The Wheel Inn Public House
Westwell
Ashford

Environmental Noise Survey and Acoustic Design Statement Report

24748/NIA1-Rev1

01 November 2017

For:
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Hann Tucker Associates

Environmental Noise Survey and Noise Impact Assessment Report
24748/NIA1-Rev1

Document Control

Rev	Date	Comment	Prepared by	Authorised by
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Hann Tucker Associates

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Contents

Attachments

1.0 Introduction

The owner of The Wheel Inn Public House in Westwell, Ashford is considering developing two pairs of semi-detached houses on surplus land to the south of the main public house building.

Hann Tucker Associates have therefore been commissioned to undertake an environmental noise survey and assess the likely operational noise emissions from the pub with regards to the predicted impact on the proposed new residencies.

This report presents the methodology and findings of our noise survey and our assessment will consider noise breakout from the main pub building and noise from the pub garden.

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.

To assess the likely noise impact of The Wheel Inn Public House on the proposed new residencies including noise emanating from windows in the public house, from the beer garden and from any associated mechanical plant.

3.0 Site Description

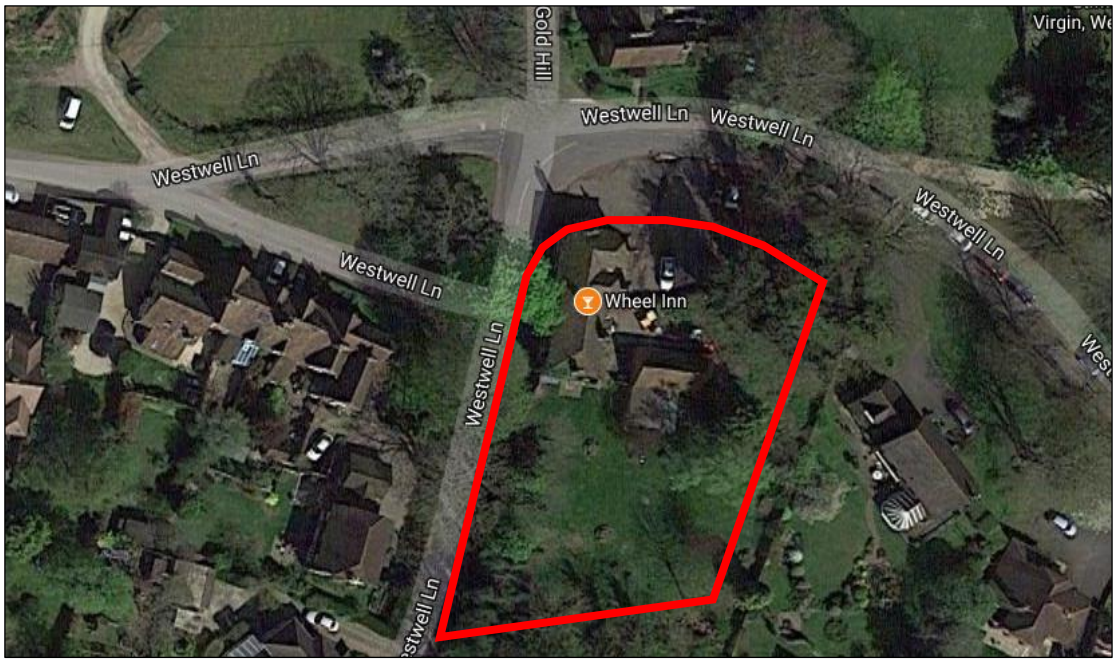
3.1 Location

The site is a two storey public house situated within the bend of Westwell Lane in Westwell. Neighbouring properties are predominantly residential and the new buildings are proposed for the surplus land to the south. The site falls within the jurisdiction of Ashford Borough Council and can be seen in the location plan below.

Site Location (Map data ©2017 Google)

3.2 Description

The Wheel Inn is bounded by Westwell Lane to the north and west, residential properties to the east and the surplus land earmarked for building to the south.



Satelite View of Site (Imagery © 2017 Bluesky, DigitalGlobe, Getmapping plc, Infoterra Ltd & Bluesky, Map Data © 2017 Google.)

Site plan showing locations of proposed buildings (courtesy of CDP Architecture Ltd)

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 Richard P Booth MSc, MIOA.

