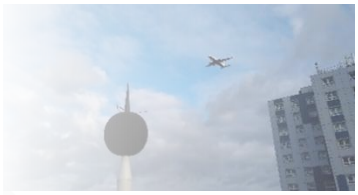
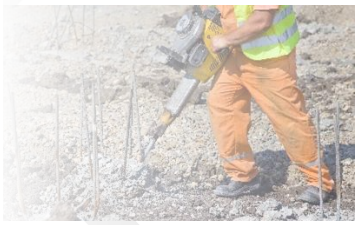
EV2449-01-A

DRAFT REPORT

Evolved Acoustics







Noise Impact Assessment

The Boars Head, Worthing Road, Horsham

Client

2C Design Consultants Limited

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Client	2C Design Consultants Limited
Project Consultant	T Hegan MIOA

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1. Introduction

1.1 Scope

Evolved Acoustics Limited was commissioned in December 2024 to undertake a Noise Impact Assessment at The Boars Head, Worthing Road, Horsham.

The assessment has been undertaken to inform a planning application for the installation of a new kitchen extraction system.

A background sound survey has been carried out to establish the prevailing background sound levels in the vicinity of the site. The operational sound levels of the proposed extraction system have been predicted based on the proposed designs and an assessment has been carried out using BS 4142:2014+A1:2019 [1] and the Planning Noise Advice Document: Sussex (2023) [2].

1.2 Statement of Competency (BS 4142 Requirement)

The assessment has been undertaken by Tim Hegan. Tim is a full member of the Institute of Acoustics (MIOA) and has over eight years' experience in acoustic consultancy. He has worked on numerous assessments where BS 4142 was applied, including undertaking sound measurements, producing calculations and authoring of acoustic reports.

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[1] British Standards Institution (BSI). BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound. 2019.
[2] Mid Sussex District Council. Planning Noise Advice Document: Sussex. November 2023.

2. Noise Policy and Criteria

2.1 Planning Noise Advice Document: Sussex

The Planning Noise Advice Document: Sussex (PNADS) is a guidance document prepared on behalf of various Local Authorities in the Sussex area. The latest revision of the document was published in November 2023.

The document aims to provide advice for developers and their consultants to assist in making a planning application in East and West Sussex having regard to noise.

The PNADS advises that planning applications which have the potential to introduce a new sound source of an industrial or commercial nature into a noise-sensitive area should be accompanied by a Noise Impact Assessment using BS 4142.

2.2 BS 4142:2014+A1:2019

BS 4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound* describes how to assess industrial and commercial sound.

The methods described in BS 4142 use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.

The basic mechanism of BS 4142 for determining an initial assessment of the impact of a specific sound source is to compare the “rating level” of the specific source against the background sound level.

The background sound level is the typical sound level at the assessment location in the absence of the specific source being assessed, expressed using $L_{A90,T}$ descriptor which is the A-Weighted residual noise that is exceeded for 90% of a given time interval.

BS 4142 allows certain corrections to be applied to the rating level to account for sound characteristics which could attract attention such as tonality, intermittency and impulsivity. Feature corrections may be applied based on a subjective appraisal or, where appropriate, using objective methods prescribed in the standard.

Typically, the greater the excess of the rating level over the background sound level, the greater the magnitude of the impact. According to BS 4142:

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

- a difference of around +5 dB is likely to be an indication of an adverse impact, depending on context.

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

Once an initial assessment of the impact has been carried out using the method above, BS 4142 advises that the context of the sound should be considered and, if necessary, the assessment of impact modified accordingly.

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3. Site and Proposed Extraction System

3.1 Site Description

The Boars Head Pub is a detached building positioned at the intersection of Worthing Road (B2237) and Tower Hill. The area surrounding the site is mostly comprised of open fields, with some residential dwellings located to the east and south on Tower Hill and Salisbury Road.

The closest noise-sensitive receptor is the detached residential dwelling known as Picts House, Tower Hill, approximately 70m south of the Pub.

A site location plan is provided on Figure A1 of Appendix A.

3.2 Proposed Extraction System

The proposal is for the installation of a new kitchen extraction system comprising an externally located box fan (Helios GBW 450/4 T 120) and associated ductwork.

The fan is to be located on the western end of the Pub building as shown on the plans and elevations on Figures A2 and A3 in Appendix A.

The acoustic data for the Helios extraction fan is shown on Figure A4 in Appendix A.

Use of the extraction system will typically be in line with the kitchen hours which are 12:00 – 21:00 hrs Mon – Sat and 12:00 – 17:00 hrs Sunday, potentially being used for a short time either side of these hours for preparation and/or kitchen close-down. Use of the system will always be restricted to within the daytime period defined in BS 4142 as 07:00 – 23:00 hrs.

