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NOISE ASSESSMENT (FOR PLANNING)

Land at Acorn Lodge, Flamstead AL3 8HB
by Love Design Studio

October 2022
PR466_V0

CONTENTS

EXECUTIVE SUMMARY

Love Design Studio has been commissioned to undertake a planning stage noise assessment for a proposed new residential development at Acorn Lodge in Flamstead.

In support of these assessment works, a baseline noise survey was undertaken to determine the prevailing environmental noise levels at the façades of the proposed building.

The results of the assessments were analysed and reviewed in line with the aims and advice contained within the National Policy Statement for England, the National Planning Policy Framework, Planning Practice Guidance and the Institute of Acoustics Professional Practice Guidance for new residential development.

The advice in the IoA ProPG document indicates that at the worst-affected façade noise levels there is a medium-risk range but that the risk may be reduced by following a good acoustic design process.

The assessment has demonstrated that the requirements established in BS 8233:2014 will be met inside all habitable rooms when fitted with suitable double-glazed windows and non-acoustic trickle ventilators.

The site can, therefore, be considered suitable for the proposed change of use.

INTRODUCTION

Love Design Studio has been commissioned to undertake a planning stage noise assessment for a proposed new residential development at Acorn Lodge in Flamstead.

This report presents the results of an environmental noise survey, the applicable policies and guidance, and a noise impact assessment demonstrating the suitability of the site for the proposed residential use.

To assist with the understanding of this report a brief glossary of acoustic terms can be found in **Appendix A**. A more in-depth glossary of acoustic terms can be assessed at the following web address http://www.acoustic-glossary.co.uk/.

SITE LAYOUT AND DEVELOPMENT PROPOSALS

The site is located along London Road with a hotel to the south-east and a commercial vehicle rental yard to the north-west. The proposed development includes four new houses and the demolition of existing outbuildings.

An image showing the site location, the surrounding area and the noise and vibration monitoring locations used in this assessment is presented in **Appendix B**.

The floor plans of the development are shown in **Appendix C**.

POLICY CONTEXT

A great deal of change has occurred in recent years in the assessment of noise impacts and their relationship with planning decisions. The following sections introduce the applicable policies, either national or local, which ought to be considered to support the planning application.

NOISE POLICY STATEMENT FOR ENGLAND

The Noise Policy Statement for England (NPSE[1]), published in March 2010, sets out the long-term vision of Government noise policy. The Noise Policy aims, as presented in this document, are:

"THROUGH THE EFFECTIVE MANAGEMENT AND CONTROL OF ENVIRONMENTAL, NEIGHBOUR AND NEIGHBOURHOOD NOISE WITHIN THE CONTEXT OF GOVERNMENT POLICY ON SUSTAINABLE DEVELOPMENT:

AVOID SIGNIFICANT ADVERSE EFFECTS ON HEALTH AND QUALITY OF LIFE;

MITIGATE AND MINIMISE ADVERSE EFFECTS ON HEALTH AND QUALITY OF LIFE; AND

WHERE POSSIBLE, CONTRIBUTE TO THE IMPROVEMENT OF HEALTH AND QUALITY OF LIFE."

The NPSE makes reference to the concepts of NOEL (No Observed Effect Level) and LOAEL (Lowest Observed Adverse Effect Level) as used in toxicology but applied to noise impacts. It also introduces the concept of SOAEL (Significant Observed Adverse Effect Level) which is described as the level above which significant adverse effects on health and quality of life occur.

The first aim of the NPSE is to avoid significant adverse effects, taking into account the guiding principles of sustainable development (as referenced in Section 1.8 of the NPSE). The second aim seeks to provide guidance on the situation that exists when the potential noise impact falls between the LOAEL and the SOAEL, in which case: ***"...all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development."***

Importantly, the NPSE goes on to state that: "This does not mean that such adverse effects cannot occur."

The NPSE does not provide a noise-based measure to define SOAEL, acknowledging that the SOAEL is likely to vary depending on the noise source,

[1] Noise Policy Statement for England, Defra, March 2010

the receptor and the time in question. NPSE advises that: *"Not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available."*

It is therefore likely that other guidance will need to be referenced when applying objective standards for the assessment of noise, particularly in reference to the SOAEL, whilst also taking into account the specific circumstances of a proposed development.

NATIONAL PLANNING POLICY FRAMEWORK

A new edition of NPPF was published in July 2021 and came into effect immediately. The original National Planning Policy Framework (NPPF[2]) was published in March 2012, with a revision in July 2018 and February 2019 - this document replaced the existing Planning Policy Guidance Note 24 (PPG 24) "Planning and Noise." The 2021 revised edition contains no new directions or guidance with respect to noise, and hence, all previous references remain extant. The paragraph references quoted below relate to the July 2021 edition.

Paragraph 174 of the NPPF states that the planning system should contribute to and enhance the natural and local environment by, (amongst others) *"preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, water or noise pollution or land stability."*

The NPPF goes on to state in Paragraph 185:

"PLANNING POLICIES AND DECISIONS 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 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 …

The NPPF document does not refer to any other documents or British Standards regarding noise other than the NPSE.

[2] National Planning Policy Framework, DCLG, March 2012

Paragraph 2 of the NPPF states that “planning law requires that applications for planning permission must be determined in accordance with the development plan unless material considerations indicate otherwise.”

Paragraph 12 of the NPPF states that “The presumption in favour of sustainable development does not change the statutory status of the development plan as the starting point for decision making. Where a planning application conflicts with an up-to-date development plan (including any neighbourhood plans that form part of the development plan), permission should not usually be granted. Local planning authorities may take decisions that depart from an up-to-date development plan, but only if material considerations in a particular case indicate that the plan should not be followed.”

Paragraph 119 states that “Planning policies and decisions should promote an effective use of land in meeting the need for homes and other uses, while safeguarding and improving the environment and ensuring safe and healthy living conditions. Strategic policies should set out a clear strategy for accommodating objectively assessed needs, in a way that makes as much use as possible of previously-developed or ‘brownfield’ land”.

PLANNING PRACTICE GUIDANCE – NOISE

An updated Planning Practice Guidance (PPG[3]) for noise was published on 22 July 2019 and provides additional guidance and elaboration on the NPPF. It advises that when plan-making and decision-taking, the Local Planning Authority should consider the acoustic environment in relation to:

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

This guidance introduced the concepts of NOAEL (No Observed Adverse Effect Level), and UAEL (Unacceptable Adverse Effect Level). NOAEL differs from NOEL in that it represents a situation where the acoustic character of an area can be slightly affected (but not such that there is a perceived change in the quality of life). UAEL represents a situation where noise is 'very disruptive' and should be 'prevented' (as opposed to SOAEL, which represents a situation where noise is 'disruptive', and should be 'avoided').

As exposure increases above the LOAEL, the noise begins to have an adverse effect and consideration needs to be given to mitigating and minimising those effects, taking account of the economic and social benefits being derived from the activity causing the noise. As the noise exposure increases, it will then at some point cross the SOAEL boundary.

The LOAEL is described in PPG[4] as the level above which ***"noise starts to cause small changes in behaviour and attitude, for example, having to turn up the volume on the television or needing to speak more loudly to be heard"***.

PPG identifies the SOAEL as the level above which ***"noise causes a material change in behaviour such as keeping windows closed for most of the time or avoiding certain activities during periods when the noise is present."***.

