

# Heyford Park Phase 7B Upper Heyford Bicester

## Environmental Noise Survey and Acoustic Design Statement Report

23195/ADS1-7B

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For:  
Dorchester Living



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## **Document Control**

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# **Environmental Noise Survey and Acoustic Design Statement Report 23195/ADS1-7B**

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## **1.0 Introduction**

A new phase (7B) of residential development is proposed at the Heyford Park development in Upper Heyford, Bicester.

Hann Tucker Associates have therefore been commissioned to undertake an environmental noise survey and noise impact assessment in order to assess the suitability of the site for residential use.

This report presents the methodology and findings of our noise survey and assessment in the context of national planning policies and the policy of the Local Authority.

## **2.0 Objectives**

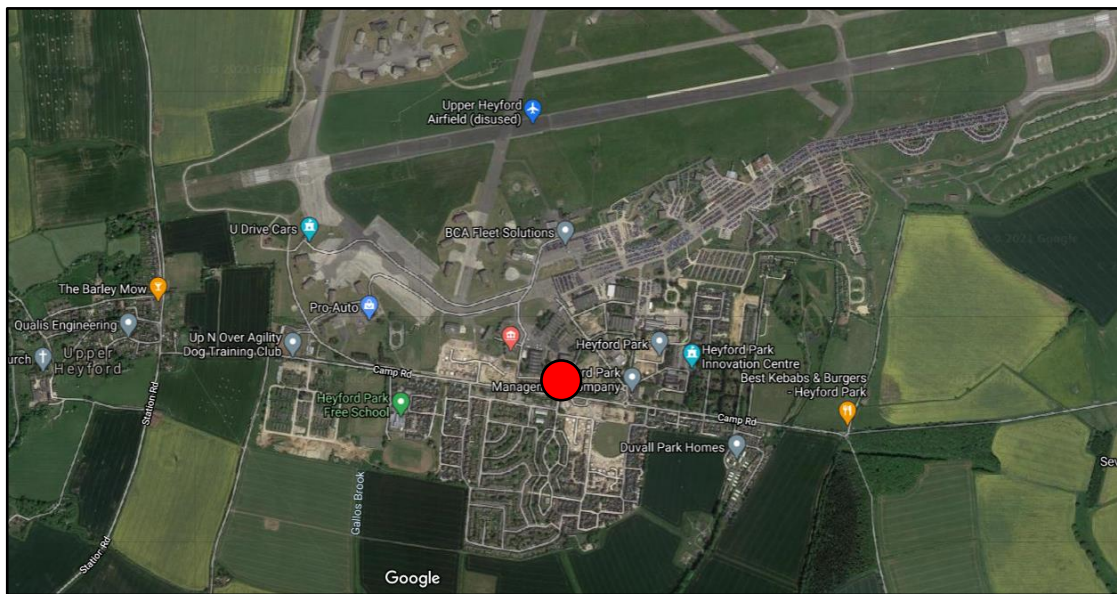
To undertake an environmental noise survey to establish the existing  $L_{Amax}$ ,  $L_{Aeq}$  and  $L_{A90}$  environmental road, rail and air traffic noise levels at selected accessible positions.

Based on the results of the survey, to undertake a noise assessment to assess the suitability of the site for residential use in accordance with the Noise Policy Statement for England (NPSE), National Planning Policy Framework (NPPF), Planning Practice Guidance (ProPG), British Standard BS8233:2014 and Local Authority requirements.

## **3.0 Site Description**

### **3.1 Location**

The site is located in Upper Heyford, Bicester, to the south of the old Upper Heyford Airfield. The location is shown in the Location Map below.



Location Map (© Google 2021).

The site lies within the jurisdiction of Oxfordshire County Council and Cherwell District Council.

### 3.2 Description

The site is bounded by Camp Road to the south, by industrial warehouses to the north, by residential properties to the west, and by a site to the east, which we understand to be a future village centre. Subjectively the dominant noise sources were road traffic from Camp road to the south, and construction noise from the 5c site, also to the south. The site is shown in the Site Plan below.



Site Plan (© Google 2021)



## 4.0 Acoustic Terminology

For an explanation of the acoustic terminology used in this report please refer to Appendix A enclosed.

## 5.0 Methodology

The survey was undertaken by Luke Rendell BA (Hons) MSc MIOA.

### 5.1 Procedure

Fully automated environmental noise monitoring was undertaken from approximately 11:15 hours on 15 January 2021 to approximately 09:00 hours on 19 January 2021.

During the periods we were on site the wind conditions were calm. The sky was generally overcast. We understand that generally throughout the survey period the weather conditions remained similar. These conditions are considered suitable for obtaining representative measurement results.

Measurements were taken continuously of the A-weighted (dBA)  $L_{90}$ ,  $L_{eq}$  and  $L_{max}$  sound pressure levels over 15 minute periods.