3.3 Noise Sensitive Receptors (NSRs)

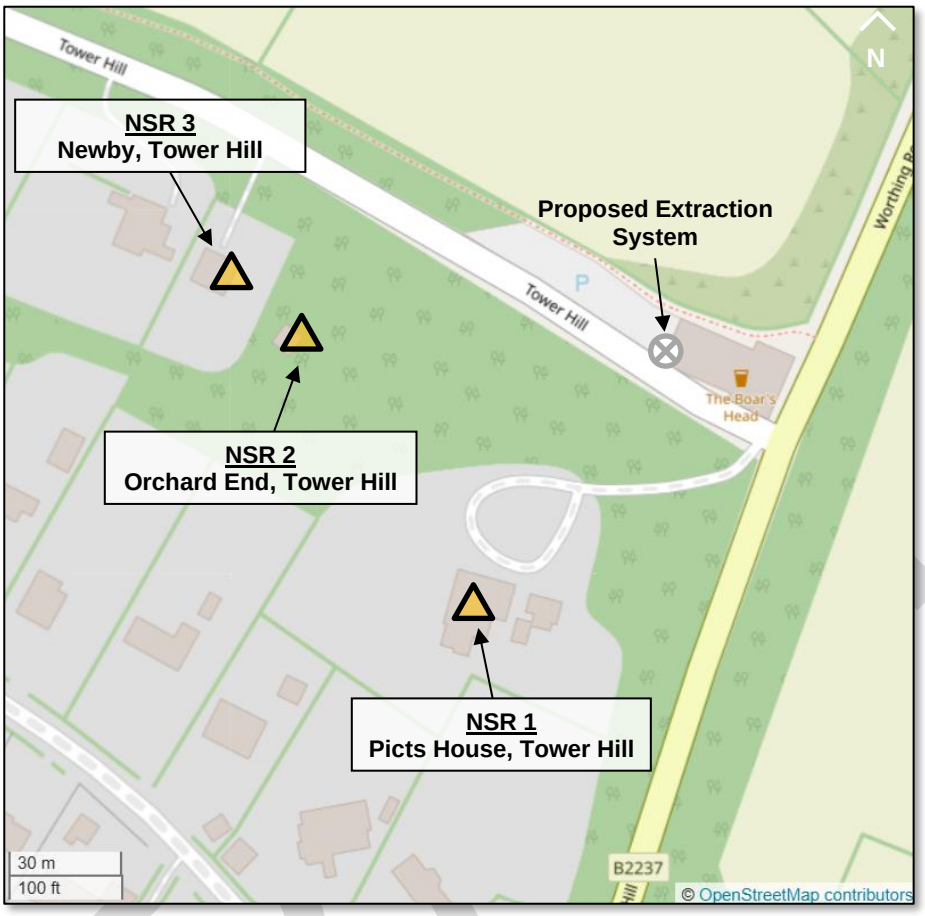
The NSRs included in the assessment are displayed on Figure 3.1 overleaf and listed in Table 3.1.

Table 3.1: List of Noise Sensitive Receptors

Receptor I.D.	Address	Direction (Relative to Sound Source)	Use / Type
NSR 1	Picts House, Tower Hill	South	Residential
NSR 2	Orchard End, Tower Hill	East	Residential
NSR 3	Newby, Tower Hill	East	Residential

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Figure 3.1: Map of Noise Sensitive Receptors



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4. Background Sound Survey

4.1 Continuous Unattended Background Sound Survey

Continuous unattended background sound measurements were undertaken at position U-P1 over an 8-day period in December 2024. A summary of the main details of the sound survey is provided in Table 4.1.

It was not feasible to conduct sound measurements directly at the noise-sensitive receptors. However, unattended sound monitoring was carried out at the Pub, which is subject to similar sound levels from the primary source, namely road traffic along Worthing Road.

Sound levels at the monitoring position U-P1 were not influenced by any sound from the existing extraction system, which terminates on the southern side of the Pub and was not subjectively audible at the monitoring position.

Table 4.1: Summary of Sound Survey Details

Position	Start Date & Time	End Date & Time	Description of Measurement Position
U-P1	Tues 10/12/24 10:30 hrs	Tues 17/12/24 12:15 hrs	Rear area of Pub grounds. Microphone 1.4m from ground level.

The fixed monitoring position U-P1 is marked on Figure A4 of Appendix A.

The sound level meter (SLM) was configured to measure ambient ($L_{Aeq,15min}$), background ($L_{A90,15min}$) and maximum ($L_{Amax,F}$) sound levels.

4.2 Attended Background Sound Survey

Attended background sound measurements were undertaken on 10th December 2024 between 11:00 and 12:00 hrs. The sound measurements were undertaken in 15-minute intervals at the position labelled A-P1 on Figure A4 of Appendix A. Sound levels at this position were representative of the neighbouring dwellings NSR 2 and NSR 3 on Tower Hill, which are positioned slightly further away from Worthing Road compared to the location of the unattended background sound monitor.

The purpose of the attended survey was to gain observations of the primary sources governing the background sound climate in the vicinity of the site and to assess for variations in sound levels between the attended position and the unattended position.

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The clock on the sound meter used for the attended survey was synchronised with the clock on the unattended sound meter.

4.3 Equipment

All sound measurements were undertaken using Rion sound level meters, rated Class 1. A summary of the equipment details is provided in Table 4.2.

Table 4.2: Details of Sound Measurement Equipment

Type	Make	Model	Serial No.	Date of Last Laboratory Calibration
Class 1 Integrating Sound Level Meter	Rion	NL-31	00410242	08/08/24
Class 1 Integrating Sound Level Meter	Rion	NL-32	00513572	05/12/23

The NL-31 SLM used for the unattended sound monitoring was housed in a weather-proof casing with a windscreen fitted to the microphone. The microphone was attached to an extension pole and positioned approximately 1.4m above floor level. The NL-32 SLM used for the attended sound monitoring was placed on a tripod approximately 1.4m from floor level, with a windshield protecting the microphone.

4.4 Field Calibration

Calibration checks were performed on the sound monitoring equipment before and after the survey using a Castle dBCal GA611 acoustic calibrator. The calibration checks indicated that no significant drift occurred throughout the measurements.

4.5 Weather Conditions

The weather during the attended background sound survey on 10th December 2024 was dry and overcast. The temperature was around 6°C and the humidity was approximately 90%. Winds speeds were measured using a handheld anemometer; the wind speeds were up to 3 $m.s^{-1}$. A record of the weather conditions during the unattended background sound survey have been obtained from a nearby weather station and are presented in Appendix B. Weather conditions were satisfactory for outdoor sound monitoring, with temperatures ranging between 1°C and 11°C and wind speeds remaining below 5 $m.s^{-1}$. Most days were dry; some very light rainfall occurred on some days however analysis of the measured sound levels indicated that this did not have any effect on the reliability of the results.

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5. Sound Survey Results

5.1 Continuous Unattended Sound Survey Results

The results of the unattended background sound survey are summarised in Table 5.1 with a time history graph provided on Figure C1 in Appendix C.

