

Project

Rochdale Station - Corner Plot
Noise and Vibration Assessment

Prepared for

Rochdale Development Agency
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Smith Street
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Published

6 November 2023

Quality Assurance

Project Title:	Rochdale Station - Corner Plot
Report Title:	Noise and Vibration Assessment
Report Number:	81567-SRL-RP-YA-01-PI
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Version History

Version	Date	Comments	Approved by
PI	06/11/2023	Initial issue	Joe Bear

Summary

SRL Technical Services Ltd has been appointed by Rochdale Development Agency to assess the impact of noise and vibration relating to the proposed corner plot development in Rochdale.

Noise limits for building services plant associated with the development have been provided to reduce the impact of building services noise at the nearest noise-sensitive receptors. These are in Section 10.0

The impact of noise in relation to overheating mitigation in accordance with the requirements of Building Regulations Part O has also been provided in Section 7.0.

Vibration levels at the site are low, and no mitigation measures will be required in the final development for vibration. This is discussed in Section 8.0.

Noise levels are relatively low, and either standard thermal double glazing, or minor acoustic upgrades to the glazing will be suitable to achieve the relevant internal noise levels, depending on the final plans for the area and the extent of pedestrianisation around the site. The glazing acoustic specification based on current noise levels at the site is given in Section 4.0.

Noise level criteria for internal mechanical services inside habitable rooms of the development have been given in Section 5.0.

An assessment of the potential noise impact from the ground floor commercial uses to the residential dwellings above is discussed in Section 9.0.

This report therefore demonstrates that suitable noise and vibration levels can be achieved for the proposed development and the nearby noise sensitive properties. Therefore, it is our view that the requirements of the relevant local and national policies have been achieved and we see no acoustics reasons to withhold planning for this development.

Contents

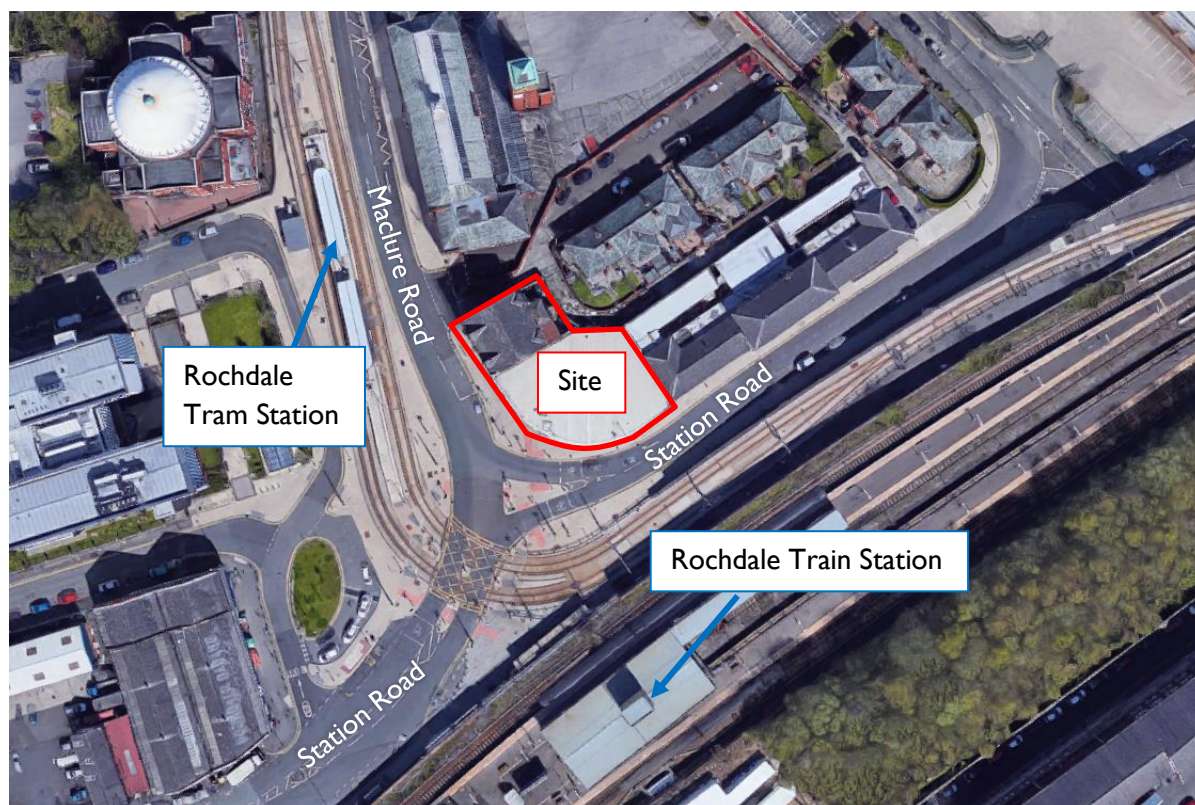
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1.0 Introduction

Rochdale development agency are proposing to develop the corner plot site facing Rochdale Train Station (as shown below) into a scheme of residential flats with commercial use on the ground floor.

