Land adjacent to Batchelor's Farm, Burgess Hill

Environmental Noise Impact Assessment

SDP

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temple

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Contents

1 Executive Summary

1.1.1 Temple Group (Temple) has been appointed by SDP to undertake a comprehensive environmental noise survey to establish prevailing external noise levels at the site of the Proposed Development on land adjacent to Batchelor's Farm, Burgess Hill.

1.1.2 External noise measurements have been undertaken at multiple locations on the site representative of future nearby noise sensitive receptors.

1.1.3 Current proposals comprise 26 residential properties, including a mixture of 1, 2, 3 and 4-bedroom houses with access to Keymer Road.

1.1.4 Based on the results of the noise survey, suitable internal noise levels can be achieved with the practical design approach outlined in this report.

1.1.5 All of the gardens within the Proposed Development are likely to meet the BS8233 lower guideline value during the daytime of 50 dB L_{Aeq}.

2 Introduction

2.1.1 Proposals are in place to build a new residential development on the land adjacent to Batchelor's Farm, Burges Hill.

2.1.2 The purpose of the noise assessment is to assess the suitability of the Site for noise sensitive residential development.

2.1.3 Unattended and attended noise measurements have been undertaken at the Site to characterise the existing ambient noise environment over daytime and night-time periods. The measured noise levels have been assessed in line with local and national noise policy guidance and relevant standards.

2.1.4 Details of the assessment methodology used, together with the results of the survey undertaken and the subsequent conclusions and recommendations drawn are presented in this report.

2.1.5 The acoustic terminology used in this report is explained in **Appendix A.**

3 Policy, Standards and Guidance

3.1 National Policy

National Planning Policy Framework

3.1.1 The National Planning Policy Framework[1] (NPPF) sets out the government's planning policies for England and how these are expected to be applied. It was revised in 2018 following a review of the 2012 document and was updated in July 2021.

3.1.2 The recently revised NPPF comments on noise in the following ways:

Paragraph 174: Planning policies and decisions should contribute to and enhance the natural and local environment by:

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability.

Paragraph 185: Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

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

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

National Policy Statement for England

3.1.3 The Noise Policy Statement for England[2] (NPSE) seeks to clarify the underlying principles and aims in existing policy documents, legislation and guidance that relate to noise. The statement applies to all forms of noise, including environmental noise, neighbour noise and neighbourhood noise.

[1] Department of Communities and Local Government (July 2021), The National Planning Policy Framework

[2] Defra (March 2010), The Noise Policy Statement for England

3.1.4 The statement sets out the long-term vision of the government's noise policy, which is to *"promote good health and a good quality of life through the effective management of noise within the context of policy on sustainable development."*.

3.1.5 The guidance promotes the effective management and control of noise, within the context of Government policy on sustainable development and thereby aims to:

- Avoid significant adverse impacts on health and quality of life;
- Mitigate and minimise adverse impacts on health and quality of life; and
- Where possible, contribute to the improvements of health and quality of life.

3.1.6 The statement adopts established concepts from toxicology that are currently being applied to noise impacts. The concept details noise levels, at which the effects of an exposure may be classified into a specific category. The classification categories as detailed within NPSE are as follows:

- No Observed Effect Level (NOEL) - the level below which no effect can be detected. Below this level no detectable effect on health and quality of life due to noise can be established;
- Lowest Observable Adverse Effect Level (LOAEL) - the level above which adverse effects on health and quality of life can be detected; and
- Significant Observed Adverse Effect Level (SOAEL) - the level above which significant adverse effects on health and quality of life occur.

3.1.7 It is recognised that SOAEL does not have a single objective noise-based level that is applicable to all sources of noise in all situations and therefore the SOAEL is likely to be different for different sources, receptors and at different times of the day.

3.1.8 No guidance has been issued at the time of writing to identify the SOAEL and LOAEL for typical noise sources and receptors.

