

Consultants in Noise & Vibration
Building Regulations Certification Sound Insulation Testing

REPORT TITLE: NOISE ASSESSMENT FOR MECHANICAL SERVICES PLANT TO SERVE A
HOT FOOD TAKEAWAY AT 31 ELM GROVE, HAYLING ISLAND PO11 9EA

REPORT REF: 23080-002

ISSUED TO: AEW Architects

ISSUED BY: David R Philip BEng (Hons) MIOA

DATE: October 2023

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SUMMARY

- This report provides a noise assessment for proposed new mechanical services plant to be installed to serve a hot food takeaway use at an existing vacant commercial property 31 Elm Grove, Hayling Island PO11 9EA.
- The proposed new plant (equipment) comprises a supply air system fan and oven extract system fan; both with associated external apertures, plus an air conditioning unit and cold room unit to be located within the property's bin store area.
- As part of the assessment a plant noise criterion (limit) is set with reference to the Local Planning Authority requirement and guidance of relevant British Standard BS4142:2014.
- Full title of the current edition of this standard is BS4142:2014+A1:2019 "*Methods for rating and assessing industrial and commercial sound*". Reference throughout this report to BS4142:2014 relates to this current edition. As an aid to clarity, this report retains use of the more familiar term "*noise*" as opposed to the replacement term "*sound*" of BS4142:2014, both terms are interchangeable in the context of this assessment report.
- In accordance with the noise assessment procedures of BS4142:2014 a survey has been conducted to establish existing representative minimum (lower) background noise levels during the range of operational times of the plant, as representative of at nearest noise sensitive (residential) properties.
- Based on results of the background noise survey and acoustic calculations using plant manufacturer's data, noise from the plant (with the specified noise reduction treatment fitted) will be below existing background noise levels and complies with the noise criterion.
- The specified noise reduction treatment comprises high performance conventional duct silencers (attenuators) to the supply air fan and oven extract fan systems plus use of acoustic louvres to the bin store area (proposed location for the air conditioning unit & cold room unit). Specification details for the noise reduction treatment are provided in Section 7.1 of the report.
- The report also considers plant vibration. It is advised the plant is required to be installed using high performance proprietary vibration isolators. Specification details for suitable vibration isolators are provided in Section 7.2 of the report.

1. INTRODUCTION

A hot food takeaway use is proposed at an existing vacant allocated commercial property 31 Elm Grove, Hayling Island PO11 9EA. Previous use of the property was RM CrossFit Gym.

The takeaway use requires the installation of mechanical services plant (equipment). Sought opening times for the takeaway are 11am to 11pm.

The new plant (equipment) comprises a supply air system fan and oven extract system fan (both with associated external apertures), plus an air conditioning unit and cold room unit.

Philip Acoustics has been commissioned to assess noise from the proposed mechanical services plant. The assessment is to determine specifications for noise reduction treatment and vibration isolation measures to the plant, in the interest of safeguarding the amenity of neighbouring residential occupiers.

This report presents results of the noise assessment and includes:

- Qualifications & experience;
- Noise assessment methodology & criterion, with reference to the Local Planning Authority requirement (*Havant Borough Council typically imposed planning approval plant noise condition*) & British Standard BS4142:2014;
- Measurement survey of existing background noise levels;
- Details of proposed plant including location & noise data;
- Calculation & assessment of plant noise levels;
- Consideration of vibration from the plant;
- Specification as necessary for noise reduction treatment & vibration isolation measures.

Informative (1): Existing Plant Precedent

As forward to this noise assessment report, it is noted by the author that items of mechanical services plant to serve the hot food takeaway are of similar type and function to existing installed plant / equipment externally to rear of other commercial / retail use premises in the local vicinity and similarly in proximity to noise sensitive (residential) properties.

Much of the existing installed plant / equipment serving other premises is observed to be installed without noise reduction treatment.

*Notwithstanding this, assessment of noise from plant to serve the takeaway in this report is only with reference to a noise criterion (limit) set with reference to the Local Planning Authority requirement (*Havant Borough Council typically imposed plant noise condition*) plus with reference to the guidance of British Standard BS4142:2014.*

The report and noise assessment takes no account of any precedent there is existing similar plant / equipment already installed in the local vicinity and in proximity to residential properties without noise reduction treatment.

2. QUALIFICATIONS & EXPERIENCE

This report is prepared and issued by David Philip. David Philip graduated in 1989 from The University of Salford Department of Applied Acoustics with a BEng Honours degree in Electroacoustics. David Philip has been since 1995, and continues to be, a fully elected Member of the Institute of Acoustics (MIOA).

David Philip has been the owner / managing director of Philip Acoustics since the firm was formed in 2002. Prior to the formation of Philip Acoustics, David Philip held senior acoustic consultant positions at Sound Research Laboratories (London office) and Spectrum Acoustic Consultants.

Philip Acoustics has held full membership of the Association of Noise Consultants (ANC) since 2003 and is also a full member of the ANC Registration Scheme of approved independent organisations to undertake Building Regulations Approved Document Part E pre-completion certification sound insulation testing.

David Philip has over 30 years' experience as an Acoustic Consultant both in the UK and internationally and has considerable experience undertaking noise surveys and noise assessments for a wide range of commercial uses and also residential developments.

This experience includes a substantial quantity of noise assessments specifically associated with hot food takeaway developments in mixed use commercial/retail and residential areas.

David Philip is fully familiar with the provisions of the current (and previous) editions of British Standard BS4142, as well as other acoustics related standards and guidance documents.

The opinions expressed in this report are the true and professional opinions of David Philip. Neither David Philip nor Philip Acoustics is appointed on any incentive fee basis.

3. NOISE ASSESSMENT METHODOLOGY & CRITERION (BS4142:2014)

Details of the Local Planning Authority noise requirement, relevant British Standard BS4142:2014 and appropriate noise criterion for proposed plant to serve the takeaway use are provided in the following sections.

3.1 Local Planning Authority Requirement

In granting planning approval for the installation of new plant / equipment (including to serve hot food takeaway use premises), Havant Borough Council typically impose a standard condition including with noise criterion limit for reason including reference to Policy DM5 and Policy DM10 of the Havant Borough Local Plan as the recent example reproduced below:

3 No development shall take place until an acoustic assessment to show that the rating level of any plant & equipment, as part of this development, will be at least 5 dB below the existing background levels, has been submitted to and been approved in writing by the Local Planning Authority. The assessment must be carried out by a suitably qualified acoustic consultant / engineer and be in accordance with BS4142: 2014 Methods for rating and assessing industrial and commercial sound.
Reason: To protect the amenities of nearby residential properties in terms of noise/vibration and having due regard to policy DM5 and DM10 of the Havant Borough Local Plan (Core Strategy) 2011 and the National Planning Policy Framework.

In overview terms, the Council's condition sets a criterion / limit that noise from proposed plant / equipment shall be at least 5dBA below existing background noise levels, with reference to the measurement and assessment provisions of BS4142:2014.

This requirement is applied for proposed new plant to serve the takeaway use at 31 Elm Grove.

Additional information and clarification details associated with the noise assessment methodology and criterion with reference BS4142:2014 as applicable for the proposed new plant are provided in sections 3.2 & 3.3.

3.2 BS4142:2014

Full title of the current edition of this standard is BS4142:2014+A1:2019 "*Methods for rating and assessing industrial and commercial sound*". Reference throughout this report to BS4142:2014 relates to this current edition standard.

As an aid to clarity, this report retains use of the more familiar term "*noise*" as opposed to the replacement term "*sound*" of BS4142:2014. The two terms are interchangeable in the context of the assessment and this report.

BS4142:2014 provides a well-established methodology to assess the likely effect (impact) to people regarding noise of an "industrial" nature from commercial or other premises.

Consequently, in requesting noise assessments for mechanical plant, including equipment such as extraction/ventilation systems and air conditioning / refrigeration units serving such as restaurants and hot food takeaways or similar premises, many Local Planning Authorities refer to BS4142:2014.

In this scenario of proposed new plant, the BS4142:2014 assessment method requires that source noise data for the plant is established, and pre-existing background noise levels be measured. The assessment is then carried out by comparing the overall plant noise Rating Level with background noise levels, at assessment positions; normally to outside nearest residential properties or similar.

The (plant noise) Rating Level in this scenario is the Specific (actual) Noise Level of the plant plus with any corrections applied to account for subjective characteristics of the noise that might mean it is more noticeable and potentially have more impact.

The BS4142:2014 assessment method then provides guidance on the likely noise impact (effect) to people depending on the magnitude of the excess of the (plant noise) Rating Level over the pre-existing background noise; the higher the excess the more likely there would be an adverse impact and correspondingly, the lower the excess (or no excess) the less likely there would be an adverse impact.

BS4142:2014 does not provide any specific guidance on suitable noise limits / criteria or standards including for proposed new plant / equipment, only guidance on how to determine the likelihood of adverse impact.

In terms of likelihood of adverse (noise) impact, BS4142:2014 advises the following dependent upon context:

- i) **Where the (plant noise) Rating Level is around +10dB or more above the background, this is likely to be an indication of significant adverse impact;**
- ii) **Where the (plant noise) Rating Level is around +5dB above the background then this is likely to be an indication of adverse impact;**
- iii) **Where the (plant noise) Rating Level does not exceed the background then this is an indication of low impact.**

It is important to note the BS4142:2014 assessment methodology does not have a “no impact” indication categorisation. “Indication of low impact” for where the Rating Level does not exceed the pre-existing background is the lowest / least likely noise impact categorisation of BS4142:2014.