The site is bounded by Maclure Road to the west and Station Road to the South. Rochdale Train Station is further to the south, and Rochdale Tram Station is further to the west.

Figure 1 – Annotated photo of the site and surrounding area



Indicative floor plans for the development are given in Appendix A.

2.0 Criteria

2.1 National Planning Guidance: National Planning Policy Framework (NPPF)

The NPPF does not provide any set limits relating to noise impacting on (or generated by) new developments. However, Section 11 “Conserving and enhancing the natural environment” does state the following:

“109. The planning system should contribute to and enhance the natural and local environment by: preventing both new and existing development from... being adversely affected by unacceptable levels of [noise] pollution.”

2.2 Professional Practice Guidance on Planning and Noise (ProPG) and BS 8233:2014 Guidance on sound insulation and noise reduction for buildings (BS8233)

Appropriate criteria for internal noise levels in residential buildings are given in BS8233:2014 Guidance on sound insulation and noise reduction for buildings (BS8233). A summary of the internal noise level guidelines are given in Table 1 below.

Table 1 - Guideline indoor noise levels for dwellings from BS 8233:2014

Location	Daytime (07:00 to 23:00)	Night-time (23:00 to 07:00)
Living Room / Kitchen / Dining Room	35 dB $L_{Aeq, 16 \text{ hour}}$	-
Bedroom	35 dB $L_{Aeq, 16 \text{ hour}}$	30 dB $L_{Aeq, 8 \text{ hour}}$

It is also considered appropriate in this case to assess the potential impact of noise from individual noise events (e.g. trains, trams, vehicles) on the bedrooms of the development during the night-time. This is in line with guidance from Professional Practice Guidance on Planning and Noise (ProPG) and BS8233:2014 which both state that individual noise events during the night have the potential to cause sleep disturbance.

Appropriate criteria for maximum noise events in habitable rooms of new residential developments are given in ProPG, which states:

“Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$, depending on the character and number of events per night. Sporadic noise events could require separate values. In most circumstances in noise sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45dB $L_{Amax,F}$ more than 10 times a night. However, where it is not reasonably practicable to achieve this guideline then the judgement of acceptability will depend not only on the maximum noise levels but also on factors such as the source, number, distribution, predictability and regularity of noise events.”

For external amenity areas, such as gardens, ProPG refers to BS8233 which gives the following guidance:

'It is desirable that the external noise level does not exceed 50 dB LAeq,T, with an upper guideline value of 55 dB LAeq,T which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.'

2.3 Approved Document O - Overheating

Approved Document O (ADO) of the Building Regulations (2021 Edition) applies to new residential buildings, or buildings containing residential accommodation (apart from hotels), where planning has been submitted after 15 June 2022. ADO sets out requirement O1 and the normal means of meeting that requirement.

Requirement O1 "Overheating mitigation" requires that:

1. Reasonable provision must be made in respect of a dwelling, institution or any other building containing one or more rooms for residential purposes, other than a room in a hotel ("residences") to
 - a) limit unwanted solar gains in summer;
 - b) provide an adequate means to remove heat from the indoor environment.
2. In meeting the obligations in paragraph (1)
 - a) account must be taken of the safety of any occupant, and their **reasonable enjoyment of the residence**; and
 - b) mechanical cooling may only be used where insufficient heat is capable of being removed from the indoor environment without it.

To allow the occupant to have 'reasonable enjoyment of the residence', the design of the building needs to take noise intrusion into account. Section 3 of ADO says that "In locations where external noise may be an issue (for example, where the local planning authority considered external noise to be an issue at the planning stage), the overheating mitigation strategy should take account of the likelihood **that windows will be closed during sleeping hours** (11pm to 7am)".

It also adds that if external night-time noise levels are higher than 40dB LAeq,T (averaged over 8 hours) or the LAFmax exceeds 55dB more than 10 times a night, occupants would likely need to keep their windows closed.

The ANC and IOA 'Guide to Demonstrating Compliance with the Noise Requirements of Approved Document O' (July 2022) provides further guidance on the noise levels relating to ADO. This document also provides external noise levels above which the simplified method cannot be used, based on a 9 dB reduction across a window open for the purposes of mitigating overheating (this applies to 'moderate risk locations' as defined by ADO). These limits have been used to determine whether an open window can be relied on for the purposes of an overheating assessment and are summarised below.

