

NOISE IMPACT ASSESSMENT **BS4142:2014**

January 2023

Noise Impact Assessment of The Installation of the
Plant Associated with Proposed Restaurant



Site Address

112 Towngate, Mapplewell,
Barnsley, S75 6AS

Prepared For

Excel Event Services
Ltd

112 Towngate, Mapplewell,
Barnsley, S75 6AS

Authorisation and Version Control

Report Prepared By	Mr H Masters, BEng
Report Checked By	Mr S Chesney, MSc, MIOA
Report Approved By	Mr A T Martin, MSc, MIOA, MCIEH, MIET, MInstSCE
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CONTENTS

1. INTRODUCTION..... 4
 Overview 4
 Scope & Objectives 4

2. ENVIRONMENTAL NOISE SURVEY..... 5
 Measurement Methodology 5
 Context & Subjective Impression 5
 Environmental Noise Survey Results 6

3. BS4142:2014 NOISE ASSESSMENT..... 7

APPENDIX A – ACOUSTIC TERMINOLOGY..... 10

APPENDIX B – LEGISLATION, POLICY AND GUIDANCE 13
 B.1 – National Planning Policy Framework (2021) 13
 B.2 – Noise Policy Statement for England (2010)..... 13
 B.3 – British Standard BS 4142:2014+A1:2019 - Methods for rating and assessing industrial and commercial sound..... 14
 B.4 – BS8233:2014 ‘Guidance on sound insulation and noise reduction for buildings’ 17

APPENDIX C – SITE PLANS..... 18

APPENDIX D – ENVIRONMENTAL SURVEY 19
 D.1 – Tabulated Summary Noise Data 19
 D.2 – Surveying Equipment 20
 D.3 – Meteorological Conditions..... 20

APPENDIX E – MANUFACTURERS DATA SHEETS 22

APPENDIX F – PLANT NOISE CALCULATIONS..... 23

Tables

Table 1.0 – Background Sound Level Summary Results 6
Table 2.0 – Plant Noise Emissions & Rating Sound Level of Proposed Extraction System 8
Table 3.0 – BS4142:2014 Noise Assessment of Proposed Extraction System 8
Table 4.0 – BS8233 Criteria for Internal Noise Levels in Dwellings..... 17
Table 5.0 – Sound Survey Summary Results 20
Table 6.0 – Measurement Equipment..... 20
Table 7.0 – Weather Summary 21

Figures

Figure 1.0 – Indicative Site Layout 5
Figure 2.0 – Indicative Extraction System Design 7

1. Introduction

Overview

NOVA Acoustics Ltd has been commissioned to prepare a noise impact assessment for a proposed restaurant ('the Proposed Development') at 112 Towngate, Mapplewell, Barnsley, S75 6AS ('the Site'). In particular, this report details an assessment on the proposed extraction unit plant associated with the restaurant.

The applicant has submitted a planning application, 2022/1091 - *New external ventilation extraction system* ('the Application') to Barnsley Metropolitan Borough Council. Barnsley Metropolitan Borough Council have requested additional supporting documentation in order to approve the application.

The following technical noise assessment has been prepared to support the planning application to Barnsley Metropolitan Borough Council. This report details the existing background sound climate at the nearest receptors, as well as the sound emissions associated with the Proposed Development.

This noise assessment is necessarily technical in nature; therefore, a glossary of terms is included in Appendix A to assist the reader.

Scope & Objectives

The scope of the noise assessment can be summarized as follows:

- Baseline sound monitoring survey to evaluate the prevailing background sound levels at the nearest Noise Sensitive Receptors ('NSR') to Site;
- A detailed assessment of the suitability of the Site, in accordance with relevant standards in respect of sound from the proposed sources; and
- Recommendation of mitigation measures, where necessary, to comply with the requirements of the National Planning Policy Framework (2021), Noise Policy Statement for England (2010) and British Standard BS 4142:2014+A1:2019 - Methods for rating and assessing industrial and commercial sound. Further information on the legislation can be found in Appendix B.

2. Environmental Noise Survey

Measurement Methodology

In order to characterise the sound profile of the area at the closest sensitive receptor (NSR), an environmental sound survey has been carried out from the 4th January 2023 to 7th January 2023. The monitoring position was chosen in order to collect representative sound levels at the NSR during the typical operational periods of the proposed development. The monitoring location is shown in Figure 1.0.