In line with the Explanatory Note of the NPSE, the PPG goes on to reference the LOAEL and SOAEL in relation to noise impact. It also provides examples of outcomes that could be expected for a given perception level of noise, plus actions that may be required to bring about a desired outcome. However, in line

[3] Planning Practice Guidance – Noise, https://www.gov.uk/guidance/noise--2, 22 July 2019
[4] Paragraph: 005 Reference ID: 30-005-20190722

with the NPSE, no objective noise levels are provided for LOAEL or SOAEL although the PPG[5] acknowledges that ***"...the subjective nature of noise means that there is not a simple relationship between noise levels and the impact on those affected. This will depend on how various factors combine in any particular situation."***.

The relevant guidance in the PPG in relation to the adverse effect levels is summarized below:

Table 1: ProPG Effects Table

Response	Examples of Outcomes	Increasing Effect Level	Action
No Observed Effect Level			
Not Present	No Effect	No Observed Effect	No specific measures required
No Observed Adverse Effect Level			
Present and not Intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Present and Intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or	Observed Adverse Effect	Mitigate and reduce to a minimum

[5] Paragraph: 006 Reference ID: 30-006-20190722

Response	Examples of Outcomes	Increasing Effect Level	Action
	perceived change in the quality of life.		
Significant Observed Adverse Effect Level			
Present and Disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Present and very Disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

The Planning Practice Guidance[6] states the following in relation to mitigation measures:

"FOR NOISE SENSITIVE DEVELOPMENTS, MITIGATION MEASURES CAN INCLUDE AVOIDING NOISY LOCATIONS IN THE FIRST PLACE; DESIGNING THE DEVELOPMENT TO REDUCE THE IMPACT

[6] Paragraph: 010 Reference ID: 30-010-20190722

OF NOISE FROM ADJOINING ACTIVITIES OR THE LOCAL ENVIRONMENT; INCORPORATING NOISE BARRIERS; AND OPTIMISING THE SOUND INSULATION PROVIDED BY THE BUILDING ENVELOPE."

In addition, the Guide notes that it may also be relevant to consider[7]:

"... whether any adverse internal effects can be completely removed by closing windows and, in the case of new residential development, if the proposed mitigation relies on windows being kept closed most of the time (and the effect this may have on living conditions). In both cases a suitable alternative means of ventilation is likely to be necessary. Further information on ventilation can be found in the Building Regulations".

[7] Paragraph: 006 Reference ID: 30-006-20190722

SITE SUITABILITY ASSESSMENT

INSTITUTE OF ACOUSTICS PROFESSIONAL PRACTICE GUIDANCE

The Institute of Acoustics published a guidance document for new residential development in May 2017, in conjunction with the ANC and the Chartered Institute of Environmental Health, ***"to provide practitioners with guidance on a recommended approach to the management of noise within the planning system in England"***.

The document advocates a two-stage process for consideration of noise affecting new residential developments. Stage 1 is an initial risk assessment of the proposed development site, based on the ambient noise levels in the area. Stage 2 recommends consideration of four main elements:

- demonstration of a ***"good acoustic design process"***
- observation of internal noise guidelines
- an assessment of noise affecting external amenity areas
- consideration of other relevant issues

The initial risk assessment considers the indicative day-time and night-time equivalent continuous noise levels which indicates an "increasing risk of adverse effect" with increasing noise levels[8].

For Stage 2, the ProPG document recommends that the guidance in BS 8233:2014 is followed.

[8] Figure 1, IoA ProPG for New Residential Development, May 2017

BS 8233:2014 GUIDANCE ON SOUND INSULATION AND NOISE REDUCTION FOR BUILDINGS.

This Standard provides recommended guideline values for internal noise levels within dwellings which are similar in scope to guideline values contained within the World Health Organisation (WHO) document, Guidelines for Community Noise (1999[9]). These guideline noise levels are shown in Table 2, below:

Table 2: BS 8233:2014 Desirable Internal Ambient Noise Levels for Dwellings

Activity	Location	07:00 to 23:00 hours	23:00 to 07:00 hours
Resting	Living room	35dB $L_{Aeq,16h}$	-
Dining	Dining room/area	40dB $L_{Aeq,16h}$	-
Sleeping (daytime resting)	Bedroom	35dB $L_{Aeq,16h}$	30dB $L_{Aeq,8h}$

BS 8233:2014 advises that: ***"regular individual noise events…can cause sleep disturbance. A guideline value may be set in terms of SEL or LAmax,F depending on the character and number of events per night. Sporadic noise events could require separate values."*** A typical requirement, derived from WHO guidance and previous editions of BS 8233, is that night-time internal L_{AMax} noise levels should not normally exceed 45dB.

The standard also provides advice in relation to design criteria for external noise. It states that:

"FOR TRADITIONAL EXTERNAL AREAS THAT ARE USED FOR AMENITY SPACE, SUCH AS GARDENS AND PATIOS, IT IS DESIRABLE THAT THE EXTERNAL NOISE LEVEL DOES NOT EXCEED 50DB $L_{AEQ,T}$, WITH AN UPPER GUIDELINE VALUE OF 55DB $L_{AEQ,T}$ WHICH WOULD BE ACCEPTABLE IN NOISIER ENVIRONMENTS. HOWEVER, IT IS ALSO RECOGNIZED THAT THESE GUIDELINE VALUES ARE NOT ACHIEVABLE IN ALL CIRCUMSTANCES WHERE DEVELOPMENT MIGHT BE DESIRABLE.

IN HIGHER NOISE AREAS, SUCH AS CITY CENTRES OR URBAN AREAS ADJOINING THE STRATEGIC TRANSPORT NETWORK, A COMPROMISE BETWEEN ELEVATED NOISE LEVELS AND OTHER FACTORS, SUCH AS THE CONVENIENCE OF LIVING IN THESE LOCATIONS OR MAKING EFFICIENT USE OF LAND RESOURCES TO ENSURE DEVELOPMENT NEEDS CAN BE MET, MIGHT BE WARRANTED. IN SUCH A SITUATION, DEVELOPMENT SHOULD BE DESIGNED TO ACHIEVE THE LOWEST PRACTICABLE LEVELS IN THESE EXTERNAL AMENITY SPACES, BUT SHOULD NOT BE PROHIBITED.

…

[9] World Health Organisation Guidelines for Community Noise, 1999

IN HIGH-NOISE AREAS, CONSIDERATION SHOULD BE GIVEN TO PROTECTING THESE AREAS BY SCREENING OR BUILDING DESIGN TO ACHIEVE THE LOWEST PRACTICABLE LEVELS. ACHIEVING LEVELS OF 55DB $L_{AEQ,T}$ OR LESS MIGHT NOT BE POSSIBLE AT THE OUTER EDGE OF THESE AREAS, BUT SHOULD BE ACHIEVABLE IN SOME AREAS OF THE SPACE."

WORLD HEALTH ORGANISATION, GUIDELINES FOR COMMUNITY NOISE, 1999 (WHO)

The World Health Organisation (WHO) Guidelines for Community Noise (1999) recommends suitable internal and external noise levels based on dose response research. The levels recommended in this guidance could be correlated to the LOAEL. Relevant guidance from this document is presented below.

Sleep Disturbance (Night-time internal LOAEL): If negative effects on sleep are to be avoided, the equivalent sound pressure level should not exceed 30dBA indoors for continuous noise.

Interference with Communication (Daytime internal LOAEL): Noise tends to interfere with auditory communication, in which speech is a most important signal. However, it is also vital to be able to hear alarming and informative signals such as door bells, telephone signals, alarm clocks, fire alarms etc., as well as sounds and signals involved in occupational tasks. The effects of noise on speech discrimination have been studied extensively and deal with this problem in lexical terms (mostly words but also sentences). For communication distances beyond a few metres, speech interference starts at sound pressure levels below 50dB for octave bands centred on the main speech frequencies at 500, 1 000 and 2 000 Hz. It is usually possible to express the relationship between noise levels and speech intelligibility in a single diagram, based on the following assumptions and empirical observations, and for speaker-to-listener distance of about 1 metre:

a) Speech in relaxed conversation is 100% intelligible in background noise levels of about 35dBA and can be understood fairly well in background levels of 45dBA.
b) Speech with more vocal effort can be understood when the background sound pressure level is about 65dBA.

