

Blacks Head PH
High Street
Upper Tean
ST20 4DY

**Plant Noise
Assessment**

On behalf of



Project Reference: 88897 | Revision: 01 | Date: 31st October 2019
Revised: 11th November 2019

Document Information

Project Name : Blacks PH, Upper Tean
Project Reference : 88897
Report Title : Plant Noise Assessment
Doc Reference : 88897/Noise Assessment
Date : 31st October 2019

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Revision	Date	Description	Prepared	Reviewed/ Approved
01	11 th November 2019	Revision to section 3	OJR	JS

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1.0 Introduction

- 1.1. Noise Solutions Ltd (NSL) has been commissioned by SEP Properties Limited to provide an assessment on suitable plant noise emissions from the Blacks Head Public House in Upper Tean.
- 1.2. This report contains recommendations based on project information available at the time of the assessment and the results of a baseline noise survey. NSL can provide further guidance on receipt of the selected plant location details.
- 1.3. To assist with the understanding of this report a glossary of acoustic terms can be found in [Appendix A](#). An in-depth glossary of acoustic terms can be viewed online at www.acoustic-glossary.co.uk.

2.0 Details of development proposals

- 2.1. The building located on the High Street in Upper Tean is currently a public house. It is understood that it is proposed to convert the building into a convenience store.
- 2.2. In order for the store to operate, air conditioning (AC) and refrigeration plant will need to be installed. At the time of writing, the proposed location of the plant is unknown.

3.0 Nearest noise sensitive receptors

- 3.1. The area surrounding the site is predominantly residential in nature. It is understood that there are plans to develop the first floor of the building into residential flats. These are likely to be within 10m of the plant area. However they may be screened depending on the location of the plant area.
- 3.2. A site plan showing the site and surrounding area, the nearest noise sensitive properties and noise monitoring location used in this assessment is presented in [Appendix B](#).

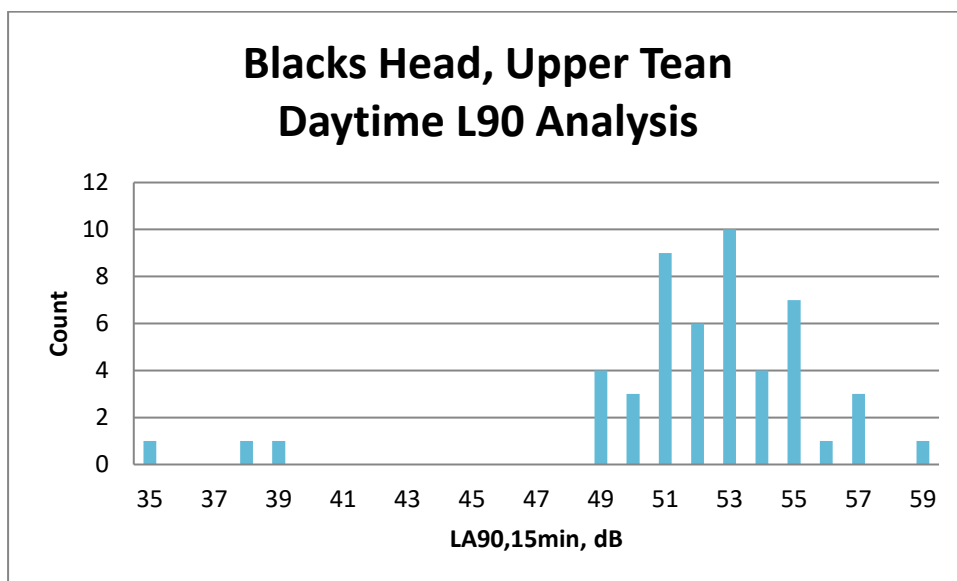
4.0 Existing noise climate

- 4.1. An environmental noise survey was undertaken to establish the typical background sound levels at a location representative of the noise climate outside the façades of the nearest noise sensitive receptors to the proposed plant area during the quietest times at which the plant will operate.
- 4.2. The results of the environmental sound survey are summarised in Table 1 below. The full set of measurement results and details of the survey methodology are presented in [Appendix C](#).