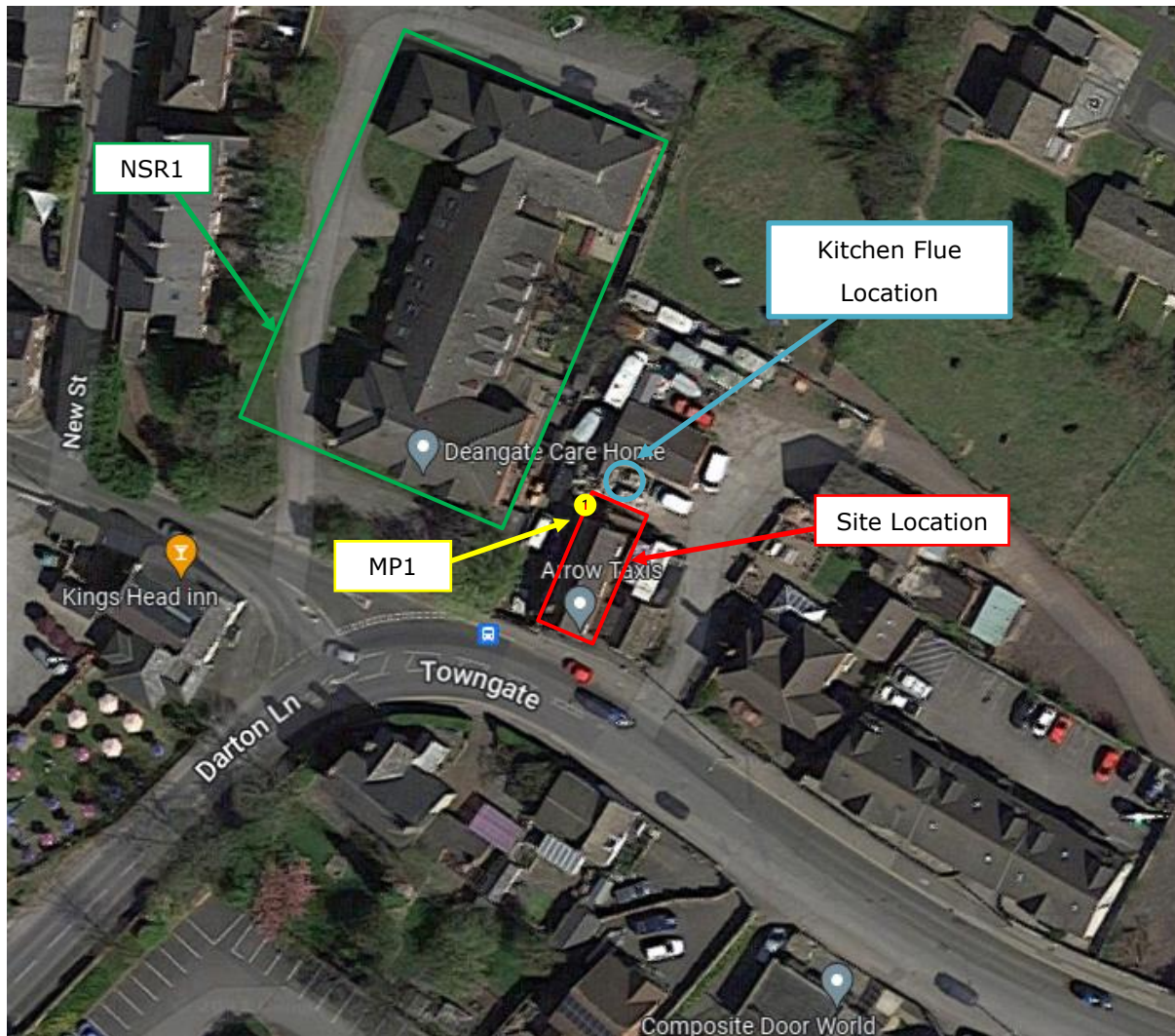


Figure 1.0 – Indicative Site Layout

Context & Subjective Impression

The surrounding area is a mixture of commercial and residential properties, and the acoustic environment is considered 'moderate' in level. To the north, is Wellgate Primary School. To the southwest lies Kings Head Inn. The primary source of noise during a site visit was Towngate road and the surrounding road network.

The closest receptor (NSR1) to the proposed plant is located approximately 10m west from the boundary of the site.

Environmental Noise Survey Results

The restaurant, and any associated plant, is proposed to operate 12:00 - 21:30 Mondays to Saturdays and 12:00 - 20:30 on Sundays. The table below outlines the background sound levels during the daytime operating hours and will be used as the baseline for the subsequent noise assessment. The typical $L_{A90,15min}$ values are determined from the distribution of measured levels during the proposed operational period, histograms are presented in Appendix D.

Measurement Position MP1			
Measurement Period ('t')	Min. $L_{A90,15min}$	Max. $L_{A90,15min}$	'Typical' $L_{A90,15min}$
Daytime	43	59	49

Table 1.0 – Background Sound Level Summary Results

3. BS4142:2014 Noise Assessment

The following section of the report analyses the expected impact from the noise emissions associated with the proposed plant.

The proposed kitchen extraction system includes the following relevant elements:

- 1 No. SystemAir MUB/T-S 062 500D4
- 2 No. CP03-C-0500-1D silencers between the fan and flue terminus.