Planning Practice Guidance – Noise

3.1.9 The NPPG[3] expands on the use of SOAEL:

"If the exposure is above this level the planning process should be used to avoid this effect occurring, by use of appropriate mitigation such as by altering the design and layout. Such decisions must be made taking account of the economic and social

[3] Department for Communities and Local Government (DCLG) (March 2014), National Planning Practice Guidance.

benefit of the activity causing the noise, but it is undesirable for such exposure to be caused."

3.1.10 The NPPG also goes on to identify unacceptable noise exposure:

"At the highest extreme, noise exposure would cause extensive and sustained changes in behaviour without an ability to mitigate the effect of noise. The impacts on health and quality of life are such that regardless of the benefits of the activity causing the noise, this situation should be prevented from occurring."

3.1.11 In addition, NPPG refers to further considerations to mitigating noise on residential developments. NPPG states that the noise impact may be partially offset if the 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, (e.g. 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 publicly accessible amenity space (e.g. a public park or a local green space designated because of its tranquillity) that is nearby (e.g. within a 5 minutes walking distance).

3.2 Local Planning Policy

Mid Sussex District Plan 2014 – 2031 Submission Version (2016)

3.2.1 Mid Sussex District Plan[4] (MSDP) will be the main planning document used by the Council when considering planning applications. MSDP replaces the majority of the Mid Sussex Local Plan adopted in 2004. Any development in the countryside must comply with policy DP27: Noise, Air, and Light Pollution.

3.2.2 The MDSP states the following:

"Noise sensitive development, such as residential, will not be permitted in close proximity to existing or Proposed Development generating high levels of noise unless

[4] Mid Sussex District Council (2016), Mid Sussex District Plan 2014 – 2031 Submission Version

adequate sound insulation measures, as supported by a noise assessment are incorporated within the development."

Planning Noise Advice Document: Sussex

3.2.3 The Planning Noise Advice Document - Sussex[5] document (July 2015) is a cross Sussex guidance applicable to various local authorities.

3.2.4 Chapter 5 paragraphs 5.5.2 and 5.5.3 relate to design criteria of any proposed residential development in Sussex which references internal levels outlined in British Standard 8233: 2014 'Guidance on Sound Insulation and Noise Reduction for Buildings'[6] and additionally the internal L_{Amax} internal recommendations from the World Health Organisation (WHO) Guidelines for Community Noise[7].

"5.5.2. Design control measures should aim to meet the recommended standards set out in table 4 of BS 8233:2014 and the night-time L_{Amax} level recommended in the WHO's Night Noise Guidelines for Europe (2009) unless there are particular reasons why this is not considered appropriate. In such cases, a clear explanation of the reasons should be provided.

5.5.3. While it is acknowledged that noise mitigation measures can be used in a lot of cases to achieve suitable internal levels, it is important that preference is given to criteria based on windows being partially open. If it is not possible to achieve suitable internal levels with the windows opened, then details of alternative ventilation must be supplied."

3.3 Standards and Guidance

CIEH, IOA and ANC - ProPG: Planning & Noise Professional Practice Guidance on Planning & Noise New Residential Development

3.3.1 Current government guidance on planning and noise for new residential developments is found in the NPPF. One of the strengths of the NPPF is that it sets clear objectives. However, the IOA, ANC and CIEH feel there is insufficient technical guidance to practitioners and developers on how to deliver the

[5] Sussex County (July 2015), Planning Noise Advice Document: Sussex.
[6] British Standard 8233, (2014), Guidance on sound insulation and noise reduction for buildings.
[7] World Health Organisation (2018), WHO Guidelines for Community Noise

Government's objectives. Therefore, these professional bodies have jointly produced "ProPG: Planning & Noise Professional Practice Guidance on Planning & Noise New Residential Development[8]" (ProPG) which aims to complement existing Government advice and provides a recommended approach that can be applied proportionately to each development site in order to encourage good acoustic design.

3.3.2 The ProPG seeks to promote the use of good acoustic design to:

- enable new homes to be built in areas previously considered unsuitable because of noise by appropriate evaluation and careful use of suitable mitigation;
- allow rapid identification of sites where noise is unlikely to be a constraint for new residential developments, hence saving developers time and unnecessary costs on considering the matter in further;
- permit swift recognition of noisy sites that are very unlikely to be suitable for new residential developments, hence saving developers time and unnecessary costs pursuing schemes that are unlikely to be not be permitted; and
- help to reduce the harmful impact of noise on those moving into the properties and the surrounding communities.

