

**Pepe's
Unit 2 Regent House
Regent Street
Wrexham**

Plant Sound Assessment Report
1106/PSA1

16 June 2023

For:

HSZ Foods Ltd



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Plant Sound Assessment Report 1106/PSA1

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1.0 Introduction

Lighthouse Acoustics has been appointed by HSZ Foods Ltd to undertake an assessment of atmospheric noise emissions from the proposed 1No. extract fan and 1No. supply fan at Pepe's, Unit 2 Regent House, Regent Street, Wrexham to the nearest existing noise sensitive receptor.

The survey methodology, results and assessment are presented in this report.

2.0 Objectives

To establish the Local Authority's plant sound requirements for the proposed 1No. extract fan and 1No. supply fan.

To visit site to undertake manned environmental sound measurements during critical periods in order to establish existing representative background sound levels at the nearest noise sensitive receptor.

To undertake an assessment of atmospheric plant sound emission levels from proposed the 1No. extract fan and 1No. supply fan to the nearest noise sensitive receptor and to propose mitigation measures where required in order to achieve the requirements of the Local Authority.

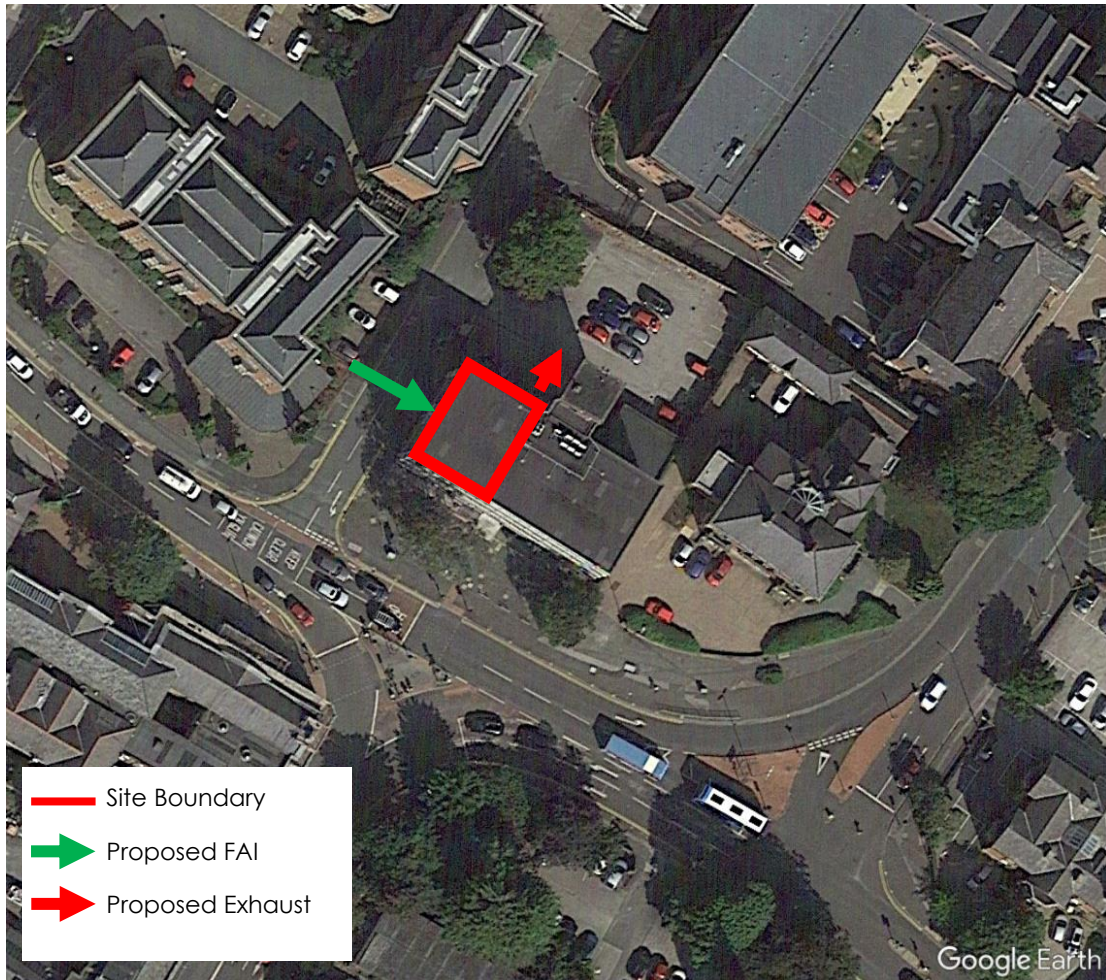
3.0 Site Description

Pepe's, Unit 2 Regent House, Regent Street, Wrexham comprises a ground floor corner commercial unit in a 4 storey detached building with other commercial units at ground, 1st 2nd and 3rd floor levels. The building is bound by a ground level car park to the north east, commercial property to the south east, Regent Street to the south west and Caxton Place to the north west.

The proposed 1No. extract fan and 1No. supply fan are situated within the unit with the extract duct penetrating the north east façade and rising up to roof level where it terminates vertically and the supply ducted to a fresh air intake grille situated in the north west façade overlooking Caxton Place.

The nearest noise sensitive receptors are understood to be the residential flats situated to the north west of the site opposite Caxton Place.

The site plan overleaf indicates the extent of the site and the surrounding environment.



Site plan indicating the extent of the site and the surrounding environment.

4.0 Local Authority Requirements

It is understood that Wrexham County Borough Council require building services noise to be assessed in accordance with the guidance provided in BS 4142:2014, "Methods for rating and assessing industrial and commercial sound" and that the rating level should not exceed the existing background sound level at the nearest noise sensitive receptor.

5.0 BS 4142: 2014

