

Land to the West of Home Farm, Plot SGR1, Bicester

Noise Impact Assessment

On behalf of **SGR (Bicester 1) Limited**

Project Ref: 41436/2007 | Rev: 01 | Date: February 2018



Document Control Sheet

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For and on behalf of Peter Brett Associates LLP				

Revision	Date	Description	Prepared	Reviewed	Approved
1	15/03/18	Revised to following Client comments	JLJ	MB	ER

This report has been prepared by Peter Brett Associates LLP ('PBA') on behalf of its client to whom this report is addressed ('Client') in connection with the project described in this report and takes into account the Client's particular instructions and requirements. This report was prepared in accordance with the professional services appointment under which PBA was appointed by its Client. This report is not intended for and should not be relied on by any third party (i.e. parties other than the Client). PBA accepts no duty or responsibility (including in negligence) to any party other than the Client and disclaims all liability of any nature whatsoever to any such party in respect of this report.

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1 Introduction

1.1 Background

- 1.1.1 Peter Brett Associates LLP (PBA) has been appointed by SGR (Bicester 1) Limited (the Applicant) to undertake a noise impact assessment to support an outline planning application for a proposed residential development for up to 75 units (the Proposed Development). The application site, known as 'Land to the West of Home Farm, Bicester' (hereafter the Site), is adjacent to the Elmsbrook Exemplar site on the North West Bicester eco town development.

1.2 Scope of Assessment

- 1.2.1 The purpose of this report is to describe the existing noise climate at the proposed development site in order to determine its suitability for residential development, having regard to local planning policy and national and international guidance documents relating to environmental noise.

1.3 Site Location

- 1.3.1 The Site is located to the west of Home Farm in Bicester. It is approximately 5.03 hectares in size and is bounded by the B4100 Banbury Road to the north-east, Home Farm to the south-east and by the Exemplar development site (ref: 10/01780/hybrid) to the north-west and south-west, which forms part of the wider North West Bicester eco town development. The extent of the red line application boundary is shown on the plan presented in **Figure 1**.