British Standard BS 8233

3.3.3 British Standard 8233: 2014 'Guidance on Sound Insulation and Noise Reduction for Buildings'[9] (BS8233) provides criteria for the assessment of internal noise levels for various uses including dwellings and commercial properties. The standard suggests suitable internal noise levels within different types of buildings and is reproduced below in **Table 1** (Table 4 in BS 8233).

Table 1 - BS8233 Guideline Indoor Noise Levels for Dwellings

Activity	***Location***	***Daytime 07:00 to 23:00***	***Night-time 23:00 to 07:00***
Resting	*Living Room*	*35 dB* $L_{Aeq,16hour}$	-
Dining	*Dining room/area*	*40 dB* $L_{Aeq,16hour}$	-
Sleeping	*Bedroom*	*35 dB* $L_{Aeq,16hour}$	*30 dB* $L_{Aeq,\ 8hour}$

[8] IOA, ANC and CIEH (2017), ProPG: Planning & Noise Professional Practice Guidance on Planning & Noise New Residential Development

[9] British Standard 8233, (2014), Guidance on sound insulation and noise reduction for buildings.

Note: where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved.

World Health Organisation

3.3.4 The World Health Organisation Guidelines for Community Noise[10] also set 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} in living rooms over a 16-hour day;
- 30 dB L_{Aeq} in bedrooms during the 8-hour night; and
- 45 dB L_{Amax} in bedrooms during the 8-hour night.

3.3.5 This document states that, in dwellings, the critical effects of noise are on sleep, annoyance and speech interference. These indoor noise levels correspond to sound pressure levels at the outside façades of the living spaces of 45 dB L_{Aeq} and 60 dB L_{Amax}. These external values have been obtained by assuming that the noise reduction from outside to inside with the window partly open is 15 dB(A).

3.3.6 According to this document, to protect the majority of people from being seriously annoyed during the daytime, the sound pressure level on balconies, terraces and outdoor living areas should not exceed 55 dB L_{Aeq} for a steady, continuous noise. To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound pressure level should not exceed 50 dB L_{Aeq}.

British Standard 7445 Parts 1 and 2

'Description and Measurement of Environmental Noise'

Part 1: Guide to quantities and procedures

3.3.7 BS7445: Description and Measurement of Environmental Noise consists of two parts.

3.3.8 Part 1[11] defines the basic quantities to be used for the description of noise in community environments and describes basic procedures for the determination of these quantities.

[10] World Health Organisation (1995), WHO Guidelines for Community Noise
[11] British Standards Institute (BSI), (1991): 'BS 7445 – Description and Measurement of Environmental Noise. Part 1: Guide to Quantities and Procedures'. BSI, London.

3.3.9 The methods and procedures described in this British Standard are intended to be applicable to sounds from all sources, individually and in combination, which contribute to the total noise at a site.

3.3.10 Part 2[12] describes methods for the acquisition of data which provide descriptors that enable:

- a description of the environmental noise in a specified area of land to be made in a uniform way; and
- the compatibility of any land use activity or projected activity to be assessed with respect to existing or predicted noise.

3.3.11 Using the data as a basis, authorities may establish a system for selecting the appropriate land use, as far as levels of noise are concerned, for a specified area, or the sources of noise, existing or planned, which are acceptable with respect to land use, existing or planned.

Calculation of Road Traffic Noise

3.3.12 Department of Transport/Welsh Office Memorandum "Calculation of Road Traffic Noise"[13] (CRTN) describes procedures for traffic noise calculation and is suitable for environmental assessment of schemes where road traffic noise may have an impact.