BS 4142: 2014 "Methods for rating and assessing industrial and commercial sound", describes methods for rating and assessing sound of an industrial and/or commercial nature, which includes:

- sound from industrial and manufacturing processes;
- sound from fixed installations which comprise mechanical and electrical plant and equipment;
- sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and

- sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train or ship movements on or around an industrial and/or commercial site.

Sound of an industrial and/or commercial nature does not include sound from the passage of vehicles on public roads and railway systems.

It should be noted that the determination of noise amounting to a nuisance is beyond the scope of BS 4142.

The likely impact is indicated by subtracting the existing background sound level from the rating level of the industrial and/or commercial sound. The standard states that:

- "a) Typically, the greater this difference, the greater the magnitude of the impact.*
- b) A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.*
- c) A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context.*
- d) The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.*

Note 2 Adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact."

The industrial and/or commercial sound is expressed as the specific sound level and given as a L_{Aeq,T_r} sound level. Should the specific sound level exhibit any acoustic features (i.e. tonality, irregularity or impulsiveness) a character correction is applied. The rating level is the specific sound level with character correction applied (if applicable) and is given as a L_{A,r,T_r} sound level.

The existing background sound level is given as a $L_{A90,T}$ sound level. The reference time interval, T_r , is 1 hour during the daytime period (07:00 to 23:00 hours) and 15 minutes during the night-time period (23:00 to 07:00 hours).

6.0 Environmental Sound Survey

6.1 Measurements

It is understood that the proposed 1No. extract fan and 1No. supply fan have the potential to operate between 11:00 and 01:00 hours seven days a week.

Fully manned environmental sound measurements were undertaken during the critical period when environmental sound levels may typically be expected to be at their lowest.

The measurements were undertaken between 00:00 to 01:00 hours on Thursday 8 June 2023.

During this period the L_{Amax} , L_{Aeq} and L_{A90} sound levels were measured over 15 minute periods.

6.2 Weather Conditions

During the survey period there was a light easterly breeze (<3m/s) and the sky was clear. There was no rainfall and road surfaces were dry. The temperature was approximately 9°C.