Different Local Planning Authorities interpret and apply the guidance of BS4142:2014 differently, some more onerously, some less so.

It is the author's experience that some Local Planning Authorities require the noise Rating Level of proposed new plant / equipment be not higher than +5dB above the pre-existing background level, majority require not higher than the background and some require a certain amount below the background. Some do not have a set requirement and consider each situation individually.

Havant Borough Council's noise condition requirement of “*at least 5dBA below existing background noise levels*” is more onerous than that of most Local Planning Authorities.

3.3 Application of Plant Noise Criterion (Limit)

Additional clarification points in respect to the assessment and application of the noise criterion are provided below:

a) **Plant Operating Conditions**

The assessment and noise criterion is cautiously/robustly applied to all proposed plant items operating cumulatively at full (100%) duty and during times as relevant; all plant operating during opening times of the takeaway premises, and with the cold room unit operable over 24 hours.

b) **Rating Noise Level**

The noise criterion is applied in terms of a noise Rating Level ($L_{Ar,T}$ dB) and thus with any corrections (such as for tonal character noise) applied as necessary to the plant noise at the assessment position as per the BS4142:2014 assessment methodology.

c) **Assessment Position**

As per normal noise assessment procedures / convention (plus with reference to BS4142:2014), the plant noise criterion is applied to an assessment position directly outside nearest windows of noise sensitive (residential) properties.

d) **Background Noise Level**

The noise criterion is cautiously/robustly as "worse case" applied to the measured representative minimum (lower) pre-existing background noise level $L_{A90,T}$ dB as representative of at the assessment position for times of operation of the plant.

e) **Very Low Background Noise Levels**

In accordance with the guidance and assessment provisions of BS4142, then for scenarios of very low background noise it is generally unreasonable / unnecessary to apply a Rating Level noise limit directly relative to the background level, in terms of ensuring amenity protection such that noise from plant / equipment does not cause disturbance or is otherwise of adverse impact.

This simply due to that there is a lower threshold level at which plant noise would become inaudible / not noticeable to neighbouring residential occupiers and thus it being unreasonable and unnecessary to further reduce the plant noise below that level.

BS4142:2014 advises "Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night."

Where background levels are very low it is instead appropriate to apply a minimum (lower level) threshold cap plant Rating Level limit of $L_{Ar,T}$ 30dB at assessment positions. BS4142:1997 advised that noise Rating Levels of below 35dB be considered very low.

Thus a minimum threshold cap plant noise limit (Rating Level) set at $L_{Ar,T}$ 30dB is significantly below (i.e. as 5dB betterment to) this guidance and for scenarios of very low background noise levels (i.e. regardless of the low background noise) will maintain surety of protection for the occupants of neighbouring properties from loss of amenity due to noise disturbance.

4. BACKGROUND NOISE SURVEY

To assess noise from the proposed plant it is necessary to establish pre-existing background noise levels during the range of operational times for the plant.

4.1 Survey Instrumentation

Details of instrumentation used for the noise survey are provided in Appendix A. The sound level meter was calibration verified before and after the survey.

4.2 Survey Details & Procedure

The supply air system, oven extract system and air conditioning unit will operate as required during opening times of the premises (11am to 11pm). The cold room unit provides an essential refrigeration function and is required to be operable over 24-hours.

A fully attended background noise survey was conducted by the author for the period approximately 9:30pm to 4am of 12 September 2023 through 13 September 2023, to include sample late evening and night periods as "worse case" when representative minimum (lower) levels of background noise will occur for operational times of the plant.

Weather conditions were suitable for the background noise survey and in accordance with BS4142:2014; not affecting or otherwise detrimentally influencing the survey measurements. Weather was dry, clear and with light wind; wind speed circa 1 to 3m/s recorded at the site and survey position.

Location of the site, plant and nearest noise sensitive (residential) properties are indicated on an aerial image, site location plan and block plan drawing plus proposed layout plan / elevation drawings in Appendix B.

Nearest residential properties are:

- Upper floors' flats above ground floor commercial / retail uses including the site itself and neighbouring adjacent premises;
- House adjacent north of the site at 33 Elm Grove.

Other residential dwellings in the general vicinity of the site including to the opposite side of Elm Grove and beyond the rear of the site on Ashwood Close / Elm Close are more distant and/or more naturally screened by intervening building structures than the above properties.

The background noise survey position was externally to the rear of the site, representative of at nearest residential properties and conducted in accordance with the procedural guidance of BS4142:2014. The survey position is indicated on the site aerial image in Appendix B.

Measurements of background noise were recorded continually in terms of consecutive 15-minute samples of overall $L_{A90,T}$ dB values ($T=15$ minutes) throughout the survey duration.

4.3 Survey Observations, Results & Plant Noise Limit

Background noise levels to the rear of the site during the late evening and night period are very low and principally due to road traffic passing in the local and wider area.

There is also some underlying faintly noticeable noise (just / barely audible – not significant) through the late evening and night from existing unidentified plant / equipment as serving other commercial / retail premises in the vicinity.

The background noise profile is normal for this location, with levels reducing gradually during the late evening and into the night as traffic locally and in the wider vicinity reduces, lowest during the night between circa 2am to 4am, before gradually starting to rise after about 4am as traffic starts to increase slightly.

Complete raw data results of the background noise survey are provided in Appendix C.

Summary of measured representative minimum background noise levels and the associated plant noise limit requirements are shown in Table 1.

Background noise levels and noise limits are split into opening hours values (range 11am to 11pm) and night period values such that all plant as operating during opening hours is assessed using representative minimum background noise during that time range, whilst the cold room unit operable over 24 hours is assessed using the typical / representative minimum background noise during the night.

Description	Plant Operating Times	Representative Minimum Background Noise Level $L_{A90, 15 \text{ min}}$	Plant Noise Limit (Rating Level)
Assessment to outside nearest windows of residential properties	All Plant: Operating during opening hours (range 11am to 11pm)	34dB	$L_{A,T} \leq 30\text{dB}$ (minimum threshold cap 30dB applicable)
	Cold Room Unit: Operable over 24 hours (including during the night)	29dB (occurs circa 2am to 4am)	$L_{A,T} \leq 30\text{dB}$ (minimum threshold cap 30dB applicable)

Table 1: Measured representative minimum background noise & associated plant noise limits

5. NOISE FROM MECHANICAL SERVICES PLANT

The proposed mechanical services plant comprises the following items as indicated on the layout plan and elevations drawings in Appendix B:

- **Supply Air System Fan:** System Air Prio 315 EC mixed flow circular duct fan, located internally with fresh air intake via ducting from an inlet louvre grille aperture to the rear elevation wall of the building;
- **Oven Extract System Fan:** System Air Prio 355 EC mixed flow circular duct fan, located internally with exhaust to atmosphere via filters and ducting to an outlet (discharge) louvre grille aperture to the side (rear part) elevation wall of the building;
- **Air Conditioning Unit:** Mitsubishi FDC100VNX condenser unit (cooling mode operation), located internally within the bin store area to rear of the building, ventilation airflow for the unit (& cold room unit – see below) facilitated by louvred doors to the bin store;
- **Cold Room Unit:** Tecumseh Wintsys WINAJ4519Z condenser unit, located internally within the bin store area to rear of the building (adjacent to air conditioning unit).

Copy of available manufacturer noise data for the plant is provided in Appendix D.

Summary of noise data for the plant items in terms of equivalent overall dBA and linear dB octave band sound power levels is shown in Table 2. The summary noise data is without any noise reduction treatment applied (i.e. is for un-silenced manufacturer noise data).

Description	Overall dBA	Octave Band Centre Frequency (Hz) Lin dB							
		63	125	250	500	1k	2k	4k	8k
Supply Air System Fan: System Air Prio 315 EC ⁽¹⁾ (Inlet – induct sound power level)	77	73	87	75	73	71	67	61	53
Oven Extract System Fan: System Air Prio 355 EC ⁽¹⁾ (Outlet – induct sound power level)	79	81	88	80	75	73	67	59	51
Air Conditioning Unit: Mitsubishi FDC100VNX ⁽²⁾ (unit configured cooling mode)	58	62	60	54	55	55	48	45	39
Cold Room Unit: Tecumseh Wintsys WINAJ4519Z ⁽²⁾	63	65	63	61	59	58	55	51	43
Note ⁽¹⁾: Manufacturer octave band noise data for the supply air system fan System Air Prio 315 EC & oven extract system fan System Air Prio 355 EC is in terms of "A-Weighted" dBA octave band values. The values stated above are equivalent linear dB octave band values (i.e. not "A-Weighted"). Note ⁽²⁾: No manufacturer octave band noise data for air conditioning unit & cold room unit; linear dB octave band sound power levels are based on octave band sound pressure level measurements undertaken by the author of these make / model air conditioning & cold room units as installed at other same & similar operator premises.									

Table 2: Summary plant noise data (sound power levels based on manufacturers' noise data)

To calculate the overall plant noise contribution to the assessment positions outside windows of nearest noise sensitive properties a spreadsheet noise model calculation has been used.

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The model takes account of the accumulation of noise from the worse-case scenario of all plant items operating simultaneously, distance between the plant locations and assessment position, acoustic directivity, acoustic reflections and any natural / default line of sight acoustic screening due to orientation and intervening buildings / structures etc.

