es acoustics
0208 488 5731
www.esacoustics.com
info@esacoustics.com

Plant Noise Impact Assessment Report for Planning

14 Sipson Road, West Drayton, Middlesex

Report Reference 21057.PNIA-RPT.01

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Principal Author	Billy Clark, Senior Acoustic Consultant
Report Checked By	Daniel J. Green, MIOA, Director and Principal Acoustic Consultant

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Principal Author Contact Details		
Name	**Telephone No.**	**Email Address**
Billy Clark	02030 627 222	billy.clark@esacoustics.com

EXECUTIVE SUMMARY

External extraction and supply systems and associated ductwork have been installed at 14 Sipson Road, West Drayton, Middlesex, serving the fish and chip shop at ground floor level.

An environmental noise survey has been undertaken to establish background sound levels representative of the closest noise sensitive receptor locations relative to the external plant locations.

A summary of the measurement results is presented in the table below for the shop operating hours when the extraction system would be in use:

Date	Period	Residual Sound Level $L_{Aeq,T}$ (dB)	Representative Background Noise Level L_{A90} (dB)
Fri 24/01/2025	Daytime 11:00-22:30	60	56
Sat 25/01/2025	Daytime 11:00-22:30	59	54
Sun 26/01/2025	Daytime 11:00-22:30	61	59

Based on the analysis above, and considering the wind effects as presented within Section 4.3, ESA would consider the lowest representative background noise levels of L_{A90} 54 dB, as measured on Saturday the 25th, to ensure a robust assessment is provided.

Manufacturer's noise data of the proposed extraction systems have been used to calculate expected noise levels at the closest noise sensitive receptors in accordance with BS 4142:2014+A1:2019. The table below compares the Rating Level calculated at each receiver against the lowest background during the proposed operating hours of the units:

Receiver	Average Residual Noise Level dB $L_{Aeq,T}$	Representative Background Sound Level dB L_{A90}	Calculated Rating Level at 1m from Receptor Façade dB $L_{Aeq,T}$	+/- compared against background dB
1	61	54	49	-5
2	61	54	48	-6

It has been concluded that noise emissions from the proposed external building services plant would be sufficiently below the background sound level to be considered as a low likelihood of adverse impact in accordance with BS 4142:2014+A1:2019 and No Observed Adverse Effect Level (NOAEL) in accordance with National Planning Policy, providing the mitigation measures outlined in Section 5.3 are implemented, as summarised below.

Unit	Noise Mitigation	Insertion Loss levels in each octave band centre frequency, dB							
		63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Extraction System	Acoustic Silencer	5	11	19	29	36	37	29	18
Supply System		2	5	11	17	20	19	12	10

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LIST OF ATTACHMENTS

1 INTRODUCTION

ES Acoustics Ltd have been commissioned by GBH Property Ltd to undertake an environmental noise survey and prepare a noise impact assessment for the installation of new external building services plant at 14 Sipson Road, West Drayton, Middlesex.

The purpose of this report is to;

- Review relevant national and local planning policy and guidance;
- Undertake an environmental noise survey on site to determine background sound levels at nearby noise sensitive receptor locations;
- Undertake a noise impact assessment in accordance with BS 4142:2014+A1:2019 to establish the likely impact of the proposal; and
- Where appropriate provide outline mitigation advice to ensure a low likelihood of adverse impact.

2 RELEVANT PLANNING POLICY AND GUIDANCE

This section of the report presents the key guidance and legislation relevant to the assessment of noise emissions from proposed installation of new external building services plant.

2.1 National Policy

2.1.1 National Planning Policy Framework (NPPF)

The National Planning Policy Framework (NPPF) superseded and replaced Planning Policy Guidance Note 24 (PPG24), which previously covered issues relating to noise and planning in England.

The paragraphs relating to noise state:

180. Planning policies and decisions should contribute to and enhance the natural and local environment by; […]

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

191. Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

a) Mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;

b) Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; […]

193. Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed.

2.1.2 Noise Policy Statement for England (NPSE)

The Noise Policy Statement for England (NPSE) was developed by DEFRA and published in March 2010. The long-term vision of the Government noise policy is to '*Promote good health and good quality of life*

through the effective management of noise within the context of Government policy on sustainable development.'

The NPSE vision noted above is supported by the following aims:

Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

- *Avoid significant adverse impacts on health and quality of life;*
- *Mitigate and minimise adverse impacts on health and quality of life; and*
- *Where possible, contribute to the improvement of health and quality of life*

The NPSE outlines observed effect levels relating to the above, as follows:

- *No observed effect level (NOEL): this is the level of noise exposure below which no effect at all on health or quality of life can be detected;*
- *Lowest observed adverse effect level (LOAEL): this is the level of noise exposure above which adverse effects on health and quality of life can be detected;*
- *Significant observed adverse effect level (SOAEL): This is the level of noise exposure above which significant adverse effects on health and quality of life occur;*

2.2 Local Policy

The site falls within the jurisdiction of the London Borough of Hillingdon. The Local Development Framework for Hillingdon comprises of the Local Plan Part 2 - Development Management Policies (LPP2).

Policy DMHB 11: 'Design of New Development' of the LPP2 confirms development will be supported provided:

> *A) All development, including extensions, alterations and new buildings will be required to be designed to the highest standards and, incorporate principles of good design including:*
>
> *i) harmonising with the local context by taking into account the surrounding:*
>
> *…*
>
> - *impact on neighbouring open spaces and their environment.*

Policy DMTC 4: 'Amenity and Town Centre Uses' of the LPP2 confirms development will be supported provided:

> *Proposals for restaurants and hot food takeaways, drinking establishments, betting shops, night clubs, casinos, amusement centres, minicab offices and other similar uses will only be supported provided that they:*
>
> *i) would not result in adverse cumulative impacts due to an unacceptable concentration of such uses in one area;*

ii) would not cause unacceptable disturbance or loss of amenity to nearby properties by reason of noise, odour, emissions, safety and security, refuse, parking or traffic congestion; and

iii) would not detrimentally affect the character or function of an area by virtue of the proposed use or visual impact.

2.3 Best Practice and Guidance

2.3.1 BS 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound'

BS 4142:2014+A1:2019 provides a methodology for rating and assessing the impacts of industrial and commercial sound at noise sensitive receptors.

