



REPORT REFERENCE:

IMP7087/1

INDUSTRIAL NOISE IMPACT ASSESSMENT

INSTALLATION OF NEW PLANT

British Standard 4142: 2014

CLIENT:

Beeches Bar & Grill

SITE:

Beeches Bar & Grill

Marsh Lane

Solihul

B92 0AH

SURVEY DATE:

4th – 9th November 2021

[Impact Acoustics Ltd](#)

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1 EXECUTIVE SUMMARY

1.1 Instruction

Impact Acoustics Ltd have been instructed by Beeches Bar & Grill to undertake a background noise survey at the existing premises at Beeches Bar & Grill, Marsh Lane, Solihull, B92 0AH, to understand the level of impact at the existing site in relation to the proposed new kitchen extract and calculate the resultant noise level at the nearest affected window at first floor level adjacent to the proposed discharge and carry out assessments to BS 4142: 2014.

1.2 Scope of Report

The measurements have been undertaken in accordance with British Standard 4142: 2014 and ISO 1996 – Part 2: 2017 to establish if the proposed site has a demonstrable adverse effect in terms of noise that outweigh the benefits of the development. This report aims to establish the following:

- Existing background noise levels at the residential façade (L_{A90});
- Noise levels from the Proposed Plant (L_{Aeq});
- Impact on the nearest noise sensitive property.
- Mitigation Levels if Required.

1.3 Summary of Report

1.3.1 Measured Background Noise Levels

Continuous background noise measurements were undertaken between 4th and 9th November 2021 at the Assessment Position 1. The day time background noise levels between 07:00 and 23:00 were found to be $L_{A90,1 \text{ hour}}$ 42 dB. This background noise level has been assessed during daytime periods only.

Daytime Equivalent Existing Background Noise Levels 2 days (07:00 – 23:00)	Measured Levels at Assessment Position 1	$L_{A90, t}$ 42 dB
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1.4 Proposed Plant

The following plant is to be installed on the side of the building as demonstrated on the proposed layout contained within this report.

Unit Description	Octave Band Centre Frequency (Hz) Lw dB								Lw(A) dB
	63	125	250	500	1.0k	2.0k	4.0k	8.0k	
Inlet Fan Discharge	82.0	94.0	83.0	82.0	79.0	79.0	75.0	58.0	87.0
Extract Fan Discharge	80.0	90.0	86.0	83.0	80.0	80.0	74.0	66.0	86.0
Inlet Fan Breakout	64.0	84.0	70.0	53.0	52.0	53.0	46.0	35.0	69.1
Extract Fan Breakout	52.0	72.0	58.0	41.0	40.0	41.0	34.0	23.0	57.1

1.5 Assessment

1.5.1 Daytime Assessment (With no Attenuation)

Rating Level	52 dB	9.1	The acoustic feature correction is added to the specific noise level
Background Noise Level LA90,1 hour	42 dB	8.1	Modal Background Noise Level (0700 – 2300)
Assessment Level	+10 dB	11	The background level is subtracted from the rating level.
Conclusion BS 4142:2014 _[1]	+10 dB Significant Adverse Effects, +5 dB Adverse Effects, +0 dB Low Impact		
Assessment	+10 dB		
Conclusion	The assessment level is 'Significant Adverse Impact'		

1.5.2 Mitigation Measures Required

Based on the above assessment it will be required to install silencer after the fan unit for both the inlet and extract fans. Based on the data provided, no additional acoustic housing is required to the fan units themselves. This will ensure noise levels of at least -5 dB below the background noise level as this is likely to be a requirement of the local planning authority.

Unit Description	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1.0k	2.0k	4.0k	8.0k
Inlet Silencer	7	13	22	38	47	47	40	29
Extract Silencer	5	8	12	23	30	30	23	18

1.5.3 Daytime Assessment (With Attenuation)

Rating Level	35 dB	9.1	The acoustic feature correction is added to the specific noise level
Background Noise Level $L_{A90,1 \text{ hour}}$	42 dB	8.1	Modal Background Noise Level (0700 – 2300)
Assessment Level	-7 dB	11	The background level is subtracted from the rating level.
Conclusion BS 4142:2014 ^[1]	+10 dB Significant Adverse Effects, +5 dB Adverse Effects, +0 dB Low Impact		
Assessment	-7 dB		
Conclusion	The assessment level is 'Low Impact'		

1.6 Conclusions

The operation of the proposed plant has been assessed to establish if the development will have a demonstrable adverse effect in terms of noise that outweighs the benefits of the development. Measurements have been undertaken in accordance with British Standard 4142: 2014 and ISO 1996 – Part 2: 2017. This report has established the existing background noise levels at the closest residential façade to the site and the assessment of the impact of the site operation on nearby residential properties. The resulting emissions from the site running on a worst case scenario show no conflict with 'low impact' criteria and give a strong indication that complaint and impact on the local amenity is unlikely, provided the mitigation measures detailed within this report are followed.

1.7 NPPF 2021

National Planning Policy Framework 2021 suggests that planning permission should be granted unless any adverse impacts of doing so would significantly and demonstrably outweigh the benefits, when assessed against the policies in the framework taken as a whole, or specific policies in the framework indicate the application should be restricted.

1.8 Planning Approval Recommendation

Based on the calculations and assessments made within this report it is the professional opinion of Impact Acoustics that the proposed development can demonstrate compliance with the National Planning Policy Framework 2021, NPPF & NPSE and that, with regards to sound, planning permission can be granted.

2 INTRODUCTION

2.1 Instruction

Impact Acoustics Ltd have been instructed by Beeches Bar & Grill to undertake a background noise survey at the existing premises at Beeches Bar & Grill, Marsh Lane, Solihull, B92 0AH, to understand the level of impact at the existing site in relation to the proposed new kitchen extract and calculate the resultant noise level at the nearest affected window at first floor level adjacent to the proposed discharge and carry out assessments to BS 4142: 2014.

The purpose of this assessment is to ensure the acoustic protection of noise sensitive premises closest to the proposed plant. Noise sensitive premises are not restricted to residential dwellings as offices can be affected by unwanted external noise. These have been established as the residential directly above the ground floor premises.

2.2 Ambient and Background Measurements

External noise levels are to be recorded over, what has been considered for the site, an average / typical time period in order to assess the daytime noise levels. Levels have been recorded over more than one day in order to ensure the uncertainty of measurement aspects of BS 4142: 2014 have been satisfied and that the data recorded is representative for the purpose of a robust assessment.

2.3 BS 4142: 2014

British Standard 4142: 2014 is to be adopted for the basis of this background noise level assessment. A BS 4142: 2014 noise assessment will be carried out in order to demonstrate the acoustic impact the proposed plant could have on the nearest affected premises and make suitable recommendations in order to demonstrate this unit will not have a significant and demonstrable adverse impact on the nearest noise sensitive premises in accordance with the National Planning Policy Framework, once remedial works are completed. BS 4142: 2014 supersedes the 1997 version and has been developed to move more in-line with the National Planning Policy Framework 2021 (NPPF) and the Noise Policy Statement for England 2010 (NPSE).

2.4 National Planning Policy Framework 2021 & Noise Policy Statement for England 2010

References and evaluations are to be made to the National Planning Policy Framework 2021 (NPPF) and the Noise Policy Statement for England 2010 (NPSE). The purpose of this document is to include all aspects of environmental noise within assessments i.e. environmental noise, neighbour noise and neighbourhood noise. Noise is to be considered alongside other relevant issues relating to the site and should not be considered in isolation, according to the NPSE. There are several key phrases within the NPSE aims and these are discussed below.

2.5 “Significant adverse” and “adverse”

There are two established concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organisation. They are:

2.6 NOEL – No Observed Effect Level

This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.

2.7 LOAEL – Lowest Observed Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected.

Extending these concepts for the purpose of this NPSE leads to the concept of a significant observed adverse effect level.

2.8 SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur.

It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available.