The calculation model also takes account of the specified noise reduction treatment applied to the plant as detailed in Section 7.1 of the Report.

Noise assessment position and noise model calculation details are provided in Appendix E.

The noise model overall calculated noise Rating Levels from the plant to outside nearest residential windows compared with the noise limit are shown in Table 3.

Noise from the plant to other residential properties in the vicinity that are farther away and/or more screened from the site and plant locations will be lower.

Description	Plant Operating Times	Plant Overall Noise Level (Rating Level)	Noise Limit (Rating Level)	Comment
Assessment Position A: Rear elevation window of upper floor flat above the site itself (nearest window to supply air system intake aperture)	All Plant Items : Operating during opening hours (range 11am to 11pm)	$L_{A,Ti}$ 28dB	$L_{A,Ti} \leq 30dB$	Complies
	Cold room unit: Operable over 24 hours (including during the night)	$L_{A,Ti}$ 15dB	$L_{A,Ti} \leq 30dB$	Complies
Assessment Position B: Side elevation window of upper floor flat above the site itself (nearest window to oven extract system discharge aperture & bin store louvres)	All Plant Items : Operating during opening hours (range 11am to 11pm)	$L_{A,Ti}$ 29dB	$L_{A,Ti} \leq 30dB$	Complies
	Cold room unit: Operable over 24 hours (including during the night)	$L_{A,Ti}$ 26dB	$L_{A,Ti} \leq 30dB$	Complies
Assessment Position C: Nearest rear elevation first floor window (likely to a bedroom) of neighbouring house 33 Elm Grove	All Plant Items : Operating during opening hours (range 11am to 11pm)	$L_{A,Ti}$ 29dB	$L_{A,Ti} \leq 30dB$	Complies
	Cold room unit: Operable over 24 hours (including during the night)	$L_{A,Ti}$ 27dB	$L_{A,Ti} \leq 30dB$	Complies

Table 3: Noise from plant to assessment positions (outside nearest residential windows)

The assessment demonstrates that with the specified noise reduction treatment fitted as detailed in Section 7.1, noise from the proposed plant complies with the limit / criterion.

6. VIBRATION FROM MECHANICAL SERVICES PLANT

Location of the plant is structurally linked via the overall building structure to upper floors' residential flats above the site itself and above adjacent neighbouring other commercial uses; therefore it is possible that plant vibration could transmit to these properties.

It is advised the proposed plant is required to be installed using high performance proprietary vibration isolators as suitable for the types of plant, as good practice and to mitigate possible plant vibration transfer to the upper floors' flats.

Outline specification details for suitable vibration isolators are provided in Section 7.2 of the report.

7. SPECIFICATIONS FOR NOISE & VIBRATION TREATMENTS

Informative (2): Proposed Plant

This report is based on the specific proposed make and models of plant as detailed in Section 5.

If during later design stages, during installation or as part of future plant / equipment replacement, an alternative make and model of plant item is selected, it is important that noise levels for the alternative item be checked by Philip Acoustics or another acoustic consultant to ensure the treatments specified below remain valid and noise emissions remain compliant with the noise limit.

Philip Acoustics can only advise on noise and vibration issues and therefore it is recommended that professional advice from others may need to be sought to confirm suitability of noise control treatments with regard to non-acoustic issues such as ventilation system airflow rates & system pressure drop. Suppliers for the specified noise control treatments would be able to assist with advice on these aspects.

7.1 Noise Reduction

To comply with the noise criterion limit it is necessary to specify noise reduction treatment to the plant items. Specification details for the noise reduction treatments are provided below and are as included in the noise model calculation in Appendix E.

7.1.1 Supply Air System

A silencer (attenuator) is to be fitted to the supply air system to reduce fan noise transmission externally out of the intake aperture. The silencer to be positioned within the supply air system atmosphere side duct, located between the fan and external intake aperture.

The proposed silencer to provide sufficient noise reduction is an Air Movement Supplies (AMS) type R2 attenuator length 1500mm. The silencer is a conventional high performance (i.e. high noise reduction) rectangular cross-section splitter baffle type.

Specification for the silencer is shown in Table 4, data sheet for the silencer is provided in Appendix F.

Description	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Supply Air System: AMS type R2 attenuator length 1500mm								
Silencer Insertion Loss (attenuation dB)	13	24	41	50	50	50	50	50
Regenerated Noise Limits L_w (dB) ⁽¹⁾	≤45	≤45	≤45	≤50	≤50	≤50	≤50	≤50
Note ⁽¹⁾: The regenerated noise limits are associated with ventilation issues including airflow rate / system pressure drop and are intended to be used by the silencer supplier to aid selection of an appropriate size cross-section (w x h) silencer for the system.								

Table 4: Specification details for Supply Air System silencer

7.1.2 Oven Extract System

A silencer (attenuator) is to be fitted to the oven extract system to reduce fan noise transmission externally out of the discharge aperture. The silencer to be positioned within the oven extract system atmosphere side duct, located between the fan and external discharge aperture.

The proposed silencer to provide sufficient noise reduction is an Air Movement Supplies (AMS) type R2 attenuator length 1200mm. The silencer is a conventional high performance (i.e. high noise reduction) rectangular cross-section splitter baffle type.

Specification for the silencer is shown in Table 5, data sheet for the silencer is provided in Appendix F.

Description	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Oven Extract System: AMS type R2 attenuator length 1200mm								
Silencer Insertion Loss (attenuation dB)	11	20	34	50	50	50	50	50
Regenerated Noise Limits L_w (dB) ⁽¹⁾	≤50	≤50	≤45	≤40	≤40	≤40	≤40	≤40
Note ⁽¹⁾: The regenerated noise limits are associated with ventilation issues including airflow rate / system pressure drop and are intended to be used by the silencer supplier to aid selection of an appropriate size cross-section (w x h) silencer for the system.								

Table 5: Specification details for Oven Extract System silencer

The normal build-up of deposits inside kitchen / oven extract ductwork can degrade the performance of silencers over time. It is important to clean the inside of the oven extract system silencer at regular intervals depending up on the level of deposit build up. This would normally take place during routine oven extract system cleaning.

7.1.3 Air Conditioning Unit & Cold Room Unit

The air conditioning unit and cold room unit are to be located internally within a bin store area to the rear of the property, with ventilation airflow for the units facilitated by louvred doors to the bin store.

Noise mitigation is required to reduce noise transmission from the units externally out of the louvres. This is to be achieved by use of acoustic louvres.

The advised minimum performance specification for the acoustic louvres is shown in Table 6.

Description	Octave Band Centre Frequency (Hz)								Comments
	63	125	250	500	1k	2k	4k	8k	
Acoustic Louvres Insertion Loss dB	5	7	9	12	18	18	15	12	Suitable acoustic louvres would be typically 300mm depth (thickness) type

Table 6: Bin store acoustic louvres performance specification

The acoustic louvres specification in Table 6 is based on using proprietary nominal 300mm depth type acoustic louvres as available from most acoustic hardware suppliers in the form of acoustic louvre doors to plant areas etc.

Informative (3): Acoustic Louvres Suppliers

Different acoustic suppliers have slightly differing performance data for their 300mm depth type acoustic louvres. Therefore some supplier data may indicate variation in performance as compared with the octave band specification in Table 6. However this is advised acceptable providing the acoustic louvres are minimum 300mm (nominal) depth type.

7.2 Vibration Isolation

As detailed in Section 6, it is advised the plant is required to be installed using high performance proprietary vibration isolators. Outline specification detail for suitable vibration isolators are provided below.

7.2.1 Supply Air Fan & Oven Extract Fan Systems

It is recommended the supply air fan and oven extract fan be installed using high performance spring type vibration isolator hangers or mounts having a nominal static deflection minimum 20mm under the installed total weights of the supply air fan and oven extract fan. The spring type vibration isolators to incorporate rubber or neoprene noise stop pads.

Four isolators are normally required per fan unit, one for each corner support position. The vibration isolator hangers or mounts should only take weight of the supply air fan and oven extract fan. Associated ductwork either side (including silencers) should be supported by other separate rubber or neoprene vibration isolator hangers / mountings.

The supply air fan and oven extract fan should also have ductwork flexible connections fitted. To be effective the flexible connections need to be "loose" (not taught) when installed and would be typically formed using rubber or neoprene sheet material. Standard size flexible connections are available from most duct component suppliers.

7.2.2 Air Conditioning Unit & Cold Room Unit (*bin store "outdoor" units*)

It is recommended the air conditioning unit & cold room unit are installed mounted on proprietary rubber or neoprene turret type vibration isolator mountings.

The isolators should be selected to each have a static deflection $\geq 3\text{mm}$ under the installed total weights of the units. Four isolators are required per unit (one to each corner mounting foot position).

7.2.3 Air Conditioning Unit & Cold Room Unit (*internal cassette units*)

It is recommended the air conditioning and cold room internal cassette units are installed using proprietary rubber or neoprene turret type vibration isolators (hangers or bracket mountings as applicable).

The isolators should be selected to each have a static deflection $\geq 3\text{mm}$ under the installed total weights of the internal cassette units. Four isolators are required per unit (one to each corner mounting / suspension position).

