The Old White Bear Pub
Well Road
London

Environmental Noise Survey and Acoustic Design Statement Report

29904/ADS1

25 July 2022

For:
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Document Control

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1.0 Introduction

The existing building at The Old White Bear is proposed to undergo a change of use to a mixed use of commercial and residential (Class E).

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 and noise impact assessment in order to assess the noise from commercial premises on the occupiers of the proposed development.

Based on the results of the survey, to undertake a noise assessment to assess the suitability of the proposed development for residential use in accordance with the NPPF/PPG24 and Local Authority guidance/requirements (to include assessment of noise from adjacent commercial uses).

Based on the results of the sound insulation testing, to undertake a noise assessment to assess the suitability of the proposed development for residential use in accordance with the NPPF/PPG24 and Local Authority guidance/requirements (to include assessment of noise from adjacent commercial uses).

Based upon the Environmental Noise Survey data and suitable recommended internal noise criteria, potential glazing configurations and internal acoustic treatment capable of meeting the criteria will be presented.

To propose plant noise emission criteria to be achieved at noise sensitive locations based on the requirements of the Local Authority.

3.0 Site Description

3.1 Location

The site is located on Well Road in Hampstead, London. The location is shown in the Location Map below.

Location Map (Map data ©2022 Google.)

The site falls within the jurisdiction of the London Borough of Camden.

3.2 Description

The site is an existing 3 storey building located on Well Road in Hampstead, London. The current use is a public house on the ground floor and Class F1 use on the first and second floors. The site is bound by Well Road to the north-east, Grove Place to the north, New End to the West and New End Square to the south-west. The site is surrounded by residential properties with a row of commercial properties also located on Grove Place.

The site is shown in the Site Plan below.

Site Plan (Imagery 2022 © Bluesky, Getmapping plc, Infoterra Ltd & Bluesky, Maxar Technologies, The Geoinformation, Map Data © 2022 Google)

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 Sandy Wilson BSc(Hons).

5.1 Unmanned Survey

5.1.1 Procedure

Fully automated environmental noise monitoring was undertaken from approximately 13:30 hours on 14th June 2022 to 23:30 hours on 18th June 2022.

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

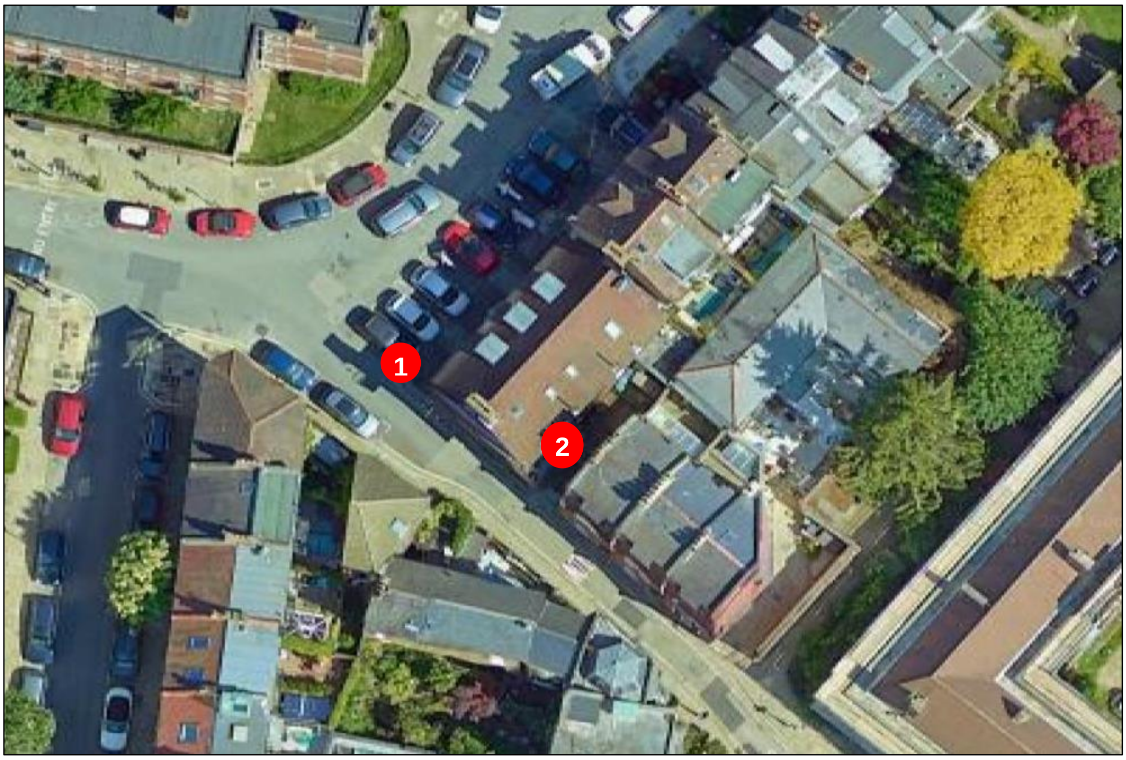
Measurements were taken continuously of the A-weighted (dBA) L90, Leq and Lmax sound pressure levels over 15-minute periods.

5.1.2 Measurement Positions

The noise level measurements were undertaken at 2no. positions as described in the table below.

Position No	Description
1	The microphone was placed in a secure lamppost box approx. 3 metres above ground level. The lamppost box was place on lamppost located on Well Road.
2	A sound level meter was placed to the rear of the property. The microphone was attached to a rail approx. 2 metres above ground level.

The positions are shown on the plan below.



Plan Showing Measurement Positions (Imagery 2022 © Bluesky, Getmapping plc, Infoterra Ltd & Bluesky, Maxar Technologies, The Geoinformation, Map Data © 2022 Google).

5.1.3 Instrumentation

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

Description	Manufacturer	Type	Serial Number	Calibration
Position 2 Type 1 Data Logging Sound Level Meter	Svantek	971	80232	Calibration on 07/10/2021
Position 2 Type 1 ½" Condenser Microphone	ACO Pacific	7052E	67976	Calibration on 07/10/2021
Position 2 Preamp	Svantek	SV18	71473	Calibration on 07/10/2021
Position 2 Type 1 Data Logging Sound Level Meter	Svantek	971	80233	Calibration on 31/01/2022
Position 2 Type 1 ½" Condenser Microphone	ACO Pacific	7052E	67983	Calibration on 31/01/2022
Position 2 Preamp	Svantek	SV18	71464	Calibration on 31/01/2022

Each sound level meter, including the extension cable, was calibrated prior to and on completion of the surveys. No significant changes were found to have occurred (no more than 0.1 dB).