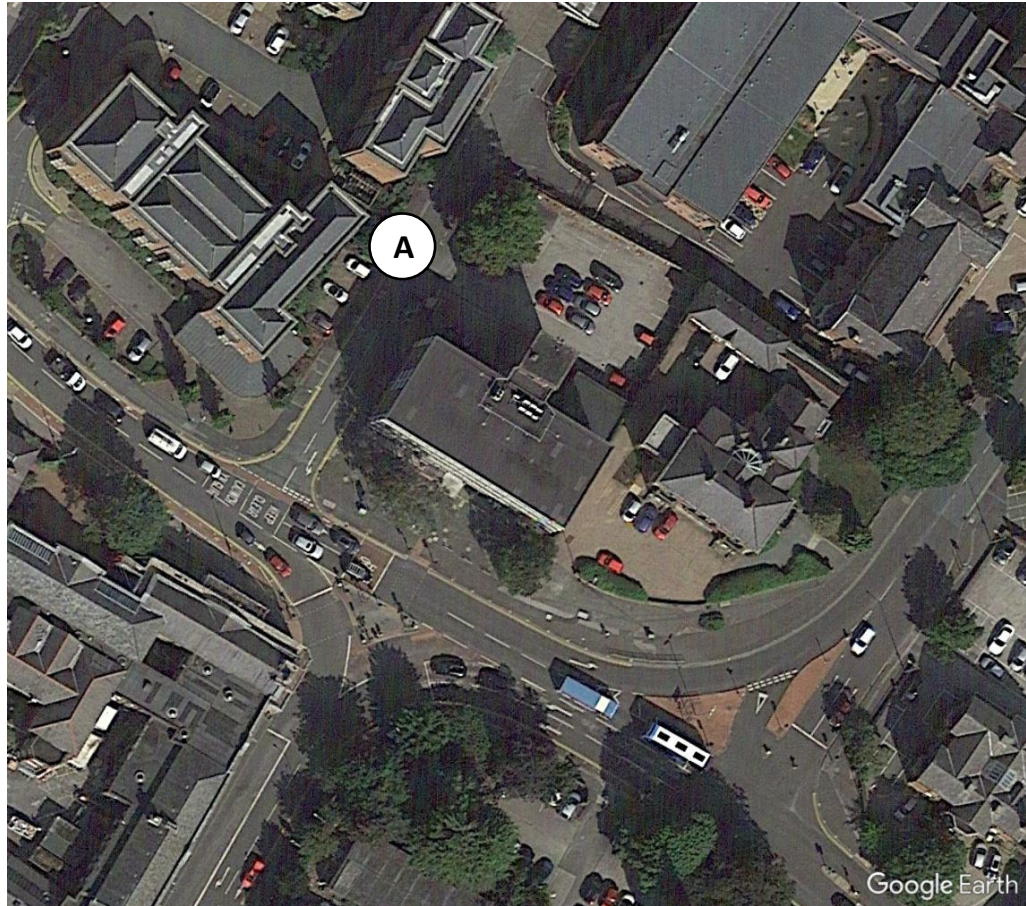
The weather conditions during the survey period are therefore considered to be suitable for undertaking measurements of sound levels.

6.3 Measurement Position

Environmental sound levels were measured at a single position on-site as described in the table below.

Position	Description
A	Microphone situated to the north east of the site on the pavement along Caxton Place outside the residential flats at 1.5m above ground level.

The measurement position is shown on the site plan below.



Site plan showing measurement position

Measurement Position A was selected in order to assess typical environmental sound levels at the nearest noise sensitive receptors.

6.4 Equipment

The following equipment was used to undertake the environmental sound survey.

Equipment	Manufacturer	Model	Serial No.	Calibration Date
Class 1 Sound Level Meter	Bruel & Kjaer	2250	2626230	27/10/2022
Preamplifier	Bruel & Kjaer	ZC-0032	21309	27/10/2022
Microphone	Bruel & Kjaer	4189	2621208	27/10/2022
Class 1 Sound Calibrator	Casella	120/1	3864878	27/10/2022

Field calibration checks were performed on the sound level meter prior to and on completion of the survey and were found to be within acceptable tolerance limits.

6.5 Results

The results of the environmental sound survey are presented below.

Position	Time	L _{Amax,15min} (dB)	L _{Aeq,15min} (dB)	L _{A90,15min} (dB)
A	00:00-00:15	44	36	34
	00:15-00:30	43	38	35
	00:30-00:45	43	36	33
	00:45-01:00	45	36	33

The lowest representative L_{A90} background sound level at Position A is 33dB.

6.6 Discussion of Sound Climate

At Position A, the dominant sound sources during the survey period were occasional road traffic along Regent Street, occasional road traffic along the surrounding road network and low level building services noise from surrounding commercial.

