

ATELIER CRESCENDO

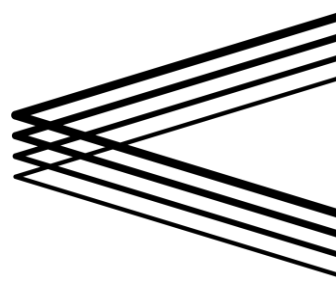
ROCHDALE DEVELOPMENT AGENCY

**HEYWOOD CIVIC CENTRE,
ROCHDALE**

**PLANT NOISE IMPACT ASSESSMENT REPORT
REVISION A**

02/12/2023





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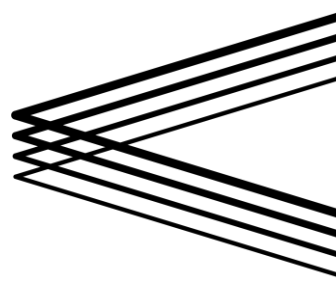


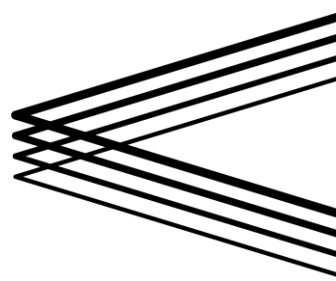
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1 **EXECUTIVE SUMMARY**

Major refurbishment and extension are proposed for Heywood Civic Centre, Rochdale.

As part of the proposals, new ventilation and cooling/heating systems are proposed.

Therefore, Atelier Crescendo have been appointed to undertake a plant noise impact assessment the new systems may have on the nearest residential properties to the south of the site (on Pine Street).

A fully automated background noise survey has been carried out to establish the existing background noise levels at the nearest residential properties.

Following the review of the proposals and calculations, the assessment shows that the noise levels (presented in Table 5) generated by the ventilation and cooling/heating systems proposed on the roof are lower than the plant noise emission limits (presented in Table 4) and therefore achieve the requirements set by the Local Authority.

Detailed calculations are available upon request.



2 SITE DESCRIPTION AND PROPOSALS

2.1 LOCATION

The site is located in Rochdale and falls within the jurisdiction of Rochdale Borough Council.

The approximate site location is indicated on Figure 1 below.

Figure 1 - Approximate site location (in yellow)



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2.2 SITE DESCRIPTION

Heywood Civic Centre (HCC) is located within the town centre of Heywood. It is surrounded by Heywood library to the west, Pine Street to the south, a dedicated car park to the east and LCpl Stephen Shaw MC Way (A6046) to the north.

The nearest noise sensitive receptors are residential properties located across Pine Street to the south of the site.

Figure 2 below presents a plan of the site.

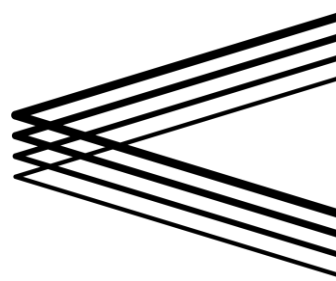


Figure 2 - Site description



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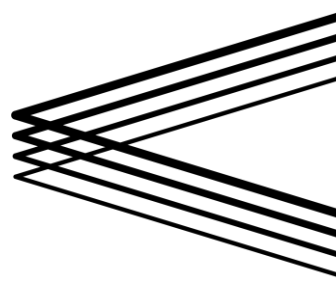
2.3 PROPOSALS

Major renovation, reorganisation and extension of HCC are proposed including:

- > The renovation and reorganisation of the back of house facilities;
- > The extension of the front house facilities;
- > The renovation of the auditorium;
- > The installation of new ventilation and cooling/heating systems, comprising AHUs, an extractor fan and condensers located on the roof (see Section 5.2 for more details about the proposals).