Each sound level meter was located in an environmental case with the microphone connected to the sound level meter via an extension cable. Each microphone was fitted with a windshield.

6.0 Results

6.1 Results of Unmanned Survey

The results have been plotted on Time History Graphs 29904/TH1 to 29904/TH2 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.

6.1.1 L_{eq} Noise Levels

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 daytime $L_{Aeq(16\text{-}hour)}$ and night-time $L_{Aeq(8\text{-}hour)}$ noise levels for each position are presented in the tables below.

Position	Daytime $L_{Aeq(16\text{-}hour)}$	Night-Time $L_{Aeq(8\text{-}hour)}$
1	64dB	47dB
2	65dB	56dB

6.1.1 L_{A90} Noise Levels

The lowest $L_{A90\ (15\ min)}$ measurements recorded during the survey are presented in the table below:

Position	Modal Measured $L_{A90(15min)}$ Background Noise Level (dB re 2 x 10^{-5} Pa)		
	Daytime (07:00 – 23:00) Hours	Night-Time (23:00 – 07:00) Hours	24 Hours
1	47dB	33dB	33dB
2	57dB	54dB	54dB

6.2 Results of Sound Insulation Testing

The testing was carried out by Sandy Wilson BSc(Hons).

6.2.1 Equipment

Description	Manufacturer	Type	Serial Number	Calibration
Type 1 ½" Condenser Microphone	ACO Pacific	7052E	71752	Calibration on 17/08/2020
Type 1 Preamp	Bruel & Kjaer	ZC0032	27782	Calibration on 17/08/2020
Type 1 Data Logging Sound Level Meter	Bruel & Kjaer	2250	3025254	Calibration on 17/08/2020
SLM Calibrator	Bruel & Kjaer	4231	2308993	Calibration on 27/08/2021
Tapping Machine	Norsonic	211A	25243	Calibration on 24/06/2021

Noise Source - Custom made, un-ported sealed cabinet type	N/A	N/A	N/A	N/A

6.2.2 Airborne Sound Insulation Test Method (Separating Walls)

Hann Tucker Associates attended site on 15th July 2022, to undertake airborne sound insulation tests to selected separating wall constructions. The tests were undertaken in full accordance with BS EN ISO 140-4:1998 Acoustics – Measurement of airborne sound insulation in buildings and of building elements – Part 4: Field measurement of airborne sound insulation between rooms.

The sound level differences were determined by generating a broad band, random diffuse sound field within the source room. A spatial average of the resulting $^1/_3$ octave band noise levels was obtained within the source room from measurements undertaken over a time period of a least 30 seconds. The measurement procedure was repeated in the receive room. A second speaker position was then selected in the source room and the measurement procedure was repeated.

The receive levels were corrected for background noise where necessary as follows:

Where the measured background noise level in each 1/3rd octave band was more than 6dB but less than 10dB below the receive level, the following formula was applied:

$$L = 10\log\left(10^{\frac{L_{SB}}{10}} - 10^{\frac{L_B}{10}}\right) \text{ dB}$$

where

L is the adjusted signal level in decibels;

L_{SB} is the level of the signal and background noise levels combined, in decibels;

L_B is the background level in decibels.

Where the measured background noise level was less than 6dB below the receive level, a correction of 1.3dB was applied (corresponding to a level difference of 6dB) and the ≥ symbol was added to the results to show that the reported values are the limit of measurement.

The corrected receive levels are subtracted from the source levels to determine the level differences over the frequency range 100-3150Hz from each source position. The level differences for each source position are arithmetically averaged at each frequency band to give the level difference, D.Reverberant decays were then recorded in the receive room to determine the reverberation times over the same frequency range using a broadband noise source. For each receiver room 6No. measurements were made, comprising of 2No. source positions and 3No. microphone positions per source position. The reverberation time, T, used in subsequent calculations is an average of the 2No. source positions.

Having established $^1/_3$ octave band level differences and reverberation times over the frequency range 100-3150Hz, the Standardised Level Difference, $D_{nT,}$ is calculated for each $^1/_3$ octave band by applying the following formula:

$$D_{nT} = D + 10\log_{10}\left(\frac{T}{T_0}\right)$$

where T_0=0.5 seconds

The $^1/_3$ octave band results are then compared with a standard curve using the method described in BS EN ISO 717-1: 1997 to determine the single figure descriptor of airborne sound insulation, the Weighted Standardised Level Difference, or $D_{nT,w}$.

The $^1/_3$ octave band results are also weighted using spectrum adaptation term no.2, C_{tr}, as detailed in BS EN ISO 717-1: 1997, to allow a more rigorous assessment of sound insulation performance with respect to low frequency noise.

The Weighted Standardised Level Difference and spectrum adaptation term are then added to give $D_{nT,w} + C_{tr}$, allowing comparison with the minimum airborne sound insulation requirements of Approved Document E.

6.2.3 Airborne Sound Insulation Test Method (Separating Floors)

Hann Tucker Associates attended site on 15th July 2022, to undertake airborne sound insulation tests to selected separating floor constructions. The tests were undertaken in full accordance with BS EN ISO 140-4:1998 Acoustics – Measurement of airborne sound insulation in buildings and of building elements – Part 4: Field measurement of airborne sound insulation between rooms.

The sound level differences were determined by generating a broad band, random diffuse sound field within the source room. A spatial average of the resulting $^1/_3$ octave band noise levels was obtained within the source room from measurements undertaken over a time period of a least 30 seconds. The measurement procedure was repeated in the receive room. A second speaker position was then selected in the source room and the measurement procedure was repeated.

The receive levels were corrected for background noise where necessary as follows:

Where the measured background noise level in each 1/3rd octave band was more than 6dB but less than 10dB below the receive level, the following formula was applied:

$$L = 10\log\left(10^{\frac{L_{SB}}{10}} - 10^{\frac{L_B}{10}}\right) \text{ dB}$$

where

L is the adjusted signal level in decibels;

L_{SB} is the level of the signal and background noise levels combined, in decibels;

L_B is the background level in decibels.

