MZA ACOUSTICS

BARNSLEY COLLEGE, CHURCH STREET CAMPUS

Plant Noise Assessment

Document History

Project Document Reference: 1700866-RP-PNA-0001

Rev	Date	Comment	Author	Checked
1	31st October 2024	Updated Plant Assessment	RC	AH

Contents

1 INTRODUCTION

MZA Acoustics has been appointed by G F Tomlinson & Sons Ltd on behalf of Barnsley College (the Client) to undertake a noise impact assessment due to the alterations of the rooftop mechanical plant located at Barnsley College, 49 Church Street, Barnsley, S70 2AX.

This report has been prepared to support a retrospective planning application to be submitted to Barnsley Metropolitan Borough Council (BMBC).

A baseline environmental noise survey has been undertaken at a location representative of the nearest noise sensitive receivers to the site in order to establish the prevailing background and ambient noise levels.

This report occasionally employs technical terminology. To assist the reader, a glossary of terms is presented in Appendix A.

2 SITE DESCRIPTION

2.1 Existing Site Location and Environment

Barnsley College, 49 Church Street, Barnsley, S70 2AX, herby referred to as 'The Site', is an existing further education premises.

It is proposed to undertake renovation works to the site in order to develop new Institute of Technology (IOT) teaching spaces.

Renovation works will also be carried out on the central atrium space, removing the existing atrium ceiling, and creating three additional mezzanine floors to cater for new learning resource centre (LRC) space and café at ground floor level.

The locations of the proposed site in relation to its surroundings is presented in Figure 1.

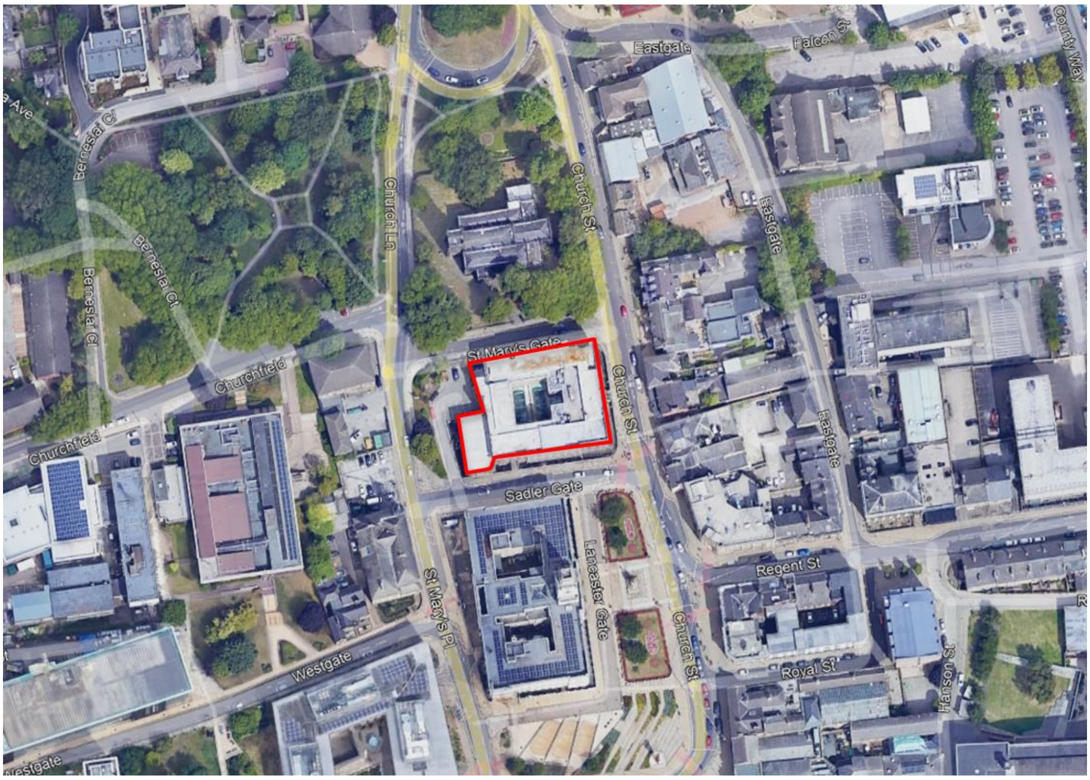


Figure 1 – Site location and its surroundings

2.2 Nearest Noise Sensitive Receptors (NSRs)

The nearest noise sensitive premises to has been identified as Flats 1-4, 33 Church Street, Barnsley, South Yorkshire, S70 2AH, residentials dwelling located 20 metres (at the closest point) to the east of the Site.