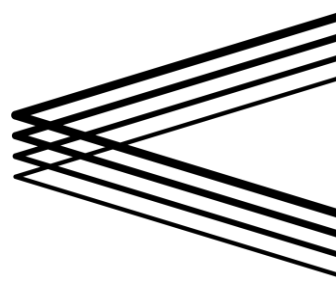
It is understood that the opening hours (and therefore the operation of the new equipment) will stay as they currently are, i.e. opening at 9:00 hours and closing as follows:

- > Approximately 22:30 hours for most touring shows;



- > Approximately 00:00 hours for anniversary/wedding receptions;
- > Approximately 01:00 hours for rare and occasional events such as New year's eve.

Note, the location and the operation of the loading bay are to remain as they currently are.



3 LEGISLATION AND GUIDELINES

3.1 LOCAL AUTHORITY REQUIREMENTS

The site falls within the jurisdiction of Rochdale Borough Council.

Following discussions with Paul Fletcher, Environmental Health Specialist Lead (Environmental protection) at Rochdale Borough Council, it is understood that the noise from new external plant or building services should not exceed 5 dB below the existing background noise when assessed in line with the methodology set in BS 4142:2014 at 1 m from the nearest residential properties.

3.2 BRITISH STANDARD 4142 - METHOD FOR RATING AND ASSESSING INDUSTRIAL AND COMMERCIAL SOUND

BS 4142:2014 describes methods for rating and assessing the effects of outdoor sound levels, of an industrial and/or a commercial nature, *“on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident”*.

The impact of a specific sound is indicated by subtracting the existing background noise level from the rating level (i.e. noise level from the proposed items of plant/machinery/etc plus any acoustic feature corrections).

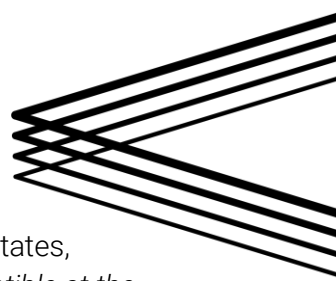
The standard states that:

- > “a difference of around +10dB or more is likely to be an indication of a significant adverse impact”;
- > “a difference of around +5dB is of marginal significance is likely to be an indication of an 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”.

The noise from the current redevelopment is expressed in terms of a rating level and given as a $L_{Aeq, T}$ noise level. The existing background noise level is expressed in terms of a $L_{A90, T}$ noise level.

T is the assessment time interval, 1 hour for operations during day time (07:00 – 23:00) and 15-minutes for operations during night-time hours (23:00 to 07:00 hours).

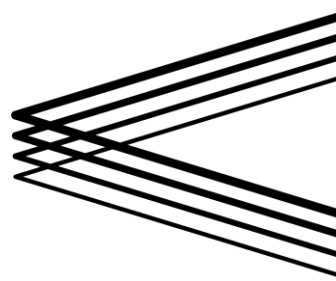
BS 4142:2014 states that if a noise source contains an ‘acoustic feature’, such as tonality, intermittency or impulsiveness, a penalty should be applied.



A penalty of between 0 dB and +6 dB can be applied for tonality, and the standard states, *"Subjectively, this can be converted to a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible, and 6 dB where it is highly perceptible"*.

A penalty of up to +9dB can be applied for impulsivity, and the standard states. *"Subjectively, this can be converted to a penalty of +3 dB for impulsivity which is just perceptible at the noise receptor, +6dB where it is clearly perceptible, and +9 dB where it is highly perceptible"*.

A penalty of +3dB can be applied for intermittency, and the standard states: *"When the specific sound has identifiable on/off conditions, the specific sound level ought to be representative of the time period of length equal to the reference time interval which contains the greatest total amount of on time. This can necessitate measuring the specific sound over a number of shorter sampling periods that are in combination less than the reference time interval in total, and then calculating the specific sound level for the reference time interval allowing for time when the specific sound is not present. If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied."*



4 BACKGROUND NOISE SURVEY

4.1 OVERVIEW

A fully automated background noise survey was undertaken from Friday 19 May 2023 until Tuesday 23 May 2023.

The purpose of the noise survey was to determine representative background noise levels at the nearest residential properties over daytime (07:00–19:00), evening time (19:00 – 23:00) and night-time (23:00–01:00) periods during the week and the weekend.

The results of the survey have been used to inform a plant noise assessment at the nearest noise sensitive properties.