The methodology involves comparing the Rating Noise Level due to the sound source/s under assessment with the existing background sound level (L_{A90}) when the noise source is not operating to estimate the initial impact, as follows (Typically, the greater this difference, the greater the magnitude of the impact):

a) *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context*

b) *A difference of around +5 dB could be an indication of an adverse impact, depending on the context*

c) *The lower the rating level is relative to the measured background sound level, the less likely it is that there will be an adverse impact or significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound having a low impact, depending on the context*

The standard notes that a noise source under assessment will have a 'low impact' when the 'rating level' of a noise source is less than the existing background sound. It is also important to note that any quantitative assessment results are assessed considering the context in which the sound occurs.

The standard notes three types of context within Clause 11, which are:

1) *The absolute level of sound. For a given difference between the rating level and the background sound level, the magnitude of the overall impact might be greater for an acoustic environment where the residual sound level is high than for an acoustic environment where the residual sound level is low.*

   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 residual sound levels are very high, the residual sound might itself result in adverse impacts or significant adverse impacts, and the margin by which the rating level exceeds the background might simply be an indication of the extent to which the specific sound source is likely to make those impacts worse.

2) *The character and level of the residual sound compared to the character and level of the specific sound. Consider whether it would be beneficial to compare the frequency spectrum and temporal variation of the specific sound with that of the ambient or residual sound to assess the degree to which the specific sound source is likely to be distinguishable and will represent an incongruous sound by comparison to the acoustic environment that would occur in the absence of the specific sound. Any sound parameters, sampling periods and averaging time periods used to undertake character comparisons should reflect the way in which sound of an industrial and/or commercial nature is likely to be perceived and how people react to it.*

3) *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, such as i. facade insulation treatment, ii. ventilation and/or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation, and iii. acoustic screening.*

The definitions noted above are described below:

- ***Specific sound*** *– sound source being assessed ($L_s = L_{Aeq,\ Tr}$)*
- ***Residual sound*** *– Ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound ($L_r = L_{Aeq,\ T}$)*
- ***Ambient sound*** *– totally encompassing sound in a given situation at a given time, usually composed of sound from many sources near and far ($L_a = L_{Aeq,\ T}$)*
- ***Background level*** *– sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval ($L_{A90,\ T}$)*
- ***Rating level*** *– specific sound level plus any adjustment for the characteristic features of the sound ($L_{Ar,Tr}$)*

With regards to background sound levels, BS 4142:2014+A1:2019 notes:

"In using the background sound level in the method for rating and assessing industrial and commercial sound it is important to ensure that values are reliable and suitably represent both the particular circumstances and periods of interest. For this purpose, the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods."

With regards to the 'rating level', the adjustments for the characteristic features of the sound are outlined below:

- *Tonality – +2 dB for a tone which is 'just perceptible' at the noise receptor, +4 dB where it is 'clearly perceptible', and +6 dB where it is 'highly perceptible'*
- *Impulsivity – +3 dB for a tone which is 'just perceptible' at the noise receptor, +6 dB where it is 'clearly perceptible', and +9 dB where it is 'highly perceptible'*

- *Intermittency – +3 dB if the intermittency is readily distinctive against the residual acoustic environment*
- *Other sound characteristics – where the specific sound features characteristics that are neither tonal nor impulsive, nor intermittent, though otherwise are readily distinctive against the residual acoustic environment, a penalty of +3 dB can be applied.*

It must be noted that as the rating level is determined at the closest noise sensitive receptor, the acoustic feature corrections should be applied based on the level at receptor location, not at source. This is particularly relevant when noise propagation characteristics cause differences in sound reduction at various frequency bands.

Note that the assessment reference periods that should be considered for daytime and night-time, as defined within the standard, are:

- *One hour period for a sound source operating during daytime hours (07:00-23:00 hours)*
- *Fifteen-minute period for a sound source operating during the night-time (23:00-07:00 hours)*

ES Acoustics Notes regarding Context:

The notes presented below are informed by the BS 4142:2014+A1:2019 Technical Note prepared by the Association of Noise Consultant Good Practice Working Group. Assessment context is often misunderstood or applied incorrectly, and the notes are therefore presented to provide a clear picture on what aspects of context should be considered when assessing the overall impact of a particular scenario:

Subclause 11(1)

The second paragraph notes that absolute levels may be as, or more, important than relative outcomes where background and rating levels are low. It is important to note that both background and rating levels would need to be low for this particular caveat to apply.

BS 4142 does not indicate how the initial estimate of impact should be adjusted when background and rating levels are low, only that the absolute levels may be more important than the difference between the two values. It is likely that where the background and rating levels are low, the absolute levels might suggest a more acceptable outcome than would otherwise be suggested by the difference between the values. For example, a situation might be considered acceptable where a rating level of 30dB is 10dB above a background sound level of 20dB, i.e. an initial estimate of a significant adverse impact is modified by the low rating and background sound levels. However, there may be situations where the opposite is true, and it is for the assessor to justify any modifications to the initial estimate of impact.

BS 4142 does not define 'low' in the context of background sound levels nor rating levels. The note to the Scope of the 1997 version of BS 4142 defined very low background sound levels as being less than about 30 dB L_{A90}, and low rating levels as being less than about 35 dB $L_{Ar,Tr}$. We would consider that similar values would not be unreasonable in the context of the current edition of BS 4142.

The third paragraph states that "where residual sound levels are very high, the residual sound might itself result in adverse impacts or significant adverse impacts".

In the ordinary application of BS 4142 the residual sound level is not compared with the background sound level to determine the level of impact. The third paragraph is therefore taken to mean that the level of impact caused by the residual level has been determined by professional judgement or with reference to another document, such as the Noise Insulation Regulations 1975 (as amended 1988). Where professional judgement is used, it should be appropriately justified.

Where the residual sound levels are very high, a significant adverse impact might be declared in a situation where the rating level exceeds the background sound level by, say, 4dB, i.e. since the residual sound levels are already considered to cause a significant impact, any worsening of the situation would be considered a significant adverse impact, even if the difference between the rating level and background sound level would not suggest this to be the case.

Subclause 11(2)

The second aspect of context described in BS 4142 relates to the character and level of the specific sound. In essence, whether or not the character of the sound is distinguishable from the character of the ambient or residual acoustic environment or is incongruous.

BS 4142 does not provide instruction as to how to treat the assessment outcomes in these circumstances, nor does it explain how to distinguish between this contextual consideration and the process for applying rating penalties. The latter is itself informed by the distinctive characteristics of the specific sound in the context of the residual sound environment.

