

Land at Prince Albert

Copthorne Bank,
Crawley,
RH10 3QX

Planning Noise Assessment Report: Residential dwellings

On behalf of



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Executive summary

Noise Solutions Ltd (NSL) has been commissioned to undertake an assessment of the acoustic suitability of a site on the corner of Copthorne Bank and Brookhill Road in Crawley for residential use.

This report presents the results of an environmental noise survey, the applicable policies and guidance, and a noise impact assessment to support a planning application.

The assessment shows that appropriate internal sound levels can be provided within the proposed houses, through the use of glazing and ventilators with a suitable acoustic specification.

Based on the findings of this assessment, noise should not be grounds for refusal of planning permission for the proposed development.

1.0 Introduction

- 1.1. Noise Solutions Ltd (NSL) has been commissioned to undertake an assessment of the acoustic suitability of a site on the corner of Copthorne Bank and Brookhill Road in Crawley for residential use.
- 1.2. This report presents the results of an environmental noise survey, the applicable policies and guidance, and a noise impact assessment to support a planning application.
- 1.3. 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/>.

2.0 Details of development proposals

- 2.1. It is proposed to provide two new homes on land adjacent to the existing Prince Albert public house on the corner of Copthorne Bank and Brookhill Road.
- 2.2. Development proposals for the remaining parts of the public house site are for a new convenience store and amended car parking.
- 2.3. The existing public house will remain in situ within the northwest corner of the site. The beer garden will be significantly reduced in size due to the proposed development. The proposed new beer garden area will be located along the west side of the site, between the south side of the public house and north side of the houses.
- 2.4. Plans of the development are shown in **Appendix B**.

3.0 Noise policy

Noise Policy Statement for England

- 3.1. The Noise Policy Statement for England (NPSE¹), 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*

¹ Noise Policy Statement for England, Defra, March 2010

- *where possible, contribute to the improvement of health and quality of life.”*
- 3.2. 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.
- 3.3. 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.”*
- 3.4. Importantly, the NPSE goes on to state that: *“This does not mean that such adverse effects cannot occur.”*
- 3.5. 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, 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.”*
- 3.6. 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

- 3.7. A new edition of NPPF was published in December 2024 and came into effect immediately, with corrections issued in February 2025. The original National Planning Policy Framework (NPPF²) was published in March 2012, with subsequent revisions made periodically - this document replaced the existing Planning Policy Guidance Note 24 (PPG 24) “Planning and Noise.” The December 2024/February 2025 revised edition contains no new directions or guidance with respect to noise. The paragraph references quoted below relate to the February 2025 edition.
- 3.8. Paragraph 187 of the NPPF states that the planning system should contribute to and enhance the natural and local environment by, (amongst others) *“preventing new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability.”*

² National Planning Policy Framework, DCLG, March 2012

3.9. The NPPF goes on to state in Paragraph 198:

"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 ...*

3.10. The NPPF document does not refer to any other documents or British Standards regarding noise other than the Noise Policy Statement for England (NPSE³).

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

3.12. 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"*.

3.13. Paragraph 124 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

3.14. An updated Planning Practice Guidance (PPG⁴) 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

³ Noise Policy Statement for England, DEFRA, March 2010

⁴ Planning Practice Guidance – Noise, <https://www.gov.uk/guidance/noise--2>, 22 July 2019

- Whether or not a good standard of amenity can be achieved.
- 3.15. 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').
- 3.16. 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.
- 3.17. The LOAEL is described in PPG⁵ 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"*.
- 3.18. 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."*
- 3.19. 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 with the NPSE, no objective noise levels are provided for LOAEL or SOAEL although the PPG⁶ 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."*
- 3.20. The relevant guidance in the PPG in relation to the adverse effect levels is summarized below:

Table 1 PPG Noise 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

⁵ Paragraph: 005 Reference ID: 30-005-20190722

⁶ Paragraph: 006 Reference ID: 30-006-20190722

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

3.21. The Planning Practice Guidance⁷ 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 of noise from adjoining activities or the local environment; incorporating noise barriers; and optimising the sound insulation provided by the building envelope.”

3.22. In addition, the Guide notes that it may also be relevant to consider⁸:

“... 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”.

4.0 Acoustic Standards and Guidance

Institute of Acoustics Professional Practice Guidance

- 4.1. 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”.
- 4.2. 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
- 4.3. 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 levels⁹.

⁷ Paragraph: 010 Reference ID: 30-010-20190722

⁸ Paragraph: 006 Reference ID: 30-006-20190722

⁹ Figure 1, IoA ProPG for New Residential Development, May 2017

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

BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings.

- 4.5. 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 (19910). 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	35 dB $L_{Aeq,16h}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16h}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16h}$	30 dB $L_{Aeq,8h}$

- 4.6. BS 8233:2014 advises that: *“regular individual noise events...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.”* While the current edition of the standard gives no specific guidance on internal night-time L_{Amax} sound levels, the previous edition¹¹ recommended that:

For a reasonable standard in bedrooms at night, individual noise events (measured with F time-weighting) should not normally exceed 45 dB L_{Amax} .

- 4.7. 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 50 dB $L_{Aeq,T}$ with an upper guideline value of 55 dB $L_{Aeq,T}$ 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.

¹⁰ World Health Organisation Guidelines for Community Noise, 1999

¹¹ BS 8233:1999 Sound insulation and noise reduction for buildings – Code of practice

...

In high-noise areas, consideration should be given to protecting these areas by screening or building design to achieve the lowest practicable levels. Achieving levels of 55 dB $L_{Aeq,T}$ or less might not be possible at the outer edge of these areas, but should be achievable in some areas of the space."

BS 4142:2014 + A1:2019 Methods for Rating and Measuring Industrial and Commercial Sound

- 4.8. BS 4142:2014+A1:2019¹² describes a method for rating and assessing sound of an industrial or commercial nature, which includes:
- Sound from industrial and manufacturing processes;
 - Sound from fixed installations which comprise mechanical and electrical plant and equipment;
 - Sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and
 - Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train or ship movements on or around an industrial and/or commercial site.
- 4.9. Therefore, for the first time in the UK, noise associated with store deliveries (i.e. sound from loading and unloading of goods) has a recognised and approved assessment methodology as this type of noise was not included in the scope of previous versions of BS 4142.
- 4.10. The industrial or commercial sound is assessed outside a dwelling or premises used for residential purposes, upon which sound is incident.
- 4.11. The procedure contained in BS 4142 is to quantify the "specific sound level", which is the measured or predicted level of sound from the source in question over a one hour period for the daytime and a 15-minute period for the night-time. Daytime is defined in the standard as 07:00 to 23:00 hours, and night-time as 23:00 to 07:00 hours.
- 4.12. The specific sound level is converted to a rating level by adding penalties on a sliding scale to account for either potentially tonal or impulsive elements. The standard sets out objective methods for determining the presence of tones or impulsive elements, but notes that it is acceptable to subjectively determine these effects.