The other noise sensitive premises identified is the St Mary's Church, located approximately 30 metres (at the closest point) to the north of the Site.

3 ASSESSMENT GUIDANCE

3.1 Local Authority Criteria

The site is located within the local authority of Barnsley Metropolitan Borough Council (BMBC). It is understood that the BMBC assess each application on its own merit in terms of plan noise emissions near to residential or noise sensitive receptors (NSRs).

In absence of any specific planning criteria, a review of similar assessment on the BMBC planning portal shows that typically the plant noise limits are set in accordance with BS4142:2014 with the target of 5 dB below the prevailing typical background sound levels.

Based on the above, the cumulative rating noise level ($L_{Ar,Tr}$) from the proposed plant shall be 5 dB below the measured daytime and night-time typical background sound level ($L_{AF90,15minute}$) when measured 1m from nearest façade of the NSRs.

3.2 BS 4142:2014 Methods For Rating and Assessing Industrial and Commercial Sound

BS 4142 provides a methodology for rating and assessing sound associated with both industrial and commercial premises. The purpose of the Standard is clearly outlined in the opening section where it states that the method is appropriate for the consideration of:

- 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 movements on or around an industrial and/or commercial site.

The Standard is based around the premise that the significance of the noise impact of an industrial/commercial facility can be derived from the numerical subtraction of the background sound level (not necessarily the lowest background level measured, but the typical background of the receptor) from the measured/calculated rating level of the specific sound under consideration. This comparison will enable the impact of the specific sound to be concluded based upon the premise that typically "the greater this difference, the greater the magnitude of the impact". This difference is then considered as follows:

- 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 the context.
- 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."

BS 4142 further states that "where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact" again depending upon the specific context of the site. The Standard further qualifies the assessment protocol by outlining conditions to the comparative assessment and stating that "not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact", thus implying that all sites should be assessed on their own merits and specifics.

The Standard quantifies the typical reference periods to be used in the assessment of noise, namely:

- Typical Daytime 07:00 – 23:00 1-hr assessment period
- Typical Night-time 23:00 – 07:00 15-min assessment period

The Standard also outlines methods for defining appropriate "character corrections" within the rating levels to account for tonal qualities, impulsive qualities, other sound characteristics and/or intermittency. These are:

a. the Subjective Method,

b. the Objective Methods for tonality; and,

c. the Reference Method.

It is noted by the Standard that where multiple features are present the corrections should be added in a linear fashion to the specific level.

Table 1 – BS 4142 Subjective Method Rating Correction

<table>
<tr><th>Level of Perceptibility</th><th>Tonal Correction dB</th><th>Impulsivity Correction dB</th><th>Correction for 'other sound characteristics' dB</th><th>Intermittency Correction dB</th></tr>
<tr><td>No Perceptibility</td><td>+0</td><td>+0</td><td rowspan="4">Where neither tonal nor impulsive but clearly identifiable
+3</td><td rowspan="4">If intermittency is readily identifiable
+3</td></tr>
<tr><td>Just Perceptible</td><td>+2</td><td>+3</td></tr>
<tr><td>Clearly perceptible</td><td>+4</td><td>+6</td></tr>
<tr><td>Highly perceptible</td><td>+6</td><td>+9</td></tr>
</table>

4 BASELINE ENIVRONMENTAL NOISE SURVEY

4.1 Measurement Location

Continuous unattended monitoring was undertaken between 12:00 hours on Monday 3rd April to 12:00 Tuesday 4th April 2023 to establish the prevailing noise levels during the daytime and night-time (shown as LT1 in Figure 1 below).