Measurements were taken of the A-weighted (dBA) L_{90} sound pressure levels continuously over periods of 15 minutes.

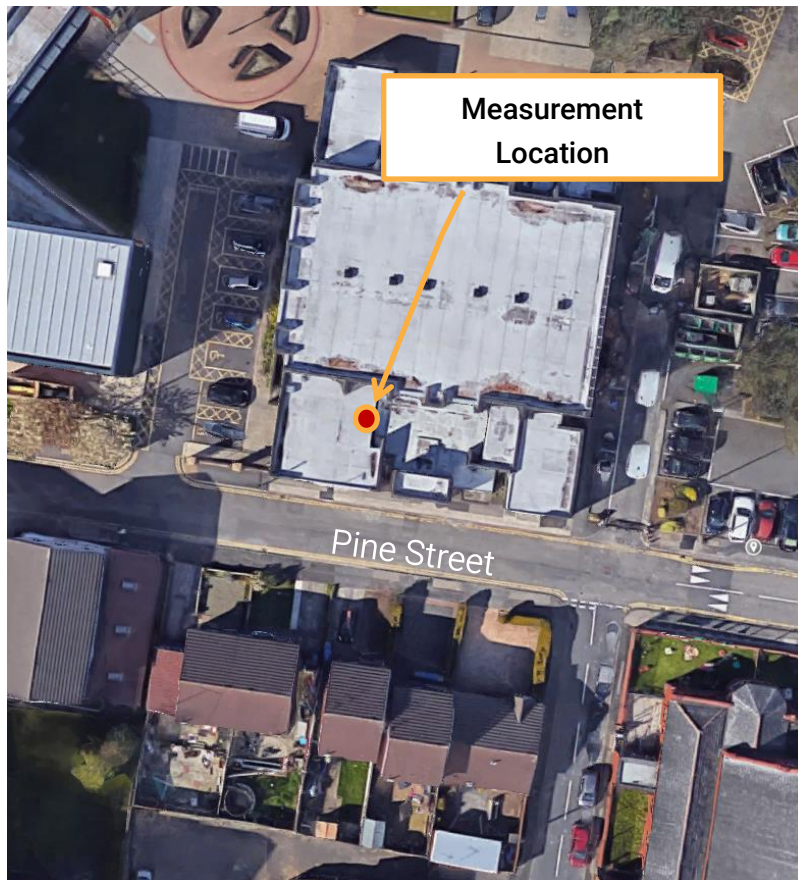
4.2 MEASUREMENT LOCATION

The noise level measurements were undertaken at a single position as described in the table below and shown on Figure 3 below.

Table 1 - Description of the measurement location

Measurement Location	Description
1	The sound level meter was located to the southern of Heywood Civic Centre's roof, at approximately 1.5 meters above the roof level. This location was selected to obtain daytime, evening time and night time background noise levels representative of those that would be measured at the nearest noise sensitive property to the south of the site.

Figure 3 - Noise Measurement Location

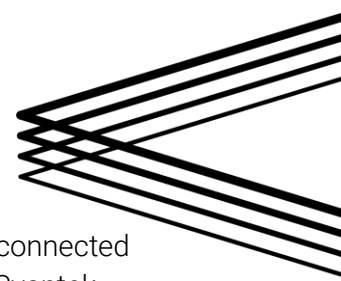


4.3 MEASUREMENT EQUIPMENT

The Table 2 below presents the details of the instrumentation used to undertake the measurements.

Table 2 - Details of measurement instrumentation

<i>Equipment</i>	<i>Manufacturer & Model</i>	<i>Serial Number</i>	<i>Calibration Due Date</i>
<i>Sound level meter</i>	Svantek Type 971a	133607	20/02/2024
<i>Pre-amplifier</i>	Svantek SV 18A	103491	
<i>Microphone</i>	Svantek Type 7152	85914	
<i>Calibrator</i>	Svantek SV33B	139040	23/02/2024



The sound level meter was located in an environmental case with the microphone connected to the sound level meter via an extension cable. The microphone was fitted with a Svantek windshield.

The equipment was calibrated prior to and on completion of the survey. No significant deviations occurred (no more than 0.1 dB).