The WHO guidelines also propose that external sound levels for amenity use should not exceed 50-55dB $L_{Aeq,16hr}$ during daytime hours.

WORLD HEALTH ORGANISATION (WHO) 2009

The introduction of the Directive on Environmental Noise obliges Member States to assess and manage noise levels. With the support of the European Commission, the WHO Regional Office for Europe has developed night noise guidelines for Europe to help Member States develop legislation to control noise exposure.

The guidelines are based on scientific evidence on the effects of noise and the thresholds above which these effects appear to harm human health.

There is limited evidence that night noise is related to hypertension, heart attacks, depression, changes in hormone levels, fatigue and accidents.

The WHO report summarises the threshold levels of night noise above which a negative effect starts to occur or above which the impact becomes dependent on the level of exposure. For example, the threshold level for waking in the night and/or too early in the morning was 42dB.

It also establishes that there are differences in the intensity and frequency of noise depending on the source, which lead to different impacts. Road traffic is characterised by low levels of noise per event, but as there are a high number of events, on average it has a greater effect on awakenings than air traffic, which has high levels of noise per event but fewer events.

Integrating these findings, the report proposed a guideline target limit of outdoor night noise of 40dB (annual average defined as ‘Lnight’ in the Environmental Noise Directive). There is not sufficient evidence that the biological effects observed below this level are harmful to health but adverse effects are observed above 40dB.

BUILDING REGULATIONS

Part L of the Building Regulations mandates that buildings become more airtight, and Part F stipulates ventilation requirements. Even though there appears to be a contradiction in this, Part L limits uncontrollable ventilation, while Part F ensures that ventilation requirements are provided in a controlled manner.

VENTILATION REQUIREMENTS FOR DWELLINGS

BACKGROUND VENTILATION

Three types of ventilation are required under Part F. Whole building ventilation provides nominally continuous air exchange which may be reduced or ceased when the building is not occupied. It can be provided via background ventilators operating alone, or together with:

- passive stack ventilators;
- continuous mechanical extract; or
- continuous mechanical supply and extract with heat recovery.

Extract ventilation is applicable to rooms where most water vapour and/or pollutants are released (e.g. kitchens and bathrooms). It can be provided by intermittent fans, passive stack or continuous mechanical extract with or without mechanical supply and heat recovery.

The four systems described in Part F do not present solutions which utilise the use of opening windows for background ventilation. Opening windows do not provide a controllable means of ventilation and also pose security risks.

PURGE VENTILATION

Purge ventilation is required throughout the building to aid the removal of high concentrations of pollutants and water vapour. It is commonly provided simply by opening windows and doors.

Even though purge ventilation is recommended via opening windows, the temporary and intermittent occurrence of this does not normally result in an unacceptable increase of internal noise levels.

Part F goes on to say[10] that "Purge ventilation provisions may also be used to improve thermal comfort, although this is not controlled under the Building Regulations."

SUMMARY IN RELATION TO VENTILATION

In summary, background ventilation for new residential dwellings, and residential dwellings formed by a material change of use, should be provided via one of the four systems in Approved Document F. The composite external

[10] Paragraph 4.15 in Approved Document F

building fabric should be designed to ensure that appropriate internal noise levels due to external incident noise are met during background ventilation.

Purge ventilation for new residential dwellings should be provided via open windows. The slight increase of internal noise levels should be considered acceptable.

BUILDING REGULATIONS – PART O

Approved Document O1: Overheating mitigation of the Building Regulations 2010, came into force in June 2022. Section 3 in the Approved Document includes the following:

NOISE

3.2 IN LOCATIONS WHERE EXTERNAL NOISE MAY BE AN ISSUE (FOR EXAMPLE, WHERE THE LOCAL PLANNING AUTHORITY CONSIDERED EXTERNAL NOISE TO BE AN ISSUE AT THE PLANNING STAGE), THE OVERHEATING MITIGATION STRATEGY SHOULD TAKE ACCOUNT OF THE LIKELIHOOD THAT WINDOWS WILL BE CLOSED DURING SLEEPING HOURS (11PM TO 7AM).

3.3 WINDOWS ARE LIKELY TO BE CLOSED DURING SLEEPING HOURS IF NOISE WITHIN BEDROOMS EXCEEDS THE FOLLOWING LIMITS.

a. 40dB $L_{Aeq,T}$, *AVERAGED OVER 8 HOURS (BETWEEN 11PM AND 7AM).*

b. 55dB L_{AFmax}, *MORE THAN 10 TIMES A NIGHT (BETWEEN 11PM AND 7AM).*

3.4 WHERE IN-SITU NOISE MEASUREMENTS ARE USED AS EVIDENCE THAT THESE LIMITS ARE NOT EXCEEDED, MEASUREMENTS SHOULD BE TAKEN IN ACCORDANCE WITH THE ASSOCIATION OF NOISE CONSULTANTS' MEASUREMENT OF SOUND LEVELS IN BUILDINGS WITH THE OVERHEATING MITIGATION STRATEGY IN USE.

NOTE: GUIDANCE ON REDUCING THE PASSAGE OF EXTERNAL NOISE INTO BUILDINGS CAN BE FOUND IN THE NATIONAL MODEL DESIGN CODE: PART 2 – GUIDANCE NOTES (MHCLG, 2021) AND THE ASSOCIATION OF NOISE CONSULTANTS' ACOUSTICS, VENTILATION AND OVERHEATING: RESIDENTIAL DESIGN GUIDE (2020).

SITE SUITABILITY ASSESSMENT METHODOLOGY

ENVIRONMENTAL NOISE SURVEY

An unattended environmental sound pressure level survey was undertaken from 10.15 hours on Friday 23rd September to 10.00 hours on Monday 26th September 2022. Automatic measurement equipment was located on site approximately level with the proposed front façade at Plot One. The survey was undertaken to establish the typical incident environmental noise levels at the proposed residential development.

Full details of the survey are provided in **Appendix D** alongside a time history graph of the measurement results. The relevant results of the survey have been summarised in Table and Table 4.

Table 3 Summary of survey results

Position	Measurement period	Range of recorded sound pressure levels (dB)			
		$L_{Aeq(15mins)}$	$L_{Amax(15mins)}$	$L_{A10(15mins)}$	$L_{A90(15mins)}$
Acorn Lodge	Daytime (07.00 – 23.00 hours)	51-69	64-97	55-65	43-61
	Night-time (23.00 – 07.00 hours)	45-61	62-85	46-63	40-59

The incident environmental noise levels at the facades of the proposed apartments are summarised below.

Table 4 Summary of free field environmental noise levels

Period	Parameter	Sound pressure level, dB
		Acorn Lodge
Friday 23rd September daytime*	$L_{Aeq,T}$	60
23rd September – 24th September night-time	$L_{Aeq,8hours}$	57
Saturday 24th September daytime	$L_{Aeq,\ 16\ hours}$	61
24th September – 25th September night-time	$L_{Aeq,8hours}$	56
Sunday 25th September daytime	$L_{Aeq,\ 16\ hours}$	58
25th September – 26th September night-time	$L_{Aeq,8hours}$	54
Monday 26th September daytime*	$L_{Aeq,T}$	61
Overall daytime	**$L_{Aeq,\ 16\ hours}$**	**60**
Overall night-time	**$L_{Aeq,\ 8\ hours}$**	**56**

*not complete 16 hour measurements

Measured octave band sound pressure levels corresponding to the overall values above are given in Table .