Table 1 Summary of survey results

Measurement period	Range of recorded sound pressure levels (dB)			
	L _{Aeq} (15mins)	L _{AFmax} (15mins)	L _{A10} (15mins)	L _{A90} (15mins)
Daytime (07.00 – 23.00 hours)	62-72	77-99	67-75	35-59
Night-time (23.00 – 07.00 hours)	39-69	65-89	37-73	31-48

Figure 1 Histogram of daytime L_{A90} background sound pressure levels



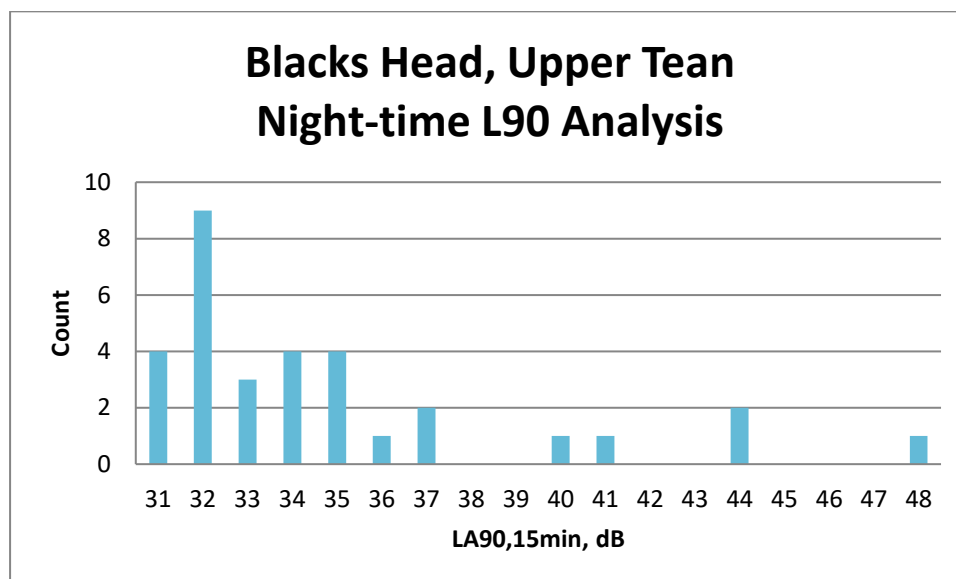
- 4.3. Further statistical analysis has been carried out on the data, and the mean and median values are shown in table 2 below.

Table 2 Statistical analysis of L_{A90,15min} levels during the daytime period

dB, L _{A90} daytime period	
mean	52
modal	53
median	53

- 4.4. In order to be robust, 49dB has been selected to be representative of the background noise level during the daytime period.

Figure 2 Histogram of night-time L_{A90} background sound pressure levels



- 4.5. Further statistical analysis has been carried out on the data and the mean and median values are shown in table 3 below.

Table 3 Statistical analysis of $L_{A90,15min}$ levels during the night-time period

dB, L_{A90} night-time period	
mean	35
modal	32
median	33

- 4.6. The lowest recorded value of 31 dB has been selected to be representative of the background noise climate during the night-time period.
- 4.7. Therefore, the following values are considered representative of the existing background sound pressure levels at nearby noise sensitive premises:
- 49dB L_{A90} during the daytime period; and
 - 31dB L_{A90} during the night-time period

5.0 Plant noise design criteria

Staffordshire Moorlands District Council

- 5.1. The below is taken from a planning condition involving noise for a similar site in the jurisdiction of Staffordshire Moorlands District Council.

The machinery, plant or equipment including installed or operated in connection with the carrying out of this permission shall be so enclosed and/or attenuated that the noise

generated by the operation of the machinery shall not increase the background noise levels during day time expressed as LA90 [1hour] (day time 07:00-23:00 hours) and/or (b) LA90 [15 mins] during night time (night time 23:00-07:00 hours) at any adjoining noise sensitive locations or premises in separate occupation above that prevailing when the machinery is not operating. Noise measurements for the purpose of this condition shall be pursuant to BS 4142:2014. The details and location of any plant or machinery to be installed under this permission should be submitted to and approved of in writing by the Local Planning Authority.