¹² For the purposes of brevity, references in this report to "BS 4142:2014" or "BS 4142" should be read as BS 4142:2014 + A1:2019

- 4.13. The penalty for tonal elements is between 0dB and 6dB, and the standard notes: "Subjectively, this can be converted to a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible, and 6 dB where it is highly perceptible."
- 4.14. The penalty for impulsive elements is between 0dB and 9dB, and the standard notes: "Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible, and 9 dB where it is highly perceptible."
- 4.15. The background sound level should be established in terms of the L_{A90} noise index. The standard states that the background sound level should be measured over a period of sufficient length to obtain a representative value. This should not normally be less than 15-minute intervals. The standard states that: "A representative level ought to account for the range of background sound levels and ought not automatically to be assumed to be either the minimum or modal value."
- 4.16. The assessment outcome results from a comparison of the rating level with the background sound level. The standard states:
- a) Typically, the greater this difference, the greater the magnitude of the impact.*
 - b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.*
 - c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.*
 - d) The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.*
- Adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact."*
- The standard goes on to note that: "Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night."*
- 4.17. In addition to the margin by which the Rating Level of the specific sound source exceeds the Background Sound Level, the 2014 edition places emphasis upon an appreciation of the context, as follows:

“An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context.”

- 4.18. BS 4142 requires uncertainties in the assessment to be considered, and where the uncertainty is likely to affect the outcome of the assessment, steps should be taken to reduce the uncertainty.

World Health Organisation, Guidelines for Community Noise, 1999 (WHO)

- 4.19. The World Health Organisation (WHO) *Guidelines for Community Noise* (1999) recommends suitable internal and external noise levels based on dose response research. The levels recommend 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 30 dBA indoors for continuous noise.

The WHO Guidelines for Community Noise also identify 60 dB L_{AFMax} outside as the guideline value for sleep disturbance with windows open.

- 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 50 dB 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 35 dBA, and can be understood fairly well in background levels of 45 dBA.
 - b) Speech with more vocal effort can be understood when the background sound pressure level is about 65 dBA.

Building Regulations Parts L and F

- 4.20. 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.
- 4.21. The 2021 edition of Approved Document F came into effect on 15 June 2022. Volume 1 sets out the requirements for ventilation of dwellings.
- 4.22. Paragraph 1.9 describes a ventilation strategy comprising extract ventilation of bathrooms and kitchens, whole house ventilation to provide fresh air and “remove water vapour and pollutants not removed by extract ventilation” and purge ventilation used intermittently to “remove high concentrations of pollutants produced by occasional activities (e.g. fumes from painting)”. The use of purge ventilation to control overheating is described in Part O, as noted below.
- 4.23. The assessment within the main part of this report deals with controlling intrusive noise in the “whole house ventilation” scenario.
- 4.24. While the use of open windows to remove intermittent fumes would inevitably result in increased intrusive sound levels compared to when windows are closed, this is considered not to be significant in acoustic terms because activities producing the fumes to be removed would tend to be short in duration and under the control of the occupants and therefore not likely to take place when occupants are trying to sleep.

Building Regulations Part O

- 4.25. Approved Document O1: Overheating mitigation of the Building Regulations 2010, came into force on 15 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 LAeq,T, averaged over 8 hours (between 11pm and 7am).

b. 55dB LAFmax, 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).

5.0 Existing noise climate

Environmental Noise Survey

- 5.1. An unattended environmental sound pressure level survey was undertaken between Wednesday 23rd October and Monday 28th October 2024.
- 5.2. The survey was undertaken in order to establish the typical incident environmental noise levels at the proposed residential development.
- 5.3. Full details of the survey are provided in [Appendix C](#) alongside time history graphs of the measurement results.
- 5.4. The relevant results of the survey have been summarised in Table 3.

Table 3 Summary of survey results

Survey Location	Measurement period	Range of recorded sound pressure levels (dB)			
		L _{Aeq} (15mins)	L _{Amax} (15mins)	L _{A10} (15mins)	L _{A90} (15mins)
West (roadside)	Daytime (07.00 – 23.00 hours)	55-71	73-99	58-71	46-62
	Night-time (23.00 – 07.00 hours)	48-65	59-89	47-69	43-56

- 5.5. The environmental noise levels at the measurement position are summarised in Table 4 below.

Table 4 Summary of free field environmental noise levels

Period	Parameter	Sound pressure level, dB
		West location
23rd Oct daytime	$L_{Aeq,T}$	64
23rd – 24th Oct night-time	$L_{Aeq,8hours}$	58
24th Oct daytime	$L_{Aeq,T}$	65
24th – 25th Oct night-time	$L_{Aeq,8hours}$	57
25th Oct daytime	$L_{Aeq,T}$	65
25th – 26th Oct night-time	$L_{Aeq,8hours}$	57
26th Oct daytime	$L_{Aeq,T}$	64
26th – 27th Oct night-time	$L_{Aeq,8hours}$	56
27th Oct daytime	$L_{Aeq,T}$	62
27th – 28th Oct night-time	$L_{Aeq,8hours}$	58
28th Oct daytime*	$L_{Aeq,T}$	65
Overall daytime	$L_{Aeq, 16 \text{ hours}}$	64
Overall night-time	$L_{Aeq, 8 \text{ hours}}$	57

- 5.6. Measured octave band sound pressure levels corresponding to the overall values above are given in Table 5.

Table 5 Measured octave band free field sound pressure levels

Survey location	Period	Incident sound pressure levels (dB) at Octave Band Centre Frequencies (Hz)								dBA
		63	125	250	500	1000	2000	4000	8000	
West (roadside)	Daytime $L_{eq, 16 \text{ hours}}$	70	66	62	60	60	57	52	49	64
	Night-time $L_{eq, 8 \text{ hours}}$	62	58	54	52	53	50	44	42	57
	Night-time L_{Amax}	86	81	80	72	76	72	68	70	80

- 5.7. L_{max} octave band levels relate to the period with the tenth-highest noise event at the survey position, in terms of $L_{AF,max,1-min}$, in accordance with the guidance in the ProPG document.
- 5.8. Noise levels at the west of the site were observed to be due to road traffic on Brookhill Road.
- 5.9. The western survey position was located immediately alongside Brookhill Road, and a distance correction is therefore applied to determine the incident sound level at the west façade of the building. The south elevation is considered to have the same incident sound level as the west façade. Due to the building geometry the incident sound levels at the east façade are considered to be 5dB lower due to screening provided by the buildings. The façade incident sound levels used in the following assessment are shown in Table 6.

Table 6 Octave band free field sound pressure levels

Façade	Period	Incident sound pressure levels (dB) at Octave Band Centre Frequencies (Hz)								dBA
		63	125	250	500	1000	2000	4000	8000	
West and South	Daytime L_{eq} , 16 hours	66	62	58	56	56	53	48	45	60
	Night-time L_{eq} , 8 hours	58	54	50	48	49	46	40	38	53
	Night-time L_{Amax}	78	73	72	64	68	64	60	62	72
East	Daytime L_{eq} , 16 hours	61	57	53	51	51	48	43	40	55
	Night-time L_{eq} , 8 hours	53	49	45	43	44	41	35	33	48
	Night-time L_{Amax}	73	68	67	59	63	59	55	57	67

6.0 Commercial noise sources

- 6.1. In addition to existing environmental noise sources, it is important to consider the potential for an adverse noise impact resulting from the new and changed commercial noise sources in the area, i.e. the convenience store, altered car park and reconfigured pub garden.

Convenience store delivery noise

- 6.2. The sound pressure levels associated with refrigerated lorry deliveries were established by measurement of a delivery at a similar convenience store in operation. The measurements included all aspects of the delivery including, but not limited to, the arrival, unloading, movement of cages and the departure of the lorry. The sound pressure levels were normalised to a distance of 10m from the delivery area and have been converted to Sound Exposure Levels (SEL) for ease of comparison/calculation. Typical L_{Amax} levels were also established.
- 6.3. It should be noted that the example delivery represented a standard operation; the refrigeration unit was switched off as standard.
- 6.4. Table 7 below details typical source noise levels, used within the assessment, with the data presented in terms of SEL and maximum individual noise event levels (L_{AFmax}).

