

The Red Lion Public House Rusthall

Environmental Noise Survey and Acoustic Design Statement Report

25348/NIA1

17 September 2018

For:
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Environmental Noise Survey and Noise Impact Assessment Report 25348/NIA1

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Contents	Page
1.0 Introduction	1
2.0 Objectives	1
3.0 Site Description	1
4.0 Acoustic Terminology	3
5.0 Methodology	3
6.0 Results	5
7.0 Discussion Of Noise Climate	6
8.0 Relevant Planning Policies and Guidance	6
9.0 Proposed Design Target Noise Levels	9
10.0 Predicted Noise Breakout from Public House	9
11.0 External Amenity Area	11
12.0 Plant Noise Emission Criteria	12
13.0 Plant Noise Impact Assessment	14
14.0 Discussion	17
15.0 Conclusions	17

Attachments

Appendix A – Acoustic Terminology

Specification for Small Acoustic Enclosure

25348/AS1 Attenuator Schedule

Time History Graphs 25348/TH1.1 to 25348/TH2.1



1.0 Introduction

The owner of The Red Lion Public House in Rusthall is considering developing a row of three attached houses on surplus land to the west 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

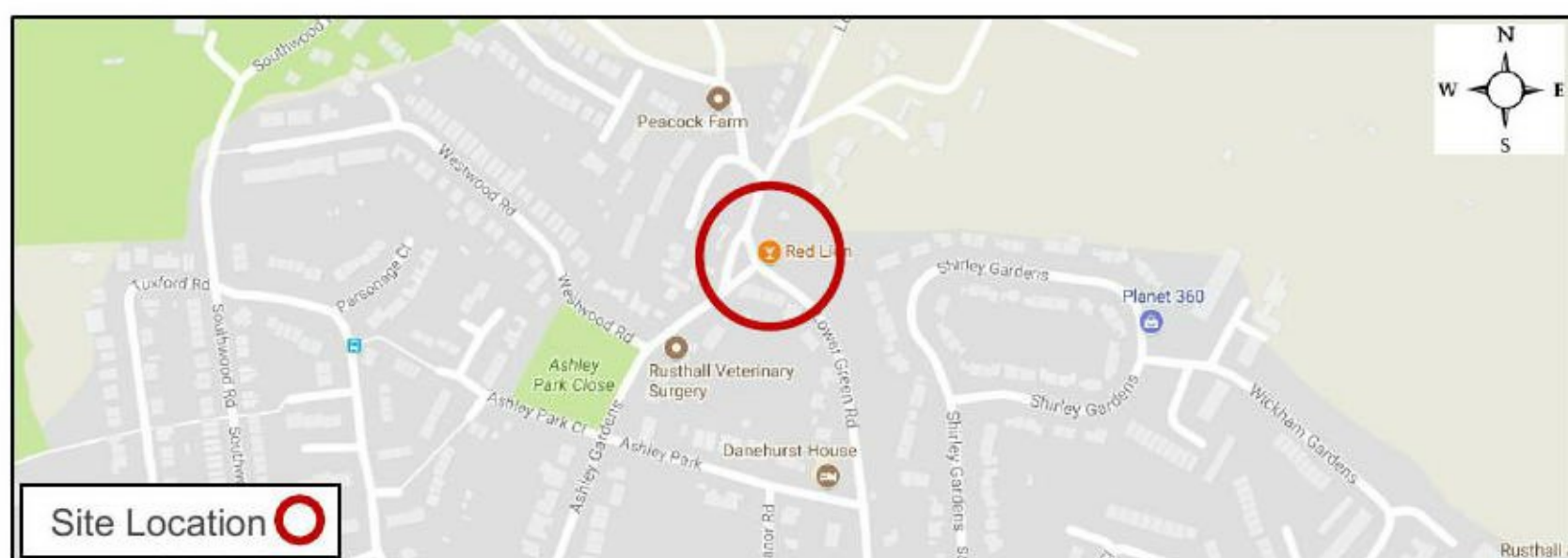
To undertake an environmental noise survey to establish the existing $L_{A_{Max}}$, $L_{A_{eq}}$ and L_{A90} environmental road, rail and air traffic noise levels.