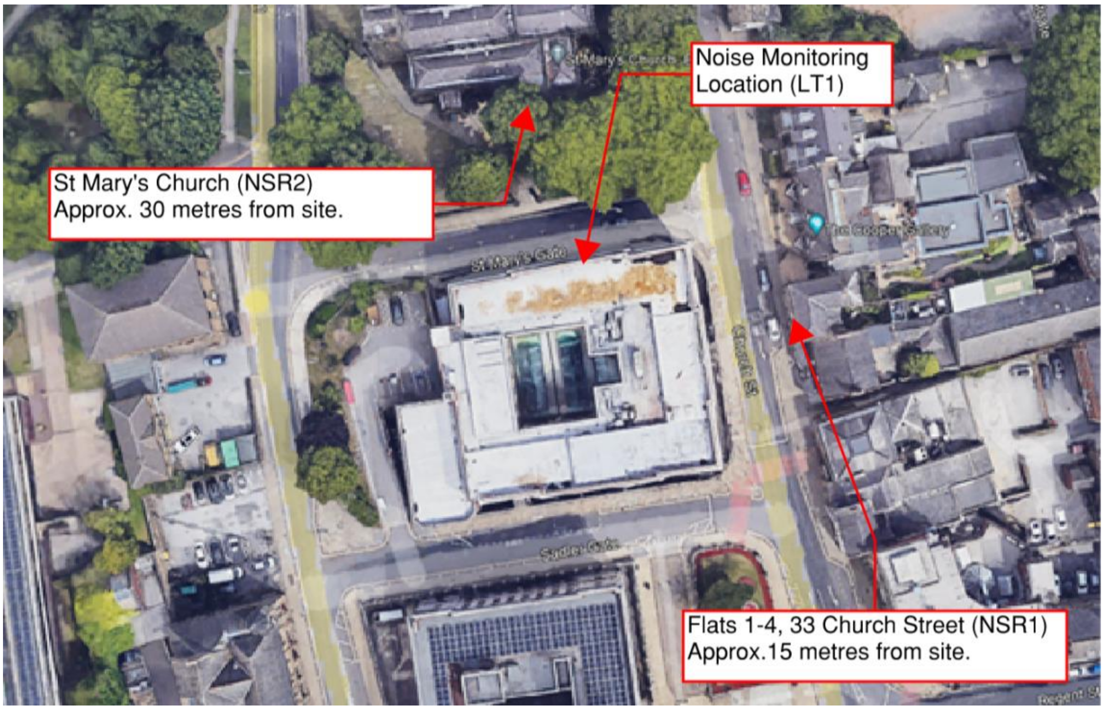


Figure 2 – Monitoring location and noise sensitive receptors.

At the monitoring position the microphone was mounted to a pole out of an upper floor window, approximately 1m from the facade. This is in line with the assessment methodology (noise level as measured 1m from the façade of the nearest NSR) and as such will not be corrected to a free-field level.

Throughout the monitoring survey, the noise climate was dominated by distant road traffic noise from the surrounding road network.

For robustness, although the NSR1 is located sightly closer to the site, the microphone was positioned to the rear of the building, overlooking the church, as the traffic along St Mary's Gate is lower and would likely experience lower background sound levels.

4.2 Weather Conditions

Weather throughout the survey was appropriate for the measurement of environmental noise, i.e. dry with windspeeds generally below 5 m/s.

4.3 Equipment

Microphones and sound level meters have been calibrated at UKAS accredited laboratories within the preceding two years, whilst field calibrators have been laboratory calibrated within the preceding 12 months.

The equipment was field calibrated prior to, and on completion of, measurement and no significant drift (<0.5 dB) in calibration was detected.

4.4 Measurement Results

The unattended monitoring results are presented in Table 2. The long-term measurement data is presented in graphical format in Appendix C. Note that the levels have been presented as measured (uncorrected façade levels) which correlates to how the plant noise rating levels are to be assessed; at a distance of 1m from the façade of the NSRs.

Table 2 – Unattended survey results

Location	Period	Equivalent Continuous Sound Level, dB $L_{Aeq,T}$	Typical Background Sound Level, dB $L_{AF90,T}$[1]
LT1	Daytime (07:00 – 23:00)	60	46
	Night-time (23:00 – 07:00)	52	34

[1] The typical background sound level has been determined by analysing the measured data and selecting the lowest modal value, in accordance with the guidance in BS 4142:2014.

5 NOISE EMISSION LIMITS

5.1 Plant Noise Emission Limits

The nearest noise sensitive premises to the plant location has been identified as Flats 1-4 33, Church Street, Barnsley, South Yorkshire, S70 2AH, residential dwellings located 20 metres (at the closest point) to the east of the Site. The other noise sensitive premises identified is the St Mary's Church, located approximately 30 metres (at the closest point) to the north of the Site.

As discussed in Section 3, the cumulative rating noise level ($L_{Ar,Tr}$) from any proposed plant shall be 5 dB below the measured daytime and night-time typical background sound level ($L_{AF90,15minute}$) when measured 1m from nearest façade of the NSRs.

Calculations have been undertaken to set the noise emission limits from the proposed scheme as shown in Table 3.

Table 3 – Maximum noise emissions from proposed scheme

Calculation Step	Parameter	
	Daytime (07:00 – 23:00)	**Night-time (23:00 – 07:00)**
Measured Typical background sound level at LT1	46 dB $L_{AF90,T}$	34 dB $L_{AF90,T}$
Correction for local authority requirement of 5 dB below background	- 5 dB	- 5 dB
Maximum noise rating level at 1m from the façade of the noise sensitive receptor	41 dB $L_{Ar,Tr}$ [1]	29 dB $L_{Ar,Tr}$[1]
[1]Maximum noise rating level at 1m from NSR façade should include penalties for any tonal, intermittent & impulsive plant noise characteristics in accordance with BS4142:2014.		

