

Project:	Cake and Cream 11-13 St Peter's Road, Reading	Date:	05/09/2019
Client:	Cake and Cream Ltd	Ref:	4452



Project:	Cake and Cream 11-13 St Peter's Road, Reading		
Client:	Cake and Cream Ltd		
Report Title:	Environmental Noise and BS4142 Assessment		
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1.0 Introduction

It is proposed that a new mechanical kitchen extraction system be installed as part of works to the commercial property known as Cake and Cream 11-13 St Peter's Road, Reading.

Paragon Acoustic Consultants Ltd has been commissioned to conduct an environmental noise survey to obtain statistical noise data to characterise the existing local background and ambient noise climate at the site and to derive noise limits to atmosphere based on Local Authority Noise Policy and other relevant guideline documents. This information is used to determine if the proposed new mechanical plant selections will meet with the derived noise limits.

If deemed necessary, effective mitigation measures shall be introduced as necessary to achieve the Local Authority Noise Policy requirements.

This practice has been advised that the operational period of the proposed mechanical plant will be during daytime hours **10:00 – 22:00 only**.

2.0 Site Description and Proposed Plant Location

2.1 Site Description

The site under consideration is situated at 11-13 St Peter's Road, Reading, within the jurisdiction of Reading Borough Council.

The site comprises the cake and Cream retail outlet at ground floor level with the shop front on the west elevation facing St Peters Road, with residential on the first and second floors above. At the rear of the site (north east) lies a single storey section of the property used as part of the Cake and Cream business.

The fan for the new mechanical kitchen extraction system is proposed for location indicated in Section 2.2 herein, above the rear ground floor single store section of the retail unit. To the north west of the site lies the Brighton Road, beyond which lies two storey terraced properties, certain of which contain loft conversions that incorporate Velux windows. To the North east at the rear of the clients site lies Number 2a Brighton Road, being a two storey residential property.

To the east lies the adjoining property of 15 St Peter's Road and its adjoining neighbour of 17 St Peter's Road both properties are of residential use.

To the south of the site lies St Peter's Road, beyond which is located a vehicle rental company (Hertz) and a car wash facility. Beyond these premises lie the Wokingham Road, being a busy two way highway.

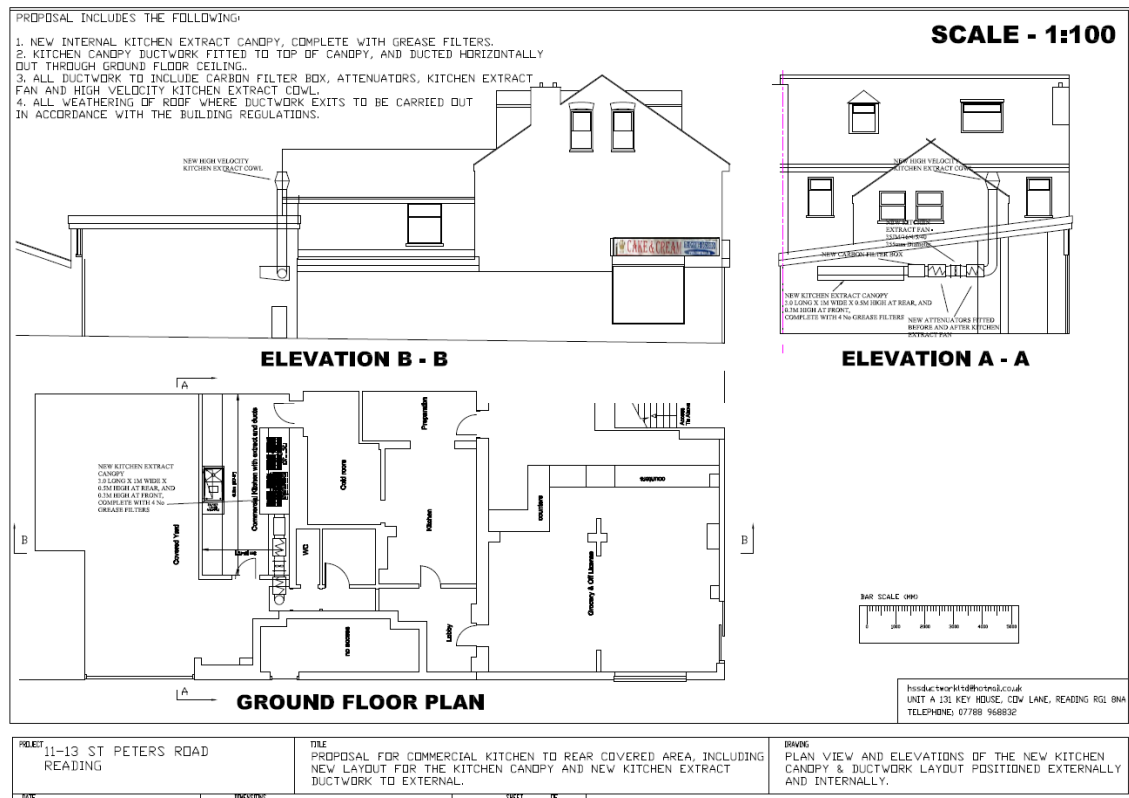
The site is illustrated by plan in Appendix A.