Table 5 Measured octave band sound pressure levels at the measurement locations

Position	Period	Incident sound pressure levels (dB) at Octave Band Centre Frequencies (Hz)								dBA
		63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	
Acorn Lodge	Daytime $L_{eq,\ 16\ hours}$	61	55	55	55	58	51	41	35	**60**
	Night-time $L_{eq,\ 8\ hours}$	57	51	50	51	54	47	39	34	**56**
	Night-time $L_{Max,F}$	67	60	63	69	70	67	55	51	**73**

The night-time $L_{Max,F}$ data relate to the sound level of the tenth-highest event, in terms of $L_{AFMax\ 10\ sec}$, measured at each position.

The measurement position was approximately at the front (north-eastern) façade of the proposed house at Plot One. All plots One to Four are a similar distance from London Road so the measured sound pressure levels are representative of the worst-case front façade of the proposed houses. The rear elevations of the proposed houses will have some screening from the traffic on the London Road and the M1 north of the nearby Junction 9. A 5dB correction to the incident noise to windows on the screened elevations is considered to be appropriate.

NATURE OF SOURCE NOISE

During installation and removal of the sound measurement equipment positioned on the site the major noise source affecting the site was observed to be due to road traffic on the nearby M1 with regular heavy vehicles along London Road. Other audible sources of noise included aircraft noise. There was no audible noise from the adjacent commercial vehicle rental business.

BUILDING FABRIC NOISE IMPACT ASSESSMENT

INITIAL RISK ASSESSMENT

Results for the highest existing ambient noise levels are shown below and compared with the risk guidance values shown in Figure 1 of ProPG.

Table 6 Comparison of external sound pressure levels with ProPG guidance

Period/Parameter	External sound level, dB	ProPG Noise Risk Assessment category
Daytime $L_{Aeq\ 16hr}$	60	Medium
Night-time $L_{Aeq\ 8hr}$	56	Medium
Night-time $L_{Amax,f}$	73	Non-negligible

The ProPG document notes that:

AT LOW NOISE LEVELS, THE SITE IS LIKELY TO BE ACCEPTABLE FROM A NOISE PERSPECTIVE PROVIDED THAT A GOOD ACOUSTIC DESIGN PROCESS IS FOLLOWED AND IS DEMONSTRATED IN AN ADS[11] WHICH CONFIRMS HOW THE ADVERSE IMPACTS OF NOISE WILL BE MITIGATED AND MINIMISED IN THE FINISHED DEVELOPMENT.

AS NOISE LEVELS INCREASE, THE SITE IS LIKELY TO BE LESS SUITABLE FROM A NOISE PERSPECTIVE AND ANY SUBSEQUENT APPLICATION MAY BE REFUSED UNLESS A GOOD ACOUSTIC DESIGN PROCESS IS FOLLOWED AND IS DEMONSTRATED IN AN ADS WHICH CONFIRMS HOW THE ADVERSE IMPACTS OF NOISE WILL BE MITIGATED AND MINIMISED, AND WHICH CLEARLY DEMONSTRATE THAT A SIGNIFICANT ADVERSE NOISE IMPACT WILL BE AVOIDED IN THE FINISHED DEVELOPMENT.

Even where noise levels are high "the risk may be reduced by following a good acoustic design process" which "confirms how the adverse impacts of noise will be mitigated and minimised."

Note that this initial indication of risk "*is not the basis for the eventual recommendation to the decision maker*" but instead should inform the assessment and design process.

[11] Acoustic Design Statement, i.e this report

INTRUSIVE NOISE ASSESSMENT AND EXTERNAL BUILDING FABRIC SPECIFICATIONS

In order to assess the suitability of the site for the proposed dwellings it is important to predict the internal noise levels within habitable rooms.

The composite acoustic performance required of any portion of the building envelope will depend on its location relative to the principal noise sources around the site and the nature of the spaces behind it (noise criteria, size, room finishes etc.). To control intrusive sound to acceptable levels the following glazing and ventilation specifications are required:

Table 7 Glazing and ventilator specifications

	Glazing Specification	Ventilator Specification
All façades		
Kitchen/Living Rooms	Type A	Standard non-acoustic trickle ventilator
Bedrooms	Type A	

Table 8: Proposed building envelope specifications

External building fabric element	Construction element	Sound reduction indices or Normalised Level Difference (for ventilators) dB at Octave band Centre Frequencies (Hz)							
		63	125	250	500	1k	2k	4k	8k
Type A glazing	4mm glass/16mm cavity/4mm glass	21	24	20	25	34	37	40	40
Standard Non-Acoustic Trickle Ventilator		30	32	32	31	33	31	31	31
External brick/block wall		35	41	45	45	54	58	55	55
Tiled/slated roof, 25mm plasterboard ceiling, 100mm mineral wool		25	27	37	43	48	52	50	50

The detailed calculation methodology described in BS 8233:2014 has been used in the assessment.

INTERNAL NOISE LEVELS

With the proposed external building fabric elements shown above, the results of the calculations show the internal noise levels given in Table 3.

Units assessed below are based on their room size, the number of windows to the unit and their proximity to London Road. The floor plans and room details are presented in **Appendix C**. The assessment made is for typical rooms for each house type; internal sound levels in all similar house types will be the same.

Table 3 Predicted ambient noise levels in internal areas

House	Room	Reference*	External noise levels, dB	Predicted internal noise levels, dB	Proposed LOAEL, dB	Difference, dB
Type 1	Kitchen/ dining	L_{Aeq}, daytime	55	25	35	-10
	Study	L_{Aeq}, daytime	60	31	35	-4
	Sitting	L_{Aeq}, daytime	60	31	35	-4
	Bedroom 1	L_{Aeq}, daytime	55	27	35	-8
		L_{Aeq}, night-time	51	23	30	-7
		L_{Amax}, night-time	68	39	45	-6
	Bedroom 2	L_{Aeq}, daytime	55	25	35	-10
		L_{Aeq}, night-time	51	21	30	-9
		L_{Amax}, night-time	68	38	45	-7
	Bedroom 3	L_{Aeq}, daytime	55	26	35	-9
		L_{Aeq}, night-time	51	22	30	-8
		L_{Amax}, night-time	68	39	45	-6
Type 2	Kitchen/ dining	L_{Aeq}, daytime	55	26	35	-9
	Study	L_{Aeq}, daytime	60	32	35	-3
	Sitting	L_{Aeq}, daytime	60	30	35	-5
	Bedroom 1	L_{Aeq}, daytime	55	25	35	-10
		L_{Aeq}, night-time	51	21	30	-9
		L_{Amax}, night-time	68	38	45	-7
	Bedroom 2	L_{Aeq}, daytime	60	31	35	-4
		L_{Aeq}, night-time	56	27	30	-3
		L_{Amax}, night-time	73	44	45	-1
	Bedroom 3	L_{Aeq}, daytime	55	27	35	-8
		L_{Aeq}, night-time	51	22	30	-8
		L_{Amax}, night-time	68	39	45	-6

*Daytime $L_{Aeq,16hr}$, night-time $L_{Aeq,8hr}$

The assessment has demonstrated that the typical requirements established in BS 8233:2014 will be met inside all habitable rooms when standard double glazing and non-acoustic trickle ventilators are installed with the acoustic specifications given in Table 7, Table 8 and **Appendix C**.