4.4 SURVEY RESULTS

For the purpose of the assessment, Table 3 below details the lowest background noise levels measured during daytime (09:00–19:00), evening time (19:00–23:00) and night-time (23:00–00:00) periods¹.

Table 3 – Results of background noise survey at the measurement location

<i>Time period</i>	Lowest Background Noise Level
	$L_{A90,T}^*$
Daytime (07:00–19:00)	43 dB
Evening time (19:00–23:00)	41 dB
Night-time (23:00–00:00)	39 dB

*T=1 hour for daytime and evening time periods; T=15min for night-time period

Appendix B includes the Time History Graph. It presents the 5-minute A-weighted (dBA) L_{90} background noise levels measured throughout the duration of the survey.

4.5 METEOROLOGICAL CONDITIONS

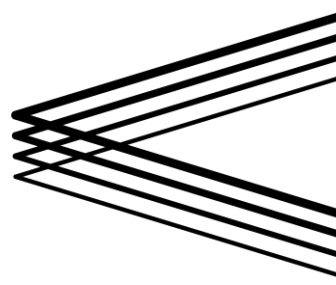
Due to the nature of the survey, i.e. unmanned, it is not possible to accurately comment on the weather conditions throughout the entire duration of the survey.

However, at the beginning and the end of the survey, the ground was identified to be dry under foot and the wind conditions were perceived lower than 5 m/s.

The local temperature was recorded as approximately 25°C during the day and 10°C at night.

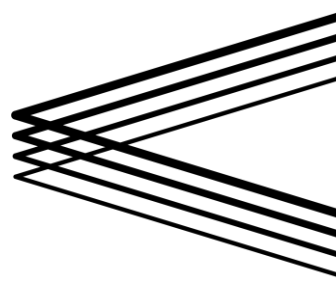
These conditions were considered suitable to undertake accurate and reliable environmental noise measurements around the site.

¹ These time periods are based on the proposed “regular” operation between 09:00 and 00:00 hours, as discussed in Section 2.3.



4.6 DISCUSSION OF NOISE CLIMATE

During attendance on site at all positions, the dominant noise source was noted to be road traffic on LCpl Stephen Shaw MC Way (A6046) and on the surrounding road network.



5 PLANT NOISE ASSESSMENT

5.1 OVERVIEW

As discussed in Section 2.3, new ventilation and cooling/heating systems are proposed to service Heywood and will be located at roof level.

Therefore, this section presents a detailed noise impact assessment of the new systems on the nearest residential properties.

5.2 PROPOSALS

A number of plant are proposed to be installed on the roof of Heywood Civic Centre. They include:

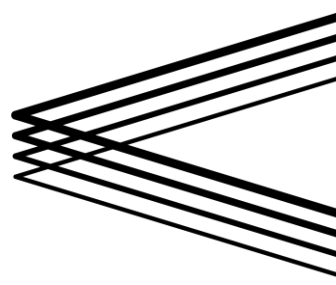
- > **2 new Air Handling Units** on the **roof of the new extension**, which outlets are located at approximately 48 metres from the nearest residential properties to the south;
- > **2 new Air Handling Units** on the **existing roof**, which outlets are located at approximately 36 metres from the nearest residential properties to the south;
- > **1 new Extractor fan** on the **roof of the new extension**, which outlet is located at approximately 48 metres from the nearest residential properties to the south;
- > **4 new condensers** on the **roof of the new extension**, located at approximately 46 metres from the nearest residential properties to the south;

The location of each element is shown on

Figure 4 below.