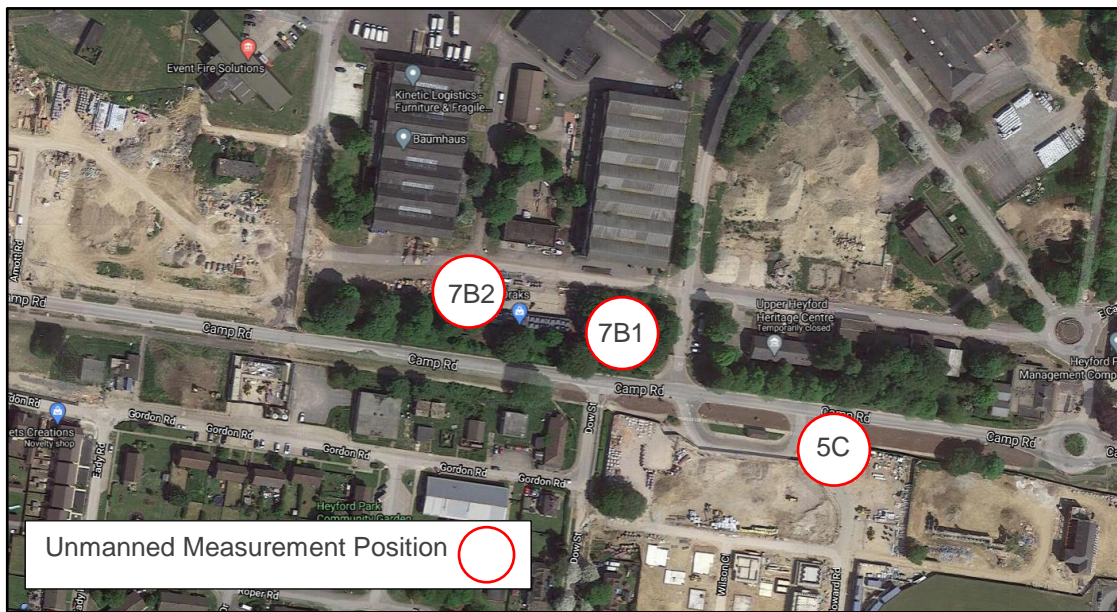
### 5.2 Measurement Positions

The measurement positions are described in the table below:

Position	Description
5C	The microphone was mounted to the top of the site hoarding, approximately 2metres above ground level, approximately 1m from the side of Camp Road. The location was chosen in order to measure noise levels from Camp Road for the purpose of assessing the suitability of residential use, whilst also being screened from construction noise from the 5c site.
7B1 Corner	The microphone was mounted to the top of some railings within the site boundary, approximately 2metres above ground level, near the south east corner of the site, slightly set back from Camp Road (approximately 17m) and near the easternmost industrial warehouse. The location was chosen in order to measure noise levels incident on the development site for the purpose of assessing the suitability of residential use.
7B2 Edge	The microphone was mounted to the top of some railings within the site boundary, approximately 2metres above ground level, near the centre of the site, near the westernmost industrial warehouse, set back from Camp Road (approximately 30m away) and slightly screened from it by containers. The location was chosen in order to measure noise levels incident on the development site for the purpose of assessing the suitability of residential use.

The positions are shown on the plan below.





Plan Showing Unmanned Measurement Position (© Google 2021).

### 5.3 Instrumentation

The instrumentation used during the survey is presented in the table below:

Description	Manufacturer	Type	Serial Number	Calibration
Type 1 ½" Condenser Microphone	ACO Pacific	7052E	50282	Calibration on 19/10/2020
Preamp	Larson Davis	PRM902	4158	Calibration on 19/10/2020
Type 1 Data Logging Sound Level Meter	Larson Davis	824	3804	Calibration on 19/10/2020
Type 1 ½" Condenser Microphone	PCB	377B02	135744	Calibration on 20/01/2020
Preamp	PCB	PRM902	4812	Calibration on 21/01/2020
Type 1 Data Logging Sound Level Meter	Larson Davis	824	3700	Calibration on 21/01/2020
Type 1 ½" Condenser Microphone	PCB	377A02	101926	Calibration on 29/06/2020
Preamp	Larson Davis	PRM902	3949	Calibration on 29/06/2020
Type 1 Data Logging Sound Level Meter	Larson Davis	824	3701	Calibration on 29/06/2020



The sound level meters, including the extension cables, were calibrated prior to and on completion of the survey. No significant changes were found to have occurred (no more than 0.1dB).

The sound level meters were located in environmental cases with the microphones connected to the sound level meters via extension cables. The microphones were fitted with windshields.

## 6.0 Results

The results have been plotted on Time History Graph 23195/TH1 to 23195/TH3 enclosed presenting the 15 minute A-weighted (dBA)  $L_{90}$ ,  $L_{eq}$  and  $L_{max}$  levels at each measurement position throughout the duration of the survey.

In order to compare the results of our survey with the relevant guidelines it is necessary to convert the measured  $L_{Aeq(15\text{minute})}$  noise levels into single figure daytime  $L_{Aeq(16\text{-hour})}$  (07:00-23:00 hours) and night-time  $L_{Aeq(8\text{-hour})}$  (23:00-07:00 hours) levels.

The measured daytime  $L_{Aeq(16\text{-hour})}$  and night-time  $L_{Aeq(8\text{-hour})}$  noise levels are presented in the table below.

Position	Daytime $L_{Aeq(16\text{-hour})}$	Night-Time $L_{Aeq(8\text{-hour})}$
5C*	65dB	59dB
7B1	55dB	49dB
7B2	50dB	47dB

\*When using the above noise levels it should be noted that Position 5C was located at approximately 1m from the roadside, whereas the facades of the nearest residential properties are proposed to be set back approximately 8m from the roadside, and appropriate corrections should therefore be made to account for this.

## 7.0 Comparison With Pre-Covid 19 Noise Levels

This noise survey was undertaken during a National Coronavirus lockdown and it is therefore possible that measured noise levels may be affected by the resultant reduction in activity.

Therefore measured noise levels have been compared with the results of the survey undertaken by Waterman Group prior to the Covid 19 pandemic as follows:





Description	Daytime $L_{Aeq}(16\text{-hour})$	Night-Time $L_{Aeq}(8\text{-hour})$
HTA Position 5C – Camp Road (During National Lockdown)	65dB	59dB
HTA Position 7B1 – Set back from Camp Road (During National Lockdown)	55dB	49dB
HTA Position 7B2 – Set back from Camp Road (During National Lockdown)	50dB	47dB
Waterman Group Position ML6 (Camp Road)	57dB	54dB
Waterman Group Position ML7 (Camp Road)	65dB	-

The above shows that noise levels measured during this survey at the closest position to Camp Road (Position 5C) were at least as high as those measured by Waterman Group pre-Covid19, and are therefore deemed to be suitable for use in assessing the suitability of the site for future residential use.