The figure below shows the proposed system design.

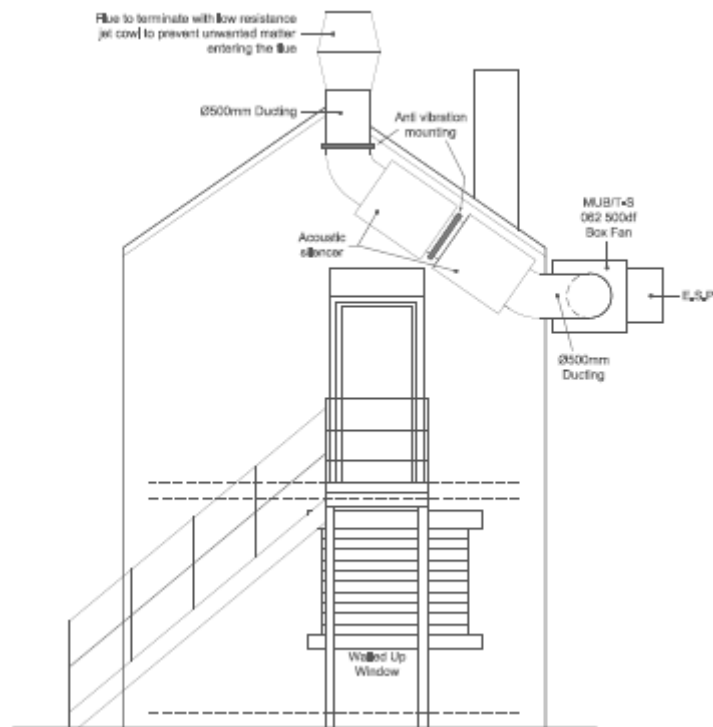


Figure 2.0 – Indicative Extraction System Design

The following assumptions have been made within the calculations:

- The extraction fan is mounted to an external wall approximately 10m from the closest window on the first floor of NSR1.
- The flue terminus is located approximately 1m above the eaves and approximately 13m from the closest window of the nearest NSR1.
- The extraction system operates on an ad-hoc basis throughout the proposed operational hours, the generated noise emissions may be intermittent in nature and include just perceptible tonal elements (in accordance with BS4142:2014).
- The system operates at maximum capacity.

The table below outlines the cumulative Rating Sound Level at NSR1. The manufacturers datasheets used in the calculations can be found in Appendix E. Full calculations can be found in Appendix F.

Cumulative Rating Noise Level at NSR1		
Description	Extraction Outlet	Fan Casing Breakout
Sound Power Level L_W (dBA)	67	60
Distance to NSR (m)	13	10
Radiation Loss* (dB)	11	8
Acoustic Shielding (dB)	0	0
Specific Sound Level at NSR1** (dBA)	34	29
Cumulative Specific Sound Level at NSR1 (dBA)	35	
Acoustic Correction Feature – Tonality & Intermittency*** (dB)	+5	
Cumulative Rating Level at NSR1 (dBA)	40	

Table 2.0 – Plant Noise Emissions & Rating Sound Level of Proposed Extraction System

* Radiation Loss levels of 11 dB for spherical radiation and 8 dB for hemi-spherical have been applied

** The noise level at the NSR has been calculated using the equation:

$$L_p = L_W - 10 \cdot \log(r) - \text{radiation loss, where } r = \text{distance to the NSR.}$$

*** A +2.0 dB penalty for possible tonal elements and a +3.0 dB penalty for intermittent fan operations has been applied to the specific sound levels in accordance with BS4142:2014.

The Rating Sound Level has been assessed in accordance with BS4142:2014 at the most affected NSR. The BS4142:2014 assessment can be seen in the table below.

BS4142:2014 Assessment – Day Time (Proposed Operational Hours)			
NSR	Results	Value (dBA)	Notes
1	Rating Level	40	Acoustic feature corrections as shown in Table 2.0.
	Background Sound Level	49	As shown in Table 1.0.
	Excess of Rating Level Over Background Sound Level	-9	The assessment indicates Low Level of 'no impact' in accordance with BS4142:2014.

Table 3.0 – BS4142:2014 Noise Assessment of Proposed Extraction System

Discussion

As can be seen in the assessment above, the rating level is predicted to be 9 dB below the prevailing background sound level at the most affected NSR. This indicates 'no impact', dependant on context, in accordance with BS4142:2014 and 'No Observed Effect Level' ('NOEL') when assessed in accordance with the NPPF and NPSE. Therefore, no additional mitigation measures are required, and the proposed extract system is considered suitable in terms of noise emission.

It should also be noted that the extract system is to be installed using anti-vibrational mounts, further reducing the likelihood of adverse impacts at the nearby NSRs.