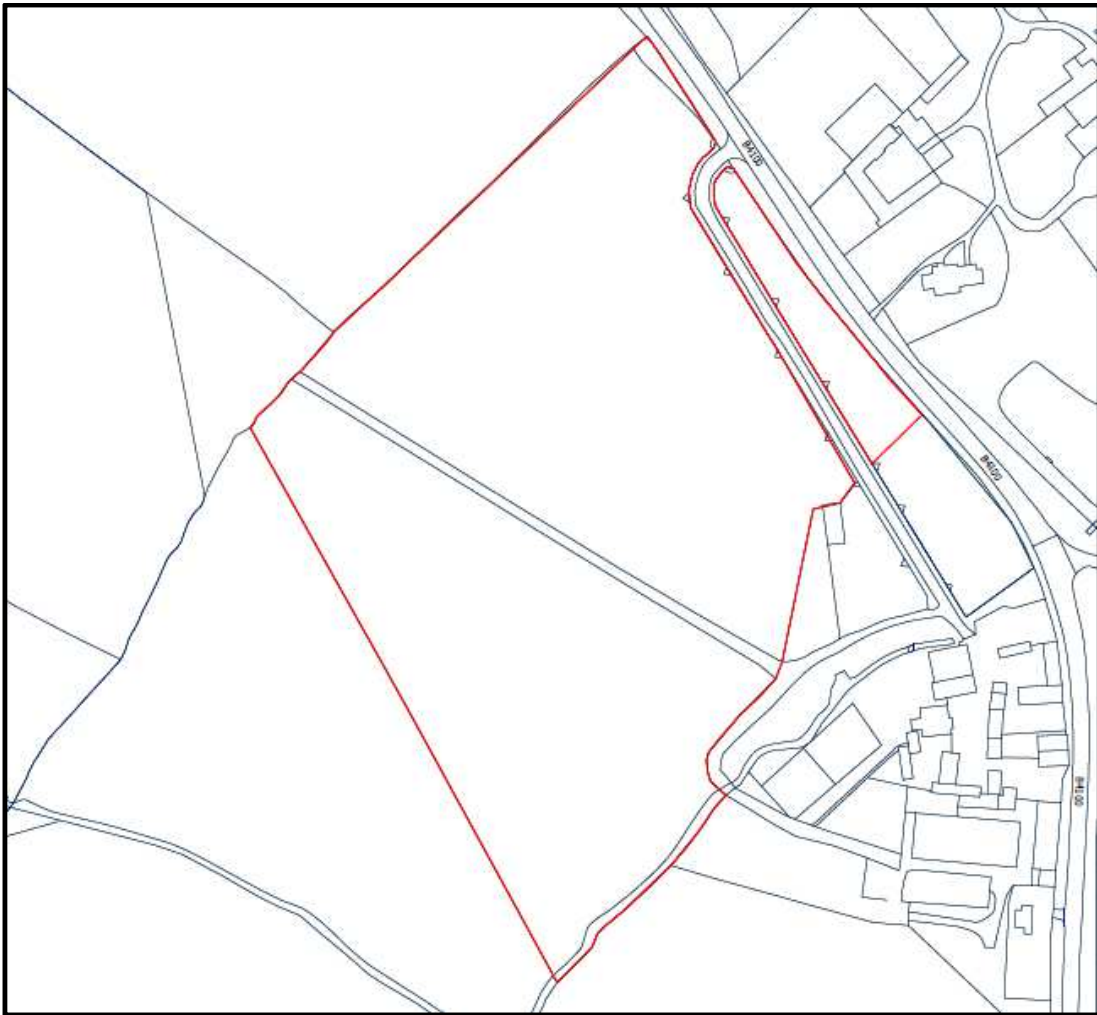


Figure 1: Site Location Plan

1.4 Proposed Development

- 1.4.1 The development proposals for the Site are for up to 75 residential units with a single point of vehicular access provided along Cranberry Avenue. New pedestrian and cycle routes will also be provided across the Site as part of the development, which will enable sustainable access to the adjacent Exemplar development site.

1.5 Acoustics Terminology

- 1.5.1 This report is technical in nature. An explanation of the acoustic terminology used is presented as a glossary in **Appendix A**.

2 Legislation, Planning, Guidance & Criteria

2.1 Local Policy

2.1.1 The Cherwell Local Plan 2011 – 2031 was re-adopted following a Court Order and an associated addendum to the Local Plan Inspector's Report.

2.1.2 Policy ESD 15: The Character of the Built and Historic Environment states:

"New proposals should:

[...] Consider the amenity of both existing and future development, including matters of privacy, outlook, natural lighting, ventilation, and indoor and outdoor space. [...]"

2.2 National Policy

2.2.1 Notwithstanding the requirements of the Local Planning framework there are several national policy requirements that any development should also have due regard to.

The National Planning Policy Framework (NPPF)

2.2.2 The NPPF was published in March 2012. In respect of noise, the document states that:

"The planning system should contribute to and enhance the natural and local environment by ... preventing both new and existing development from contributing to or being put at unacceptable risk from or being adversely affected by unacceptable levels of ... noise pollution."

2.2.3 The NPPF goes on to advise that:

"Planning policies and decisions should aim to:

- *Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;*
- *Mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;*
- *Recognise that development will often create some noise and existing business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and*
- *Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason."*

2.2.4 The NPPF indicates that the Noise Policy Statement for England (NPSE) should be used to define the "significant adverse impacts".

Noise Policy Statement for England (NPSE)

2.2.5 The Noise Policy Statement for England was published in March 2010. The document seeks to clarify the underlying principles and aims outlined in existing policy documents, legislation and guidance that relate to noise. It also sets out the long-term vision of Government noise policy:

"To promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development."

- 2.2.6 The NPSE clarifies that noise should not be considered in isolation of the wider benefits of a scheme or development, and that the intention is to minimise noise and noise effects as far as is reasonably practicable having regard to the underlying principles of sustainable development.
- 2.2.7 The first two aims of the NPSE follow established concepts from toxicology that are applied to noise impacts, for example, by the World Health Organisation. They are:
- NOEL – No Observed Effect Level - the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise; and
 - LOAEL – Lowest Observed Adverse Effect Level - the level above which adverse effects on health and quality of life can be detected.
- 2.2.8 The NPSE extends these to the concept of a significant observed adverse effect level.
- SOAEL – Significant Observed Adverse Effect Level - The level above which significant adverse effects on health and quality of life occur.
- 2.2.9 The NPSE notes *"It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times"*.