Where character-based contextual matters are taken into account, the assessor should make it clear how these matters are distinct from those that informed the rating level corrections, and what the implications of these further character assessments should be. For example; new deliveries on an estate entailing rating penalties for reversing alarms and impulsive noise but these types of noise are already present at other existing premises, so contextually the impact is reduced. Conversely, where the residual level is largely comprised of natural sounds, such as the sea or birdsong, so the impact from the specific source might be increased.

Subclause 11(3)

The third contextual matter described in Clause 11 relates to the receptor itself. It is important to note that the reference at the start of this section of BS 4142 to 'the sensitivity of the receptor' refers to a generic receptor type, i.e. a dwelling, and not to the particular attitudes or responses of a particular person (although if the residential receptor type is specific it may have a bearing e.g. student accommodation).

The ANC working group notes that this part of BS 4142 allows the internal noise environment to be considered, despite BS 4142 excluding such matters from its Scope (Subclauses 1.1, 1.2 and 1.3). The working group considers that the consideration of the internal noise environment is only valid in a BS 4142 assessment where it relates to the contextual elements of the assessment.

2.3.2 BS 8233:2014 'Guidance on sound insulation and noise reduction for buildings'

Table 4 of BS 8233:2014 (reproduced below) provides guidance on recommended internal ambient noise levels in residential spaces based on World Health Organisation (WHO) research:

Room	Daytime (07:00-23:00)	Night-time (23:00-07:00)
Living Room	≤ 35 dB $L_{Aeq,16hr}$	N/A
Dining Room	≤ 40 dB $L_{Aeq,16hr}$	N/A
Bedroom	≤ 35 dB $L_{Aeq,16hr}$	≤ 30 dB $L_{Aeq,8hr}$

Table 1 BS 8233:2014 indoor ambient noise levels for dwellings

Whilst it is accepted that the levels presented above are for steady external noise sources without a specific character, the guidance provides useful context as to what acceptable internal noise levels are in an ideal situation.

Predicted noise levels from site activities would be compared against the noise levels shown above to provide an indication of acceptability and likelihood of adverse impact in accordance with National Planning Policy.

3 SITE CONTEXT AND BACKGROUND INFORMATION

3.1 Site Description

14 Sipson Road is located in West Drayton within the jurisdiction of the London Borough of Hillingdon.

The site is bounded by Sipson Road to the east, adjoining mixed commercial and residential properties to the north and residential properties to the south and west. The immediate area surrounding the site would be considered an urban environment.

A satellite image of the area is presented in Figure 1 which shows the application site boundary in red:

Figure 1 Satellite image of the site and surrounding area (Image Ref: Google Earth)

3.2 Proposal

The proposal involves the installation of an extraction fan with associated ductwork, and a supply fan with associated ductwork.

The closest noise sensitive receptors to the site and external plant installations are identified as being the existing residential properties above the ground floor restaurant unit, which will also comprise future residential units as part of planned refurbishment works.

An indicative site plan is shown in Figure 2 below, which shows the site application area (ground floor), closest noise sensitive receptor windows relative to each unit installation (green) and proposed plant installation location (yellow):

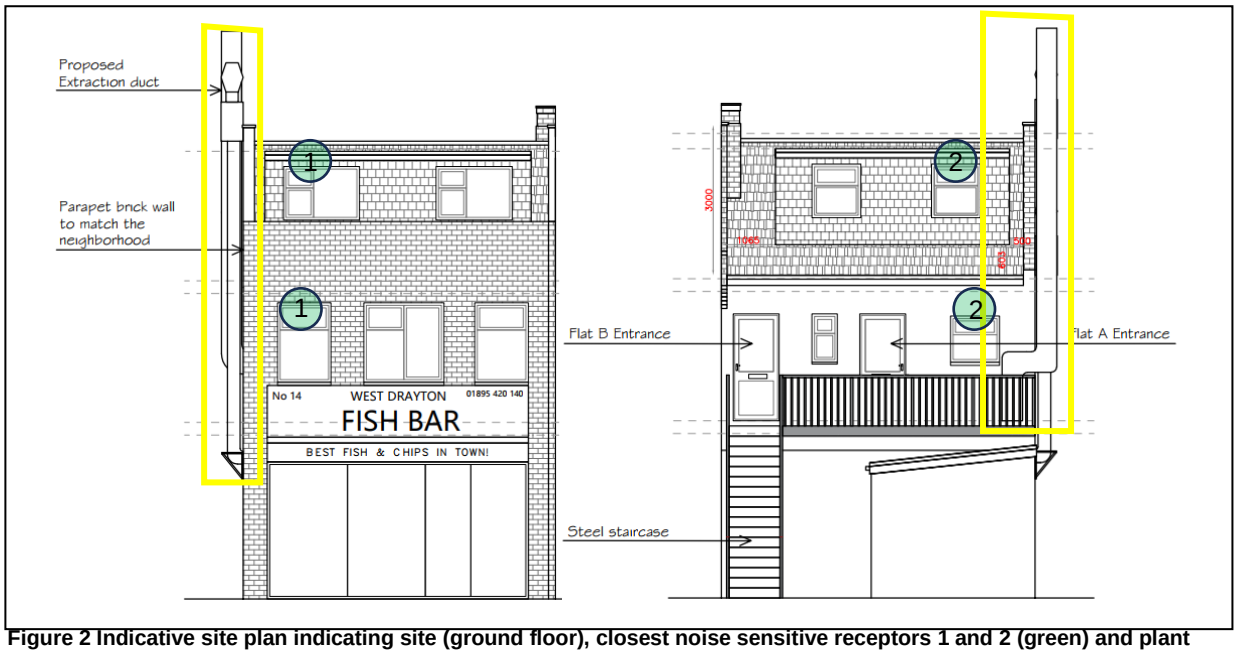

Figure 2 Indicative site plan indicating site (ground floor), closest noise sensitive receptors 1 and 2 (green) and plant locations (yellow)

It is understood that the Client has sourced details of the noise-generating fixed plant from a previous planning application. Due to this, some information is unavailable regarding the specifics of the proposal, including formal confirmation of which model, of the two fan systems proposed, is to be installed in which position, of the two proposed and identified in the plans presented below.

The following assessment will therefore consider an assumed layout, based on the most likely scenario in consideration of all available information, and also to consider the worst-case scenario. This however will be subject to formal confirmation from a qualified M&E consultant.