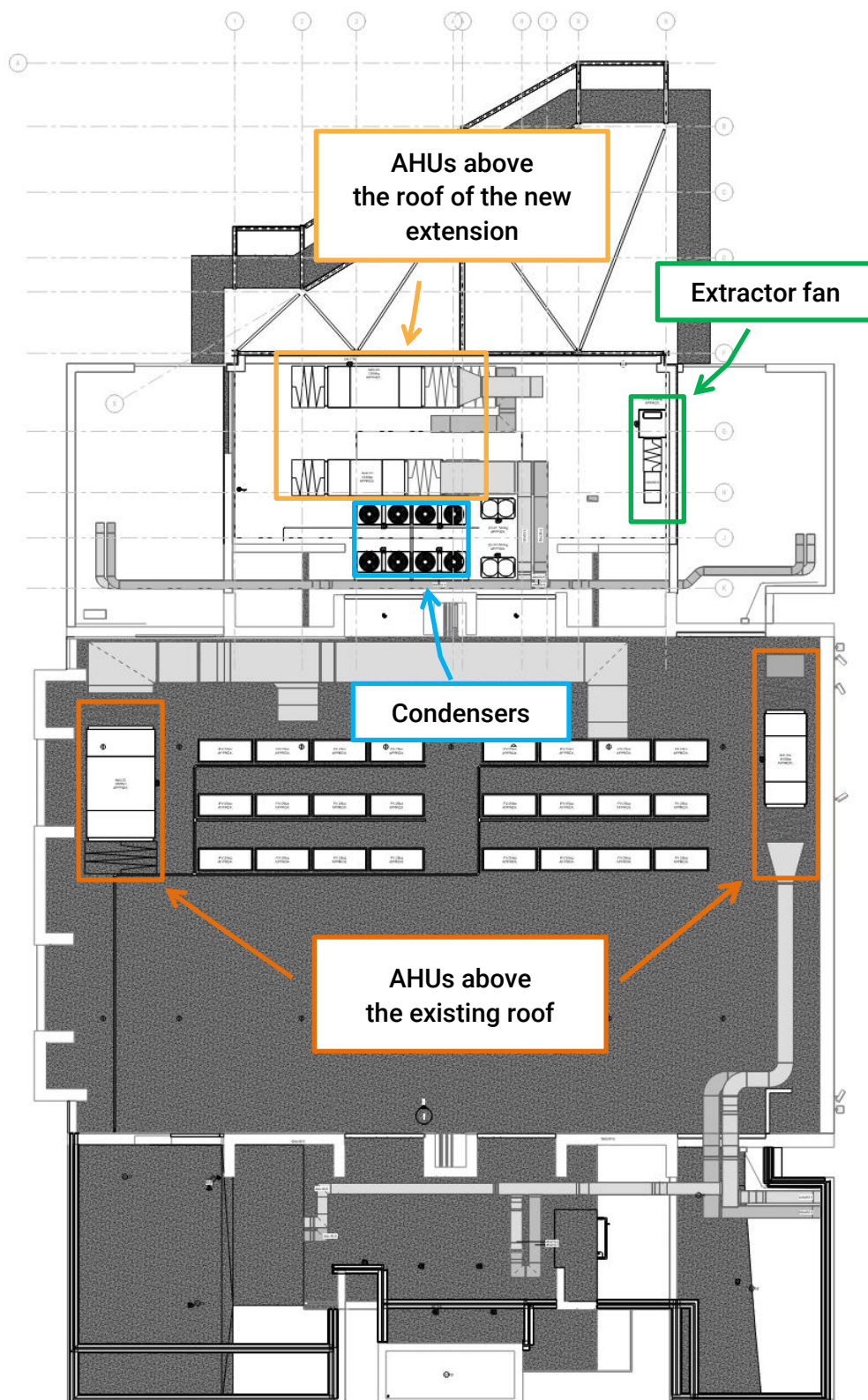
The maximum sound power or pressure levels of the proposed equipment are presented in Appendix C.

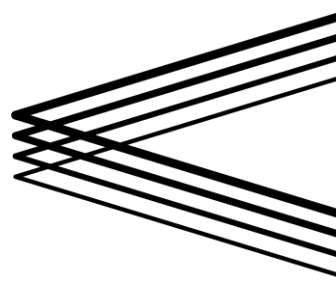
As discussed in Section 2.3 above, proposed “regular” operation of Heywood Civic Centre, and therefore the plant, are between 09:00 and 00:00 hours.



It is understood that all other plant or equipment installed externally will be quiet.

Figure 4 – Location of the proposed plant





5.3 PLANT NOISE EMISSION LIMITS

As discussed in Section 3.1, noise generated by new equipment associated with the development should be controlled so that it is no greater than 5 dB below the prevailing background noise levels at the nearest noise sensitive properties.