## 8.0 Discussion of Noise Climate

During the periods we were on site the dominant noise source was noted to be road traffic noise from Camp Road. In addition, at the time of our survey the 5c site was an active construction site, however the 5C measurement position was chosen to minimise the effect of construction noise.

## 9.0 Relevant Planning Policies and Guidance

### 9.1 Noise Policy Statement for England

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

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

That vision is supported by the following NPSE noise policy aims which are reflected in three of the four aims of planning policies and decisions in paragraph 123 of the NPPF (see paragraph 8.2 (b) below):



*“Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:*

- *avoid significant adverse impacts on health and quality of life;*
- *mitigate and minimise adverse impacts on health and quality of life; and*
- *where possible, contribute to the improvement of health and quality of life.”*

The Explanatory Note to the NPSE has three concepts for the assessment of noise in this country:

#### **NOEL – No Observed Effect Level**

This is the level below which no effect can be detected and below which there is no detectable effect on health and quality of life due to noise.

#### **LOAEL – Lowest Observable Adverse Effect Level**

This is the level above which adverse effects on health and quality of life can be detected.

#### **SOAEL – Significant Observed Adverse Effect Level**

This is the level above which significant adverse effects on health and quality of life occur.

None of these three levels are defined numerically and for the SOAEL the NPSE makes it clear that the noise level is likely to vary depending upon the noise source, the receptor and the time of day/day of the week, etc. The need for more research to investigate what may represent an SOAEL for noise is acknowledged in the NPSE and the NPSE asserts that not stating specific SOAEL levels provides policy flexibility in the period until there is further evidence and guidance.

The NPSE concludes by explaining in a little more detail how the LOAEL and SOAEL relate to the three NPSE noise policy aims listed above. It starts with the aim of avoiding significant adverse effects on health and quality of life, then addresses the situation where the noise impact falls between the LOAEL and the SOAEL when *“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.”* The final aim envisages pro-active management of noise to improve health and quality of life, again taking into account the guiding principles of sustainable development which include the need to minimise travel distance between housing and employment uses in an area.



## 9.2 National Planning Policy Framework (NPPF)

The National Planning Policy Framework (NPPF) was first published in March 2012. This document replaced the existing Planning Policy Guidance Note 24 (PPG24) "Planning and Noise". A new edition of NPPF was published in July 2018 and revised in February 2019.

Paragraph 170 of the NPPF states that the planning system should contribute to and enhance the natural and local environment by (amongst others) *"preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, water or noise pollution or land stability."*

The following paragraphs are from the NPPF (revised February 2019):

"180. 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;
- 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.

182. Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed."

Paragraph 180 also references the Noise Policy Statement for England. This document does not refer to specific noise levels but instead sets out three aims:

"Avoid significant adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.



Mitigate and minimise adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

Where possible, contribute to the improvement of health and quality of life through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.”

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

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

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

### 9.3 Planning Practice Guidance on Noise

Planning Practice Guidance (PPG) under the NPPF has been published by the Government as a web based resource at <http://planningguidance.planningportal.gov.uk/blog/guidance/>. This includes specific guidance on Noise although, like the NPPF and NPSE the PPG does not provide any quantitative advice. It seeks to illustrate a range of effect levels in terms of examples of outcomes as set out in the following table:

Perception	Examples of Outcomes	Increasing effect level	Action
Not noticeable	No effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. 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	



Noticeable and intrusive	Noise can be heard and causes 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.	Observed Adverse Effect	Mitigate and reduce to a minimum
		Significant Observed Adverse Effect Level	
Noticeable and disruptive	The 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.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable hard, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

## 9.4 Local Planning Policy

Saved Policy ENV1 of the Cherwell Local Plan 2011-2031 states “*Development which is likely to cause materially detrimental levels of noise, vibration, smell, smoke, fumes or other type of environmental pollution will not normally be permitted*”.

## 9.5 World Health Organisation

The current Environmental Noise Guidelines 2018 for the European Region (ENG) supersede the Guidelines for Community Noise from 1999 (CNG). Nevertheless, the ENG recommends that all CNG indoor guideline values and any values not covered by the current guidelines (such as industrial noise and shopping areas) remain valid.

A summary of the guidance from the ENG and CNG is shown in the table below.

Source	CNG guideline indoors all sources	ENG guideline outdoors noise from specific source only
Road traffic noise	35 L <sub>Aeq</sub> , 16h	53 dB L <sub>den</sub>
	30 L <sub>Aeq</sub> , 8h	45 dB L <sub>night</sub>
Railway noise	35 L <sub>Aeq</sub> , 16h	54 dB L <sub>den</sub>
	30 L <sub>Aeq</sub> , 8h	44 dB L <sub>night</sub>
Aircraft noise	35 L <sub>Aeq</sub> , 16h	45 dB L <sub>den</sub>
	30 L <sub>Aeq</sub> , 8h	40 dB L <sub>night</sub>





With regard to single-event noise indicators, Section 2.2.2 of the WHO Environmental Noise Guidelines 2018 state:

*“In many situations, average noise levels like the  $L_{den}$  or  $L_{night}$  indicators may not be the best to explain a particular noise effect. Single-event noise indicators – such as the maximum sound pressure level ( $L_{A,max}$ ) and its frequency distribution – are warranted in specific situations, such as in the context of night-time railway or aircraft noise events that can clearly elicit awakenings and other physiological reactions that are mostly determined by  $L_{A,max}$ . Nevertheless, the assessment of the relationship between different types of single-event noise indicators and long-term health outcomes at the population level remains tentative. The guidelines therefore make no recommendations for single-event noise indicators.”*

## 9.6 British Standard BS8233: 2014

British Standard 8233: 2014 “Guidance on sound insulation and noise reduction for buildings” provides guidance for the control of noise in and around buildings.