The plant proposal is therefore assumed to comprise of the following:

- Extraction System: 1 no. JM Aerofoil 63JM/20/4/6/36 extraction fan, installed within the kitchen of the restaurant unit and ducted externally from the rear of the site to roof level
- Supply System: 1 no. Helios GigaBox GBW 500/4 500mm centrifugal supply fan, installed within a box-in on the roof of the site, and ducted into the kitchen from the roof via the south facade

The proposed location of the units and ducting routes are shown further in the figure below:

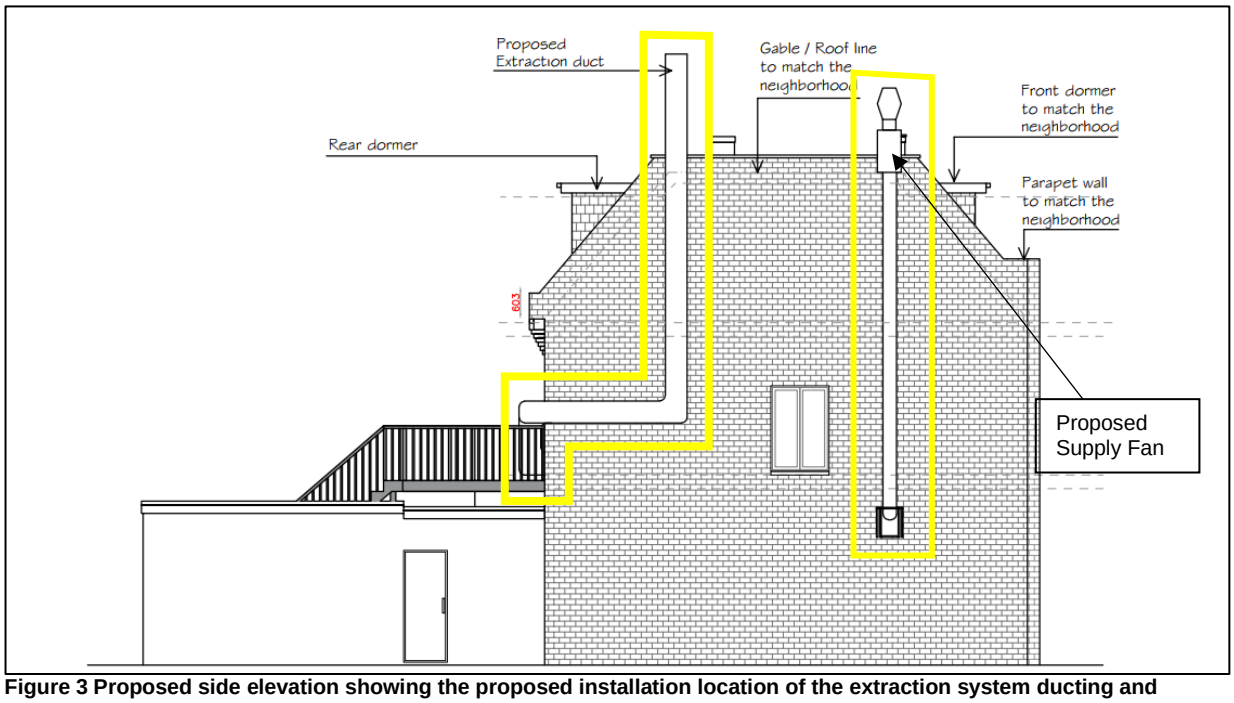

Figure 3 Proposed side elevation showing the proposed installation location of the extraction system ducting and exhaust

Noise emissions data for the proposed noise-generating fixed plant units have been sourced from the manufacturers, as shown in Appendix B and summarised in the tables below. As no data is available for the 63 Hz single octave bands for the Helios system, the data from the adjacent band would be repeated.

Extraction System - JM Aerofoil 63JM/20/4/6/36	**Sound Pressure Levels (1m) at Octave Band Centre Frequency, dB**								**dB(A)**
	63Hz	**125Hz**	**250Hz**	**500Hz**	**1kHz**	**2kHz**	**4kHz**	**8kHz**	
Outlet Levels (L_W)	86	90	90	87	83	80	77	74	89.1

Table 2 JM Aerofoil 63JM/20/4/6/36 from JM Aerofoil

Supply System - Helios GigaBox GBW 500/4	**Sound Pressure Levels (1m) at Octave Band Centre Frequency, dB**								**dB(A)**
	63Hz	**125Hz**	**250Hz**	**500Hz**	**1kHz**	**2kHz**	**4kHz**	**8kHz**	
Case Breakout (L_{WA})	-	64	63	53	52	50	46	40	67
Intake (L_{WA})	-	63	72	72	74	72	66	59	79

Table 3 Helios GigaBox GBW 500/4 fan noise levels from Helios

4 ENVIRONMENTAL NOISE SURVEY

4.1 Measurement Location and Procedure

A noise survey was undertaken on the proposed site as shown in the figures below, which was considered representative of the closest noise sensitive receptor locations.

Figure 4 Satellite view of noise survey measurement location (Image Reference: Google Earth)