The average ambient ($L_{Aeq,T}$), background ($L_{A90,T}$) and maximum (L_{AFmax}) values are shown in Table 5.1 for each daytime and night-time period, with the range of measured levels shown in parentheses. Average $L_{Aeq,T}$ sound levels have been calculated logarithmically whilst average background and maximum sound levels have been calculated arithmetically.

Whilst only the daytime levels are relevant to the assessment, the night-time levels are included for information.

Table 5.1: Sound Levels at Position U-P1

Date	Measured Noise Levels, dB [A]					
	DAYTIME (07:00 – 23:00 hrs)			NIGHT-TIME (23:00 – 07:00 hrs)		
	$L_{Aeq,15min}$	$L_{A90,15min}$	$L_{Amax,F}$	$L_{Aeq,15min}$	$L_{A90,15min}$	$L_{Amax,F}$
Tue 10/12	59	53	71 (99 / 64)	51	36	66 (86 / 58)
Wed 11/12	60	53	74 (97 / 66)	53	34	66 (98 / 54)
Thu 12/12	59	52	74 (101 / 64)	52	32	67 (96 / 57)
Fri 13/12	58	51	74 (92 / 65)	50	32	67 (93 / 62)
Sat 14/12	58	51	74 (88 / 64)	49	34	66 (72 / 59)
Sun 15/12	56	45	72 (88 / 64)	48	32	64 (71 / 47)
Mon 16/12	56	48	71 (84 / 64)	49	30	64 (79 / 47)
Tue 17/12	58	50	75 (90 / 67)	-	-	-
Average	**58**	**50**	**73 (92 / 65)**	**51**	**33**	**66 (85 / 55)**

Notes:
[A] free-field sound levels, dB re $2x10^{-5}$ Pa

The average ambient level ($L_{Aeq,15min}$) during the daytime (07:00 – 23:00 hrs) across the survey period was 58 dB, whilst the average background level ($L_{A90,15min}$) was 50 dB.

5.2 Analysis of Background Sound Levels

A statistical analysis has been carried out to determine the most commonly occurring daytime background sound level based on an example method given in Section 8 of BS 4142:2014+A1:2019.

To provide a reasonably worse-case assessment, the analysis has been performed on the measured levels from Sun 15th and Mon 16th December only, during which the lowest daytime levels were recorded.

The results of the statistical analysis are shown on Figure C2 in Appendix C, showing that the most commonly occurring a background sound level was 50 dB $L_{A90,15min}$.

5.3 Attended Background Sound Survey Results

The results of the attended sound measurements are shown in Table 5.2.

Table 5.2: Attended Background Sound Survey Results

Date	Position	Start Time	Duration *T* (mins)	Measured Sound Levels, dB [A]		
				$L_{Aeq,T}$	$L_{A90,T}$	L_{AFmax}
10/12//24	A-P1	11:00	15	65	55	80
		11:15	15	66	54	84
		11:30	15	67	54	82
		11:45	15	67	54	82
		Total:		**66**	**54**	**84**

Notes:
[A] free-field sound levels dB re $2x10^{-5}$ Pa

Observations made during the survey indicated that the primary source of noise governing the background sound levels ($L_{A90,15min}$) in the vicinity of the site was semi-continuous road traffic along the B2237 Worthing Road. Vehicles on Tower Hill were infrequent and were not a major contributor to the ambient levels. Secondary sound sources included gentle rustling of foliage and birdsong.

5.4 Summary of Background Sound Assessment Levels

NSR 1 is represented by the unattended sound monitoring position U-P1 whereas NSR 2 and NSR 3 are set back further from Worthing Road and are represented by the attended sound monitoring position A-P1.

The results of the attended sound measurements at A-P1 and the unattended sound measurements at U-P1 have been compared for the corresponding time periods.

Background sound levels ($L_{A90,15min}$) at A-P1 were, on average, 2 dB lower than those at U-P1. Accordingly, a -2 dB correction has been applied to the background sound levels measured at U-P1 to determine the background sound levels adopted for the noise impact assessment at NSR 2 and NSR 3.

The background sound assessment levels adopted for the assessment are summarised in Table 5.3.

Table 5.3: Background Sound Assessment Levels

I.D.	Address	Monitoring Position Representing Receptor	Correction Applied (dB)	Daytime Background Sound Assessment Level (LA90,T)
NSR 1	Picts House, Tower Hill	U-P1	0	50
NSR 2	Orchard End, Tower Hill	A-P1	-2	48
NSR 3	Newby, Tower Hill	A-P1	-2	48

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6. Calculation Method

6.1 Sound Model

Sound levels of the extraction system have been calculated using a spreadsheet-based sound model considering the sound emission of each source and the distance from the source to the receiver position.

The sound levels have been calculated in individual octave frequency bands between 125 Hz and 8 kHz and then summed logarithmically to provide the overall level (dBA).

The sound model considers the following sources of sound:

- Sound from the outlet of the extraction fan motor travelling through the ductwork and escaping via the end terminal.
- Sound break-out from extraction fan casing.

The free-field Sound Pressure Level (dBA) at each receiver position has been calculated based on the Sound Power Level of the source assuming point-source attenuation over soft ground, as follows:

$$L_p = L_w - 20log(r) - 11$$

Where:

- L_p is the calculated sound pressure level at the receptor (dBA).
- L_w is the Sound Power Level of the source (dBA).
- *r* is the distance form the source to the receptor in metres (m).
- - 11 dB is a standard correction to calculate Sound Pressure Level from Sound Power Level assuming mostly soft ground between the source and receiver position

.

Sound Model Assumptions:

A list of assumptions adopted in the sound model is provided below:

- Continuous operation of the plant over the reference time interval has been assumed.
- The source levels have been derived from the manufacturer's acoustic laboratory test data for the components as shown in Appendix A.

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- Sound levels have been calculated at 1m outside the closest façade of each noise-sensitive receptor.

- No attenuation of sound has been assumed for any barriers between the sound source and the receptors, e.g. foliage or fences.

Calculation sheets are shown in Appendix D.