A P P E N D I X A

Noise Survey Instrumentation

Site: 31 Elm Grove, Hayling Island PO11 9EA

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NOISE SURVEY INSTRUMENTATION

Instrumentation Used:

- Rion sound level meter type NL-32 Class 1 serial number 01103430, Rion preamplifier type NH-21, Rion microphone type UC-53A serial number 317947, Rion microphone windshield type WS-10, Rion microphone extension cable type EC-04A and tripod / boom arrangement;
- Bruel & Kjaer calibrator type 4231 serial number 2642929.
- Speedtech Instruments Skymaster model SM-28 serial number 19370 (sample weather conditions data).

Instrumentation Calibration Certification:

Description	Type Number	Manufacturer	Date of Calibration Expiration	Calibration Certificate Number
Class 1 Sound Level Meter s/n 01103430	NL-32	Rion	18/02/2024	TCRT22/1132
Microphone s/n 317947	UC-53A			
Preamplifier s/n 34369	NH-21			
Calibrator s/n 2642929	4231	Bruel & Kjaer	18/02/2024	TCRT22/1131

Instrumentation On-Site Calibration Check:

Description	Calibrator Reference Level (applicable to sound level meter)	Measured Level	Comment
Before survey measurements	94.0dB	94.0dB	Pass
After survey measurements		94.0dB	Pass (nil drift)

A P P E N D I X B

Aerial Image, Site Location Plan, Block Plan & Proposed Layout Plan / Elevation Drawings

Site: 31 Elm Grove, Hayling Island PO11 9EA

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Date: October 2023

AERIAL IMAGE

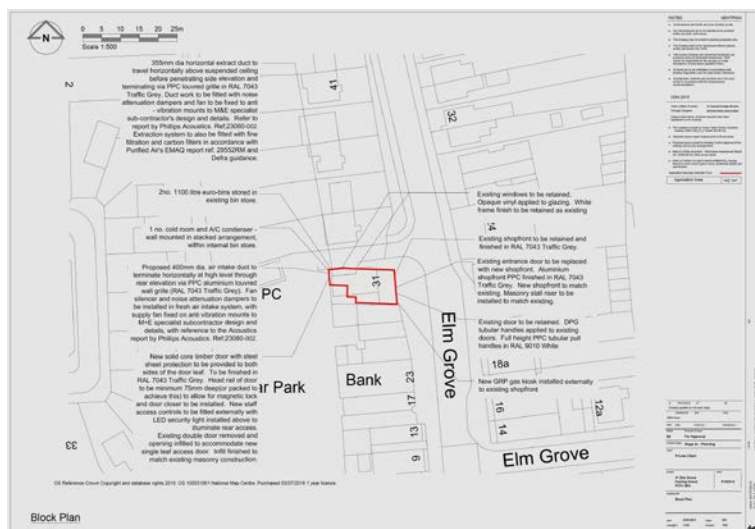
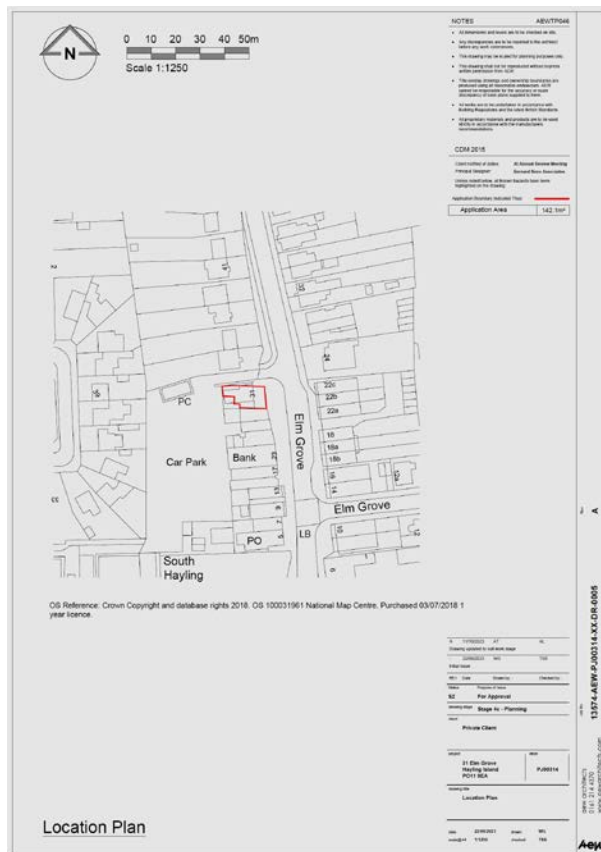


Site: 31 Elm Grove, Hayling Island PO11 9EA

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SITE LOCATION PLAN & BLOCK PLAN