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2.2 Proposed Plant Location

This practice has been provided with the following drawing indicating the external extent of the proposed mechanical extraction system and its location.

Figure 1: Proposed Plant Location



The drawing above does not explicitly show the system detail. This is discussed in further details herein.

3.0 Existing Noise Climate

Traffic noise was considered to provide a primary contribution to the ambient noise climate, typically due to the traffic on the Wokingham Road, but also local traffic using Brighton Road. Aircraft overflights were observed during the survey periods, although these were generally at medium / high altitude. The noise contribution from aircraft will be included within the measurements taken. Rail traffic noise events were not observed during the survey period. It was noted that a low level of mechanical plant noise was audible at the rear of the site, this potentially being attributed to existing equipment operated by Cake and Cream.

4.0 Environmental Noise Survey

4.1 Measurements

Critical period noise measurement surveys took place on Thursday 29th August commencing 16:06 hours and continuing to 20:25 hours the same day. The noise measurements were unmanned manned, and undertaken at the location as described below:

- **MP1:** External to the first floor roof of the property above Cake and Cream

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MP1 was chosen as being representative of the noise climate at the nearest affected noise sensitive residential receptor

The measurement location is illustrated on the site layout drawing in Appendix A.

Various statistical broad-band and spectral sound pressure level measurements were obtained during the survey. A measurement time interval $T_m = 15$ minutes was used for sampling. Measurements of the percentile level $L_{A90,T}$ were made using time weighting F as per clause 3.4 of BS 4142:2014.

The quantities recorded included:

- **L_{Aeq}** : the equivalent continuous A-weighted sound pressure level over the measurement period
- **L_{Amax}** : the maximum A-weighted sound pressure level for the measurement period
- **L_{A10}** : the A-weighted sound pressure level exceeded for 10% of the measurement period
- **L_{A90}** : the A-weighted sound pressure level exceeded for 90% of the measurement period

4.2 Weather during survey period

The weather conditions during the survey were dry and mild and still.

4.3 Instrumentation

Sound pressure level measurements were obtained using the following instrumentation complying with the Type 1 specification of BS EN 60804, BS EN 60651, BS EN 60942, BS EN 61260, and BS EN 61672-1:

- Norsonic Type 118 Sound level analyser, serial number 31663
- Norsonic Type 1225 ½" microphone

The sound level analyser was mounted on a boom through a first floor window.

Calibration checks were made prior to and after completion of measurements using a Norsonic Type 1251 acoustical calibrator complying with Class 1 of BS EN 60942, calibration level 114.0 dB $\pm$ 0.3 dB, @ 1.0 kHz. All instrumentation carries a current manufacturer's certificate of conformance a copy of which is available upon request.

4.4 Background Sound Level - Results

The recorded survey data is shown within Appendix B.

BS4142:2014 states:

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.

For this particular situation, it is considered that the existing mechanical plant does indeed form a legitimate part of the background sound level.

Based on the survey results, it is considered that the background sound level corresponding to the proposed operational period of the plant is 43 dB ($L_{A90,15min}$).

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5.0 Evaluation of External Noise Criteria

Although the local vicinity contains properties of mixed usage, it is the residential dwellings which are considered to be the most exposed to potential noise emissions from the new plant.

5.1 Local Authority Advice

In the absence of Local Authority advice regarding any individual requirements, this practice has considered the RBC paper headed "Local Plan Background Paper" "Information to support the Submission Draft Reading Borough Local Plan" dated March 2018. This paper includes the following details:

4.26 Noise Generating Equipment (EN17)

4.26.1 Key Considerations

- The NPPF states that the planning system should prevent both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of noise pollution (paragraph 109). Paragraph 123 further states that planning policies should avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development.
- A Noise Policy Statement for England was produced in 2010 by DEFRA, which contains the following vision:

"Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development."