6 PLANT NOISE ASSESSMENT

6.1 Proposed Rooftop Mechanical Plant

The newly proposed plant associated with the development is presented in Table 4. This table presents broadband plant noise data for each item, however, octave band data, obtained from the manufacturer, has been used in the noise model.

Table 4 – Proposed rooftop mechanical plant and manufacturer noise data

Plant Item		Manufacturer	Location Served	No. of items	A-weighted Sound Level [1]
PURYP600YSNW (VRF Heat Pump)		Mitsubishi	GF North / L02 North	2	70 dB $L_{pA\ 1m}$
PURYP500YNW (VRF Heat Pump)		Mitsubishi	L03 North / L02 South	2	65 dB $L_{pA\ 1m}$
PURYP550YNW (VRF Heat Pump)		Mitsubishi	L01 South	1	65 dB $L_{pA\ 1m}$
PURYP450YNW (VRF Heat Pump)		Mitsubishi	GF South / L01 North / L03 South	3	70 dB $L_{pA\ 1m}$
HRU 01	Intake	Nuaire	2nd floor WC	1	36 dB L_{wA}
	Discharge				44 dB L_{wA}
HRU 02	Intake	Nuaire	WC Areas	1	51 dB L_{wA}
	Discharge				61 dB L_{wA}
EF 01 (Extract Fan)		Nuaire	Dishwasher Canopy	1	70 dB L_{wA}
EF 02 (Extract Fan)		Nuaire	Comms & Server Rooms	1	69 dB L_{wA}
AHU 03	Intake	Fre-sh-air	Atrium	1	82 dB L_{wA}
	Discharge				91 dB L_{wA}
AHU 04	Intake	Fre-sh-air	Teaching Spaces	1	75 dB L_{wA}
	Discharge				85 dB L_{wA}
PUHZ-ZRP250YKA3 (DX Condenser)		Mitsubishi	AHU 01 / AHU03	7	62 dB $L_{pA\ 1m}$
PUHZ-ZRP200YKA3 (DX Condenser)		Mitsubishi	AHU 02 / AHU04	5	62 dB $L_{pA\ 1m}$
PUZ-ZM50VKA2 (DX Condenser)		Mitsubishi	Server Rooms	4	46 dB $L_{pA,\ 1m}$
LGH-50RVX-E (Lossnay Unit)	Intake	Mitsubishi	Third Floor Meeting Room / LRC Office	2	34 dB $L_{pA\ 1.5m}$
	Discharge				34 dB $L_{pA\ 1.5m}$

[1] Level stated is per item.

6.1.1 Noise Impact Assessment

New plant is to be installed on the roof of the Site in order to provide ventilation within the classrooms, atrium, offices and toilet facilities.

The cumulative noise level has been determined using a 3D noise model of the roof plant area, the Barnsley College building (as proposed), and the nearest NSRs. The noise model has been built in the CadnaA (2024, 64bit) noise modelling software, which uses calculation methods based on guidance within ISO 9613-2:2024 *'Acoustics — Attenuation of sound during propagation outdoors - Part 2: Engineering method for the prediction of sound pressure levels outdoors'*. This standard outlines methods for predicting A-weighted sound levels based on atmospheric propagation, ground effect, surface reflection, and screening from obstacles. The building geometry has been simplified somewhat, however, includes important features such as the perimeter boundary, and any variation in building height across its footprint. The sound levels have been modelled to be 1.5m above roof level.

It is understood that the VRF located on the roof will typically operate during daytime hours, however, they have the potential to operate during the night time hours. This will likely be due to heating demand during the colder months, to heat the building for the day ahead, and is likely to be between the hours of 04:00 and 07:00. As such the units have been included in the model for both daytime and night time. However, as the VRF units do have a 'night mode', which runs at a lower duty and lower noise level, these units have been modelled as such during the night time. All other units are modelled to be running at full capacity, simultaneously. In reality, it is likely that not all of the units will be running simultaneously due to varying demand. As such the scenario modelled here represents a worst-case.

It should be noted that in the case where a unit has multiple run modes (most have a heating/cooling setting) the louder of the two settings has been used in the assessment. Taking this into account, alongside the fact that not all units will be running at full capacity at all times, the assessment levels presented here are worst-case. It should be noted that, in most cases, the cumulative noise emission level will be lower. Most instances will see some units running whilst others are dormant, resulting in a lower cumulative noise level than is presented here.

