



Azymuth Acoustics UK

Professional Acoustic Services

Noise Impact Assessment

Ref: AA0430 Rev A

Station Works Site, Radcliffe

Bury Road,
Radcliffe,
Greater Manchester,
M26 2UA

On behalf of

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1.0 Introduction

Azymuth Acoustics UK (henceforth Azymuth) has been contracted by Jenkins Design Services Limited to perform a Noise Impact Assessment (NIA) in relation to a proposed residential development located on Bury Road, Radcliffe M26 2UA

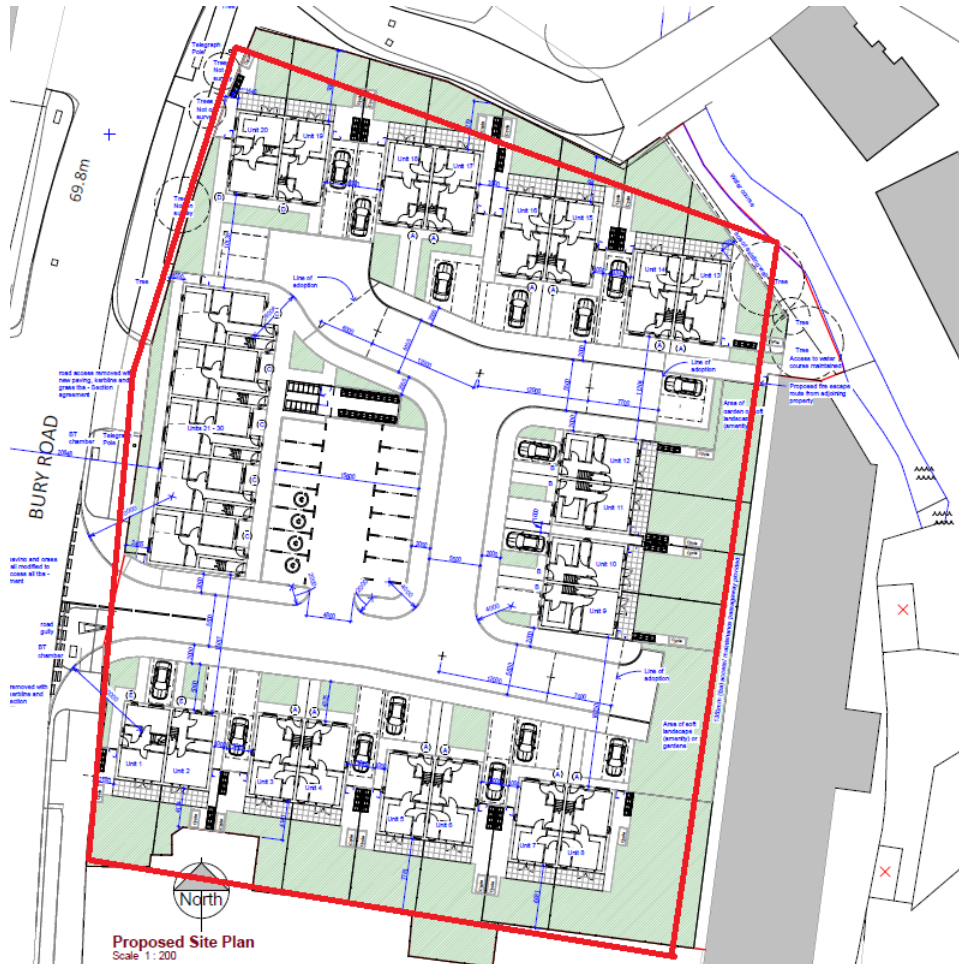


Figure 1 – Drawing of proposed development with the site outlined in red

This NIA is intended to provide information relating to potential noise levels affecting the site in order to support the detailed planning application for the residential development. In particular, this report sets out the following details:

- The results of a baseline noise survey undertaken in the vicinity of Station Works off Bury Road
- The appropriate assessment criteria and guidance relating to noise in the environment as associated with this kind of development
- Recommendations to meet the targets as set out by the assessment criteria

Azymuth previously undertook a study in 2016 for the same site, however, the layout of the proposed scheme has changed. This report will include all of the data from 2016 for reference purposes and to compare with the more up to date noise measurements.