This document includes a shortened daytime measurement method for sites dominated by road traffic, which is an alternative to 18-hour monitoring. This method requires L_{A10} noise levels to be measured over three consecutive 1-hour periods between 10:00 and 17:00 hours. By using the $L_{A10,3hours}$ as the arithmetic mean of the measured $L_{A10,1hour}$ values, the $L_{A10,18hours}$ value can then be calculated by subtracting 1 dB.

Building Regulations Part O (Approved Document O)

3.3.13 Approved Document O[14] (ADO) took effect on 15 June 2022 for use in England and provides practical guidance in common building situations in residential buildings on how to meet the requirements of the Building Regulations with regards to overheating.

[12] British Standards Institute (BSI), (1991): 'BS 7445 – Description and Measurement of Environmental Noise. Part 2: Guide to the acquisition of data pertinent to land use'. BSI, London.
[13] Design Manual for Roads and Bridges, Volume 11, Environmental Assessment, Section 3, Environmental Assessment Techniques, LA 111, Noise and Vibration, (formerly HD 213/11, IAN 185/15), Highways England, May 2020
[14] HM Government. The Building Regulations 2010 - Approved Document O, Overheating (2021)

3.3.14 Requirement O1(2)(a) ensures the safety and reasonable enjoyment of the occupant is accounted for by the buildings overheating mitigation strategy. Guidance on night-time noise levels relating to this requirement states the following:

"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).

Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits:

40 dB $L_{Aeq,\ T}$ averaged over 8 hours (between 11pm and 7am).

55 dB L_{AFmax} more than 10 times a night (between 11pm and 7am).

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 strategy in use."

4 The Site and its Surroundings

4.1.1 The Site is circa 1.6 hectares (ha) and is located to the west of Keymer Road;

- to the west of the Site is Batchelors Farm Local Nature Reserve;
- to the north of the Site are lines of trees and fields;
- to the south of the Site are unused agricultural land and properties; and
- to the east of the Site are residential units located along Keymer Road.

4.1.2 The Site location is shown in **Appendix B.**

4.1.3 Current proposals comprise 26 residential properties, including a mixture of 1, 2, 3 and 4-bedroom houses with access to Keymer Road.

5 Noise Survey Methodology

5.1 Noise Monitoring

5.1.1 An unattended environmental noise survey was carried out at the eastern perimeter of the Proposed Development, representative of the closest proposed façade to the road at measurement location U1. Continuous measurements were undertaken between Tuesday 29th November and Tuesday 6th December 2022 to obtain prevailing noise levels representative of the most exposed sensitive receptors.

5.1.2 Additional short-term attended noise surveys were carried out at various locations around the Proposed Development on Tuesday 29th November and Tuesday 6th December 2022 to obtain prevailing noise levels representative of each area within the Proposed Development and to inform the 3D model.

5.1.3 Both unattended and attended measurement positions were considered free field. Microphones were positioned 1.5m above the local ground height and windshields were fitted for all measurements.

5.1.4 Photos of the measurements are presented in **Appendix C**.

5.2 Measurement Equipment and Meteorological Conditions

5.2.1 The measurement equipment used is listed below in **Table 2.** The sound level meters were set to continuously store octave band L_{Aeq}, L_{Amax}, L_{A90} and L_{A10} parameters in 15-minute intervals. Field calibrations were undertaken prior to and post measurement at each location; no significant drift occurred. Calibration certificates are available upon request.

Table 2 - Equipment Used

Manufacturer	Item	Type	Serial Number	Last Calibration Date
RION	Sound Level Meter	NA-52	00510141	27/08/2021
RION	Sound Level Meter	NA-52	00410086	27/08/2021
RION	Calibrator	NC-74	34936354	06/09/2022

5.2.2 To verify that periods of potential adverse weather conditions did not impact the data, the local wind speed levels and precipitation rate were collected using

'Wunderground' data from weather station IBURGE18[15], located approximately 1 km from the Site. When short periods of precipitation did occur, the measurement data was excluded.

[15] https://www.wunderground.com/dashboard/pws/IBURGE18

6 Noise Survey Results

6.1 Survey Observations

6.1.1 During visits to site, observations regarding noise sources influencing the baseline were noted by the surveyor at each measurement location and included:

- road traffic noise from Keymer Road;
- bird song;
- aircraft noise;
- cyclists; and
- dog walkers.