Where the measured background noise level was less than 6dB below the receive level, a correction of 1.3dB was applied (corresponding to a level difference of 6dB) and the ≥ symbol was added to the results to show that the reported values are the limit of measurement.

The corrected receive levels are subtracted from the source levels to determine the level differences over the frequency range 100-3150Hz from each source position. The level differences for each source position are arithmetically averaged at each frequency band to give the level difference, D.

Reverberant decays were then recorded in the receive room to determine the reverberation times over the same frequency range using a broadband noise source. For each receiver room 6No. measurements were made, comprising of 2No. source positions and 3No. microphone positions per source position. The reverberation time, T, used in subsequent calculations is an average of the 2No. source positions.

Having established $^{1}/_{3}$ octave band level differences and reverberation times over the frequency range 100-3150Hz, the Standardised Level Difference, D_{nT}, is calculated for each $^{1}/_{3}$ octave band by applying the following formula:

$$D_{nT} = D + 10\log_{10}\left(\frac{T}{T_0}\right)$$

where T_0=0.5 seconds

The $^1/_3$ octave band results are then compared with a standard curve using the method described in BS EN ISO 717-1: 1997 to determine the single figure descriptor of airborne sound insulation, the Weighted Standardised Level Difference, or $D_{nT,w}$.

The $^1/_3$ octave band results are also weighted using spectrum adaptation term no.2, C_{tr}, as detailed in BS EN ISO 717-1: 1997, to allow a more rigorous assessment of sound insulation performance with respect to low frequency noise.

The Weighted Standardised Level Difference and spectrum adaptation term are then added to give $D_{nT,w}$ + C_{tr}, allowing comparison with the minimum airborne sound insulation requirements of Approved Document E.

6.2.4 Impact Sound Insulation Test Method (Separating Floors)

Hann Tucker Associates also undertook impact sound insulation tests on the selected separating floor constructions. The tests were undertaken in full accordance with BS EN ISO 140-7:1998 Acoustics – Measurement of sound insulation in buildings and of building elements – Part 7: Field measurements of impact sound insulation of floors.

A tapping machine (meeting the requirements of BS EN ISO 140-7:1998, Annex A) was located at four positions in each source room. The machine generated a sound field in the room underneath (receive room) by means of dropping 5, ½kg hammers in sequence onto the floor at 0.1 second intervals.

A spatial average of the resulting $^1/_3$ octave band noise levels was obtained within the receive room from measurements undertaken over a time period of a least 30 seconds for each of the 4 source positions. The 4 No. resulting receive levels were logarithmically averaged at each $^1/_3$ octave frequency band to give the receive level L.

The receive levels were corrected for background noise where necessary as follows:

Where the measured background noise level in each 1/3rd octave band was more than 6dB but less than 10dB below the receive level, the following formula was applied:

$$L = 10\log\left(10^{\frac{L_{SB}}{10}} - 10^{\frac{L_B}{10}}\right) \text{ dB}$$

where

L is the adjusted signal level in decibels;

L_{SB} is the level of the signal and background noise levels combined, in decibels;

L_B is the background level in decibels.

Where the measured background noise level was less than 6dB below the receive level, a correction of 1.3dB was applied (corresponding to a level difference of 6dB) and the ≤ symbol was added to the results to show that the reported values are the limit of measurement.

Reverberant decays were then recorded in the receive room to determine the reverberation times over the same frequency range using a broadband noise source. For each receiver room 6No. measurements were made, comprising of 2No. source positions and 3No. microphone positions per source position. The reverberation time, T, used in subsequent calculations is an average of the 2No. source positions.

Having established the $^1/_3$ octave impact sound pressure levels and reverberation times over the frequency range 100-3150Hz, the standardized Impact Sound Level is calculated for each $^1/_3$ octave by applying the following formula:

$$L'_{nT} = L - 10\log_{10}\left(\frac{T}{T_0}\right)$$

where T_0 = 0.5 seconds

The $^1/_3$ octave band results are then compared with a standard curve using the method described in BS EN ISO 717-2: 1997 to determine the single figure descriptor of impact sound insulation, the Weighted Standardised Impact Sound Pressure Level, or $L'_{nT,w}$.

6.2.5 Test Locations

The following airborne wall tests were undertaken:

Test	Source Room		Receive Room	
	Location	Approximate Volume	Location	Approximate Volume
AW1	*Classroom (1st Floor)	60m³	*Classroom (1st Floor)	50m³

*Partition contained a door

The following airborne floor tests were undertaken:

Test	Source Room		Receive Room	
	Location	Approximate Volume	Location	Approximate Volume
AF1	Bar Area	100m³	Classroom (1st Floor)	50m³
AF2	Classroom (2nd Floor)	80m³	Classroom (1st Floor)	50m³

The following impact tests were undertaken:

Test	Source Room		Receive Room	
	Location	Approximate Volume	Location	Approximate Volume
IF1	Classroom (1st Floor)	100m³	Bar Area	50m³
IF2	Classroom (2nd Floor)	80m³	Classroom (1st Floor)	50m³

6.2.6 Requirements Of Approved Document E

To satisfy Requirement E1 of Approved Document E: 2003 Edition, the following sound insulation values should be achieved:-

Table 1a: Dwellings – performance standards for separating floors, and stairs that have a separating function.		
	Airborne Sound Insulation $D_{nT,w} + C_{tr}$ dB (Minimum Values)	Impact Sound Insulation $L'_{nT,w}$ dB (Maximum Values)
Dwellings formed by material change of use		
Floors and stairs	43	64

Therefore the minimum value of weighted standardised level difference ($D_{nT,w}$) plus the spectrum adaptation curve (C_{tr}) as defined in BS EN ISO 717-1: 1997 specified in Approved Document E: 2003 Edition: Sound Insulation Standards for airborne sound tests is 43dB for dwellings formed by material change of use.

The maximum values of weighted standardised impact sound pressure level ($L'_{nT,w}$) as defined in BS EN ISO 717-2: 1997 specified in Approved Document E: 2003 Edition: Sound Insulation Standards for impact sound tests on dwellings formed by material change of use is 64dB.