The new nature of the plant suggests that any impulsivity or intermittency, so as to draw additional attention to the plant, is unlikely. Therefore, no noise characteristic penalties have been applied for these attributes. However, tonality may feature and as such tonality has been accounted for in the assessment.

Tonality corrections correlate 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. These levels are to be applied subjectively, in line with the guidance within BS4142:2014, and as such must be taken in context. It cannot be known exactly what the perception of tonality will be until the equipment is installed and operational, however, we can make some assumptions based on the context of the scheme as it stands.

It is assumed that a rating level of no more than +4 dB would be applied. This correlates to a tonality which is 'clearly perceptible'. This is likely to be much lower and as such this is considered a worst-case scenario. Due to the new nature of the plant items to be installed as well as the difference between the specific sound from plant and the background sound level, a rating of +0 dB or +2 dB is much more likely to be relevant.

The cumulative noise level of the proposed roof top plant during the daytime and night-time is presented in Table 5 and Table 6, respectively. Note that the cumulative sound pressure levels presented in the tables have been measured at 1m from the façade of the NSRs, accounting for façade reflections.

Table 5 – Noise impact assessment of mechanical plant to be installed on the roof (daytime)

Plant Duty [1]	Criterion (5 dB below background level), dB $L_{Ar,Tr}$	Cumulative Sound Pressure Level 1m from the Façade, dB $L_{Aeq,Tr}$		BS4142:2014 Rating Level, dB $L_{Ar,Tr}$ [2] (= dB $L_{Aeq,T}$ + tonality correction)		Rating level Relative to Criteria, dB	
		NSR1	NSR2	NSR1	NSR2	NSR1	NSR2
70%	41	33	27	37	31	-4	-10
85%		37	31	41	35	0	-6
100%		42	36	46	42	+5	+1

[1] Note that this refers to duty of the 8no. VRF units serving the atrium and open plan areas, operational in heating mode.

[2] Rating level is based upon the specific sound level of the source (which her is the cumulative sound pressure level of the plant), plus an acoustic correction for tonality as follows:

- +2 dB for a tone which is just perceptible
- +4 dB for a tone which is clearly perceptible
- +6 dB for a tone which is highly perceptible

Table 6 – Noise impact assessment of mechanical plant to be installed on the roof (night time).

Plant Duty [1]	Criteria (5 dB below background level), dB $L_{Ar,Tr}$	Cumulative Sound Pressure Level 1m from the Façade, dB $L_{Aeq,Tr}$		BS4142:2014 Rating Level, dB $L_{Ar,Tr}$ [2] (= dB $L_{Aeq,T}$ + tonality correction)		Rating level Relative to Criteria, dB	
		NSR1	NSR2	NSR1	NSR2	NSR1	NSR2
Night Mode	29	29	25	33	29	+4	0

[1] Note that this refers to duty of the 8no. VRF units serving the atrium and open plan areas, operational in heating mode

[2] Rating level is based upon the specific sound level of the source (which her is the cumulative sound pressure level of the plant), plus an acoustic correction for tonality as follows:

- +2 dB for a tone which is just perceptible
- +4 dB for a tone which is clearly perceptible
- +6 dB for a tone which is highly perceptible

Table 5 shows that during the daytime the target criterion of 5 dB below the typical background sound level is achieved at both receptors, even with a tonality penalty of +4 dB, for all units running simultaneously, when the VRF plant duty is at 85% or less. The criterion is exceeded when plant duty is set to be 100%. However, all items of plant running at 100% duty whilst in heating mode would under extreme circumstances and is not considered to be a representative scenario. Experience from large building schemes using VRF units has shown that the units are likely to run at a duty of 70% or lower.

When running at 100% duty Table 5 shows the rating level, assuming an acoustic correction penalty of +4 dB, exceeds the applied criterion by +5 dB. However, it should be noted that the applied criterion targets 5 dB below the background sound level, meaning that this exceedance of the criteria by 5 dB still would provide a BS4142:2014 rating level that is **equal to the background sound level**. As discussed in Section 3.2, BS4142:2014 states the following:

> *"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."*

When running night mode Table 6 shows the rating level, assuming an acoustic correction penalty of +4 dB, exceeds the applied criterion by +4 dB. As above, it should be noted that the applied criterion targets 5 dB below the background sound level, meaning that this exceedance of the criteria by 4 dB still would provide a BS4142:2014 rating level that is **below to the background sound level**. As above, this indicates that noise from the roof plant will have a low impact, depending on the context. As this rating level is based on all units running simultaneously, and assuming a tonality correction of +4 dB (for tonality that is clearly perceptible at the receptor), this is likely to b a worst-case scenario and does not represent typical operation. In reality the noise levels, and the associated impact, will be lower in day-to-day operation of the plant.