7.0 Atmospheric Plant Sound Emissions Impact Assessment

7.1 Plant Sound Data

Atmospheric building services sound levels have been assessed based on the manufacturers sound data for the proposed 1No. extract fan and 1No. supply fan which indicates octave band sound data as detailed in the tables below.

Extract Fan – Flakt Woods 50 Maxfan Compac - 2.63m³/s at 400Pa

Induct Outlet Sound Power Level (dB) at Octave Band Centre Frequency (Hz)								dBA
63	125	250	500	1k	2k	4k	8k	
85	79	90	89	86	86	81	79	95

Supply Fan - Elta SEL355/2-1AC – 1.32m³/s at 100Pa

Induct Inlet Sound Power Level (dB) at Octave Band Centre Frequency (Hz)								dBA
63	125	250	500	1k	2k	4k	8k	
-	47	64	70	75	74	71	64	79

Whilst it is not possible to assess plant irregularity or impulsiveness based on manufacturer's sound data, BS 4142: 2014 provides an objective method for assessing the audibility of tones in sound. The one-third octave method states that if the level of a one third octave band exceeds the level of both adjacent one third octave bands by the following amounts, then a tonal component may be identified as present:

- 15dB in the low-frequency one-third-octave bands (25Hz to 125Hz);
- 8dB in the mid-frequency one-third-octave bands (160Hz to 400Hz);
- 5dB in the high-frequency one-third-octave bands (500Hz to 10kHz).

However, one third octave band sound data is rarely available from manufacturers as is the case in this instance.

By applying the same principal to the octave band sound data in the table above, a review indicates that these items are unlikely to exhibit a tonal component. As such, no character correction has been applied to the specific sound level for these items.

Should one third octave band sound data become available a revised assessment should be undertaken.

7.2 Plant Location

The locations of the proposed 1No. extract fan and 1No. supply fan have been taken from the following drawing.

Author	Drawing No.	Revision	Date
KRS Steel Services Ltd	C2739/M01	-	Jun 23

This indicates that the proposed 1No. extract fan and 1No. supply fan are situated within the unit with the extract duct penetrating the north east façade and rising up to roof level where it terminates vertically and the supply ducted to a fresh air intake grille situated in the north west façade overlooking Caxton Place.

7.3 Operating Hours

It is understood that the proposed 1No. extract fan and 1No. supply fan have the potential to operate between 11:00 and 01:00 hours seven days a week.

In order to undertake a worst case assessment, it is assumed that the proposed 1No. extract fan and 1No. supply fan operate for the full 15 minute night-time assessment period.

7.4 Nearest Noise Sensitive Receptors

The nearest noise sensitive receptors to the proposed 1No. extract fan and 1No. supply fan are understood to be the residential flats situated to the north west of the site opposite Caxton Place.

The table below details the approximate distance between the proposed 1No. extract fan and 1No. supply fan and the nearest noise sensitive receptors.

Nearest Noise Sensitive Receptors	Plant Item	Approximate Distance (m)
Residential Flats to the North West	Extract Fan	30
	Supply Fan	15

7.5 Calculation

The assessment has been undertaken in accordance with generally accepted acoustic principles for building services plant items and includes corrections for duct dimensions, grille dimensions, end reflections, directivity and distance loss.

7.6 Attenuation Proposals

The proposed 1No. extract fan and 1No. supply fan shall be fitted with an atmospheric silencer as specified in the Silencer Schedule 1106/SS1 enclosed at the rear of the report.

If the atmospheric silencer for the extract fan is installed externally, any ductwork between the atmospheric silencer and penetration of the facade should be acoustically lagged comprising 50mm (min.) mineral wool slab (min. 16kg/m³) wrapped with a polymeric heavy mass barrier material of at least 10kg/m².

7.7 Assessment

The results of the assessment are summarised in the following tables.

