Noise Impact Assessment of the installation of the proposed Extraction System

Client Name:	Harwood Caterings
Site Address:	62 Harwoods Road, Watford, Hertfordshire, WD18 7RE
Date:	18/02/2021

Authorisation and Version Control	
Report Prepared By	Mr A Garcigoy, MSc, AMIOA
Report Checked By	Mr P Soler, BEng, MIOA
Report Approved By	Mr A T Martin, MSc, MIOA, MCIEH, MIET, MInstSCE
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Executive summary

An environmental noise survey and noise impact assessment have been undertaken at 62 Harwoods Road, Watford, Hertfordshire WD18 7RE to assess the potential increase in noise levels from the installation of the proposed Extraction System on the surrounding Noise Sensitive Receptors. The measured background sound levels have allowed a BS4142:2014 noise assessment to be carried out.

The BS4142:2014 assessment of the proposed extraction system indicates that, provided the proposed Extraction System is installed as specified within this report and the recommendations are implemented, the Rating Noise Level should not exceed the background sound level. This indicates low impact in accordance with BS4142:2014 and 'No Observed Effect Level' when assessed in accordance with the NPSE and NPPF.

An overview of the recommendations can be found below:

Recommendations and Mitigation Measure Overview
- Relocate the proposed fan unit to a new position inside the premises. - The duct elbows must be lined with sound attenuation duct liner and installed between the extraction fan and the end of the ductwork. - All mechanical plant should be fitted on appropriate anti-vibrational mounts. - The make, model and location of the external unit should not be altered. If alterations to the specification and location of the units are required further assessment should be undertaken. - The silencers make and model should be capable of meeting the assumed minimum required insertion loss outlined in Table 6.0. - The proposed separating floor construction upgrades can be found in Table 7.0.

The findings of this report will require written approval from the Local Authority prior to work commencing.

1. Introduction

Overview

NOVA Acoustics Ltd has been commissioned to prepare a noise assessment for the installation of the proposed Extraction System (the Proposed Development') at 62 Harwoods Road, Watford, Hertfordshire WD18 7RE ('the Site').

The applicant has submitted a full planning application 20/01346/FUL - Proposed new extract duct to be submitted ('the Application') to Watford Borough Council. The planning application has been refused for the following reason:

"The application has failed to demonstrate that the proposed extractor and ducting flue, motors and systems would not unacceptably harm the amenities of adjoining and surrounding residential occupiers. The systems and housing for the extractor and ducting, to serve the enhanced commercial activity at the site, have the potential to create unreasonable disturbance to the amenities of nearby residential occupiers. The information provided with the application has been insufficient to demonstrate that the potential noise and odour of the development would not unacceptably harm the amenities of residential occupiers. The development is therefore contrary to the 'saved' policies S11 and SE22 of the Watford District Plan 2000 and policies SS1 and UD1 of the Watford Local Plan, Part 1- Core Strategy 2006-31."

Therefore, the following technical noise assessment has been prepared to support the planning application to Watford 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 sensitive receptor ('NSR') to Site;
- Acoustic calculation and analysis in accordance with; ISO9613 – 1 ISO 9613-2 - Attenuation of sound during propagation outdoors prediction methodology, to predict sound levels at the NSR;
- 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 (2019), 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 10/02/2021 to 11/02/2021. 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.