2.0 Baseline Noise Survey

2.1 Measurement Procedures

The instrumentation used for the NIA consisted of a SvanTek 959/Nti XL2-TA type 1 precision sound level meter. The equipment was calibrated before and after measurements. The sound level meter measured A-weighted (fast response) noise levels as well as octave bands noise levels for all measurement record.

Daytime noise level measurements were undertaken between 10:15hrs - 10:20hrs on Wednesday 21st September, 12:05hrs - 13:30hrs on Thursday 22nd September and 10:00hrs - 12:35hrs on Friday 23rd September 2022. The night-time measurements were undertaken between 23:07hrs - 00:34hrs on Monday 26th / Tuesday 27th September 2022.

The noise measurements were undertaken using the sound level meter at the position(s) shown in figure 2 below and the equivalent positioned measured in 2016 *refer to figure 3*:

Measurement position	Description	Equivalent measurement position in 2016
A)	Corner of entrance to Newbridge Close, approx. 5m from pavement edge of Bury Rd	3
B)	Bury Road perimeter, tram line unscreened ~60m to the West and approx. 5m from pavement edge of Bury Rd	4
C)	Outside existing front gate of site near NBS Ltd. 7m from pavement edge of Bury Rd	2
D)	towards the bottom of proposed site near where current vans are parked 25m from pavement edge of Bury Rd	5

Table 1 – Identification of noise measurement positions at Station Works site, Radcliffe



Figure 2 – Noise measurement positions, Station Works site, Radcliffe

Full results of the noise levels recorded during the survey are included in Appendix B of this report.

The following table summarises the results of the noise measurements undertaken at the proposed site in terms of the average daytime and night-time noise levels.

Position	Period	L _{AFmax}	L _{Aeq}	L _{A10}	L _{A50}	L _{A90}
A)	Day	79	66.1	68.4	60.9	53.5
A)	Night	76.7	56.7	54.1	40.1	31
B)	Day	81.2	70	73.1	66.1	58.9
B)	Night	71.1	57.7	50.5	36.8	28.7
C)	Day	80.9	68.2	72.4	64.4	54.8
C)	Night	70.8	52.2	50.2	36.4	29.2
D)	Day	74.1	63.4	67.1	61.4	52.3
D)	Night	NA	NA	NA	NA	NA

Table 2 – Summary of noise measurements at Station Works site, Radcliffe

The L_{Amax} noise levels identified above (in Table 2) represent the average maximum levels measured during the noise survey. The highest individual night-time L_{Amax} recorded during the September 2022 survey was 87.6dB L_{Amax} and was measured at 23:57hr on 26 September 2022. Based on a statistical analysis of the maximum noise levels it is estimated that this value could occur 5 to 6 times per night. Azymuth has estimated that a level of 83dB L_{Amax} would be expected to occur typically 10 to 15 times per night. Hence this value has been used with reference to ProPG guidance.

2.2 Description of Noise Climate

The noise climate during the day at The Station Works Site is dominated by two main noise sources which are road traffic originating from Bury Road and The Manchester Metrolink line which runs adjacent to the site.

Bury Road, which is the main road that connects the A56 to the A6053, is serviced by multiple HGVs routes and represents the dominant noise source affecting the site. The Manchester Metrolink is the secondary source of noise affecting the site.

The West façades of the proposed development are open to the road with the north and south façades being partially exposed. All the east façades face away from the road.

In addition, commercial premises around the proposed site contribute to the noise via vehicle and mechanical noise. The sound level data recorded in the 2016 survey is generally similar to the noise recorded in 2022.