Table 7 Reference noise data for delivery activities (at 10m)

Noise Source	SEL, dB(A)	L _{Afmax} , dB(A)
Lorry arrives and manoeuvres	68	62
Lorry manoeuvring-first movement (no reversing alarms)	75	66
Unloading cages on to lift	71	74
Unloading pallets on to lift	75	73
Lift up	73	65
Lift down	71	71
Unloading cages into BoH	69	75
Lorry departure	75	68

Predicted impact

- 6.5. The information contained in Table 7 was used to model a source noise level based on the number of activity events over the required assessment period using the following equation:

$$L_{Aeq,T} = SEL + 10 \cdot \log\left(\frac{1}{T}\right) + 10 \cdot \log(N) \quad (\text{Equation 1})$$

Where:

SEL is the L_{Aeq} over a one second period, and represents the noise energy from an event (e.g. cage movement) compressed into one second;

T is the reference time period in seconds; and

N is the number of movements in the time period, T.

- 6.6. The delivery noise level at each of the nearest residential windows has been predicted. Full calculations are shown in [Appendix E](#) and are summarised in Table 8.

Table 8 Predicted delivery noise levels

Predicted noise levels at window of most affected residential dwelling	
L _{Aeq,T} , dB	Range of L _{Afmax} (dB)
50	59 - 69

BS 4142:2014 delivery noise assessment

- 6.7. Table 9 below presents the initial assessment of the likely impact at the nearest residences during the likely delivery periods, in accordance with the BS 4142:2014 methodology:

Table 9 Assessment of predicted external delivery noise levels at Receptor R1 using BS 4142:2014 during the daytime period

Results	Mon-Sun 07.00 – 23.00	Relevant Clauses of BS 4142:2014	Commentary
Background Sound level	$L_{A90} = 48\text{dB}$	8.1, 8.2	Representative typical background sound level during permitted delivery period, determined from a range of measurements
Assessment made during the daytime, so the reference interval is one hour		7.2	
Specific Sound Level	$L_{Aeq,T} = 50\text{dB}$	7.3.6	Calculations presented in Appendix D
Acoustic Feature Correction	5dB	9.2	See calculation
Rating Level	$(50+5)\text{ dB} = 55\text{dB}$		
Excess of Rating Level over background sound level	$(55-48)\text{ dB} = +7\text{dB}$		
Context	Site is on a road with local traffic, producing short periods of high noise levels.		
Assessment of impact:	Possible adverse impact		

- 6.8. The assessment indicates that, for deliveries made within the typical delivery periods as noted, the rating level is 7dB above the representative background sound level and there is therefore the possibility of an adverse noise impact. It is therefore appropriate that a suitable level of noise mitigation is incorporated into the design of the new houses. This will be discussed in **Section 7.0** of this report.

Car park activities

- 6.9. Noise from vehicles in car parks, and noise from customers, falls outside the scope of BS 4142:2014 + A1:2019. It will be similar in character to existing road traffic noise affecting the site. A comparison may therefore be made of predicted noise levels from the use of the car park and the prevailing noise environment, to determine whether car park noise will elevate façade sound levels.
- 6.10. The noise from the car park will comprise the noise produced from vehicles entering and departing the car park, engines starting, car doors closing etc. The patrons of the store and public house may also converse with each other or on the phone whilst they walk back and forth from their vehicles. Other patrons who may not drive may also be present. It is unlikely that all the car park spaces will be used in the later hours. Therefore, for the purposes of the assessment, a set of reasonably worst-case assumptions will have to be made in relation to the number of

vehicles which may use the car park in any, one-hour period (particularly outside the peak opening hours).

- 6.11. Table 10 below details typical source noise level used in this assessment with the data presented in terms of SEL.

Table 10 Reference noise data for assessment

Activity	Measurement Data			
	L _{Aeq,T}	Dist (m)	Time (s)	SEL (dB)
Car movement	58	3	15	70
A person talking	60	1	15	72

- 6.12. The information in Table 10 was used to calculate a source noise level based on the number of activity events over the assessment period.
- 6.13. A total of 23 car park spaces are proposed, including four dedicated for use by Blue Badge holders. An estimate of the typical number of movements to each space in a peak hour has been made and used to calculate the resultant external noise level at the receptors. As a robust assessment, it has been assumed that every parking space will be used by three vehicles in a nominal peak hour for the proposed retail store and used by one vehicle in a nominal peak hour for the existing public house.
- 6.14. The car park was divided into different zones as to better predict the noise from each zone to the receptor. The locations of these zones, and the noise predictions, are included in [Appendix F](#) and summarised in Table 11.

Table 11 Predicted car park sound levels at new dwellings

Source	Zones	L _{Aeq,1hr}
		External Noise Level, dB
Retail car park*	A, B, C and D	36
Public house car park*	E and F	33
Combined		38

**Nominal allocation*

- 6.15. It can be seen that the predicted worst-case sound level due to the use of the car park is significantly below the lowest existing daytime L_{Aeq 15min} value in Table 3, and will therefore have no appreciable influence on noise levels at the façades of the proposed dwellings.

Beer garden

- 6.16. In order to predict the noise levels from occupants of the existing beer garden, it is considered most appropriate to base an assessment of the typical volume of an adult speaking voice.

- 6.17. A person talking at a normal level of speech is around 65dB L_{Aeq} at 1m.¹³ A simple noise model can be constructed based on occupancy levels of the beer garden along with distance and screening effects.
- 6.18. The following assessment is based on a full beer garden of thirty occupants and assumes that half are talking at any one time (which would seem to be a robust assumption).
- 6.19. Predictions have been made at the nearest windows on the east and west elevations of the proposed dwellings, based on a notional distribution of people within the garden.
- 6.20. The following table details the results of the predictions, externally at the east and west façades. Full calculations are shown in [Appendix G](#).

Table 12 Predicted noise levels from beer garden

Receptor	Predicted external L_{Aeq} dB	Predicted external $L_{A_{fMax}}$ dB
West elevation	64	75
East elevation	59	73

- 6.21. It can be seen that predicted noise levels at the west elevation are likely to be similar to those due to existing environmental sound levels, though it must be appreciated that the character of the noise is likely to be different and more likely to result in an adverse noise effect on the occupants.
- 6.22. While sound levels at the east elevation are predicted to be lower, environmental noise levels will also be lower, due to the additional distance and screening between Brickhill Road and the rear of the houses.
- 6.23. It is therefore appropriate that a suitable level of noise mitigation is incorporated into the design of the new houses. This will be discussed in **Section 7.0** of this report.

7.0 Residential noise assessment

Initial risk assessment

- 7.1. At the west and south elevations, the incident noise levels are up to 62dB $L_{Aeq,16hr}$ during the daytime and up to 56dB $L_{Aeq,8hr}$ at night. The highest noise levels are therefore within the “Medium” range of noise levels in Figure 1 of the IoA ProPG document.

¹³ Kinsler, Frey, Coppens, Sanders, Fundamentals of Acoustics Third Edition, p275

7.2. 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 ADS¹⁴ 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 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.