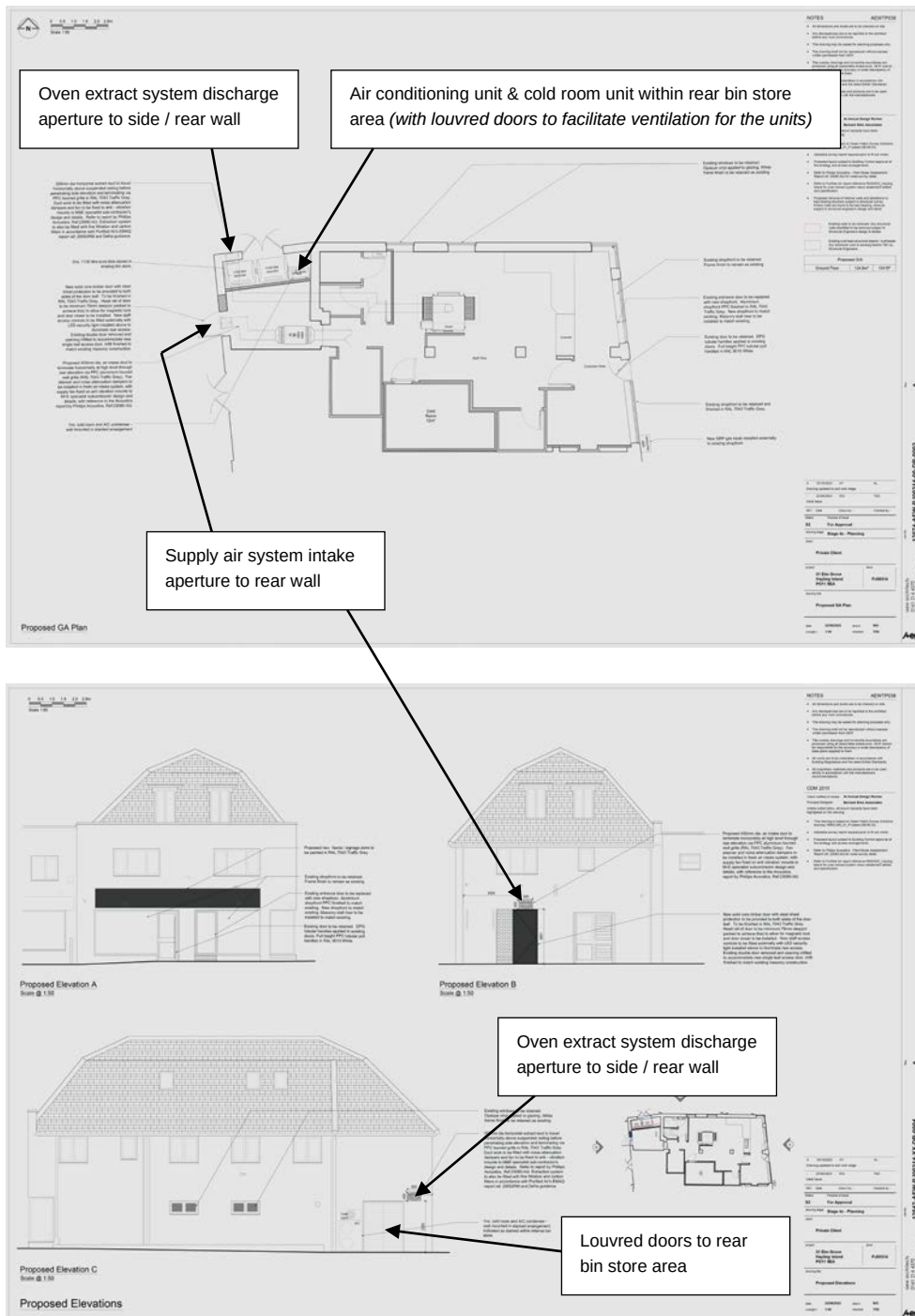


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PROPOSED LAYOUT PLAN & ELEVATIONS DRAWINGS



A P P E N D I X C

Background Noise Survey Results

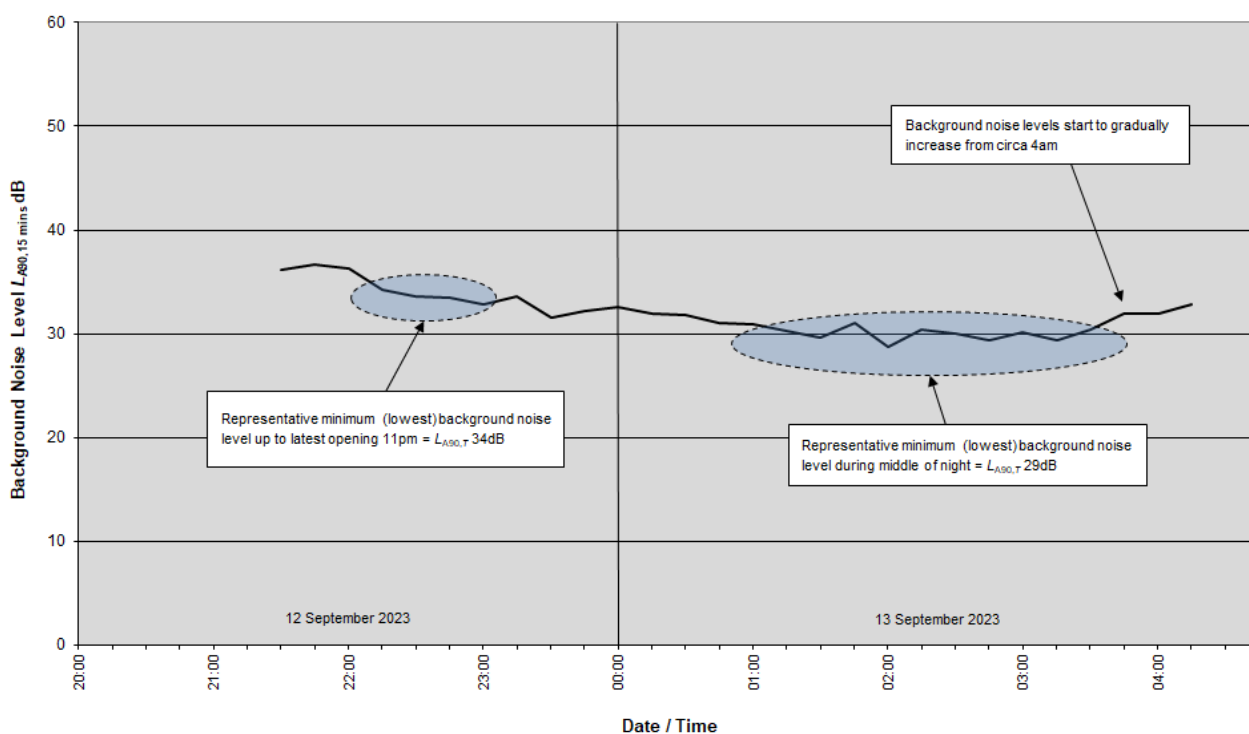
Site: 31 Elm Grove, Hayling Island PO11 9EA

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Date: October 2023

BACKGROUND NOISE SURVEY RESULTS

Raw Data Survey Results – Externally To Rear Of Site



A P P E N D I X D

Manufacturer's Plant Noise Data

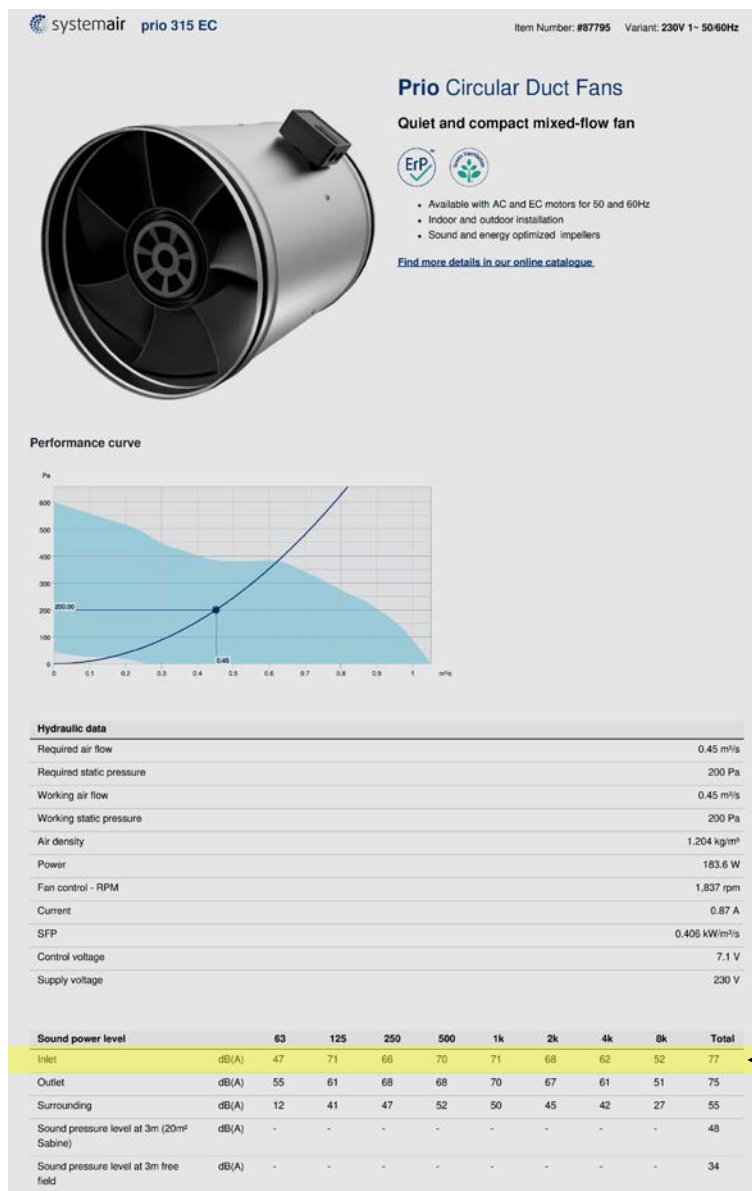
Site: 31 Elm Grove, Hayling Island PO11 9EA

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Date: October 2023

MANUFACTURER'S PLANT NOISE DATA

Supply Air System Fan: System Air Prio 315 EC



Manufacturer noise data overall dBA & octave band dBA sound power levels (supply fan inlet)

Site: 31 Elm Grove, Hayling Island PO11 9EA

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Date: October 2023

MANUFACTURER'S PLANT NOISE DATA

Oven Extract System Fan: System Air Prio 355 EC



Manufacturer noise data overall dBA & octave band dBA sound power levels (extract fan outlet)

Site: 31 Elm Grove, Hayling Island PO11 9EA

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MANUFACTURER'S PLANT NOISE DATA

Air Conditioning Unit: Mitsubishi FDC100VNX

Outdoor unit		
FDC100VNX		
Outdoor Unit		FDC100VNX
Cooling (Nominal)	kW	10.00
Cooling Range	kW	4.00 to 11.20
E.E.R (Energy Label)		4.00 (A)
Heating (Nominal)	kW	11.20
Heating Range	kW	4.00 to 12.50
C.O.P (Energy Label)		4.34 (A)
Exterior Dimensions (H x W x D)	mm	1300 x 970 x 370
Net Weight	mm	105
Sound Pressure Level	dB(A)	50
ELECTRICAL DATA		
Power Source Rating MCB	A	32
Mains Power To	Outdoor	1Phase 220-240V 50Hz, 1Phase 2
Interconnecting Wires		3+E
Running Current - Cooling	A	11.1
Running Current - Heating	A	11.4
Start Current	A	24
Power Input - Cooling	kW	2.50
Power Input - Heating	kW	2.58
INSTALLATION/REFRIGERANT		
Ref. Max Piping size	Liquid	3/8"(9.52)
	Gas	5/8"(15.88)
Ref. Max Piping Length	m	100
Vertical Height Difference (Max) - Outdoor Unit Above Indoor Unit	m	30
Outdoor Unit Below Indoor Unit	m	15
Refrigerant Amount Precharged	kg	4.5
For Pipe Length Up To	m	30
Additional Refrigerant	g/m	60

Manufacturer noise data overall
free-field sound pressure level
at 1m = 50dBA

Site: 31 Elm Grove, Hayling Island PO11 9EA

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MANUFACTURER'S PLANT NOISE DATA

Cold Room Unit: Tecumseh Wintsys WINAJ4519Z



Condensing unit
Voltage Code : FZ

High Temp. Commercial (HP)

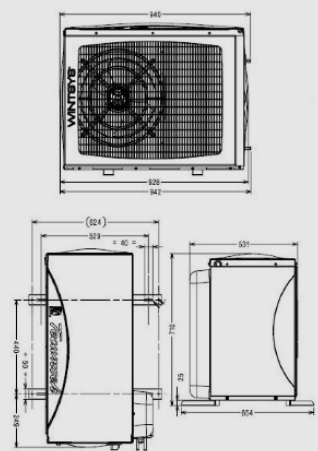
WINAJ4519Z-FZ

220 - 240V 1~ 50 Hz

R452A / R404A / R448A / R449A

WINAJ4519Z-FZ

Conditions	Frequency	Nominal Cooling Capacity		Sound Power ISO3745 / ISO 3743-1
		Watts	BTU/h	
EN13215 / R452A	50 Hz	2729	9306	63 dBA
EN13215 / R404A	50 Hz	2860	9754	63 dBA
EN13215 / R448A	50 Hz	2501	8528	63 dBA
EN13215 / R449A	50 Hz	2502	8532	63 dBA



* EN13215 : T°Ambient 32.0°C / T°Evap. -10.0°C / T°Return gas temp. 20.0°C
T°Subcooling 3.0K

Net Weight (Kg) 65.0

Expansion device Expansion_Valve

Air Flow (m³/h) 1650

Compo Data Sheet 224ST-FZ

Elec Comp Type CSR

Current (Amp)

Load Rated Amp 10.2

Max Cont Current 15.5

Lock Rotor Amp 45

Fan

Speed (rpm) 546

Power (W) 65.0

Diameter (mm) 360

Protection Overload

IP Level IP44

Condenser 360/14100

Liquid Receiver

Capacity (L) 2.35

Maximum Pressure (Bars) 32.0

Suction Line

Suction Type Tube / Tube

For Tubing Out Diam 15.9 (5/8")

Suction Connection Type Braided

Liquid Line

Liquid Line Type Tube

For Tubing Out Diam 9.5 (3/8")

Liquid Connection Type Braided

Connection Type TT

Fan Guard maille < à 8mm

Note : Tecumseh reserves the right to change information contained in this document without notification.