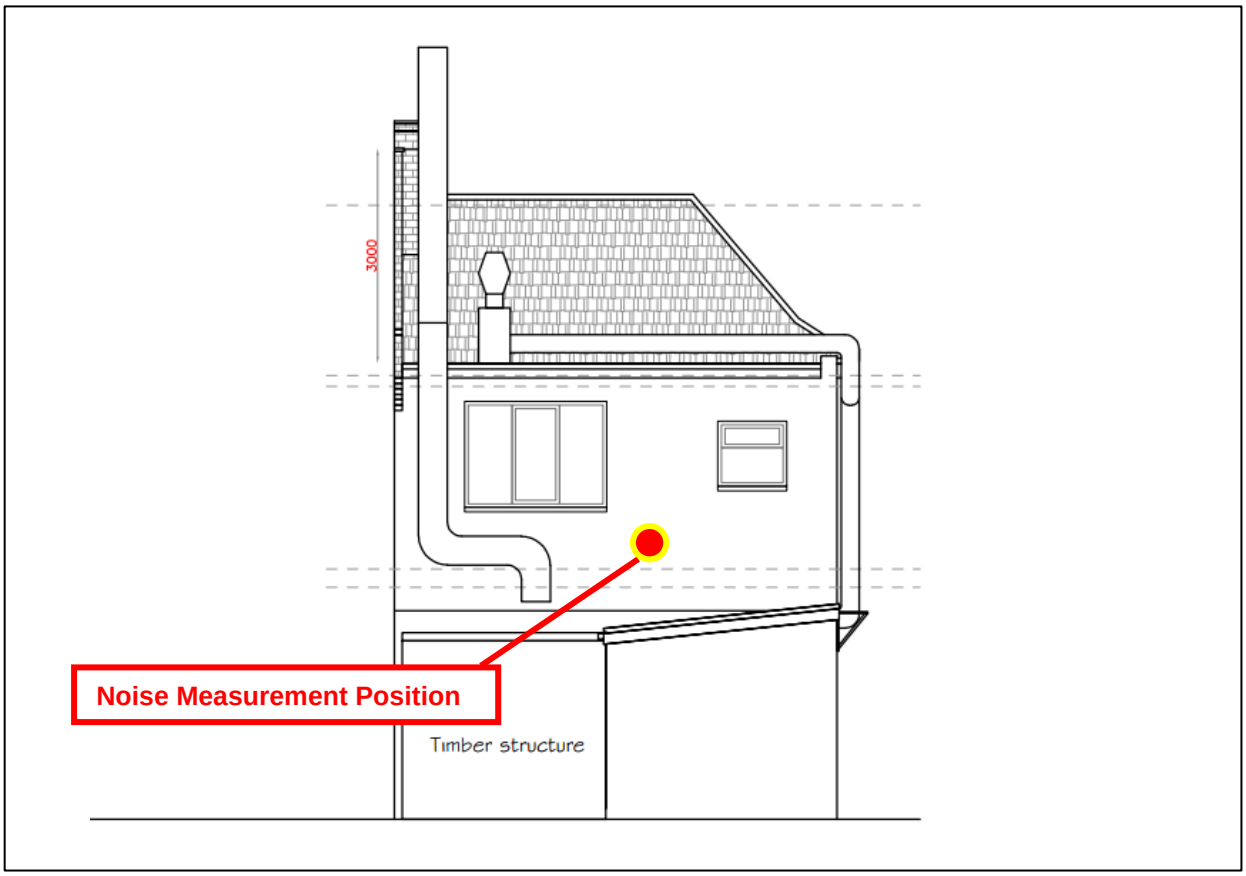

Figure 5 Existing elevation plan of noise survey measurement location

An appraisal of the site determined road traffic noise from the nearby Sipson Road and Harmondsworth Road to be the dominant noise source affecting the site, in addition to contribution for existing nearby plant installations serving the adjacent commercial and residential premises.

The measurement procedure complied with ISO 1996-2:2017 Acoustics '*Description, measurement and assessment of environmental noise - Part 2: Determination of environmental noise levels'*, with automated monitoring undertaken between 22:00 on 25/01/2025 and 11:00 on 27/01/2025.

The key acoustic descriptors measured for this assessment are as follows:

- $L_{Aeq,T}$ *(the continuous equivalent A-weighted noise level over a given time period, T);*
- $L_{A90,T}$ *(the noise level exceeded for 90% of the measurement period T, referred to as the 'background' noise level);*

4.2 Measurement Equipment

The table below presents the equipment used for the baseline noise survey. The equipment calibration was verified before and after use and no abnormalities were observed.

Equipment	Make and Model	Serial Number
Sound Level Meter	NSRT MK4	ANPcLH0weVW3IJvAb0JZFD
Calibrator	Svantek SV36 Class 1 Sound Calibrator	122255

Table 4 Noise survey equipment

Copies of external calibration certificates are available upon request.

4.3 Weather Conditions

Weather conditions during the automated monitoring were generally dry with and therefore suitable for the measurement of environmental noise. It was however noted that high wind speeds were recorded over the course of the weekend within the regional area.

Data on temperature, wind speed and precipitation has been sourced from the closest weather station[1] with accessible data.

Analysis of the time history and measurement results show that the levels of wind speed are expected to have increased the background noise levels on the dates of the 24th, 26th and 27th.

A summary of the weather data is reported in Table 5.

Description	Installation Date 24/01/2025	Interim Date 25/01/2025	Interim Date 26/01/2025	Collection Date 27/01/2025
Average Wind Speed (m/s)	11	5	11	12
Average Temperature (°C)	8	8	8	9
Precipitation (mm)	0.1	0.02	0.1	0.2

Table 5 Weather conditions

[1] Weather Station: EGLL, UK. ID: EGLL located 3 km from the site at Latitude 51.48, Longitude -0.45

4.4 Survey Results

An environmental noise time history of the measurement results is presented in Appendix C with a summary of the measurement results for daytime and night-time presented in the table below:

Period	Residual Sound Level $L_{Aeq,\,T}$ (dB)	Representative Background Sound Level L_{A90} (dB)
Daytime 07:00-23:00	60	58
Night-time 23:00-07:00	55	41

Table 6 Overall noise survey results

A further daily and nightly breakdown of the data is presented in Table 7.

Date	Period	Residual Sound Level $L_{Aeq,\,T}$ (dB)	Representative Background Noise Level L_{A90} (dB)
24/01/2025	Daytime 11:00-23:00	60	56
24-25/01/2025	Night-time 23:00-07:00	52	41
25/01/2025	Daytime 07:00-23:00	58	54
25-26/01/2025	Night-time 23:00-07:00	56	49
26/01/2025	Daytime 07:00-23:00	61	59
26-27/01/2025	Night-time 23:00-07:00	56	51
27/01/2025	Daytime 07:00-11:00	63	59

Table 7 Measured noise levels per day and night period

With regards to the background sound level, BS 4142:2014+A1:2019 notes that *"…it is important to ensure that values are reliable and suitably represent both the particular circumstances and periods of interest. For this purpose, the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods."*

In terms of quantifying what background sound levels are typical during particular time periods, ESA have defined representative background sound levels as the modal average of L_{A90} values during the time periods in question.

It is understood that the fish and chips shops operating hours are between 11:30 – 22:00 Monday to Saturday.

With regards to the operating times of the extraction systems, it would be expected that the systems could be in use shortly before opening and after closing, as part of the cooking/cleaning process. Therefore, it is reasonable to assume that the ASHPs could be operational between the hours of 11:00 – 22:30. Table 8 presents the results of the survey during this period.

Date	Period	Residual Sound Level $L_{Aeq,\,T}$ (dB)	Representative Background Noise Level L_{A90} (dB)
Fri 24/01/2025	Daytime 11:00-22:30	60	56
Sat 25/01/2025	Daytime 11:00-22:30	59	54
Sun 26/01/2025	Daytime 11:00-22:30	61	59

Table 8 Measured noise levels during school operating periods

Based on the analysis above, and considering the wind effects as presented within Section 4.3, ESA would therefore consider the lowest representative background noise levels of L_{A90} 54 dB, as measured on Saturday the 25th, to ensure a robust assessment is provided.