Building fabric assessment

- 7.3. In order to assess the suitability of the site for the proposed development it is important to predict the internal noise levels within habitable rooms.
- 7.4. 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.).
- 7.5. The detailed calculation methodology described in BS 8233:2014 has been used in the assessment. To calculate the internal noise levels, and thereby determine the acoustic performance required for glazing, the rooms with the worst-case combination of room volume, window glazing, ventilators, and roof specifications have been assessed. The calculations are based on the room layouts shown on in [Appendix D](#).
- 7.6. The potential sources of commercial noise identified previously – deliveries to the proposed convenience store and the use of the pub garden – should be considered within the acoustic specification for the external building fabric. It is noted, however, that these sources will affect daytime noise levels only. It is therefore proposed to impose a more stringent limit on daytime intrusive noise than is set out in BS 8233, shown in Table 2; it is recommended that external building fabric is capable of controlling intrusive noise levels in the living rooms and bedrooms to 30dB L_{Aeq 16hr} or below during the daytime.
- 7.7. Based on the above, and the noise spectrum data shown in Table 6, the resulting internal sound levels may be calculated. The results of the assessment are shown in Table 15.
- 7.8. These predictions are based on the following glazing and ventilator specifications:

¹⁴ Acoustic Design Statement (i.e. this report)

Table 13 Glazing and ventilator types

Façade	Room type	Glazing	Ventilator
West	Living Room	Type B	Acoustic trickle ventilator
	Master Bedroom / Bedroom 4	Type B	Acoustic trickle ventilator
East	Kitchen/Diner	Type A	Non acoustic trickle ventilator
	Bedrooms 2 and 3	Type A	Non acoustic trickle ventilator

- 7.9. The minimum airborne sound insulation performance of each of these constructions is as set out in Table 14.

Table 14 Proposed building envelope specifications

Item		Attenuation (dB) at Octave Band Centre Frequency (Hz)							
		63	125	250	500	1000	2000	4000	8000
Type A Glazing [typically 4mm glass /16mm cavity /4 mm glass]	SRI	21	24	20	25	34	37	40	40
Type B Glazing [typically 10mm glass /16mm cavity /6 mm glass]	SRI	19	24	24	31	39	39	43	43
Non-Acoustic trickle ventilator	D _{ne}	30	32	32	31	33	31	31	31
Acoustic trickle ventilator	D _{ne}	30	27	30	35	34	46	40	40
Roof [Tiled/slatted roof, 12mm p/bd ceiling, 100mm m/w]			24	34	40	45	49		

- 7.10. Intrusive sound levels with the external building fabric constructions shown in Table 14 and shown in Table 15.

Table 15 Predicted internal noise levels (based on typical room sizes, windows closed)

Room Type	Reference	External noise levels, dB	Predicted internal noise levels, dB	Proposed criterion, dB	Difference, dB
Living Room	L _{Aeq} , daytime	60	29	30	-1
Kitchen Diner	L _{Aeq} , daytime	55	27	40	-13
Master Bedroom and Bedroom 4	L _{Aeq} , daytime	60	30	30	0
	L _{Aeq} , night-time	53	23	30	-7
	L _{Amax} , night-time	72	42	45	-3
Bedrooms 2 and 3	L _{Aeq} , daytime	55	27	30	-3
	L _{Aeq} , night-time	48	20	30	-10
	L _{Amax} , night-time	67	39	45	-6

- 7.11. It should be noted that glazing configurations and other constructions described above are for guidance and costings purposes only. It will be the responsibility of the manufacturer to provide evidence of compliance with the required octave band sound reduction performances.
- 7.12. The assessment shows that with typical building constructions and glazing and ventilators, internal noise levels will be below the guidance values in BS 8233:2014.
- 7.13. Where rooms are ventilated using an MVHR system or similar, for example to provide suitable internal air quality, intake and exhaust ducts must incorporate appropriate attenuation to control intrusive noise to meet the criteria in Table 2. Resulting intrusive sound levels would be lower than shown in Table 15.

Conclusion

- 7.14. The assessment has demonstrated that, taking into consideration the provision of reasonable practicable measures (i.e. the provision of good quality thermal double glazing and non-acoustic trickle ventilators, with acoustic ventilators where necessary) adverse effects of noise can be minimised for the development proposals.

8.0 Mitigation of overheating

- 8.1. 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).
- 8.2. 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.
- 8.3. From Approved Document O and the AVO guide the noise criteria in the ‘overheating’ condition are:
- 50dB L_{Aeq} 16 hr, 0700-2300hrs (BS 8233 and AVO guide) – applies to all habitable rooms;
 - 40dB L_{Aeq} 8hr, 2300-0700hrs (BS 8233 and Building Regulations Approved Document O) – applies to bedrooms only; and

- 55dB $L_{A_{fMax}}$, event sound level not exceeded more than 10 times between 2300 and 0700hrs (ProPG document, ANC/loA guidance and Approved Document O) – applies to bedrooms only

8.4. Additional guidance published by the ANC and loA¹⁵ sets out the method used for calculating the maximum permissible equivalent area of the ‘non acoustic’ apertures / ventilators used to mitigate overheating and determine the minimum sound insulation required (in terms of the $D_{ne,w} + C_{tr}$ laboratory test value) required from passive ventilation panels where an opened window or other aperture provides insufficient airflow; in those cases other means of cooling, such as boost ventilation or local cooling coils, may also be considered as part of the strategy for mitigation of overheating. The assessment above is for the normal condition with windows closed and ventilation provided by trickle ventilators. These are shown in Table 16.

Table 16 Overheating mitigation and acoustics

Elevation	Room	Day		Night	
		Maximum EA of aperture, % of floor area	Minimum $D_{ne,w} + C_{tr}$ of ventilator, dB	Maximum EA of aperture, % of floor area	Minimum $D_{ne,w} + C_{tr}$ of ventilator, dB
West	Living Room	4	4	n/a	n/a
West	Master Bedroom, Bedroom 4	4	9	1	16
East	Bedrooms 2 & 3	11	3	2	10

Note: The requirements stated are for the maximum size of an unattenuated aperture and are given to assist the overheating assessment. If this size aperture does not sufficiently mitigate the overheating risk an additional ventilator, sized to provide sufficient airflow to mitigate overheating, will be required, with the minimum acoustic performance shown.

8.5. Subject to the findings of an overheating assessment, it is likely that mitigation of night-time overheating by opened windows will be acceptable for the bedrooms on the east elevation, but additional measures such as trim cooling or acoustic louvres may be required to fully achieve Part O compliance for the bedrooms on the west elevation.

9.0 Discussion of results

9.1. Where possible uncertainty in the above assessments has been minimised by taking the following steps:

- The measurement of the background sound levels was taken over many days including a weekend.

¹⁵ Approved Document O Noise Guide, Version 1.1, November 2024

- The meter and calibrator used have a traceable laboratory calibration and was field calibrated before and after the measurements.
- Uncertainty in the calculated impacts has been reduced by the use of a well-established calculation method.
- Care was taken to ensure that the measurement positions were representative of the noise climate outside the nearby residential dwellings and not in positions where higher noise levels were present.

10.0 Summary

- 10.1. Noise Solutions Ltd (NSL) has been commissioned to undertake an assessment of the acoustic suitability of a site on the corner of Copthorne Bank and Brookhill Road for residential use.
- 10.2. This report presents the results of an environmental noise survey, the applicable policies and guidance, and a noise impact assessment to support a planning application.
- 10.3. The building fabric assessment has demonstrated that, taking into consideration the provision of reasonable practicable measures (i.e. the provision of good quality thermal double glazing and non-acoustic trickle ventilators, with acoustic ventilators where necessary) adverse effects of noise can be minimised for the development proposals, including consideration of likely noise from commercial sources.
- 10.4. Based on the findings of this assessment, noise should not be grounds for refusal of planning permission for the proposed development.