The NPSE aims are as follows:

- avoid significant adverse impacts on health and quality of life;
- mitigate and minimise adverse impacts on health and quality of life; and
- where possible, contribute to the improvement of health and quality of life.
- The Council receives numerous planning applications for the introduction of new noise generating industrial and commercial equipment such as air conditioning; refrigeration plant and kitchen extraction. This equipment is often installed in close proximity to residential properties and has the potential to cause significant annoyance and/or sleep disturbance to residents or other businesses, and have a negative impact on residential amenity.
- Planning applications for noisy mechanical plant are already required to be accompanied by a noise assessment which compares the noise level produced by the equipment against the existing background noise level using the British Standard 'Methods for rating and assessing industrial and commercial sound' (BS4142:2014). Whilst the BS4142:2014 method gives some guidance on assessing whether the level of noise may have an adverse impact, its recent update has made this guidance more ambiguous and crucially it does not set a noise limit for new plant.
- The Environmental Protection team for some years has required that the noise level from new mechanical plant be at least 10 dB below the background noise level in order to prevent 'background creep' (see draft policy for an explanation). However, this does not have the weight of policy behind it.
- Although general principles for noise were set out in policy CS34 of the Core Strategy (PP004), no specific noise levels are referenced in existing policy.

4.26.2 Policy Options

The following options have been considered and have been subject to Sustainability Appraisal. Where rejected, the reasons are summarised below.

- **EN17(i) No policy – REJECTED**

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Whilst the Council would continue to usually seek the level set out in the proposed policy, without the benefit of policy it carries reduced weight. As such, it could lead to developments that have a detrimental effect on the quality of life and health of neighbours.

• EN17(ii) New policy limiting noise level to at least 10dBA below the existing background level – PROPOSED OPTION

This option would be a new policy, giving clarity to developers and applicants on the maximum level of background noise at the nearest sensitive receptor that will be acceptable. It will ensure that equipment does not have a detrimental effect on the health and quality of life of neighbours.

Based on the details of this document it does appear as though RBC will be continuing to require that the noise level from new mechanical plant be at least 10 dB below the background noise level. As such, the assessment shall consider this limit.

5.2 BS4142:2014

BS 4142:2014: “*Methods for rating and assessing industrial and commercial sound*” describes methods for rating and assessing sound of an industrial and/or commercial nature, which includes sound from fixed installations which comprise mechanical and electrical plant and equipment.

The methods described in the standard use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident. The standard provides a method for correcting the specific sound levels so as to account for acoustic features that are present at the assessment location (scaled corrections up to +6 dB for tones and up to +9 dB for impulses, depending upon the prominence of the tones or impulses, as well as +3 dB corrections for other sound characteristics).

Where characteristics likely to affect perception and response are present in the specific sound within the same reference period; then the applicable corrections ought normally to be added arithmetically. However, if any single feature is dominant, to the exclusion of the others, then it may be appropriate to apply a reduced, or even zero, correction to the minor characteristics.

Whereas the 1997 edition of BS4142 assess likelihood of complaints, the 2014 edition was revised to use assessment of adverse impacts. This change was introduced because the likelihood of complaints is not a particularly appropriate benchmark, especially when it is used in a planning context, and it also aligns the standard more closely with the type of language and benchmarks that are suitable for the assessment of sound at the planning stage, e.g., for new proposed development.

The 2014 edition of the standard continues to use the difference between the rating level and the background sound level:

- 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.”

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It can also be seen that the range of assessment outcomes has been reduced and it is now suggested that rating levels equal to the background would indicate a low impact. This is in contrast to the earlier edition which gave indications of the likelihood of complaints based upon differences ranging between +10 and -10 dB.

It is important to note that the numerical outcome only represents the **initial** estimate of impact, as noted in the first paragraph of Clause 11 of the standard, and that contextual matters should be considered **before** determining what the potential impact is.

The context includes consideration of pertinent factors, such as:

- The absolute level of sound;
- The character and level of the residual sound compared to the character and level of the specific sound;
- The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions.

For the purposes of this assessment, and in line with the Local Authority likely requirement, it is proposed to consider a target noise level whereby the rating level of the sound from the proposed new plant shall be at least 10 dB below the background sound level at the assessment location.

6.0 Review of Proposed Plant

6.1 Introduction

The new kitchen extract fan will comprise a Flakt Woods fan model 35JM/16/4/5/40/1Ph Long cased axial flow extract fan

Detailed calculations have been carried out in order to determine the likely level of airborne noise transmission outside the identified assessment locations due to the operation of the proposed new plant to be installed.

Following initial assessment showing the extract fan located external to the building with the fan adjacent to the residential property window, this practice advised that acoustic assessment showed that the noise limits could not be achieved. As such the plant was moved inside the building as indicated within Section 2.2 herein, that details the plant location/s used in the assessment.

The following sections provide a record of the proposed new plant, the operational sound levels used as the basis for this assessment, and a specification for noise mitigation treatments.