### 9.6.1 Internal Areas

BS8233:2014 Section 7.7.2 titled “Internal ambient noise levels for dwellings” states:

*“In general for steady external noise sources, it is desirable that internal ambient noise levels do not exceed the following guideline values:*

Activity	Location	Desirable Internal Ambient Criteria	
		07:00 – 23:00	23:00 to 07:00
Resting	Living Rooms	35 dB $L_{Aeq,16hour}$	-
Dining	Dining Room/Area	40 dB $L_{Aeq,16hour}$	-
Sleeping (Daytime Resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

*Note 1 The above table provides recommended levels for overall noise in the design of a building. These are the sum total of structure-borne and airborne noise sources. Groundborne noise is assessed separately and is not included as part of these targets, as human response to groundborne noise varies with many factors such as level, character, timing, occupant expectation and sensitivity.*

*Note 2 The levels shown in the above table are based on the existing guidelines issued by the WHO and assume normal diurnal fluctuations in external noise. In cases where local conditions do not follow a typical diurnal pattern, for example on a road serving a port with high levels of traffic at certain times of the night, an appropriate alternative period, e.g. 1 hour, may be used, but the level should be selected to ensure consistency with the levels recommended in the above table.*



*Note 3 These levels are based on annual average data and do not have to be achieved in all circumstances. For example, it is normal to exclude occasional events, such as fireworks night or New Year's Eve.*

*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 ventilation that does not compromise the façade insulation or the resulting noise level.*

*If applicable, any room should have adequate ventilation (e.g. trickle ventilators should be open) during assessment.*

*Note 6 Attention is drawn to the Building Regulations.*

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

## 9.6.2 External Amenity Areas

BS8233:2014 Section 7.7.3.2 titled "Design criteria for external noise" states:

*"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  $L_{Aeq,T}^1$ , 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 55dB  $L_{Aeq,T}$  or less might not be possible at the outer edge of these areas, but should be achievable in some areas of the space."*



## 9.7 ProPG : Planning & Noise : 2017

**9.7.1** The primary goal of the ProPG is to assist the delivery of sustainable development by promoting good health and well-being through the effective management of noise. It seeks to do that through encouraging a good acoustic design process in and around proposed new residential development having regard to national policy on planning and noise. It is applicable to noise from existing transport sources (noting that good professional practice should have regard to any reasonably foreseeable changes in existing and/or new sources of noise). The recommended approach is also considered suitable where some industrial or commercial noise contributes to the acoustic environment provided that is “not dominant”.

**9.7.2** This ProPG advocates a systematic, proportionate, risk based, 2-stage, approach. The approach encourages early consideration of noise issues, facilitates straightforward accelerated decision making for lower risk sites, and assists proper consideration of noise issues where the acoustic environment is challenging.

**9.7.3** The two sequential stages of the overall approach are:

- Stage 1 – an initial noise risk assessment of the proposed development site; and
- Stage 2 – a systematic consideration of four key elements.

**9.7.4** The four key elements to be undertaken in parallel during Stage 2 of the recommended approach are:

- Element 1 – demonstrating a “Good Acoustic Design Process”;
- Element 2 – observing internal “Noise Level Guidelines”;
- Element 3 – undertaking an “External Amenity Area Noise Assessment”; and
- Element 4 – consideration of “Other Relevant Issues”.

**9.7.5** The ProPG considers suitable guidance on internal noise levels found in “BS8233:2014: Guidance on sound insulation and noise reduction for buildings”. Table 4 in Section 7.7.2 of the standard suggests that “in general, for steady external noise sources, it is desirable that the internal ambient noise level does not exceed the guideline values”. The standard states (Section 7.7.1) that “occupants are usually more tolerant of noise without a specific character” and only noise without such character is considered in Table 4 of the standard.

Activity	Location	07:00 – 23:00 Hours	23:00 – 07:00 Hours
Resting	Living Room	35dB L <sub>Aeq,16hr</sub>	-
Dining	Dining Room / Area	40dB L <sub>Aeq,16hr</sub>	-
Sleeping (daytime resting)	Bedroom	35dB L <sub>Aeq,16hr</sub>	30dB L <sub>Aeq,16hr</sub> 45dB L <sub>Amax,F</sub>



*NOTE 1 the Table provides recommended internal  $L_{Aeq}$  target levels for overall noise in the design of a building. These are the sum total of structure-borne and airborne noise sources. Ground-borne noise is assessed separately and is not included as part of these targets, as human response to ground-borne noise varies with many factors such as level, character, timing, occupant expectation and sensitivity.*

*NOTE 2 The internal  $L_{Aeq}$  target levels shown in the Table are based on the existing guidelines issued by the WHO and assume normal diurnal fluctuations in external noise. In cases where local conditions do not follow a typical diurnal pattern, for example on a road serving a port with high levels of traffic at certain times of the night, an appropriate alternative period, e.g. 1 hour, may be used, but the level should be selected to ensure consistency with the  $L_{Aeq}$  target levels recommended in the Table.*

*NOTE 3 These internal  $L_{Aeq}$  target levels are based on annual average data and do not have to be achieved in all circumstances. For example, it is normal to exclude occasional events, such as fireworks night or New Year's Eve.*

*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. In most circumstances in noise-sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45dB  $L_{Amax,F}$  more than 10 times a night. However, where it is not reasonably practicable to achieve this guideline then the judgement of acceptability will depend not only on the maximum noise levels but also on factors such as the source, number, distribution, predictability and regularity of noise events (see Appendix A).*