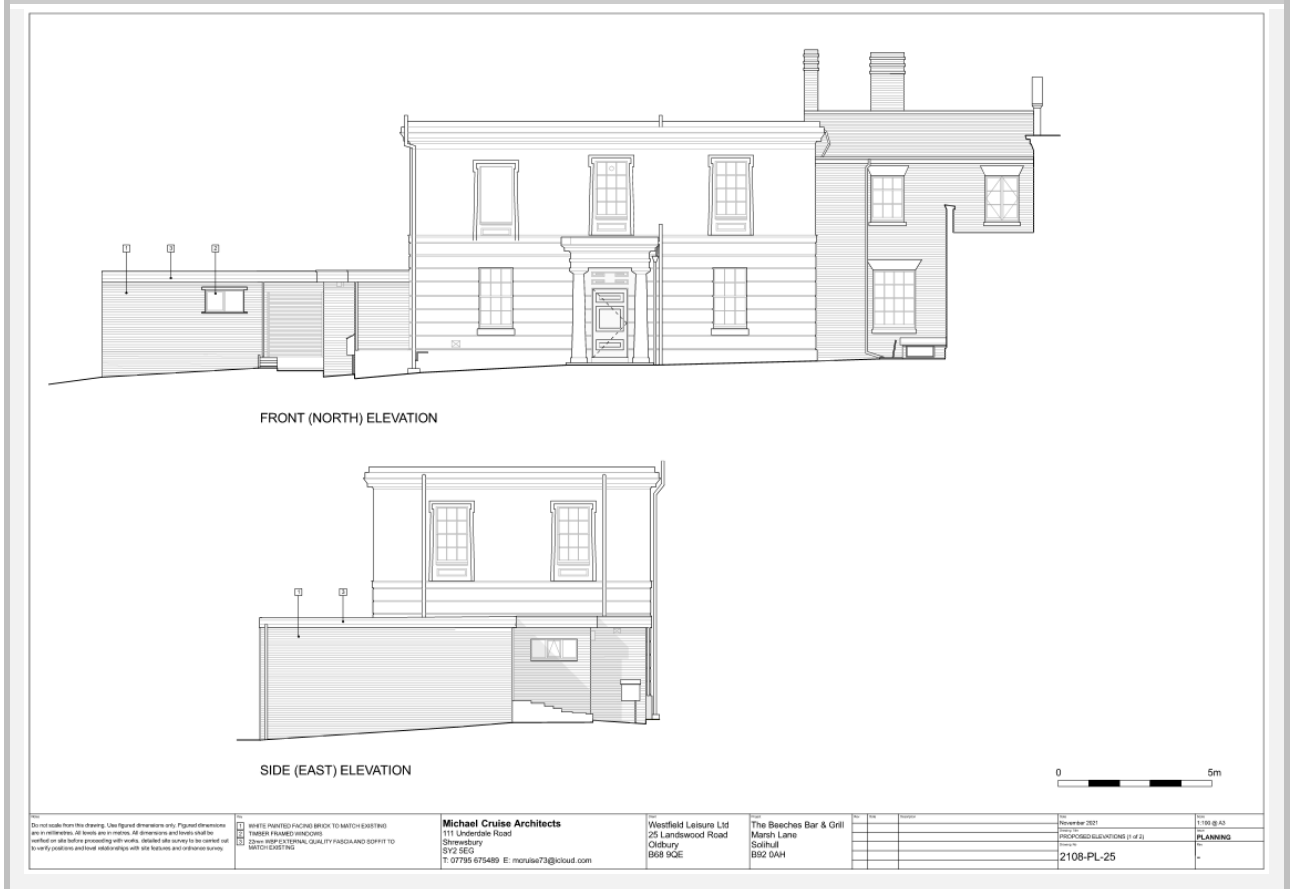
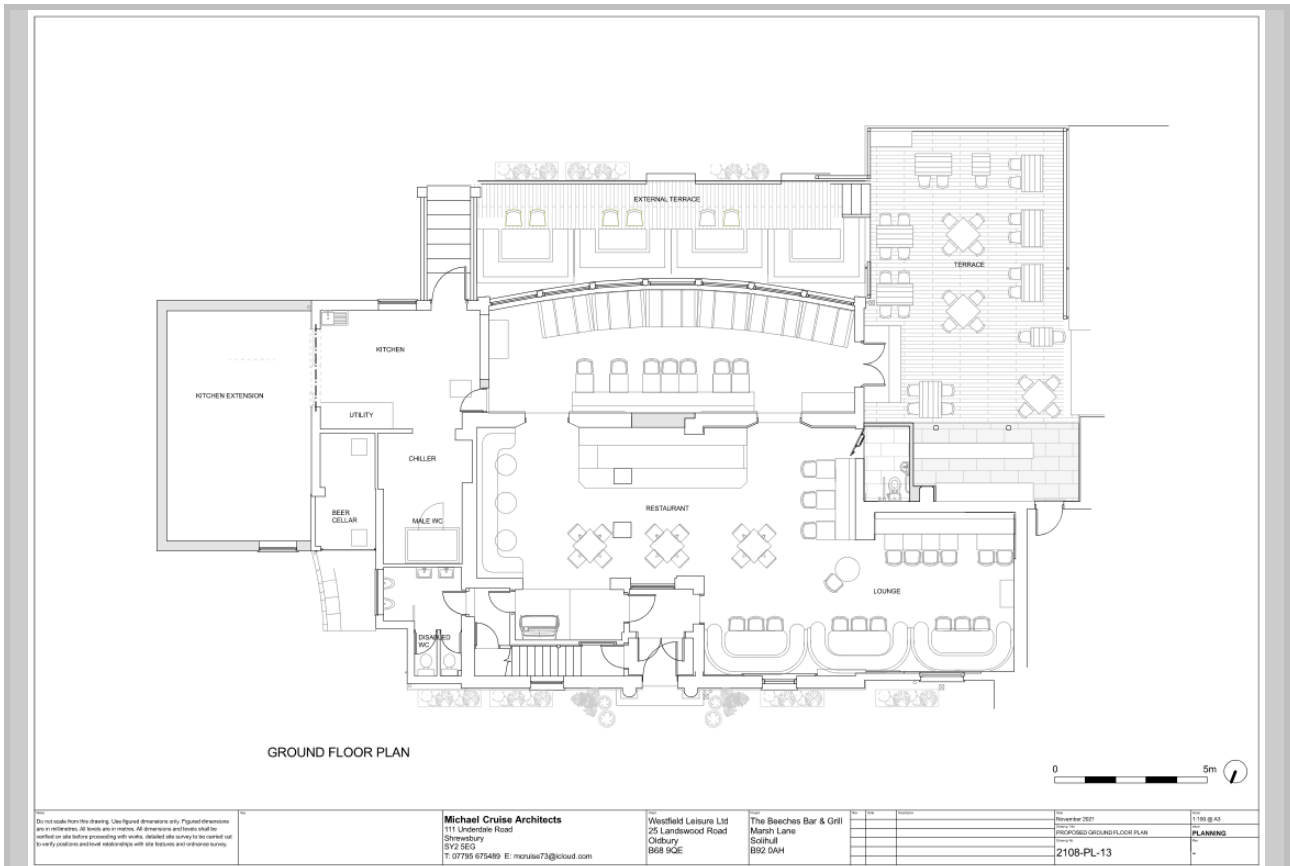
3 SITE LOCATION