6.2 Plant Noise Data

The acoustic data advised for the proposed new extract fan are shown below:

Figure 2: Noise data for proposed Kitchen Extract fan

	Sound Spectrum (Hz)								Overall	
	63	125	250	500	1k	2k	4k	8k	Lw*	LpA@ 3m**
Inlet*	71	70	69	68	62	58	53	48	76	48
Outlet*	73	71	69	69	63	59	55	50	77	49
Breakout*	63	58	49	48	37	30	30	27	64	27

* Lw dB re 10^{-12} W

** dBA re 2×10^{-5} Pa

The client has advised that the provisionally proposed installation will include roomside and atmosphere side attenuators offering the following claimed insertion loss performance:

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Table 1: Client proposed roomside and atmosphere side attenuator performance

Quantity	1/1 octave band centre frequency, Hz							
	63	125	250	500	1k	2k	4k	8k
Minimum insertion loss (dB re: 2x10 ⁻⁵ Pa)	0	2	6	11	14	9	4	5

The performance indicated in Table 1 represents the proposed attenuators as manufactured by Messrs Lindab, model type SLCU, with nominal dimensions 315mm diameter x 600mm long. It is been found that these attenuators will **NOT BE SUFFICIENT** to meet with the derived noise limits and as such an enhanced attenuator performance is proposed herein.

6.3 Predicted Plant Noise Levels

At this stage, an assessment of mechanical plant noise transmission to internal occupied areas of the building at 142 Wokingham Road is not in the scope of works by this practice. It is recommended that the client seek advice regarding this matter.

Calculations have been carried out using the data presented earlier within this report to predict the resultant sound pressure levels due to airborne transmitted noise outside the nearest exposed noise assessment position, and corresponding to the quietest period of plant operation.

For an installation such as the proposed extract fan at 142 Wokingham Road, there are a number of airborne noise paths to be considered such as:

- Noise breakout from the fan casing and through the roof of the proposed fan plant area.
- Noise breakout from the connecting ductwork and flexible connections through the roof of the proposed fan plant area.
- Noise transmission from the duct discharge opening to atmosphere
- Discharge duct re-generated noise levels (see Section 7.5 of this report)

Using standard calculation techniques the fan noise transmission from these paths (excluding point d)) have been assessed, and the combined predicted results are summarised in Table 2 as follows.

In assessing the noise levels, it has been assumed that there are no flexible connections within the system as proposed and that the attenuators will be close-coupled directly to the fan (generally as indicated by the design drawing proposal).

The predicted results for the proposed situation are summarised below:

Table 2: Predicted Noise Levels at nearest affected premises

Plant under consideration	Worst case assessment location	Approx. distance to receiver	Direct line of sight?	Predicted Lp
Kitchen Extract ventilation system	Residential property at 11-13 St Peter's Road first Floor level.	2 m	Partial	49 dB

Predictions are based on the plant operating normally at the noise levels detailed herein,

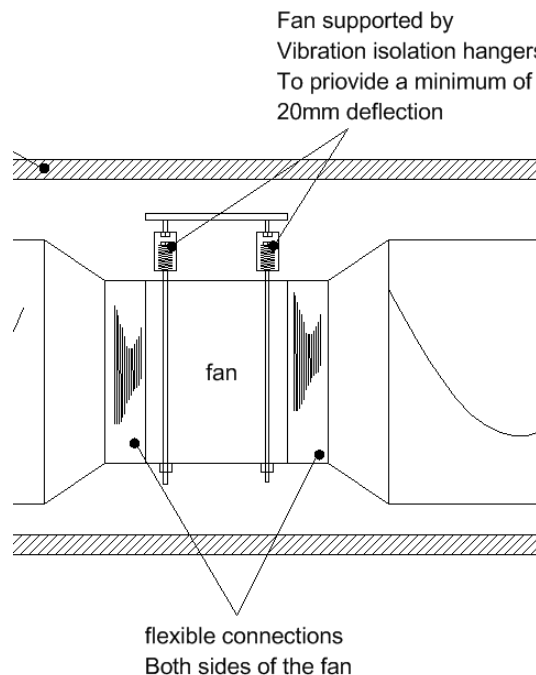
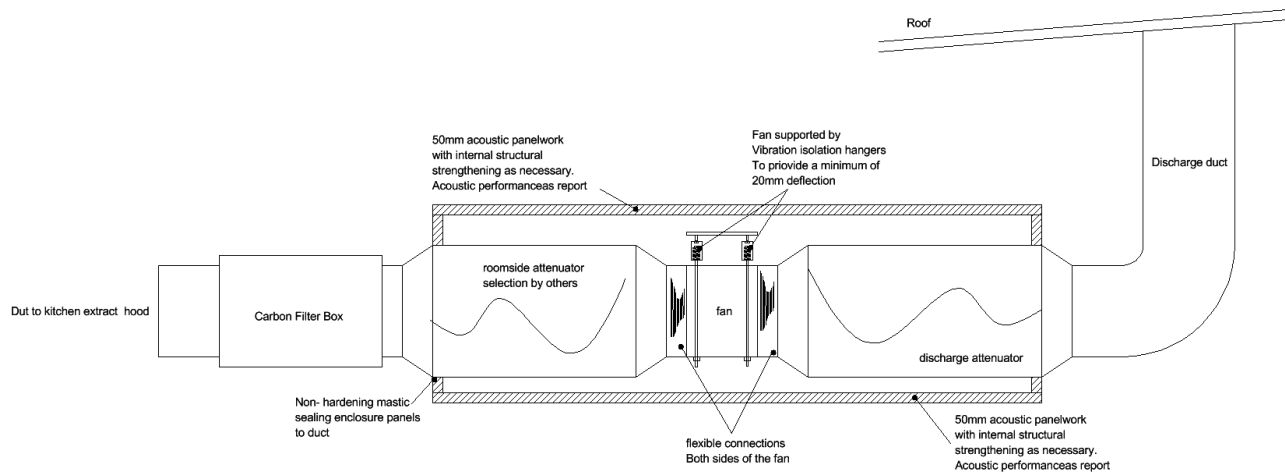
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The predicted plant noise levels of 49 dBA at the nearest residential is 6 dB above the background noise level, this level being 16 dB above the Local Authority noise limits requirements. As such, noise mitigation measures are required.