*NOTE 5 Designing the site layout and the dwellings so that the internal target levels can be achieved with open windows in as many properties as possible demonstrates good acoustic design. Where it is not possible to meet internal target levels with windows open, internal noise levels can be assessed with windows closed, however any façade openings used to provide whole dwelling ventilation (e.g. trickle ventilators) should be assessed in the "open" position and, in this scenario, the internal  $L_{Aeq}$  target levels should not normally be exceeded, subject to the further advice in Note 7.*

*NOTE 6 Attention is drawn to the requirements of the Building Regulations.*

*NOTE 7 Where development is considered necessary or desirable, despite external noise*



levels above WHO guidelines, the internal  $L_{Aeq}$  target levels may be relaxed by up to 5dB and reasonable internal conditions still achieved. The more often internal  $L_{Aeq}$  levels start to exceed the internal  $L_{Aeq}$  target levels by more than 5dB, the more that most people are likely to regard them as “unreasonable”. Where such exceedances are predicted, applicants should be required to show how the relevant number of rooms affected has been kept to a minimum. Once internal  $L_{Aeq}$  levels exceed the target levels by more than 10dB, they are likely to be regarded as “unacceptable” by most people, particularly if such levels occur more than occasionally. Every effort should be made to avoid relevant rooms experiencing “unacceptable” noise levels at all and where such levels are likely to occur frequently, the development should be prevented in its proposed form (See Section 3.D).

Figure 2. ProPG Internal Noise Level Guidelines (additions to BS8233:2014 shown in blue).

## 10.0 Proposed Design Target Internal Noise Levels

On the basis of BS8233:2014 we propose the following internal noise levels be adopted as design targets in the proposed habitable rooms:

Activity	Location	Desirable Internal Ambient Criteria	
		07:00 – 23:00	23:00 to 07:00
Resting	Living Rooms	35 dB $L_{Aeq,16hour}$	-
Dining	Dining Room/Area	40 dB $L_{Aeq,16hour}$	-
Sleeping (Daytime Resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

Note: For this site the  $L_{Aeq,T}$  noise parameter alone is considered to be sufficient given the character of the noise climate we have measured. This is consistent with Section 2.2.2 of The World Health Organisation Environmental Noise Guidelines for the European Region and Note 4 of Section 7.7.2 of BS8233:2014)

Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target noise levels may be relaxed (subject to the requirements of any planning conditions) by up to 5 dB and reasonable internal conditions still achieved.

## 11.0 Achievable Internal Noise Levels

We have predicted the levels that would be achievable in the worst-case dwellings with windows partially opened and also with windows closed.





## 11.1 Windows Partially Open

It is generally accepted that the typical noise reduction achieved with partially opened windows is around 15dBA (ref. BS 8233:2014 Annex G.1). This value is the difference between dBA levels measured outside and inside typical dwellings, therefore 3dBA should be added to free field noise levels to determine outside levels.

A simple assessment thus indicates the following noise levels may be expected within the proposed worst case habitable rooms with partially opened windows. As a guide, noise data from the Waterman Group survey has also been included, which was from a position representative of the rear of the site.

Description	Predicted Worst Case Internal Noise Levels with Windows Partially Opened			
	Position 5c (Worst case front facing rooms, closest to Camp Road)		Position 7B2 (Rear facing rooms close to warehouses)	
	Daytime L <sub>Aeq</sub> (16-hour)	Night-time L <sub>Aeq</sub> (8-hour)	Daytime L <sub>Aeq</sub> (16-hour)	Night-time L <sub>Aeq</sub> (8-hour)
External measured free field level	65dBA	59dBA	50dBA	47dBA
Distance correction	-5dBA	-5dBA	0dBA	0dBA
Façade correction	3dBA	3dBA	3dBA	3dBA
Façade noise level	63dBA	57dBA	53BA	51BA
Noise reduction for conventional thermal double glazing	-15dBA	-15dBA	-15dBA	-15dBA
Predicted internal noise levels	48dBA	42dBA	38dBA	36dBA

## 11.2 Windows Closed

It is generally accepted that the typical noise reduction achieved by conventional thermal double glazing is 33dBA for road traffic noise. This value is taken from PPG24 (now superseded) and is the difference between dBA levels measured outside and inside typical dwellings, therefore 3dBA should be added to free field noise levels to determine outside levels.

A simple assessment thus indicates the following noise levels may be expected within the proposed worst case dwellings with conventional thermal double glazing.



Description	Predicted Worst Case Internal Noise Levels with Windows Closed			
	Position 5c (Worst case front facing rooms, closest to Camp Road)		Position 7B2 (Rear facing rooms close to warehouses)	
	Daytime L <sub>Aeq</sub> (16-hour)	Night-time L <sub>Aeq</sub> (8-hour)	Daytime L <sub>Aeq</sub> (16-hour)	Night-time L <sub>Aeq</sub> (8-hour)
External measured free field level	65dBA	59dBA	50dBA	47dBA
Distance correction	-5dBA	-5dBA	0dBA	0dBA
Façade correction	3dBA	3dBA	3dBA	3dBA
Façade noise level	63dBA	57dBA	53BA	51BA
Noise reduction for conventional thermal double glazing	-33dBA	-33dBA	-33dBA	-33dBA
Predicted internal noise levels	30dBA	24dBA	20dBA	18dBA

Note: At detailed design stage octave band acoustic specifications will need to be developed, and it will be essential that the prospective glazing/cladding system suppliers can demonstrate compliance with these specifications, rather than simply offering generic glazing configurations as described above.

## 12.0 External Amenity Area

Noise levels in external amenity areas should ideally not be above the range of 50-55dB L<sub>Aeq,16hr</sub>, as stated in BS8233:2014. The design has achieved the lowest practicable noise levels by locating the residential gardens of the closest properties to Camp Road in locations which are screened from the road by the development itself.