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7. BS 4142 Sound Assessment

7.1 Background Sound Assessment Levels

The background sound assessment levels ($L_{A90,T}$) have been established from the sound survey results as described in Section 5.

7.2 Specific Sound Level

The specific sound levels of the proposed extraction system have been calculated using the method set out in Section 6 and are summarised in Table 7.1.

Table 7.1: Calculated Plant Sound Levels

Rec I.D.	Address	Specific Sound Level dB $L_{Aeq,15min}$
NSR 1	Picts House, Tower Hill	33
NSR 2	Orchard End, Tower Hill	29
NSR 3	Newby, Tower Hill	27

7.3 Rating Level

Whilst the sound generated at-source from commercial kitchen extraction systems can contain tonal components, it is not expected that these would attract attention at the receptor locations as the calculated specific sound levels are more than 10 dB below the background sound assessment levels. Furthermore, sound from the extraction system is not likely to be impulsive or intermittent. Therefore, no rating corrections are applicable under BS 4142.

The calculated rating levels and an initial assessment of the sound impact using BS 4142 are presented in Table 7.2 overleaf.

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Table 7.2: BS 4142 Sound Assessment

Assessment Time Period and Location			Background Sound	BS 4142 Initial Assessment of Daytime Impact				
Time Period	**Rec I.D.**	**Address**	**Background Sound Level, dB $L_{A90,1hr}$**	**Specific Sound Level, dB $L_{Aeq,1hr}$**	**Rating Corrections Applied (dB)**	**Rating Level, dB L_{Ar}**	**Rating Level Minus Background**	**Initial Outcome Indicated by Rating Level vs Background Comparison**
Daytime	NSR 1	Picts House, Tower Hill	50	33	0	33	-17	Low Impact
	NSR 2	Orchard End, Tower Hill	48	29	0	29	-19	Low Impact
	NSR 3	Newby, Tower Hill	48	27	0	27	-21	Low Impact

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The assessment presented in Table 7.2 demonstrates that the predicted rating level of the extraction system falls below the background sound level ($L_{A90,15min}$) by 17 dB at the closest receptor, NSR 1 – Picts House, Tower Hill. The rating levels falls below the background sound level by 19 dB at NSR 2 and 21 dB at NSR 3.

BS 4142 indicates that where the rating level does not exceed the background sound level ($L_{A90,T}$) this is an indication of the source having a low impact, depending on the context. The lower the rating levels is compared to the background level, the lower the likelihood of adverse impact.

No contextual factors have been identified which would alter the outcome of the initial assessment. Therefore, the conclusion of the assessment is that the sound from the extraction system is likely to have a 'Low Impact'.

No specific sound mitigation measures are required.

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8. Uncertainty

BS 4142:2014+A1:2019 requires that consideration is given to potential sources of uncertainty within the assessment. Uncertainty in an assessment of this type can arise from factors such as:

- The accuracy of the source sound data provided by the manufacturer(s).
- The accuracy of the sound modelling.
- The reliability of the background sound survey data.

Uncertainty has been minimised by adopting a cautious approach in the selection of the background sound assessment level. The predicted rating levels fall within the 'Low Impact' criterion of BS 4142 by a considerable margin. Therefore, the degree of uncertainty around the assessment's conclusions is relatively small.

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9. Summary and Conclusions

A Noise Impact Assessment (NIA) has been undertaken for the proposed commercial kitchen extraction system at The Boars Head, Worthing Road, Horsham.

A background sound survey consisting of attended and unattended sound monitoring has been carried out to establish the background sound levels representative of the nearby noise-sensitive receptors. The background sound climate is comprised mainly of sound from road traffic on the B2237 Worthing Road which is semi-continuous throughout the daytime.

Sound levels of the proposed kitchen extraction system have been predicted using a sound model based on the proposed design layout and the manufacturer's acoustic data for the fan.

Rating levels of the extraction system were predicted to fall below the background sound level ($L_{A90,15min}$) by at least 17 dB. According to BS 4142:2014+A1:2019 this indicates a very low likelihood of any adverse impact. Accordingly, no specific mitigation is required to limit the sound impact.

Overall, the proposal complies with the National Planning Policy Framework (NPPF) [3] and Planning Noise Advice Document: Sussex (2023) by avoiding giving rise to any significant adverse noise impacts upon surrounding residential receptors.

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[3] UK Government. National Planning Policy Framework. Dec 2023.