Planning Practice Guidance - Noise (2014)

- 2.2.10 Government's Planning Practice Guidance on noise (PPG) provides guidance on the effects of noise exposure, relating these to people's perception of noise, and linking them to the NOEL and, as exposure increases, the LOAEL and SOAEL.
- 2.2.11 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.
- 2.2.12 The LOAEL is described in PPG as the level above which *"noise starts to cause small changes in behaviour and/or attitude, 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 perceived change in the quality of life."*
- 2.2.13 PPG identifies the SOAEL as the level above which *"noise causes a material change in behaviour and/or attitude, 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."*
- 2.2.14 PPG also states that the impact of noise on residential development may be partially off-set if residents of those dwellings have access to:
- a relatively quiet facade (containing windows to habitable rooms) as part of their dwelling, and/or;
 - a relatively quiet external amenity space for their sole use, (eg a garden or balcony). Although the existence of a garden or balcony is generally desirable, the intended benefits will be reduced with increasing noise exposure and could be such that significant adverse effects occur, and/or;

- a relatively quiet, protected, nearby external amenity space for sole use by a limited group of residents as part of the amenity of their dwellings, and/or;
- a relatively quiet, protected, external publically accessible amenity space (eg a public park or a local green space designated because of its tranquility) that is nearby (eg within a 5 minutes walking distance).

2.3 Guidance

British Standard 8233: 2014 ‘Guidance on Sound Insulation and noise reduction for buildings’

- 2.3.1 BS 8233, in relation to this planning application, sets out desirable guideline values in habitable rooms, such as living rooms and bedrooms.
- 2.3.2 The guideline values relate to steady external noise without a specific character, previously termed ‘anonymous noise’. According to the standard, noise has a specific character if it contains features such as a distinguishable, discrete and continuous tone, is irregular enough to attract attention, or has strong low-frequency content, in which case lower noise limits might be appropriate. Examples of noise with a character may include tonal/intermittent plant noise emissions, music playback, and workshop noise. Examples of external steady noise sources may include environmental noise sources such as busy road traffic.
- 2.3.3 The desirable internal ambient noise levels for dwellings are presented in **Table 2.1**.

Table 2.1: BS 8233 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 LAeq,16h	-
Dining	Dining room/area	40 dB LAeq,16h	-
Sleeping (daytime resting)	Bedroom	35 dB LAeq,16h	30 dB LAeq,8h
*Note 4 Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or L _{Amax,f} , depending on the character and number of events per night. Sporadic noise events could require separate values.			
Note 5 If relying on closed windows to meet the guide values, there needs to be an appropriate alternative source of ventilation that does not compromise the façade insulation or the resulting noise levels.			
Note 7 Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5dB and reasonable internal conditions still achieved.			

*A selection of the available notes

- 2.3.4 The standard also provides advice in relation to desirable levels 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.

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

Small balconies may be included for uses such as drying washing or growing pot plants, and noise limits should not be necessary for these uses. However, the general guidance on noise in amenity space is still appropriate for larger balconies, roof gardens and terraces, which might be intended to be used for relaxation.

In high-noise areas, consideration should be given to protecting these areas by screening or building design to achieve the lowest practicable levels. Achieving levels of 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.”

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

2.3.5 The World Health Organisation (WHO) *Guidelines for Community Noise* (1999) also sets out guidance on suitable internal and external noise levels in and around residential properties. The following internal noise levels are recommended by the WHO:

- 35 dB $L_{Aeq,T}$ in living rooms over a 16 hour day; and
- 30 dB $L_{Aeq,T}$ in bedrooms during the 8 hour night.

2.3.6 With respect to the night-time maximum noise levels, the WHO guidelines state:

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

2.4 Proposed Assessment Criteria

2.4.1 Based on the aforementioned standards and guidelines, the following assessment criteria are proposed as detailed in **Table 2.2**.

Table 2.2: Proposed LOAEL and SOAEL Noise Levels

Level	Internal Ambient Noise Levels		External Noise Levels in Amenity Areas
	Daytime (07:00 to 23:00 hours)	Night-time (23:00 to 07:00 hours)	Daytime (07:00 to 23:00 hours)
LOAEL	35 $L_{Aeq,16h}$ (dB)	30 $L_{Aeq,8h}$ (dB) 45 dB L_{Amax} 10-15 times per night	55 $L_{Aeq,16h}$ (dB)
SOAEL	50 $L_{Aeq,16h}$ (dB)	45 $L_{Aeq,8h}$ (dB)	70 $L_{Aeq,16h}$ (dB)

3 Environmental Sound Survey

3.1 Methodology

- 3.1.1 A fully automated environmental sound survey was undertaken over a period of 24-hours from approximately 12:00 hours on Wednesday 24th January 2018 to approximately 12:00 hours on Thursday 25th January 2018 in order to determine the current sound climate at the site.
- 3.1.2 Sound measurements were undertaken at two positions, selected to represent typical sound levels representative of the proposed development as indicated in **Figure 2** and summarised in **Table 3.1**.