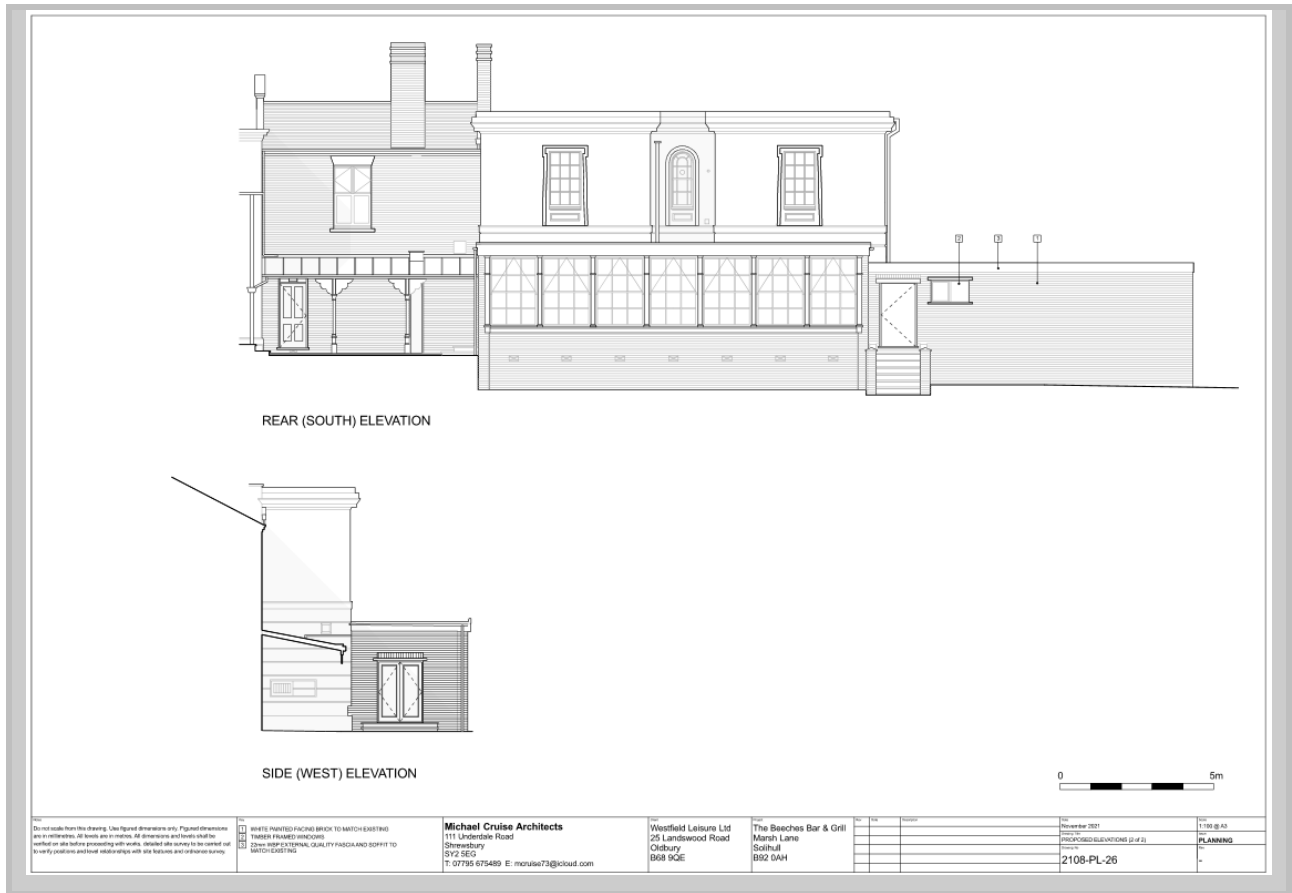
3.1 Position of Site in Wider Area

- Yellow Measurement Position
- Black Circled Nearest Noise Sensitive Premises

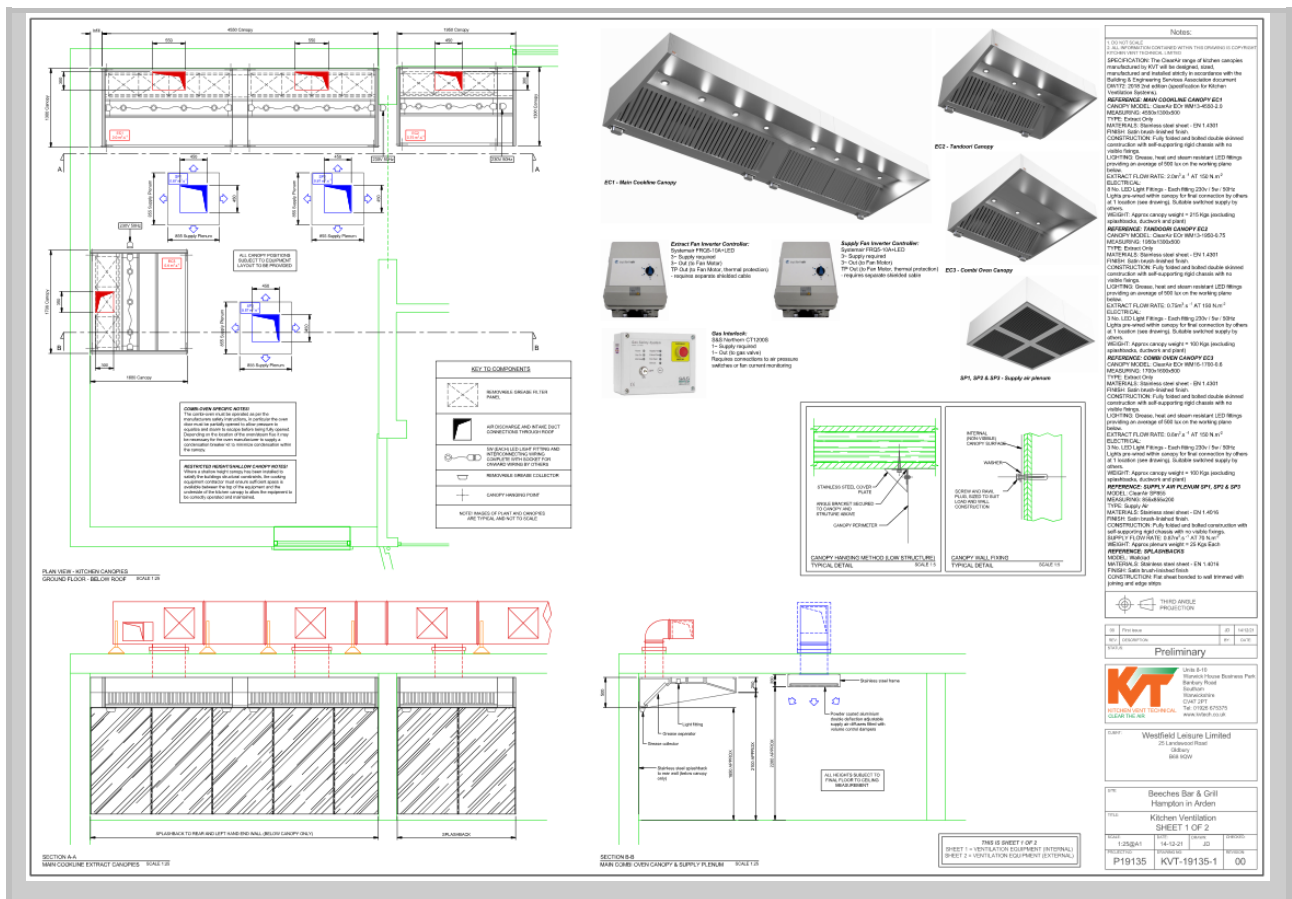


3.2 Proposed Building Works





<p>Do not scale from this drawing. Use figured dimensions only. Figured dimensions are in millimetres. All items are in metric. All dimensions and levels shall be verified on site before proceeding with works. Detailed data subject to be checked on site to verify positions and level relationships with site features and on-site survey.</p>	<p>WHITE PAINTED FACING BRICK TO MATCH EXISTING TRIMER FRAMED WINDOWS SHOW BEST TECHNICAL QUALITY FINISH AND SOPHIC TO MATCH EXISTING</p>	<p>Michael Cruise Architects 111 Underdale Road Strawberry SY2 5EG T: 07795 675489 E: mcruise73@icloud.com</p>	<p>Westfield Leisure Ltd 25 Lanswood Road Oldbury B68 9QE</p>	<p>The Beeches Bar & Grill Marsh Lane Solihull B92 0AH</p>	<p>NOV 2021 PROPOSED ELEVATIONS (2 of 2) 2108-PL-26</p>	<p>1:100 @ A3 PLANNING</p>
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4 BACKGROUND NOISE LEVELS

Continuous background noise measurements were undertaken between 4th and 9th November 2021 at the Assessment Position 1. The day time background noise levels between 07:00 and 23:00 were found to be $L_{A90,1 \text{ hour}}$ 42 dB. This background noise level has been assessed during daytime periods only.

Daytime Equivalent Existing Background Noise Levels 2 days (07:00 – 23:00)	Measured Levels at Assessment Position 1	$L_{A90, t}$ 42 dB
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5 APPARATUS

5.1 Equipment Calibration

The equipment was calibrated using a sound pressure level of 114.0 dB at an octave band centre frequency of 1000Hz with reference to $2 \times 10^{-5} \text{ Nm}^{-2}$ before and after the tests and the equipment set to have no inaccuracy greater than 0.2 dB.

All the following equipment was calibrated in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service (UKAS) on the following dates.

5.2 Position 1 – Side of Site

Description	Make	Type	Serial No.	Calibration Intervals	Last Calibrated	Next Due Calibration
Integrated Sound Level Meter	Norsonic	118	<u>31632</u>	2 YEARS	01.05.2020	01.05.2022
12.5mm Microphone (with windshield)	Norsonic	1225	<u>91720</u>	2 YEARS	01.05.2020	01.05.2022
Microphone Pre – Amplifier	Norsonic	1201	<u>29307</u>	2 YEARS	01.05.2020	01.05.2022

The noise meter was calibrated before and after the assessment period and found to be within the tolerance of the manufacturer's guidance. Full Calibration certificates are available upon request.

6 CALCULATIONS

6.1 Proposed Plant

The following plant is to be installed on the side of the building as demonstrated on the proposed layout contained within this report.

Unit Description	Octave Band Centre Frequency (Hz) Lw dB								Lw(A) dB
	63	125	250	500	1.0k	2.0k	4.0k	8.0k	
Inlet Fan Discharge	82.0	94.0	83.0	82.0	79.0	79.0	75.0	58.0	87.0
Extract Fan Discharge	80.0	90.0	86.0	83.0	80.0	80.0	74.0	66.0	86.0
Inlet Fan Breakout	64.0	84.0	70.0	53.0	52.0	53.0	46.0	35.0	69.1
Extract Fan Breakout	52.0	72.0	58.0	41.0	40.0	41.0	34.0	23.0	57.1

6.2 Calculations Prior to Remedial Works

Kitchen Inlet Fan	Octave Band Centre Frequency (Hz)								Lw(A) dB
	63	125	250	500	1.0k	2.0k	4.0k	8.0k	
Outside Noise Level	82.0	94.0	83.0	82.0	79.0	79.0	75.0	58.0	87.0
Silencer	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Bend Section	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Duct Length	-1.5	-1.2	-0.6	-0.3	-0.3	-0.3	-0.3	-0.2	
End Reflection Loss	-6.0	-2.0	0.0	0.0	0.0	0.0	0.0	0.0	
Directivity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Barrier Attenuation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Calculated Discharge Level	74.5	90.8	82.4	81.7	78.7	78.7	74.7	57.8	85.2

Kitchen Extract Fan	Octave Band Centre Frequency (Hz)								Lw(A) dB
	63	125	250	500	1.0k	2.0k	4.0k	8.0k	
Outside Noise Level	80.0	90.0	86.0	83.0	80.0	80.0	74.0	66.0	86.0
Silencer	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Bend Section	0.0	0.0	-5.0	-8.0	-4.0	-3.0	-3.0	-3.0	
Duct Length	-9.8	-7.9	-4.0	-1.9	-1.9	-1.9	-1.9	-1.2	
End Reflection Loss	-11.0	-6.0	-2.0	0.0	0.0	0.0	0.0	0.0	
Directivity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Barrier Attenuation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Calculated Discharge Level	59.2	76.1	75.0	73.1	74.1	75.1	69.1	61.8	78.4

Kitchen Inlet Casing Breakout	Octave Band Centre Frequency (Hz)								Lw(A) dB
	63	125	250	500	1.0k	2.0k	4.0k	8.0k	
Outside Noise Level	64.0	84.0	70.0	53.0	52.0	53.0	46.0	35.0	69.1
Acoustic Enclosure	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Calculated Discharge Level	64.0	84.0	70.0	53.0	52.0	53.0	46.0	35.0	69.1

Kitchen Extract Casing Breakout	Octave Band Centre Frequency (Hz)								Lw(A) dB
	63	125	250	500	1.0k	2.0k	4.0k	8.0k	
Outside Noise Level	52.0	72.0	58.0	41.0	40.0	41.0	34.0	23.0	57.1
Acoustic Enclosure	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Calculated Discharge Level	52.0	72.0	58.0	41.0	40.0	41.0	34.0	23.0	57.1

6.3 Inputted Noise Levels

The following noise levels have been inputted in to the 3D acoustic Model in order to calculate the resultant noise levels at the aforementioned assessment position, prior to any remedial works.