5.1 Procedure

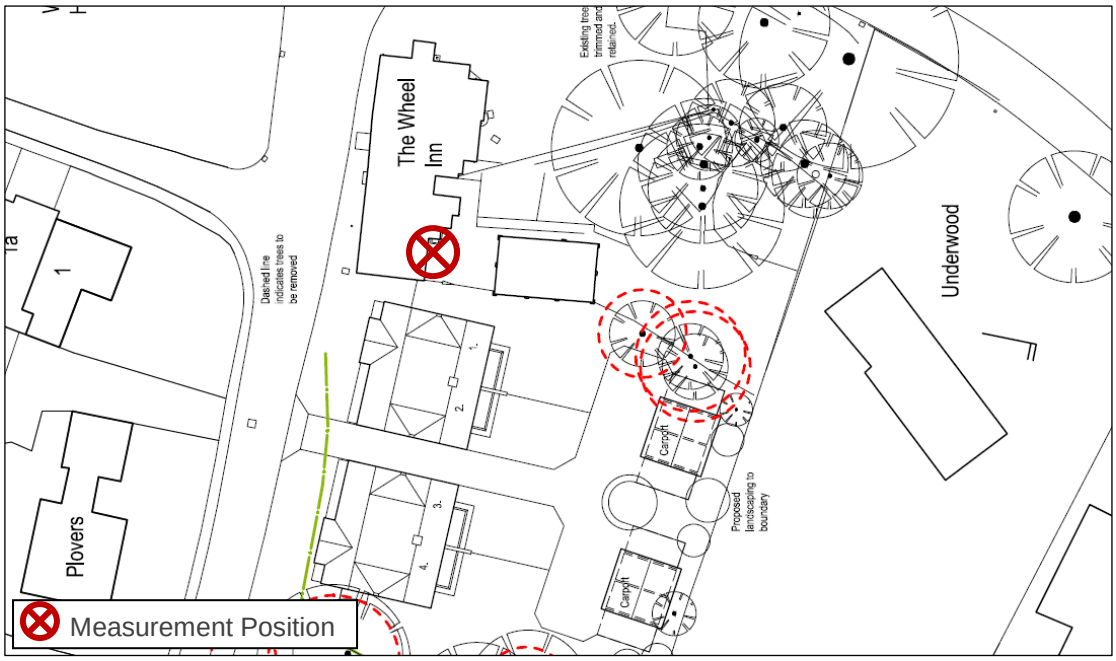
Fully automated environmental noise monitoring was undertaken from approximately 13:00 hours on Thursday 19th October 2017 to 13:00 hours on Monday 23rd October 2017. Unfortunately, the measuring equipment was tampered with at approximately 16:30 hours on Friday 20th October 2017 so only 28.5 hours of relevant data is available.

During the periods we were on site the wind conditions were calm and the sky was generally patchy cloud. We understand that generally throughout the survey period the weather conditions were similar to this. 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_{AMax} sound pressure levels over 15 minute periods.

5.2 Measurement Position

The microphone was attached to a pole approximately five metres above ground level sticking out of the first floor lounge window. The microphone was within one metre of the building façade. This position is indicated on the site plan overleaf.



Plan Showing Unmanned Measurement Position (courtesy of CDP Architecture Ltd)

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	PCB	377B02	122885	Calibration on 16/05/2017
Type 1 Preamp	Larson Davis	PRM902	3692	Calibration on 16/05/2017
Type 1 Data Logging Sound Level Meter	Larson Davis	824	3444	Calibration on 16/05/2017

The sound level meter, including the extension cable, was calibrated prior to and on completion of the survey. No significant change was found to have occurred (no more than 0.2 dB).

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

6.0 Results

The results have been plotted on Time History Graph 24748/TH1.1 enclosed presenting the 15 minute A-weighted (dBA) L_{90}, L_{eq} and L_{AMax} levels throughout the duration of the survey.

6.1 L_{eq} Noise Levels

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

The daytime $L_{Aeq,16hour}$ and night-time $L_{Aeq,8hour}$ noise levels are presented in the table below.

Daytime $L_{Aeq,16hour}$	Night-Time $L_{Aeq,8hour}$
70 dB	42 dB

The above levels have been corrected for façade reflections where appropriate, for comparison with the free field levels.

The daytime $L_{Aeq,16hour}$ above has been dominated by a local unknown noise event which occurred between approximately 09:30 hours and 10:15 hours on Friday 20 October 2017. The following table presents the daytime $L_{Aeq,16hour}$ and night-time $L_{Aeq,8hour}$ noise levels with this event omitted.

Daytime $L_{Aeq,16hour}$	Night-Time $L_{Aeq,8hour}$
60 dB	42 dB

The above levels have been corrected for façade reflections where appropriate, for comparison with the free field levels.