To assess the likely noise impact of The Red Lion Public House on the proposed new residencies including noise emanating from 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 on Lower Green Road in Rusthall. Neighbouring properties are predominantly residential and the new buildings are proposed for the surplus land to the west. The site falls within the jurisdiction of Tunbridge Wells Borough Council and can be seen in the location plan below.



Site Location (Map data ©2017 Google)



3.2 Description

The Red Lion is bounded by Lowe Green Road to the south and west, residential properties to the north and the surplus land earmarked for building to the west.



Satellite View of Site (Map Data © 2018 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 14:30 hours on Thursday 15th March 2018 to 12:50 hours on Monday 19th March 2018.

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, however, on Saturday 17th March 2018 there was some snowfall in the area. 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 5 minute periods.

5.2 Measurement Positions

The noise level measurements were undertaken at two positions as described in the table below.

Position No	Description
1	The microphone was attached to a pole approximately three metres above ground level to the north of the site.
2	The microphone was attached to a pole approximately two metres above ground level to the south of the site.



Plan Showing Unmanned Measurement Positions (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
Position 1 Type 1 ½" Condenser Microphone	PCB	377A02	101926	Calibration on 16/05/2017
Position 1 Type 1 Preamp	Larson Davis	PRM902	3691	Calibration on 16/05/2017
Position 1 Type 1 Data Logging Sound Level Meter	Larson Davis	824	3841	Calibration on 16/05/2017
Position 2 Type 1 ½" Condenser Microphone	PCB	377B02	136744	Calibration on 24/07/2017
Position 2 Type 1 Preamp	Larson Davis	PRM902	4812	Calibration on 24/07/2017
Position 2 Type 1 Data Logging Sound Level Meter	Larson Davis	824	3839	Calibration on 24/07/2017
Type 1 Calibrator	Larson Davis	CAL200	3082	Calibration on 03/07/2017



The sound level meters, including the extension cables, were calibrated prior to and on completion of the survey. No significant changes were found to have occurred (no more than 0.2 dB).

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

6.0 Results

The results have been plotted on Time History Graphs 25348/TH1.1 to 25348/TH2.1 enclosed presenting the 5 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 $L_{Aeq,5min}$ 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.

Position	Daytime $L_{Aeq,16hour}$	Night-Time $L_{Aeq,8hour}$
1	54 dB	43 dB
2	52 dB	43 dB

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

6.2 Lowest L_{90} (Background) 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:



Position	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
1	32 dBA	31 dBA	31 dBA
2	32 dBA	31 dBA	31 dBA

7.0 Discussion Of Noise Climate

During the periods we were on site the dominant noise source was noted to be passing cars on Lower Green Road.

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 night or New Year's Eve.

Note 4 Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{AMax,F}$ depending on the character and number of events per night. Sporadic noise events could require separate values.

Note 5 If relying on closed windows to meet the guide values, there needs to be an appropriate alternative ventilation that does not compromise the façade insulation or the resulting noise level.



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

Note 6 Attention is drawn to the Building Regulations.

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

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 6.2.

10.0 Predicted Noise Breakout from Public House

The public house is located approximately eighteen metres to the south-west of the proposed new dwellings with no openable windows facing the new development from inside the public bar. We have been informed that currently there are no plans to play music in the public house aside from the occasional acoustic jazz trio or quartet which would finish no later than 23:00 hours. The approximate location of these performances has been marked with an 'M' in the site plan in Section 5.2.

We have over time built up a large database of typical noise levels associated with the operation of pubs and music venues. We would anticipate worst-case internal reverberant noise level in the region of 82 dBA L_{Aeq} within the pub whilst a DJ or soul/jazz band were performing. Typical worst-case spectra are shown in the table below.

Description	Sound Pressure Level (dB re 2×10^{-5} Pa) at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
Typical Worst-Case Public House with Soul Music	89	88	81	80	77	72	70	66	92 L_{Amax}
	98	99	91	88	86	82	82	78	82 L_{Aeq}



The currently installed windows inside the public house do not directly face the proposed residential properties. These windows have a wooden frame containing a single glazed outer layer and an inner secondary glazing layer. A detailed calculation from inside the public house to one metre from the proposed nearest residential façade has been completed using the following typical sound reduction indices for a secondary glazing 6/100/4 system.