Appendix A Acoustic terminology

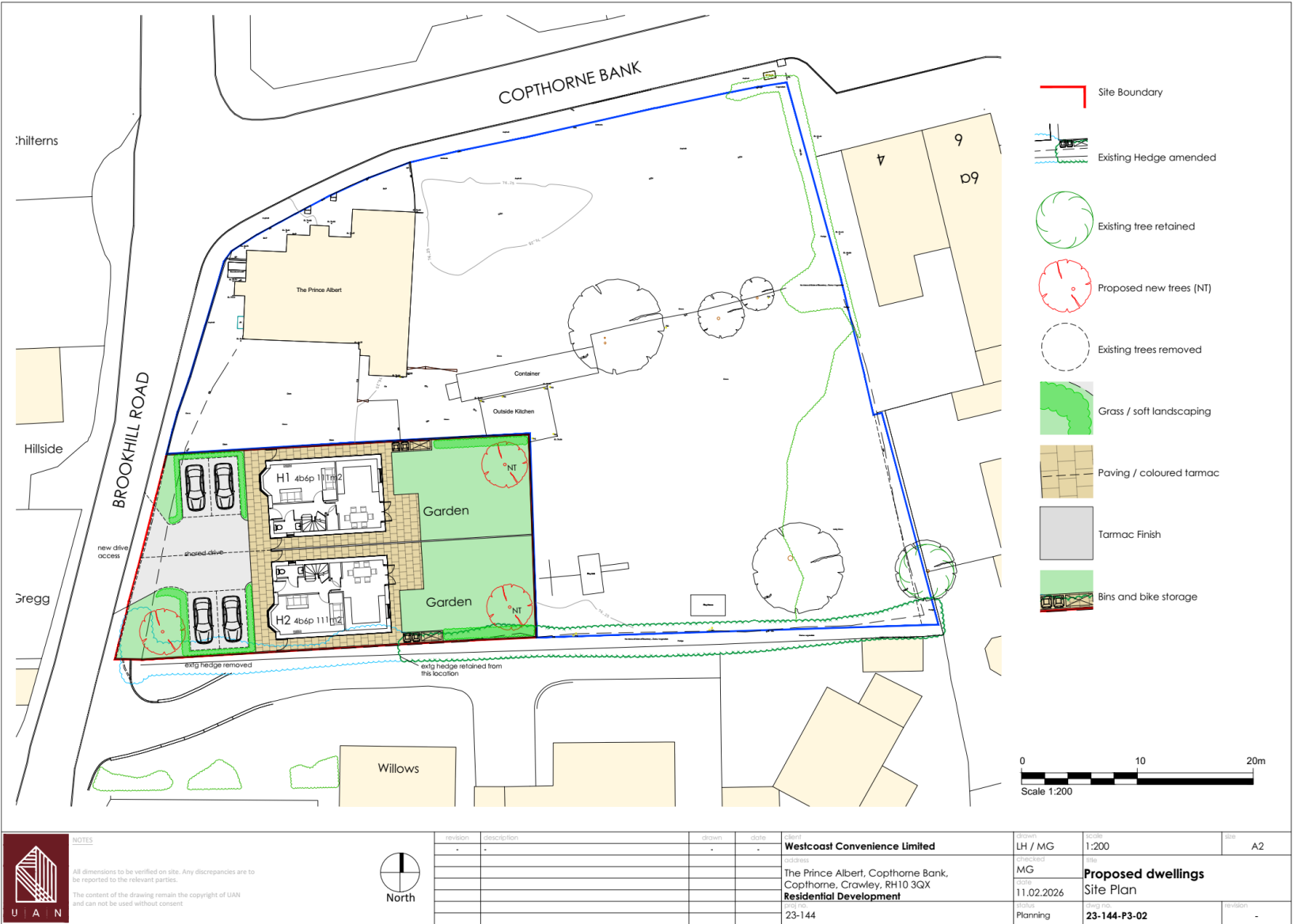
Parameter	Description
Ambient Noise Level	The totally encompassing sound in a given situation at a given time, usually composed of a sound from many sources both distant and near ($L_{Aeq,T}$).
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s_1 and s_2 is given by $20 \log_{10} (s_1/s_2)$. 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 $20\mu\text{Pa}$. The threshold of normal hearing is in the region of 0 dB and 140 dB is the threshold of pain. A change of 1 dB 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 3 dB(A) is the minimum perceptible under normal conditions, and a change of 10 dB(A) corresponds roughly to halving or doubling the loudness of a sound. The background noise in a living room may be about 30 dB(A); normal conversation about 60 dB(A) at 1 metre; heavy road traffic about 80 dB(A) at 10 metres; the level near a pneumatic drill about 100 dB(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.
$L_{10,T}$	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 Photograph and images of site showing areas of interest



Photograph 1 Courtesy of Google Earth

Site layout, showing areas of interest



Layout of proposed commercial site



Appendix C Environmental sound survey

Details of environmental sound surveys

- C.1 Measurements of the existing environmental sound levels were undertaken between 12.45 hours on Wednesday 23rd October and 16.45 hours on Monday 28th October 2024.
- C.2 The sound level meter was programmed to record the A-weighted L_{eq} , L_{90} , L_{10} and L_{max} noise indices for consecutive fifteen-minute sample periods for the duration of the survey.

Measurement position

- C.3 The representative measurement position was located on a lamppost on east side of Brookhill Road, representative of the nearest noise-sensitive property (location indicated on the site plan in [Appendix B](#)). In accordance with BS 7445-2:21991 '*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

- C.4 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 (+/-0.2 dB) in the calibration level was noted.

Description	Model / serial no.	Calibration date	Calibration certificate no.
Class 1 Sound level meter	Svantek 971A / 124660	01/06/2023	1505421-1
Condenser microphone	ACO Pacific 7052E / 81197		
Preamplifier	Svantek SV18A / 130661		
Calibrator	Svantek SV33B / 125546	04/06/2024	1508883-1