6.2 L_{90} Noise Levels

The background noise levels are usually accepted as the lowest levels measured during the survey period, above which the noise levels were measured for 90% of the period; in other words, the quietest 10% of any measurement period.

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

Lowest Measured LA90(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**
37 dBA	34 dBA	34 dBA

7.0 Discussion Of Noise Climate

During the periods we were on site the dominant noise sources were noted to be nearby tree surgery, local workman carrying out interior decorating related activities and passing cars on Westwell Lane.

8.0 Relevant Planning Policies and Guidance

8.1 World Health Organisation Guidelines on Community Noise

BS8233:2014 is based upon the current World Health Organisation (WHO) guidance "*Guidelines on Community Noise".* A summary of the noise guidelines relevant to the proposed development is presented in the table below.

Residential Environment	Critical Health Effect(s)	L_{Aeq}	L_{AFmax}	Time Base
Outdoor living area	Serious annoyance, daytime and evening	55	-	07:00-23:00
	Moderate annoyance, daytime and evening	50	-	07:00-23:00
Dwelling, indoors	Speech intelligibility and moderate annoyance, daytime and evening	35	-	07:00-23:00
Inside bedrooms	Sleep disturbance, night-time	30	45	23:00-07:00
Outside bedrooms	Sleep disturbance, window open (outdoor values)	45	60	23:00-07:00

These WHO guidelines are based, in almost all cases, on the lower threshold below which the occurrence rates of any particular effect can be assumed to be negligible.

The internal and external noise level criteria presented in BS8233:2014 for residential dwelling are generally consistent with the WHO guidelines, although some differences are apparent. For instance the WHO guidelines refer to research that suggests *"For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB L_{AFmax} more than 10-15 times per night."* (Vallet & Vernet, 1991). The current version of BS8233 does not identify a

specific L_{AFmax} level although it suggests that a guideline value may be set using that parameter depending on the character and number of individual noise events per night.

8.2 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.

8.2.1 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."

8.2.2 External Amenity Areas

BS823:2014 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."

8.3 Institute of Acoustics: Good Practice Guide on the Control of Noise from Pubs and Clubs

The IOA guidance regarding good practice guide on the control of noise from pubs and clubs recommends in Section 2.4 that

'for premises where entertainment takes place on a regular basis, music and associated sources should not be audible inside noise sensitive property at any time… For the purposes of this document, noise may be considered not audible or inaudible when it is at a low enough

level such that it is not recognisable as emanating from the source in question and it does not alter the perception of the ambient noise environment that would prevail in the absence of the source in question.'

9.0 Proposed Design Target 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 (with reference to Note 4 of Section 7.7.2 of BS8233:2014) given the character of the noise climate we have measured.

On the Basis of the Institute of Acoustics: *Good Practice Guide on the Control of Noise from Pubs and Clubs,* we would recommend that the L_{AMax} noise breakout level from the public house does not exceed the lowest fifteen minute L_{90} noise level outside the nearest noise sensitive window during the public house's hours of operation. This level is shown in Section 6.1.2.

10.0 Predicted Noise Breakout from Public House

10.1 Dining Room to Residential

The dining area to the southern end of the pub is located approximately five metres from the proposed nearest residency. We have been informed that currently there are no plans to play music in this area and any future installation of music speakers would be for background ambience only.

We have over time built up a large database of typical noise levels associated with the operation of pubs and restaurant businesses. We would anticipate an internal reverberant noise level in the region of 65-70 dBA L_{Aeq} within the dining area whilst it is busy. Typical spectra are shown in the table below.

Description	Sound Pressure Level (dB re $2x10^{-5}$ Pa) at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
Typical Pub Restaurant	71	76	79	78	75	74	80	71	84 L_{AMax}
	61	63	63	66	62	59	58	51	68 L_{Aeq}

The currently installed doorway from inside the pub dining room which directly faces the proposed residential is a double glazed unit (see photo below). A detailed calculation from inside the dining room to one metre from the proposed nearest residential façade has been completed using the following typical sound reduction indices for 10/12/6 double glazing.

Sound Reduction Index (dB) @ Octave Band Centre Frequency (Hz)					
125	250	500	1k	2k	4k
20	29	35	37	35	44

Photograph showing double glazed door from pub dining room to residential façades

Our calculations indicate that, with the public house dining room operating at predicted internal noise levels, the resultant noise levels at one metre from the proposed nearest residential façade would be 36 dB L_{AMax} and 23 dB L_{Aeq} (including façade reflection effects).