Table 2 – External noise levels above which closed windows cannot be relied on for the purpose of an overheating assessment without a more detailed analysis

Parameter	Moderate Risk Location
$L_{Aeq,8h}$, averaged over 8 hours (between 11pm and 7am)	49 dB
L_{AFmax} , more than 10 times a night (between 11pm and 7am)	64 dB

2.4 BS 6472-1:2008 Guide to Evaluation of Human Exposure to Vibration in Buildings (BS 6472)

BS6472 describes how to determine the vibration dose value, VDV, from frequency weighted vibration measurements. The vibration dose value can be used to estimate the probability of adverse comment which might be expected from humans experiencing vibration in buildings.

Table 3 summarises the VDV ranges which might result in different probabilities of adverse comment within residential buildings, as taken from BS6472.

Table 3 - Vibration dose value ranges

Time period	VDV ($m/s^{-1.75}$)		
	Low probability of adverse comment ¹	Adverse comment possible	Adverse comment probable ²
Day (07:00 – 23:00)	0.2 – 0.4	0.4 – 0.8	0.8 – 1.6
Night (23:00 – 07:00)	0.1 – 0.2	0.2 – 0.4	0.4 – 0.8

¹ Below these ranges adverse comment is not expected

² Above these ranges adverse comment is very likely

2.5 BS 4142:2014+A1:2019 Methods for Rating and Assessing Industrial and Commercial Sound (BS 4142)

BS 4142 provides a method to assess whether “sound of an industrial and/or commercial nature” is likely to have an adverse impact at noise sensitive receptors.

When comparing the specific noise against existing background levels, BS4142 highlights that certain acoustic features (tonality, impulsivity, intermittency etc.) can increase the significance of any impact and penalties should be applied to the specific noise level, in accordance with the guidance in BS4142. The specific noise level plus any appropriate character corrections (as perceived at the location of the nearby noise-sensitive receptor) is known as the ‘Rating Level’ of the noise source.

Comparison of the Rating Level to background noise level indicates the significance of the new noise source at the receptor under assessment:

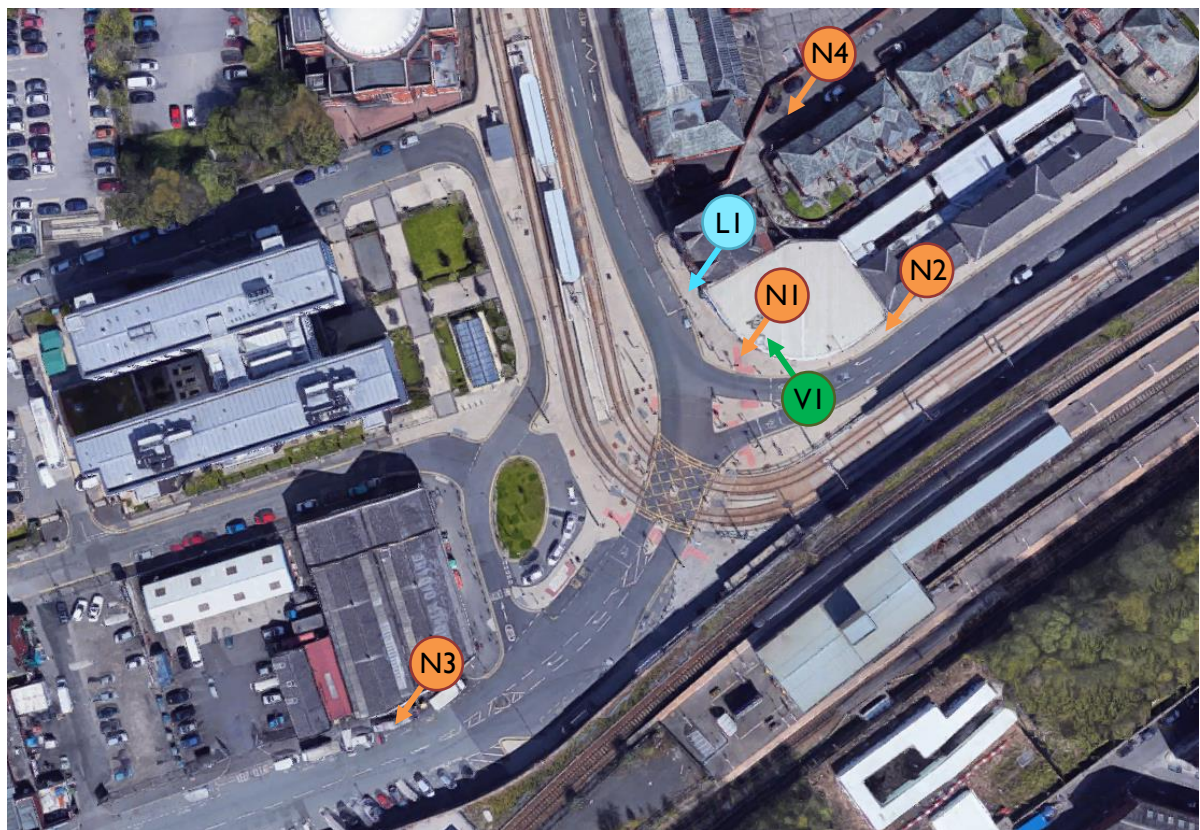
- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact. 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.