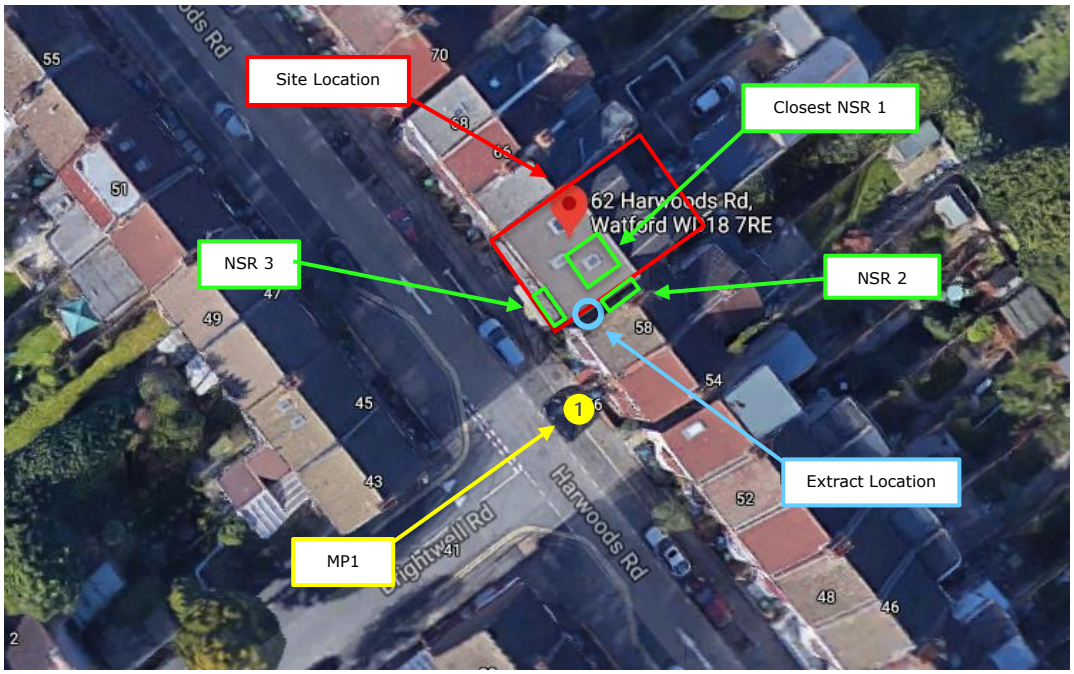

Figure 1.0 - Indicative Site Layout

Context & Subjective Impression

The area surrounding site is primarily a quiet residential area. To the south-west runs Harwood Road, a one-way road which facilitates light levels of traffic flow and low commercial activity. The Vicarage Road Cemetery is located directly to the rear and north-east of the site. The noise profile of the area is dominated by distant and local traffic noise with other noise sources secondary in nature.

Environmental Noise Survey Results

The proposed plant will operate from 11am to 11pm Monday to Saturday. The table below outlines the background sound levels, during the operational period of the plant, that will be used as the baseline for the noise assessment. Further summary results for the entire measurement period can be found in Appendix D.

Measurement Position MP1				
Measurement Period ('t')	**$L_{A90,15min}$**	***SMR $L_{A90,15min}$**	**Min. $L_{A90,15min}$**	**Max. $L_{A90,15min}$**
Day 1 – 10/02/2021 – 13:29 – 22:59	44.0	44.0	37.0	48.0

Table 1.0 – Background Sound Level Summary Results

**Statistically Most Repeated*

As can be seen in the table above the statistically most repeated $L_{A90,15min}$ value is 44.0. The range of measured background sound levels is moderate and as such, the statistically most repeated $L_{A90,15min}$ value is deemed 'Typical' and will be used in the following analysis as it can be considered to provide a robust assessment.

3. BS4142:2014 Noise Assessment

The following section of the report analyses the expected impact from the noise emissions associated with the proposed extraction system. The following equipment is to be installed:

Plant Equipment	Specific Noise Level @ 1m	NSR	Distance to NSR1	Specific Noise Level at NSR*1	Shielding*2	Acoustic Feature Correction*3
S&P Fan TCBBX2/4-450 with 1 No. Silencer*4 - Outtake	81.0 dB(A)	1	2.7m	52.0	0.0	Tonality +2
		2	5.1m	46.0	0.0	
		3	5.2m	46.0	-5.0	
S&P Fan TCBBX2/4-450	81.0 dB(A)	1	6.3m	65.0	-5.0	
		2	4.3m	68.0	0.0	
		3	3.3m	71.0	-5.0	
Cumulative Rating Noise Level $L_{AR,TR}$ @ NSR1				62.0 dBA		
Cumulative Rating Noise Level $L_{AR,TR}$ @ NSR2				70.0 dBA		
Cumulative Rating Noise Level $L_{AR,TR}$ @ NSR3				68.0 dBA		

Table 2.0 – Plant Noise Emissions

**1 The noise level at the NSR has been calculated using the following equation 20log(r1/r2).*

**2 A -5 dBA shielding correction is applicable as a barrier (façade) stands between the source of noise and the NSR.*

**3 The new source cannot be measured because it is only proposed, but the characteristics of similar sources can subjectively be assessed. A penalty for perceptible tonality is typically applicable.*

**4 We have not been provided with proposed silencers specification. Assumed/Recommended silencers: 1 no. Systemair FSAF400C1DA Silencer 450/8*

The BS4142 Assessment of the proposed extraction system is outlined in the table below.