7.0 Outline Noise Mitigation measures

Based on the findings of the initial assessment, it is considered necessary to provide noise mitigation measures to the proposed scheme. The following sections provide outline details of the noise mitigation scheme.

7.1 Outline Scheme



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NB: It is understood that the fan motor is an in-airstream type and is not bifurcated. If a bifurcated fan is to be used the enclosure will require specific design to allow airflow to the motor for air cooling purposes. The final fan type shall be advised to the enclosure supplier for their designs of any motor cooling measures required.

7.2 Extract fan Attenuators

It has been indicated that the attenuator performance as shown within Table 1 at Section 6.2 of this report will be installed on either side of the fan.

The roomside and atmosphere side attenuators shall be enhanced to provide the following acoustic performance:

Table 3: Requirement for enhanced attenuator performance

Quantity	1/1 octave band centre frequency, Hz							
	63	125	250	500	1k	2k	4k	8k
Minimum insertion loss (dB re: 2×10^{-5} Pa)	4	7	16	23	22	21	19	16

It is considered that in order to achieve the stated performance, a rectangular attenuator selection will potentially be required.

The dimensions of the attenuator shall be determined by a suitable attenuator supplier, in conjunction with any other physical and aerodynamic performance constraints imposed by the client and the ventilation system designer.

The attenuator shall be selected to ensure that the installed pressure loss does not exceed 25Pa at the maximum design duty (stated as 1.0 m³/s on the fan data sheet). Alternatively, should the system designer require a lower installed pressure loss for the atmosphere side attenuator, then the lower pressure loss limit shall be complied with.

A constructional specification for the attenuator is provided as follows:

Attenuator dimensions to be determined by the hardware supplier.

Attenuator construction:

Casings: Galvanised steel construction in accordance with DW144 pressure ratings and leakage requirements, with casing gauge, flange connections and intermediate stiffeners to suit.

If rectangular attenuators proposed: Acoustic elements (Rectangular attenuators): Each element constructed from a minimum 0.8mm galvanised steel sheet folded to form a continuous peripheral tray for retaining perforated galvanised steel facings. The acoustic medium shall be Class 1 rated (as per BS476: Part 7) mineral wool of 35kg/m³ minimum density, and retained behind the 30% minimum free area perforated steel in order to prevent fibre migration. Where it is predicted or known that the airstream will contain a grease laden atmosphere or high moisture atmosphere the mineral wool shall be bagged within Melinex and retained behind the 30% minimum free area perforated steel.

The elements shall incorporate aerodynamically shaped leading edges and be secured within the casing using suitable mechanical fixings. Side elements shall be provided to reduce noise breakout

If circular attenuators proposed: The acoustic medium shall be Class 1 rated (as per BS476: Part 7) mineral wool of 35kg/m³ minimum density, and retained behind the 30% minimum free area perforated steel in order to prevent fibre migration. Where it is predicted or known that the airstream will contain a grease laden atmosphere or high moisture atmosphere the mineral wool shall be bagged within Melinex and retained behind the 30% minimum free area perforated steel.

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7.3 Acoustic Panels Forming Enclosure to System

A six sided (four sides, top and base) enclosure shall be formed to achieve the minimum insertion loss given in Table 4

The panels shall be suitably stiffened to allow for structural loadings. Access doors shall be designed by others and shall be designed such that the acoustic performance detailed below is not undermined.