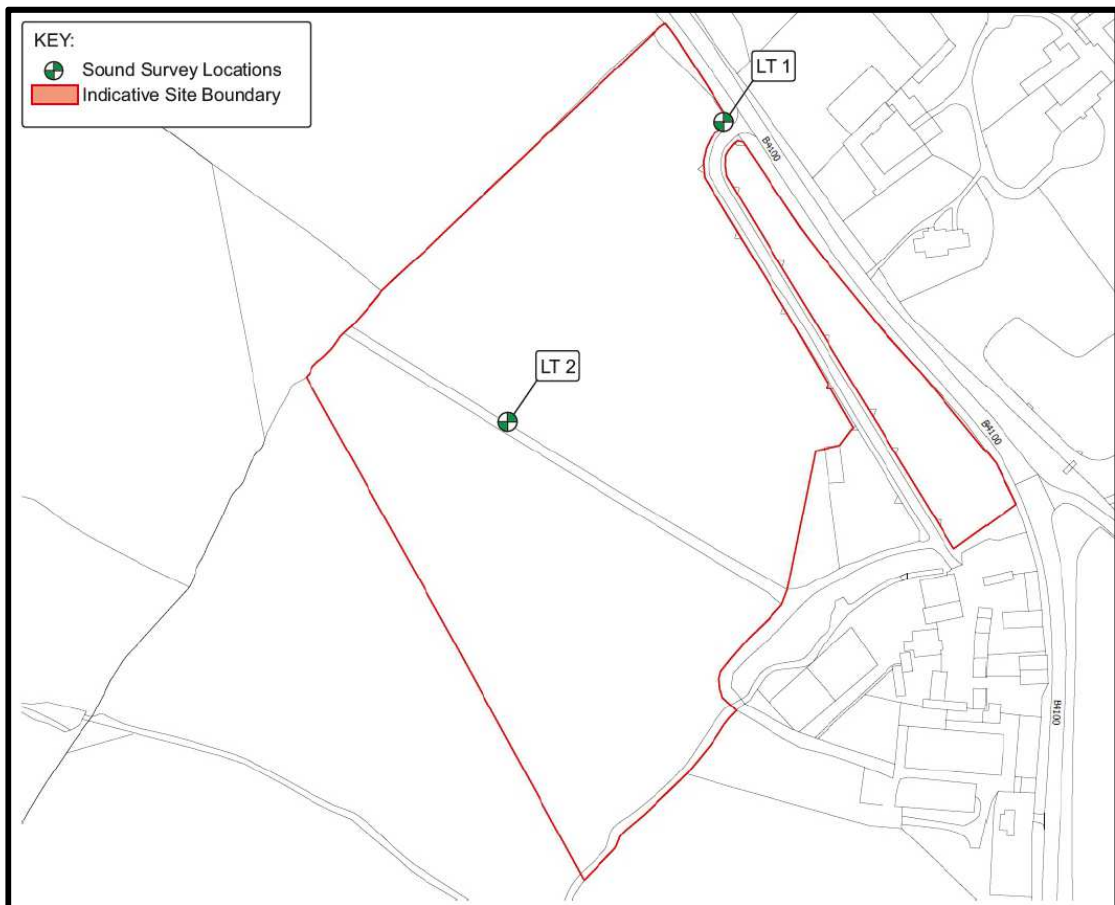


Figure 2: Approximate Environmental Sound Survey Positions

Table 3.1: Measurement Positions

Position	Description
LT1	The microphone was located on the eastern boundary of the Site, approximately 10 m from the B4100 in a free field position. The microphone was located at a height of approximately 1.5 m.
LT2	The microphone was located in the central area of the site approximately 150 m to the west of the B4100 in a free field position. The microphone was located at a height of approximately 1.5 m.