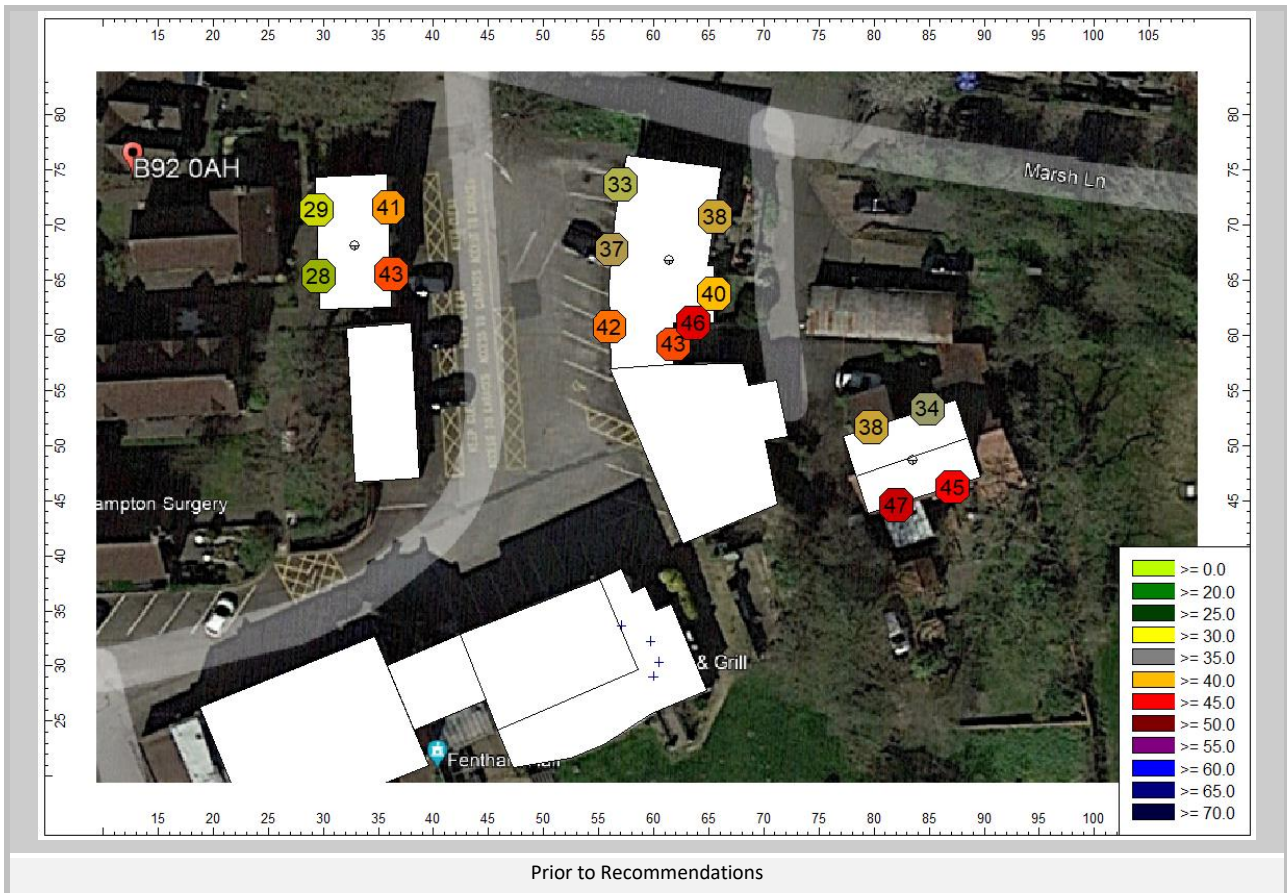
Sound Levels (local) — □ ×

Name	ID	Type	Oktave Spectrum (dB)												Source
			Weight.	31.5	63	125	250	500	1000	2000	4000	8000	A	lin	
KitchenInletFan	KitchenInletFan	Li		0.0	74.5	90.8	82.4	81.7	78.7	78.7	74.7	57.8	85.2	92.4	
KitchenExtractFan	KitchenExtractFan	Li		0.0	59.2	76.1	75.0	73.1	2.1	75.1	69.1	61.8	78.4	81.3	
InletBreakout	InletBreakout	Li		0.0	64.0	84.0	70.0	53.0	52.0	53.0	46.0	35.0	69.1	84.2	
ExtractBreakout	ExtractBreakout	Li		0.0	52.0	72.0	58.0	41.0	40.0	41.0	34.0	23.0	57.1	72.2	

INPUTTED NOISE LEVELS

6.4 Calculated Façade Levels Prior to Recommendations

Based on the above inputted noise levels, the following calculated façade levels have been calculated.



6.5 Calculations Post Remedial Works

Kitchen Inlet Fan	Octave Band Centre Frequency (Hz)								Lw(A) dB
	63	125	250	500	1.0k	2.0k	4.0k	8.0k	
Outside Noise Level	82.0	94.0	83.0	82.0	79.0	79.0	75.0	58.0	87.0
Silencer	-7.0	-13.0	-22.0	-38.0	-47.0	-47.0	-40.0	-29.0	
Bend Section	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Duct Length	-1.5	-1.2	-0.6	-0.3	-0.3	-0.3	-0.3	-0.2	
End Reflection Loss	-6.0	-2.0	0.0	0.0	0.0	0.0	0.0	0.0	
Directivity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Barrier Attenuation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Calculated Discharge Level	67.5	77.8	60.4	43.7	31.7	31.7	34.7	28.8	62.3

Kitchen Extract Fan	Octave Band Centre Frequency (Hz)								Lw(A) dB
	63	125	250	500	1.0k	2.0k	4.0k	8.0k	
Outside Noise Level	80.0	90.0	86.0	83.0	80.0	80.0	74.0	66.0	86.0
Silencer	-5.0	-8.0	-12.0	-23.0	-30.0	-30.0	-23.0	-18.0	
Bend Section	0.0	0.0	-5.0	-8.0	-4.0	-3.0	-3.0	-3.0	
Duct Length	-9.8	-7.9	-4.0	-1.9	-1.9	-1.9	-1.9	-1.2	
End Reflection Loss	-11.0	-6.0	-2.0	0.0	0.0	0.0	0.0	0.0	
Directivity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Barrier Attenuation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Calculated Discharge Level	54.2	68.1	63.0	50.1	44.1	45.1	46.1	43.8	57.8

Kitchen Inlet Casing Breakout	Octave Band Centre Frequency (Hz)								Lw(A) dB
	63	125	250	500	1.0k	2.0k	4.0k	8.0k	
Outside Noise Level	64.0	84.0	70.0	53.0	52.0	53.0	46.0	35.0	69.1
Acoustic Enclosure	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Calculated Discharge Level	64.0	84.0	70.0	53.0	52.0	53.0	46.0	35.0	69.1

Kitchen Extract Casing Breakout	Octave Band Centre Frequency (Hz)								Lw(A) dB
	63	125	250	500	1.0k	2.0k	4.0k	8.0k	
Outside Noise Level	52.0	72.0	58.0	41.0	40.0	41.0	34.0	23.0	57.1
Acoustic Enclosure	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Calculated Discharge Level	52.0	72.0	58.0	41.0	40.0	41.0	34.0	23.0	57.1

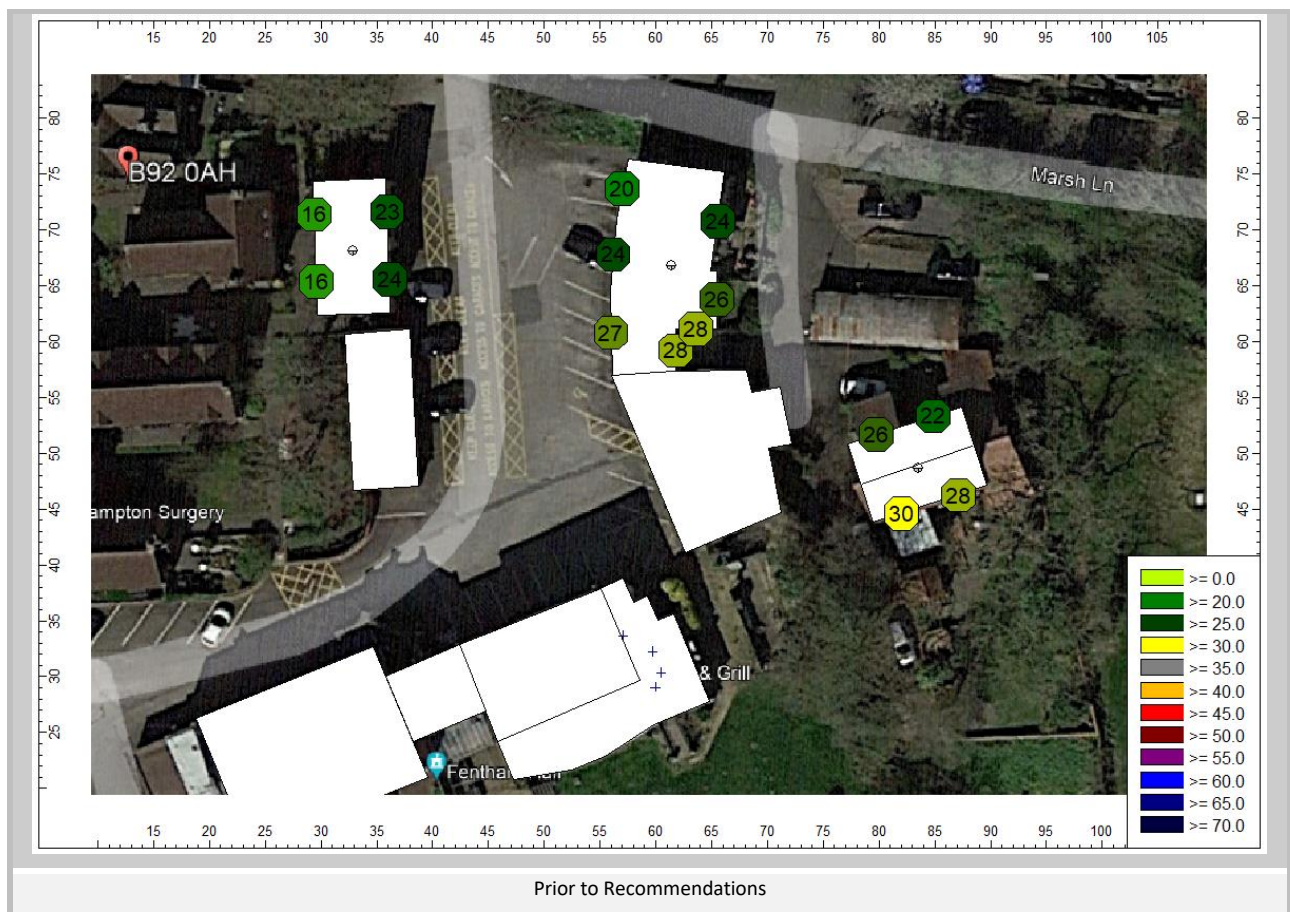
6.6 Mitigation Measures Required

Based on the above assessment it will be required to install silencer after the fan unit for both the inlet and extract fans. Based on the data provided, no additional acoustic housing is required to the fan units themselves. This will ensure noise levels of at least -5 dB below the background noise level as this is likely to be a requirement of the local planning authority.