Extract Fan

Nearest Noise Sensitive Receptor	Cumulative Rating Level $L_{Ar,15min}$ at Receptor (dB)	Lowest Representative L_{A90} Background Sound Level at Nearest Noise Sensitive Receptor (dB)	Difference (dB)	Local Authority's Requirements Achieved
North West	27	33	-6	Yes

Supply Fan

Nearest Noise Sensitive Receptor	Cumulative Rating Level $L_{Ar,15min}$ at Receptor (dB)	Lowest Representative L_{A90} Background Sound Level at Nearest Noise Sensitive Receptor (dB)	Difference (dB)	Local Authority's Requirements Achieved
North West	29	33	-4	Yes

The assessment indicates that the L_{Ar} rating levels are likely to achieve between 4 and 6dB below the lowest representative L_{A90} background sound level L_{A90} at the nearest noise sensitive receptors.

As such, atmospheric plant sound emissions from the proposed 1No. extract fan and 1No. supply fan are likely to have a low impact at the nearest noise sensitive receptors and achieve the requirements of the Local Authority with the incorporation of the proposed mitigation measures.

8.0 Context

BS 4142: 2014 states the following with regard to the context of the industrial/commercial sound:

"The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs. An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context."

In order to place the industrial/commercial sound in context the following points have therefore been considered:

- Atmospheric plant sound emissions from the proposed 1No. extract fan and 1No. supply fan are likely to have a low impact at the nearest noise sensitive receptor;
- BS 4142:2014 only uses outdoor sound levels to assess the likely effects of sound.

Based on the above, it is considered that the proposed industrial/commercial sound is likely to have a have a low impact at the nearest noise sensitive receptor. This conclusion is reached by professional judgement, taking context into consideration.

9.0 Uncertainty

Weather conditions were monitored during the survey period and were considered to be suitable for undertaking measurements of sound levels. Measurement positions were selected that were representative of the nearest noise sensitive receptor.

Measurements were undertaken during the critical period when environmental sound levels may typically be expected to be at their lowest during the operational period. Whilst environmental sound levels have the potential to be lower than those measured on some occasions, they are likely to be similar to those measured for the vast majority of the time. As such, uncertainty in the survey methodology is considered to be of marginal significance.

The survey was undertaken using Class 1 equipment which had been calibrated within the required intervals. In addition, field calibration checks were performed on the sound level meters prior to and on completion of the survey and were found to be within acceptable tolerance limits. As such, uncertainty in the survey equipment is considered to be of negligible significance.

Assessment data including sound data and operating hours has been based on manufacturers sound data, measured sound data and information received from others. A character correction has been applied as deemed appropriate. As such, uncertainty in the assessment data is considered to be of marginal significance.

Calculations have been undertaken in accordance with recognised procedures and have been performed in a spreadsheet. As such, uncertainty in the assessment is considered to be of negligible significance.

Based on the above, overall uncertainty in the assessment is considered to be of marginal significance.

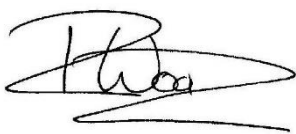
10.0 Conclusions

The Local Authority's plant sound requirements for the proposed 1No. extract fan and 1No. supply fan has been established.

Manned environmental sound measurements during critical periods have been undertaken in order to establish existing representative background sound levels at the nearest noise sensitive receptor.

An assessment of atmospheric plant noise emission levels from proposed the 1No. extract fan and 1No. supply fan to the nearest noise sensitive receptor has been undertaken.

The assessment indicates that the proposed 1No. extract fan and 1No. supply fan are likely to have a low impact at the nearest noise sensitive receptor and achieve the requirements of the Local Authority with the incorporation of the proposed mitigation measures.

A handwritten signature in black ink, appearing to read 'R Wood', with a long horizontal flourish extending to the right.

Robin Wood
LIGHTHOUSE ACOUSTICS

Ref: 1106/SS1

Date: 16 June 2023

Revision: -

Comments: -

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Plant Ref.	Description	Inlet/Outlet	Vol. (m ³ /s)	Typical Length (mm)	Face Velocity (m/s)	Pressure Drop (Pa)	Insertion Loss (dB) at Octave Band Centre Frequency (Hz)							
							63	125	250	500	1k	2k	4k	8k
-	Extract Fan Flakt Woods 50 Maxfan Compac	Exhaust	2.63	1200	<4.5	<55	7	12	19	35	40	36	28	17
-	Supply Fan Elta SEL355/2-1AC	Fresh Air Inlet	1.32	1800	<2.7	<55	13	22	37	43	44	31	24	16