3.0 Assessment Criteria

In order to assess the extent of any measures required in order to comply with suitable conditions relating to potential noise sources, Azymuth Acoustics UK has reviewed various guidance documents and standards, these include:

- ProPG: Professional Practice Guidance on Planning and Noise (New residential development)
- National Planning Policy Framework (NPPF 2021)
- British Standard 8233:2014
- World Health Organisation Guidelines on Community Noise
- British Standard 4142:2014
- Acoustics Ventilation and Overheating Residential Design Guide 2020

3.1 ProPG: Planning and Noise - May 2017

This Professional Practice Guidance on Planning and Noise (ProPG) has been produced to provide practitioners with guidance on a recommended approach to the management of noise within the planning system in England. The National Planning Policy Framework (NPPF) encourages improved standards of design. The CIEH, IOA and the ANC have worked together to produce this guidance which encourages better acoustic design for new residential development and aims to protect people from the harmful effects of noise.

The Professional Practice Guidance on Planning and Noise States 'The recommended approach is intended to give the developer, noise practitioner, and decision maker an early indication of the likely initial suitability of the site for new residential development from a noise perspective and the extent of acoustic issues that would be faced'. It is important that acoustic design is reviewed at an early stage of the development process.

3.2 National Planning Policy Framework (NPPF) 2021

The NPPF provides guidance to local authorities taking into account noise in making planning decisions. Paragraph 185 of the National Planning Policy Framework (NPPF) states that planning policies and decisions should aim to:

- Avoid noise giving rise to significant adverse impacts on health and quality of life as a result of new development
- Mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions

The National Planning Policy Framework states that the planning system should 'prevent both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability'.

3.3 British Standard 8233: 2014

BS 8233 provides a code of practice for the sound insulation of a variety of building types affected by general environmental noise. It provides recommendations for control of noise in and around buildings and suggests appropriate internal ambient noise level criteria / limits for a variety of different situations including residential properties.

The following table summarises the noise limits suggested by BS 8233 applying to residential properties:

Activity	Room	Good Design Range $L_{Aeq, T}$ dB	
		07:00-23:00hrs	23:00-07:00hrs
Resting	Living Room	35	-
Dining	Dining Room / Area	40	-
Sleeping (daytime resting)	Bedroom (at night)	35	30

Table 3 – Noise Limits for Residential Properties Suggested in BS 8233

3.4 World Health Organisation Environmental Noise Guidelines (ENG) 2018

The main purpose of the 2018 WHO guidelines is to provide recommendations for protecting human health from exposure to environmental noise originating from the following sources: transportation (road traffic, railway and aircraft), wind turbines and leisure activities.

The guidelines set out to define recommended exposure levels for environmental noise in order to protect population health. Exposure limits are average levels defined over a period of one year, measured outdoors in free field at the most exposed façade. It should be noted that the document does not provide guideline limit values for multiple noise sources in combination.

The 2018 guidelines supersede the Community Noise Guidelines from 1999. Nevertheless, the document recommends that all CNG indoor guideline values and any values not covered by the current guidelines should remain valid. As such, the following guidance would remain appropriate:

For protection against sleep disturbance inside dwellings, night-time noise levels should not exceed 30dB L_{Aeq} for continuous noise and 45dB L_{Amax} for typical single sound events (which are exceeded 15 times or more per night – see ProPG Appendix A.12 for more details). To protect the majority of people from being seriously annoyed during the daytime, the outdoor sound level from steady, continuous noise (interpreted as noise from all sources combined) should not exceed 55dB L_{Aeq} on balconies, terraces and in outdoor living areas.

It should be noted that exposure levels defined in ENG and CNG are for guidance purposes as relates potential adverse health impacts and should not be interpreted as absolute limits or regulations.

3.5 British Standard 4142:2014

British Standard 4142: 2014 “Methods for assessing and rating industrial sound” describes methods for rating and assessing sound of an industrial and/or commercial nature. The methods described in this British Standard use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.

- Typically, the greater the difference between background sound and industrial/commercial noise, the greater the magnitude of the impact.
- 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.
- A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context.
- A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.

BS 4142 notes that: “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.”

3.6 Acoustics Ventilation and Overheating Residential Design Guide 2020

The Acoustics, Ventilation and Overheating Guide (AVO) is intended to be used by acoustic practitioners as well as all those involved in the planning, development, design and commissioning of new dwellings.

It recommends an approach to acoustic assessments for new residential developments that take due regard of the interdependence of provisions for acoustics, ventilation and overheating. Application of the AVO Guide is intended to demonstrate good acoustic design as described in the ProPG, when considering internal noise level guidelines.