3.1.3 Due to the nature of the survey (i.e. unattended), it is not possible to accurately comment on the weather conditions throughout the entire survey period. However, at the beginning of the survey period, the temperature was cool (approx. 8 °C) with a light breeze (< 5 ms⁻¹) and approximately 100 % cloud cover. At the end of the survey period, the temperature was cool (approx. 8 °C) with a light breeze (< 5 ms⁻¹) with approx. 50 % cloud cover. It is understood that there was no rain during the survey period. These conditions are therefore considered suitable for obtaining representative measurements.

3.1.4 The A-weighted $L_{eq,T}$, $L_{90,T}$ and L_{FMax} were measured over full 15-minute periods.

3.2 Instrumentation

3.2.1 The instrumentation used in the survey is listed in **Table 3.2**. Field calibrations were performed before and after the measurements with no significant fluctuation recorded (<0.5 dB). Calibration certificates are available upon request.

Table 3.2: Instrumentation

Description	Manufacturer	Type	Serial Number	Laboratory Calibration Date
Sound Level Meter	Rion	NL-52	542901	30/08/2016
Pre-amplifier		UC-59	06478	
½" Pre-polarised microphone		NH25	42929	
Calibrator		NC-74	34746691	17/07/2017
Sound Level Meter		NL-52	542902	05/01/2018
½" Pre-polarised microphone		UC-59	07374	
Pre-amplifier		NH25	43580	

3.3 Environmental Sound Climate

3.3.1 The dominant noise source at the survey positions was noted to be vehicular movements on the surrounding road network, particularly the B4100.

3.4 Assumptions/Limitations

3.4.1 The site engineer noticed nothing unusual in terms of the noise climate at the time of the survey. This report refers, within the limitations stated, to the environment of the site in the context of the surrounding area at the time of the inspections. Environmental conditions can vary and no warranty is given as to the possibility of changes in the environment of the site and surrounding area at differing times.

3.5 Environmental Sound Survey Results

3.5.1 The results of the sound survey have been plotted on Time History Graphs enclosed in **Appendix B**, presenting the 15-minute A-weighted (dB) L_{eq} , L_{90} and L_{max} levels at the measurement positions throughout the duration of the survey. A summary of the survey results is presented in **Table 3.3**.

Table 3.3: Summary of Measured and Calculated Environmental Sound Survey Results

Position	Date	Measured Sound Level (dB)		
		Daytime (07:00 – 23:00 hours)	Night-time (23:00 – 07:00 hours)	
		$L_{Aeq,16hr}$	$L_{Aeq,8hr}$	L_{AFmax}^*
LT1	24/01/2018 – 25/01/2018	71	64	83
LT2		53	47	56

* L_{AFmax} based on the 10-15th highest L_{Fmax} levels measured during the survey period

3.6 Acoustic Model

3.6.1 An acoustic model has been prepared to complement the baseline surveys. The acoustic model has been used to determine likely sound levels across the development site.

3.6.2 The site topography and existing buildings have been included within the model, with the baseline survey data used to calibrate the model.

3.6.3 It is understood that Charlotte Avenue will run through the site as indicated on the proposed plan in **Appendix C**. The acoustic model includes noise associated with the predicted vehicular movements on this road based on information provided by the transport consultants.

4 Residential Noise Impact Assessment

4.1 Calculated Incident Sound Levels

- 4.1.1 Based on the results of the acoustic model and the proposed parameter plan (Land Use, Drawing Number RPC001/011 Revision C dated 07 February 2018), **Table 4.1** details the calculated incident sound levels at locations representative of the proposed dwellings.

Table 4.1: Calculated Incident Sound Levels

Dwelling Facade	Period	L _{Aeq,T} dB	Typical* L _{AFMax} dB
Proposed dwellings	Daytime (07:00 – 23:00 hours)	55	-
	Night-time (23:00 – 07:00 hours)	49	60

* Based on 10th highest measured L_{Amax} level.

4.2 Internal Ambient Noise Levels

- 4.2.1 The calculated incident sound levels have been used to determine the likely internal sound levels due to external noise ingress in notional dwellings across the site.
- 4.2.2 Exact construction proposals are yet to be determined, however a preliminary assessment has been undertaken based on typical construction details.
- 4.2.3 **Table 4.2** details the approximate reductions that could typically be expected from the assumed building fabric constructions.