Based on this and the results of the background noise survey (presented in Section 4.4), Table 4 below presents the cumulative plant noise emission limits not to be exceeded at the nearest residential properties for daytime (09:00 – 19:00) evening time periods (19:00 – 23:00) and night time (23:00 – 00:00) periods².

Table 4 – Plant Noise Emission Limits

<i>Time period</i>	Plant Noise Emission Limits (to be achieved at 1m from any noise sensitive window) $L_{A,r,Tr}^*$
Daytime (09:00 – 19:00)	38 dB
Evening time (19:00 – 23:00)	36 dB
Night-time (23:00 – 00:00)	34 dB

*Tr=1hour for daytime and evening time periods; T=15min for night-time period

5.4 PLANT NOISE CALCULATIONS

Based on the proposals presented in Section 5.2, calculations have been undertaken to predict the plant noise emission levels at the nearest residential properties to the south of the site.

For the calculations, it has been assumed that the plant can be operated continuously over minimum 1 hour.

The calculations consider distance, directivity and screening losses.

In line with BS 4142:2014 methodology, the noise from all the plant has been assessed to be free from tonality or irregularity.

Table 5 below presents the results of the calculations. Details of the calculations are available upon request.

² These time periods are based on the proposed “regular” operation between 09:00 and 00:00 hours, as discussed in Section 2.3.

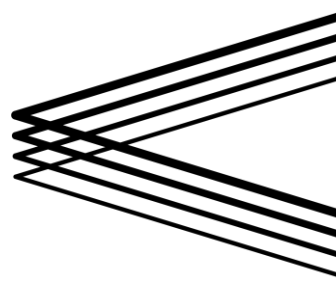


Table 5 – Plant Noise Emission Levels at the nearest residential properties to the south of the site

<i>Receptor</i>	Worst-case Plant Noise Emission Levels
	(at 1m from any noise sensitive window) $L_{Ar,1hr/15min}$
Residential property to the south	28 dB

5.5 CONCLUSION

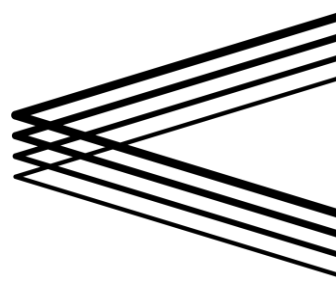
The calculated plant noise emission level, presented in Table 5, is lower than the plant noise emission limits presented in Table 4.

In conclusion, the noise levels from the new ventilation and cooling/heating systems, proposed on roof of Heywood Civic Centre is likely to achieve the Local Authority's requirements and, therefore, unlikely to cause any adverse impact on the nearest residential properties.

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APPENDIX A

ACOUSTIC TERMINOLOGY

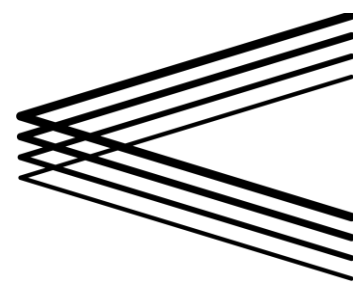


Terminology	Description
<i>Sound Pressure</i>	Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.
<i>Decibel (dB)</i>	Used as a measurement of sound pressure level. It is the logarithmic ratio of the noise being assessed to a standard reference level.
<i>A-weighting, dB(A)</i>	The human ear is more susceptible to mid-frequency noise than the high and low frequencies. To take account of this when measuring noise, the 'A' weighting scale is used so that the measured noise corresponds roughly to the overall level of noise that is discerned by the average human. It is also possible to calculate the 'A' weighted noise level by applying certain corrections to an un-weighted spectrum. The measured or calculated 'A' weighted noise level is known as the dB(A) level. Because of being a logarithmic scale noise levels in dB(A) do not have a linear relationship to each other. For similar noises, a change in noise level of 10dB(A) represents a doubling or halving of subjective loudness. A change of 3dB(A) is just perceptible.
<i>$L_{eq,T}$</i>	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
<i>L_{max}</i>	L_{max} is the maximum sound pressure level recorded over the period stated. L_{max} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the L_{eq} noise level.
<i>L_{90}</i>	If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The L_n indices are used for this purpose, and the term refers to the level exceeded for n% of the time, hence L_{90} is the level exceeded for 90% of the time and as such can be regarded as the background noise level'.
<i>Façade</i>	At a distance of 1m in front of a large sound reflecting object such as a building façade.
<i>Octave Band</i>	Octave Band A range of frequencies whose upper limit is twice the frequency of the lower limit.