Based on the measured noise levels it should be possible for noise levels to be controlled to be within this range as long as all gardens are screened from the road either by buildings or by solid imperforate fences of standing head height or greater with a mass per unit area of at least 10kg/m<sup>2</sup>.

## 13.0 Mitigation Measures

The predicted worst case internal noise levels with windows closed meet the proposed criteria. It is thus demonstrated that acceptable internal noise levels are achievable with conventional double glazing.

The predicted worst case internal noise levels with windows partially opened exceed the proposed target levels (as is often the case), although internal noise levels in rooms at the rear



of the site facing away from the road may meet relaxed criteria (relaxed by 5dB) and reasonable conditions still achieved. The minimum mitigation available to future occupants would be to close their window. We recommend conventional double glazing providing a weighted sound reduction of at least  $R_w30\text{dB}$  is installed along with trickle ventilators providing an element normalised level difference of at least  $D_{\text{new}}32\text{dB}$  to comply with the requirements of the Building Regulations Approved Document F whole dwelling ventilation. The occupants will thus have the option of keeping windows closed for most of the time and opening windows for purge ventilation.

This form of mitigation is supported within the Pro:PG which advises the following:

- 2.34 Where the LPA accepts that there is a justification that the internal target noise levels can only be practically achieved with windows closed, which may be the case in urban areas and at sites adjacent to transportation noise sources, special care must be taken to design the accommodation so that it provides good standards of acoustics, ventilation and thermal comfort without unduly compromising other aspects of the living environment. In such circumstances, internal noise levels can be assessed with windows closed but with façade openings used to provide “*whole dwelling ventilation*” in accordance with Building Regulations Approved Document F (e.g. trickle ventilators) in the open position (see Supplementary Document 2). Furthermore, in this scenario the internal  $L_{\text{Aeq}}$  target noise levels should not generally be exceeded.
- 2.35 It should also be noted that the internal noise level guidelines are generally not applicable under “*purge ventilation*” conditions as defined by Building Regulations Approved Document F, as this should only occur occasionally (e.g. to remove odour from painting and decorating or from burnt food).

## 14.0 Conclusions

A detailed environmental noise survey has been undertaken in order to establish the currently prevailing environmental noise climate around the site.

The environmental noise impact upon the proposed dwellings has been assessed in the context of national and local planning policies.

Appropriate target internal noise levels have been proposed. These are achievable using conventional mitigation measures.

Appropriate target internal noise levels have been proposed. These are achievable using



conventional mitigation measures. Mitigation advice, including the use of suitably specified glazing and ventilation, have been recommended to reduce to a minimum the adverse impact on health and quality life arising from environmental noise.

The assessment shows the site, subject to appropriate mitigation measures, is suitable for residential development in terms of noise.

## Appendix A

The acoustic terms used in this report are defined as follows:

dB	Decibel - Used as a measurement of sound level. Decibels are not an absolute unit of measurement but an expression of ratio between two quantities expressed in logarithmic form. The relationships between Decibel levels do not work in the same way that non-logarithmic (linear) numbers work (e.g. $30\text{dB} + 30\text{dB} = 33\text{dB}$ , not $60\text{dB}$ ).
dBA	<p>The human ear is more susceptible to mid-frequency noise than the high and low frequencies. The 'A'-weighting scale approximates this response and allows sound levels to be expressed as an overall single figure value in dBA. The <sub>A</sub> subscript is applied to an acoustical parameter to indicate the stated noise level is A-weighted</p> <p>It should be noted that levels in dBA do not have a linear relationship to each other; for similar noises, a change in noise level of 10dBA represents a doubling or halving of subjective loudness. A change of 3dBA is just perceptible.</p>
$L_{90,T}$	$L_{90}$ is the noise level exceeded for 90% of the period $T$ (i.e. the quietest 10% of the measurement) and is often used to describe the background noise level.
$L_{eq,T}$	$L_{eq,T}$ is the equivalent continuous sound pressure level. It is an average of the total sound energy measured over a specified time period, $T$ .
$L_{max}$	$L_{max}$ is the maximum sound pressure level recorded over the period stated. $L_{max}$ is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the $L_{eq}$ noise level.
$L_p$	Sound Pressure Level (SPL) is the sound pressure relative to a standard reference pressure of $2 \times 10^{-5}$ Pa. This level varies for a given source according to a number of factors (including but not limited to: distance from the source; positioning; screening and meteorological effects).
$L_w$	Sound Power Level (SWL) is the total amount of sound energy inherent in a particular sound source, independent of its environment. It is a logarithmic measure of the sound power in comparison to a specified reference level (usually $10^{-12}$ W).