6.2 Unattended Monitoring Results

6.2.1 The results of the measured daytime and night-time continuous ambient noise measurements at the unattended location are presented below in **Table 3**.

6.2.2 The typical L_{AFmax} has been based on the average of the tenth highest occurring L_{AFmax} each day. The typical L_{AF90} (background sound level) has been calculated by undertaking a statistical analysis of how often the levels occur during the day/night period in accordance with methods presented in BS 4142.

6.2.3 A graph showing the time history of the measured results for the unattended monitoring location is given in **Appendix D.**

Table 3. Unattended Noise Survey Results.

Measurement Position	$L_{Aeq,T}$, dB		Typical L_{Amax}, dB		Typical L_{A90}, dB	
	Day	Night	Day	Night	Day	Night
	07:00 – 23:00	23:00 – 07:00	07:00 – 23:00	23:00 – 07:00	07:00 – 23:00	23:00 – 07:00
U1	57	47	73	68	34	23

6.3 Attended Monitoring Results

6.3.1 The results of the measured daytime attended surveys are presented below in **Table 4**.

Table 4. Attended Noise Survey Results

Measurement Position	Start Time and Date	$L_{Aeq,T,15mins}$ dB	$L_{Amax,15mins}$ dB	$L_{A90,15mins}$ dB
A1	13:15 29/11/2022	58	77	40

Measurement Position	Start Time and Date	$L_{Aeq,T,15mins}$ dB	$L_{Amax,15mins}$ dB	$L_{A90,15mins}$ dB
	13:00 06/12/2022	58	78	42
A2	13:36 29/11/2022	48	64	40
	12:45 06/12/2022	49	73	44
A3	14:00 29/11/2022	64	77	43
	13:30 06/12/2022	62	76	44
A4	14:15 29/11/2022	55	70	41

7 Noise Assessment

7.1 Predicted Noise Levels at Facades

7.1.1 The long-term measurement location was approximately 11 m from the edge of Keymer Road on the eastern perimeter of the Site; the facades of the most exposed dwellings within the Proposed Development are approximately 18 m from the road.

7.1.2 A 3D noise model has been built using 'CadnaA' noise modelling software, which implements distance attenuation calculations and calculation methods from CRTN. The noise model has been produced to predict noise levels from road traffic noise at the facades of the proposed dwellings within the Proposed Development, and across the external areas of the site.

7.1.3 The road traffic noise sources in the noise model have been calibrated using the measured noise survey data.

7.1.4 As the L_{AFmax} is dominated by road traffic, L_{AFmax} levels of a typical car passby recorded during the survey have been predicted to the worst affected façade of the closest receptor using point source distance attenuation from the road source line along the shortest path.

7.1.5 **Table 5** shows predicted free field noise levels at the most exposed facades facing Keymer Road.

Table 5 – Predicted noise levels at most exposed facades on the eastern perimeter.

Location	$L_{Aeq,T}$, dB		Typical L_{Amax}, dB
	Day	Night	Night
	07:00-23:00	23:00-07:00	23:00-07:00
Eastern Façades of Proposed Development approx. 18 m from Keymer Road (Properties 1-2 & 24, 25 & 26)	57	47	68

7.2 Predicted Noise Levels at External Areas

7.2.1 The predicted noise levels at external amenity areas (gardens) are likely to be below the WHO lower guideline of 50 dB $L_{Aeq,16hrs}$ across the site. This is due to additional screening provided by the proposed housing and increased distance from the Keymer Road that will protect the majority of people from being moderately annoyed during the daytime. The shared open space at the northeast of the site is likely to be below the WHO upper guideline of 55 dB $L_{Aeq,16hrs}$ for the majority of the open space.

7.2.2 **Figures 1** and **2** below show predicted noise contours of the daytime $L_{Aeq,16hr}$ and night-time $L_{Aeq,8hr}$ noise level respectively across the site with the Proposed Development in place. The figures show predicted noise levels from road traffic at 1.5m above local ground level.