Results	NSR1 Sound Level (dB)	NSR2 Sound Level (dB)	NSR3 Sound Level (dB)	Notes
Rating Sound Level	62.0	70.0	68.0	Acoustic feature corrections as shown in Table 2.0.
Background Sound Level	44.0			As shown in Table 1.0
Excess of Rating over Background Sound Level	+18.0	+26.0	+24.0	The assessment indicates; Significant Adverse Impact Dependant on Context

Table 3.0 – BS4142:2014 Noise Assessment

Discussion

The assessment above indicates that the rating level is above the background sound level at the noise sensitive receptor by at least 18.0 dB. This indicates the potential for Significant Adverse Impact Dependant on Context impact on the surrounding residential Noise Sensitive Receptors.

In order to ensure the noise emissions from the proposed plant units do not cause a significant adverse impact and are compliant with Local Authority noise policy, it is advised to relocate the position of the proposed fan unit inside of the building envelope and line the duct elbows with suitable acoustic insulation.

The below Table 4.0 analyses the expected impact of the noise emissions associated with the proposed extraction system with the mitigation.

Plant Equipment	Specific Noise Level @ 1m	NSR	Distance to NSR1	Specific Noise Level at NSR*1	Shielding	Acoustic Feature Correction
S&P Fan TCBBX2/4-450 with 1 No. Silencer - Outtake	81.0 dB(A)	1	2.7m	38.0	0.0	Tonality +2
		2	5.1m	32.0	0.0	
		3	5.2m	32.0	-5.0	
Cumulative Rating Noise Level $L_{AR,TR}$ @ NSR1				40.0		
Cumulative Rating Noise Level $L_{AR,TR}$ @ NSR2				34.0		
Cumulative Rating Noise Level $L_{AR,TR}$ @ NSR3				29.0		

Table 4.0 – Plant Noise Emissions with Mitigation

**1 The noise level at the NSR has been calculated assuming that the two lined elbows are installed between the extraction fan and the end of the ductwork.*

The BS4142 Assessment of the proposed extraction system with the fan unit relocated inside of the restaurant is outlined in the table below.

Results	NSR1 Sound Level (dB)	Notes
Rating Sound Level	40.0	Acoustic feature corrections as shown in Table 4.0.
Background Sound Level	44.0	As shown in Table 1.0
Excess of Rating over Background Sound Level	-4.0	The assessment indicates; Negilgible Impact, Dependant on Context

Table 5.0 – BS4142:2014 Noise Assessment with Mitigation

Discussion

The assessment above indicates that the rating level is below the background sound level at the noise sensitive receptor by 4 dB. This indicates the potential for Negilgible Impact, Dependant on Context impact on the surrounding residential Noise Sensitive Receptors.

Given the outcome of the assessment, no further mitigation measures would be required.

3.1.1 Recommendations & Mitigation

The following section outlines the mitigation measures that are necessary to reduce the impact of the proposed extraction system.

- Relocate the proposed fan unit to a new position inside the premises.
- The duct elbows must be lined with sound attenuation duct liner and installed between the extraction fan and the end of the ductwork.
- All mechanical plant should be fitted on appropriate anti-vibrational mounts.
- The make, model and location of the external unit should not be altered. If alterations to the specification and location of the units are required further assessment should be undertaken.
- The silencer acoustic data has not been provided/found so example data has been used. The silencer installed should be capable of meeting the minimum required insertion loss set out in the table below.

Silencer Insertion Loss								
Silencer/s	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
1 No. Systemair FSAF400C1DA Silencer 450/8	-3	-10	-12	-17	-27	-34	-35	-34

Table 6.0 – Required Insertion Loss

4. Noise Break Through Assessment

The development has commercial units on the ground floor and residential units on the 1st floor. This section analyses the noise level breaking through the floor partition. It is recommended that the partition scores a minimum of 10 dB above the regulations stated at Part E of Building regulations to ensure that the amenity of future residents is fully protected. This means the partition must score a minimum of 53 dB $D_{nT,w+ctr}$ when tested for airborne sound attenuation.