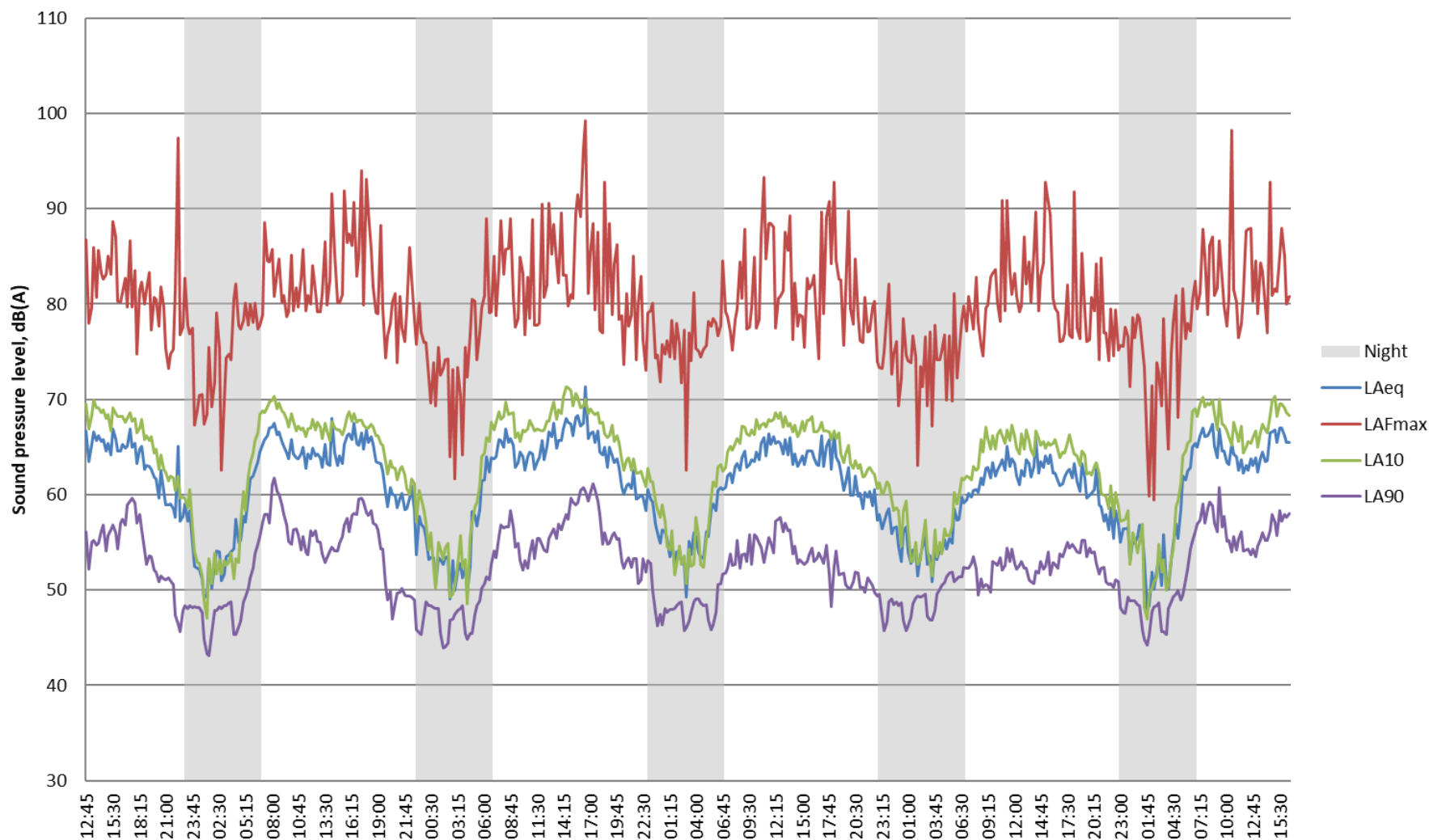
- C.5 Weather conditions were determined both at the start and on completion of the survey. It is considered that the meteorological conditions were appropriate for environmental noise measurements. The table below presents the weather conditions recorded on site at the installation and removal of the meter.

Weather Conditions				
Measurement Location	Time/Date	Description	Beginning of Survey	End of Survey
As indicated on Appendix B	12.45 23 Oct - 16.45 28 Oct 2024	Temperature (°C)	14	14
Cloud Cover Symbol Scale in oktas (eighths)  0 Sky completely clear  1  2  3  4 Sky half cloudy  5  6  7  8 Sky completely cloudy  (9) Sky obstructed from view		Precipitation:	No	Yes
		Cloud cover (oktas – see guide)	7	8
		Presence of fog/snow/ice	No	No
		Presence of damp roads/wet ground	Yes	Yes
		Wind Speed (m/s)	0.2	1.5
		Wind Direction	S	S
		Conditions that may cause temperature inversion (i.e. calm nights with no cloud)	-	-