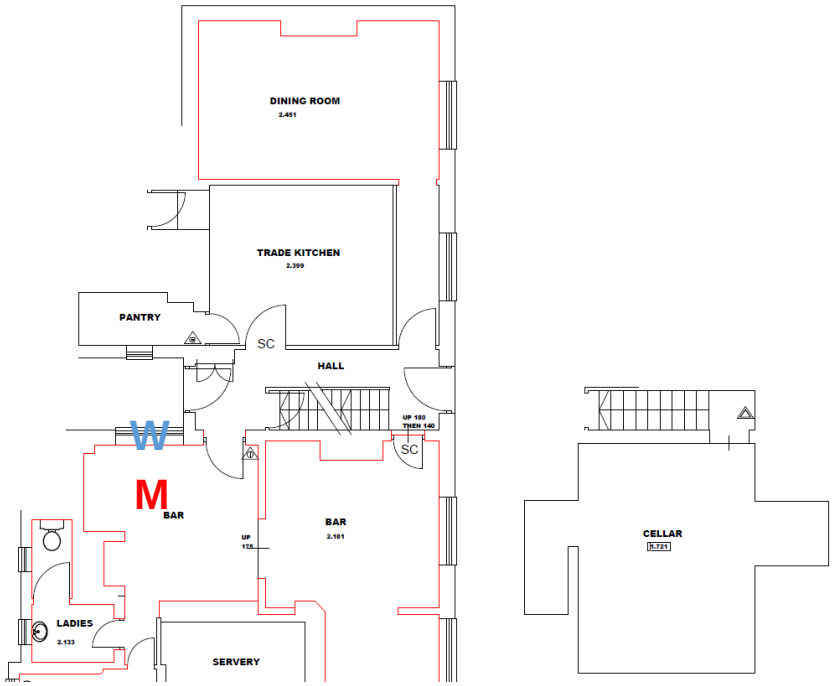
It is generally accepted that the typical noise reduction achieved with partially opened windows is around 10-15 dBA (ref. BS 8233:2014 Annex G.1). This value is the difference between dBA

levels measured outside and inside typical dwellings.

Based on the above calculations and British Standards guidance, we predict that noise levels within the new residential property through a partially open window are likely to be 21-26 dB L_{AMax} and 8-13 dB L_{Aeq}. These levels are significantly below the existing background noise levels and should, therefore, be inaudible within the residential property when the pub dining room door is closed.

10.2 Live Music to Residential

We have been informed that if any live music is to be performed within the Wheel Inn, it would be performed in the bar area marked with an 'M' in the plan shown below.



Proposed ground floor layout of public house (courtesy of Shepherd Neame)

We understand that the bar window, indicated with a 'W' on the plan above, is currently a single glazed unit facing onto the pantry wall as shown in the photograph below.

Photograph showing the bar area where music may be performed and the adjacent pantry

Again, we have over time built up a large database of typical noise levels associated with music in public houses. We would anticipate an internal reverberant noise level in the region of 85-90 dBA L_{Aeq} during a typical live music performance. Typical spectra are shown in the table below.

Description	Sound Pressure Level (dB re $2x10^{-5}$ Pa) at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
Typical Live Music in a Public House	87	97	99	100	95	90	86	75	100 L_{AMax}
	77	87	84	81	80	75	69	60	84 L_{Aeq}

A detailed calculation from inside the bar to one metre from the proposed nearest residential façade has been completed using the following typical sound reduction indices for 6mm single glazing and assuming a -3 dBA barrier loss for the pantry screening.

Sound Reduction Index (dB) @ Octave Band Centre Frequency (Hz)					
125	250	500	1k	2k	4k
22	25	31	34	31	22

Our calculations indicate that, with a live music performance within the public house at the predicted internal noise levels, the resultant noise levels at one metre from the proposed nearest residential façade would be 45 dB L_{AMax} and 36 dB L_{Aeq} (including façade reflection effects).

Based on the above calculations and British Standards guidance regarding noise attenuation through a partially opened window, we predict that noise levels within the new residential property through a partially open window are likely to be 30-35 dB L_{AMax} and 21-26 dB L_{Aeq}.

The predicted internal L_{eq} noise levels are significantly below the existing background noise levels and should, therefore, be inaudible within the residential property when the pub window is closed, however, L_{AMax} noise events may be up to 1 dB above background noise levels during night-time periods. In addition, the L_{AMax} noise levels may exceed the lowest background L_{90} at the nearest residential façade by up to 11 dB.