5 NOISE IMPACT ASSESSMENT

5.1 Predicted Noise Levels at Closest Receptor Locations

The Specific Sound Level of the proposed plant has been assessed to each of the noise sensitive receptor locations, considering various factors such as attenuation over distance, surface reflections, barrier/screening effects, directivity and façade reflections. Please note that the calculations also consider mitigation measures, which are detailed in Section 5.3 below.

All units are assumed to be operating at their maximum duty/fan speed during the operating period.

To establish the Rating Level as required by BS 4142:2014+A1:2019, appropriate acoustic feature corrections should be applied to the Specific Sound Level. It must be noted that the acoustic feature corrections are applied based on the level at receptor location, not at source, as they are reflective of the perceived sound by the receptor.

Tonality is commonly defined as being present when a single octave band sound level is 6dB higher than the adjacent octave bands.

The calculated Specific Sound Levels at Receiver 1 present a 4dB difference between the 63Hz and 125Hz octave bands and a 13dB difference between the 125Hz and 250Hz octave bands (shown in Appendix C). It should be noted that the levels from 250Hz to 8kHz would be considered broadband in nature. Due to the higher sound energy at 125Hz, a +3dB correction would be applied for tonality to ensure a worst-case scenario is assessed.

The calculated Specific Sound Levels at Receiver 2 present a 2dB difference between the 63Hz and 125Hz octave bands and a 9dB difference between the 125Hz and 250Hz octave bands (shown in Appendix C). It should be noted that the levels from 250Hz to 8kHz would be considered broadband in nature. Due to the higher sound energy at 125Hz, a +3dB correction would be applied for tonality to ensure a worst-case scenario is assessed.

Due to the constant nature of the operation of the extraction system units under assessment, the received sound level would not be considered intermittent or impulsive

The table below compares the Rating Level calculated at each receiver against the lowest background during the proposed operating hours of the units. Full calculations are presented in Appendix C.

Receiver	Average Ambient Noise Level dB $L_{Aeq, T}$	Representative Background Sound Level dB L_{A90}	Calculated Rating Level at 1m from Receptor Façade dB $L_{Aeq, T}$	+/- compared against background dB
1	61	54	49	-5
2	61	54	48	-6

Table 9 Summary of the Rating Level at each receptor

Noise emissions from the proposed extraction systems would be sufficiently below the background sound level to be considered as a low likelihood of adverse impact in accordance with BS 4142:2014+A1:2019 and No Observed Adverse Effect Level (NOAEL) in accordance with National Planning Policy, providing the mitigation measures outlined in Section 5.3 are implemented.

5.2 Context

BS 4142:2014+A1:2019 notes that a noise source under assessment will have a low impact when the Rating Sound Level of a noise source is less than the existing background noise. It is also important to note that any quantitative results are assessed considering the context in which the sound occurs.

As outlined in Section 2.3.1, the three types of contexts which should be considered are:

- *aspects of the absolute level;*
- *aspects of character; and*
- *aspects of the receptor, including physical measures designed to reduce noise.*

With respect to the absolute level, this would be considered low relative to the existing ambient and background noise levels. Most importantly, the calculated Rating Level is predicted to be at least 5dB lower than the representative background noise level during the shops operational hours in both positions.

With regards to aspects of character, the immediate locale of the area is one of an urban residential and commercial environment. The dominant source of the prevailing background noise at the receptor façade is road traffic noise from the nearby Sipson Road and Harmondsworth Road, in addition to fixed plant installations on adjacent commercial buildings, therefore the character of the type of noise source under assessment would be common within the area.

With regards to aspects of the receptor property, it would be assumed as a worst case that the only means to reduce internal heat gains would be via openable windows. However, if the receptor were to open their windows, they would be far more exposed to existing environmental noise levels in excess of those from the proposed fixed plant installation. In the case of the window being closed, the window itself would provide further attenuation from outside to inside.

Finally, the actual use of the proposed fixed plant installations should be considered within the context of the assessment. The fish and chip shop is only operational during daytime hours, which will therefore typically incur no noise at all during the late evening, night or early morning, which are the times most likely to cause disturbance when residents are preparing for sleep and/or sleeping.

5.3 Noise Mitigation Measures

In order to achieve the levels specified in Table 9 above, additional mitigation measures are required in the form of an acoustic silencers to attenuate the noise emissions of extraction systems. The minimum insertion loss values required are shown in the table below:

Unit	Noise Mitigation	Insertion Loss levels in each octave band centre frequency, dB							
		63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Extraction System	Acoustic Silencer	5	11	19	29	36	37	29	18
Supply System	Acoustic Silencer	2	5	11	17	20	19	12	10

Table 10 Insertion loss levels of acoustic mitigation

The silencer for the Extraction System should be installed immediately to the atmosphere outlet of the extract outlet fan or within the extract exhaust duct route internally of the building. The performance specified for this unit within Table 10 can be achieved using a 1200mm silencer with a 30% free area.

The silencers for the Supply System should be installed immediately to the atmosphere inlet and room outlet of the supply inlet fan. The performance specified for this unit within Table 10 can be achieved using a 900mm silencer with a 45% free area.

6 CONCLUSION

An environmental noise survey has been undertaken at 14 Sipson Road, West Drayton, Middlesex to establish background sound levels representative of the closest noise sensitive receptor locations relative to the proposed external extraction system installations.

Manufacturer's noise data of the proposed external plant have been used to calculate expected noise levels at the closest noise sensitive receptors in accordance with BS 4142:2014+A1:2019 for comparison with representative background sound levels.

It has been concluded noise emissions from the proposed external extraction system installations would be sufficiently below the background sound level to be considered as a low likelihood of adverse impact in accordance with BS 4142:2014+A1:2019 and No Observed Adverse Effect Level (NOAEL) in accordance with National Planning Policy, providing the mitigation measures outlined in Section 5.3 are implemented.

APPENDIX A

ACOUSTIC TERMINOLOGY

Decibel scale - dB

The decibel (dB) is a relative unit of measurement used in acoustics. The dB is a logarithmic ratio between a measured level and a reference level of 0 dB (i.e the threshold of human hearing). Simply put, the decibel compresses the wide range of sounds we hear into more manageable numbers.

Addition of noise from several sources

Sound produced by multiple sound sources are added logarithmically e.g. power ratio of 2 = 3dB, power ratio of 10 = 10dB. Therefore, two equally intense sound sources operating simultaneously produce a sound level which is 3dB higher than a single source e.g. 60dB + 60dB = 63dB.