Appendix A – Figures

Figure A1: Site Location Plan

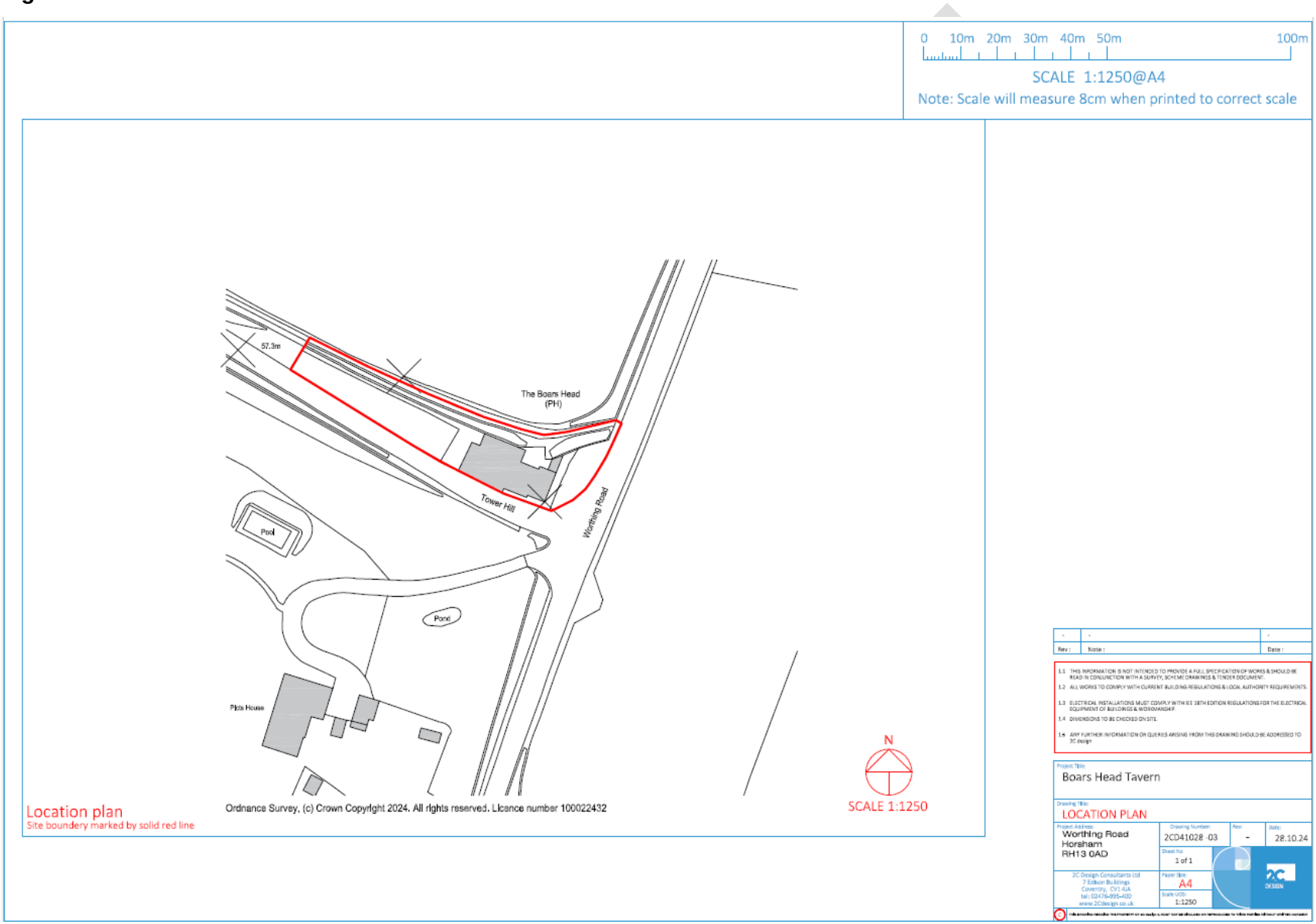


Figure A2: Proposed Extraction System – Plans and Elevations

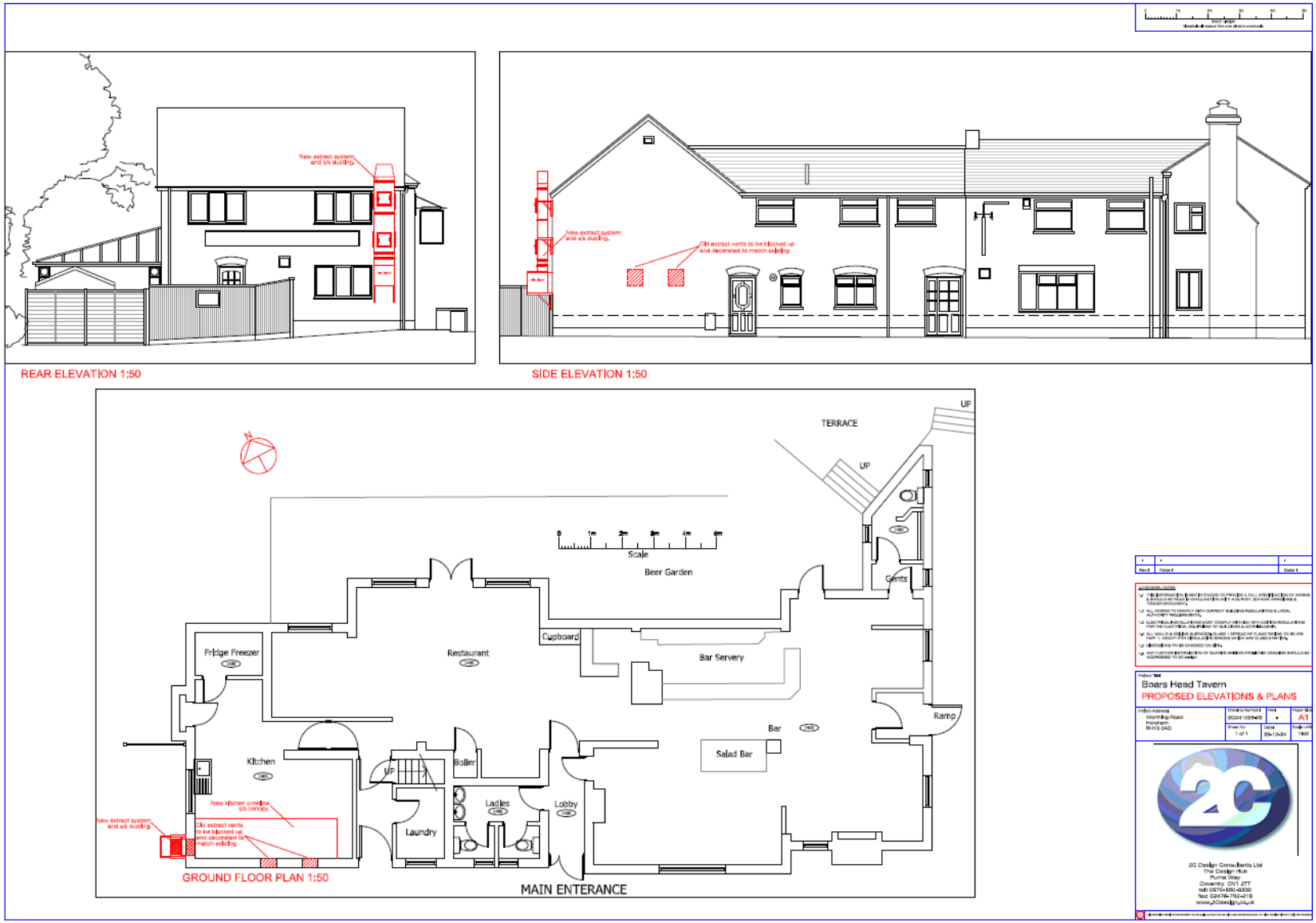


Figure A3: Manufacturer Acoustic Data for Extraction Fan – Helios GBW 450/4 T

Date 07.11.2024

Technical data sheet

Technical specifications

Nominal-Ø	450 mm
Weight	74 kg
Wiring diagram no.	935
Delivery time	Upon request
Soundproof	✓
Delivery of hot air up to 120°C	✓