Appendix A – Acoustic Terminology

Sound Pressure	Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.
Sound Pressure Level (Sound Level)	The sound level is the sound pressure relative to a standard reference pressure of 20µPa (20x10 ⁻⁶ Pascals) on a decibel scale.
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s1 and s2 is given by 20 log ₁₀ (s1 / s2). 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 20µPa.
A-weighting, dB(A)	The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.
Noise Level Indices	Noise levels usually fluctuate over time, so it is often necessary to consider an average or statistical noise level. This can be done in several ways, so a number of different noise indices have been defined, according to how the averaging or statistics are carried out.
L _{eq,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 during the 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 _{90,T}	A noise level index. The noise level exceeded for 90% of the time over the period T. L ₉₀ can be considered to be the "average minimum" noise level and is often used to describe the background noise.
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.
Free-Field	Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5m
Facade	At a distance of 1m in front of a large sound reflecting object such as a building façade.
Fast Time Weighting	An averaging time used in sound level meters. Defined in BS 5969.

In order to assist the understanding of acoustic terminology and the relative change in noise, the following background information is provided. The human ear can detect a very wide range of pressure fluctuations, which are perceived as sound. In order to express these fluctuations in a manageable way, a logarithmic scale called the decibel, or dB scale is used. The decibel scale typically ranges from 0 dB (the threshold of hearing) to over 120 dB. An indication of the range of sound levels commonly found in the environment is given in the following table.

Sound Level	Location
0dB(A)	Threshold of hearing
20 to 30dB(A)	Quiet bedroom at night
30 to 40dB(A)	Living room during the day
40 to 50dB(A)	Typical office
50 to 60dB(A)	Inside a car
60 to 70dB(A)	Typical high street
70 to 90dB(A)	Inside factory
100 to 110dB(A)	Burglar alarm at 1m away
110 to 130dB(A)	Jet aircraft on take off
140dB(A)	Threshold of Pain

The ear is less sensitive to some frequencies than to others. The A-weighting scale is used to approximate the frequency response of the ear. Levels weighted using this scale are commonly identified by the notation dB(A).

In accordance with logarithmic addition, combining two sources with equal noise levels would result in an increase of 3 dB(A) in the noise level from a single source. A change of 3 dB(A) is generally regarded as the smallest change in broadband continuous noise which the human ear can detect (although in certain controlled circumstances a change of 1 dB(A) is just perceptible). Therefore, a 2 dB(A) increase would not normally be perceptible. A 10 dB(A) increase in noise represents a subjective doubling of loudness.

A noise impact on a community is deemed to occur when a new noise is introduced that is out of character with the area, or when a significant increase above the pre-existing ambient noise level occurs.

For levels of noise that vary with time, it is necessary to employ a statistical index that allows for this variation. These statistical indices are expressed as the sound level that is exceeded for a percentage of the time period of interest. In the UK, traffic noise is measured as the L_{A10} , the noise level exceeded for 10% of the measurement period. The L_{A90} is the level exceeded for 90% of the

time and has been adopted to represent the background noise level in the absence of discrete events. An alternative way of assessing the time varying noise levels is to use the equivalent continuous sound level, L_{Aeq} .

This is a notional steady level that would, over a given period of time, deliver the same sound energy as the actual fluctuating sound. To put these quantities into context, where a receiver is predominantly affected by continuous flows of road traffic, a doubling or halving of the flows would result in a just perceptible change of 3 dB, while an increase of more than 25%, or a decrease of more than 20%, in traffic flows represent changes of 1 dB in traffic noise levels (assuming no alteration in the mix of traffic or flow speeds).

Note that the time constant and the period of the noise measurement should be specified. For example, BS4142:2014 specifies background noise measurement periods of 1 hour during the day and 15 minutes during the night. The noise levels are commonly symbolised as $L_{A90,1hour}$ dB and $L_{A90,15mins}$ dB. The noise measurement should be recorded using a 'FAST' time response equivalent to 0.125ms

Appendix B – Legislation, Policy and Guidance

This report is to be primarily based on the following legislation, policy and guidance.

B.1 – National Planning Policy Framework (2021)

Government policy on noise is set out in the National Planning Policy Framework (NPPF), published in 2021. This replaced all earlier guidance on noise and places an emphasis on sustainability. In section 15, Conserving and enhancing the natural and local environment, paragraph 174e, it states:

Preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans;

Paragraph 185 states:

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 impact 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; and*
- c) Limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.*

B.2 – Noise Policy Statement for England (2010)

Paragraph 185 of the NPPF also refers to advice on adverse effects of noise given in the Noise Policy Statement for England (NPSE). This document sets out a policy vision 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.

To achieve this vision the Statement identifies the following three aims:

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;*
- Where possible, contribute to the improvement of health and quality of life.*

In achieving these aims the document introduces significance criteria as follows:

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur. It is stated that “significant adverse effects on health and quality of life should be avoided while also considering the guiding principles of sustainable development”.