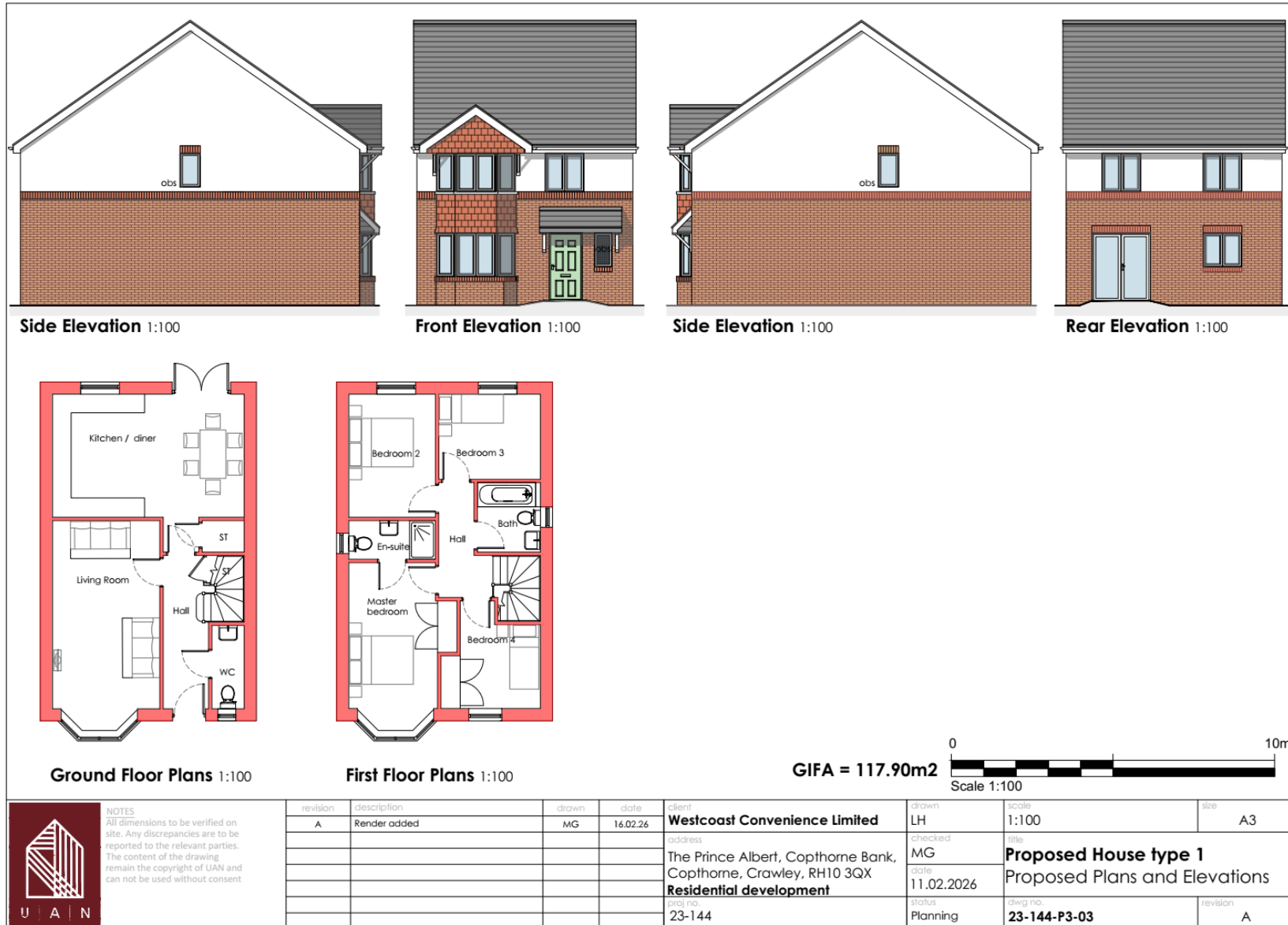
Results

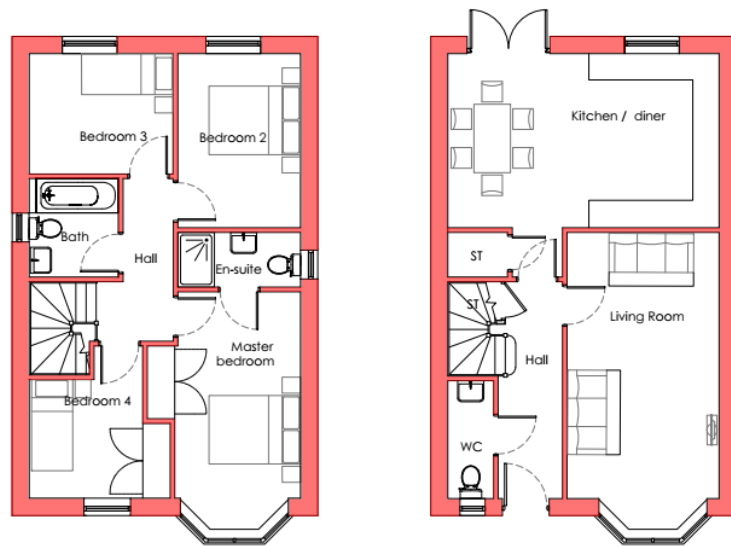
- C.6 The results of the survey are considered to be representative of the background sound pressure levels at the façades of the proposed houses. During installation and removal of the meter, the noise climate at the measurement position was dominated by local, with occasional lower levels of noise from plant and aircraft.
- C.7 The results of the survey are presented in a time history graph overleaf.

Land at the Prince Albert, Copthorne Bank Wednesday 23 - Monday 28 Oct 2024



Appendix D Proposed plans and elevations





GIFA = 117.90m²

0 5 10m
Scale 1:100

 NOTES All dimensions to be verified on site. Any discrepancies are to be reported to the relevant parties. The content of the drawing remain the copyright of UAN and can not be used without consent	revision	description	drawn	date	client	drawn	scale	size
	A	Render added	MG	16.02.26	Westcoast Convenience Limited	LH	1:100	A3
					address	checked	title	
					The Prince Albert, Copthorne Bank, Copthorne, Crawley, RH10 3QX	MG	Proposed House type 2	
					Residential Development	11.02.2026	Proposed Plans and Elevations	
					proj no.	status	dwg no.	revision
					23-144	Planning	23-144-P3-04	A

Appendix E Delivery Noise Predictions

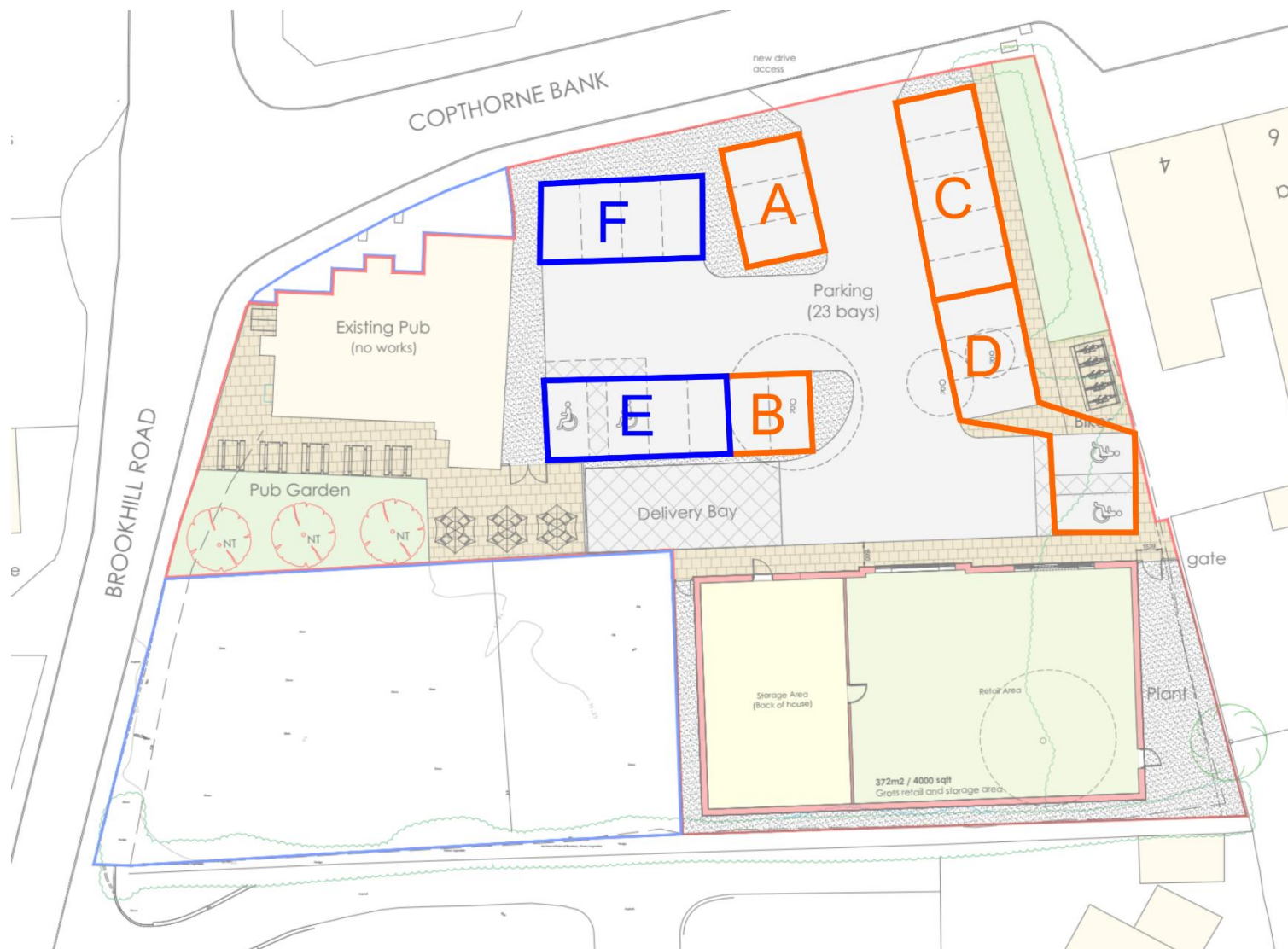
Activity	Measured noise levels		Correction for no. of occurrences		Distance correction		Screening correction (dB)	Resultant SEL at receptor (dB)	Resultant L _{Amax} at receptor (dB)	BS4142 feature corr'n	SEL + feature
	SEL @ 10m	L _{Amax} @ 10m	No.	Corr'n (dB)	Distance (m)	Corr'n (dB)					
Lorry arrival	68	62	1	0	11	-1	0	67	61	0	67
Lorry manoeuvring-first movement (no reversing alarms)	75	66	1	0	11	-1	0	74	65	3*	77
Unloading cages on to lift	71	74	10	10	19	-6	0	75	68	6**	81
Unloading pallets on to lift	75	73	10	10	19	-6	0	79	67	6**	85
Lift up	73	65	10	10	19	-6	0	77	59	3*	80
Lift down	71	71	10	10	19	-6	0	75	65	3*	78
Unloading cages into BoH	78	75	10	10	19	-6	0	82	69	6**	88
Lorry departure	75	68	1	0	11	-1	0	74	67	0	74
Combined								86			91
Overall feature correction											+5
L_{Aeq} (1hour)								50			
Range of L_{Amax}									59-69		

*+3dB correction for intermittency

**+6dB for impulsivity clearly perceptible

Appendix F Car park Noise Predictions

Car park assessment zones (notional)