Sound power level LWA dB(A)

Sound spectrum	Hz	Total	125	250	500	1k	2k	4k	8k
LwA Inlet side	dB(A)	77	62	64	67	72	73	67	56
LwA Outlet side	dB(A)	80	67	68	70	76	75	72	59
LwA Radiation	dB(A)	65	61	58	56	57	55	52	44

Head curve

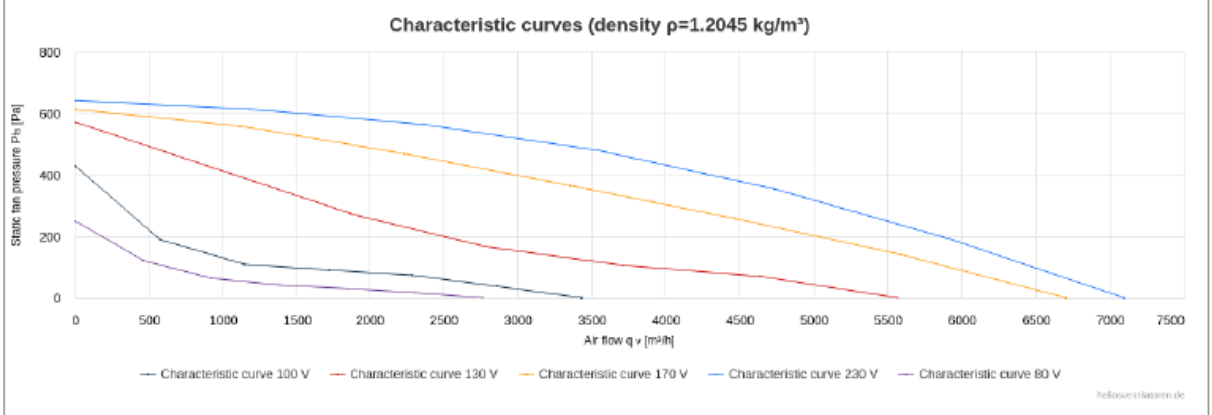


Figure A4: Site and Background Sound Monitoring Positions



Appendix B – Weather Record

Day	Date	Temperature, (°C) Avg (Range)	Wind Speed (ms^{-1}) Avg (Range)	Humidity	Precipitation (Total)
Tues	10-Dec-24	6.0 (6.5 / 5.5)	1 (4.3 / 0)	91 %	1.30 mm
Weds	11-Dec-24	5.6 (6.2 / 5.0)	0.4 (2.4 / 0)	93 %	0.51 mm
Thurs	12-Dec-24	6.1 (6.8 / 5.6)	0.2 (2.1 / 0)	94 %	0.00 mm
Fri	13-Dec-24	4.0 (5.9 / 3.1)	0.2 (3 / 0)	92 %	0.20 mm
Sat	14-Dec-24	4.5 (7.8 / 0.7)	0.3 (4.3 / 0)	92 %	0.00 mm
Sun	15-Dec-24	9.0 (12.6 / 1.1)	0.5 (3.9 / 0)	93 %	0.00 mm
Mon	16-Dec-24	9.8 (11.8 / 7.5)	0.6 (3.9 / 0)	88 %	0.00 mm
Tues	17-Dec-24	8.4 (9.4 / 5.2)	0.5 (3.3 / 0)	95 %	2.01 mm*

**rain on17/12 occurred after the survey period.*

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Appendix C – Graphs of Background Sound Levels

Figure C1: Background Sound Survey Results - U-P1 (free-field)