During the site visit the property's floor construction could not be inspected. It is assumed that the existing floor build-up is comprised of 200mm traditional timber joists partially filled with mineral wool insulation and a lightweight ceiling circa 15kg/m^2. This is considered to be a typical construction for this type of buildings. The current build-up (200mm joist depth has been model as a worst-case scenario) has been modelled with INSUL 9.0 software and it is predicted to score approximately 31 dB $D_{nT,w+Ctr}$.

In order to achieve the necessary attenuation, the following upgrade is recommended:

Ensure all holes and gaps within the existing partition floor are fully sealed to ad airtight condition. Affix a layer of 15mm sound rated plasterboard to the existing ceiling and then install an MF suspended ceiling with acoustic hangers with a minimum drop of 200mm. The cavity of the MF suspended ceiling to be filled with at least 100mm of mineral wool insulation (min. density of 45 kg/m^3). Finally, close the with 2 No. 15mm soundbloc plasterboards (min. density of 12.6 kg/m^2 per board).

Adjoining floor Construction Detail

To ensure the noise breaking through the adjoining floor is sufficiently suppressed the following sound insulation upgrades should be implemented at the site, any other construction capable of providing the attenuation outlined in section 4.0 will be suitable.

Proposed Separating Floor Construction Detail
- Existing sub-floor e.g. floorboards. - 200mm traditional timber joists partially filled with mineral wool insulation. - Existing lightweight ceiling (assumed 15kg/m^2) - 1 No. layer sound rated plasterboard. - British Gypsum's Casoline MF ceiling with acoustic hangers GAH1/2 creating a 200mm (min.) cavity partially filled with 100mm mineral wool insulation e.g. Rockwool RWA45. - 2 No. Layer of 15mm sound rated plasterboard

Description	**125**	**250**	**500**	**1k**	**2k**	**4k**	**Rw**	**$D_{nT,w+Ctr}$**
Expected Sound Reduction Rw	44.0	51.0	57.0	62.0	59.0	68.0	65.0	50.0 – 55.0 dB

Table 7.0 – Adjoining Structure Specification

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 log10 (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. Lmax is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall Leq 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. L90 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. L10 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 be 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 (2019)

Government policy on noise is set out in the National Planning Policy Framework (NPPF), published in 2019. 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 170e, 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 180 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 180 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 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.

Appendix C – Site Plans

Ordnance Survey®

Superplan®

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N

Scale 1:1250

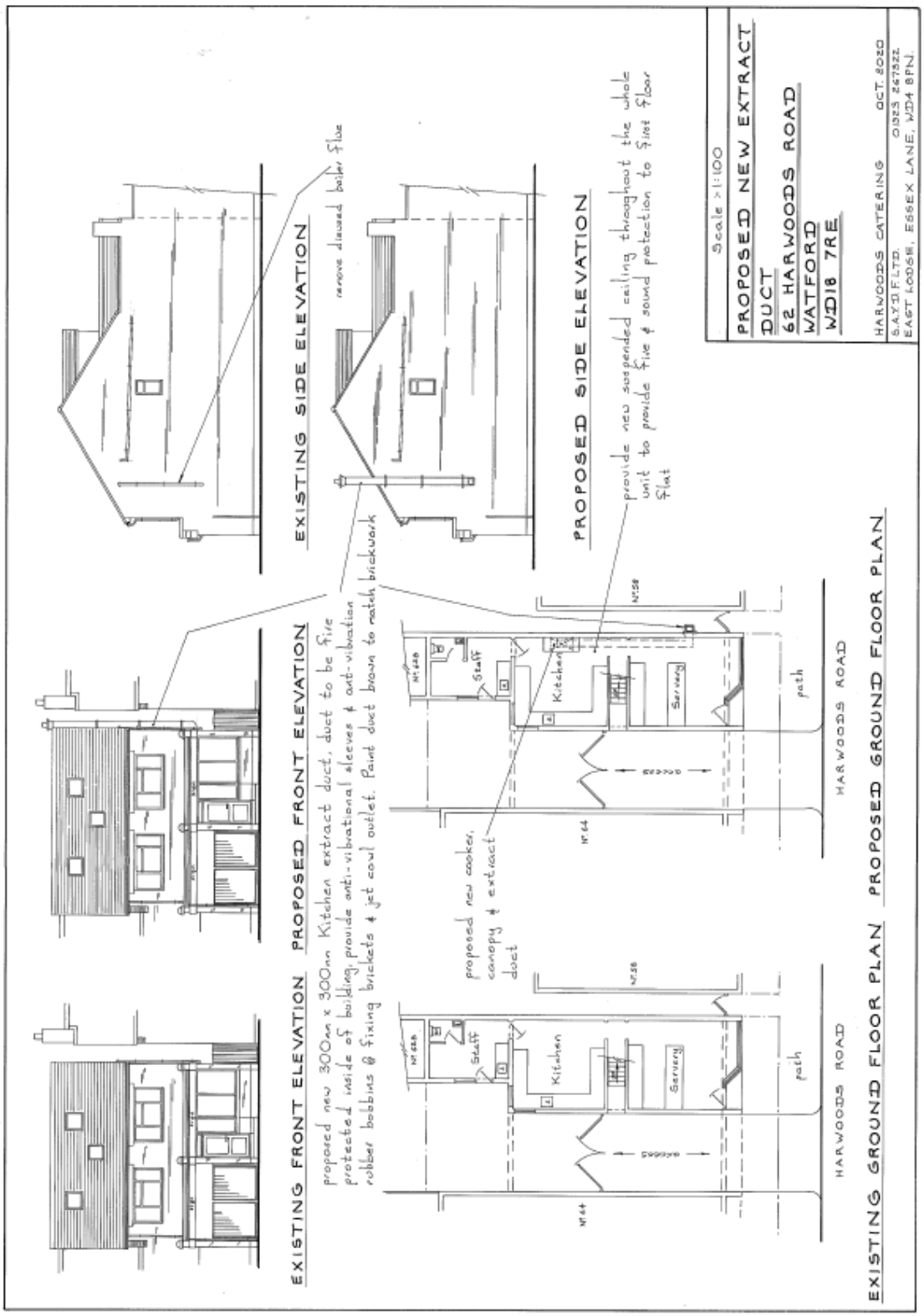
National Grid sheet reference at centre of this Superplan: TQ1065NW