Unit Description	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1.0k	2.0k	4.0k	8.0k
Inlet Silencer	7	13	22	38	47	47	40	29
Extract Silencer	5	8	12	23	30	30	23	18

6.7 Calculated Façade Levels Prior to Recommendations

Based on the above remedial works being implemented, as close to the fan unit as possible, the following calculated façade levels have been evaluated.



Based on the above being achieved, the following noise assessment can be concluded.

7 BS4142: 2014 NOISE ASSESSMENT

7.1 Scope of British Standard 4142: 2014

In the assessment of the existing surrounding commercial premises, consideration has been given to the scope of British Standard 4142: 2014, which in section 1, details applicability of this standard to rating assessing sound of an industrial and/or commercial nature. It is considered appropriate that both the background noise levels and the rating noise levels obtained fall within the scope of British Standard 4142: 2014 by using outdoor sound levels to assess the effect of sound on local residents.

7.2 Terms and Definitions

Symbol	Term	Definition
AP	Assessment Position	Position externally at the façade property under investigation at which the assessment is undertaken which is usually 1m from the 1 st floor bedroom window.
EP	Equivalent Position	Position at which the background noise levels are measured if there is no access to the assessment position or if source under investigation is audible.
$L_s = L_{Aeq, T}$	Specific Level	The average continuous equivalent sound pressure level of the source at the assessment position.
$L_{Ar, Tr}$	Rating Level	The average continuous equivalent sound pressure level of the source at the assessment position with a correction to account for the characteristic features.
$L_r = L_{Aeq, T}$	Residual Level	The average continuous equivalent sound pressure level at the assessment position without the source operating.
$L_{A90, T}$	Background Level	The sound pressure level that is not exceeded 90% of the time at the assessment position.
$L_a = L_{Aeq, T}$	Ambient Level	The totally encompassing sound at the assessment position including the residual and specific noise.

7.3 Assessment Position

The assessment positions were established as the existing surrounding noise sensitive premises as identified within section 3.1 of this report.

7.4 Calculations

The specific noise levels are calculated at the assessment position located at the residential property above the site using the calculations detailed within ISO 9613 Part 1 and 2: 1996. These calculations take the manufacturers sound power levels into account for a variety of factors including source directivity, distance, atmospheric absorption, ground absorption and the effects of any barriers and determine the resultant noise levels at the assessment position.

7.5 Equivalent Position

The background noise levels were measured at the equivalent position, chosen as it most represented the closest noise sensitive façade, between 4th – 9th November 2021.

7.6 Rating Levels (Character Correction)

It is appropriate to add a character correction where there is a new source that cannot be measured in line with BS4142: 2014. There are 3 methods for approaching this.

- a) Subjective method
- b) Objective method (for tonality)
- c) Reference method

7.7 Subjective Method

The subjective method establishes a rating penalty that is added to the specific noise level if any of the following is present at the assessment position. If a tone is expected to be present a character correction of 0 dB to 6 dB is added depending on how perceptible it is at noise sensitive locations.

BS4142: 2014 – Section 9.2 Subjective Method	Perceptibility to noise sensitive facades	Correction
Tonality Ranging from not tonal to prominently tonal	Not tonal	+0
	Just perceptible	+2
	Clearly perceptible	+4
	Highly perceptible	+6

If the source is expected to be impulsive a character correction of 0 dB to 9 dB is added depending on how perceptible it is at noise sensitive locations.

BS4142: 2014 – Section 9.2 Subjective Method	Perceptibility to noise sensitive facades	Correction
Impulsivity Considering both the rapidity and any overall change in sound levels	Not impulsive	+0
	Just perceptible	+3
	Clearly perceptible	+6
	Highly perceptible	+9

When the sound features are neither tonal nor impulsive, a character correction of +3 is added for the readily distinctive quality against the acoustic environment or for the intermittency of the source.

BS4142: 2014 – Section 9.2 Subjective Method	Perceptibility to noise sensitive facades	Correction
Readily Distinctive	Is not present	+0
	Is present	+3
Intermittency	Is not present	+0
	Is present	+3

7.8 Assessment Criterion

The significance of the resulting noise on the residential property depends on the margin by which it exceeds the background noise levels. British Standard 4142: 2014 provides the following guidance within section 11.

Difference	Assessment of Impact
+10 dB	Indication of a significant adverse impact
+5 dB	Indication of an adverse impact
+0 dB	Indication of low impact

7.9 Noise Meter Floor

BS 4142: 2014 suggests that Care is necessary in circumstances where background sound levels are low to ensure that self-generated and electrical noise within the measurement system does not unduly influence reported values, which might be the case if the measured background sound levels are less than 10 dB above the noise floor of the measuring system. The floor of a typical class 1 noise meter is in the region of 14 dB(A) and therefore measurements of less than 24 dB(A) should be assessed with care.

7.10 Octave Band Frequency Analysis

All calculations for the extract have been carried out are done so on an octave band centre frequency basis and not an overall dB(A) level. This ensures that the tonal element from any proposed plant is minimised. A large majority of manufacturer’s data is supplied in the octave band centre frequency (Hz) format.

7.11 BS 4142: 2014 Penalties

Whilst BS 4142: 2014 allows receptor assessments to be made to achieve levels equal to prevailing background noise levels, it also ensures that appropriate and more stringent penalties are applied to the specific noise level to ensure the correct level of protection for the local residents.

7.12 Assessments

7.12.1 Daytime 07:00 – 23:00 Calculated Façade Levels Prior to Recommendations.

Rating Industrial Noise affecting Mixed Industrial and Residential Areas British Standard 4142: 2014 Day Time (07:00 to 23:00)			
Source	Operating Times		Source Position
	07:00 to 23:00 7 days per week Worst case scenario		See Plans
Assessment Position	BEECHES BAR & GRILL, MARSH LANE, SOLIHULL, B92 0AH		
Background Position	At the assessment position		
Item	Calculation	Clause	Commentary
Specific Noise Level $L_{Aeq,1\text{ hour}}$	47 dB	7	Calculated using ISO 9613:1996 ^[3] .
Tonality	+2 dB	8.1	Tonality Characteristic
Impulsivity	+3 dB	8.1	Impulsivity Characteristic
Rating Level	52 dB	9.1	The acoustic feature correction is added to the specific noise level
Background Noise Level $L_{A90,1\text{ hour}}$	42 dB	8.1	Modal Background Noise Level (0700 – 2300)
Assessment Level	+10 dB	11	The background level is subtracted from the rating level.
Conclusion BS 4142:2014 ^[1]	+10 dB Significant Adverse Effects, +5 dB Adverse Effects, +0 dB Low Impact		
Assessment	+10 dB		
Conclusion	The assessment level is 'Significant Adverse Impact'		

7.13 Tonal Penalty

A +2 dB penalty has been applied to the specific noise level to allow for any minor tonal elements that may be present from the proposed plant.

7.14 Impulsivity Penalty

A +3 dB penalty has been applied to the specific noise level to allow for any minor impulsive elements that may be present from the proposed plant.

7.15 Assessment Conclusion

It can be seen from the above assessments that with the proposed new plant, an assessment conclusion of Significant Adverse Impact could be expected during daytime. Therefore, the following assessments demonstrate the effects of installing the proposed remedial acoustic works.

7.15.1 Daytime 07:00 – 23:00 Calculated Façade Levels Post Recommendations.

Rating Industrial Noise affecting Mixed Industrial and Residential Areas		British Standard 4142: 2014 Day Time (07:00 to 23:00)	
Source	Operating Times	Source Position	
	07:00 to 23:00 7 days per week Worst case scenario	See Plans	
Assessment Position	BEECHES BAR & GRILL, MARSH LANE, SOLIHULL, B92 0AH		
Background Position	At the assessment position		
Item	Calculation	Clause	Commentary
Specific Noise Level $L_{Aeq,1\text{ hour}}$	30 dB	7	Calculated using ISO 9613:1996 ^[3] .
Tonality	+2 dB	8.1	Tonality Characteristic
Impulsivity	+3 dB	8.1	Impulsivity Characteristic
Rating Level	35 dB	9.1	The acoustic feature correction is added to the specific noise level
Background Noise Level $L_{A90,1\text{ hour}}$	42 dB	8.1	Modal Background Noise Level (0700 – 2300)
Assessment Level	-7 dB	11	The background level is subtracted from the rating level.
Conclusion BS 4142:2014 ^[1]	+10 dB Significant Adverse Effects, +5 dB Adverse Effects, +0 dB Low Impact		
Assessment	-7 dB		
Conclusion	The assessment level is 'Low Impact'		

7.16 Tonal Penalty

A +2 dB penalty has been applied to the specific noise level to allow for any minor tonal elements that may be present from the proposed plant.

7.17 Impulsivity Penalty

A +3 dB penalty has been applied to the specific noise level to allow for any minor impulsive elements that may be present from the proposed plant.

7.18 Assessment Conclusion

It can be seen from the above assessments that with the proposed new plant and associated acoustic works incorporated within the design, an assessment conclusion of Low Impact could be expected.