Subjective impression of noise

Human response to sound is highly individualized and often based on psychological factors such as emotion and expectation. Sensitivity to sound typically depends on the loudness, pitch, duration of the occurrence, and time of occurrence (e.g. a sound source could cause annoyance during the night where it would not during the day). The following table is a guide to explain increases or decreases in sound levels for many scenarios.

Change in sound level	Change in perceived loudness
1 dB	Imperceptible
3 dB	Just barely perceptible
6 dB	Clearly noticeable
10 dB	About twice as loud

'A' Weighted Frequency Filter - dB(A)

The human ear is not equally sensitive in all frequencies. The A-weighting filter was devised to take this into account when undertaking noise measurements and allows a sound level meter to replicate the human ears response to sound.

$L_{Aeq, T}$

Sound can fluctuate widely over a given period. L_{Aeq} is the A-weighted equivalent continuous sound level, with T denoting the time period over which the fluctuating sound levels were averaged e.g. $L_{Aeq,16h}$ is the equivalent continuous noise level over an 16 hour period.

L_{A90}

A-weighted sound level exceeded for 90% of the measurement period, calculated via statistical analysis. The L_{A90} descriptor is typically used to establish background sound levels for noise impact assessments

L_{A10}

A-weighted sound level exceeded for 10% of the measurement period, calculated via statistical analysis.

L_{AFmax}

A-weighted sound level maximum sound pressure level that has been measured over a given time period

APPENDIX A

ACOUSTIC TERMINOLOGY

Octave Bands

The audio or frequency spectrum of the human ear is in the range of 20Hz to 20 kHz. The spectrum tells how the energy of the sound signal is distributed in frequency. Octave bands divides the audio spectrum into 10 equal parts. The International Standards Organisation defines the centre frequency of these bands as 31.5Hz, 63 Hz, 125 Hz, 250 Hz, 500 Hz, 1kHz, 2kHz, 4kHz, 8kHz and 16kHz.

Noise Rating (NR) Curves

A method of rating noise using a set of curves relating octave band sound pressure levels. Typically used for building services systems within offices

Airborne sound

Sound radiated from a source into the surrounding air e.g. musical instruments, tv/radio, machinery/equipment. Airborne sound insulation refers to the reduction or attenuation of airborne sound, usually via a solid partition between a source and receiver.

Impact sound

Sound resulting from the impact between colliding objects, e.g. footfall impact upon a floor. Impact sound insulation refers to the resistance of a floor to the transmission of impact sound, typically via the installation of a ‘resilient layer’

Flanking sound

The transmission of airborne sound between two adjacent rooms by paths other than via the separating partition between the rooms, e.g. the abutment point of a wall and floor.

Structure-borne noise

Noise caused by the vibration of elements of a structure. This can result in reradiated noise, whereby the vibrating element transmits airborne sound into a space e.g. vibration caused by mechanical plant installed within a plant room which is not adequately isolated from the structure, or construction/demolition work in an adjacent building.

Reverberant sound

Sound in an enclosed space (usually a room), which results from repeated reflections at the boundaries. Reverberation time is the time taken for a steady sound level in an enclosed space to decay by 60dB, measured from the moment the sound source is switched off. A example of a typically reverberant space would be a classic church. Absorptive materials can be used to reduce reflections and reverberation times.

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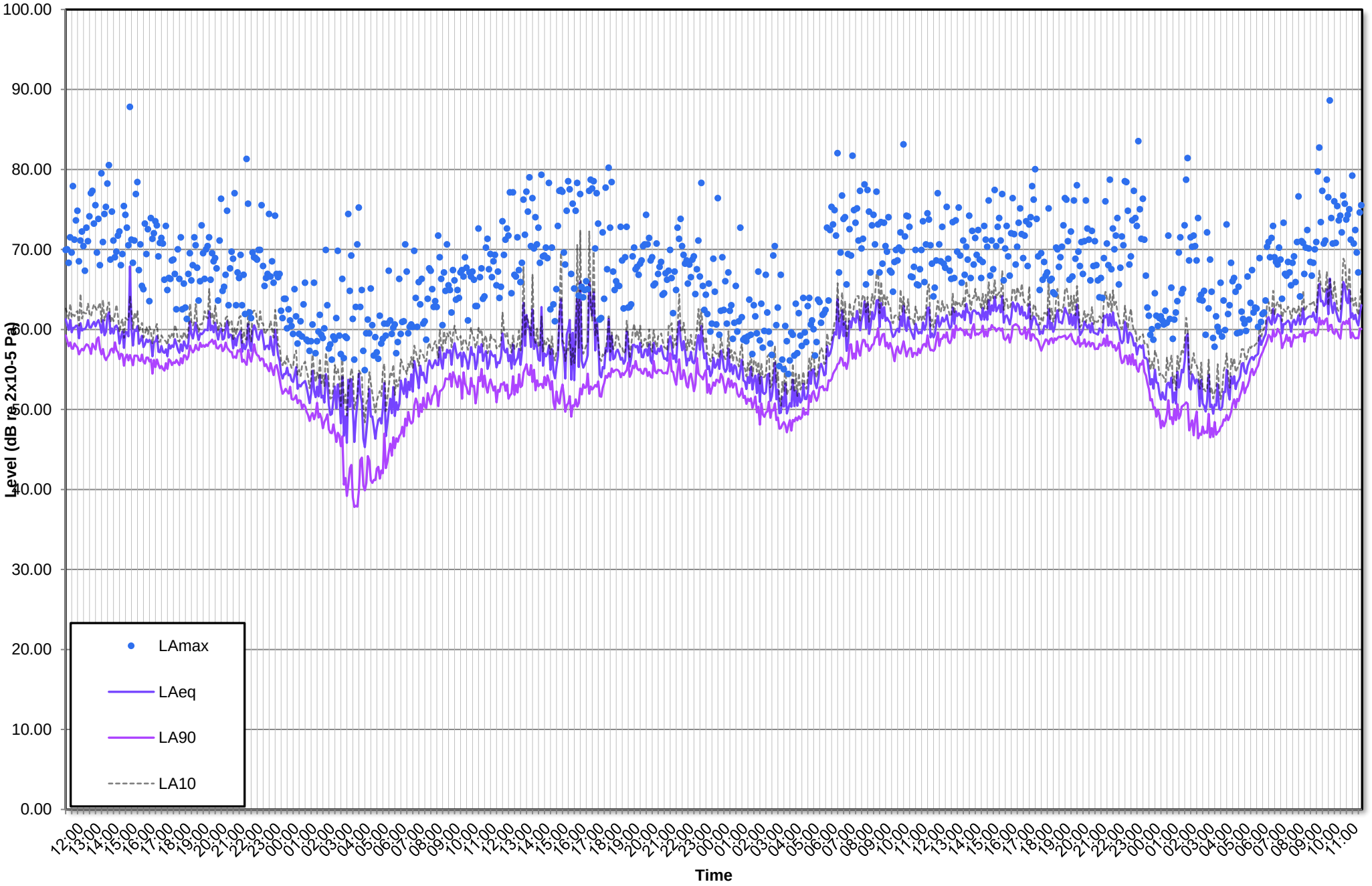
11:00 on 24th January to 11:00 on 27th January 2025