3.7 Recommended Noise Assessment Criteria

Based on the guidance above it is recommended that the following criteria would be reasonable with the aim of minimising the impact of the environmental noise on the proposed new residential accommodation:

- Daytime noise levels not to exceed 35dB $L_{Aeq, 16hr}$ in living rooms / bedrooms
- Daytime noise levels not to exceed 40dB $L_{Aeq, 16hr}$ in dining room / kitchen
- Night-time noise levels in bedrooms not to exceed 30dB $L_{Aeq, 8hr}$
- Night-time single sound events in bedrooms not to exceed 45dB L_{Amax} more than 15 times a night

Table 4, Note 5 of BS 8233:2014 states: ‘If relying on closed windows to meet the guide values, there needs to be an appropriate alternative ventilation that does not compromise the façade insulation or the resulting noise level. If applicable, any room should have adequate ventilation (e.g. trickle ventilators should be open) during assessment.’



4.0 Assessment of Results

4.1 Assessment of Noise Risk for Residential Development

The following noise risk assessment highlight the level of risk of an adverse noise effect based on the guidance from the ProPG and AVO guidance documents (generally when windows are closed).

Location	Time of Day	Calculated Noise Levels (dBA)	ProPG Risk of Adverse Effect	AVO Guide Risk (overheating) Noise Category
All Proposed West facing Elevations within 15m of Bury Rd	Daytime $L_{Aeq, 16hr}$	65-69	Medium	HIGH
	Night-time $L_{Aeq, 8hr}$	55-57	Medium	Medium-HIGH
North and South facing elevations within 20m of Bury Rd	Daytime $L_{Aeq, 16hr}$	62-65	Low-Medium	Medium-HIGH
	Night-time $L_{Aeq, 8hr}$	52-54	Low-Medium	Medium
All other elevations (greater than 20m from Bury Rd)	Daytime $L_{Aeq, 16hr}$	48-61	Low	Low-Medium
	Night-time $L_{Aeq, 8hr}$	45-52	Low	Low-negligible

Table 4 – Noise risk assessment for Station Work's Radcliffe

4.2 SoundPLAN Model

Azymuth has undertaken acoustic modelling with the SoundPLAN noise modelling software to predict and visualise the impact of noise on the Bury Road, Station Work's site.

4.2.1 Grid Noise Map

The following figure shows the noise propagation as a grid noise map where noise levels are represented by colour bands.



Figure 3 - Grid Noise Map of noise propagation with proposed houses

4.2.2 Effects of noise on gardens

Gardens closest to the road will exceed 55dBA because of the road noise, Garden 1 at a distance greater than 30m will not be affected. For the gardens close to Bury Road a 1.8m tall timber fence can be implemented to attenuate the noise at the gardens of the 2 houses closest to the main road (marked A and 2 on figure 4).



Figure 4- marked points of garden receivers.

Garden Location	L _{Aeq} Day	L _{Aeq} Night
• Garden 1	51.6	48.3
• Garden 2	61.3	53.4
• Garden 3	49.8	46.5
• Pos A / Garden 4	66.0	55.4

4.2.3 Façade Noise Maps

The following figure shows the noise levels as extrapolated to various façade locations across the proposed buildings.