8 THE NATIONAL PLANNING POLICY FRAMEWORK 2021 (NPPF)

The National Planning Policy Framework 2021 (NPPF) and assessments to the Noise Policy Statement for England 2010 (NPSE) should be made in conjunction with each other. Paragraphs 185 - 188 of the National Planning Policy Framework 2021 (NPPF) states the following:

Paragraph 185 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.

Paragraph 186 Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications.

Paragraph 187 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.

Paragraph 188 The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities.

The Noise Policy Statement for England gives various levels of effect as detailed within this report.

With the proposed plant installed as detailed within this report, the development can be implemented within the guidelines of the aforementioned documents and ensure a conclusion of **NOEL – No Observed Effect Level**. This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.

9 CONCLUSIONS

9.1 Summary of Report

9.1.1 Measured Background Noise Levels

Continuous background noise measurements were undertaken between 4th and 9th November 2021 at the Assessment Position 1. The day time background noise levels between 07:00 and 23:00 were found to be $L_{A90,1 \text{ hour}}$ 42 dB. This background noise level has been assessed during daytime periods only.

Daytime Equivalent Existing Background Noise Levels 2 days (07:00 – 23:00)	Measured Levels at Assessment Position 1	$L_{A90, t}$ 42 dB
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9.2 Proposed Plant

The following plant is to be installed on the side of the building as demonstrated on the proposed layout contained within this report.

Unit Description	Octave Band Centre Frequency (Hz) Lw dB								Lw(A) dB
	63	125	250	500	1.0k	2.0k	4.0k	8.0k	
Inlet Fan Discharge	82.0	94.0	83.0	82.0	79.0	79.0	75.0	58.0	87.0
Extract Fan Discharge	80.0	90.0	86.0	83.0	80.0	80.0	74.0	66.0	86.0
Inlet Fan Breakout	64.0	84.0	70.0	53.0	52.0	53.0	46.0	35.0	69.1
Extract Fan Breakout	52.0	72.0	58.0	41.0	40.0	41.0	34.0	23.0	57.1

9.3 Assessment

9.3.1 Daytime Assessment (With no Attenuation)

Rating Level	52 dB	9.1	The acoustic feature correction is added to the specific noise level
Background Noise Level $L_{A90,1 \text{ hour}}$	42 dB	8.1	Modal Background Noise Level (0700 – 2300)
Assessment Level	+10 dB	11	The background level is subtracted from the rating level.
Conclusion BS 4142:2014 _[1]	+10 dB Significant Adverse Effects, +5 dB Adverse Effects, +0 dB Low Impact		
Assessment	+10 dB		
Conclusion	The assessment level is 'Significant Adverse Impact'		

9.3.2 Mitigation Measures Required

Based on the above assessment it will be required to install silencer after the fan unit for both the inlet and extract fans. Based on the data provided, no additional acoustic housing is required to the fan units themselves. This will ensure noise levels of at least -5 dB below the background noise level as this is likely to be a requirement of the local planning authority.

Unit Description	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1.0k	2.0k	4.0k	8.0k
Inlet Silencer	7	13	22	38	47	47	40	29
Extract Silencer	5	8	12	23	30	30	23	18

9.3.3 Daytime Assessment (With Attenuation)

Rating Level	35 dB	9.1	The acoustic feature correction is added to the specific noise level
Background Noise Level $L_{A90,1 \text{ hour}}$	42 dB	8.1	Modal Background Noise Level (0700 – 2300)
Assessment Level	-7 dB	11	The background level is subtracted from the rating level.
Conclusion BS 4142:2014 _[1]	+10 dB Significant Adverse Effects, +5 dB Adverse Effects, +0 dB Low Impact		
Assessment	-7 dB		
Conclusion	The assessment level is 'Low Impact'		

9.4 Conclusions

The operation of the proposed plant has been assessed to establish if the development will have a demonstrable adverse effect in terms of noise that outweighs the benefits of the development. Measurements have been undertaken in accordance with British Standard 4142: 2014 and ISO 1996 – Part 2: 2017. This report has established the existing background noise levels at the closest residential façade to the site and the assessment of the impact of the site operation on nearby residential properties. The resulting emissions from the site running on a worst case scenario show no conflict with 'low impact' criteria and give a strong indication that complaint and impact on the local amenity is unlikely, provided the mitigation measures detailed within this report are followed.

9.5 NPPF 2021

National Planning Policy Framework 2021 suggests that planning permission should be granted unless any adverse impacts of doing so would significantly and demonstrably outweigh the benefits, when assessed against the policies in the framework taken as a whole, or specific policies in the framework indicate the application should be restricted.

9.6 Planning Approval Recommendation

Based on the calculations and assessments made within this report it is the professional opinion of Impact Acoustics that the proposed development can demonstrate compliance with the National Planning Policy Framework 2021, NPPF & NPSE and that, with regards to sound, planning permission can be granted.

10 APPENDIX A – UNCERTAINTY

In line with the requirements of section 10 of British Standard 4142: 2014 it is expected that the reported expanded uncertainty with a confidence limit of 95% and assuming a convergence of $k=2$ is likely to be ± 2.1 dB. Uncertainty, in this instance has been minimised by undertaking longer background noise measurements over a 96-hour period.

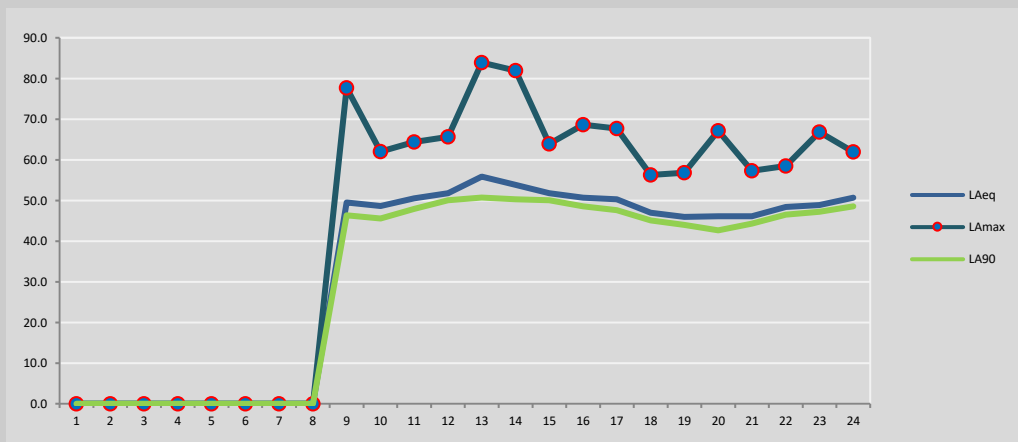
10.1 Uncertainty Budget

Sources of Uncertainty	Uncertainty Notes	Commentary	Value (half Width)	Convert to Same Units (dB)	Distribution Divisor			Standard Uncertainty (u) dB
					Normal	Rectangular	Other	
Measurement Position	Choice of position, ,	1m in 20m		0.2		rect($\sqrt{3}$)		0.13
	microphone orientation	Type 1 0 - 30deg	0.4		Normal			0.50
Instrumentation	Calibration	Calibration Drift	0.1		Normal			0.10
	Accuracy and precision (type 1)	Type 1 practical	1.9			rect($\sqrt{3}$)		0.50
Background Noise Level	Timing of Measurement							
Background Noise Level	Modal Analysis Day	Calculated Standard Deviation	3.7				s/ \sqrt{n}	0.39
Background Noise Level	Modal Analysis Night	Calculated Standard Deviation	2.2				s/ \sqrt{n}	0.16
Combined Uncertainty (root sum of squares)								1.05
Expanded Uncertainty $U = Kuc$ (95% Confidence $K=2$)								2.1
Final Answer Expressed as Value $\pm U$ dB with a confidence Level of 95%								
REFERENCE: Uncertainty Budget Calculated in line with M3003: The Expression of Uncertainty and Confidence in Measurement Edition 3, November 2012 and A Good Practice Guide on the Sources and Magnitude of Uncertainty Arising in the Practical Measurement of Environmental Noise N J Craven, G Kerry Edition 1a – May 2007.								