Sound Reduction Index (dB) @ Octave Band Centre Frequency (Hz)				
125	250	500	1k	2k
26	34	44	44	38



Photograph showing secondary glazing inside public bar

10.1 Public House Windows Closed

Our calculations indicate that, with the public house operating at predicted internal noise levels for a performing jazz quartet with the windows closed, the resultant noise levels at one metre from the proposed nearest residential façade would be worst-case 26 dB $L_{A_{Max}}$ and 16 dB $L_{A_{eq}}$ (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 11-16 dB $L_{A_{Max}}$ and 1-6 dB $L_{A_{eq}}$. These levels are significantly below the existing background noise levels and should, therefore, be inaudible within the residential property when the pub windows are closed.

10.1.1 Public House Windows Open (Purge Ventilation)

It is our understanding that the public house windows shall be opened upon the requirement of purge ventilation only i.e. in the event of airborne contamination or during the hottest periods of the year when mechanical ventilation does not meet the needs of the area.

Our calculations indicate that, with the public house operating at predicted internal noise levels for a performing jazz quartet with the windows open, the resultant noise levels at one metre from the proposed nearest residential façade would be 36-41 dB $L_{A_{Max}}$ and 26-31 dB $L_{A_{eq}}$ (including façade reflection effects).

Again, 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 21-31 dB $L_{A_{Max}}$ and 11-21 dB $L_{A_{eq}}$. These levels are below the daytime criteria level of BS8233:2014 as described in Section 9.0 and these levels should not be reached during night-time hours as no music is proposed for this period.

11.0 External Amenity Area

The proposed pub garden area is located to rear of the freestanding brick built coach house, approximately nine metres from the proposed nearest residential façade.

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 47 dB L_{Aeq} when measured at a distance of nine metres from the garden area when fully occupied.

We would expect a typical residential façade to provide a minimum 30dBA sound attenuation which should result in the pub garden noise being approximately 17 dB L_{Aeq} within the residential properties with the residential windows closed. This level is significantly below that of the existing background noise and significantly below the criteria of WHO and British Standard 8233:2014 regarding internal noise levels for daytime and night-time periods.

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 garden 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 2m 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 32-37 dB L_{eq} . The criteria of WHO and British Standard 8233:2014 regarding internal noise levels for daytime periods is in-between these predicted noise levels.

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 46 dBA without screening and 41 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 Tunbridge Wells Borough Council.

We understand that Tunbridge Wells 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.

In addition to the above, Section 3.8 of the *Tunbridge Wells Borough Local Plan: Noise and Vibration Supplementary Planning Document – Adopted November 2014* states that:

'There are certain smaller pieces of equipment on commercial premises, such as extract ventilation, air conditioning units and condensers, where the Borough Council may consider that just a BS 4142 assessment alone is not able to provide all the information necessary. In these cases, the Borough Council will generally also require a NR curve specification of less than NR35 (based upon measured or predicted $L_{eq,5mins}$ 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, then a NR30 specification may be implemented. The use of NR curves is outlined in 9.4 and Annex B of BS 8233:2014.'



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)
27 dBA and NR 30 dB	26 dBA and NR 30 dB

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 Plant Noise Impact Assessment

We understand the currently installed plant comprises of a cellar condenser and a kitchen extract fan. The approximate locations of these items have been labelled as 'C' and 'K' respectively on the site plan in Section 5.2.

13.1 Plant Noise Data

During our survey we undertook noise measurements of each of the above plant items running at what we understand to be full operational duty. Measurements were taken at one metre from the plant items in the direction of the proposed new dwellings for a period of five minutes. These measurements are displayed in the table below.

Plant Description	Sound Pressure Level (dB re 2x10 ⁻⁵ Pa) at 1 metre at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
Cellar condenser	62	64	55	52	49	44	43	42	55
Kitchen extract	62	62	58	57	56	53	51	52	61



13.2 Location of Plant

The cellar condenser is situated on ground level to the west and centre of the public house footprint. This condenser is approximately twenty-two metres from the nearest residential façade.