Selection program - V4_6_2020072 - 06/05/2020

Manufacturer noise data
overall dBA sound power level

A P P E N D I X E

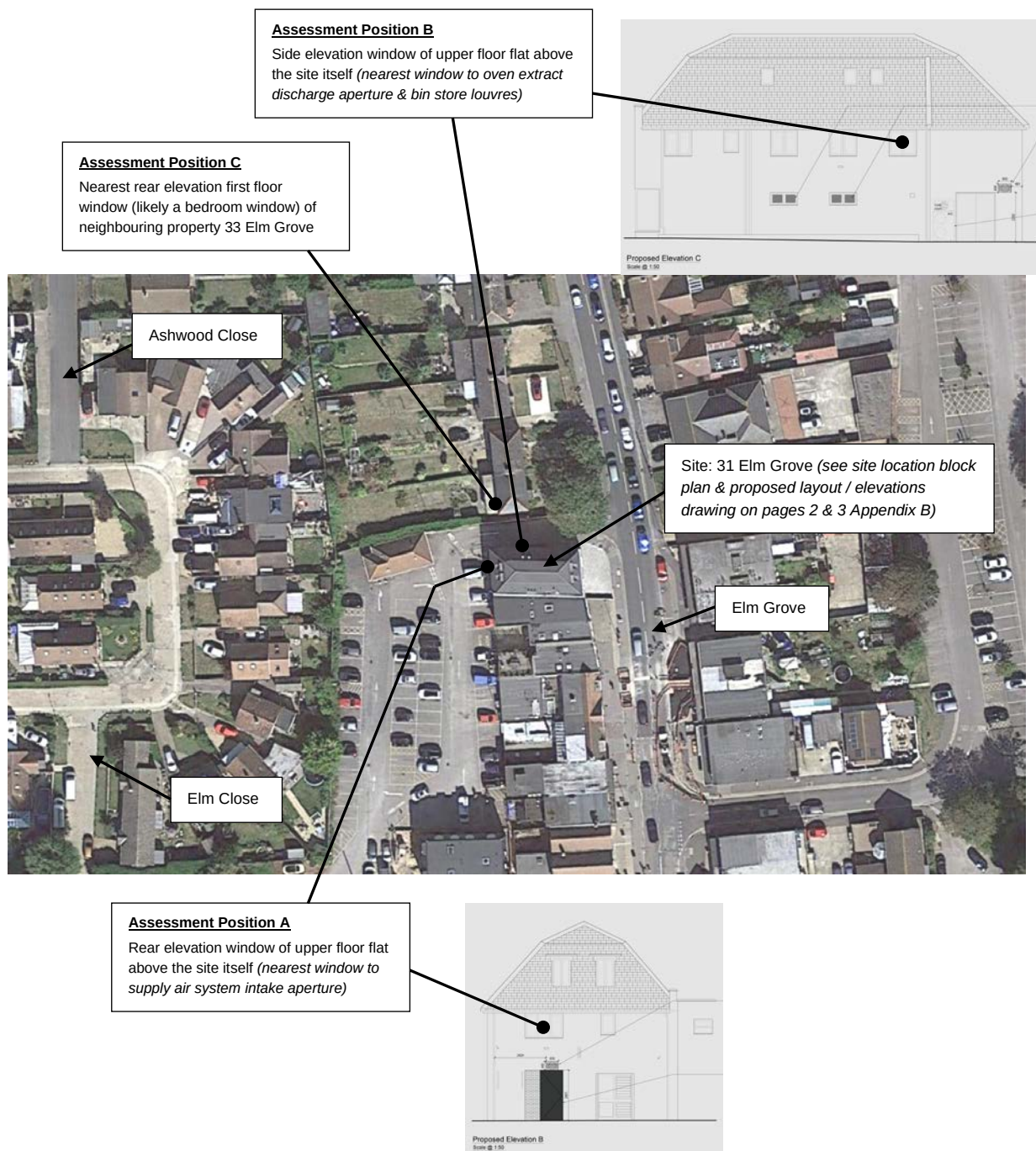
Noise Assessment Positions & Plant Noise Model Calculation

Site: 31 Elm Grove, Hayling Island PO11 9EA

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NOISE ASSESSMENT POSITIONS



Site: 31 Elm Grove, Hayling Island PO11 9EA

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Date: October 2023

PLANT NOISE MODEL CALCULATION

ASSESSMENT POSITION A: Rear elevation window of upper floor flat (nearest window to supply air intake aperture)

NOISE CONDITION: Opening hours; all plant items operating full duty

NOISE MITIGATION: Silencers to supply air system & oven extract system + acoustic louvres to bin store area
(see Section 7.1 Report 23080-002)

Plant & Description	Overall dBA	Lin dB at Octave Band Centre Frequency Hz							
		63	125	250	500	1k	2k	4k	8k
SUPPLY AIR SYSTEM - INTAKE APERTURE: System Air Prio 315 EC Fan									
Sound power level Lw dB; fan inlet induct	77	73	87	75	73	71	67	61	53
Duct Loss; duct length between fan & aperture (excluding silencers) - allow =2m duct 400mm Ø		0	0	0	0	0	0	0	0
Duct Loss; duct bends between fan & aperture - allow 2 x 90° radius duct bends 400mm Ø		0	-1	-1	-2	-4	-6	-6	-6
Duct Loss; aperture end reflection 400mm Ø duct to external intake aperture		-10	-6	-2	0	0	0	0	0
Noise Mitigation; silencer to system (AMS type R2 attenuator 1500mm length)		-13	-24	-41	-50	-50	-50	-50	-50
Sound power level Lw dB; aperture external Lw	40	50	56	31	21	17	11	5	-3
Distance; free-field correction for =2m from aperture to assessment position		-14	-14	-14	-14	-14	-14	-14	-14
Screening; nil line of sight screening correction applicable		0	0	0	0	0	0	0	0
Directivity; =90° off-axis aperture directivity applicable, limit to -10dB		-1	-2	-3	-4	-6	-10	-10	-10
Non Free-Field / Reflections; +3dB correction applied for intake aperture within wall		3	3	3	3	3	3	3	3
Individual contribution at assessment position	27	38	43	17	6	0	-10	-16	-24
OVEN EXTRACT SYSTEM - DISCHARGE APERTURE: System Air Prio 355 EC Fan									
Sound power level Lw dB; fan outlet induct	79	81	88	80	75	73	67	59	51
Duct Loss; duct length between fan & aperture (excluding silencer) - allow =6m duct 355mm Ø		0	-1	-1	-1	-1	-1	-1	1
Duct Loss; duct bends between fan & aperture - allow 2 x 90° radius duct bends 355mm Ø		0	-1	-1	-2	-4	-6	-6	-6
Duct Loss; aperture end reflection 355mm Ø duct to external discharge aperture		-10	-6	-2	0	0	0	0	0
Noise Mitigation; silencer to system (AMS type R2 attenuator 1200mm length)		-11	-20	-34	-50	-50	-50	-50	-50
Sound power level Lw dB; aperture external Lw	45	60	60	42	22	18	10	2	-4
Distance; free-field correction for =4m from aperture to assessment position		-20	-20	-20	-20	-20	-20	-20	-20
Screening; line of sight screening correction applicable (building edge), limit to -10dB		-7	-9	-10	-10	-10	-10	-10	-10
Directivity; ≥90° off-axis aperture directivity applicable, limit to -10dB		-1	-2	-3	-4	-6	-10	-10	-10
Non Free-Field / Reflections; +3dB correction applied for discharge aperture within wall		3	3	3	3	3	3	3	3
Individual contribution at assessment position	17	35	32	12	-9	-15	-27	-35	-41
AIR CONDITIONING UNIT: Mitsubishi FDC100VNX									
Sound power level Lw dB (unit installed for cooling mode operation)	58	62	60	54	55	55	48	45	39
Quantity; 0dB quantity correction applicable for 1 x unit		0	0	0	0	0	0	0	0
Reverberant Sound Pressure level Lp dB; unit Lp inside bin store plantroom	63	61	55	56	56	49	46	40	40
Noise Mitigation; acoustic louvres to bin store plantroom (300mm depth type)		-5	-7	-9	-12	-18	-18	-15	-12
Sound Power Level Lw dB; unit external Lw at bin store plantroom louvres	46	58	54	46	44	38	31	31	28
Distance; free-field correction for =5m from plantroom louvres to assessment position		-22	-22	-22	-22	-22	-22	-22	-22
Screening; line of sight screening correction applicable (building edge), limit to -10dB		-10	-10	-10	-10	-10	-10	-10	-10
Directivity; ≥90° off-axis louvres aperture directivity applicable, limit to -10dB		-2	-3	-6	-10	-10	-10	-10	-10
Non Free-Field / Reflections; +3dB correction applied for bin store plantroom louvres within wall		3	3	3	3	3	3	3	3
Individual contribution at assessment position	10	28	23	12	6	0	-7	-8	-11
COLD ROOM UNIT: Tecumseh Wintsys WNA345192									
Sound power level Lw dB	63	65	63	61	59	58	55	51	43
Quantity; 0dB quantity correction applicable for 1 x unit		0	0	0	0	0	0	0	0
Reverberant Sound Pressure level Lp dB; unit Lp inside bin store plantroom	66	64	62	60	59	56	52	44	44
Noise Mitigation; acoustic louvres to bin store plantroom (300mm depth type)		-5	-7	-9	-12	-18	-18	-15	-12
Sound Power Level Lw dB; unit external Lw at bin store plantroom louvres	50	61	57	53	48	41	38	37	32
Distance; free-field correction for =5m from plantroom louvres to assessment position		-22	-22	-22	-22	-22	-22	-22	-22
Screening; line of sight screening correction applicable (building edge), limit to -10dB		-10	-10	-10	-10	-10	-10	-10	-10
Directivity; ≥90° off-axis louvres aperture directivity applicable, limit to -10dB		-2	-3	-6	-10	-10	-10	-10	-10
Non Free-Field / Reflections; +3dB correction applied for bin store plantroom louvres within wall		3	3	3	3	3	3	3	3
Individual contribution at assessment position	15	31	26	19	10	3	0	-2	-7
Cumulative Plant Noise (Specific Noise Level) At Assessment Position									
All Plant: Operating during opening hours (range 11am to 11pm)	28	40	43	22	12	6	1	-1	-5
Cold Room Unit: Operable over 24 hours (including through the night)	15	31	26	19	10	3	0	-2	-7