BS 4142:2014 'Methods for Rating and Measuring Industrial and Commercial Sound;

- 5.2. British Standard (BS) 4142:2014 describes a method for rating and assessing sound of an industrial or commercial nature, which includes:
- Sound from industrial and manufacturing processes;
 - Sound from fixed installations which comprise mechanical and electrical plant and equipment;
 - Sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and
 - Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train or ship movements on or around an industrial and/or commercial site.
- 5.3. The industrial or commercial sound is assessed outside a dwelling or premises used for residential purposes, upon which sound is incident.
- 5.4. The procedure contained in BS 4142 is to quantify the "specific sound level", which is the measured or predicted level of sound from the source in question over a one hour period for the daytime and a 15-minute period for the night-time. Daytime is defined in the standard as 07:00 to 23:00 hours, and night-time as 23:00 to 07:00 hours.
- 5.5. The specific sound level is converted to a rating level by adding penalties on a sliding scale to account for either potentially tonal or impulsive elements. The standard sets out objective methods for determining the presence of tones or impulsive elements, but notes that it is acceptable to subjectively determine these effects.

- 5.6. The penalty for tonal elements is between 0dB and 6dB, and the standard notes: "Subjectively, this can be converted to a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible, and 6 dB where it is highly perceptible."
- 5.7. The penalty for impulsive elements is between 0dB and 9dB, and the standard notes: "Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible, and 9 dB where it is highly perceptible."
- 5.8. The background sound level should be established in terms of the L_{A90} noise index. The standard states that the background sound level should be measured over a period of sufficient length to obtain a representative value. This should not normally be less than 15-minute intervals. The standard states that: *"A representative level ought to account for the range of background sound levels and ought not automatically to be assumed to be either the minimum or modal value."*
- 5.9. The assessment outcome results from a comparison of the rating level with the background sound level. The standard states:
- a) Typically, the greater this difference, the greater the magnitude of the impact.*
 - b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.*
 - c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.*
 - d) 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.*
- Adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact."*
- 5.10. The standard goes on to note that: "Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night."
- 5.11. In addition to the margin by which the Rating Level of the specific sound source exceeds the Background Sound Level, the 2014 edition places emphasis upon an appreciation of the context, as follows:
- "An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context."*

- 5.12. BS 4142 requires uncertainties in the assessment to be considered, and where the uncertainty is likely to affect the outcome of the assessment, steps should be taken to reduce the uncertainty.

Proposed criteria

- 5.13. Table 4 below shows the cumulative plant noise rating levels required in order to meet the local authority's criteria during the daytime period.
- 5.14. Due to the exceptionally low background levels, 30dB has been selected to be the criteria during the night-time periods. (An external level of 30dB will result in an internal noise level of 15dB(A) within bedrooms with windows partially open. This is well below the levels normally produced by domestic refrigerators etc.)

Table 4 Plant noise emissions limits at residences

Period	Cumulative plant noise rating level, dB(A)
Daytime (07.00 – 23.00 hours)	39
Night-time (23.00 – 07.00 hours)	30

- 5.15. The above limits have not been approved by the local authority at this stage.

6.0 AC and refrigeration plant noise limits

At the time of writing it is unknown where the proposed plant location is to be. NSL can update this report to provide guidance on plant noise levels once the proposed location is known.

7.0 Summary

- 7.1. Noise Solutions Ltd has been commissioned by SEP properties limited to provide a plant noise assessment on new plant to serve the development at the Blacks Head public house on the High Street in Upper Tean.
- 7.2. An environmental noise survey has been undertaken to establish the existing prevailing noise levels at locations representative of the noise climate outside the nearest noise sensitive receptors to the proposed plant area.
- 7.3. Guidance on the maximum noise emissions from the proposed plant will be provided once a proposed plant location has been confirmed.