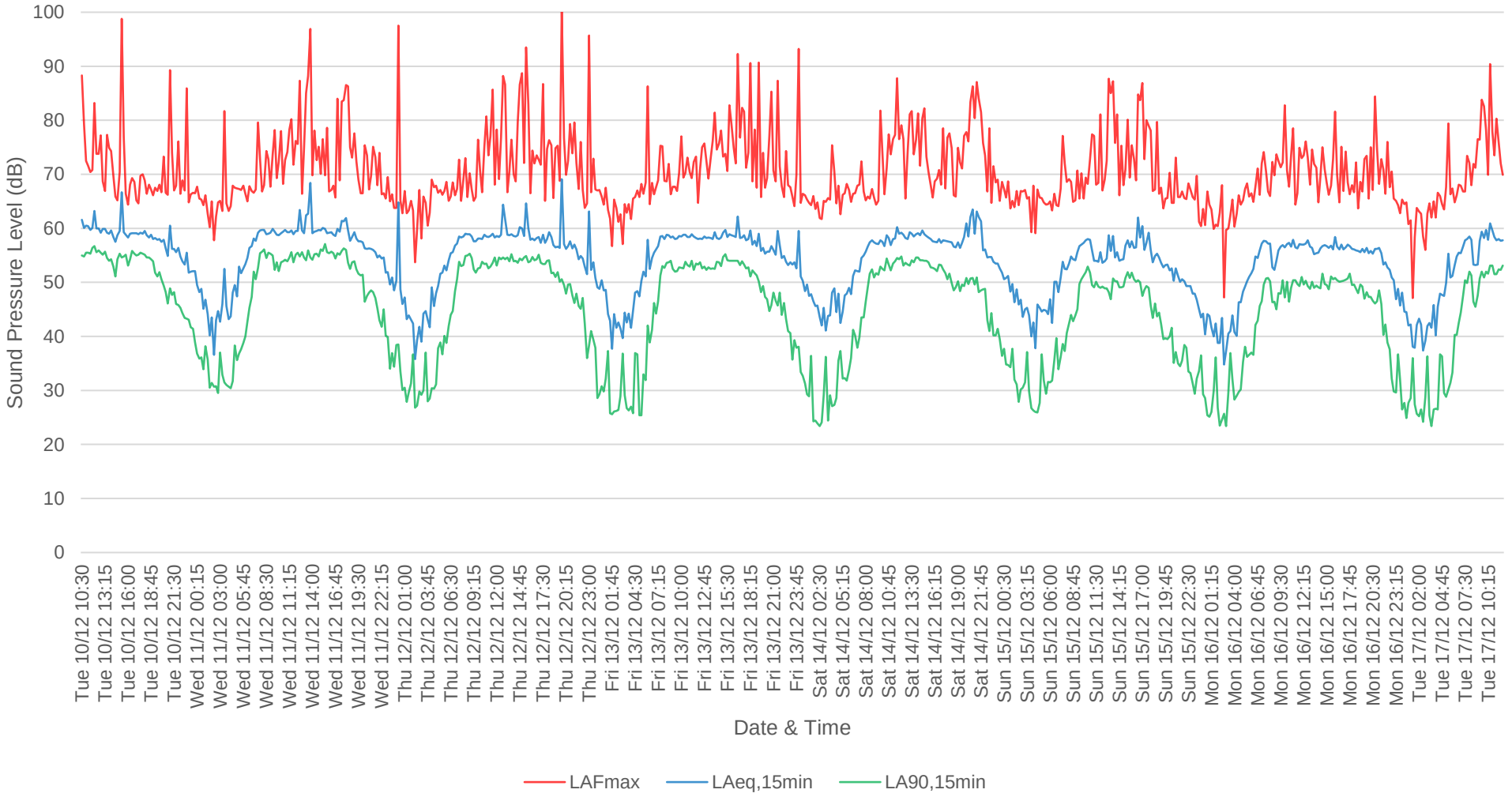
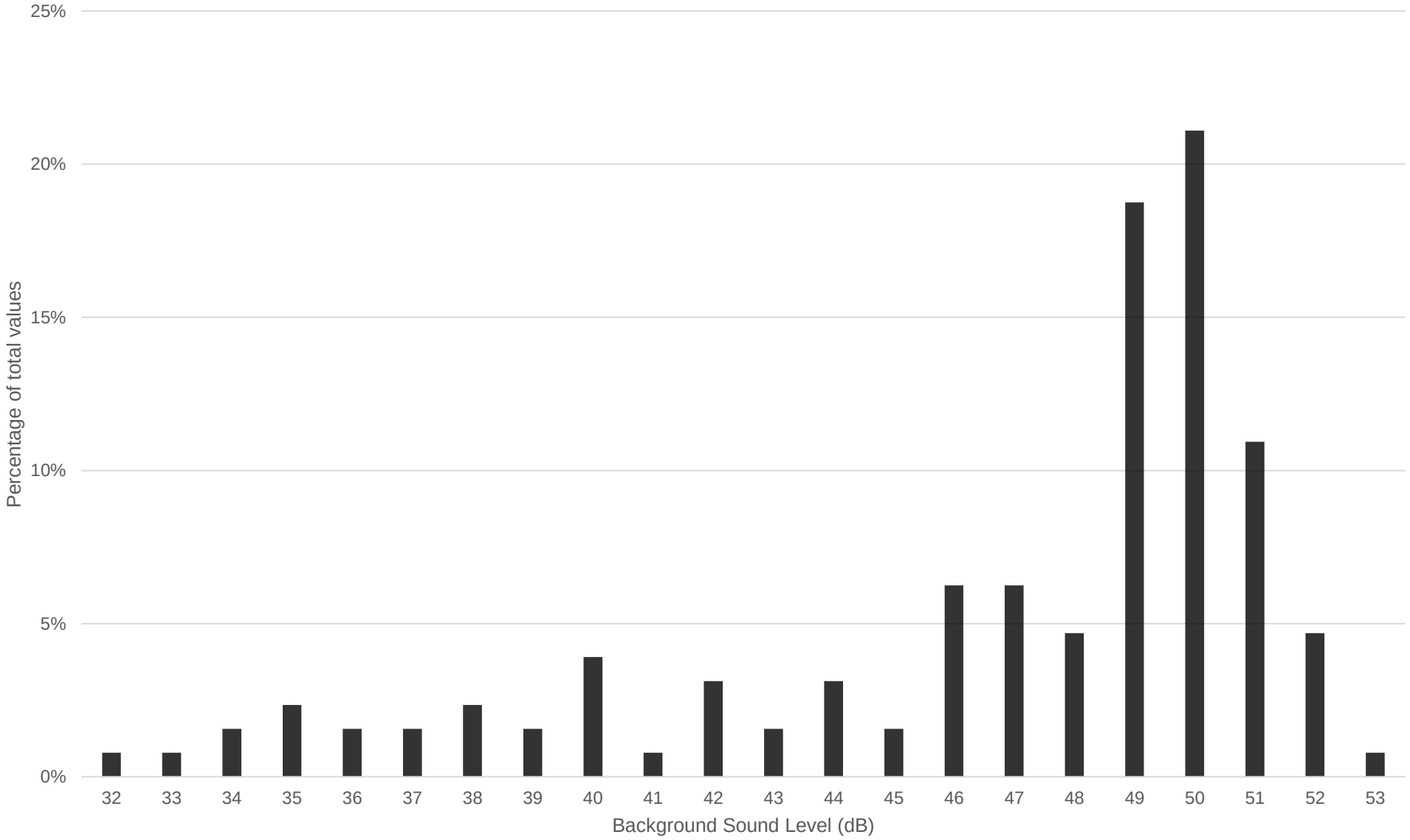


Figure C2: Statistical Analysis of Background Sound Levels (LA90,15min) - Daytime 07:00 - 23:00 hrs