LOAEL – Lowest Observed Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected. It is stated that the second aim above lies somewhere between LOAEL and SOAEL and requires that: “all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also considering the guiding principles of sustainable development. This does not mean that such adverse effects cannot occur.”

NOEL – No Observed Effect Level

This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise. This can be related to the third aim above, which seeks: “where possible, positively to improve health and quality of life through the pro-active management of noise while also considering the guiding principles of sustainable development, recognising that there will be opportunities for such measures to be taken and that they will deliver potential benefits to society. The protection of quiet places and quiet times as well as the enhancement of the acoustic environment will assist with delivering this aim.”

The NPSE recognises that it is not possible to have a single objective noise-based measure that is mandatory and applicable to all sources of noise in all situations and provides no guidance as to how these criteria should be interpreted. It is clear, however, that there is no requirement to achieve noise levels where there are no observable adverse impacts but that reasonable and practicable steps to reduce adverse noise impacts should be taken in the context of sustainable development and ensure a balance between noise sensitive and the need for noise generating developments.

Any scheme of noise mitigation outlined in this report will, therefore, aim to abide by the above principles of the NPPF and NPSE whilst recognizing the constraints of the site.

B.3 – British Standard BS 4142:2014+A1:2019 - Methods for rating and assessing industrial and commercial sound

Overview

BS4142:2014 sets out a method to assess the likely effect of sound from factories, industrial premises or fixed installations and sources of an industrial nature in commercial premises, on people who might be inside or outside a dwelling or premises used for residential purposes in the vicinity.

The procedure contained in BS4142:2014 for assessing the effect of sound on residential receptors is to compare the measured or predicted sound level from the source in question, the $L_{Aeq,T}$ ‘specific sound level’, immediately outside the dwelling with the $L_{A90,T}$ background sound level.

Where the sound contains a tonality, impulsivity, intermittency and other sound characteristics, then a correction depending on the grade of the aforementioned characteristics of the sound is added to the specific sound level to obtain the $L_{Ar,Tr}$ 'rating sound level'. A correction to include the consideration of a level of uncertainty in sound measurements, data and calculations can also be applied when necessary.

Rating Penalty

Section 9 of BS4142:2014 describes how the rating sound level should be derived from the specific sound level, by deriving a rating penalty.

BS4142:2014 states:

"Certain acoustic features can increase the significance of impact over that expected from a basic comparison between the specific sound level and the background sound level. Where such features are present at the assessment location, add a character correction to the specific sound level to obtain the rating level. This can be approached in three ways:

- a) subjective method;*
- b) objective method for tonality;*
- c) reference method."*

Due to the nature of the development the subjective method has been adopted to derive the rating sound level from the specific sound level. This is discussed in Section 9.2 of BS4142:2014, which states:

"Where appropriate, establish a rating penalty for sound based on a subjective assessment of its characteristics. This would also be appropriate where a new source cannot be measured because it is only proposed at that time, but the characteristics of similar sources can subjectively be assessed. Correct the specific sound level if a tone, impulse or other characteristics occurs, or is expected to be present, for new or modified sound sources."

BS4142:2014 defines four characteristics that should be considered when deriving a rating penalty, namely; tonality; impulsivity; intermittency; and other sound characteristics, which are defined as:

a) Tonality

A rating penalty of +2 dB is applicable for a tone which is "just perceptible", +4 dB where a tone is "clearly perceptible", and +6 dB where a tone is "highly perceptible".

b) Impulsivity

A rating penalty of +3 dB is applicable for impulsivity which is "just perceptible", +6 dB where it is "clearly perceptible", and +9 dB where it is "highly perceptible".

c) Other Sound Characteristics

BS4142:2014 states that where "the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distance against the residual acoustic environment, a penalty of +3 dB can be applied."

d) *Intermittency*

BS4142:2014 states that when the “specific sound has identifiable on/off conditions, the specific sound level ought to be representative of the time period of length equal to the reference time interval which contains the greatest total amount of on time ... if the intermittency is readily distinctive against the residual acoustic environment, a penalty of +3 dB can be applied.”

Background Sound Level

The background sound level is the underlying level of sound over a period, T, and is indicative of the relative quietness at a given location. It does not reflect the occurrence of transient and/or higher sound level events and is generally governed by continuous or semi-continuous sounds.

To ensure the background sound level values used within the assessment are reliable and suitably represent both the particular circumstance and periods of interest, efforts have been made to quantify a ‘typical’ background sound level for a given period. The purpose has not been to simply select the lowest measured value. Diurnal patterns have also been considered as they can have a major influence on background sound levels, for example, the middle of the night can be distinctly different (and potentially of lesser importance) compared to the start or end of the night time period for sleep purposes.

Since the intention is to determine a background sound level in the absence of the specific sound that is under consideration, it is necessary to understand that the background sound level can in some circumstances legitimately include industrial and/or commercial sounds that are present as separate to the specific sound.