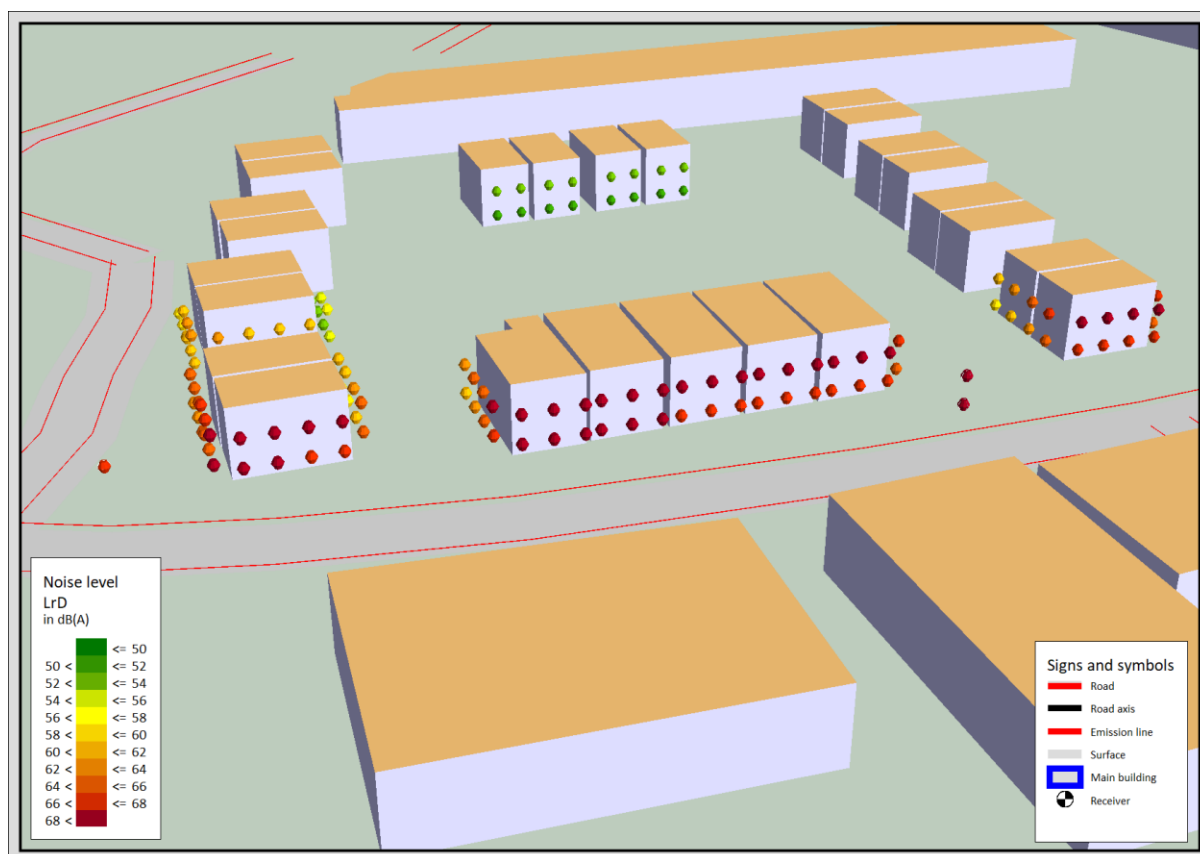


Figure 5 - Façade Noise Map of proposed houses

5.0 Recommendations for Noise Mitigation

Based on survey data and the predicted noise levels derived from SoundPLAN, Azymuth has produced the following recommendations in order to mitigate the effects of noise across the Station Works site. If these recommendations are followed, noise levels within the Station Works site will satisfy the criteria as set out in Section 3.7.

5.1 Recommended Glazing Specification

Table 5 below outlines the glazing specifications Azymuth would recommend for the Station Works site.

Location (Habitable Spaces)	Glazing Specification	Appropriate Glazing Types
All proposed West facing elevations within 20m of Bury Rd - Coloured orange	Any building regulations approved min. 38dB R_w and 33dB R_w+C_{tr}	Acoustic glazing e.g 6 mm / 16 mm argon / 6.8 mm Pilkington Optiphon™
All other elevation, dwellings 20m or more from Bury Rd Coloured green	Any building regulations approved min.32dB R_w and 28dB R_w+C_{tr}	Insulating glazing e.g 6 mm / (6 - 16 mm) / 4 mm

Table 5 – Azymuth Acoustics recommended glazing specification for Station Works Radcliffe



Figure 6 showing the type of glazing to be used on each façade refer to table 5

5.2 Recommended Ventilation Specification

Table 6 outlines the recommended ventilation that should be paired with the glazing specifications to ensure the appropriate sound insulation targets are met. With reference to the AVO and ProPG guidance, Azymuth recommends the following ventilation specification to ensure sufficient air flow to dwellings whilst also achieving internal noise level targets (with windows closed).