11 APPENDIX B – RESULTS

11.1 4th - 5th November 2021

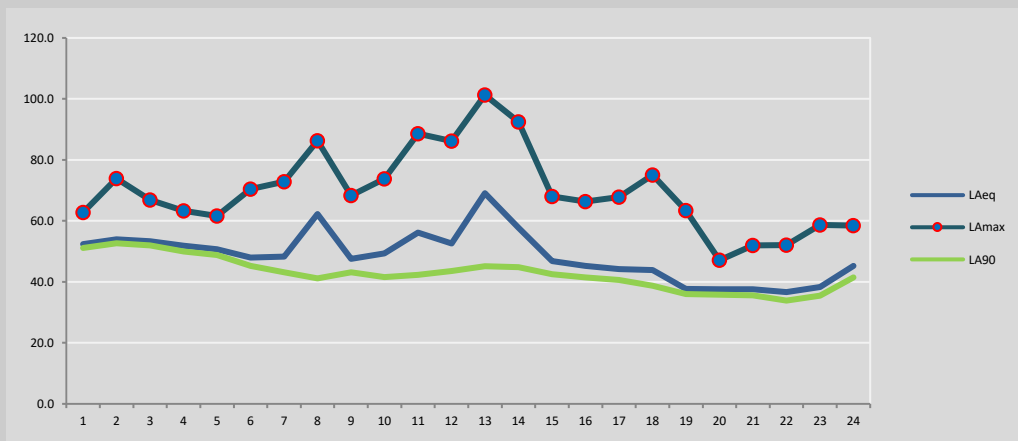
Time Period	L _{Max}	Minimum 15 minute		1 Hour		Day and Night	
		L _{Aeq,15 min}	L _{A90, 15 min}	L _{Aeq, 1 hour}	L _{A90, 1 hour}	L _{Aeq, t}	L _{A90, 16hours}
07:00 – 08:00	0.0	0.0	0.0	0.0	0.0	49.2	46.0
08:00 – 09:00	0.0	0.0	0.0	0.0	0.0		
09:00 – 10:00	0.0	0.0	0.0	0.0	0.0		
10:00 – 11:00	0.0	0.0	0.0	0.0	0.0		
11:00 – 12:00	0.0	0.0	0.0	0.0	0.0		
12:00 – 13:00	0.0	0.0	0.0	0.0	0.0		
13:00 – 14:00	0.0	0.0	0.0	0.0	0.0		
14:00 – 15:00	0.0	0.0	0.0	0.0	0.0		
15:00 – 16:00	77.7	48.8	45.8	49.5	46.3		
16:00 – 17:00	62.0	47.2	44.9	48.6	45.5		
17:00 – 18:00	64.4	50.2	46.6	50.5	47.9		
18:00 – 19:00	65.6	50.4	48.9	51.8	50.0		
19:00 – 20:00	83.9	52.9	50.4	55.9	50.7		
20:00 – 21:00	81.9	52.1	50.0	53.8	50.3		
21:00 – 22:00	63.9	51.4	49.4	51.8	50.0		
22:00 – 23:00	68.6	49.6	47.9	50.6	48.5		
23:00 – 00:00	67.7	48.3	44.3	50.2	47.6		
00:00 – 01:00	56.3	46.5	44.4	47.0	45.1	48.2	46.2
01:00 – 02:00	56.8	43.8	41.9	45.9	44.0		
02:00 – 03:00	67.1	44.6	42.1	46.1	42.7		
03:00 – 04:00	57.3	45.2	43.6	46.1	44.3		
04:00 – 05:00	58.5	46.3	44.3	48.4	46.5		
05:00 – 06:00	66.8	47.3	46.1	48.9	47.2		
06:00 – 07:00	61.9	49.7	48.5	50.6	48.5		



Sound Pressure Levels, dB. Reference level of $2 \times 10^{-5} \text{ Nm}^{-2}$

11.2 5th – 6th November 2021

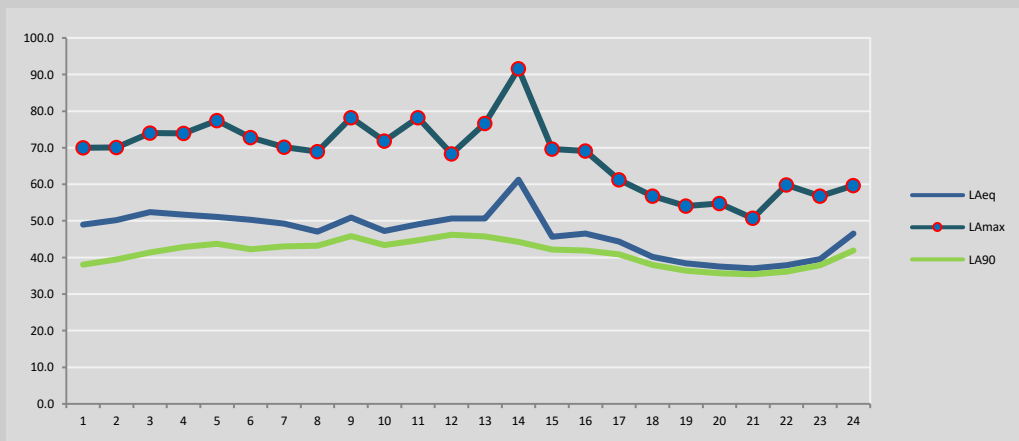
Time Period	L _{Max}	Minimum 15 minute		1 Hour		Day and Night	
		L _{Aeq,15 min}	L _{A90, 15 min}	L _{Aeq, 1 hour}	L _{A90, 1 hour}	L _{Aeq, t}	L _{A90, 16hours}
07:00 – 08:00	62.8	51.9	50.6	52.4	51.1	58.8	47.4
08:00 – 09:00	73.9	52.5	50.7	54.0	52.7		
09:00 – 10:00	66.9	52.7	50.9	53.3	51.9		
10:00 – 11:00	63.3	51.1	49.4	51.8	50.0		
11:00 – 12:00	61.6	48.7	47.0	50.7	48.8		
12:00 – 13:00	70.4	46.5	42.1	48.0	45.2		
13:00 – 14:00	72.9	46.3	41.9	48.3	43.2		
14:00 – 15:00	86.3	45.6	39.7	62.3	41.1		
15:00 – 16:00	68.3	45.6	41.9	47.5	43.2		
16:00 – 17:00	73.8	46.1	40.9	49.3	41.6		
17:00 – 18:00	88.6	45.8	41.9	56.2	42.3		
18:00 – 19:00	86.2	47.2	43.0	52.6	43.5		
19:00 – 20:00	101.3	55.2	43.6	69.1	45.1		
20:00 – 21:00	92.5	47.4	43.4	57.7	44.8		
21:00 – 22:00	68.0	46.4	41.8	46.8	42.5		
22:00 – 23:00	66.3	42.4	39.9	45.3	41.4		
23:00 – 00:00	67.8	42.9	39.6	44.2	40.6		
00:00 – 01:00	75.1	41.7	38.2	43.9	38.7		
01:00 – 02:00	63.4	36.5	34.8	37.7	36.0		
02:00 – 03:00	47.1	37.1	35.5	37.6	35.8		
03:00 – 04:00	52.0	35.7	34.3	37.5	35.6		
04:00 – 05:00	52.1	35.0	33.5	36.7	33.9		
05:00 – 06:00	58.7	36.3	34.5	38.3	35.5		
06:00 – 07:00	58.5	38.7	36.1	45.3	41.4		
						40.6	37.1
07:00 – 08:00	75.1	41.7	38.2	43.9	38.7		
08:00 – 09:00	63.4	36.5	34.8	37.7	36.0		
09:00 – 10:00	47.1	37.1	35.5	37.6	35.8		
10:00 – 11:00	52.0	35.7	34.3	37.5	35.6		
11:00 – 12:00	52.1	35.0	33.5	36.7	33.9		
12:00 – 13:00	58.7	36.3	34.5	38.3	35.5		
13:00 – 14:00	58.5	38.7	36.1	45.3	41.4		



Sound Pressure Levels, dB. Reference level of $2 \times 10^{-5} \text{ Nm}^{-2}$

11.3 6th – 7th November 2021

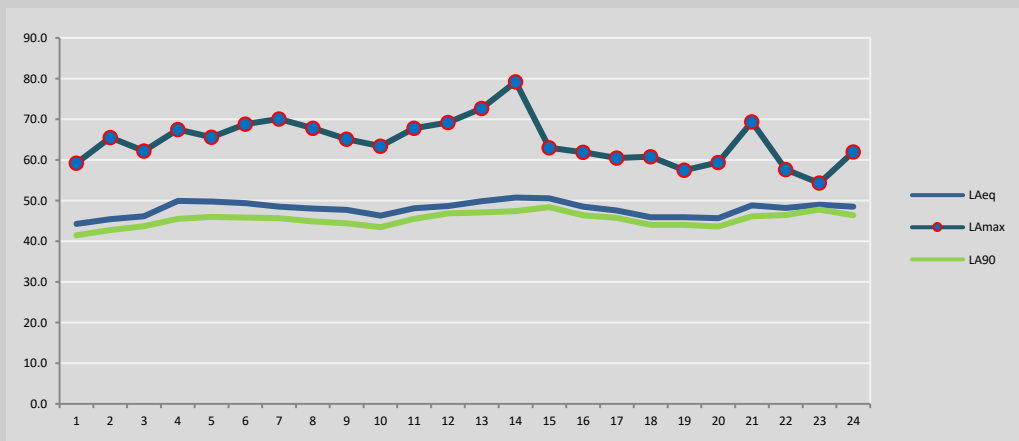
Time Period	L _{Max}	Minimum 15 minute		1 Hour		Day and Night	
		L _{Aeq,15 min}	L _{A90, 15 min}	L _{Aeq, 1 hour}	L _{A90, 1 hour}	L _{Aeq, t}	L _{A90, 16hours}
07:00 – 08:00	70.0	42.7	37.4	49.0	38.1	52.4	43.5
08:00 – 09:00	70.1	44.5	39.0	50.2	39.4		
09:00 – 10:00	74.0	45.1	40.9	52.4	41.4		
10:00 – 11:00	73.9	50.6	42.6	51.7	42.9		
11:00 – 12:00	77.4	50.0	42.9	51.1	43.8		
12:00 – 13:00	72.8	47.8	41.7	50.3	42.3		
13:00 – 14:00	70.2	45.8	41.9	49.3	43.1		
14:00 – 15:00	68.9	45.5	42.3	47.1	43.3		
15:00 – 16:00	78.2	50.3	44.1	51.0	45.8		
16:00 – 17:00	71.8	45.8	42.3	47.3	43.4		
17:00 – 18:00	78.2	45.8	43.2	49.1	44.7		
18:00 – 19:00	68.3	48.8	45.0	50.6	46.2		
19:00 – 20:00	76.6	48.9	45.6	50.6	45.8		
20:00 – 21:00	91.6	49.1	43.4	61.3	44.3		
21:00 – 22:00	69.6	44.9	41.7	45.6	42.2		
22:00 – 23:00	69.1	45.1	41.0	46.5	41.9		
23:00 – 00:00	61.2	42.6	40.3	44.4	40.9	40.5	38.3
00:00 – 01:00	56.8	38.5	36.6	40.1	38.0		
01:00 – 02:00	54.1	37.8	35.2	38.4	36.4		
02:00 – 03:00	54.8	37.1	35.0	37.5	35.7		
03:00 – 04:00	50.7	36.1	34.4	37.0	35.4		
04:00 – 05:00	59.8	37.3	35.3	37.9	36.1		
05:00 – 06:00	56.8	37.1	35.7	39.5	37.8		
06:00 – 07:00	59.7	41.1	39.9	46.5	41.9		