The representation of a road, track or path is no evidence of a right of way.

Centre Coordinates: 510410 195800

Supplied by: Trident Map Services

Serial Number: 01013900


PROPOSED NEW EXTRACT DUCT
62 HARWOODS ROAD
WATFORD
WD18 7RE
Scale 1:100
HARWOODS CATERING
S.A.Y.D LTD
EAST LODGE, ESSEX LANE, WD4 8PN
OCT 2020
01923 267522
EXISTING SIDE ELEVATION
remove disused boiler flue
PROPOSED SIDE ELEVATION
provide new suspended ceiling throughout the whole unit to provide fire & sound protection to first floor flat
EXISTING FRONT ELEVATION
PROPOSED FRONT ELEVATION
proposed new 300mm x 300mm kitchen extract duct, duct to be fire protected inside of building, provide anti-vibrational sleeves & anti-vibration rubber bobbins @ fixing brackets & jet cowl outlet. Paint duct brown to match brickwork
proposed new cooker, canopy & extract duct
EXISTING GROUND FLOOR PLAN
PROPOSED GROUND FLOOR PLAN
HARWOODS ROAD
HARWOODS ROAD
Staff
Kitchen
Servery
path
Staff
Kitchen
Servery
path

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 – 10/02/2021 – 13:29 – 22:59	58.0	90.0	53.0	59.0
Night 1 – 10/02/2021 – 23:00 – 06:59	49.0	88.0	35.0	53.0
Day 2 – 11/02/2021 – 07:00 – 14:58	57.0	90.0	55.0	59.0

LA90 Analysis				
Measurement Period ('t')	**$L_{A90,t}$**	**SMR $L_{A90,t}$**	**Min. $L_{A90,t}$**	**Max. $L_{A90,t}$**
Day 1 – 10/02/2021 – 13:29 – 22:59	44.0	44.0	37.0	48.0
Night 1 – 10/02/2021 – 23:00 – 06:59	35.0	32.0	30.0	42.0
Day 2 – 11/02/2021 – 07:00 – 14:58	46.0	44.0	43.0	49.0