Figure 1 - Daytime noise levels, $L_{Aeq,16hrs}$

Figure 2 – Night-time noise levels, $L_{Aeq,8hrs}$

7.3 Internal Noise Levels including Ventilation and Overheating

7.3.1 According to BS 8233, internal noise levels within the Proposed Development are required to be controlled using appropriate façade attenuation measures to 30 dB $L_{Aeq,8hour}$ at night in bedrooms, and 35 dB $L_{Aeq,16hour}$ in bedrooms and in habitable rooms during the day as shown in **Table 1**. The WHO Guidelines recommend that a 'Typical night-time L_{AFmax} dB' value of 45 dB should not be exceeded more than 10 to 15 times inside bedrooms during the night-time period to avoid potential sleep disturbance.

7.3.2 **Table 6** below shows noise risk assessment categories based on the colour banding in **Figures 1** and **2** above. Each band suggests typical glazing and ventilation requirements, whether open windows can be used during overheating and the relevant noise levels each band represents.

Table 6 - Noise risk assessment categories and appropriate glazing and ventilation requirements

Noise Risk Assessment	Band Colour	Typical glazing	Typical Ventilation approach to meet internal noise level	Typical ventilation during overheating to meet internal noise level	Approx Daytime $L_{Aeq,16hrs}$, dB	Approx Night-time $L_{Aeq,8hrs}$, dB	Approx Night-time L_{AFmax}, dB
High	Red	High sound insulation performance glazing (>35 dB R_w+C_{tr}*)	High performance acoustic ventilation (>35 dB $D_{n,e,w}+C_{tr}$*) and at higher levels, mechanical ventilation	Alternative to open windows required - probably mechanical cooling	>65	>60	>75
Medium	Orange	Medium sound insulation performance glazing (up to 35 dB R_w+C_{tr}*)	Acoustic attenuated ventilation (up to 35 dB $D_{n,e,w}+C_{tr}$*)	Alternative to open windows required - acoustic vent may be possible	60-65	53-60	68-75
Low	Yellow	Standard double glazing (up to 25 dB R_w+C_{tr}*)	Standard ventilation to enable windows to be closed.	Open windows may be possible	48-60	40-53	55-68
Negligible	Green	Standard double glazing	Open windows may be possible	Open windows	<48	<40	<55

**Figures are approximate and can vary based on several factors such as size of façade, window or vent and size and layout of room. Specific calculation of the attenuation provided by the whole façade is required to confirm required performance of elements.*

7.3.3 The results show that the majority of the site during the daytime and night-time is at negligible risk. Typical glazing requirements would be standard double glazing. Open windows may be possible for ventilation and to control overheating.

7.3.4 Facades closest to Keymer Road will be impacted by higher L_{Aeq} levels (and L_{Amax} during the night) from traffic noise and as a result are at a low risk. Typical glazing requirements would be standard double glazing. The use of open windows for ventilation may not provide sufficient attenuation to meet internal noise level requirements or to control overheating.

8 Conclusions

8.1.1 Temple has been appointed by SDP to undertake a comprehensive environmental noise survey to establish prevailing external noise levels at the site of the Proposed Development on land adjacent to Batchelor's Farm, Burgess Hill.

8.1.2 The purpose of the noise assessment is to assess the suitability of the Site for noise sensitive residential development.

8.1.3 Unattended and attended noise measurements have been undertaken at the Site to characterise the existing ambient noise environment over daytime and night-time periods. The measured noise levels have been assessed in line with local and national noise policy guidance and relevant standards.

8.1.4 Planning Noise Advice Document: Sussex requires that "control measures should aim to meet the recommended standards set out in table 4 of BS 8233:2014 and the night-time L_{AFmax} level recommended in the WHO's Night Noise Guidelines for Europe". As there is no set criteria for L_{AFmax} levels within the Night Guidelines for Europe (the guidelines generally deal with $L_{night,outside}$ levels, L_{AFmax} levels have been assessed against the WHO Community Guidelines, which represents industry best practice.

