are at a high level, we have demonstrated that with the recommended requirements for mitigation being adopted, this would help to ensure that adherence to the local and national policies should be achieved. As the application progresses and the layout plans are further developed, a more detailed assessment of noise break in and the required level of mitigation could be undertaken.

9.3 A reasonable proportion of the site is shown to be subject to relatively low noise levels and we would not expect acoustic mitigation measures to be required to avoid adverse impact for the vast majority of the site.

9.4 Houses to the southwest of the site will require mitigation measures to ensure that suitable internal and, in some a few instances, suitable external levels can be achieved.

9.5 The requirements for these areas have been provided in this report.

9.6 We have provided guidance for the assessment of mechanical plant associated with the development. It is ultimately for the Council to propose and agree to suitable noise limits for any plant.

9.7 We have undertaken an indicative construction noise assessment which highlights the need for mitigation to be implemented. A detailed construction noise assessment should be undertaken once the construction method statement is available.

9.8 We have considered the impact from known new sources of noise, such as that of the two community sports pitches.

9.9 We are of the opinion that for the majority of the site, there should be no adverse impact to the existing, or proposed dwellings. Where there are areas of elevated sound levels, with the mitigation measures recommended within this report, the sound levels should reduce to a level where there should be no adverse impact to the existing, or proposed dwellings.

10.0 DISCLAIMER

10.1 Create Consulting Engineers Ltd disclaims any responsibility to the Client and others in respect of any matters outside the scope of this report.

10.2 The copyright of this report is vested in Create Consulting Engineers Ltd and Crest Nicholson Ltd. The Client, or his appointed representatives, may copy the report for purposes in connection with the development described herein. It shall not be copied by any other party or used for any other purposes without the written consent of Create Consulting Engineers Ltd or Crest Nicholson Ltd.

10.3 Create Consulting Engineers Ltd accepts no responsibility whatsoever to other parties to whom this report, or any part thereof, is made known. Any such other parties rely upon the report at their own risk.

APPENDIX A
Acoustic Glossary

dB(A)

The human ear is less sensitive to low (below 125Hz) and high (above 16kHz) frequency sounds. A sound level meter can be used to duplicate the ear's variable sensitivity to sound across a spectrum of frequencies. This is achieved by building a filter into the instrument with a similar frequency response to that of the average ear. This is called an "A-weighting filter". Measurements of sound made with this filter are called A-weighted sound level measurements and the unit is dB(A).

$L_{eq,T}$

The sound from noise sources often fluctuates widely during a given period of time. An average value can be measured, the equivalent sound pressure level L_{eq}. The L_{eq} is the equivalent sound level which would deliver the same sound energy as the actual fluctuating sound measured in the same time period (T).

$L_{10,T}$

This is the minimum level exceeded for not more than 10% of the time period (T). This parameter is often used as a "not to exceed" criterion for noise.

$L_{90,T}$

This is the minimum level exceeded for not more than 90% of the time period (T). This parameter is often used as a descriptor of "background noise" for environmental impact studies.

L_{fmax}

This is the maximum sound pressure level that has been measured over a period using a fast time constant.

Octave Bands

In order to completely determine the composition of a sound it is necessary to determine the sound level at each frequency individually. Usually, values are stated in octave bands. The audible frequency region is divided into 10 such octave bands whose centre frequencies are defined in accordance with international standards.

Addition of noise from several sources

Noise from different sound sources combine, on a logarithmic scale, to produce a sound level higher than that from any individual source. Two equally intense sound sources operating together produce a sound level which is 3dB higher than one alone and 3 identical sources produce a 5dB higher sound level.

Attenuation by distance

Sound which propagates from a point source in free air attenuates by 6dB for each doubling of distance from the noise source. Sound energy from line sources (e.g. stream of cars) drops off by 3dB for each doubling of distance.

Subjective impression of noise

Sound intensity is not perceived directly at the ear; rather it is transferred by the complex hearing mechanism to the brain where acoustic sensations can be interpreted as loudness. This makes hearing perception highly individualised. Sensitivity to noise also depends on frequency content, time of occurrence, duration of sound and psychological factors such as emotion and expectations. The following table is a reasonable guide to help explain increases or decreases in sound levels for many acoustic scenarios.

Change in sound level (dB)	Change in perceived loudness
1	Imperceptible
3	Just barely perceptible
6	Clearly noticeable
10	About twice as loud
20	About 4 times as loud

Barriers

Outdoor barriers can be used to reduce environmental noises, such as traffic noise. The effectiveness of barriers is dependent on factors such as its distance from the noise source and the receiver, its height and its construction.

Reverberation control

When sound falls on the surfaces of a room, part of its energy is absorbed and part is reflected back into the room. The amount of reflected sound defines the reverberation of a room, a characteristic that is critical for spaces of different uses as it can affect the quality of audio signals such as speech or music. Excess reverberation in a room can be controlled by the effective use of sound-absorbing treatment on the surfaces, such as fibrous ceiling boards, curtains and carpets.

IANL

IANL or 'Internal Ambient Noise Level' refers to the recorded (or predicted) $L_{Aeq,T}$ within a dwelling, office, commercial unit or treatment space. IANL typically defines a design limit or range.