The overall cumulative noise level (specific level) at the assessment position due to all plant items operating is 28dBA. For only the cold room unit operating through the night period the level is 15dBA. The specified high performance noise reduction treatment suppresses tonal characteristics of the plant; noise at the assessment position is nominally broadband in nature; plant noise rating levels = plant noise specific levels.

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Date: October 2023

PLANT NOISE MODEL CALCULATION

ASSESSMENT POSITION B: Side elevation window of upper floor flat (nearest window to oven extract discharge aperture)

NOISE CONDITION: Opening hours; all plant items operating full duty

NOISE MITIGATION: Silencers to supply air system & oven extract system + acoustic louvres to bin store area
(see Section 7.1 Report 23080-002)

Plant & Description	Overall dBA	Lin dB at Octave Band Centre Frequency Hz							
		63	125	250	500	1k	2k	4k	8k
SUPPLY AIR SYSTEM - INTAKE APERTURE: System Air Prio 315 EC Fan									
Sound power level Lw dB; fan inlet induct	77	73	87	75	73	71	67	61	53
Duct Loss; duct length between fan & aperture (excluding silencers) - allow ~2m duct 400mm Ø		0	0	0	0	0	0	0	0
Duct Loss; duct bends between fan & aperture - allow 2 x 90° radius duct bends 400mm Ø		0	-1	-1	-2	-4	-6	-6	-6
Duct Loss; aperture end reflection 400mm Ø duct to external intake aperture		-10	-6	-2	0	0	0	0	0
Noise Mitigation; silencer to system (AMS type R2 attenuator 1500mm length)		-13	-24	-41	-50	-50	-50	-50	-50
Sound power level Lw dB; aperture external Lw	40	50	56	31	21	17	11	5	-3
Distance; free-field correction for ~9m from aperture to assessment position		-27	-27	-27	-27	-27	-27	-27	-27
Screening; line of sight screening correction applicable (building edge), limit to -10dB		-10	-10	-10	-10	-10	-10	-10	-10
Directivity; ~90° off-axis aperture directivity applicable, limit to -10dB		-1	-2	-3	-4	-6	-10	-10	-10
Non Free-Field / Reflections; +3dB correction applied for intake aperture within wall		3	3	3	3	3	3	3	3
Individual contribution at assessment position	4	15	20	-6	-17	-23	-33	-39	-47
OVEN EXTRACT SYSTEM - DISCHARGE APERTURE: System Air Prio 355 EC Fan									
Sound power level Lw dB; fan outlet induct	79	81	88	80	75	73	67	59	51
Duct Loss; duct length between fan & aperture (excluding silencer) - allow ~6m duct 355mm Ø		0	-1	-1	-1	-1	-1	-1	1
Duct Loss; duct bends between fan & aperture - allow 2 x 90° radius duct bends 355mm Ø		0	-1	-1	-2	-4	-6	-6	-6
Duct Loss; aperture end reflection 355mm Ø duct to external discharge aperture		-10	-6	-2	0	0	0	0	0
Noise Mitigation; atmosphere side primary silencer to system (AMS type R2 attenuator 1200mm length)		-11	-20	-34	-50	-50	-50	-50	-50
Sound power level Lw dB; aperture external Lw	45	60	60	42	22	18	10	2	-4
Distance; free-field correction for ~5m from aperture to assessment position		-22	-22	-22	-22	-22	-22	-22	-22
Screening; nil line of sight screening correction applicable		0	0	0	0	0	0	0	0
Directivity; ~90° off-axis aperture directivity applicable, limit to -10dB		-1	-2	-3	-4	-6	-10	-10	-10
Non Free-Field / Reflections; +3dB correction applied for discharge aperture within wall		3	3	3	3	3	3	3	3
Individual contribution at assessment position	24	40	39	20	-1	-7	-19	-27	-33
AIR CONDITIONING UNIT: Mitsubishi FDC100VNX									
Sound power level Lw dB (unit installed for cooling mode operation)	58	62	60	54	55	55	48	45	39
Quantity; 0dB quantity correction applicable for 1 x unit		0	0	0	0	0	0	0	0
Reverberant Sound Pressure level Lp dB; unit Lp inside bin store plantroom		63	61	55	56	56	49	46	40
Noise Mitigation; acoustic louvres to bin store plantroom (300mm depth type)		-5	-7	-9	-12	-18	-18	-15	-12
Sound Power Level Lw dB; unit external Lw at bin store plantroom louvres	46	58	54	46	44	38	31	31	28
Distance; free-field correction for ~4m from plantroom louvres to assessment position		-20	-20	-20	-20	-20	-20	-20	-20
Screening; nil line of sight screening correction applicable		0	0	0	0	0	0	0	0
Directivity; ~90° off-axis louvres aperture directivity applicable, limit to -10dB		-2	-3	-6	-10	-10	-10	-10	-10
Non Free-Field / Reflections; +3dB correction applied for bin store plantroom louvres within wall		3	3	3	3	3	3	3	3
Individual contribution at assessment position	22	39	34	23	17	11	4	4	1
COLD ROOM UNIT: Tecumseh Wintsys WINA345192									
Sound power level Lw dB	63	65	63	61	59	58	55	51	43
Quantity; 0dB quantity correction applicable for 1 x unit		0	0	0	0	0	0	0	0
Reverberant Sound Pressure level Lp dB; unit Lp inside bin store plantroom		66	64	62	60	59	56	52	44
Noise Mitigation; acoustic louvres to bin store plantroom (300mm depth type)		-5	-7	-9	-12	-18	-18	-15	-12
Sound Power Level Lw dB; unit external Lw at bin store plantroom louvres	50	61	57	53	48	41	38	37	32
Distance; free-field correction for ~4m from plantroom louvres to assessment position		-20	-20	-20	-20	-20	-20	-20	-20
Screening; nil line of sight screening correction applicable		0	0	0	0	0	0	0	0
Directivity; ~90° off-axis louvres aperture directivity applicable, limit to -10dB		-2	-3	-6	-10	-10	-10	-10	-10
Non Free-Field / Reflections; +3dB correction applied for bin store plantroom louvres within wall		3	3	3	3	3	3	3	3
Individual contribution at assessment position	26	42	37	30	21	14	11	10	5
Cumulative Plant Noise (Specific Noise Level) At Assessment Position									
All Plant: Operating during opening hours (range 11am to 11pm)	29	45	42	31	23	16	12	11	7
Cold Room Unit: Operable over 24 hours (including through the night)	26	42	37	30	21	14	11	10	5

The overall cumulative noise level (specific level) at the assessment position due to all plant items operating is 29dBA. For only the cold room unit operating through the night period the level is 26dBA. The specified high performance noise reduction treatment suppresses tonal characteristics of the plant; noise at the assessment position is nominally broadband in nature; plant noise rating levels = plant noise specific levels.