Table 4.2: Typical Sound Reductions of Various Building Fabric Constructions

Construction	Typical Attenuation (dB)
Conventional double glazing (4 / 16 / 4)	30
Hit and miss trickle ventilator (8000 mm ²)	30
Brick/block cavity wall	50
Tiles on timber joists with plasterboard ceilings and thermal insulation	40-45

- 4.2.4 Based on the environmental sound survey data and the typical attenuation afforded by the construction details as above, the internal noise levels within notional dwellings across the site are likely to fall below the proposed LOAEL. These levels indicated that the Site is considered likely to be suitable for residential development, without any specific acoustic mitigation measures being required, assuming typical building fabric constructions.
- 4.2.5 A detailed assessment should be undertaken during the detailed design stage to ascertain the exact acoustic specification requirements for the various elements of the external building fabric. The final design proposals during the detailed stage may differ from the suggested constructions identified in **Table 4.2**.

4.3 Noise Levels in External Amenity Areas

- 4.3.1 The exact locations of external amenity areas are unknown; however, they are likely to be spread across the residential areas of the site as presented in **Appendix C**.
- 4.3.2 **Figure 3** details the noise levels across the site with reference to the proposed LOAEL and SOAEL levels.

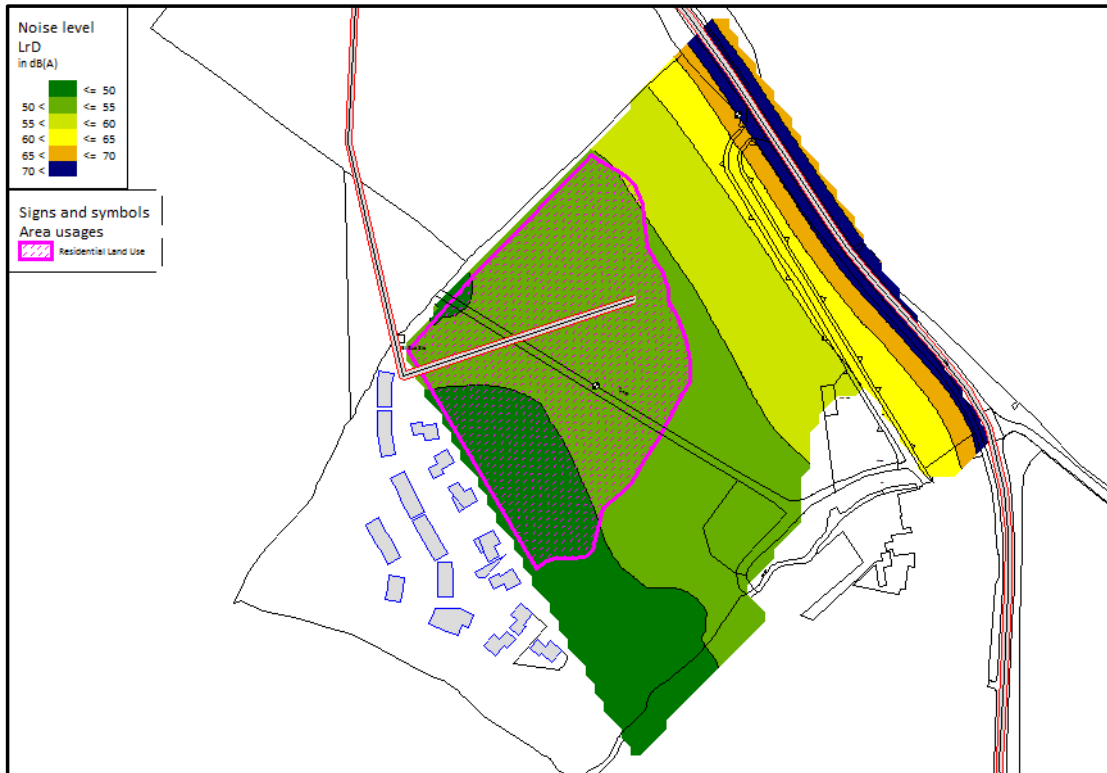


Figure 3: Calculated External Noise levels in External Amenity Areas

- 4.3.3 Calculations indicate that noise levels in external amenity areas across the site are likely to fall below the proposed LOAEL, and therefore no specific acoustic mitigation measures are deemed necessary.