8.1.5 The noise assessment, based on the results of the noise survey, has indicated that these guideline internal noise levels can be achieved with the practical design approach outlined above.

8.1.6 Noise levels may also be minimised in habitable rooms through suitable layout design which would place façades of sensitive rooms further or screened from the road and less sensitive rooms (like kitchens, bathrooms etc.) closer to, or overlooking the road.

8.1.7 Further detailed calculations of internal ambient noise levels in habitable rooms should be completed during detailed design development to inform mitigation, façade and ventilation design.

8.1.8 All of the gardens within the Proposed Development are likely to meet BS 8233 lower guideline value of 50 dB $L_{Aeq,T}$.

8.1.9 The ADO internal noise limit for night-time L_{AFmax} is 55 dBA (not to be exceeded more than 10 times a night). Therefore, the typical L_{AFmax} has been based on the 10th highest car passby measured during the survey, as it is representative of the typical night-time road traffic along Keymer Road.

8.1.10 The assessment indicates that all properties in the Proposed Development should fall below this criteria as a result of road traffic on Keymer Road. However, due to the updated road layout on the Site, properties within 10 m of the nearest road curb may not achieve ADO criteria if there are 10 or more

L_{AFmax} events above the criteria occurring on these internal roads between 11pm and 7am. It is worth noting that cars will likely be travelling as lower speeds on these internal roads and the L_{AFmax} levels from road traffic will likely be lower.

Appendix A: Acoustic Glossary

Noise/Sound

Noise and sound need to be carefully distinguished. Sound is a term used to describe wave-like variations in air pressure that occur at frequencies that can stimulate receptors in the inner ear and, if sufficiently powerful, be appreciated at a conscious level. Noise implies the presence of sound but also implies a response to sound: noise is often defined as unwanted sound.

Decibel, dB

The unit used to describe the magnitude of sound is the decibel (dB) and the quantity measured is the sound pressure level. The decibel scale is logarithmic, and it ascribes equal values to proportional changes in sound pressure, which is a characteristic of the ear. Use of a logarithmic scale has the added advantage that it compresses the very wide range of sound pressures to which the ear may typically be exposed to a more manageable range of numbers. The threshold of hearing occurs at approximately 0 dB (which corresponds to a reference sound pressure of 20 μPa) and the threshold of pain is around 120 dB.

Frequency, Hz

Frequency is the number of occurrences of a repeating event per unit second or Hertz (Hz). The human ear is sensitive to sound in the range 20 Hz to 20,000 Hz (20 kHz). For acoustic engineering purposes, the frequency range is usually divided up into octave bands, in which the upper limiting frequency for any band is twice the lower limiting frequency. The bands are described by their centre frequency value. In environmental acoustics the ranges typically used are from 63 Hz to 8 kHz.

A-weighting

The sensitivity of the ear is frequency dependent. Sound level meters are fitted with a weighting network which approximates to this response and allows sound levels to be expressed as an overall single figure value, in dB(A).

Ambient sound

Totally encompassing sound in each situation at a given time, usually composed of sound from many sources near and far.

Ambient sound level ($L_{Aeq,T}$)

Equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time, usually from many sources near and far, at the assessment location over a given time interval, T.

Background sound level ($L_{A90,T}$)

A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90 % of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels.

Appendix B: Proposed Site Layout

Figure 3 - Proposed Development site to the west of Keymer Road

Appendix C: Measurement Position Photos

Figure 4 - Unattended Measurement Position U1 west of Keymer Road, approximately 12m from the edge of Keymer Road.

Figure 5 - Attended Measurement Position A1 on the footpath to Batchelors Farm Nature Reserve, approximately 16m from the edge of Keymer Road.