Assessment of Impact

BS4142:2014 states: “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 sound can be obtained by the difference of the rating sound level and the background sound 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 negligible impact, depending on the context.”

Interpreting the guidance given in BS4142:2014, with consideration of the guidance given in the NPSE and NPPG Noise, an estimation of the impact of the rating sound is summarised in the following text:

- A rating sound level that is +10 dB above the background sound level is likely to be an indication of a Significant Observed Adverse Effect Level;
- A rating sound level that is +5 dB above the background sound level is likely to be an indication of a Lowest Observed Adverse Effect Level;
- The lower the rating sound 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 sound level does not exceed the background sound level, this is an indication of the specific sound source having a negligible impact and would therefore be classified as a No Observed Adverse Effect Level.

During the daytime, the assessment is carried out over a reference time period of 1-hour. The periods associated with day or night, for the purposes of the Standard, are 07.00 to 23.00 and 23.00 to 07.00, respectively.

B.4 – BS8233:2014 ‘Guidance on sound insulation and noise reduction for buildings’

The British Standard BS 8233: 2014, Guidance on Sound insulation and noise reduction for buildings provides additional guidance on noise levels from sources without specific character in the built environment, based on the recommendations of the World Health Organization; specifically, WHO Guidelines on Community Noise, 1999. The criteria desirable levels of steady state, “anonymous” noise in unoccupied spaces within dwellings, from sources such as road traffic, mechanical services and other continuously running plant, are tabulated below:

Activity	Location	07:00 – 23:00	23:00 – 07:00
Resting	Living Room	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 $L_{Aeq,8hour}$

Table 4.0 – BS8233 Criteria for Internal Noise Levels in Dwellings

It is noted, however that where development is considered necessary or desirable, despite external noise level above WHO guidelines, the above target levels may be relaxed by up to 5 dB.

The standard also recommends that for traditional external amenity areas, such as gardens, it is desirable that external noise levels do not exceed 50 dB $L_{Aeq,T}$, and that 55 dB $L_{Aeq,T}$ would be acceptable in noisier environments. However, it is recognised that these values may not be achievable in all areas where development is desirable and in such locations, development should be designed to achieve the lowest practicable levels.

General recommendations for mitigation to enable these targets to be achieved are provided, including the use of bunds and barriers to reduce external noise and space planning and sound insulation for the control of internal noise levels.

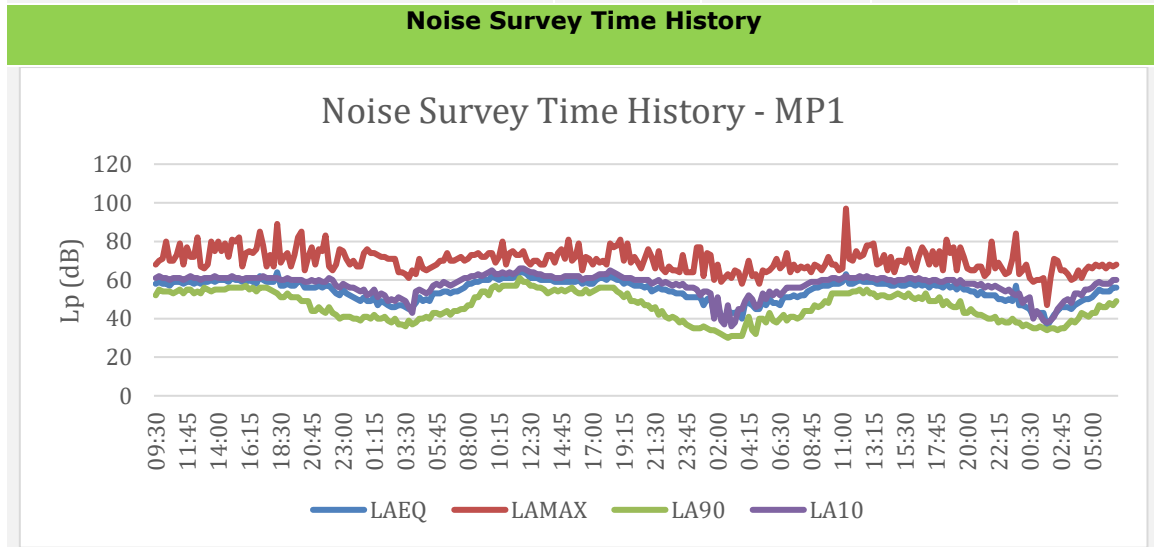
For this assessment, the above criteria are considered to be the LOAEL as defined in the NPSE above.