Activity	Measurement Data				Normalised at 10m	No. Events / Hour	L _{Aeq} , 1hr @ 10m	Receptor dist. m	Distance corr'n, dB	Screening corr'n, dB	Resultant at R1, dB(A)
	L _{Aeq,T}	Dist. (m)	Time (s)	SEL	SEL, 10m						
ZONE A (Spaces 1-3)											
Car Pass by	58	3	15	70	60	18*	37	30	-10	0	27
People talking	60	1	15	72	52	18*	29	28	-9	0	20
ZONE B (Spaces 4-5)											
Car Pass by	58	3	15	70	60	12	35	20	-6	0	29
People talking	60	1	15	72	52	12	27	20	-6	0	21
ZONE C (Spaces 6-10)											
Car Pass by	58	3	15	70	60	30	39	32	-10	0	29
People talking	60	1	15	72	52	30	31	28	-9	0	22
ZONE D (Spaces 11-15)											
Car Pass by	58	3	15	70	60	30	39	28	-9	0	30
People talking	60	1	15	72	52	30	31	28	-9	0	22
Total											36

*3no. Spaces, each used 3 times, with each car entering and exiting the car park. 3x3x2=18 movements.

Activity	Measurement Data				Normalised at 10m	No. Events / Hour	L _{Aeq} , 1hr @ 10m	Receptor dist. m	Distance corr'n, dB	Screening corr'n, dB	Resultant at R1, dB(A)
	L _{Aeq,T}	Dist. (m)	Time (s)	SEL	SEL, 10m						
ZONE E (Spaces 16-19)											
Car Pass by	58	3	15	70	60	8*	33	12	-2	0	31
People talking	60	1	15	72	52	8*	25	12	-2	0	23
ZONE F (Spaces 20-23)											
Car Pass by	58	3	15	70	60	8	33	19	-6	0	27
People talking	60	1	15	72	52	8	25	19	-6	0	19
Total											33

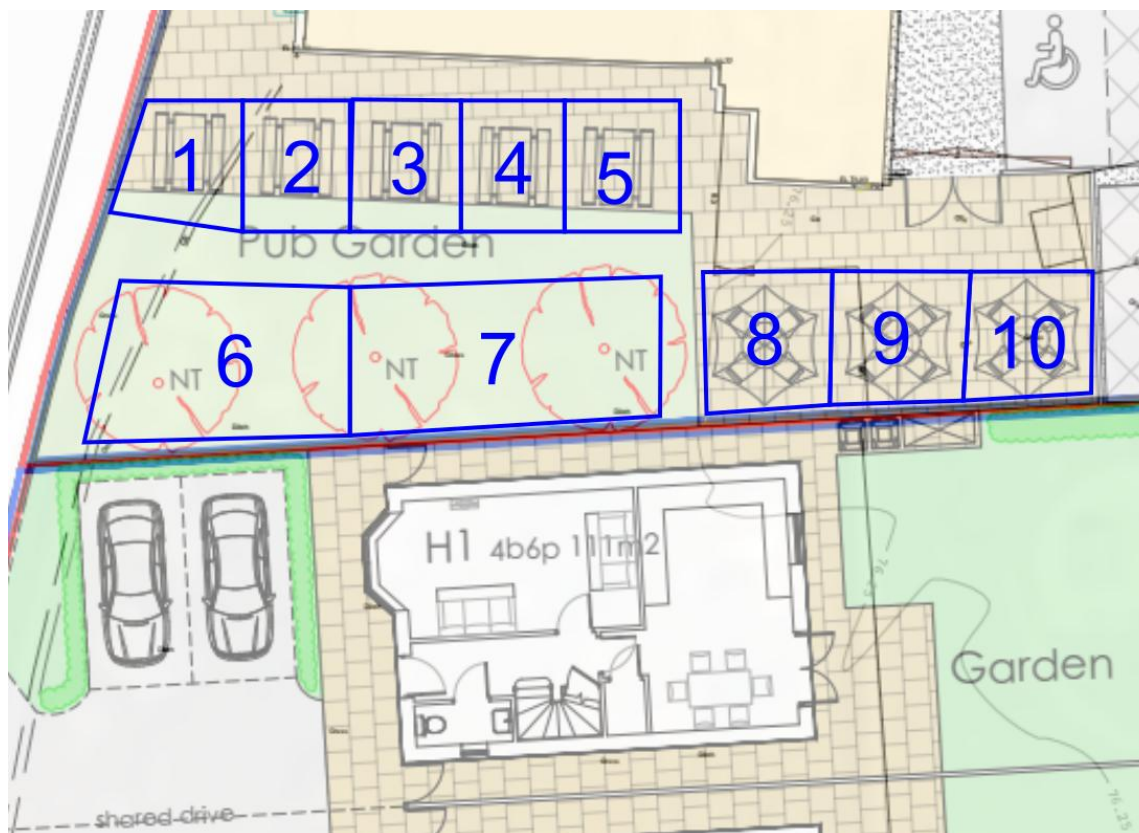
**4no. Spaces, each used once in an hour, with each car entering and exiting the car park. 4x1x2=8 movements.*

Appendix G Public house beer garden activity noise impact assessment

Reference data

Source	L _{Aeq} at 1m, dB(A)
Typical speaking voice	65
Shouting/laughing	80-85

Garden zones (notional)



Prediction at west facade

Zone	Reference $L_{Aeq,T}$, dB at 1m	Distance to receptor, m	Distance correction, dB	Screening loss, dB	Number of people talking	Correction, dB	L_{Aeq} at receptor, dB	Reference $L_{A_{fMax}}$, dB at 1m	Distance and screening corr'ns, dB	$L_{A_{fMax}}$ at receptor, dB
1	65	9	-19	0	3	5	51	85	-19	66
2	65	8	-18	0	3	5	52	85	-18	67
3	65	8	-18	0	3	5	52	85	-18	67
4	65	9	-19	0	3	5	51	85	-19	66
5	65	10	-20	-5	3	5	45	85	-25	60
6	65	3	-10	0	3	5	60	85	-10	75
7	65	3	-10	0	3	5	60	85	-10	75
8	65	10	-20	-10	2	3	38	85	-30	55
9	65	12	-22	-15	2	3	31	85	-37	48
10	65	16	-24	-15	2	3	29	85	-39	46
$L_{Aeq,T}$ at receptor							64	Highest $L_{A_{f,max}}$		75

Prediction at east facade

Zone	Reference $L_{Aeq,T}$, dB at 1m	Distance to receptor, m	Distance correction, dB	Screening loss, dB	Number of people talking	Correction, dB	L_{Aeq} at receptor, dB	Reference $L_{A_{fMax}}$, dB at 1m	Distance and screening corr'ns, dB	$L_{A_{fMax}}$ at receptor, dB
1	65	16	-24	-15	3	5	31	85	-19	47
2	65	14	-23	-15	3	5	32	85	-18	48
3	65	12	-22	-15	3	5	33	85	-18	55
4	65	10	-20	-10	3	5	40	85	-19	56
5	65	9	-19	-10	3	5	41	85	-25	48
6	65	12	-22	-15	3	5	33	85	-10	54
7	65	6	-16	-15	3	5	39	85	-10	68
8	65	4	-12	-5	2	3	51	85	-30	73
9	65	4	-12	0	2	3	56	85	-37	69
10	65	6	-16	0	2	3	52	85	-39	47
$L_{Aeq,T}$ at receptor							59	Highest $L_{A_{f,max}}$		73