Location (Habitable Spaces)	Ventilation Specification	Appropriate Ventilation Types
All Proposed Dwellings within 20m of Bury Rd Coloured orange	System 4 MVHR balanced whole house ventilation	NO trickle vents (depending on ventilation system)
All other Dwellings Coloured green	System 3 continuous running extract ventilation supplemented with additional purge ventilation	$D_{n,e,w} \text{ (open)} \geq 35\text{dB}$

Table 6 – Azymuth Acoustics recommended ventilation specification for Station Work's Radcliffe

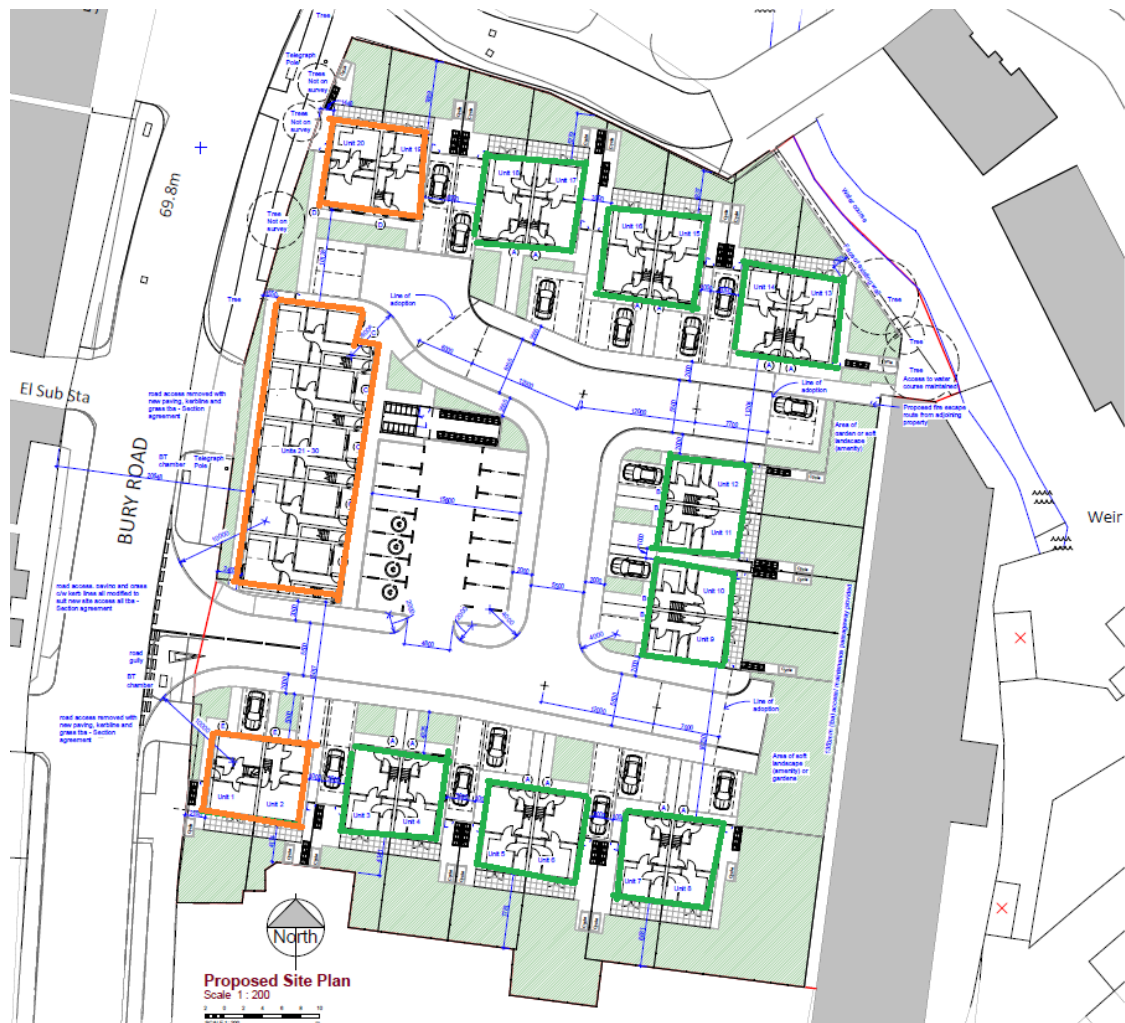


Figure 7 showing the type of ventilation to be used on each façade refer to table 6