The kitchen extract is situated approximately two metres above ground level to the north of the public house footprint. This extract is approximately eighteen metres from the nearest residential façade.

The approximate locations of these items have been labelled as 'C' and 'K' respectively on the site plan in Section 5.2.

13.3 Plant Noise Impact Assessment

We understand that the proposed kitchen extract unit will be operational during daytime hours only, however, the cellar condenser will run twenty-four hours a day.

The following table summarises our predictions of atmospheric noise emissions from the existing plant items to the nearest noise sensitive proposed residential façade during daytime hours.

	Sound Pressure Level (dB re 2x10 ⁻⁵ Pa) at Octave Band Centre Frequency (Hz)								dBA	NR
	63	125	250	500	1k	2k	4k	8k		
Cellar Condenser Sound Pressure Level at 1m	62	64	55	52	49	44	43	42	55	-
Spherical Distance Correction to 22m	-27	-27	-27	-27	-27	-27	-27	-27	-	-
Calculated Noise Level at Receptor from Cellar Condenser	35	37	28	25	22	17	16	15	28	22
Kitchen Extract Sound Pressure Level at 1m	62	62	58	57	56	53	51	52	61	-
Spherical Distance Correction to 18m	-25	-25	-25	-25	-25	-25	-25	-25	-	-
Calculated Noise Level at Receptor from Kitchen Extract	37	37	33	32	31	28	26	27	36	34
Façade Reflection	+3	+3	+3	+3	+3	+3	+3	+3	-	-
Total Calculated Noise Level at Receptor	39	40	34	33	32	28	26	27	37	34

The following table summarises our predictions of atmospheric noise emissions from the existing plant items to the nearest noise sensitive proposed residential façade during night-time hours only.



	Sound Pressure Level (dB re 2x10 ⁻⁵ Pa) at Octave Band Centre Frequency (Hz)								dBA	NR
	63	125	250	500	1k	2k	4k	8k		
Cellar Condenser Sound Pressure Level at 1m	62	64	55	52	49	44	43	42	55	-
Spherical Distance Correction to 22m	-27	-27	-27	-27	-27	-27	-27	-27	-	-
Façade Reflection	+3	+3	+3	+3	+3	+3	+3	+3	-	-
Calculated Noise Level at Receptor from Cellar Condenser	38	40	31	28	25	20	19	18	31	25

Our calculations indicate that the currently installed plant may not meet the requirements of the Local Authority outlined in Sections 12.0 and 12.1 without further mitigation measures, however, should meet the requirements for external amenity areas as detailed in Section 8.2.2.

13.4 Mitigation Measures

In order to meet the requirements of the Local Authority outlined in Sections 12.0 and 12.1 the cellar condenser should be contained within an acoustic enclosure as detailed in our attached Specification for Small Acoustic Enclosure.

In addition, the kitchen extract fan should be fitted with an attenuator capable of achieving the performance specified in our Attenuator Schedule attached to this report.

Whilst it would likely be possible to change the attenuator dimensions, it is essential that all alterations are confirmed with us. It is essential that the attenuator is manufactured in accordance with our "General Specification for Acoustic and Vibration Isolation Materials and Products" which is enclosed with this Report. This will ensure the attenuator is both mechanically and aerodynamically suitable. The ideal location of the attenuator is as close to the fan as possible on the atmospheric side of the ducting.

It should be noted that:

- The attenuator selection dimensions are suggestions and could likely be altered;
- It is likely possible to reduce attenuator length by increasing cross-sectional area, and vice-versa;
- It would be possible to alter the attenuator width and height providing the cross-sectional area is maintained and the width to height aspect ratio does not exceed 3:1;
- All alterations must be confirmed by ourselves.



14.0 Discussion

An assessment of worst-case noise breakout from the public house with a performing jazz quartet and the pub windows closed suggests that worst-case 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.

A further assessment of worst-case noise breakout from the public house with a performing jazz quartet and suggests that, with the pub windows open, $L_{A_{Max}}$ noise levels at the nearest residential façade may exceed that of the lowest L_{90} background noise level. Worst-case internal noise levels at the proposed development, however, should be below the criterion described in BS8233:2014 and Section 9.0. It should also be noted that these conditions would only be met during infrequent purge ventilation of the public bar during the hottest periods of the year.