6.2.7 Results

The following tables summarise our findings:

Airborne Tests Across Separating Walls	$D_{nT,w} + C_{tr}$ Test Result*
AW1	31dB

*Tests results including the ≥ symbol are background limited

Airborne Tests Across Separating Floors	$D_{nT,w} + C_{tr}$ Test Result*
AF1	56dB
AF2	50dB

*Tests results including the ≥ symbol are background limited

Impact Tests Across Separating Floors	$L'_{nT,w}$ Test Result*
IF1	47dB
IF2	56dB

*Tests results including the ≤ symbol are background limited

7.0 Discussion of Noise Climate

The dominant noise sources were noted to be road traffic from Well Road and existing plant from the Old White Bear Pub.

8.0 Acoustic Standards, Relevant Planning Policies and Guidelines

8.1 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.

8.2 National Planning Policy Framework (NPPF)

The following paragraphs are from the NPPF (published July 2021):

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;

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.

187. 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 185 also references the Noise Policy Statement for England (NPSE). 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."
-

8.3 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	

Perception	Examples of Outcomes	Increasing effect level	Action
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

8.4 The London Plan (2021)

The London Plan was published March 2021.

Policy D14 Noise states:

A. *"In order to reduce, manage and mitigate noise to improve health and quality of life, residential and other non-aviation development proposals should manage noise by:*

1) *avoiding significant adverse noise impacts on health and quality of life*
2) *reflecting the Agent of Change principle as set out in Policy D13*
3) *mitigating and minimising the existing and potential adverse impacts of noise on, from, within, as a result of, or in the vicinity of new development without placing unreasonable restrictions on existing noise-generating uses*
4) *improving and enhancing the acoustic environment and promoting appropriate soundscapes (including Quiet Areas and spaces of relative tranquillity)*
5) *separating new noise-sensitive development from major noise sources (such as road, rail, air transport and some types of industrial use) through the use of distance, screening, layout, orientation, uses and materials – in preference to sole reliance on sound insulation*
6) *where it is not possible to achieve separation of noise-sensitive development and noise sources without undue impact on other sustainable development objectives, then any potential adverse effects should be controlled and mitigated through applying good acoustic design principles*

7) *promoting new technologies and improved practices to reduce noise at source, and on the transmission path from source to receiver.*

B. *Boroughs, and others with relevant responsibilities, should identify and nominate new Quiet Areas and protect existing Quiet Areas in line with the procedure in Defra's Noise Action Plan for Agglomerations.*

3.14.1 The ***management of noise*** *is about encouraging the right acoustic environment, both internal and external, in the right place at the right time. This is important to promote good health and a good quality of life within the wider context of achieving sustainable development. The management of noise should be an integral part of development proposals and considered as early as possible. Managing noise includes improving and enhancing the acoustic environment and promoting appropriate soundscapes. This can mean allowing some places or certain times to become noisier within reason, whilst others become quieter. Consideration of existing noise sensitivity within an area is important to minimise potential conflicts of uses or activities, for example in relation to internationally important nature conservation sites which contain noise sensitive wildlife species, or parks and green spaces affected by traffic noise and pollution. Boroughs, developers, businesses and other stakeholders should work collaboratively to identify the existing noise climate and other noise issues to ensure effective management and mitigation measures are achieved in new development proposals.*

3.14.2 The ***Agent of Change Principle*** *places the responsibility for mitigating impacts from existing noise-generating activities or uses on the new development. Through the application of this principle existing land uses should not be unduly affected by the introduction of new noise sensitive uses. Regard should be given to noise-generating uses to avoid prejudicing their potential for intensification or expansion.*

3.14.3 The management of noise also includes promoting ***good acoustic design of the inside of buildings****. Section 5 of BS 8223:2014 provides guidance on how best to achieve this. The Institute of Acoustics has produced advice Pro:PG Planning and Noise (May 2017) that may assist with the implementation of residential developments. BS4214 provides guidance on monitoring noise issues in mixed residential/industrial areas.*

3.14.4 Deliberately ***introducing sounds*** *can help mitigate the adverse impact of existing sources of noise, enhance the enjoyment of the public realm, and help protect the relative tranquillity and quietness of places where such features are valued. For* *example, playing low-level music outside the entrance to nightclubs has been found to reduce noise from queueing patrons, leading to an overall reduction in noise levels. Water features can be used to reduce the traffic noise, replacing it with the sound of falling water, generally found to be more pleasant by most people.*

3.14.5 Heathrow and London City Airport Operators have responsibility for noise action plans for airports. Policy T8 Aviation sets out the Mayor's approach to ***aviation-related development****.*

3.14.6 The definition of ***Tranquil Areas, Quiet Areas and spaces of relative tranquillity*** *are matters for London boroughs. These are likely to reflect the specific context of individual boroughs, such that Quiet Areas in central London boroughs may reasonably be expected not to be as quiet as Quiet Areas in more residential boroughs. Defra has identified parts of Metropolitan Open Land and local green spaces as potential Quiet Areas that boroughs may wish to designate."*

8.5 Local Planning Policy

The site lies within the jurisdiction of Camden City Council. The criteria for commercial/industrial noise sources as follows:

"Industrial and Commercial Noise Sources

A relevant standard or guidance document should be referenced when determining values for LOAEL and SOAEL for non-anonymous noise. Where appropriate and within the scope of the document it is expected that British Standard 4142:2014 'Methods for rating and assessing industrial and commercial sound' (BS 4142) will be used. For such cases a 'Rating Level' of 10 dB below background (15dB if tonal components are present) should be considered as the design criterion).

Table C: Noise levels applicable to proposed industrial and commercial developments (including plant and machinery)

Existing Noise sensitive receptor	Assessment Location	Design Period	LOAEL(Green)	LOAEL to SOAEL(Amber)	SOAL(Red)
Dwellings**	Garden used for main amenity (free field) and Outside living or dining or	Day	'Rating level' 10dB* below background	'Rating level' between 9dB below and 5dB above background	'Rating level' greater than 5dB above background

	bedroom window (façade)				
Dwellings**	Outside bedroom window (façade)	Night	'Rating level' 10dB* below background and no events exceeding 57dBL$_{Amax}$	'Rating level' between 9dB below and 5dB above background or noise events between 57dB and 88dB L$_{Amax}$	'Rating level' greater than 5dB above background and/or events exceeding 88dBL$_{Amax}$

*10dB should be increased to 15dB if the noise contains audible tonal elements. (day and night). However, if it can be demonstrated that there is no significant difference in the character of the residual background noise and the specific noise from the proposed development then this reduction may not be required. In addition, a frequency analysis (to include, the use of Noise Rating (NR) curves or other criteria curves) for the assessment of tonal or low frequency noise may be required.