Where background ventilation is provided by an MVHR system or similar, trickle ventilators will not be used, and internal sound levels will therefore be lower than tabulated above. MVHR systems must be provided with intake and discharge attenuation, where necessary, to control intrusive levels to meet the BS 8233:2014 guidance values shown in Table 2 of this report.

EXTERNAL AMENITY LEVELS

The external daytime noise levels in gardens have been predicted, taking into consideration the distance from the main noise sources (the M1 to the east and the London Road to the north) and screening provided by the building layout across the site and close-boarded timber fences to prevent – where possible – direct vision from the gardens to the noise source.

At the monitoring position the average daytime noise levels are up to 61 dB $L_{Aeq,16hr}$. This is above the upper guideline value within BS 8233:2014 for external amenity areas. Fences surrounding private gardens in addition to intervening buildings would be likely to reduce road traffic noise such that the guideline values are achieved.

BUILDING REGULATIONS PART O

It is important to note that the building envelope sound insulation specifications and associated advice given in this report are based on meeting the design criteria under the "Whole Dwelling Ventilation" conditions set out in Approved Document F (and formerly referred to as "background ventilation" in previous editions of the AD), as distinct from "Extract Ventilation" or "Purge Ventilation" conditions within the AD, and from the overheating condition (which is only briefly mentioned in AD F).

In January 2020 the Association of Noise Consultants (ANC) and Institute of Acoustics (IoA) published a Residential Design Guide on Acoustic Ventilation and Overheating ("the AVO Guide"), which sets out some of the acoustic design issues associated with the control of overheating. The night-time thresholds suggested in the AVO Guide have been superseded by the limits set out in Approved Document O.

The AVO guide suggests that a value of 13dB(A) is used for the noise reduction provided by an open window. Resulting internal noise levels would therefore be as shown below:

Table 10 Predicted ambient noise levels in internal areas

House	Room	Reference	External noise levels, dB	Internal noise levels, dB	Internal target level, dB	Difference, dB
Type 1	Kitchen/ dining	L_{Aeq}, daytime	55	42	50 (AVO guidance	-8
	Study	L_{Aeq}, daytime	60	47	50 (AVO guidance	-3
	Sitting	L_{Aeq}, daytime	60	47	50 (AVO guidance)	-3

House	Room	Reference	External noise levels, dB	Internal noise levels, dB	Internal target level, dB	Difference, dB
	Bedroom 1	L_{Aeq}, daytime	55	42	50 (AVO guidance)	-8
		L_{Aeq}, night-time	51	38	40 (Part O requirement)	-2
		L_{Amax}, night-time	68	55	55 (Part O requirement)	0
	Bedroom 2	L_{Aeq}, daytime	55	42	50 (AVO guidance)	-8
		L_{Aeq}, night-time	51	38	40 (Part O requirement)	-2
		L_{Amax}, night-time	68	55	55 (Part O requirement)	0
	Bedroom 3	L_{Aeq}, daytime	55	42	50 (AVO guidance)	-8
		L_{Aeq}, night-time	51	38	40 (Part O requirement)	-2
		L_{Amax}, night-time	68	55	55 (Part O requirement)	0
Type 2	Kitchen/ dining	L_{Aeq}, daytime	55	42	50 (AVO guidance)	-8
	Study	L_{Aeq}, daytime	60	47	50 (AVO guidance)	-3
	Sitting	L_{Aeq}, daytime	60	47	50 (AVO guidance)	-3
	Bedroom 1	L_{Aeq}, daytime	55	42	50 (AVO guidance)	-8
		L_{Aeq}, night-time	51	38	40 (Part O requirement)	-2
		L_{Amax}, night-time	68	55	55 (Part O requirement)	0
	Bedroom 2	L_{Aeq}, daytime	60	47	50 (AVO guidance)	-3
		L_{Aeq}, night-time	56	43	40 (Part O requirement)	+3
		L_{Amax}, night-time	73	60	55 (Part O requirement)	+5
	Bedroom 3	L_{Aeq}, daytime	55	42	50 (AVO guidance)	-8
		L_{Aeq}, night-time	51	38	40 (Part O requirement)	-2
		L_{Amax}, night-time	68	55	55 (Part O requirement)	0

It should be noted that these are worst-case values assuming that windows are open continuously to control overheating. Where windows are only open for a proportion of the time the internal noise levels will be lower.

The Part O criteria are exceeded by up to 5dB L_{AMax} in bedrooms on the front elevation. Although this excess over is only minor, an alternative method of providing mitigation of overheating will be required. Since the excess shown in the table is below +5dB (i.e. a total sound reduction of 18dBA of the external sound level would be required to meet the Part O limits), this is likely to be achievable with an attenuated louvre ventilator.

CONCLUSION

Love Design Studio has been commissioned to undertake a planning stage noise assessment for a proposed new residential development at Acorn Lodge in Flamstead.

In support of these assessment works, a baseline noise survey was undertaken to determine the prevailing environmental noise levels at the façades of the proposed building.

The results of the assessments were analysed and reviewed in line with the aims and advice contained within the National Policy Statement for England, the National Planning Policy Framework, Planning Practice Guidance and the Institute of Acoustics Professional Practice Guidance for new residential development.

The advice in the IoA ProPG document indicates that the worst-affected façade noise levels are in the medium risk range but that the risk may be reduced by following a good acoustic design process".

The assessment has demonstrated that the requirements established in BS 8233:2014 will be met inside all habitable rooms when fitted with suitable double-glazed windows and non-acoustic trickle ventilators.

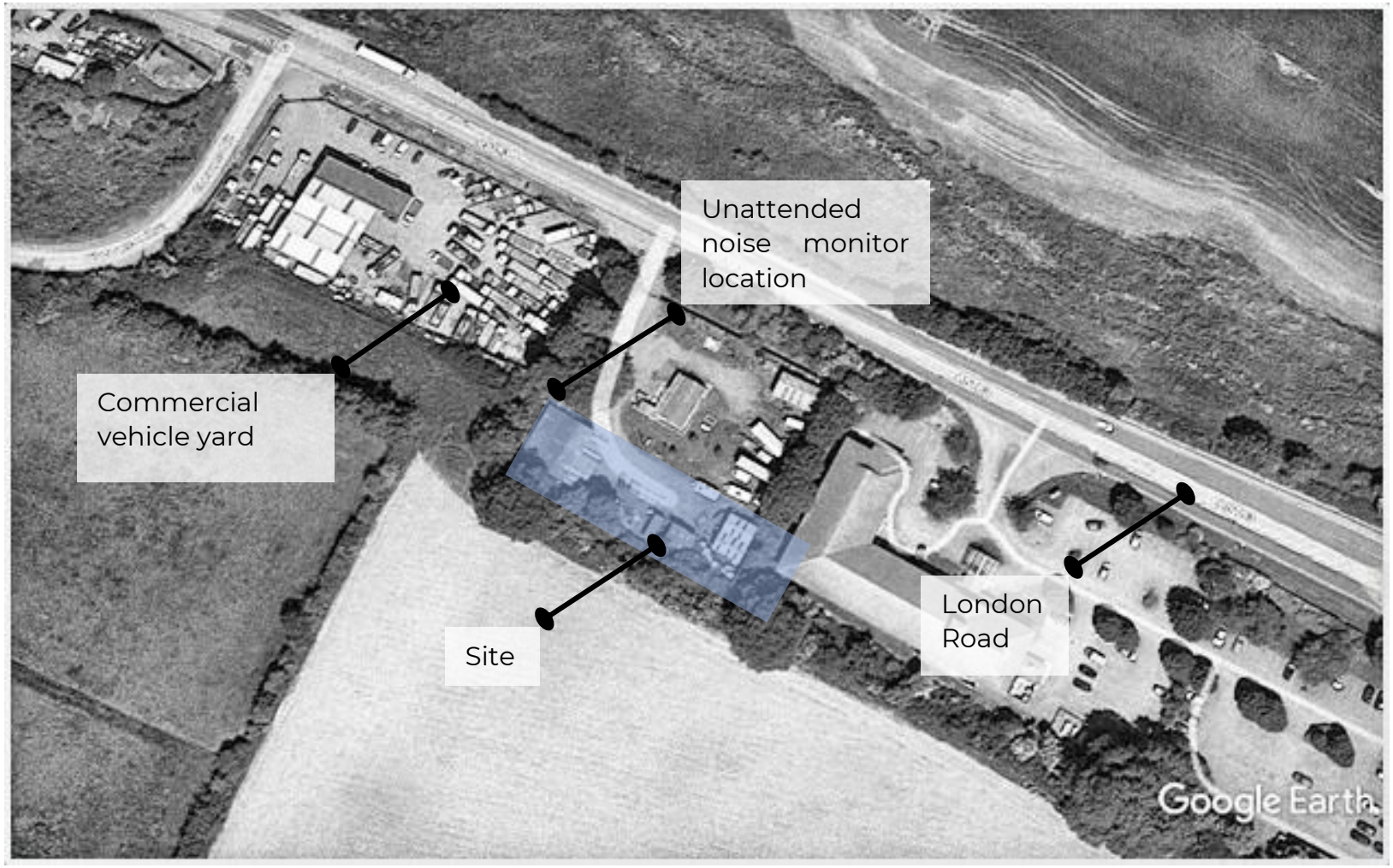
The site can, therefore, be considered suitable for the proposed change of use.