An assessment of noise from the beer garden of the public house suggests that internal noise levels within the nearest residential property should be generally 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 from the existing cellar condenser and kitchen extract fan has been calculated to the nearest residential façade and the proposed residential garden space. In order to meet the requirements of the Local Authority mitigation measures have been recommended. It should be noted that this criteria is onerous due to the very low background noise levels at this site.

15.0 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 with the public house as it exists as 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	<p>The human ear is more susceptible to mid-frequency noise than the high and low frequencies. The 'A'-weighting scale approximates this response and allows sound levels to be expressed as an overall single figure value in dBA. The _A subscript is applied to an acoustical parameter to indicate the stated noise level is A-weighted</p> <p>It should be noted that levels in dBA do not have a linear relationship to each other; for similar noises, a change in noise level of 10dBA represents a doubling or halving of subjective loudness. A change of 3dBA is just perceptible.</p>
L _{90,T}	L ₉₀ is the noise level exceeded for 90% of the period <i>T</i> (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, <i>T</i> .
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).

RED LION, RUSTHALL

SPECIFICATION FOR

SMALL ACOUSTIC ENCLOSURE

The cellar condenser unit shall be fitted with acoustic treatment which shall achieve adequate levels of attenuation to ensure that the following limiting sound pressure levels are not exceeded when measured at a distance of 1m (free field over a reflecting plane) in any horizontal or vertical direction under any load conditions.

Duty/Time	A-weighted Limiting Sound Pressure Level @ 1m (dB re 2 x 10 ⁻⁵ Pa)
Full operational duty / 24 hours	48 dBA

Furthermore they shall not exhibit any significant tonal content.

Exceedances in excess of the measurement tolerance for a Type 1 sound level meter shall constitute a failure.

The enclosed outer panels shall be constructed from galvanized sheet steel having a minimum thickness of 1.6mm and fixed at 300mm (max) centres. The enclosure inner panels shall be constructed from punch-perforated (round-hole) galvanised sheet steel facing, having a minimum thickness of 0.7mm fixed at 300mm (max) centres. Flattened-expanded ("Expamet") sheet shall not be used, unless all edges of the sheet are mechanically fixed to the panel casing and galvanised steel cover strips are used to prevent rivet heads pulling through the perforated sheet (trapping the Expamet between two solid steel layers).

The inert, rot and vermin proof, non-hygroscopic and non-combustible mineral wool or glass fibre acoustic medium shall be packed to a density of not less than 48kg/m³. This shall be faced with a glass fibre cloth, or other approved infill protection membrane. Panels shall be constructed and assembled so that no egress of the acoustic medium will occur under the operating conditions.

Doors, access panels, windows and ventilation ducts or electrical cable penetrations shall be treated so as to maintain the specified acoustic insulation of the assembled enclosure.

Demountable sections shall be designed to allow easy disassembly and reassembly by unskilled personnel without affecting the acoustic performance.

The supplier shall ensure that the assembled enclosure is designed and constructed to withstand site operating conditions such as wind and snow loads, roof mounted plant, etc., as appropriate, and if outside, to be suitably weatherproofed.

The acoustic media shall not comprise materials which are generally composed of mineral fibres, either man made or naturally occurring, which have a diameter of 3 microns or less and a length of 200 microns or less or which contain any fibres not sealed or otherwise stabilised to ensure that fibre migration is prevented.

Any deviations from the above specification must be agreed by, and confirmed in writing to, Hann Tucker Associates.

Red Lion, Rusthall

Revision: 0	Date: 17/09/2018	Prepared by: Richard P Booth				Comments: First Issue									
Attenuator Ref.	Description	No. Off	Dimensions (mm)			Vol m ³ /s	Max PD Pa	Minimum Insertion Loss (dB) at Octave Band Centre Frequency (Hz)							
			W	H	L			63	125	250	500	1k	2k	4k	8k
KEF-01	Kitchen Extract Atmospheric	1	400	400	900	-	50	4	7	13	19	23	23	16	13