**levels given are for dwellings, however, levels are use specific and different levels will apply dependent on the use of the premises.

The periods in Table C correspond to 0700 hours to 2300 hours for the day and 2300 hours to 0700 hours for the night. The Council will take into account the likely times of occupation for types of development and will be amended according to the times of operation of the establishment under consideration.

There are certain smaller pieces of equipment on commercial premises, such as extract ventilation, air conditioning units and condensers, where achievement of the rating levels (ordinarily determined by a BS:4142 assessment) may not afford the necessary protection. In these cases, the Council will generally also require a NR curve specification of NR35 or below, dependant on the room (based upon measured or predicted Leq,5mins noise levels in octave bands) 1 metre from the façade of affected premises, where the noise sensitive premise is located in a quiet background area."

8.6 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 $L_{Aeq, 16h}$	53 dB L_{den}
	30 $L_{Aeq, 8h}$	45 dB L_{night}
Railway noise	35 $L_{Aeq, 16h}$	54 dB L_{den}
	30 $L_{Aeq, 8h}$	44 dB L_{night}
Aircraft noise	35 $L_{Aeq, 16h}$	45 dB L_{den}
	30 $L_{Aeq, 8h}$	40 dB L_{night}

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."

8.7 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.

8.7.1 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 nigh or News 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."

8.8 BS 4142:2014

When setting plant noise emission criteria reference is often made to BS 4142: 2014 "*Methods for rating and assessing industrial and commercial sound".*

The procedure contained in BS 4142:2014 provides an assessment of the likely effects of sound on people when comparing the specific noise levels from the source with representative background noise levels. Where the noise contains "a tone, impulse or other characteristic" then various corrections can be added to the specific (source) noise level to obtain the "rating level".

BS 4142 states that: *"The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs". An estimation of the impact of the specific noise can be obtained by the difference of the rating noise level and the background noise level and considering the following:*

• *"Typically, the greater this difference, the greater the magnitude of the impact."*

• *"A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context."*

• *"A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context."*

• *"The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context."*

The determination of the "rating level" and the "background level" are both open to interpretation, depending on the context.

In summary it is not possible to set plant noise emission criteria purely on the basis of BS 4142:2014. It is reasonable to infer from the above, however, that a difference of around -5dB corresponds to "No Observed Effect Level" as defined in the Noise Policy Statement for England. It is also reasonable to infer from the above that if the plant noise rating level does not exceed the existing background noise level outside any noise sensitive residential window then the plant noise is of "low impact".

8.9 Statutory Noise Nuisance

There is no quantitative definition of statutory noise nuisance. It is generally accepted however, that if the measured dBA L_{eq} plant noise level is at least 5dBA (or 10dBA if tonal) below the minimum background $L_{90(15minutes)}$ at 1m from the nearest noise sensitive window, then the risk of a statutory noise nuisance is avoided. By adopting this as a design criterion the guidance contained in BS 4142:2014 should also be complied with.

8.10 ProPG : Planning & Noise : 2017

8.10.1 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".

8.10.2 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.

8.10.3 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.

8.10.4 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".

8.10.5 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 $L_{Aeq,16hr}$	-
Dining	Dining Room / Area	40dB $L_{Aeq,16hr}$	-

Activity	Location	07:00 – 23:00 Hours	23:00 – 07:00 Hours
Sleeping (daytime resting)	Bedroom	35dB $L_{Aeq,16hr}$	30dB $L_{Aeq,16hr}$

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.

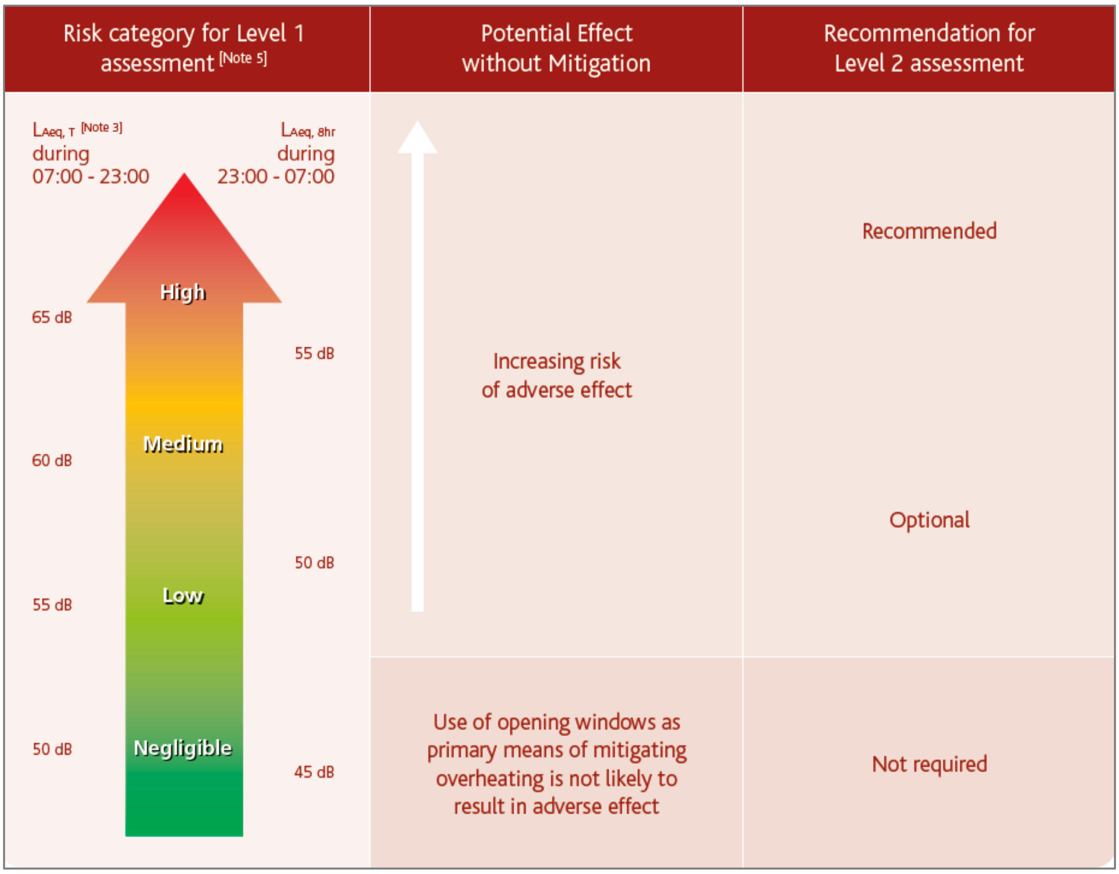
NOTE 7 Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal L_{Aeq} target levels may be relaxed by up to 5dB and reasonable internal conditions still achieved. The more often internal L_{Aeq} levels start to exceed the internal L_{Aeq} 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).