APPENDIX A - ACOUSTIC TERMINOLOGY

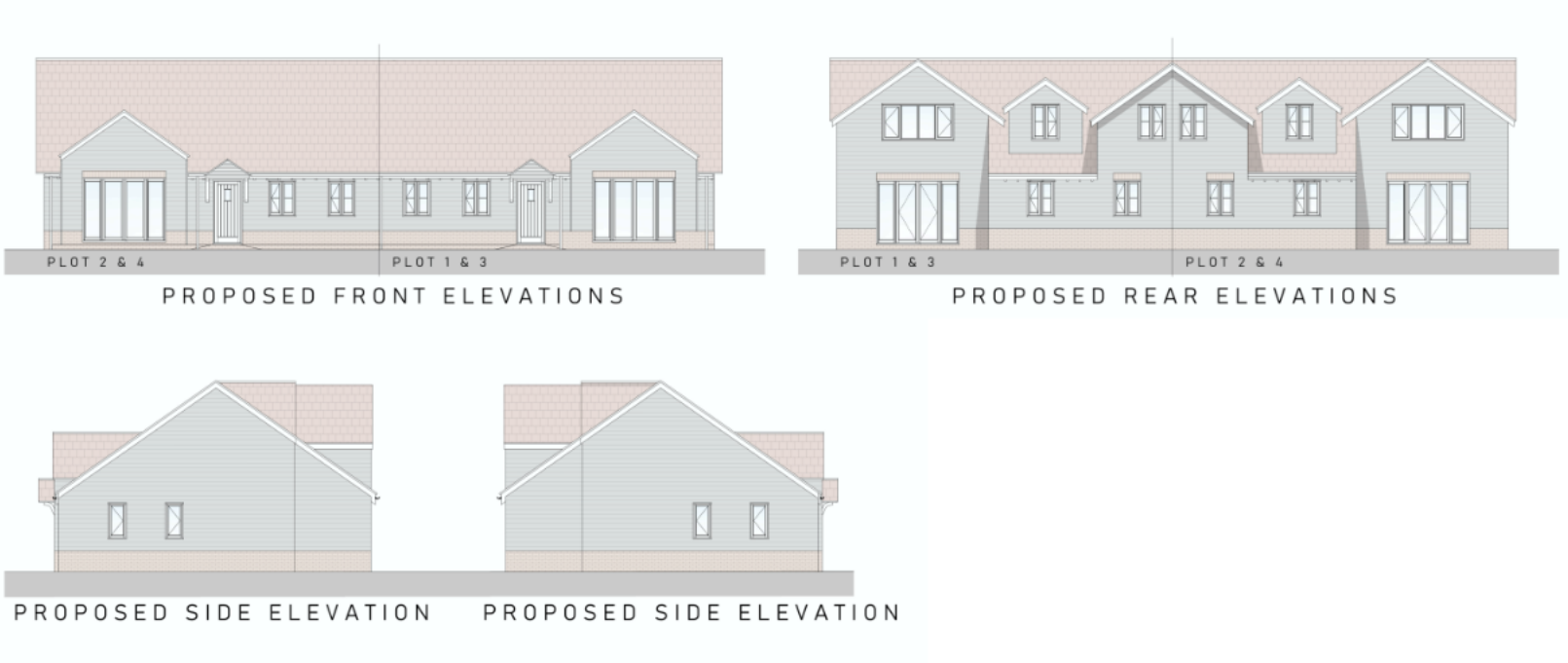
Parameter	Description
Ambient Noise Level	The totally encompassing sound in a given situation at a given time, usually composed of a sound from many sources both distant and near ($L_{Aeq,T}$).
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s1 and s2 is given by 20 $\log_{10}$ (s1/s2). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20μPa. The threshold of normal hearing is in the region of 0dB and 140dB is the threshold of pain. A change of 1dB is only perceptible under controlled conditions.
dB(A), L_{Ax}	Decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB(A) broadly agree with people's assessment of loudness. A change of 3dB(A) is the minimum perceptible under normal conditions, and a change of 10dB(A) corresponds roughly to halving or doubling the loudness of a sound. The background noise in a living room may be about 30dB(A); normal conversation about 60dB(A) at 1 metre; heavy road traffic about 80dB(A) at 10 metres; the level near a pneumatic drill about 100dB(A).
Fast Time Weighting	Setting on sound level meter, denoted by a subscript F, that determines the speed at which the instrument responds to changes in the amplitude of any measured signal. The fast time weighting can lead to higher values than the slow time weighting when rapidly changing signals are measured. The average time constant for the fast response setting is 0.125 (1/8) seconds.
Free-field	Sound pressure level measured outside, far away from reflecting surfaces (except the ground), usually taken to mean at least 3.5 metres
Façade	Sound pressure level measured at a distance of 1 metre in front of a large sound reflecting object such as a building façade.
$L_{Aeq,T}$	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{max,T}$	A noise level index defined as the maximum noise level recorded during a noise event with a period T. L_{max} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.