BS4142 recommends that "Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night."

3.0 Noise and Vibration Survey

Noise and vibration levels were measured at key locations around the site between Friday 6th October and Monday 9th October 2023. The measurement locations are shown in Figure 2 below. LI shows the location of the longer-term unattended noise monitoring device, NI-N4 show the locations of the attended noise measurements, and VI shows the location of the vibration measurements.

Figure 2 – Measurement Locations



Across the site, average (L_{Aeq}), background (L_{A90}) and maximum (L_{AFmax}) noise levels were dominated by a combination of transport noise from vehicles on nearby roads, trams, and trains during both the day and night-time.

Details of the noise and vibration survey are provided in Appendix A, and a summary of the results is given below.

3.1 Noise Survey Results

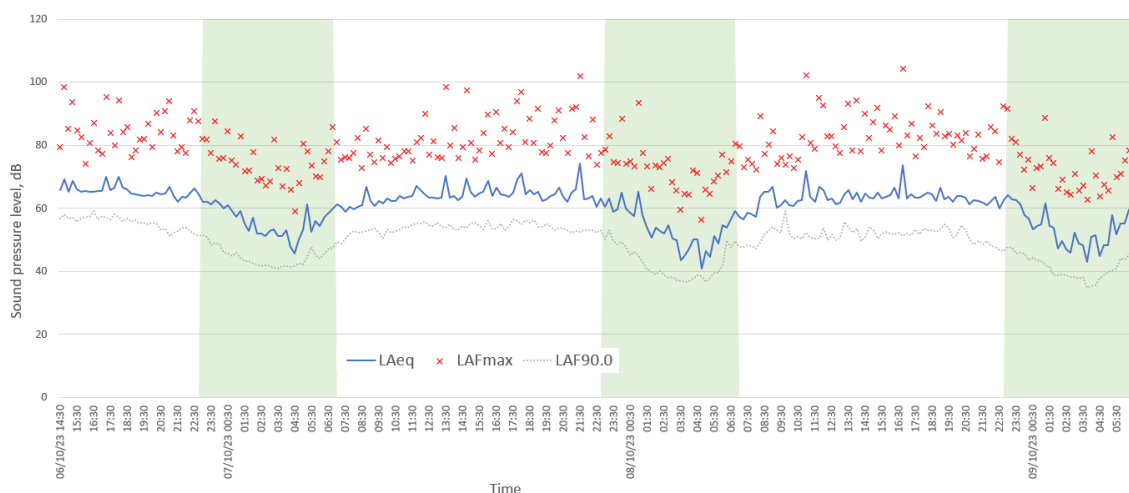
Attended measurements were taken during the day on Friday 6th October between 13:30 to 16:30 and during the night on 6th October between 23:00 to 00:00. Further attended measurements were taken during the night on Monday 9th October between 06:00 to 07:00. Using these measurements, the typical noise levels at these locations has been calculated and are summarised below. Details of the noise survey are given in Appendix A.

Table 4 – Summary of attended noise survey measurements

Location	Free-field / facade level	Time period	Typical average level dB L _{Aeq,T}	Typical maximum level dB L _{AFmax}
N1	Free field	Day (07:00-23:00)	65	n/a
		Night (23:00-07:00)	56	71-77
N2	Facade level	Day (07:00-23:00)	67	n/a
		Night (23:00-07:00)	58	76-80
N3	Facade level	Day (07:00-23:00)	67	n/a
		Night (23:00-07:00)	58	75-76
N4	Free field	Day (07:00-23:00)	53	n/a

The longer-term noise monitoring device was set up outside the first floor window of Chicken ShaQ, to measure noise levels over multiple days and nights. The results are presented below.

Figure 3 – Graph of longer-term noise monitoring results



The graph above is also reproduced in Appendix B.

A summary of the results is presented in Table 5 below.

Table 5 – Summary of longer-term noise monitoring results

Time period	Typical average level dB $L_{Aeq,T}$	Typical background level dB $L_{A90,T}$	Typical maximum level dB L_{AFmax}
Day (07:00-23:00)	65	53	n/a
Night (23:00-07:00)	58	38	76 ¹

¹Typical maximum noise level exceeded 10 times per night

3.2 Vibration Survey Results

Vibration measurements were taken during the day on Friday 6th October between 13:30 to 16:30. The vibration dose values (VDV) for these measurements are summarised below.