We would therefore recommend that the window within the bar be secondary glazed. A detailed calculation from inside the bar to one metre from the proposed nearest residential façade has been completed using the following typical sound reduction indices for 6/200/6 secondary glazing and assuming a -3 dBA barrier loss for the pantry screening.

Sound Reduction Index (dB) @ Octave Band Centre Frequency (Hz)					
125	**250**	**500**	**1k**	**2k**	**4k**
34	41	46	49	46	34

Our calculations indicate that, with a live music performance within the public house at the predicted internal noise levels, the resultant L_{AMax} noise levels at one metre from the proposed nearest residential façade with secondary glazing would be 34 dB L_{AMax} (including façade reflection effects).

11.0 External Amenity Area

The proposed pub garden seating area is located to the east of the pub garden outbuilding, approximately eight metres from the proposed nearest residential garden and sixteen metres from the proposed nearest residential window. We understand that there could be seating for circa twenty-four people.

We have again based our noise assessment on historical noise data obtained from previous noise level measurements at similar locations. We would anticipate a noise level in the region of 60 dB L_{Aeq} when measured at a distance of two metres from the garden seating area when fully occupied.

A detailed distance–loss calculation indicates the likely worst-case noise level outside of the nearest proposed residential window would be 44 dB L_{Aeq}. We would expect a typical residential façade to provide a minimum 30dBA sound attenuation which should result in the pub garden noise being inaudible within the residential properties with the residential windows closed.

The introduction of an acoustic screen/fence between the pub garden outbuilding and the rear of the pub garden, providing a line-of-sight barrier between the pub seating area and the 1st floor windows of the proposed residencies would also provide a minimum 5 dBA further sound attenuation. The height of this barrier should be ascertained by the Architect once the dimensions of the beer garden have been finalised, however, it is likely to be around 2.4m tall.

Based on the above calculations and British Standards guidance regarding noise attenuation through a partially opened window, we predict that noise levels within the new residential property through a partially open window from a full beer garden are likely to be 30-35 dB L_{eq}. This level meets the criteria of WHO and British Standard 8233:2014 regarding internal noise levels for daytime periods.

We have also assessed the likely pub garden noise emission level within the rear garden of the nearest proposed residency. Our calculations indicate a noise level of approximately 52 dBA without screening and 47 dBA with the above proposed acoustic screen which is compliant with the guidance detailed in BS8233:2014.

We would also recommend in this situation that signs be erected internally and externally asking smokers and users of the garden to respect the wishes of the local residents and keep noise to a minimum.

12.0 Plant Noise Emission Criteria

The site falls within the jurisdiction of Ashford Borough Council. We understand that Ashford Borough Council use the methodology detailed in BS4142:2014 *"Methods for rating and assessing industrial and commercial sound".* in order to determine plant noise emission criteria.

BS4142 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.

12.1 Proposed Criteria

On the basis of the above and the results of the environmental noise survey, we propose that the following plant noise emission criteria be achieved at one metre from the nearest noise sensitive residential window.

Plant Noise Emission Criteria (dB re 2x10-5 Pa)	
Daytime (07:00 – 23:00 hours)	**Night-time (23:00 – 07:00 hours)**
32 dBA	29 dBA

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

If plant contains tonal or impulsive characteristics the external design criteria should be reduced by 5dBA.

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

13.0 Discussion

An assessment of noise breakout from the dining room of the public house suggests that, provided that the dining room external doors remain closed, noise levels should be acceptable both inside and at the façade of the nearest residential property. This is irrespective of whether the residential windows are partially opened or closed.

An assessment of noise generated by live music from the bar of the public house suggests that, provided that the existing single glazed window can be secondary glazed, noise levels should be acceptable both inside and at the façade of the nearest residential property. This is irrespective of whether the residential windows are partially opened or closed.

Both of the above findings may result in the requirement for mechanical ventilation within the public house in these areas.

An assessment of noise from the beer garden of the public house suggests that internal noise levels within the nearest residential property should be acceptable during the daytime.

An assessment of noise from the beer garden of the public house suggests that external amenity noise levels at the nearest residential property should be acceptable during both the daytime and night-time periods.

Plant noise emission criteria has been proposed for the mechanical plant serving the public house including the kitchen extract fan. It should be noted that this criteria is onerous and it is likely that all mechanical plant shall require some additional attenuation measures.

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 industry standard guidelines.