APPENDIX B
Summary of National Policy

National Planning Policy

National Planning Policy Framework (December 2024)

The National Planning Policy Framework (NPPF) replaces the previous version of the NPPF and the Planning Policy Statements (PPS) and Planning Policy Guidance (PPG), including the Department of the Environment's Planning Policy Guidance Note 24: 'Planning and Noise' (PPG 24), which was published in 1994. The main reference to noise within the latest version of the NPPF is at Paragraphs 187 (e) and 198:

'Para.187 (e). "Planning policies and decisions should contribute to and enhance the natural and local environment by:

> *(e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and."*

'Para.198. 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[72];*
> *(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 reference number 72 cross references the National Policy Statement for England (2010) Explanatory Note.

Although some qualitative guidance on noise has been provided in the web-based Planning Practice Guidance document, there has been no alternative quantitative guidance proposed by the Government as a direct replacement for PPG24. This was due to the recognition that every site is different and that there is no single acceptable noise level, suitable for all applications.

National Planning Policy Guidance (2019)

On 6th March 2014, the Department for Communities and Local Government (DCLG) launched the National Planning Practice Guidance (NPPG) web-based resource to supersede previous planning guidance documents including PPG24 and provide clarification over all disciplinary sectors in the delivery of the design quality aspirations of the NPPF. This has been updated in July 2019.

The NPPG-Noise provides guidance on the assessment of noise, the needs to be considered when new developments may create additional noise and when developments would be sensitive to the prevailing acoustic environment.

The acoustic environment should be taken into account in the planning of new development and decision making should take the following into consideration:

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

It then cross-references the Noise Policy Statement for England (2010) for further clarification on how to assess the overall effect of noise exposure.

The Noise Policy Statement for England (2010)

The Noise Policy Statement for England (NPSE) was published in March 2010 and is the overarching statement of noise policy for England and applies to all forms of noise other than occupational noise, setting out the long-term vision of Government noise policy which is to:

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

The vision is supported by the following aims which are reflected in paragraph 1.7 of the Noise Policy Statement for England:

> *'Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development*:
>
> - *Avoid significant adverse impacts on health and quality of life;*
> - *Mitigate and minimise adverse impacts on health and quality of life; and*
> - *Where possible, contribute to the improvement of health and quality of life.'*

The Explanatory Note to the NPSE introduces three concepts to the assessment of the potential effects of noise:

- '***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.'*

Unlike the now redundant PPG24, the three levels are not defined numerically in the NPSE, and for the SOAEL the NPSE makes it clear that the noise level is likely to vary depending upon the noise source, the receptor and the time of day/day of the week, etc. The need for more research to investigate what may represent a SOAEL for noise is acknowledged and the NPSE asserts that not stating specific SOAEL levels provides policy flexibility in the period until there is further evidence and guidance.

APPENDIX C
Measurement Equipment

Equipment No.	Equipment	Make/Model	Certification	
32 (lower field and attended measurements)	Class 1 Sound Level Meter	Norsonic 140 RTA	Serial Number	
			1406932	
			Cert No.	
			1146505	
			Calibration Date	
			22/06/2023	
	Preamplifier	Norsonic 1209	Serial Number	
			1209.21140	
			Cert No.	
			1146505	
			Calibration Date	
			23/06/2023	
	Microphone	Norsonic 1225	Serial Number	
			1225.285513	
			Cert No.	
			1146505	
			Calibration Date	
			23/06/2023	
	Calibrated Level Before:	**113.9 dB @ 1 kHz**	**Sens**	-26.1
	Calibrated Level After:	**114.1 dB @ 1 kHz**	**Sens**	-26.1

Equipment No.	Equipment	Make/Model	Certification
33 (road)	Class 1 Sound Level Meter	Norsonic 140 RTA	Serial Number
			1406933
			Cert No.
			114506
			Calibration Date
			23/06/2023
	Preamplifier	Norsonic 1209	Serial Number
			1209.21141
			Cert No.
			114506
			Calibration Date
			23/06/2023
	Microphone	Norsonic 1225	Serial Number
			1225.285519
			Cert No.
			114506
			Calibration Date
			23/06/2023
	Calibrated Level Before:	**113.9 dB @ 1 kHz**	**Sens** -25.8
	Calibrated Level After:	**114.1 dB @ 1 kHz**	**Sens** -25.8

Equipment No.	Equipment	Make/Model	Certification
1	Acoustic Calibrator	Norsonic 1251	Serial Number
			125134963
			Cert No.
			1164831
			Calibration Date
			08/07/2024

Person in charge of measurement: Jody Blacklock MIOA
Sam Ward MIOA

Other people present: -

Measurement parameters: $L_{eq\ (1/3rd\ octave)}$, $L_{F90\ (1/3rd\ octave)}$, $L_{Fmax\ (1/3rd\ octave)}$, L_{Aeq}, L_{AF90} and L_{AFmax}

Crest Nicholson Ltd

LAND NORTHEAST OF HARPENDEN BETWEEN LOWER LUTON ROAD, BOWERS HEATH LANE AND COMMON LANE

Acoustic Assessment