8.11 Acoustics Ventilation and Overheating – Residential Design Guide (AVO)

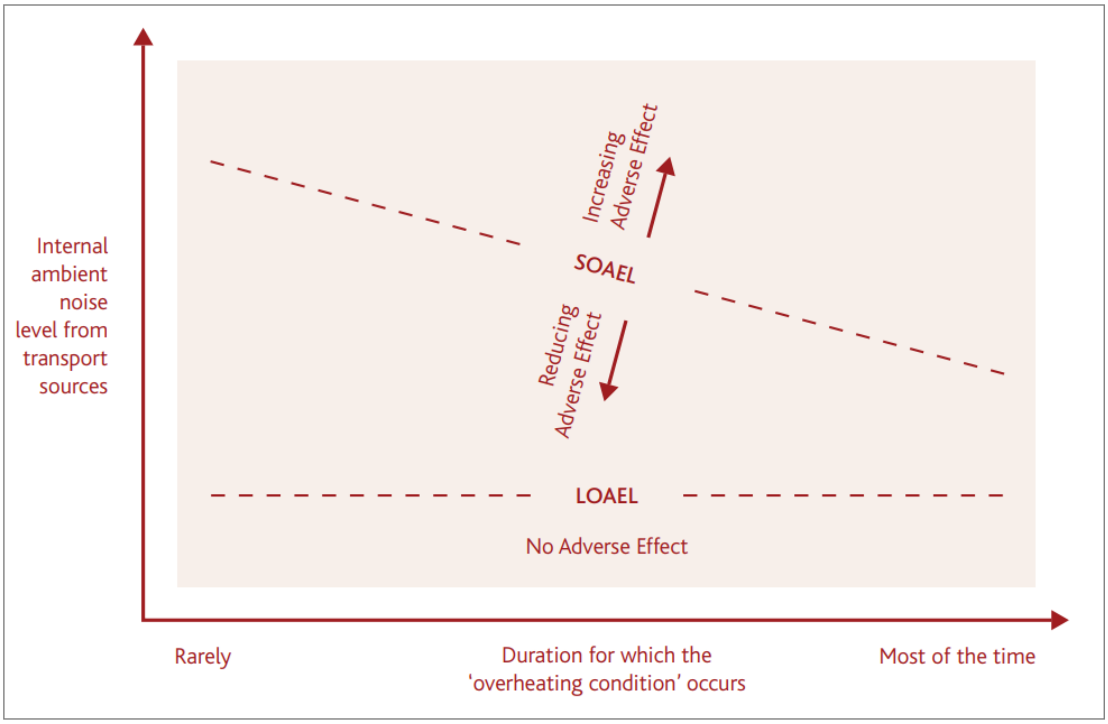
The Association of Noise Consultants (ANC) and the Institute of Acoustics (IOA) published the Acoustics Ventilation and Overheating – Residential Design Guide (AVO) in January 2020). This provides guidance on the interdependence between acoustics, ventilation and overheating.

The guidance recommends a two-level assessment to estimate the potential impact on occupants in the case of windows being open to mitigate overheating. The Level 1 assessment relates to the levels of incident environmental noise across a proposed site. The site can be put into "risk categories" depending on the levels of external noise as set out below:



Where a Level 2 assessment is recommended the AVO guide states that the Significant Observed Adverse Effect Level (SOAEL), which is the noise level above which significant adverse effects on health and quality of life occur, is dependent on how frequently and for what duration the overheating condition occurs (i.e. how often the windows need to be open to mitigate overheating). However, the document refers to the overheating condition being “rare” or “most of the time” rather than providing specific durations; therefore this is open to interpretation.

The graph presented below demonstrates how the SOAEL changes depending on how often the windows are required to be open to mitigate overheating.



© ANC 2020. Acoustics Ventilation and Overheating Residential Design Guide

Based on the above, the SOAEL in a Level 2 assessment will change depending on how often the overheating condition occurs.

8.12 Building Regulations Approved Document O

Building Regulations Approved Document O relates to setting standards for overheating in new residential buildings. It aims to protect the health and welfare of occupants of the building by reducing the occurrence of high indoor temperatures.

Requirement O1 of Approved Document O is met by designing and constructing the building to achieve both of the following:

a. Limiting unwanted solar gains in summer.

b. Providing an adequate means of removing excess heat from the indoor environment.

Sections 3.2 to 3.4 of this document relate to noise and state 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.

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

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

Where in-situ noise measurements are used as evidence that these limits are not exceeded, measurements should be taken in accordance with the Association of Noise Consultants' Measurement of Sound Levels in Buildings with the overheating mitigation strategy in use.

***NOTE:** Guidance on reducing the passage of external noise into buildings can be found in the National Model Design Code: Part 2 – Guidance Notes (MHCLG, 2021) and the Association of Noise Consultants' Acoustics, Ventilation and Overheating: Residential Design Guide (2020).*

9.0 Target Internal Noise Levels

On the basis of BS8233:2014 and ProPG the following internal noise levels are considered to be reasonable design targets for 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 external noise levels are above WHO guidelines, the internal target noise levels may be relaxed (as per Note 7 of Section 7.7.2 of BS8233:2014) by up to 5 dB and reasonable internal conditions still achieved.

The above design targets are subject to the requirements of any planning conditions.

10.0 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.

10.1 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.