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

The assessment shows the site is suitable for the proposed 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. 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_{AMax} — L_{AMax} is the maximum sound pressure level recorded over the period stated. L_{AMax} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the L_{eq} noise level.

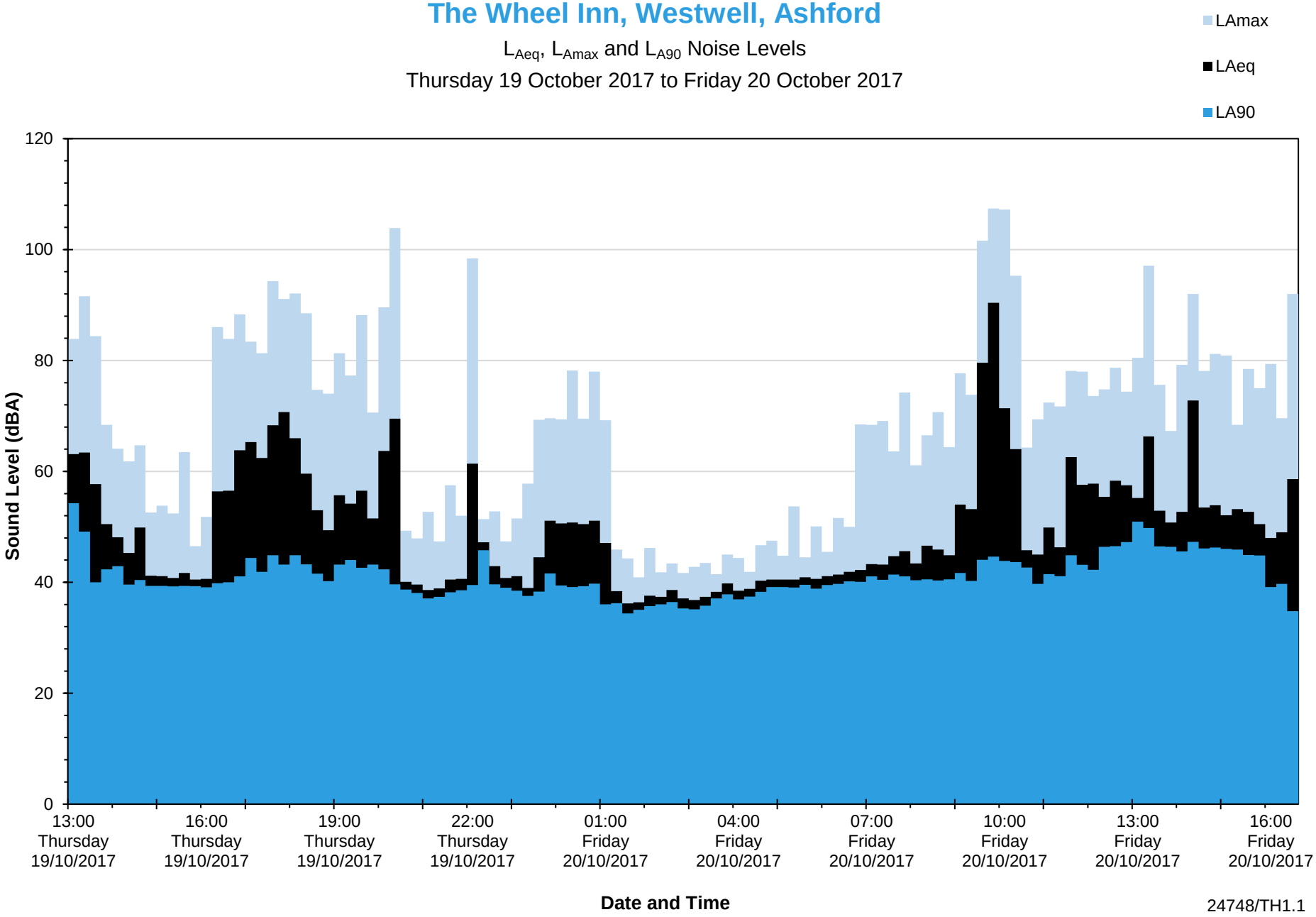
L_p — Sound Pressure Level (SPL) is the sound pressure relative to a standard reference pressure of 2×10^{-5} Pa. This level varies for a given source according to a number of factors (including but not limited to: distance from the source; positioning; screening and meteorological effects).

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 Wheel Inn, Westwell, Ashford

L_{Aeq}, L_{Amax} and L_{A90} Noise Levels

Thursday 19 October 2017 to Friday 20 October 2017



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