Based on the above, the noise emissions from the plant as presented here is likely to have a low impact at the NSRs. When accounting for the fact this assumes all items of plant are running simultaneously and with an acoustic penalty for tonality that is 'clearly perceptible', this is likely to present a worst-case scenario. In most instances, perhaps at all times, the rating level will be lower, indicating a lower potential for impact due to noise.

6.1.2 Acoustic Mitigation

It should be noted that the above findings are based on the proposed layout, plant noise levels as presented in data from the design team, and proposed insertion losses for specified in-duct acoustic attenuators. If any of these details are to change then this assessment will need to be revisited. The attenuator schedule as currently proposed by the project building services engineers can be seen in Table 7.

Table 7 – Attenuator schedule for atmosphere-side noise emissions

Plant		Length (mm)	PD (Pa)	Dynamic Insertion Loss (dB)							
				63	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**
AHU 03	Inlet	1200	30	5	9	17	25	30	23	18	11
	Discharge	1200	30	5	9	17	25	30	23	18	11
AHU 04	Inlet	900	30	6	9	15	18	25	15	11	8
	Discharge	900	30	6	9	14	17	23	13	10	7
HRU 01	Inlet	600	5	1	2	6	16	23	19	17	12
	Discharge	600	5	1	2	6	16	23	19	17	12
HRU 02	Inlet	600	26	1	3	6	15	25	21	19	11
	Discharge	600	5	1	2	6	15	20	15	14	10
EF 01	Discharge	900	29	3	7	13	26	37	30	26	16
EF 02	Discharge	600	5	1	2	6	16	23	19	17	12

6.1.1 Attenuator Pressure Drops

The pressure drop caused by the presence of an attenuator has the potential to produce regenerated noise, which can have an adverse impact on the overall noise level generated if not controlled.

The table shows that all atmosphere-side attenuators have a pressure drop of below 35Pa and as such will not cause any significant regenerated noise. Note that these are based on the data presented in the Allaway Acoustics attenuator schedule 95611-11295611Q2. Any changes to these may require revisiting the assessment to ensure acoustic criteria are met.

7 CONCLUSION

MZA Acoustics has been appointed by G F Tomlinson & Sons Ltd on behalf of Barnsley College (the Client) to undertake a noise impact assessment due to the alterations of the rooftop mechanical plant located at Barnsley College, 49 Church Street, Barnsley, S70 2AX.

This report presents to the findings of the noise impact assessment associated with mechanical plant serving the development.

Based on the data presented herein, noise from the development will have a low impact upon the nearby receptors, even when considering the worst-case scenario of all plant running simultaneously. During typical operation, noise from the development will be equal-to or lower-than 5 dB below the background noise level, meaning the impact upon receptors will be even lower and noise emissions will not contribute to background creep.

Appendices

Appendix A – Glossary of Acoustic Terminology

Acoustics is the branch of physics concerned with the properties of sound, including ultrasound, infrasound and vibration. A scientist or engineer who works in the field of acoustics is an acoustician or acoustic engineer.

Sound can be measured by a sound level meter or other measuring system. Noise is related to a human response, and is routinely described as unwanted sound, or sound that is considered undesirable or disruptive. Care has been taken in this document to use the most relevant of these terms (whereby 'sound' is used predominantly); however, in most reference documents, and, indeed, generally, 'sound' and 'noise' are used interchangeably. Consequently, just because the term 'noise' is used doesn't necessary mean a negative effect exits or will occur, and the context of the accompanying text should be taken into account.

Human hearing is able to respond to sound in the frequency range 20 Hz (deep bass) to 20,000 Hz (high treble), and over the audible range of 0 dB (the threshold of perception) to 140 dB (the threshold of pain).

The ear does not respond equally to different frequencies of the same magnitude, but is more responsive to mid-frequencies than to lower or higher frequencies. To quantify sound in a manner that approximates the response of the human ear, a weighting mechanism is used, which reduces the importance of lower and higher frequencies in a similar manner to human hearing.

The weighting mechanism that best corresponds to the response of the human ear (though not necessarily perfectly) is the 'A'-weighting scale. This is widely used for environmental sound measurement, and the levels are denoted as dBA, dB(A) or L_{Aeq}, L_{A90} etc. according to the metric being measured or determined (see the Definitions over leaf).

The decibel scale is logarithmic rather than linear, and hence a 3 dB increase in sound level represents a doubling of the sound energy present. Judgement of sound is subjective, but as a general guide a 10 dB increase can be taken to represent a doubling of loudness, whilst an increase in the order of 3 dB is generally regarded as the minimum difference needed to perceive a change under normal listening conditions. Where other changes occur (associated with the change in sound level), such as additional vehicle movements on a road, which can be seen, then these may result in changes in sound level being more noticeable than they might otherwise be.