Site: 31 Elm Grove, Hayling Island PO11 9EA

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Date: October 2023

PLANT NOISE MODEL CALCULATION

ASSESSMENT POSITION C: Nearest rear elevation first floor window of neighbouring property 33 Elm Grove

NOISE CONDITION: Opening hours; all plant items operating full duty

NOISE MITIGATION: Silencers to supply air system & oven extract system + acoustic louvres to bin store area
(see Section 7.1 Report 23080-002)

Plant & Description	Overall dBA	Lin dB at Octave Band Centre Frequency Hz							
		63	125	250	500	1k	2k	4k	8k
SUPPLY AIR SYSTEM - INTAKE APERTURE: System Air Prio 315 EC Fan									
Sound power level Lw dB; fan inlet induct	77	73	87	75	73	71	67	61	53
Duct Loss; duct length between fan & aperture (excluding silencers) - allow ~2m duct 400mm Ø		0	0	0	0	0	0	0	0
Duct Loss; duct bends between fan & aperture - allow 2 x 90° radius duct bends 400mm Ø		0	-1	-1	-2	-4	-6	-6	-6
Duct Loss; aperture end reflection 400mm Ø duct to external intake aperture		-10	-6	-2	0	0	0	0	0
Noise Mitigation; silencer to system (AMS type R2 attenuator 1500mm length)		-13	-24	-41	-50	-50	-50	-50	-50
Sound power level Lw dB; aperture external Lw	40	50	56	31	21	17	11	5	-3
Distance; free-field correction for ~12m from aperture to assessment position		-30	-30	-30	-30	-30	-30	-30	-30
Screening; partial line of sight screening correction applicable (building edge), limit to -5dB		-5	-5	-5	-5	-5	-5	-5	-5
Directivity; ≥90° off-axis aperture directivity applicable, limit to -10dB		-1	-2	-3	-4	-6	-10	-10	-10
Non Free-Field / Reflections; +3dB correction applied for intake aperture within wall		3	3	3	3	3	3	3	3
Individual contribution at assessment position	7	17	22	-4	-15	-21	-31	-37	-45
OVEN EXTRACT SYSTEM - DISCHARGE APERTURE: System Air Prio 355 EC Fan									
Sound power level Lw dB; fan outlet induct	79	81	88	80	75	73	67	59	51
Duct Loss; duct length between fan & aperture (excluding silencer) - allow ~6m duct 355mm Ø		0	-1	-1	-1	-1	-1	-1	1
Duct Loss; duct bends between fan & aperture - allow 2 x 90° radius duct bends 355mm Ø		0	-1	-1	-2	-4	-6	-6	-6
Duct Loss; aperture end reflection 355mm Ø duct to external discharge aperture		-10	-6	-2	0	0	0	0	0
Noise Mitigation; atmosphere side primary silencer to system (AMS type R2 attenuator 1200mm length)		-11	-20	-34	-50	-50	-50	-50	-50
Sound power level Lw dB; aperture external Lw	45	60	60	42	22	18	10	2	-4
Distance; free-field correction for ~8m from aperture to assessment position		-26	-26	-26	-26	-26	-26	-26	-26
Screening; nil line of sight screening correction applicable		0	0	0	0	0	0	0	0
Directivity; nil off-axis aperture directivity applicable		0	0	0	0	0	0	0	0
Non Free-Field / Reflections; +3dB correction applied for discharge aperture within wall		3	3	3	3	3	3	3	3
Individual contribution at assessment position	22	37	37	19	-1	-5	-13	-21	-27
AIR CONDITIONING UNIT: Mitsubishi FDC100VNX									
Sound power level Lw dB (unit installed for cooling mode operation)	58	62	60	54	55	55	48	45	39
Quantity; 0dB quantity correction applicable for 1 x unit		0	0	0	0	0	0	0	0
Reverberant Sound Pressure level Lp dB; unit Lp inside bin store plantroom		63	61	55	56	56	49	46	40
Noise Mitigation; acoustic louvres to bin store plantroom (300mm depth type)		-5	-7	-9	-12	-18	-18	-15	-12
Sound Power Level Lw dB; unit external Lw at bin store plantroom louvres	46	58	54	46	44	38	31	31	28
Distance; free-field correction for ~8m from plantroom louvres to assessment position		-26	-26	-26	-26	-26	-26	-26	-26
Screening; nil line of sight screening correction applicable		0	0	0	0	0	0	0	0
Directivity; nil off-axis louvres aperture directivity applicable		0	0	0	0	0	0	0	0
Non Free-Field / Reflections; +3dB correction applied for bin store plantroom louvres within wall		3	3	3	3	3	3	3	3
Individual contribution at assessment position	23	35	31	23	21	15	8	8	5
COLD ROOM UNIT: Tecumseh Wintsys WINA345192									
Sound power level Lw dB	63	65	63	61	59	58	55	51	43
Quantity; 0dB quantity correction applicable for 1 x unit		0	0	0	0	0	0	0	0
Reverberant Sound Pressure level Lp dB; unit Lp inside bin store plantroom		66	64	62	60	59	56	52	44
Noise Mitigation; acoustic louvres to bin store plantroom (300mm depth type)		-5	-7	-9	-12	-18	-18	-15	-12
Sound Power Level Lw dB; unit external Lw at bin store plantroom louvres	50	61	57	53	48	41	38	37	32
Distance; free-field correction for ~8m from plantroom louvres to assessment position		-26	-26	-26	-26	-26	-26	-26	-26
Screening; nil line of sight screening correction applicable		0	0	0	0	0	0	0	0
Directivity; nil off-axis louvres aperture directivity applicable		0	0	0	0	0	0	0	0
Non Free-Field / Reflections; +3dB correction applied for bin store plantroom louvres within wall		3	3	3	3	3	3	3	3
Individual contribution at assessment position	27	38	34	30	25	18	15	14	9
Cumulative Plant Noise (Specific Noise Level) At Assessment Position									
All Plant: Operating during opening hours (range 11am to 11pm)	29	42	40	31	27	20	16	15	11
Cold Room Unit: Operable over 24 hours (including through the night)	27	38	34	30	25	18	15	14	9

The overall cumulative noise level (specific level) at the assessment position due to all plant items operating is 29dBA. For only the cold room unit operating through the night period the level is 27dBA. The specified high performance noise reduction treatment suppresses tonal characteristics of the plant; noise at the assessment position is nominally broadband in nature; plant noise rating levels = plant noise specific levels.

A P P E N D I X F

Noise Reduction Treatment For Plant

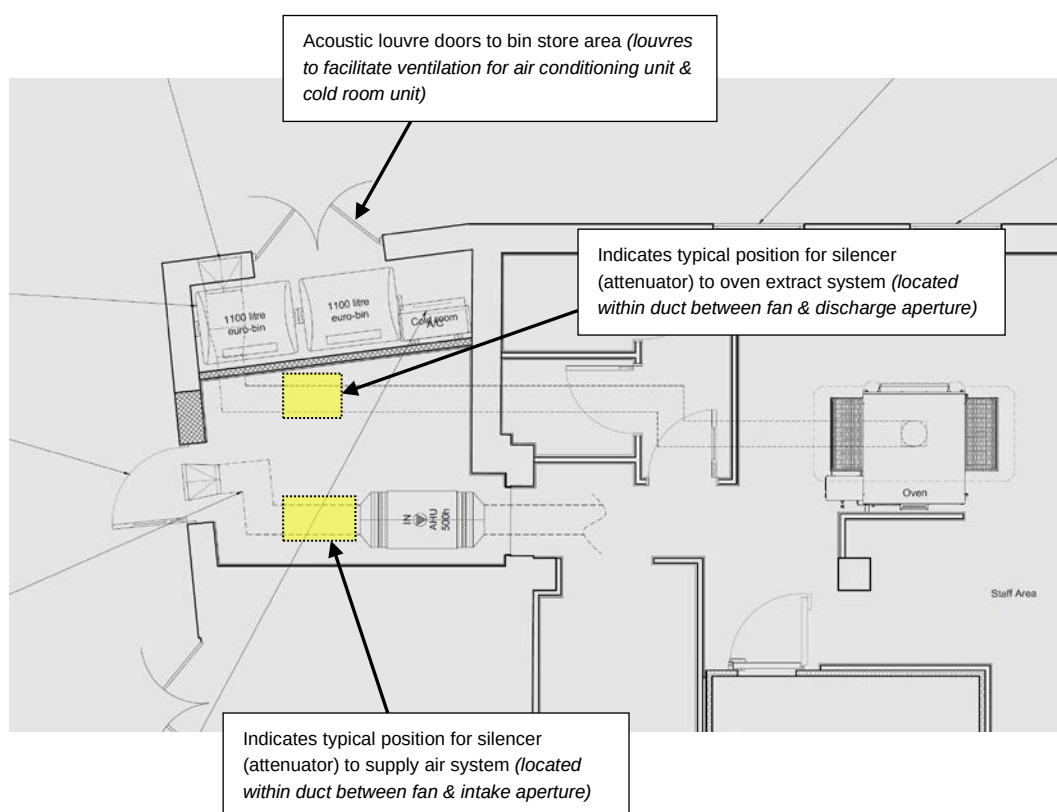
Site: 31 Elm Grove, Hayling Island PO11 9EA

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Date: October 2023

NOISE REDUCTION TREATMENT FOR PLANT

Annotated Part-Copy Proposed Layout Plan Drawing Indicating Noise Reduction Treatment To Plant



Site: 31 Elm Grove, Hayling Island PO11 9EA

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Date: October 2023

NOISE REDUCTION TREATMENT FOR PLANT

Supply Air System & Oven Extract System Silencers:

Data sheet for Air Movement Supplies (AMS) Type R2 Attenuators



AMS
AIR MOVEMENT SUPPLIES

Unit 10 Gunners Building
Limberline Road
Hilsea
Portsmouth
PO3 5BJ
Tel: 02393 200170
Fax: 02393 541170
email: sales@airmovementsupplies.co.uk

TYPE R2 ATTENUATOR STATIC INSERTION LOSS

LENGTH MM	HZ / dB							
	63	125	250	500	1000	2000	4000	8000
600	7	12	20	31	39	40	38	27
900	9	16	25	42	50	50	50	41
1200	11	20	34	50	50	50	50	48
1500	13	24	41	50	50	50	50	50
1800	15	30	47	50	50	50	50	50
2100	16	33	50	50	50	50	50	50
2400	20	38	50	50	50	50	50	50

AMS Type R2 Attenuator (length 1200mm)
specified for oven extract system silencer

AMS Type R2 Attenuator (length 1500mm)
specified for supply air system silencer