# Heyford Park

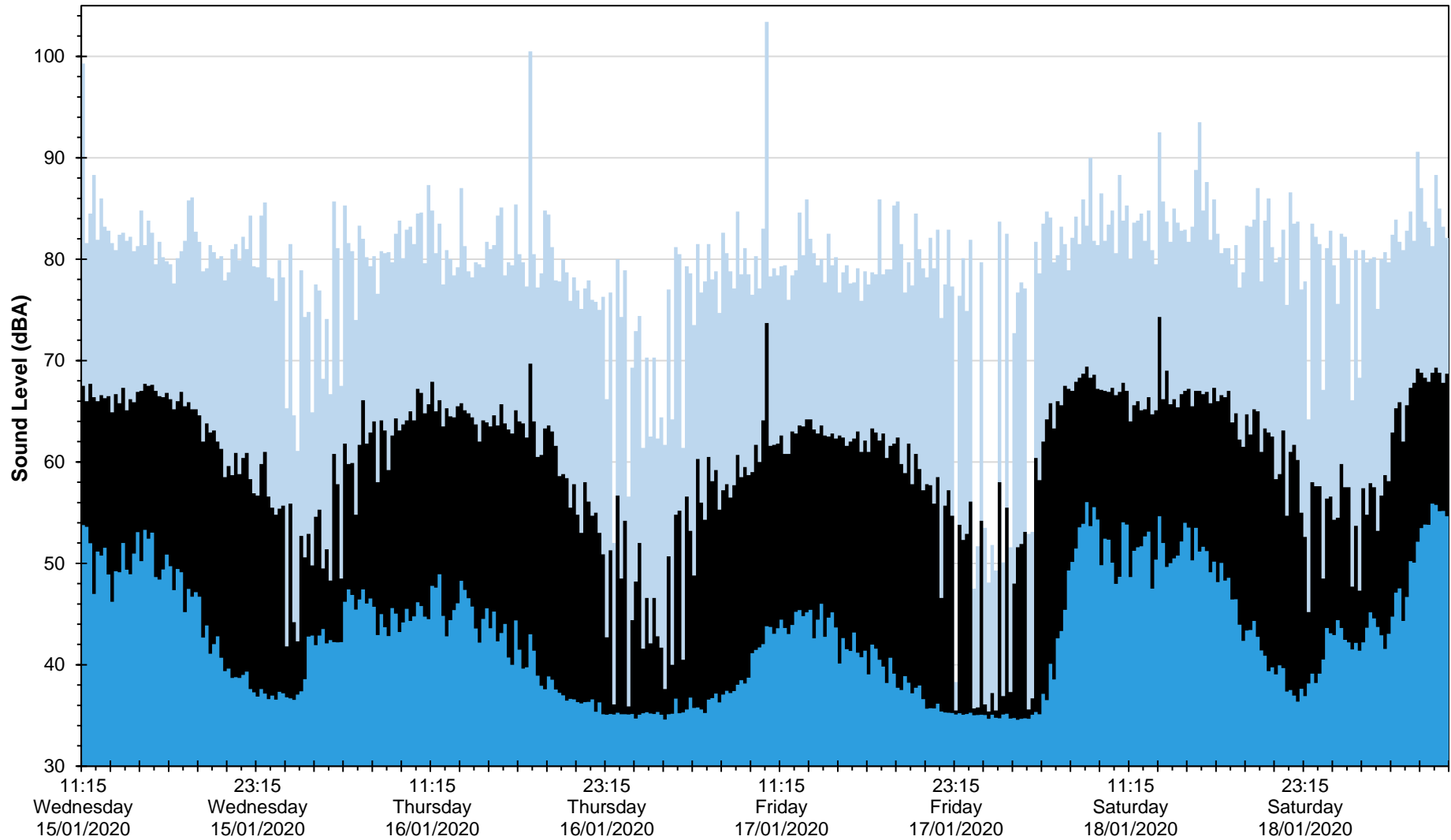
## Phase 5C

$L_{eq}$ ,  $L_{max}$  and  $L_{90}$  Noise Levels

Wednesday 15 January 2020 to Sunday 19 January 2020

■  $L_{max}$  ■  $L_{eq}$

■  $L_{90}$



Date and Time

23195/TH1

# Heyford Park

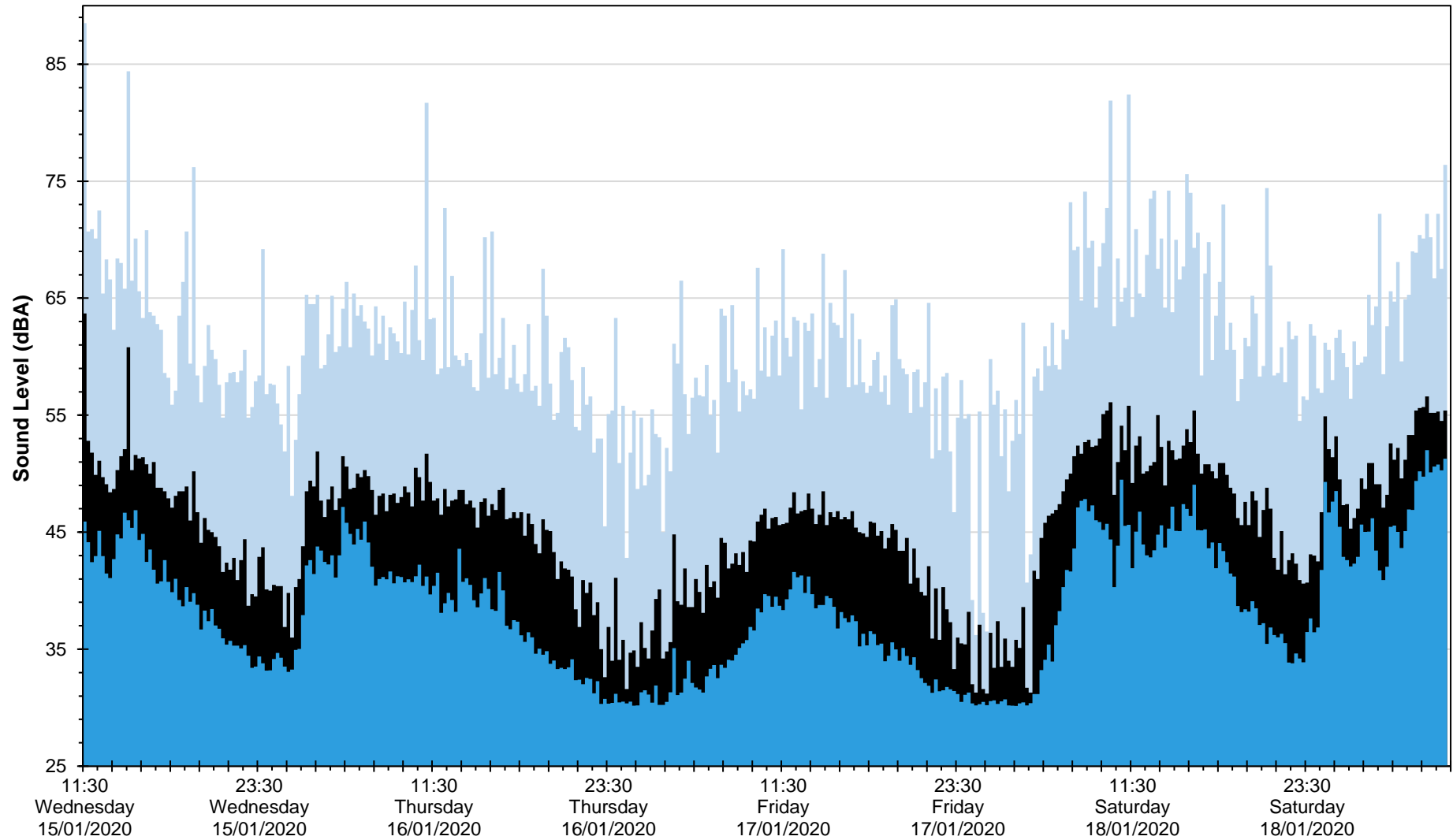
## Phase 7B - Centre

$L_{eq}$ ,  $L_{max}$  and  $L_{90}$  Noise Levels