Appendix D – Environmental Survey

D.1 – Tabulated Summary Noise Data

Measurement Position MP1				
Measurement Time Period ('t')	L _{Aeq,t}	L _{Amax,t}	L _{A90,t}	L _{A10,t}
Day 1 – 04/01/23: 09:30 – 23:00	59	89	56	60
Night 1 – 04/01/23: 23:00 – 07:00	51	76	46	53
Day 2 – 05/01/23: 07:00 – 23:00	60	81	55	61
Night 2 – 06/01/23: 23:00 – 07:00	49	77	42	51
Day 3 – 07/01/23: 07:00 – 23:00	57	97	52	59
Night 3 – 07/01/23: 23:00 – 07:00	51	84	42	55

LA90 Analysis				
Measurement Period ('t')	L _{A90,t}	SMR L _{A90,t}	Min. L _{A90,t}	Max. L _{A90,t}
Day 1 – 04/01/23: 09:30 – 23:00	56	55	40	57
Night 1 – 04/01/23: 23:00 – 07:00	41	40	36	44
Day 2 – 05/01/23: 07:00 – 23:00	55	56	40	61
Night 2 – 06/01/23: 23:00 – 07:00	42	31	30	43
Day 3 – 07/01/23: 07:00 – 23:00	52	53	38	55
Night 3 – 07/01/23: 23:00 – 07:00	42	35	34	49



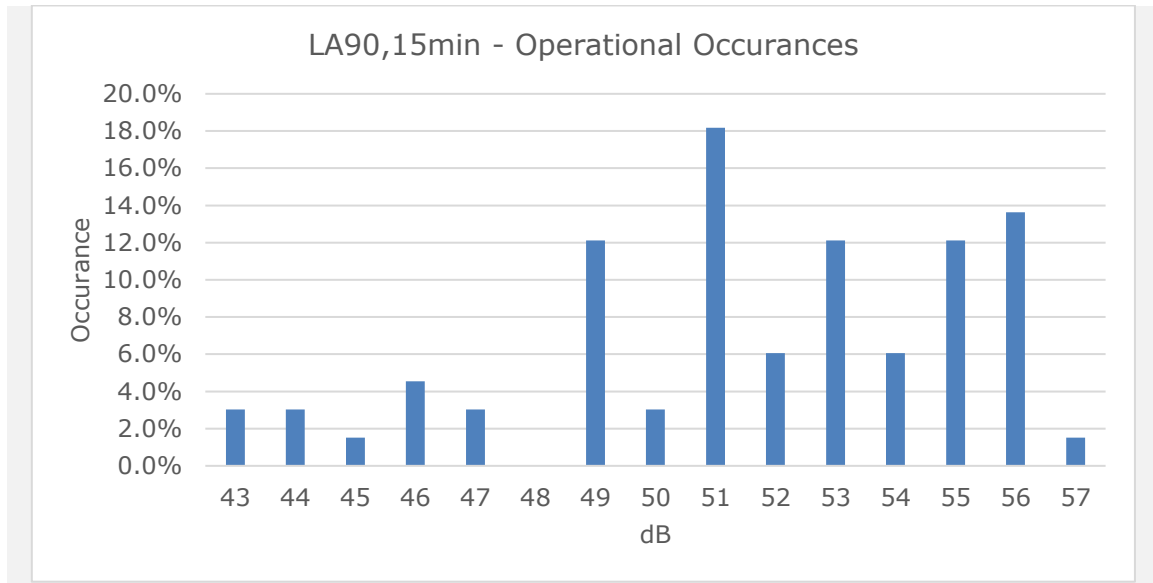


Table 5.0 – Sound Survey Summary Results

D.2 – Surveying Equipment

Piece of Equipment	Serial No	Calibration Deviation
CESVA SC250 Class 1 Sound level meter	T252915	≤0.1
CESVA CB011 Class 1 Calibrator	T251945	

Table 6.0 – Measurement Equipment

All equipment used during the survey was field calibrated at the start and end of the measurement period with a negligible deviation noted. All sound level meters are calibrated every 24 months and all calibrators are calibrated every 12 months, by a third-party calibration laboratory. All microphones were fitted with a protective windshield for the entire measurements period. Calibration certificates can be provided upon request.

D.3 – Meteorological Conditions

As the environmental noise survey was carried out over a long un-manned period no localised records of weather conditions were taken. However, during the set up and collection of the monitoring equipment the weather conditions have been documented in the following table. All measurements have been compared with met office weather data of the area, specifically the closest weather station, the data from the weather station is outlined in the table below. When reviewing the time history of the noise measurements, any scenarios that were considered potentially to be affected by the local weather conditions have been omitted. The analysis of the noise data includes statistical and percentile analysis and review of minimum and maximum values, which aids in the preclusion of any periods of undesirable weather conditions. The weather conditions were deemed suitable for the measurement of environmental noise in accordance with BS7445 Description and Measurement of Environmental Noise. The table below presents the average temperature, wind speed and rainfall range for each 24-hour period during the entire measurement.