The enclosure shall provide an imperforate structure and shall achieve the following insertion loss:

Table 4: Requirement for fan enclosure acoustic performance

Quantity	1/1 octave band centre frequency, Hz							
	63	125	250	500	1k	2k	4k	8k
Minimum insertion loss (dB re: 2x10 ⁻⁵ Pa)	6	9	14	14	12	5	2	2

7.4 Fan and Ductwork Support Vibration Isolation Mounts

The following specification provides details of vibration isolation equipment to be used.

Table 5: Requirement for vibration isolation equipment

Position	Mounting type (See following description)	Minimum mount deflection (mm)
Fan supporting mounts	SH	20
Ductwork / attenuator supporting mounts	RM	3
All mountings /bases – refer to general specification Clause 1.1.0		
OS:	OPEN SPRING MOUNTINGS	See Clause 1.2
RM:	RUBBER TURRET MOUNTINGS	See Clause 1.5

SPECIFICATION CLAUSES FOR VIBRATION ISOLATION DEVICES

1.1.0 GENERAL

1.1.1 All vibration isolators should be selected to provide the minimum static deflection required. Selection should allow for asymmetric load distributions such that the minimum static deflection can be achieved on all vibration isolators under normal operating conditions.

1.1.2 All vibration isolators must be suitable for the loading, operating and environmental conditions which will prevail. Special attention shall be paid to vibration isolators that will be exposed to atmospheric conditions and appropriate finishes must be applied to prevent excessive rusting or corrosion.

1.1.3 All vibration isolators shall be color coded or otherwise clearly marked to indicate rated load and deflection capacity to facilitate identification during installation and service.

1.1.4 The efficiency of an isolator system can be seriously impaired if the system is connected to rigid pipes, electrical conduits, ducts or shafts. It is essential that such external connections be as flexible as possible not only to prevent transmission of vibration through the connections and allow the system freedom of movement but also to avoid possible failure of the connections.

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1.1.5 The vibration isolator system should be selected to support the operating weight of the plant and equipment to be isolated only. All associated pipework, valves, filters, ductwork etc. and their contents must be supported independently so as not to impose additional forces on the isolator system and all flexible connections must be selected and arranged to accommodate this requirement.

1.1.6 Where it is proposed to support AHU/enclosed fan units on vibration isolators, it is recommended that flexible connections are fitted to any external connecting ductwork, pipework, conduits etc. regardless of whether or not the internal fan and motor assembly is supported on vibration isolators and has internal flexible connections to the unit casings.

1.2 OPEN SPRING MOUNTINGS WITH HEIGHT ADJUSTMENT (TYPE OS)

1.2.1 Each mounting shall consist of a helical steel spring as the principal isolation element and shall incorporate a built-in leveling device.

1.2.2 The spring will be permanently fixed under both free and working conditions to fabricated top and bottom plates. The method of fixing the spring to the top and bottom plates shall incorporate high frequency attenuation devices preventing direct contact between spring and end plates. Therefore fixing by loose location metal clips or welding will NOT be permitted.

1.2.3 Each helical steel spring shall be permanently color coded to denote rated load and deflection capacity and, by design, to have an outside diameter at least equivalent to 85% of its working height with a minimum 50% overload capacity before becoming coil bound.

1.2.4 A 6mm thick ribbed Neoprene pad shall be bonded to the underside of the bottom plate except where bolting to flat steel surfaces is required.

1.5 NATURAL RUBBER TURRET MOUNTINGS (TYPE RM)

1.5.1 Each mounting shall be moulded in durable oil resistant Natural Rubber with integral steel base and upper fixing boss. The Natural Rubber shall be color coded to denote rated load and deflection capacity.

1.5.2 Each mounting shall be supplied with a standard fitting bolt or optional height adjuster as required.

7.5 Discharge Duct Termination

It is not considered possible to accurately predict the flow generated noise from such an arrangement. It is therefore recommended that the velocity of the discharge be decreased as far as practically possible (typically less than 6m/s) in order to reduce the risk of excessive flow generated noise.

It is important that the system is designed such that obstructions are not introduced that may cause turbulence and increase flow generated noise. It is assumed that the client will verify that the reduction in air velocity will remain compatible with any legal requirements and any requirements of the Local Authority in respect of odour (& moisture etc) dissipation.

7.6 Noise Mitigation – General

Paragon Acoustic Consultants has considered the acoustic performance of the enclosure. The introduction of this type of structure has implications in other areas of design. As such, the client shall employ the services of other specialists to take responsibility for other areas of design associated with the introduction of such a structure. The following list is provided as an example of other areas to be considered as a minimum:

- **Structural:** A suitably qualified consultant shall assess all structural loading as necessary. All support steelwork to be considered by others.
- **Aesthetics:** The visual appearance of the enclosure is to be agreed by the client's architect. The architect shall also consider all necessary statutory approvals and address design issues not covered by the relevant specialist consultant.