Wednesday 15 January 2020 to Sunday 19 January 2020

■  $L_{max}$  ■  $L_{eq}$

■  $L_{90}$



Date and Time

23195/TH3

# Heyford Park

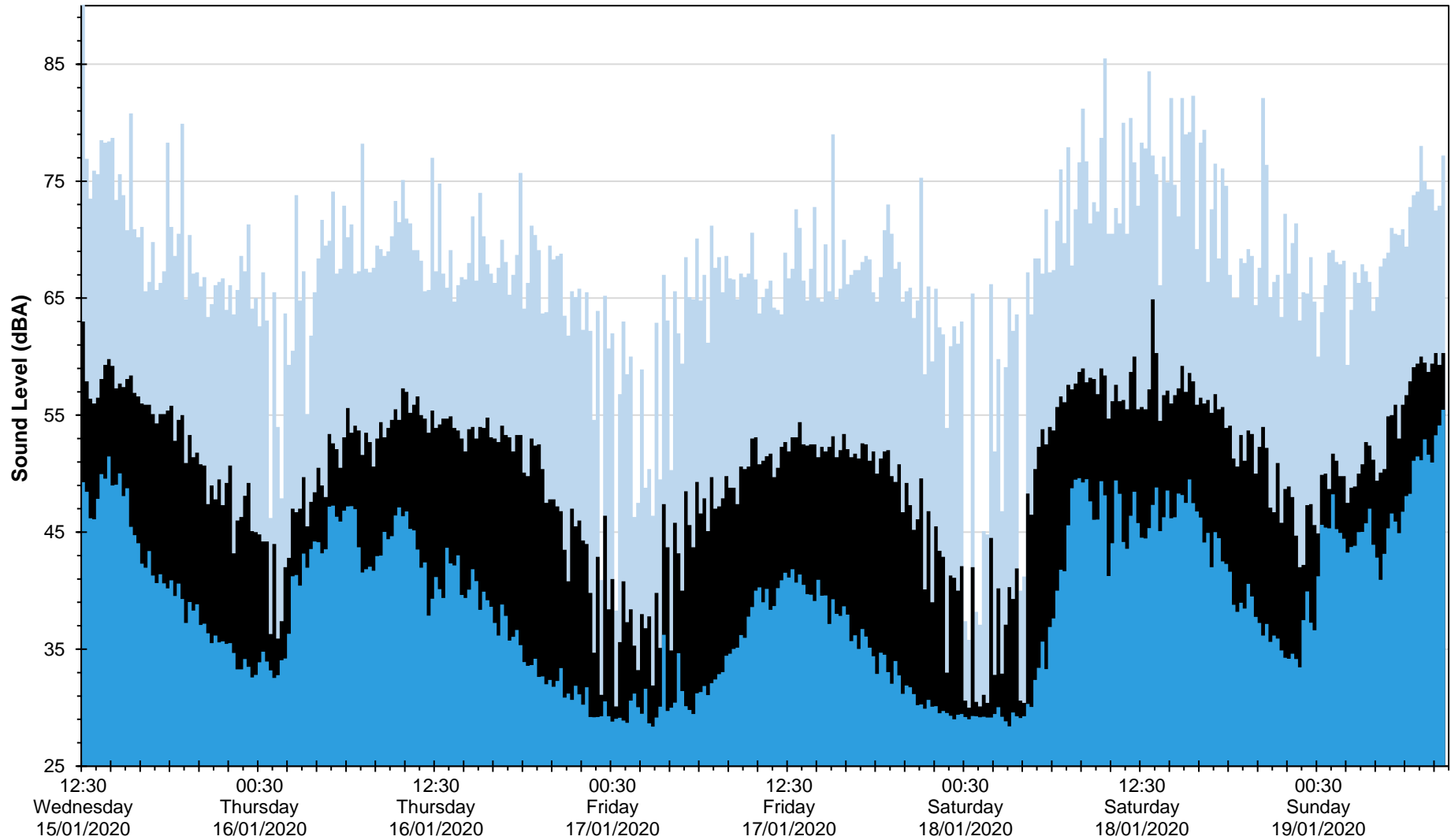
## Phase 7B - Corner

$L_{eq}$ ,  $L_{max}$  and  $L_{90}$  Noise Levels

Wednesday 15 January 2020 to Sunday 19 January 2020

■  $L_{max}$  ■  $L_{eq}$

■  $L_{90}$



Date and Time

23195/TH2