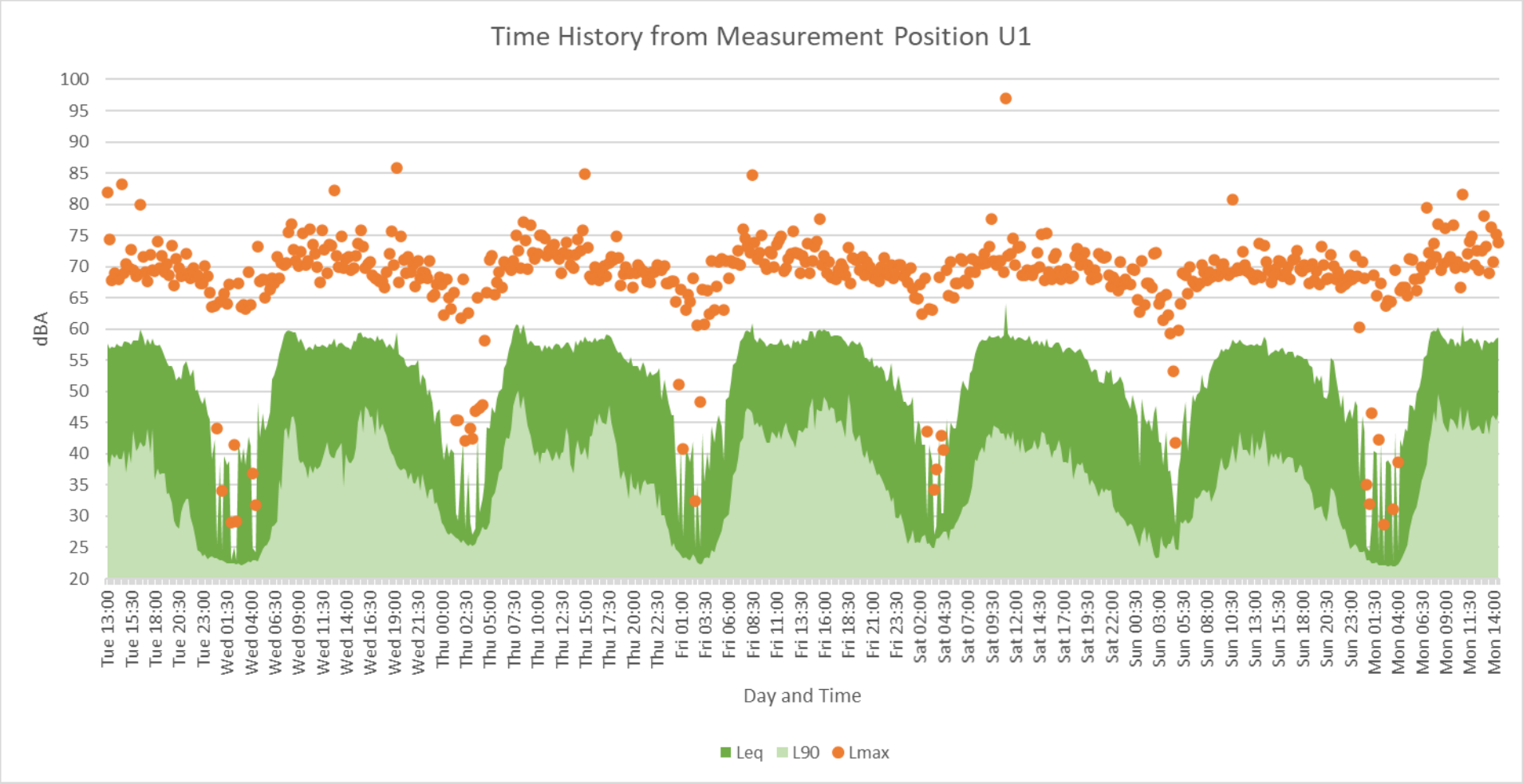
Figure 6 - Attended Measurement Position A2 on the footpath to Batchelors Farm Nature Reserve, approximately 80m from the edge of Keymer Road.

Figure 7 - Attended Measurement Position A3 near the existing entrance to the rear of Batchelors Farmhouse, approximately 5m from the edge of Keymer Road.

Figure 8 - Attended Measurement Position A4 near the existing entrance to Batchelors Farmhouse, approximately 18m from the edge of Keymer Road.

Appendix C: Unattended Survey Data Time History

Figure 9 - Time History of Measurement Position U1



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