The Red Lion, Rusthall

Position 1

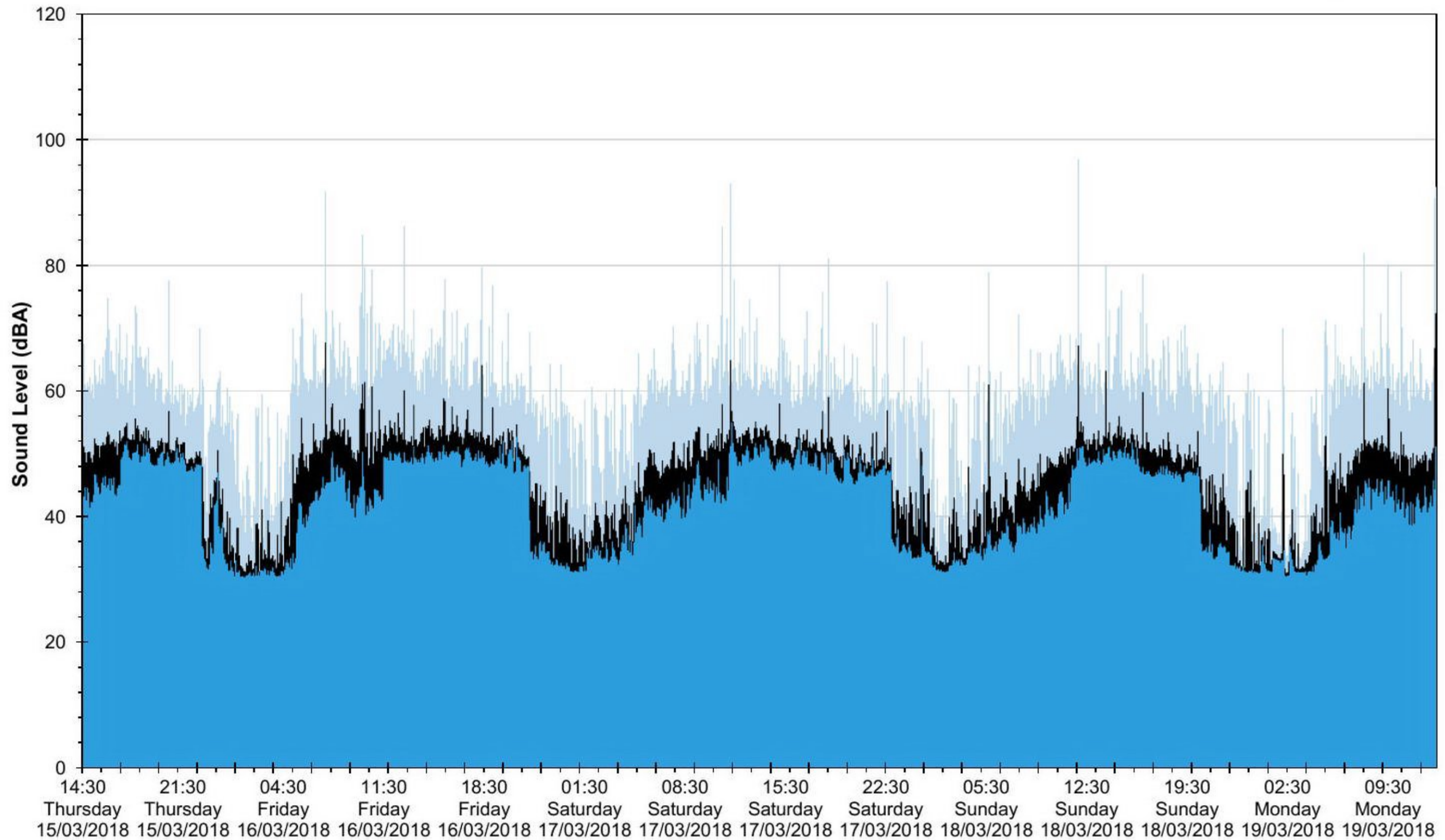
L_{Aeq} , L_{Amax} and L_{A90} Noise Levels