Appendix D – Sound Calculations

NSR 1

Picts House, Tower Hill

Source: Extraction Fan Outlet Noise *Distance* *70.0* *Gnd Corr.* *-11*

Description	Unit	125	250	500	1k	2k	4k	8k	Total
Extraction Fan Outlet	LwA	67	68	70	76	75	72	59	
Silencer (None)	dB	0	0	0	0	0	0	0	
Level at End Terminal	LwA	67	68	70	76	75	72	59	
Acoustic Losses:									
Distance to Receptor [R]	m	70.0	70.0	70.0	70.0	70.0	70.0	70.0	
Correction: Lw to Lp at Distance *R*		-47.9	-47.9	-47.9	-47.9	-47.9	-47.9	-47.9	
Attenuation due to Screening	dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sound Pressure Level at Receptor	dB LpA	19.1	20.1	22.1	28.1	27.1	24.1	11.1	**32.5**

Source: Extraction Fan Motor Breakout *Distance* *70.0*

Description	Unit	125	250	500	1k	2k	4k	8k	Total
Extraction Fan Motor Breakout	LwA	61	58	56	57	55	52	44	
Acoustic Losses:									
Distance to Receptor [R]	m	70.0	70.0	70.0	70.0	70.0	70.0	70.0	
Correction: Lw to Lp at Distance *R*		-47.9	-47.9	-47.9	-47.9	-47.9	-47.9	-47.9	
Attenuation due to Screening	dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sound Pressure Level at Receptor	dB LpA	13.1	10.1	8.1	9.1	7.1	4.1	-3.9	**17.3**

TOTAL - Sum of Noise Sources

Description	Unit	125	250	500	1k	2k	4k	8k	Total
Extraction Fan - Outlet Noise	dB LpA	19.1	20.1	22.1	28.1	27.1	24.1	11.1	32.5
Extraction Fan - Breakout Noise	dB LpA	13.1	10.1	8.1	9.1	7.1	4.1	-3.9	17.3
TOTAL (ROUNDED)									**33**

NSR 2

Orchard End, Tower Hill

Source: Extraction Fan Outlet Noise *Distance* *112.0* *Gnd Corr.* *-11*

Description	Unit	125	250	500	1k	2k	4k	8k	Total
Extraction Fan Outlet	LwA	67	68	70	76	75	72	59	
Silencer (None)	dB	0	0	0	0	0	0	0	
Level at End Terminal	LwA	67	68	70	76	75	72	59	
Acoustic Losses:									
Distance to Receptor [R]	m	112.0	112.0	112.0	112.0	112.0	112.0	112.0	
Correction: Lw to Lp at Distance *R*		-52.0	-52.0	-52.0	-52.0	-52.0	-52.0	-52.0	
Attenuation due to Screening	dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sound Pressure Level at Receptor	dB LpA	15.0	16.0	18.0	24.0	23.0	20.0	7.0	**28.4**

Source: Extraction Fan Motor Breakout *Distance* *112.0*

Description	Unit	125	250	500	1k	2k	4k	8k	Total
Extraction Fan Motor Breakout	LwA	61	58	56	57	55	52	44	
Acoustic Losses:									
Distance to Receptor [R]	m	112.0	112.0	112.0	112.0	112.0	112.0	112.0	
Correction: Lw to Lp at Distance *R*		-52.0	-52.0	-52.0	-52.0	-52.0	-52.0	-52.0	
Attenuation due to Screening	dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sound Pressure Level at Receptor	dB LpA	9.0	6.0	4.0	5.0	3.0	0.0	-8.0	**13.2**

TOTAL - Sum of Noise Sources

Description	Unit	125	250	500	1k	2k	4k	8k	Total
Extraction Fan - Outlet Noise	dB LpA	15.0	16.0	18.0	24.0	23.0	20.0	7.0	28.4
Extraction Fan - Breakout Noise	dB LpA	9.0	6.0	4.0	5.0	3.0	0.0	-8.0	13.2
TOTAL (ROUNDED)									**29**

DRAFT

NSR 3

Newby, Tower Hill

Source: Extraction Fan Outlet Noise *Distance* *132.0* *Gnd Corr.* *-11*

Description	Unit	125	250	500	1k	2k	4k	8k	Total
Extraction Fan Outlet	**LwA**	67	68	70	76	75	72	59	
Silencer (None)	**dB**	0	0	0	0	0	0	0	
Level at End Terminal	**LwA**	67	68	70	76	75	72	59	
Acoustic Losses:									
Distance to Receptor [R]	m	132.0	132.0	132.0	132.0	132.0	132.0	132.0	
Correction: Lw to Lp at Distance *R*		-53.4	-53.4	-53.4	-53.4	-53.4	-53.4	-53.4	
Attenuation due to Screening	dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sound Pressure Level at Receptor	dB LpA	13.6	14.6	16.6	22.6	21.6	18.6	5.6	**27.0**

Source: Extraction Fan Motor Breakout *Distance* *132.0*

Description	Unit	125	250	500	1k	2k	4k	8k	Total
Extraction Fan Motor Breakout	**LwA**	61	58	56	57	55	52	44	
Acoustic Losses:									
Distance to Receptor [R]	m	132.0	132.0	132.0	132.0	132.0	132.0	132.0	
Correction: Lw to Lp at Distance *R*		-53.4	-53.4	-53.4	-53.4	-53.4	-53.4	-53.4	
Attenuation due to Screening	dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sound Pressure Level at Receptor	dB LpA	7.6	4.6	2.6	3.6	1.6	-1.4	-9.4	**11.8**

TOTAL - Sum of Noise Sources

Description	Unit	125	250	500	1k	2k	4k	8k	Total
Extraction Fan - Outlet Noise	dB LpA	13.6	14.6	16.6	22.6	21.6	18.6	5.6	27.0
Extraction Fan - Breakout Noise	dB LpA	7.6	4.6	2.6	3.6	1.6	-1.4	-9.4	11.8
TOTAL (ROUNDED)									**27**

DRAFT