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APPENDIX B

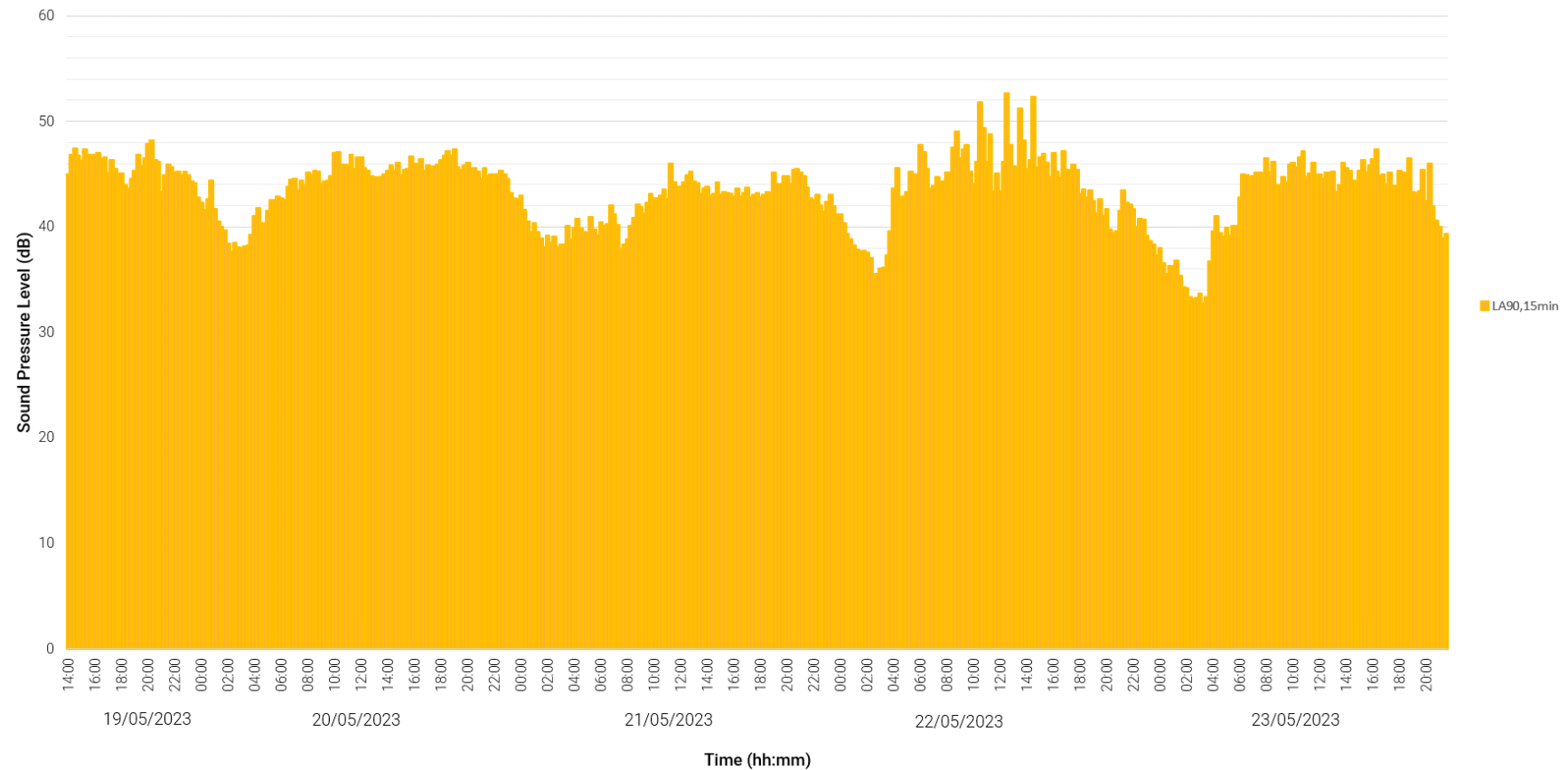
TIME HISTORY GRAP



Heywood Civic Centre, Rochdale

Results of Background Noise Survey (LA90,15min)