Description	Predicted Worst Case Internal Noise Levels with Windows Partially Opened			
	Position 1		Position 2	
	Daytime $L_{Aeq(16\text{-}hour)}$	Night-time $L_{Aeq(8\text{-}hour)}$	Daytime $L_{Aeq(16\text{-}hour)}$	Night-time $L_{Aeq(8\text{-}hour)}$
Façade noise level	*67dBA	*50dBA	65dBA	56dBA
Noise reduction for conventional thermal double glazing	-15dBA	-15dBA	-15dBA	-15dBA
Predicted internal noise levels	52dBA	35dBA	50dBA	41dBA

*Contains a façade correction (+3dBA)

10.2 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 1		Position 2	
	Daytime $L_{Aeq(16\text{-}hour)}$	Night-time $L_{Aeq(8\text{-}hour)}$	Daytime $L_{Aeq(16\text{-}hour)}$	Night-time $L_{Aeq(8\text{-}hour)}$
Façade noise level	*67dBA	*50dBA	65dBA	56dBA
Noise reduction for conventional thermal double glazing	-33dBA	-33dBA	-33dBA	-33dBA
Predicted internal noise levels	34dBA	17dBA	32dBA	23dBA

*Contains a façade correction (+3dBA)

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.

11.0 Internal Noise Breakout

There is potential for noise transfer from the bar areas on the ground floor to affect the proposed residential areas on the first floor.

11.1 Separating Floor

Sound insulation testing between the ground and first floor areas was undertaken on Friday 15th July 2022. The results can be found in section 6.2.7.

11.2 Ground Floor Noise Levels

The ground floor is to comprise of a bar area with the dominant noise source is likely to be the patrons talking. The following noise levels are based on measurements undertaken by Hann Tucker Associates in a similar sized bar/pub.

Lmax Sound Pressure Level (dB re 2 x 10^{-5} Pa) at Octave Band Centre Frequency (Hz)				
125	**250**	**500**	**1k**	**2k**
80	81	81	79	79

11.3 Noise Impact Assessment

Our calculations are based on the following equation;

$L_{p2} = L_{p1} - D$

where

L_{p1} = source noise level (based on assumptions made above)

D = level difference of floor established from sound insulation test

L_{p2} = resultant noise level (first floor)

Our findings are presented below.

	Sound Pressure Level (dB re 2 x 10^{-5}Pa at Octave Centre Band Frequency (Hz)					dBA
	125	250	500	1k	2k	
L_{p1}	80	81	81	79	79	84
D	42	49	55	59	63	
L_{p2}	38	32	26	20	16	29

The above demonstrates that the internal noise levels required by the Local Authority should be achievable with the existing floor construction.

12.0 Plant Noise Emission Criteria

Building services plant external noise emission levels will need to comply with local planning requirements and statutory noise nuisance legislation.

On the basis of Section 8.5 and the results of the environmental noise survey, we propose that the following plant noise emission criteria be achieved at 1 metre from the nearest noise sensitive residential windows:

Position	Noise Emission Limit (dBA)		
	Daytime (07:00 – 23:00 hours)	Night-time (23:00 – 07:00 hours)	24 hours
1	37dB	23dB	23dB
2	47dB	44dB	44dB

The above criteria are to be achieved with all of the proposed plant operating simultaneously.

It should be noted that the above are subject to the final approval of the Local Authority.

For life safety standby plant, only used in emergencies and occasional testing - e.g. smoke extract fans and life safety generators - relaxations of the internal and external criteria are normally acceptable but should comply with local authority and occupational requirements and must not interfere with internal audible emergency alarms.

13.0 Conclusions

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

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

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

Plant noise emission criteria have been recommended based on the results of the noise survey and with reference to the Local Authority's advice and relevant guidance.

This assessment shows noise should not be a planning issue.

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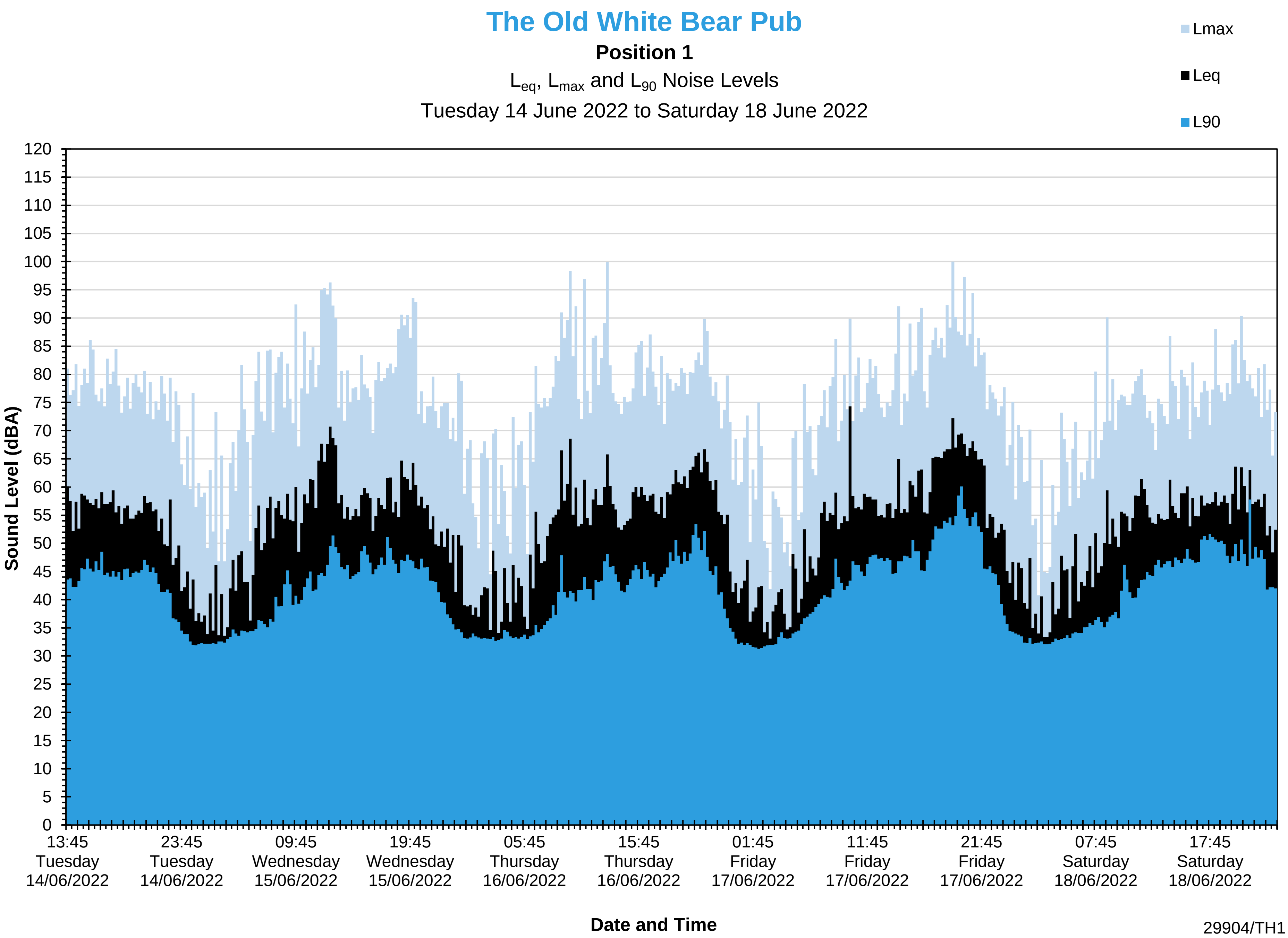
Appendix A