Noise Survey Time History

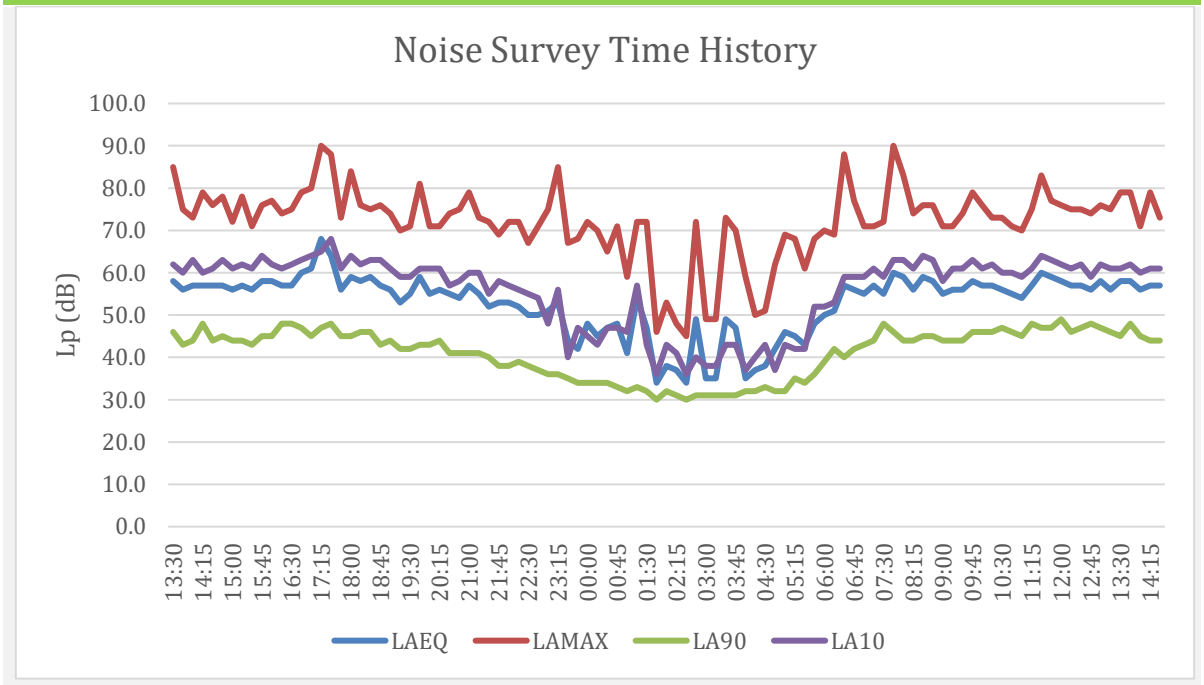


Table 8.0 – Sound Survey Summary Results

D.2 Surveying Equipment

Piece of Equipment	Serial No	Calibration Deviation
CESVA SC420 Class 1 Sound level meter	T250680	≤0.5
CESVA CB006 Class 1 Calibrator	902441	

Table 9.0 – Measurement Equipment

All equipment used during the survey was field calibrated at the start and end of the measurement period with a negligible deviation of ≤0.5 dB. 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 localized 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 – Watford Weather Station				
Time period	**Air temp (^{0}C)**	**Rainfall mm/h**	**Prevailing Wind Direction**	**Wind Speed (m/s)**
10/02/2021 – 00:00 – 23:59	-3.7 – 2.7	0.0 - 0.3	ENE	0.0 - 2.6
11/02/2021 – 00:00 – 23:59	-4.7 – 1.6	0.0	ESE	0.0 - 2.8

Table 10.0 – Weather Summary

D.4 Duct calculations

Description	63 Hz	125Hz	250Hz	500Hz	1000Hz	2000Hz	4000Hz	8000Hz
1. Lw of fan	63	75	86	85	87	82	74	67
2. Uncertainties	3	3	3	3	3	3	3	3
3. Room and Terminal effect	0	0	0	0	0	0	0	0
4. Allowance for end reflection	-8	-4	-1	0	0	0	0	0
5. Ductwork attenuation	0	0	0	0	0	0	0	0
6. Elbow attenuation x 2No. (lined)	0	0	0	0	0	0	0	0
7. Silencer/s	-3	-10	-12	-17	-27	-34	-35	-34
8. Weighting (A)	-26	-16	-9	-3	0	1	1	1
9. Resulting Lw	29	48	67	68	63	52	43	37
10. spherical propagation (10logQ/4πr^2)	-25.1	-25.1	-25.1	-25.1	-25.1	-25.1	-25.1	-25.1
11. Laeq at NSR	3.9	22.9	41.9	42.9	37.9	26.9	17.9	11.9
12. Gobal LAeq at NSR	51.7							