Vibration could not be subjectively felt by the surveyor, including during train passes, tram passes or vehicle passes.

The vibration analysis in Section 8.0 uses the typical vibration measured in the day-time to calculate the total day and night-time vibration dose value (VDV). As fewer trains, trams and vehicles were passing the site in the night, this creates a robust, 'worst-case' assessment. It was therefore not necessary to measure vibration in the night-time.

Table 6 – Summary of vibration measurement results

Time period	X axis VDV (m/s ^{-1.75})	Y axis VDV (m/s ^{-1.75})	Z axis VDV (m/s ^{-1.75})
13:39-14:39	0.00246	0.00067	0.01640
15:00-16:00	0.00052	0.00059	0.01608
16:00-16:33	0.00066	0.00062	0.01887

4.0 External Noise Break-in

The external wall will include masonry elements (i.e. brick) for the outside face on the lower floors, and will therefore achieve a good level of sound insulation. External walls on the top floor will be a lightweight construction. We would expect these constructions to achieve a sound insulation performance of at least 40 dB $R_w + C_{tr}$ (subject to a check at detailed design stage). Therefore the noise break-in will be dictated by the specification of windows and ventilators.

The development will have mechanical ventilation with heat recovery in the residential dwellings and therefore there will be no trickle ventilators in the facade.

Dimensions and details about the site have been based on the floor plans sent to SRL via email on 24th October 2023.

Using this information above, we have calculated the minimum performance requirements of the glazing and frames to achieve the BS8233 internal noise levels given in Section 2.2.

The glazing performance requirements apply to the glazing system as a whole (i.e. glazing and frames in combination) and are given in Table 7 below with some example glazing types that may meet the requirement.

Table 7 – Required glazing specifications

Location	Required glazing performance (dB $R_w + C_{tr}$)	Example Glazing Construction
Windows with direct line of sight to trams or trains	30	4/20/6
No direct line of sight to trams or trains	27	6/12/6

The sound insulation performance requirements given for the glazing are for the full glazing system (including any frames and spandrel panels) and not just the glass.

This assessment has been based on the current noise levels at the site. It is worth noting that the area surrounding the site may be pedestrianised before the site is occupied, and therefore noise levels from road traffic could be reduced because of this. If this happens, then a further detailed assessment may show lower noise levels and a different outcome. Although, we understand that noise from trains and trams is not expected to be effected by these proposals.

5.0 External Amenity Area Noise Levels

There are no gardens proposed for these developments, however noise levels on the top floor balcony areas are predicted to be around 55-60 dB LAeq,16hrs in the day. This is above the desirable levels mentioned in BS8233. However, BS8233 also acknowledges that these levels are not always achievable, especially in town centres and areas close to strategic transport networks.

BS8233 states that a compromise may be appropriate between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met.

Therefore, in line with the relevant guidance from BS8233, this should not be a reason to withhold planning permission.

6.0 Internal Mechanical Services Noise Limits

The internal ambient noise criteria in BS8233 applies to the cumulative noise level from noise break-in and the contribution of mechanical services noise. To achieve these limits, noise from mechanical services within dwellings must be limited to the LAeq levels in Table 8 below (an equivalent approximate NR limit has been estimated based on a 6dB reduction from the LAeq).

Table 8 - Internal mechanical services noise limits

Location	Mechanical services noise limit	
	dB LAeq	Approximate NR
Living rooms	32	26
Bedrooms	27	21

7.0 Overheating – Building Regulations Part O

As discussed in Section 2.3, the noise level at which open windows cannot be relied on for the purpose of an overheating (TM59) assessment is >49 dB LAeq,8h (23:00 to 07:00) and >64 dB LAfmax more than 10 time in the night.

Our environmental noise assessment indicated that areas of the development with direct line of sight to the tram/ train line will have to assume closed windows at night (between 11pm and 7am) for the purpose of the overheating assessment.

8.0 Vibration Assessment

The dominant sources of vibration affecting the site are the nearby tram and train lines. Attended vibration measurements were taken at position 'V1' whilst trams, trains, and vehicles were passing by (including a freight train in one of the measurement periods).

I have used the three different measurement periods (summarised in Section 3.2) to extrapolate the total day and night-time vibration dose values (VDV), assuming the same level of vibration in every hour of the day and night. I then took the largest VDV in each axis from each measurement period, and calculated the total day and night-time VDV based on this in order to produce a robust, 'worst-case' assessment. In addition, this is likely to overestimate the VDV, as I measured during busy periods, and fewer trains, trams and cars will go past during the night. The results are shown in Table 9 below.