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. 30dB + 30dB = 33dB, not 60dB).
dBA	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 $_A$ subscript is applied to an acoustical parameter to indicate the stated noise level is A-weighted 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.
$L_{90,T}$	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 x 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).


The Old White Bear Pub
Position 1
Leq, Lmax and L90 Noise Levels
Tuesday 14 June 2022 to Saturday 18 June 2022
Lmax
Leq
L90
Sound Level (dBA)
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
85
90
95
100
105
110
115
120
13:45 Tuesday 14/06/2022
23:45 Tuesday 14/06/2022
09:45 Wednesday 15/06/2022
19:45 Wednesday 15/06/2022
05:45 Thursday 16/06/2022
15:45 Thursday 16/06/2022
01:45 Friday 17/06/2022
11:45 Friday 17/06/2022
21:45 Friday 17/06/2022
07:45 Saturday 18/06/2022
17:45 Saturday 18/06/2022
Date and Time

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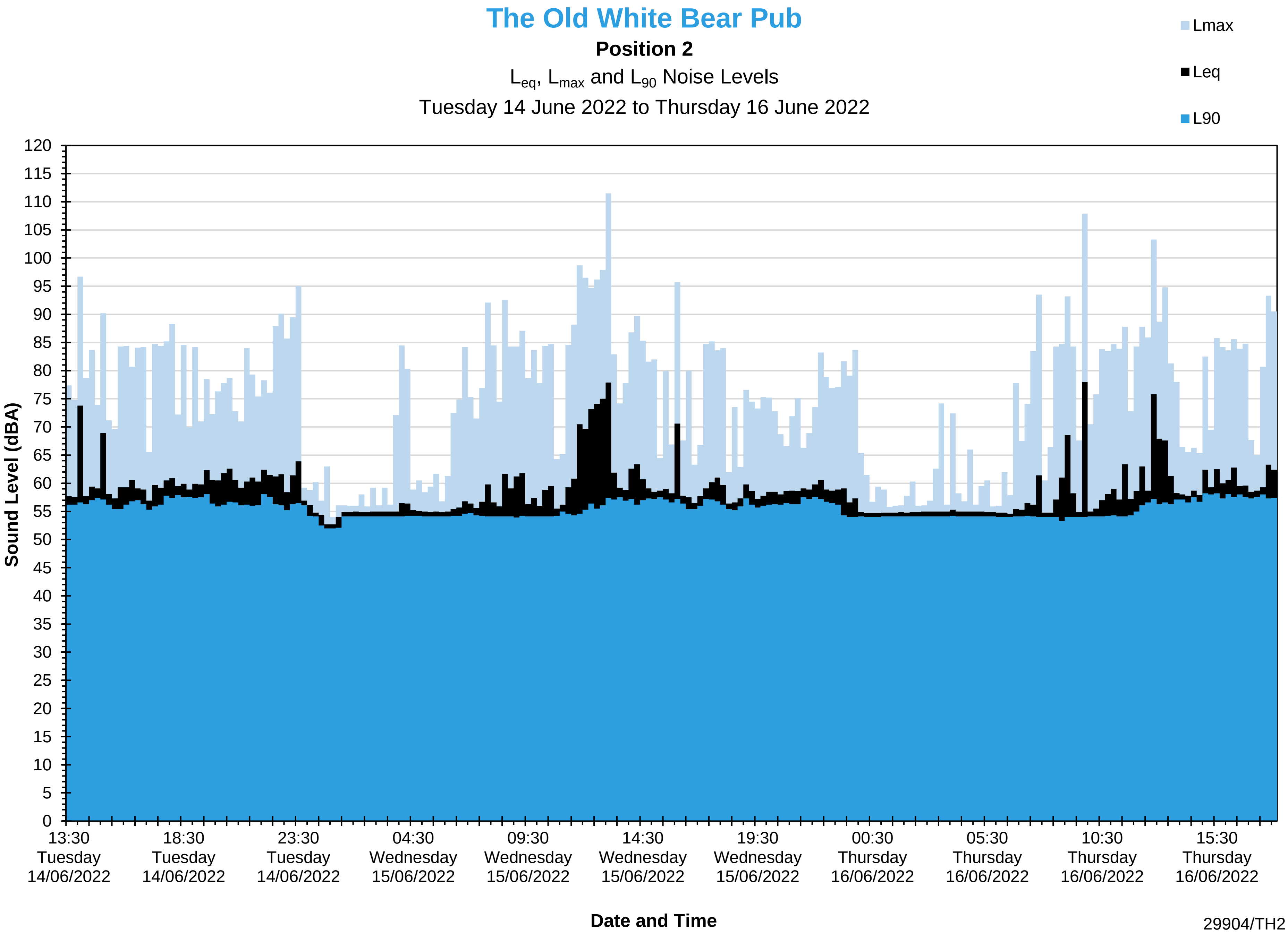
The Old White Bear Pub
Position 2
Leq, Lmax and L90 Noise Levels
Tuesday 14 June 2022 to Thursday 16 June 2022
Lmax
Leq
L90
Sound Level (dBA)
120
115
110
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
13:30 Tuesday 14/06/2022
18:30 Tuesday 14/06/2022
23:30 Tuesday 14/06/2022
04:30 Wednesday 15/06/2022
09:30 Wednesday 15/06/2022
14:30 Wednesday 15/06/2022
19:30 Wednesday 15/06/2022
00:30 Thursday 16/06/2022
05:30 Thursday 16/06/2022
10:30 Thursday 16/06/2022
15:30 Thursday 16/06/2022
Date and Time

29904/TH2