APPENDIX C
PLANT NOISE EMISSION CALCULATIONS

Source: Proposed noise-generating fixed plant extraction system 1 installation Receiver: Residential windows of 1st floor flat on rear facade	Frequency, Hz 63	125	250	500	1k	2k	4k	8k	dB(A)
Extraction System									
Fan Noise Emissions from Extract Outlet									
JM Aerofoil 63JM/20/4/6/36: Outlet Levels (Sound Power Level)	86	90	90	87	83	80	77	74	
Attenuation due to duct length (approx. 11m), dB	-1	-1	-1	-1	-2	-2	-2	0	
Attenuation due to duct bends (approx. 3), dB	0	0	-3	-6	-9	-9	-9	0	
Correction due to duct end reflection, dB	-8	-4	-1	0	0	0	0	0	
Conversion to SPL@1m	-11	-11	-11	-11	-11	-11	-11	-11	
Directivity correction, dB	2	0	-4	-11	-11	-11	-11	-11	
Minimum attenuation provided by distance (3.5m), dB	-11	-11	-11	-11	-11	-11	-11	-11	
Minimum attenuation provided by screening from the building envelope, dB	-5	-5	-6	-6	-8	-9	-12	-14	
Minimum attenuation required from proposed silencer, dB	-5	-11	-19	-29	-36	-37	-29	-18	
Specific Sound Level from Extract Outlet Exhaust, dB	**47**	**47**	**35**	**12**	**0**	**0**	**0**	**9**	**33**
Fan Noise Emissions from Extract Radiating Duct Surface									
JM Aerofoil 63JM/20/4/6/36: Outlet Levels (Sound Power Level)	86	90	90	87	83	80	77	74	
Attenuation due to duct walls. 18g galvanised sheet steel ductwork, dB	-8	-13	-20	-24	-29	-33	-39	-44	
Correction due to radiating duct area, dB	3	3	3	3	3	3	3	3	
Conversion to SPL@1m	-11	-11	-11	-11	-11	-11	-11	-11	
Correction due to surface reflections (1), dB	3	3	3	3	3	3	3	3	
Minimum attenuation required from proposed silencer, dB	-5	-11	-19	-29	-36	-37	-29	-18	
Total Noise Emissions from Radiating Duct Surface, dB	**67**	**60**	**45**	**29**	**13**	**5**	**4**	**7**	**46**
Total Specific Noise Level at Receptor Façade due to Extraction System, dB	**67**	**60**	**46**	**29**	**13**	**6**	**5**	**11**	**46**
BS4142 Acoustic Feature Corrections									
Tonality									3
Impulsivity									0
Intermittency									0
Total Rating Noise Level at Receptor Façade, dB									**49**

Source: Proposed noise-generating fixed plant extraction system 2 installation Receiver: Residential windows of 1st floor flat on front facade	Frequency, Hz 63	125	250	500	1k	2k	4k	8k	dB(A)
Supply System									
Fan Noise Emissions from Supply Inlet									
Helios GigaBox GBW 500/4: Intake (Sound Power Level)	63	63	72	72	74	72	66	59	
Correction due to duct end reflection, dB	-8	-4	-1	0	0	0	0	0	
Conversion to SPL@1m	-11	-11	-11	-11	-11	-11	-11	-11	
Directivity correction, dB	2	0	-4	-11	-11	-11	-11	-11	
Minimum attenuation provided by distance (3.5m), dB	-10	-10	-10	-10	-10	-10	-10	-10	
Minimum attenuation provided by screening from the building envelope, dB	-5	-5	-6	-7	-8	-10	-12	-15	
Minimum attenuation required from proposed silencer, dB	-2	-5	-11	-17	-20	-19	-12	-10	
Specific Sound Level from Supply Intake, dB	**29**	**28**	**30**	**17**	**14**	**11**	**10**	**2**	**34**
Fan Noise Emissions from Supply Radiating Duct Surface									
Helios GigaBox GBW 500/4: Intake (Sound Power Level)	63	63	72	72	74	72	66	59	
Attenuation due to duct walls. 18g galvanised sheet steel ductwork, dB	-8	-13	-20	-24	-29	-33	-39	-44	
Correction due to radiating duct area, dB	3	3	3	3	3	3	3	3	
Conversion to SPL@1m	-11	-11	-11	-11	-11	-11	-11	-11	
Correction due to surface reflections (1), dB	3	3	3	3	3	3	3	3	
Minimum attenuation provided by distance (1.5m), dB	-4	-4	-4	-4	-4	-4	-4	-4	
Minimum attenuation provided by screening from the building envelope, dB	-6	-7	-8	-10	-13	-16	-18	-21	
Minimum attenuation required from proposed silencer, dB	-2	-5	-11	-17	-20	-19	-12	-10	
Total Noise Emissions from Radiating Duct Surface, dB	**38**	**29**	**24**	**12**	**4**	**0**	**0**	**0**	**39**
Air Handling Unit - Noise Emissions from Supply Fan Casing Breakout									
Helios GigaBox GBW 500/4: Case Breakout (Sound Power Level)	64	64	63	53	52	50	46	40	
Conversion to SPL@1m	-11	-11	-11	-11	-11	-11	-11	-11	
Minimum attenuation provided by distance (3.5m), dB	-10	-10	-10	-10	-10	-10	-10	-10	
Minimum attenuation provided by screening from the building envelope, dB	-5	-5	-6	-7	-8	-10	-12	-15	
Total Noise Emissions from Noise Emissions from Supply Fan Casing Breakout,	**38**	**38**	**37**	**26**	**23**	**19**	**13**	**4**	**43**
Total Specific Noise Level at Receptor Façade due to Supply System, dB	**42**	**39**	**38**	**26**	**24**	**20**	**15**	**7**	**45**
BS4142 Acoustic Feature Corrections									
Tonality									3
Impulsivity									0
Intermittency									0
Total Rating Noise Level at Receptor Façade, dB									**48**