Table 11.0 – Duct Calculations - Initial

Description	63 Hz	125Hz	250Hz	500Hz	1000Hz	2000Hz	4000Hz	8000Hz
1. Lw of fan	63	75	86	85	87	82	74	67
2. Uncertainties	3	3	3	3	3	3	3	3
3. Room and Terminal effect	0	0	0	0	0	0	0	0
4. Allowance for end reflection	-8	-4	-1	0	0	0	0	0
5. Ductwork attenuation	0	0	0	0	0	0	0	0
6. Elbow attenuation x 2No. (lined)	0	-2	-10	-32	-36	-32	-34	-34
7. Silencer/s	-3	-10	-12	-17	-27	-34	-35	-34
8. Weighting (A)	-26	-16	-9	-3	0	1	1	1
9. Resulting Lw	29	46	57	36	27	20	9	3
10. spherical propagation (10logQ/4πr^2)	-19.6	-19.6	-19.6	-19.6	-19.6	-19.6	-19.6	-19.6
11. Laeq at NSR	9.4	26.4	37.4	16.4	7.4	0.4	-10.6	-16.6
12. Gobal LAeq at NSR	37.8							

Table 12.0 – Duct Calculations - Mitigated

Appendix E – Plant Equipment Datasheets

CONTRA-FOIL™ contra-rotating cased axial flow fans (aluminium impellers)

TCBBX2/4-450 (230V50HZ) V3

Range of cylindrical cased axial fans fitted with aluminium impellers and manufactured from high grade rolled galvanised steel and protected against corrosion by cataforesis primer and black polyester paint finish.
Fited with 2 contra rotating complementary impellers manufactured from die-cast aluminium.
All models are supplied with pre-wired wiring junction box located on the outside of the fan casing for easy wiring access.
Available with single or three phase 4 poles motors.

Motors
All the motors are IP65, Class F insulation (1), equipped with thermal protection.
Single phase motors are variable voltage (Excepted TCBBX2/4-630).
Three phase motors suitable for inverter control.
Electrical supplies:
Single phase 230V-50Hz (Capacitor located inside the wiring terminal box)
Three phase 230/400V-50Hz.
(1) Working temperatures from -40ºC up to 70ºC.

+ Attributes

Contra-rotating: High pressure
Contra-rotating system with two complementary impellers allowing the duplication of the pressure with the same air volume.

Corrosion resistance
Rolled steel casings and motor support protected by cataforesis primer and black polyester paint finish. Stainless steel screws.

Terminal box
Wiring terminal box with bycable gland PG-11.

Impeller dynamically balanced
Impellers are dynamically balanced, according to ISO 1940 standard, giving vibration free operation.

+ Acoustic characteristics

Hz	63	125	250	500	1k	2k	4k	8k	Overall
Inlet (LwA)	46	73	85	82	85	79	72	64	90
Inlet LpA @ 1.5m	31	58	70	67	70	64	57	49	75
Outlet (LwA)	63	75	86	85	87	82	74	67	92
Outlet LpA @ 1.5m	48	60	71	70	72	67	59	52	77

systemair

FSAF400C1DA Silencer 450/8

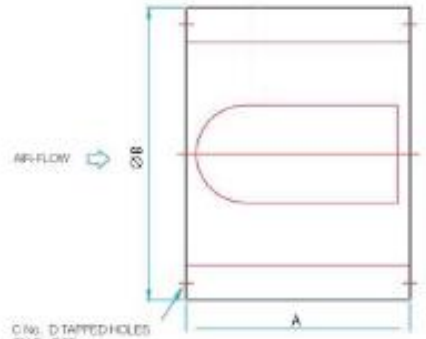
Item Number: 50113

Circular attenuator suitable for direct connection to cased axial fans Construction comprises galvanised steel outer casing, end rings fitted with tapped inserts to suit the relevant fan drilling detail. Inner bore is manufactured from perforated galvanised steel spiral tube retaining a 45 kg /m³ density acoustic media with a surface particulate membrane. Fitted with a centrally mounted cylindrical acoustic pod with aerodynamic end domes.

Technical parameters

Dimensions and weights		
Weight	16	kg

Dimension



A	B	C	D	E	Weight kg
400	500	8	M10	450	16

Acoustic

Frequency Hz	63	125	250	500	1K	2K	4K	8K
Insertion Loss dBW	3	10	12	17	27	34	35	34

N.B. Above figures only apply when silencer is bolted direct to the fan flange.