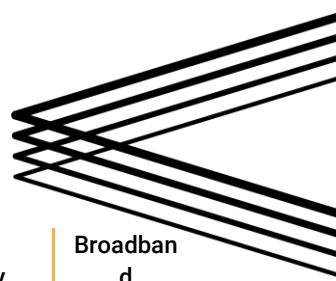
Friday 19 May 2023 - Tuesday 23 May 2023



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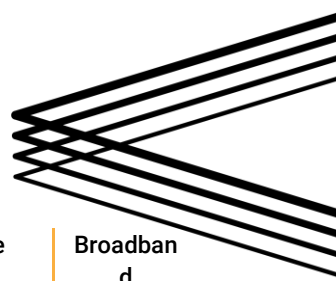
APPENDIX C

PLANT NOISE DATA



Fan reference	Element of fan		Sound Power Levels (dB) in octave band centre frequency								Broadband dBA
			63	125	250	500	1000	2000	4000	8000	
Kitchen Extract	Supply	Inlet (outdoor)	-	-	-	-	-	-	-	-	-
		Outlet (supply)	-	-	-	-	-	-	-	-	-
	Extract	Inlet (extract)	60	51	57	55	58	60	60	52	66
		Outlet (exhaust)	69	53	64	60	65	68	64	58	72
	Surrounding (assumed at 3m)		48	49	49	38	40	36	29	23	45

AHU reference	Element of AHU		Sound Power Levels (dB) in octave band centre frequency								Broadband dBA
			63	125	250	500	1000	2000	4000	8000	
AHU01 TW-IHP	Supply	Inlet (outdoor)	62	80	72	64	60	54	44	36	69
		Outlet (supply)	69	78	82	84	84	79	74	66	87
	Extract	Inlet (extract)	57	73	67	66	62	64	58	56	69
		Outlet (exhaust)	61	71	76	81	78	73	68	52	82
	Surrounding (assumed at 3m)		72	78	65	58	58	50	43	37	43
AHU02 IHP	Supply	Inlet (outdoor)	49	71	62	53	46	38	32	24	58
		Outlet (supply)	65	77	78	77	75	72	67	61	80
	Extract	Inlet (extract)	54	72	60	52	44	37	30	21	58
		Outlet (exhaust)	68	76	75	73	71	69	63	59	76
	Surrounding (assumed at 3m)		68	71	58	49	47	42	36	31	57
AHU03 IHP	Supply	Inlet (outdoor)	65	76	62	53	42	36	23	10	62
		Outlet (supply)	71	73	73	73	72	67	62	53	76
	Extract	Inlet (extract)	63	77	63	55	43	39	30	26	62
		Outlet (exhaust)	71	72	72	72	71	66	61	52	75
	Surrounding (assumed at 3m)		78	75	58	48	47	40	33	24	60
AHU04 TW-IHP	Supply	Inlet (outdoor)	67	82	69	59	51	47	39	27	67
		Outlet (supply)	73	77	79	76	79	73	69	60	82
	Extract	Inlet (extract)	52	74	61	54	48	41	34	24	60
		Outlet (exhaust)	57	67	69	72	74	65	62	53	76
	Surrounding (assumed at 3m)		76	76	62	50	53	43	38	29	62



Pant reference	Element of fan	Sound Pressure Levels (dB), at 1 m, in octave band centre frequency								Broadband dBA
		63	125	250	500	1000	2000	4000	8000	
PURY- P350	Standard (heating mode)	71	66	66	63	58	53	48	42	64
	Low noise mode	55	55	51	47	43	37	36	35	49