Thursday 15 March 2018 to Monday 19 March 2018

■ L_{Amax}

■ L_{Aeq}

■ L_{A90}



Date and Time

25348/TH1.1

The Red Lion, Rusthall

Position 2

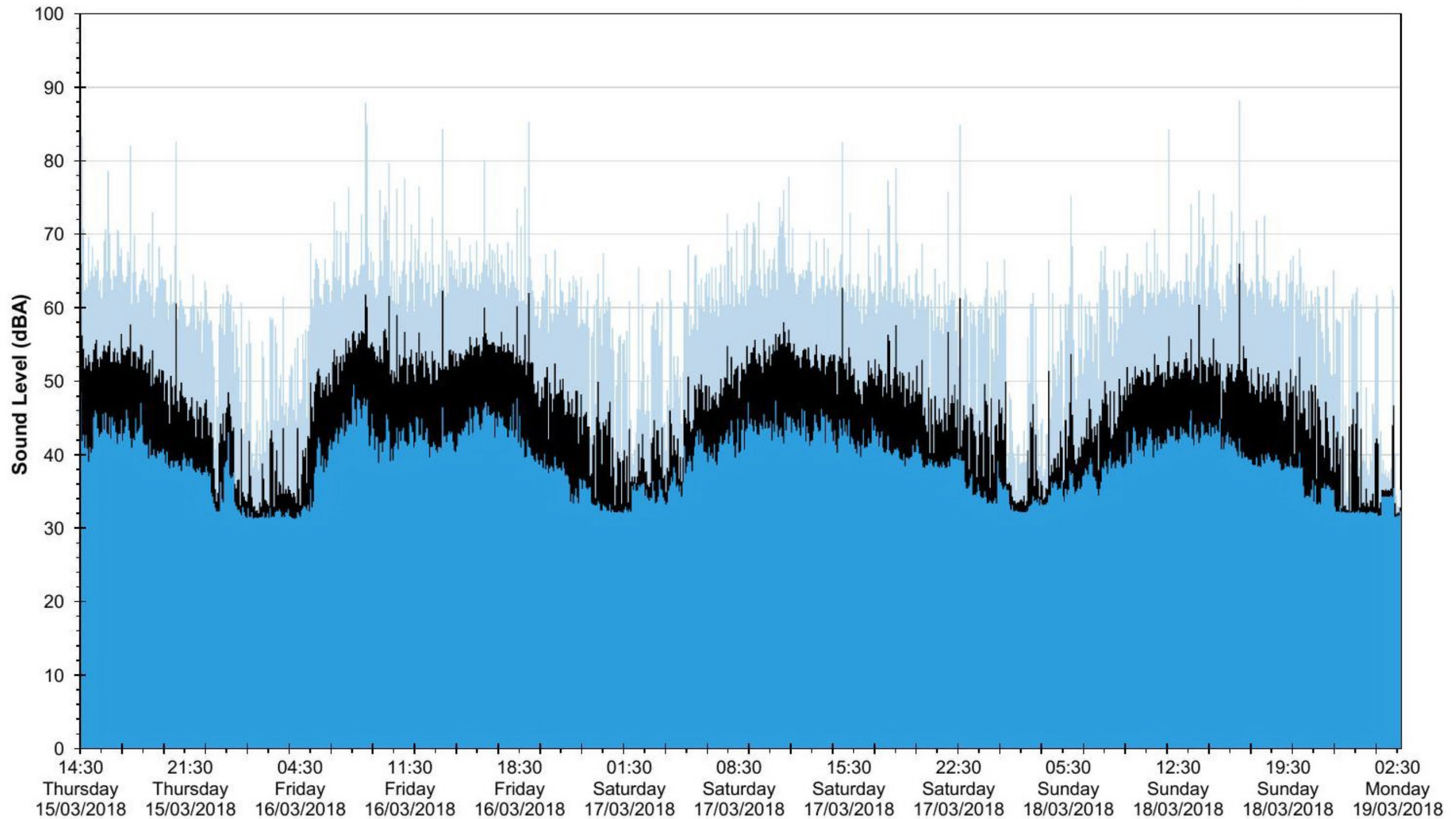
L_{Aeq} , L_{Amax} and L_{A90} Noise Levels

Thursday 15 March 2018 to Monday 19 March 2018

■ L_{Amax}

■ L_{Aeq}

■ L_{A90}



Date and Time

25348/TH2.1