5 Conclusion

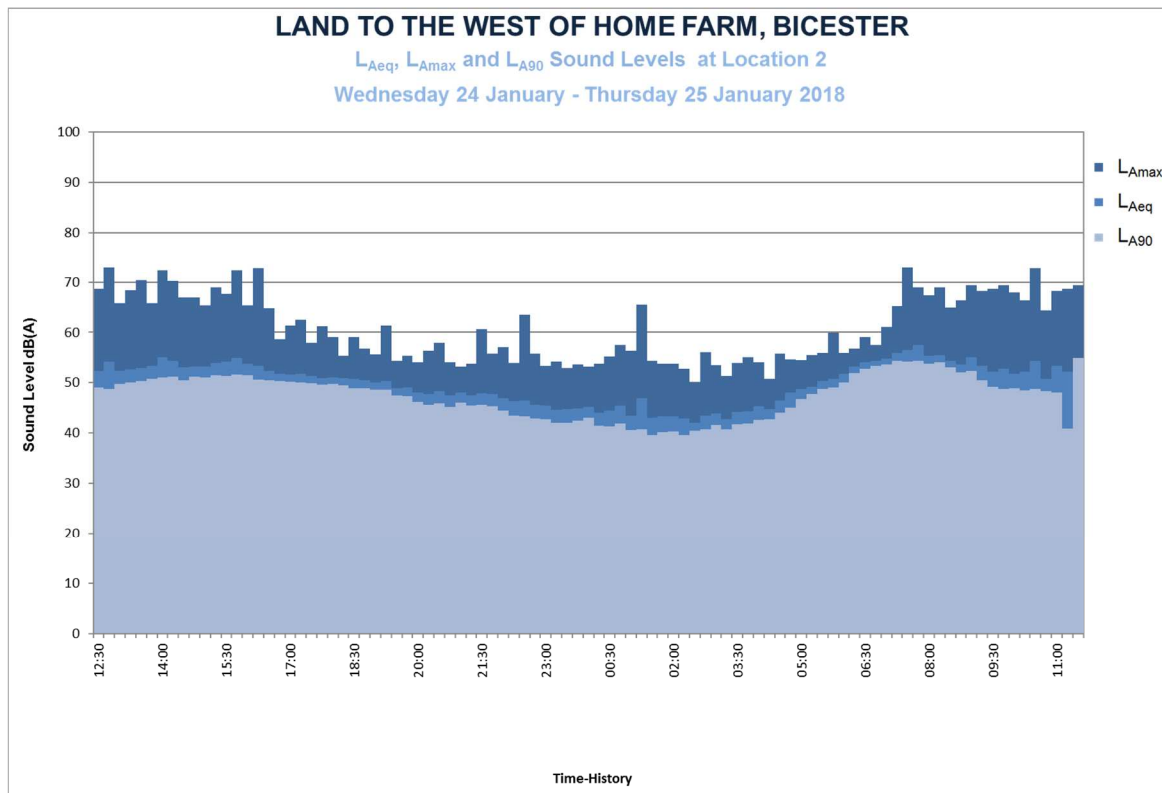
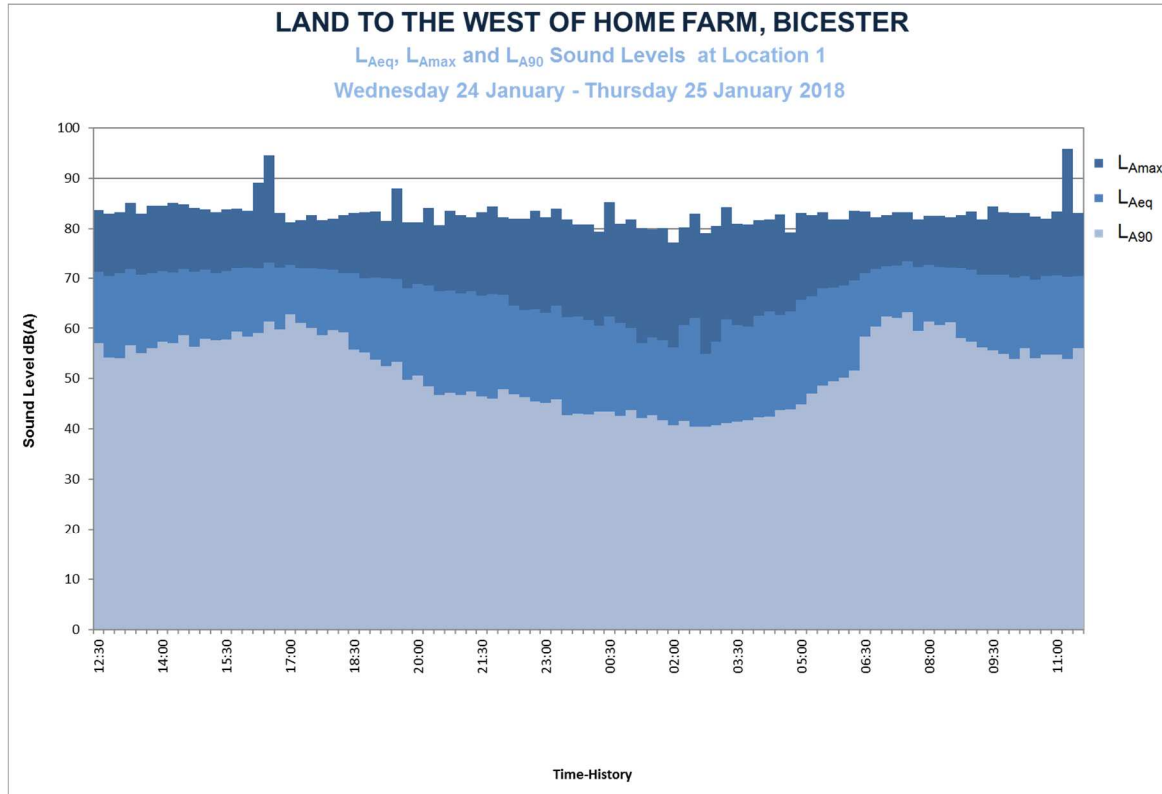
- 5.1.1 Peter Brett Associates LLP (PBA) has been appointed by Resolution Property to undertake a noise impact assessment to support an outline planning application for a proposed residential development for up to 75 units.
- 5.1.2 The application site, known as 'Land to the West of Home Farm, Bicester', is adjacent to the Elmsbrook Exemplar site on the North West Bicester eco town development.
- 5.1.3 A fully automated environmental sound survey was undertaken over a period of 24-hours from approximately 12:00 hours on Wednesday 24th January 2018 to approximately 12:00 hours on Thursday 25th January 2018 in order to determine the current sound climate at the site.
- 5.1.4 An acoustic model of the Site and the surrounding area has been prepared using computer software SoundPLAN version 8. The results of the environmental sound survey have been used to calibrate the acoustic model.
- 5.1.5 Based on the results of the noise survey and the assumed building fabric constructions, the proposed LOAELs for internal noise levels are likely to be met during both daytime and night-time periods and will meet the criteria set out in the relevant guidance.
- 5.1.6 It should be noted that a detailed assessment should be undertaken during the detailed design stage in order to ascertain the exact acoustic specification requirements for the various elements of the external building fabric.
- 5.1.7 Calculations indicate that noise levels for private amenity areas are likely to fall below the proposed LOAEL.