Further to such visual clues, and any other non-acoustical factors that affect people's response (such personal characteristics, and social, residential, or environmental factors), the subjective response to a sound is dependent not only upon the sound pressure level and component frequencies, but also its intermittency. Consequently, various metrics have been developed to try and correlate people's attitudes to different sounds with the sound level and its fluctuations. The metrics used in this document, as per the relevant guidance, are defined overleaf.

Ambient Sound — Sound from all sources at any given time, form both near and far. Usually measured in terms of L_{Aeq}.

A-Weighting — The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.

Background Sound Level — The A-weighted sound pressure level that can be considered the baseline in the absence of any noise from a specific source of sound under assessment. Measured in terms of $L_{A90, T}$.

Calibration — The measurement system/ chain should be periodically calibrated, within a laboratory, against traceable calibration instrumentation, to either National Standards or as UKAS-Accredited, as required. The calibration of the system should also be checked in the field using a portable calibrator before and after each short-term measurements, and periodically for longer term monitoring.

Class 1 — The Class of a sound level meter describes its accuracy as defined by the relevant international standards – Class 1 is more accurate than Class 2. The older standard IEC 60651 referred to the grade as "Type", whereas the new standard IEC 61672 refers to it as the "Class". The most accurate meters used in the field (as opposed to a laboratory) are Class 1. Class 2 meters can be used in some instances; however, MZA Acoustics use Class 1 (or Type 1) meters by default, as required by BS 4142:2014, for example.

Decibel — A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds (s1 and s2) is given by 20 log10 (s_1/s_2). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20 Pa.

Fast time Weighting (F) — Averaging time used in sound level meters. Defined in BS EN 61672-2:2013 Electroacoustics. Sound level meters. Pattern evaluation tests.

Free-field / Façade — Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5 m away.

$L_{AF90, T}$ — The A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time fast time-weighting (F). Generally used to describe the 'background' sound conditions.

LAFmax — The maximum A-weighted sound pressure level during a given time period. Lmax is sometimes used for the assessment of occasional loud sounds, which may have little effect on the overall L_{eq} noise level, but could still affect the sound environment. Unless described otherwise, it is measured using the fast time-weighting (F).

Leq, T — A sound level index called the equivalent continuous sound 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. Where the value is A-weighted, is will be presented '$L_{Aeq,T}$' or 'dBA $L_{eq,T}$', otherwise is should be an un-weighted (or linear) value.

Lp — See Sound Pressure Level.

Noise — Related to human response to sound. Unwanted sound, or sound that is considered undesirable or disruptive.