Table 9 - Calculated VDV

Calculation / Threshold Level	VDV, $\text{m/s}^{-1.75}$	
	Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
Threshold for low probability of adverse comment (from BS6472)	0.2 – 0.4	0.1 – 0.2
Calculated VDV	< 0.05	< 0.04

VDV levels during both daytime and night-time hours are significantly below the threshold for "low probability of adverse comment" which means that adverse comment is not expected, based on the guidance in BS6472.

Along with the on-site observation that vibration was not perceptible at the measurement locations during our survey, this indicates that vibration is not likely to be an issue in the final development and does not need to be mitigated in the design.

9.0 Assessment of Noise from Ground Floor Commercial Unit

The proposed apartment block contains commercial units at ground floor level and apartments directly above, connected through a separating floor.

As the proposed operator of the commercial unit is not yet known, I have assumed that the commercial unit will be provided as shell and core with fit-out works undertaken after the main building works are complete.

Based on the constructions currently proposed, I would expect the sound insulation from the shell and core commercial unit to the residential flats above will be at least as good as that provided by a separating floor between residential units.

If it becomes apparent that a higher standard of sound insulation than this is required once the use of the commercial unit is known, the expectation is that this will be provided as part of the fit out works within the commercial unit.

10.0 External Mechanical Services Noise

Noise from external mechanical services has the potential to impact the nearby noise-sensitive receptors. Noise from fixed plant and mechanical services will therefore be controlled to minimise the potential impact, in line with the methodology in BS4142.

Using the measured background noise levels, summarised in Section 3.1 of this report, and these levels have been used to set appropriate plant noise limits for the development.

In the absence of specific local authority guidance on noise from external plant, I recommend that the rating level from all items of external plant associated with the development does not exceed the typical measured background noise level at the receptor.

Table 10 shows the typical lowest measured background noise level and our proposed rating noise limits for external plant associated with the development.

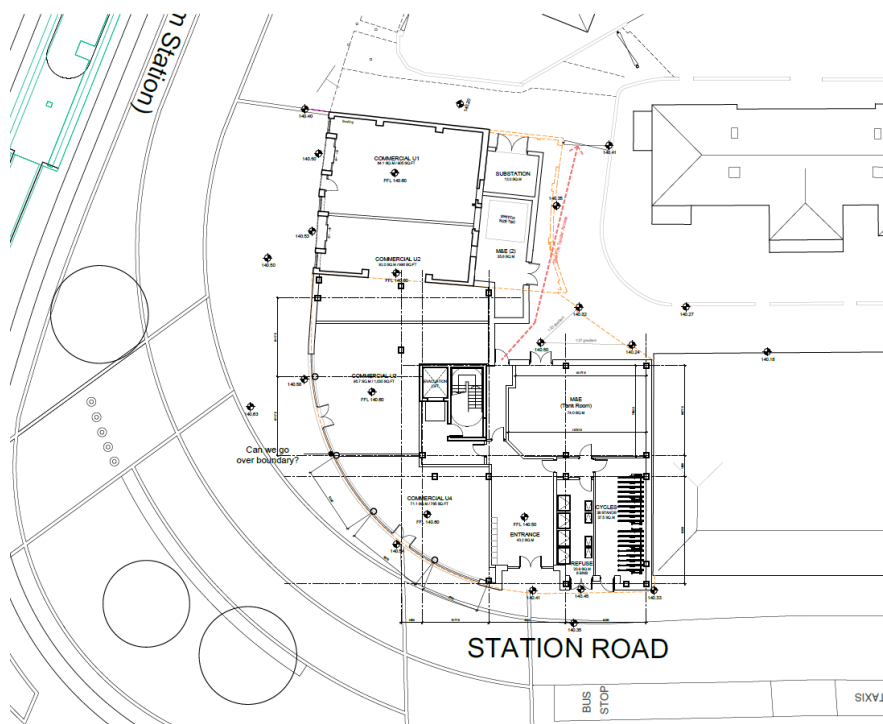
Table 10 - Proposed Plant Noise Limits at Receptors

Time period	Measured background noise level, L_{A90} dB	Plant noise limit Rating level $L_{Ar,Tr}$ dB
Day (07:00–23:00)	53	53
Night (23:00–07:00)	38	38