Sound Pressure Levels, dB. Reference level of $2 \times 10^{-5} \text{ Nm}^{-2}$

11.4 7th – 8th November 2021

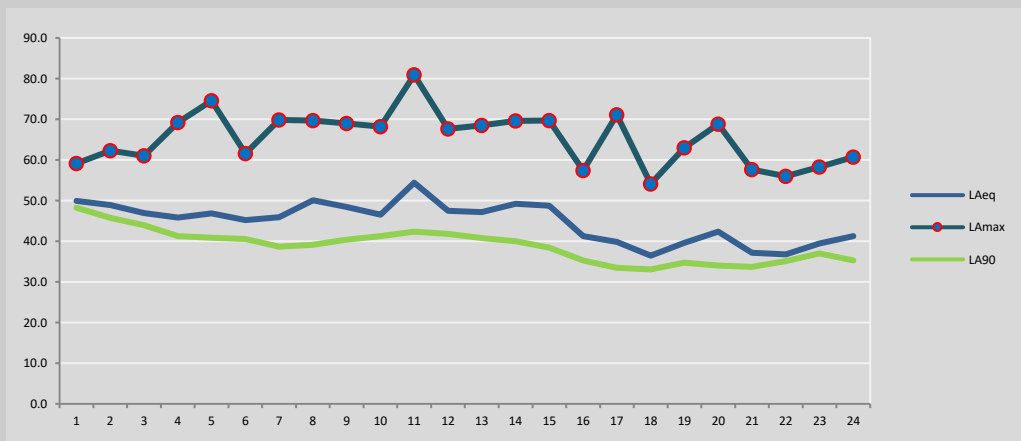
Time Period	L _{Max}	Minimum 15 minute		1 Hour		Day and Night	
		L _{Aeq,15 min}	L _{A90, 15 min}	L _{Aeq, 1 hour}	L _{A90, 1 hour}	L _{Aeq, t}	L _{A90, 16hours}
07:00 – 08:00	59.2	41.8	40.3	44.3	41.5	48.6	45.7
08:00 – 09:00	65.5	44.0	41.6	45.4	42.7		
09:00 – 10:00	62.2	44.9	42.8	46.2	43.7		
10:00 – 11:00	67.5	45.7	43.9	49.9	45.5		
11:00 – 12:00	65.6	47.7	45.0	49.8	45.9		
12:00 – 13:00	68.8	48.5	45.7	49.3	45.8		
13:00 – 14:00	70.1	48.2	45.1	48.5	45.7		
14:00 – 15:00	67.8	47.2	44.6	48.1	44.9		
15:00 – 16:00	65.1	47.5	43.8	47.7	44.4		
16:00 – 17:00	63.4	45.4	42.5	46.3	43.4		
17:00 – 18:00	67.8	47.2	44.8	48.1	45.5		
18:00 – 19:00	69.2	48.1	46.5	48.7	46.8		
19:00 – 20:00	72.7	49.5	46.7	49.8	47.1		
20:00 – 21:00	79.2	49.0	46.4	50.7	47.4		
21:00 – 22:00	63.0	49.9	47.3	50.5	48.4		
22:00 – 23:00	61.9	47.1	45.5	48.5	46.4		
23:00 – 00:00	60.5	47.1	45.4	47.6	45.7		
00:00 – 01:00	60.8	45.0	43.3	45.9	44.0		
01:00 – 02:00	57.5	44.1	42.3	45.9	44.0		
02:00 – 03:00	59.4	45.0	43.1	45.7	43.6		
03:00 – 04:00	69.4	47.0	45.4	48.8	46.1		
04:00 – 05:00	57.6	47.8	46.2	48.2	46.5		
05:00 – 06:00	54.3	48.2	47.0	49.0	47.8		
06:00 – 07:00	62.0	49.4	47.7	48.5	46.4		
						47.9	46.1



Sound Pressure Levels, dB. Reference level of $2 \times 10^{-5} \text{ Nm}^{-2}$

11.5 8th – 9th November 2021

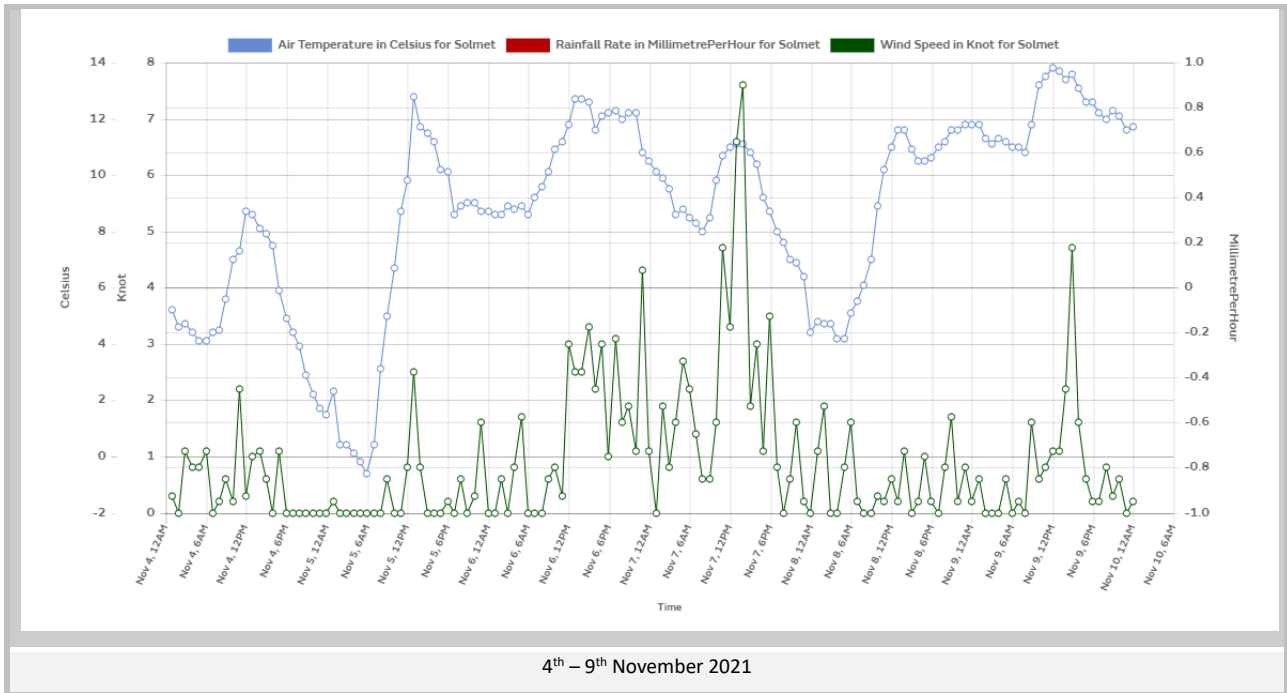
Time Period	L _{Max}	Minimum 15 minute		1 Hour		Day and Night	
		L _{Aeq,15 min}	L _{A90, 15 min}	L _{Aeq, 1 hour}	L _{A90, 1 hour}	L _{Aeq, t}	L _{A90, 16hours}
07:00 – 08:00	59.1	48.3	46.5	49.9	48.2	48.6	42.3
08:00 – 09:00	62.3	48.5	44.9	48.9	45.8		
09:00 – 10:00	61.0	46.3	43.0	46.9	43.9		
10:00 – 11:00	69.2	45.2	40.6	45.8	41.3		
11:00 – 12:00	74.6	46.0	40.3	46.9	40.9		
12:00 – 13:00	61.6	44.5	40.3	45.2	40.5		
13:00 – 14:00	69.8	42.7	38.1	45.9	38.7		
14:00 – 15:00	69.7	43.9	38.5	50.0	39.2		
15:00 – 16:00	69.0	46.7	39.8	48.4	40.4		
16:00 – 17:00	68.2	45.2	40.7	46.5	41.3		
17:00 – 18:00	80.9	48.9	41.8	54.4	42.4		
18:00 – 19:00	67.6	45.3	41.6	47.5	41.8		
19:00 – 20:00	68.5	43.4	40.3	47.2	40.8		
20:00 – 21:00	69.6	46.2	39.3	49.2	40.0		
21:00 – 22:00	69.7	45.5	36.3	48.7	38.4		
22:00 – 23:00	57.4	39.7	34.5	41.2	35.3		
23:00 – 00:00	71.1	35.3	33.1	39.9	33.4		
00:00 – 01:00	54.1	35.7	32.5	36.4	33.1		
01:00 – 02:00	63.0	36.1	33.9	39.6	34.7		
02:00 – 03:00	68.8	35.5	33.2	42.4	34.0		
03:00 – 04:00	57.6	34.5	33.1	37.2	33.7		
04:00 – 05:00	56.0	35.9	34.4	36.8	35.1		
05:00 – 06:00	58.3	37.8	36.1	39.4	37.0		
06:00 – 07:00	60.7	39.5	38.2	41.2	35.3		
						39.7	35.6
07:00 – 08:00	59.1	48.3	46.5	49.9	48.2		
08:00 – 09:00	62.3	48.5	44.9	48.9	45.8		
09:00 – 10:00	61.0	46.3	43.0	46.9	43.9		
10:00 – 11:00	69.2	45.2	40.6	45.8	41.3		
11:00 – 12:00	74.6	46.0	40.3	46.9	40.9		
12:00 – 13:00	61.6	44.5	40.3	45.2	40.5		
13:00 – 14:00	69.8	42.7	38.1	45.9	38.7		



Sound Pressure Levels, dB. Reference level of $2 \times 10^{-5} \text{ Nm}^{-2}$

12 APPENDIX C – WEATHER CONDITIONS

12.1 4th – 9th November 2021



END OF REPORT