- 5.1.8 From a noise perspective, the Site should therefore be considered be suitable for residential 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 ($L_{Aeq,T}$).
Daytime	The period 07:00-23:00 hours.
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), LAx	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.
$L_{90,T}$ or Background Noise Level	A noise level index. The noise level exceeded for 90% of the time over the period T. L_{90} can be considered to be the "average minimum" noise level and is often used to describe the background noise.

LOAEL	Lowest Observed Adverse Effect Level - the level above which adverse effects on health and quality of life can be detected.
Night-time	The period 23:00-07:00 hours.
NOEL	No Observed Effect Level - the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise; and
SOAEL	Significant Observed Adverse Effect Level - The level above which significant adverse effects on health and quality of life occur.

Appendix B Time History Graphs



Appendix C Proposed Parameter Plan

-  Development Site Boundary
-  Residential Avenue
-  Footpath / Cycle Route
-  Pedestrian Access to Orchard
-  Car parking for Allotments and Church
-  Vehicular Access to Site
-  Vehicular Access to Allotments and Parking for Church
-  Residential Development
-  Open space
-  Allotments
-  Community Orchard



F	Removing annotations beyond site & amended footpath/cycle route	08.03.2018
E	Car Park, Allotments	05.03.2018
D	Amendments to key	16.02.2018
C	Amendments following clients comments	08.02.2018
B	Amendments following project team meeting	07.02.2018
A	Amendments following pre-app meeting	31.01.2018

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Caversfield, Bicester
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