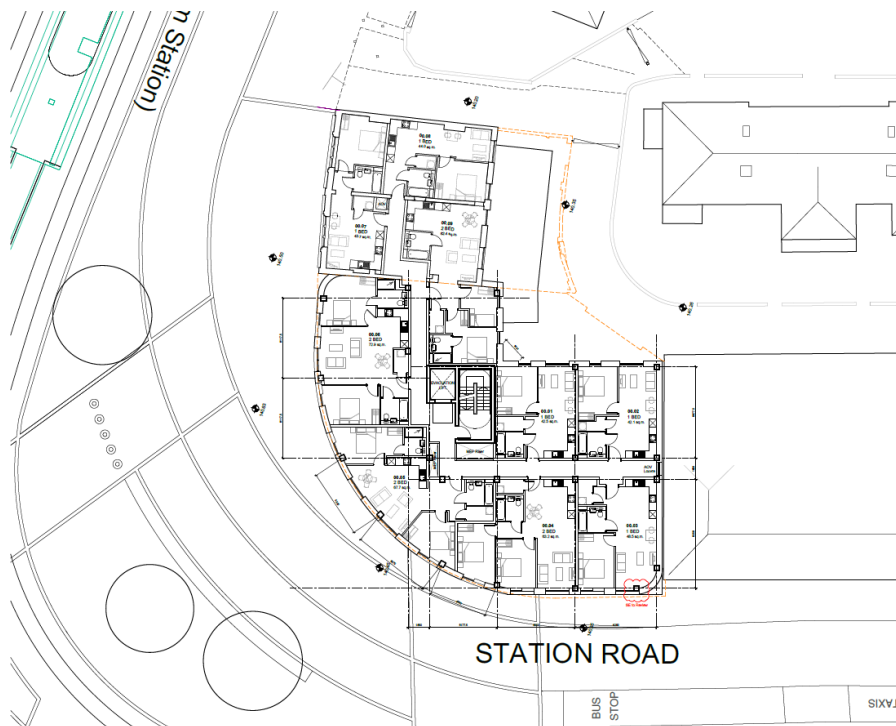
In accordance with BS4142:2014, noise character corrections (e.g. tonality, impulsivity and intermittency) are added to the specific noise level to determine the rating level at the receptor.

Appendix A – Indicative Site Plans

Ground Floor



First Floor



Appendix A - Survey Details

A1. Location of Survey

Near Chicken ShaQ, Rochdale tram station and Rochdale train station, Rochdale

A2. Date & Time of Survey

Friday 6th October to Monday 9th October 2023

A3. Personnel Present During Survey

Alex Clark BEng(Hons) MIOA – SRL Technical Services Ltd

A4. Weather Conditions during Survey

Weather conditions were generally acceptable for the purposes of the noise survey during the attended measurement periods (medium wind speeds and small amounts of rain). The weather was taken into account when doing the survey to avoid weather conditions having a significant effect on the results.

Weather records for the area show that weather conditions were acceptable for acoustic measurement during the unattended logging periods (i.e. low-medium wind speeds and no rain).

A5. Instrumentation

Brüel & Kjaer - Noise Meter AE1

Description	SRL No.	Make	Type	S/N
Sound Level Meter (AE1, Orange)	516	Brüel & Kjaer	2250	2506736
Pre-amp	516	Brüel & Kjaer	ZC0032	14463
Microphone	516	Brüel & Kjaer	4189	2643199
Calibrator	517	Brüel & Kjaer	4231	2528393

Brüel & Kjaer - Noise Meter AE2

Description	SRL No.	Make	Type	S/N
Sound Level Meter (AT2, Green)	519	Brüel & Kjaer	2250	2559287
Pre-amp	519	Brüel & Kjaer	ZC0032	5419

Description	SRL No.	Make	Type	S/N
Microphone	519	Brüel & Kjaer	4189	2689671
Calibrator	520	Brüel & Kjaer	4231	2482655

RION VM-56 - Vibration Kit

Description	Make	Type	S/N
Vibration Meter	RION	VM-56	34390092
Accelerometer	RION	PV-83D	80089

A6. Calibration Procedure

Before and after the survey the noise measurement apparatus was check calibrated to an accuracy of ± 0.3 dB using the type 4231 Sound Level Calibrator. No significant calibration drift was found to have occurred.