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- **Alteration to existing services:** The installation of each acoustic hardware may require alteration to certain of the existing mechanical and electrical services in the vicinity of the proposed hardware. The client shall co-ordinate any such works.
- **Delivery and installation access:** The enclosure supplier shall make appropriate arrangements for the delivery and installation of hardware, including equipment such as cranes and scaffolding requirements.
- **Guarantees:** The client shall obtain the necessary guarantees that the acoustic hardware (enclosure and attenuators) will meet the minimum insertion loss requirements as specified by this practice in the foregoing section. In addition, the client shall obtain all other guarantees as required.
- **Maintenance / repair / replacement:** The enclosure shall allow for the maintenance / repair / replacement of the extract fan system as required.
- **Warranties:** The client shall ensure that the warranties provided by the fan supplier/manufacture are not invalidated by the introduction of the noise mitigation works.
- **Submission of final designs:** The final design of the noise mitigation (and associated ventilation system) shall be submitted to Paragon Acoustic Consultants for comment prior to manufacture.

Paragon Acoustic Consultants can offer details of a local acoustic company that would be able to assist with the supply of acoustic hardware, as follows:

Caice Acoustic Air Movement Ltd

Riverside House
3 Winnersh Fields
Gazelle Close
Winnersh
Berkshire
RG41 5QS

Telephone Number: 0118 918 6470

Contact: Andy Smith

8.0 Predicted Fan System Noise Levels following mitigation

Calculations have been carried out to predict the noise levels at the nearest exposed noise assessment positions including the insertion loss effect of the noise mitigation indicated previously. Copies of the calculation analysis sheets to the most exposed residential and commercial receivers are included in Appendix C for reference. The predicted results are summarised below:

Table 6: Predicted Noise Levels (with mitigation) at nearest affected premises

Plant under consideration	Worst case assessment location	Approx. distance to receiver	Direct line of sight?	Predicted Lp
Kitchen Extract ventilation system	Residential property at first floor 11-13 St Peter's Road.	2 m	Partial	33 dB

Predictions are based on the plant operating normally at the noise levels detailed herein,

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Based on the Local Authority requirement that the limiting noise level to be at least 10dBA below the existing background noise level and based on background noise levels measured of 43 dBA, the predicted noise level following the enhanced noise mitigation measures herein will achieve the Local Authority requirements.

9.0 Conclusions

A background noise survey has been undertaken to determine the noise climate likely to exist at noise sensitive properties at the 1st floor of 11-13 St Peters Road, where the positioning of a mechanical kitchen extraction system is proposed.

Noise emissions of the kitchen extract system have been determined where possible and extrapolated to the receiver positions using standard acoustic calculation techniques. Based on the predicted kitchen extract fan noise levels at the receiver positions an assessment has been undertaken.

The assessment shows acoustic enhancements are required to the scheme in order to meet with the Local Authority noise requirements for the system. Enhanced noise mitigation measures are detailed herein.

Subsequent analysis of the system noise emissions based on the noise mitigation measures detailed in Section 7.0 show that the scheme will meet with the noise requirements set out by the Local Authority.

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Appendix A: Site Plan



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Appendix B: Recorded Survey Data

File	Date	LAeq	LAFmax	L10	L90
NOR118_7091284_190829_0001.NBF	(2019/08/29 16:06:16.00)	53	73.9	53.5	43.3
NOR118_7091284_190829_0002.NBF	(2019/08/29 16:21:17.00)	49.9	66.9	51.5	43.3
NOR118_7091284_190829_0003.NBF	(2019/08/29 16:36:17.00)	47.8	60.7	50.5	43.3
NOR118_7091284_190829_0004.NBF	(2019/08/29 16:51:17.00)	48.8	66.8	51.5	43.7
NOR118_7091284_190829_0005.NBF	(2019/08/29 17:06:18.00)	49	70.4	51.2	43.3
NOR118_7091284_190829_0006.NBF	(2019/08/29 17:21:18.00)	51.8	72.8	53	43.6
NOR118_7091284_190829_0007.NBF	(2019/08/29 17:36:19.00)	47.7	69	49.8	43.8
NOR118_7091284_190829_0008.NBF	(2019/08/29 17:51:19.00)	50.4	71.6	52	44.2
NOR118_7091284_190829_0009.NBF	(2019/08/29 18:06:19.00)	49.3	67	50.7	43.7
NOR118_7091284_190829_0010.NBF	(2019/08/29 18:21:19.00)	49.1	69.5	50.3	43.9
NOR118_7091284_190829_0011.NBF	(2019/08/29 18:36:20.00)	47.5	74.2	48.1	43.8
NOR118_7091284_190829_0012.NBF	(2019/08/29 18:51:20.00)	46.8	66.7	47.6	43.7
NOR118_7091284_190829_0013.NBF	(2019/08/29 19:06:20.00)	48.1	65.8	48.8	42.8
NOR118_7091284_190829_0014.NBF	(2019/08/29 19:21:21.00)	46.2	59.6	48.7	43.3
NOR118_7091284_190829_0015.NBF	(2019/08/29 19:36:21.00)	45.8	61.4	47.3	43.1
NOR118_7091284_190829_0016.NBF	(2019/08/29 19:51:21.00)	46.7	63.6	49.3	42.8
NOR118_7091284_190829_0017.NBF	(2019/08/29 20:06:22.00)	51.4	78.3	49.2	42.7
NOR118_7091284_190829_0018.NBF	(2019/08/29 20:21:22.00)	49.4	63.3	53.6	42.5