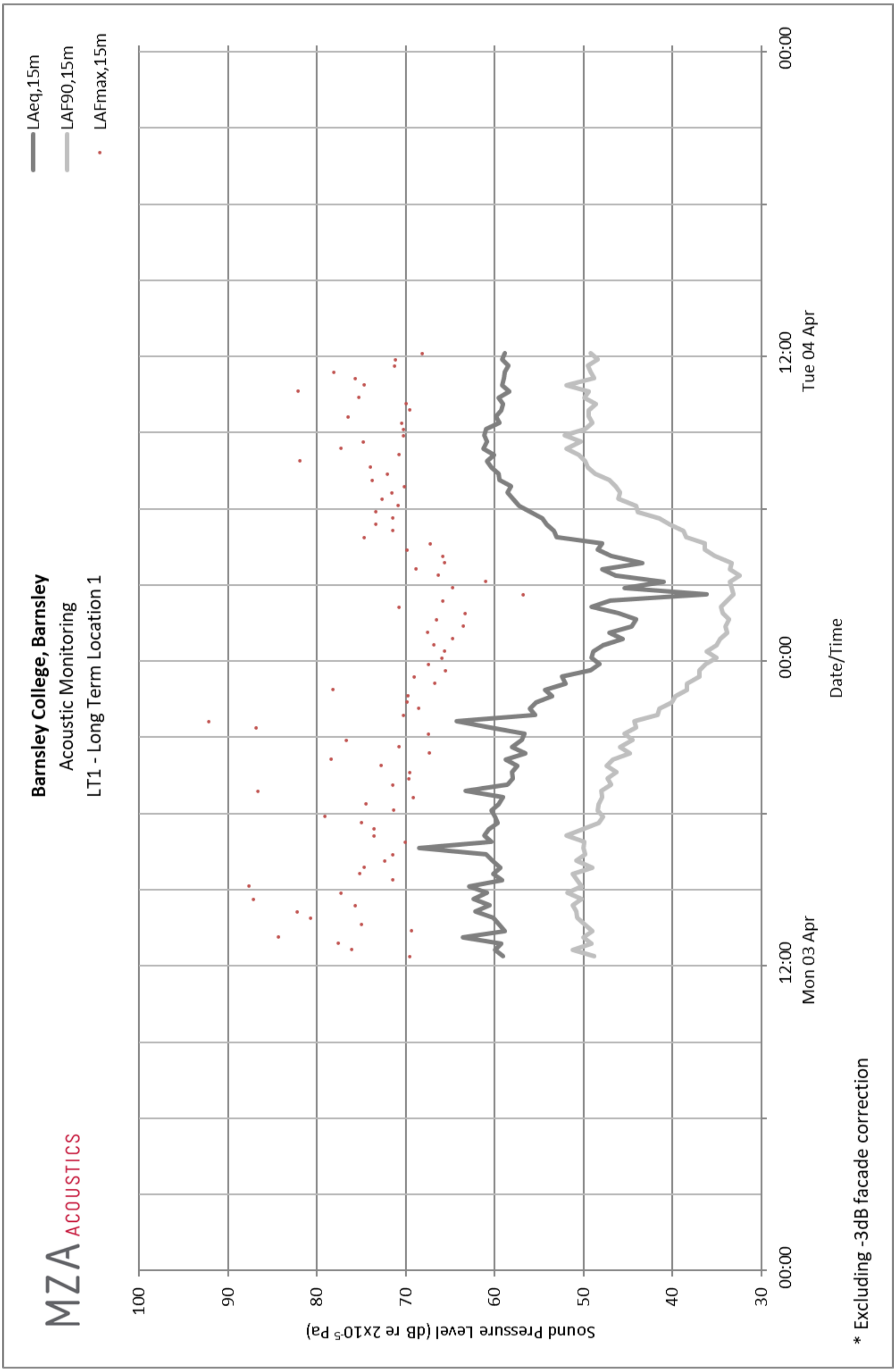
Octave Band — Frequency ranges in which the upper limit of each band is twice the lower limit. Octave bands are identified by their geometric mean frequency, or centre frequency.

Sound Power	In a specified frequency band, the rate at which acoustic energy is radiated from a source. In general, the rate of flow of sound energy, whether from a source, through an area, or into an absorber.
Sound Power Level	Of airborne sound, ten times the common logarithm of the ratio of the sound power under consideration of the standard reference power of 1 pW. Expressed in decibels.
Sound Pressure	Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.
Sound Pressure Level	The sound level is the sound pressure relative to a standard reference pressure of 20 Pa ($20x10^{-6}$ Pascals) on a decibel scale.

Appendix B – Equipment Used in Environmental Noise Survey

Equipment Ref	Equipment	Type	Serial Number	Calibration Due Date
Kit E	Sound Level Meter	01dB Metravib FUSION	11703	01/07/2026
	Pre-amplifier	01dB Metravib PRE22	2138123	
	Microphone	GRAS 40CD 1/2" Pre-polarised free-field	470866	
	Calibrator	01dB Metravib CAL31	82793	30/06/2025

Appendix C – Baseline Noise Survey Data


Barnsley College, Barnsley
Acoustic Monitoring
LT1 - Long Term Location 1
LAeq,15m
LAF90,15m
LAFmax,15m
Sound Pressure Level (dB re 2x10-5 Pa)
100
90
80
70
60
50
40
30
00:00
12:00
Mon 03 Apr
00:00
12:00
Tue 04 Apr
00:00
Date/Time
* Excluding -3dB facade correction

Appendix D – Limitations to this report

This report has been prepared for the titled project or named part thereof and should not be used in whole or part and relied upon for any other project without the written authorisation of MZA Acoustics Limited. MZA Acoustics Limited accepts no responsibility or liability for the consequences of this document if it is used for a purpose other than that for which it was commissioned. Persons wishing to use or rely upon this report for other purposes must seek written authority to do so from the owner of this report and/ or MZA Acoustics Limited and agree to indemnify MZA Acoustics Limited for any and all loss or damage resulting therefrom. MZA Acoustics Limited accepts no responsibility or liability for this document to any other party other than the person by whom it was commissioned.

The findings and opinions expressed are relevant to the dates of the site works and should not be relied upon to represent conditions at substantially later dates. Opinions included therein are based on information gathered during the study and from our experience. If additional information becomes available which may affect our comments, conclusions or recommendations MZA Acoustics Limited reserve the right to review the information, reassess any new potential concerns and modify our opinions accordingly.

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