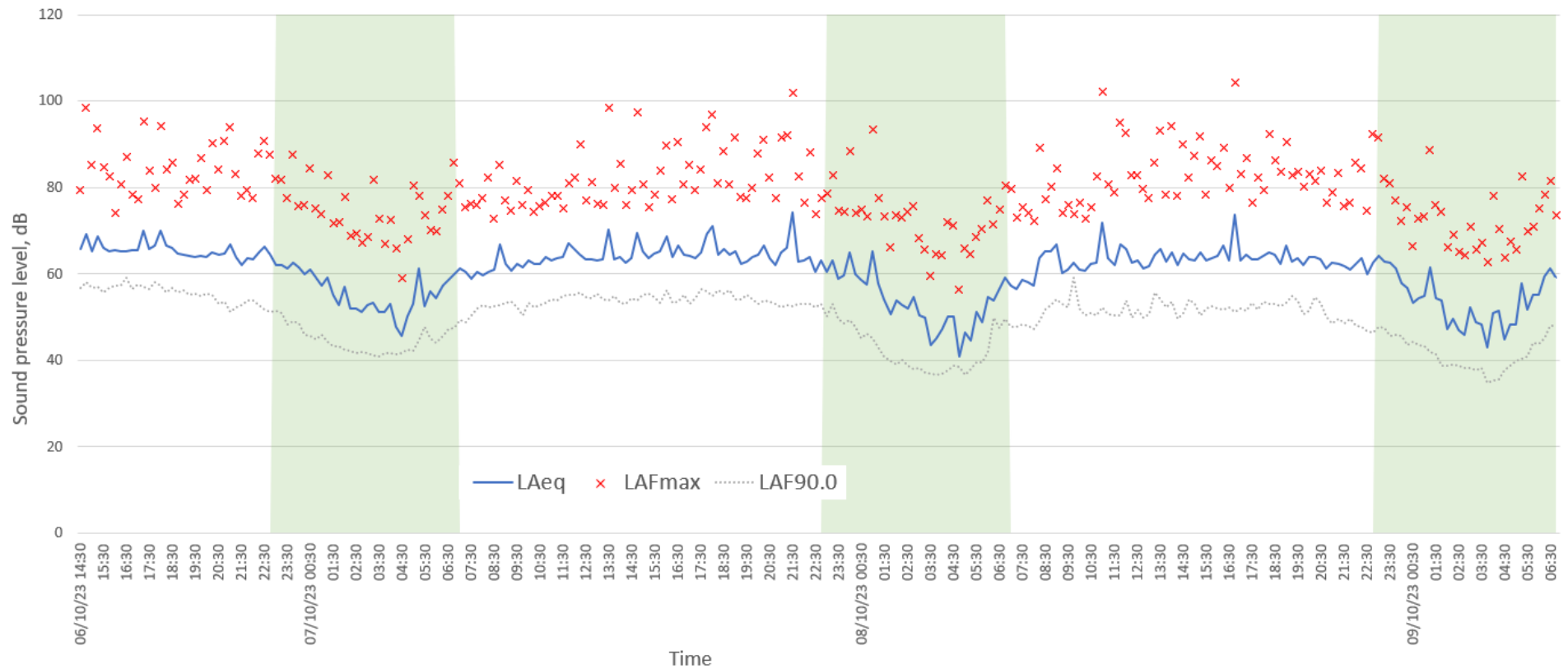
A7. Measurement Locations



Measurement Locations

Ref	Free Field / Facade	Height	Description
L1	Facade level	6 m	Longer term noise monitoring device set up outside the first floor window of Chicken ShaQ
N1	Free field	1.5 m	On corner of development around 3.5m from edge of road (note that the facade of the existing building is further back than it looks from an aerial view)
N2	Facade level	1.5 m	In centre of pavement near Station Road and Polish shop
N3	Facade level	1.5 m	In centre of drive between Station Road and roller shutter door
N4	Free field	1.5 m	On Fire Station Yard, screened from road, railway and trams
V1	N/A	On Ground	Vibration measurement on ground as close to existing facade as possible

Appendix B – Unattended Noise Measurement Data



Acoustics

Since 1967, our team of acoustic consultants has played a key role in major projects where noise or vibration is an issue, in the UK and across the globe – whether it's planning, performance prediction, design, inspection, troubleshooting, measurement or commissioning.

Air Quality

We offer a comprehensive service to model, monitor and analyse air quality, delivering assessments for a broad range of projects and purposes, for both private and public sector clients.

Carbon & Net Zero

Top of the agenda is tackling energy and carbon reduction to limit the impact of climate change. Our team of consultants will help you to achieve your sustainability objectives.

Lab & Site Testing

Design based on test data will always achieve the best results – and that's why we offer a wide range of acoustic testing at our independently accredited laboratories, as well as on-site testing to support live projects.

Monitoring

Our specialist services to monitor and assess noise, vibration, dust, air quality and odour employ the latest technology to provide remote access to data, helping to address issues quickly and to protect our clients.

Noise & Vibration

Ensuring noise and vibration does not exceed agreed levels is an important part of our environmental management services, using state-of-the-art technology to access real-time data remotely, to enable swift remedial action if required.

Odour & Dust

As part of our portfolio of environmental monitoring services, we offer specialist advice on the adverse impact of dust and odour across a range of projects including construction, waste handling and mineral extraction.

Sustainability

Minimising the impact on the environment is at the centre of today's business objectives. Our specialist services help our clients to fulfil their obligations, whether it's a BREEAM assessment, Energy Carbon Reduction or Net Zero.