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Appendix C: Calculation sheets

Ventilation System Analysis - Atmosphere Calculation												
Project Name	Cake and Cream 11-13 St Peter's Road											
Paragon reference	4452											
Calc sheet date	05/09/2019											
Calc sheet reference	1											
Revision												
Room reference / description	Exhaust air to residential receiver											
Plant reference / description												
Fan Data Entry												
Fan Sound Power Level Data	ACTUAL	In-duct Lw										
Fan Air Volume	1000	litres/sec										
Total Static Pressure	110	Pa										
AHU Loss	None											
AHU Loss	None											
AHU Loss	None											
Number of sources correction	1											
Lw introduced into ventilation system												
Attenuator details												
Insertion Loss												
Attenuated Lw												
Generated Sound Power level												
Nett Lw into system after attenuator												
Losses after attenuation	Qty	Type	Dim (mm)	Dim (mm)								
Power split		100 %										
End reflection	0.1 m2	Circular	350									
Limiting Duct Loss correction												
Lw introduced via Atmosphere Terminal												
Atmosphere noise radiating condition			Dim (mm)	Dim (mm)								
Situation		Vertical stack										
Radiating aperture		Circular	350									
Radiating angle from normal		75°										
Location Q-factor												
Distance to receiver		2.00 m										
Number of sources		1										
Atmosphere side effect												
Barrier between source and receiver?	N											
Predicted Atmosphere side Lp												
Design Criteria	Value	Type										
Design criteria	30	dB(A)										
			Typical spectral values									
Limiting values for design criteria												
Excess and Mitigation												
Calculated Ductborne Insertion loss requirement												
Calculated Breakout Insertion loss requirement												
Overall Insertion loss requirement												
Attenuator Insertion loss												
Excess												
Mitigated Ductborne Noise Level												

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project	Cake and Cream St Peters Road								
date	05/09/2019								
Plant	Extract fan								
Frequency	63	125	250	500	1000	2000	4000	8000	dB(A)
Fan radiated sound power level	63	56	49	48	37	30	30	27	48.1
Estimated breakout flexibles	61	63	61	58	47	38	28	23	57.7
Based on Lp in the reverberant field calc: $Lp_{rev} = Lw + 10 \log(T) - 10 \log(V) + 14$									
Sound power level of all sources	65	64	61	58	47	39	32	28	58
Enter the room width	7	Metres							
Enter the room depth	7	Metres							
Enter the room height	2	Metres							
Enter the estimated rev time	2	(seconds)							
calculated volume of room	118	m3							
10logT	3	3	3	3	3	3	3	3	10
-10logV	-21	-21	-21	-21	-21	-21	-21	-21	
14	14	14	14	14	14	14	14	14	
Room LP - in the reverberant field	61	60	57	54	43	34	28	24	54
LP 2 = $Lp + 10 \log S - 20 \log r + 11 - R - 6 + DI$									
Façade LP	61	60	57	54	43	34	28	24	54
Enter the room opening size	24	M2							
Enter the room to receiver idstance	1.5	metres							
Enter the Q correction factor	4	Q=1 free space, Q=2 one reflective surface, Q=4 two reflective surfaces, Q=8 three reflective surfaces							
Façade correction (Y/N)	n								
Enter R - composite SRI assessed for the roof	9	10	12	15	19	21	27	24	
LW of façade before attenuation	75	73	71	68	57	48	42	38	68
R	-9	-10	-12	-15	-19	-21	-27	-24	
LW out of room after attenuation	66	63	59	53	38	28	15	14	54
Attenuation with distance	-15	-15	-15	-15	-15	-15	-15	-15	
inside to outside correction	-6	-6	-6	-6	-6	-6	-6	-6	
Directivity - correction as above for reflective surfaces	6	6	6	6	6	6	6	6	
Façade correction	0	0	0	0	0	0	0	0	
Lp predicted at the receiver	51	49	45	38	24	13	1	0	40
Need to hit 30 dB allowing for tonal , therefore enclose									
Enclosure SRI	6	9	14	14	12	5	2	2	
LP at receiver based on enclosure SRI	45	40	31	24	12	8	-1	-2	28.0