Weather Conditions – Sylvan Street (Approx. 1.7km West of Site)				
Time period	Air temp (°C)	Rainfall mm/h	Prevailing Wind Direction	Wind Speed (m/s)
06/12/2022: 00:00 – 23:59	6.3 – 11.6	0.0 – 0.2	ESE	0.0 – 3.6
07/12/2022: 00:00 – 23:59	6.4 – 12.1	0.0 – 7.9*	SE	0.0 – 4.1
08/12/2022: 00:00 – 23:59	4.6 – 7.8	0.0	ESE	0.0 – 2.6
09/12/2022: 00:00 – 23:59	4.7 – 6.9	0.0 – 0.2	ESE	0.0 – 2.4

Table 7.0 – Weather Summary

**Periods of heavy rainfall have been excluded from the data and calculations*

Appendix E – Manufacturers Data Sheets

Hydraulic data	
Required air flow	1.41 m ³ /s
Required static pressure	660 Pa
Working air flow	1.41 m ³ /s
Working static pressure	660 Pa
Air density	1.204 kg/m ³
Power	1793.2 W
Fan control - RPM	1454 rpm
Current	3.45 A
SFP	1.273 kW/m ³ /s
Control voltage	400.0 V
Supply voltage	400 V

Sound power level		63	125	250	500	1k	2k	4k	8k	Total
Inlet	dB(A)	50	74	77	79	80	77	74	66	85
Outlet	dB(A)	52	76	78	81	81	79	75	67	87
Surrounding	dB(A)	30	58	49	47	50	49	41	30	60
Sound pressure level at 3m (20m ² Sabine)	dB(A)	-	-	-	-	-	-	-	-	53
Sound pressure level at 3m free field	dB(A)	-	-	-	-	-	-	-	-	39

CP03-CA-0500 SILENCER



PATTERN A - 12 x M10 - 560 PCD
PATTERN B - 12 x M8 - 541 PCD

INSERTION LOSS (dB) - CENTRE BAND FREQUENCY

DIMENSIONAL DATA

PRODUCT CODE	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	LENGTH	MASS
CP03-C*-0500-1D	2	3	6	14	14	12	10	5	500mm	18 Kg
CP03-C*-0500-2D	3	7	8	19	20	17	14	11	1000mm	32 Kg
CP03-C*P-0500-1D	2	7	9	17	24	24	20	16	500mm	22 Kg
CP03-C*P-0500-2D	4	10	16	26	29	29	29	20	1000mm	37 Kg

Replace * in code with A or B for connection pattern. Insertion loss data is derived from continual testing to BS4718 and other standards in independent UKAS certified laboratories, which includes where appropriate, re-generated or self noise testing in both forward and reverse flow conditions. If you request system analysis from our technicians all predictions will be assessed using the relevant certified insertion loss data together with relevant dynamic corrections.

500 DIA FAN MOUNTED SILENCER

Available in two standard lengths C Series silencers have excellent attenuation properties, achieved with sound absorbing infill retained in the attenuator casing by a perforated liner. The central pod (code P) is an option to increase the insertion loss, however it will add resistance.

- Fits directly onto 500mm diameter fans
- Standard lengths 500mm (1D) & 1000mm (2D)
- Use up to 70°C (standard construction)
- Systems up to 1000 Pascals
- Special lengths on request

Appendix F – Plant Noise Calculations

	63	125	250	500	1000	2000	4000	8000	dBA
Fan Outlet (Lw)	78	92	87	84	81	78	74	68	87
Duct (500m Diameter, 2m Length)	2	1	1	0	0	0	0	0	
Silencer 1	2	3	6	14	14	12	10	5	
Silencer 2	2	3	6	14	14	12	10	5	
Bend (500mm)	0	0	1	2	3	3	3	3	
End Reflection (500mm)	9	5	2	0	0	0	0	0	
Sound Power at Terminus (Lw)	64	80	71	54	50	51	51	55	67

	63	125	250	500	1000	2000	4000	8000	dBA
Outlet at Terminus (Lw)	64	80	71	54	50	51	51	55	67
Radiation	11	11	11	11	11	11	11	11	
Distance Loss	22	22	22	22	22	22	22	22	
Total	30	47	38	20	16	17	17	21	34

	63	125	250	500	1000	2000	4000	8000	dBA
Breakout (Lw)	56	74	58	50	50	48	40	31	60
Radiation	8	8	8	8	8	8	8	8	
Distance Loss	22	22	22	22	22	22	22	22	
Total	26	44	28	20	20	18	10	1	29

	63	125	250	500	1000	2000	4000	8000	dBA
Outlet	30	47	38	20	16	17	17	21	34
Breakout	26	44	28	20	20	18	10	1	29
Total Specific	30	45	35	20	20	18	13	10	35
Correction (+2 Tonal, +3 Intermittency)	5	5	5	5	5	5	5	5	
Rating Level (Tonality)	35	50	40	25	25	23	18	15	40