Appendix A Acoustic terminology

Parameter	Description
Ambient Noise Level	The totally encompassing sound in a given situation at a given time, usually composed of a sound from many sources both distant and near ($L_{Aeq,T}$).
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s_1 and s_2 is given by $20 \log_{10}(s_1/s_2)$. The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is $20\mu\text{Pa}$. The threshold of normal hearing is in the region of 0 dB and 140 dB is the threshold of pain. A change of 1 dB is only perceptible under controlled conditions.
dB(A), L_{Ax}	Decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB(A) broadly agree with people's assessment of loudness. A change of 3 dB(A) is the minimum perceptible under normal conditions, and a change of 10 dB(A) corresponds roughly to halving or doubling the loudness of a sound. The background noise in a living room may be about 30 dB(A); normal conversation about 60 dB(A) at 1 metre; heavy road traffic about 80 dB(A) at 10 metres; the level near a pneumatic drill about 100 dB(A).
Fast Time Weighting	Setting on sound level meter, denoted by a subscript F, that determines the speed at which the instrument responds to changes in the amplitude of any measured signal. The fast time weighting can lead to higher values than the slow time weighting when rapidly changing signals are measured. The average time constant for the fast response setting is 0.125 (1/8) seconds.
Free-field	Sound pressure level measured outside, far away from reflecting surfaces (except the ground), usually taken to mean at least 3.5 metres
Façade	Sound pressure level measured at a distance of 1 metre in front of a large sound reflecting object such as a building façade.
$L_{Aeq,T}$	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{max,T}$	A noise level index defined as the maximum noise level recorded during a noise event with a period T. L_{max} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
$L_{10,T}$	A noise level index. The noise level exceeded for 10% of the time over the period T. L_{10} can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise. $L_{A10,18h}$ is the A-weighted arithmetic average of the 18 hourly $L_{A10,1h}$ values from 06:00-24:00.
$L_{90,T}$	A noise level index. The noise level that is exceeded for 90% of the measurement time interval, T. It gives an indication of the lower levels of fluctuating noise. It is often used to describe the background noise level and can be considered to be the "average minimum" noise level and is a term used to describe the level to which non-specific noise falls during quiet spells, when there is lull in passing traffic for example.

Appendix B Aerial photograph site showing areas of interest



Appendix C Environmental sound survey

Details of sound surveys

- C.1 Measurements of the existing background sound levels were undertaken between 16:15 hours on Monday 28th and 12:45 hours on Tuesday 29th October 2019.
- C.2 The sound level meter was programmed to record the A-weighted L_{eq} , L_{90} , L_{10} and L_{max} noise indices for consecutive 15-minute sample periods for the duration of the noise survey.

Measurement position

- C.3 The representative measurement position was located on a lamppost on Cumberland Road in an area representative of the nearest noise sensitive receptor (location indicated on the site plan in [Appendix B](#)).
- C.4 In accordance with BS 7445-2:1991 'Description and measurement of environmental noise – Part 2: Guide to the acquisition of data pertinent to land use', the measurements were undertaken under free-field conditions.

Equipment

- C.5 Details of the equipment used during the survey are provided in the table below. The sound level meter was calibrated before and after the survey; no significant change (+/-0.2 dB) in the calibration level was noted.

Environmental noise survey

Description	Model / serial no.	Calibration date	Calibration certificate no.
Class 1 Sound level meter	Svantek 977 / 36190	06/07/2018	15444
Condenser microphone	ACO Pacific 7052E / 57366		
Preamplifier	Svantek SV12L / 41504		
Calibrator	CEL 284/2 /4/03326334	24/05/2019	TCRT19/1408

Weather conditions

- C.6 Weather conditions were determined both at the start and on completion of the survey. It is considered that the meteorological conditions were appropriate for environmental noise measurements. The table below presents the weather conditions recorded on site at the beginning and end of the survey.

Weather Conditions				
Measurement Location	Date/Time	Description	Beginning of Survey	End of Survey
As indicated on Appendix B	16:15 28/10/2019 – 12:45 29/10/2019	Temperature (°C)	9	10
		Precipitation:	No	No
		Cloud cover (oktas - see guide)	6	2
		Presence of fog/snow/ice	No	No
		Presence of damp roads/wet ground	No	No
		Wind Speed (m/s)	<1	2
		Wind Direction	N/A	East
		Conditions that may cause temperature inversion (i.e. calm nights with no cloud)	No	No
		Cloud Cover Symbol Scale in oktas (eighths) 0 Sky completely clear 1 2 3 4 Sky half cloudy 5 6 7 8 Sky completely cloudy (9) Sky obstructed from view		

Results

- C.7 The results of the environmental survey are considered to be representative of the background sound pressure levels at the façades of the nearest noise sensitive receptors during the quietest times at which the plant will operate. The noise climate during the survey period was dominated by traffic noise and birds. Plant noise from the chip shop next to the site could also be heard. The results of the survey are presented in a time history graph overleaf.

Blacks Head, Upper Tean Monday 28 - Tuesday 29 Oct 2019