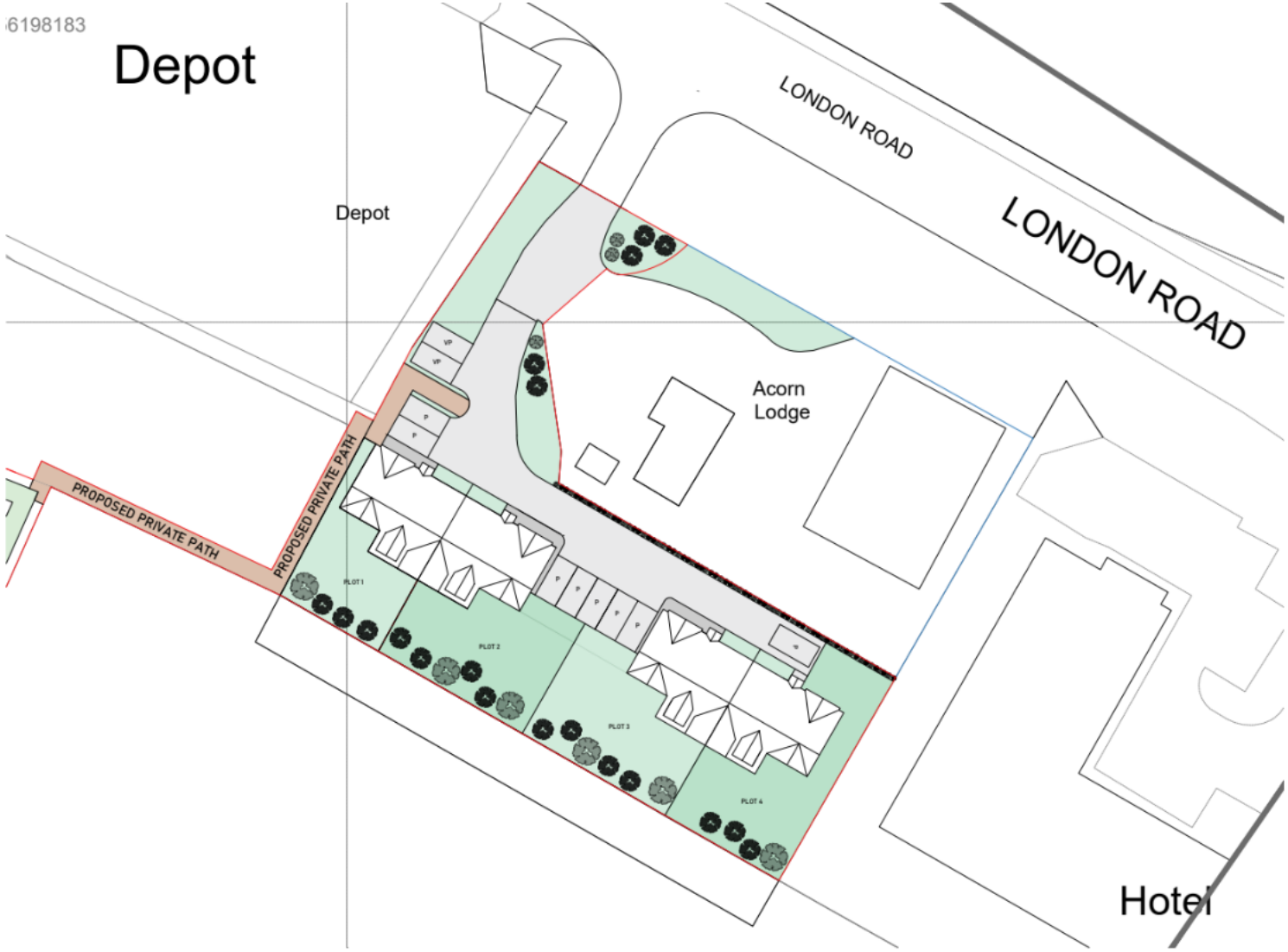
Parameter	Description
$L_{10,T}$	A noise level index. The noise level exceeded for 10% of the time over the period T. L_{10} can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise. $L_{A10,18h}$ is the A – weighted arithmetic average of the 18 hourly $L_{A10,1h}$ values from 06:00-24:00.
$L_{90,T}$	A noise level index. The noise level that is exceeded for 90% of the measurement time interval, T. It gives an indication of the lower levels of fluctuating noise. It is often used to describe the background noise level and can be considered to be the “average minimum” noise level and is a term used to describe the level to which non-specific noise falls during quiet spells, when there is lull in passing traffic for example.

APPENDIX B - PLACES OF INTEREST

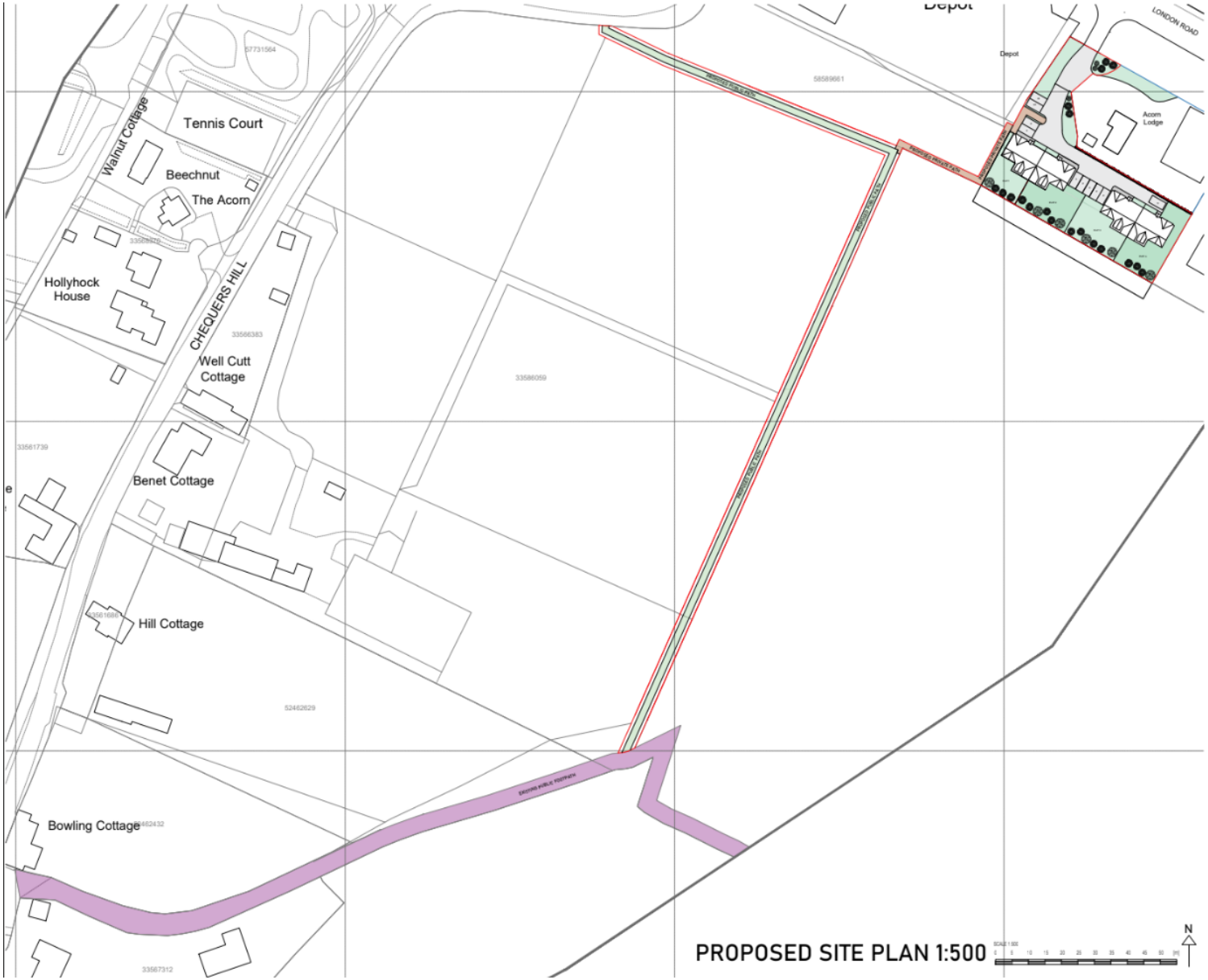


APPENDIX C - PLANS AND ELEVATION DRAWINGS





PROPOSED SITE PLAN 1:200


Depot
LONDON ROAD
Depot
Acorn Lodge
Tennis Court
Walnut Cottage
Beechnut
The Acorn
Hollyhock House
CHEQUERS HILL
Well Cutt Cottage
Benet Cottage
Hill Cottage
Bowling Cottage
PROPOSED SITE PLAN 1:500
N

APPENDIX D - ENVIRONMENTAL SOUND SURVEY

DETAILS OF ENVIRONMENTAL SOUND SURVEY

Measurements of the existing background sound levels were undertaken between 10.15 hours on Friday 23rd September and 10.00 hours on Monday 26th September 2022.

The sound level meter was programmed to record the A-weighted L_{eq}, L_{90}, L_{10} and L_{max} noise indices for consecutive 15-minute sample periods for the duration of the survey.

MEASUREMENT POSITION

The sound level meters was fixed to an outbuilding at Acorn Lodge at the location shown in **Appendix B**. In accordance with BS 7445-2:1991 *'Description and measurement of environmental noise – Part 2: Guide to the acquisition of data pertinent to land use'*, the measurements were undertaken under free-field conditions.

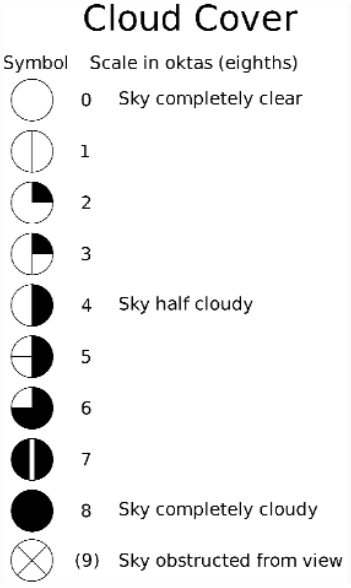
EQUIPMENT

Details of the equipment used during the survey are provided in the table below. The sound level meter was calibrated before and after the survey; no significant change (+/-0.2dB) in the calibration level was noted.

Position	Description	Model / serial no.	Calibration date	Calibration certificate no.
Acorn Lodge	Class 1 Sound level meter	Svantek 971 / 111624	18/06/2021	Factory conformation certificate
	Condenser microphone	ACO Pacific 7052E / 80036		
	Preamplifier	Svantek SV 18 / 112639		
	Calibrator	Svantek SV 33B / 83850	20/10/2021	1501134-1

WEATHER CONDITIONS

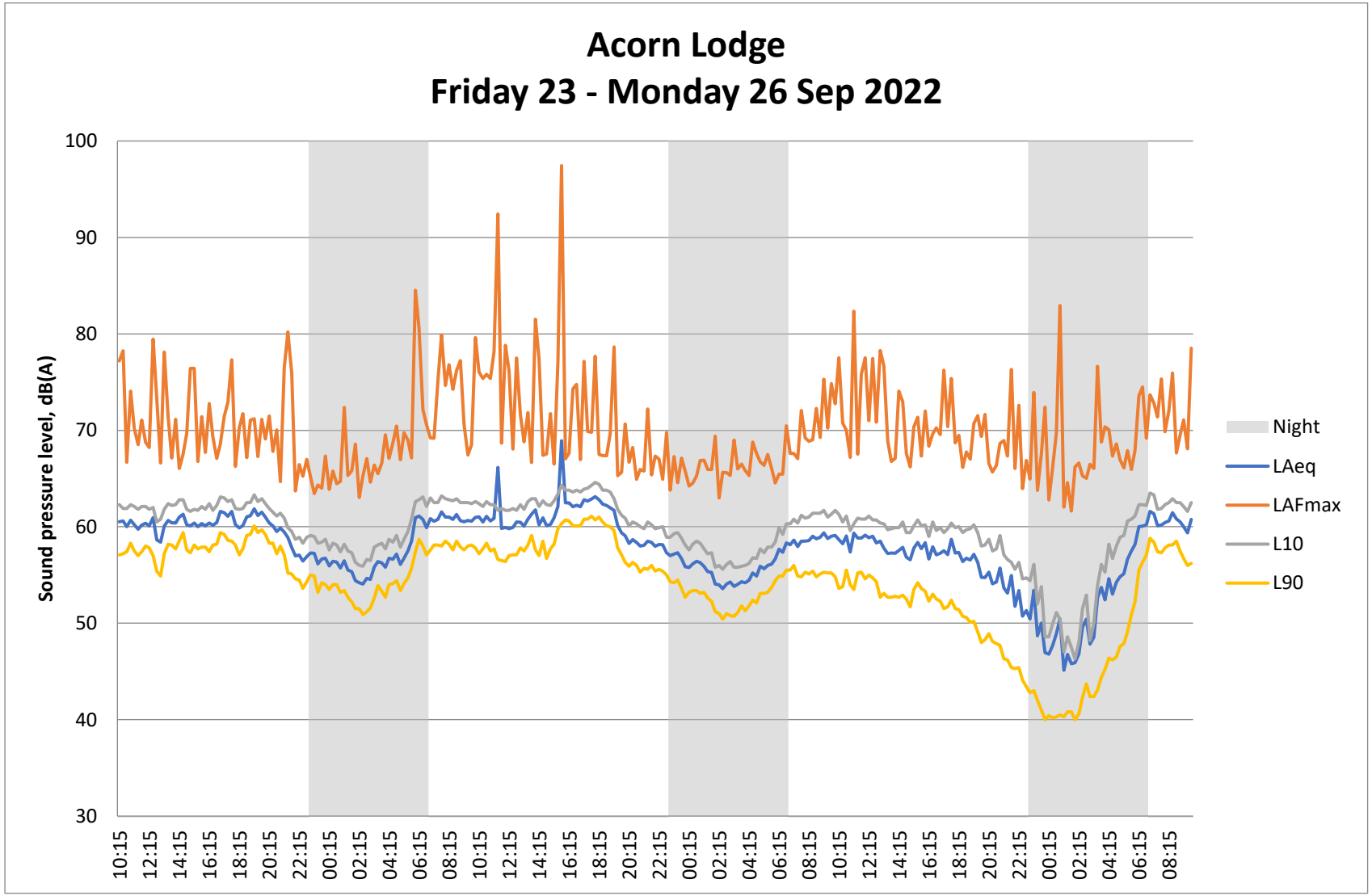
Weather conditions were determined both at the start and on completion of the survey. It is considered that the meteorological conditions were appropriate for environmental noise measurements. The table below presents the weather conditions recorded on site at the beginning and end of the survey.

Weather Conditions				
Measurement Location	**Date/Time**	**Description**	**Beginning of Survey**	**End of Survey**
As indicated on Appendix B	10:15 23/9/22 – 10:00 26/9/22	Temperature (°C)	14	13
		Precipitation:	yes	No
		Cloud cover (oktas - see guide)	7	7
		Presence of fog/snow/ice	No	No
		Presence of damp roads/wet ground	yes	No
		Wind Speed (m/s)	1	3
		Wind Direction	Northerly	North westerly
		Conditions that may cause temperature inversion (i.e. calm nights with no cloud)	No	No

RESULTS

During installation and removal of the sound measurement equipment positioned on Rosendale Road the major noise source affecting the site was observed to be due to road traffic with some aircraft noise.

The results of the survey are presented in a time history graph overleaf.


Acorn Lodge
Friday 23 - Monday 26 Sep 2022
Sound pressure level, dB(A)
100
90
80
70
60
50
40
30
10:15
12:15
14:15
16:15
18:15
20:15
22:15
00:15
02:15
04:15
06:15
08:15
10:15
12:15
14:15
16:15
18:15
20:15
22:15
00:15
02:15
04:15
06:15
08:15
Night
LAeq
LAFmax
L10
L90

DOCUMENT INFORMATION

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Date	03/10/2022
Project Number	466 / 91021
Version Reference	00 / 91021/PNA

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