5.3 Other Elements of Building Envelope

Other elements of the building envelope should have the following sound insulation performance:

- **External Walls:** minimum sound insulation R_w 54dB. This minimum is likely to be significantly exceeded by a normal brickwork façade. Where alternative external wall types (eg composite cladding panels / Metsec build-ups) are proposed on habitable areas it will be appropriate to check whether they comply with the target R_w 55dB.
- **Roof:** minimum sound insulation R_w 48dB. This minimum would likely be exceeded with a traditional slate or tile roof with mineral wool loft insulation above plasterboard ceilings or by a suitably insulated concrete roof or composite flat roof. (NB for composite flat roof build-ups a minimum 200mm roof void and 100mm mineral wool insulation would be recommended over and above the rigid insulation required to provide the required levels of thermal insulation).

5.4 Boundary Treatment / Garden Fences

In the absence of any boundary treatment the gardens closest to Bury Road will exceed 55dBA during the daytime. Hence, a 1.8m tall timber fence can be implemented to attenuate the noise in the gardens along the Bury Road boundary.

6.0 Summary

Azymuth Acoustics UK has undertaken a Noise Impact Assessment (NIA) in relation to a residential development at the Station Works site on Bury Road, Radcliffe.

Ambient noise levels were measured to be ~67dB L_{Aeq} for daytime periods and ~57dB L_{Aeq} for night-time measurement periods. Azymuth has produced a noise prediction model in SoundPLAN 8.2. This model helps to visualize the impact of noise on the development site and furthermore calculate the predicted noise levels at each façade of the development. Noise levels at the worst affected façades (facing Bury Road) were predicted to be ~65-69dB L_{Aeq} during the daytime and ~55-57dB L_{Aeq} during the night-time.

The elevations facing Bury Road fall into the medium noise risk category as per the ProPG document. In addition, the noise levels on elevations facing Bury Road imply that ventilation needs to be enhanced to ensure that open windows are not required to provide adequate ventilation in warm weather and to therefore minimize the potential for over-heating (based on the AVO guidance).

As such, Azymuth has recommended the following mitigation measures for the glazing, ventilation and building envelope specifications in order to satisfy the noise assessment criteria as set out in section 3.7:

- Glazing recommendation: facades within 20m of Bury Rd min. R_w 38dB / $R_w + C_{tr}$ 33dB, other facades min. R_w 32dB / $R_w + C_{tr}$ 28dB
- Ventilation recommendation for dwellings falling within 20m of Bury Rd: system 4 whole dwelling Mechanical Ventilation with Heat Recovery (MVHR)
- Building envelope recommendation: minimum sound insulation R_w 54dB for external walls
- A 1.8m high timber fence can be implemented in order to attenuate the noise levels in the private gardens of the houses closest to Bury Road.

If these recommendations are followed, the internal noise levels at the proposed development will meet the noise assessment criteria as set out in the guidance.

Appendix A – Glossary of Acoustic Terms

Decibel (dB)

This is the unit used to measure sound. The human ear has an approximately logarithmic response to acoustic pressure over a very large dynamic range (typically 20 micro Pascal to 100 Pascal).

dB (A)

This is a measure of the overall noise level of sound across the audible spectrum with a frequency weighting (i.e. A-weighting) to compensate for the sensitivity of the human ear to sound of different frequencies. The A-weighting curve is implemented in sound level meters using an electronic filter that approximately corresponds to the frequency response of the ear.

Octave Band Noise Level

The human ear is sensitive to sound over a range of frequencies between approximately 20Hz to 20kHz. The ear is also generally more sensitive to medium and high frequencies than to low frequencies. In order to define the frequency content of a noise, the spectrum can be divided into frequency bands. The most commonly used frequency bands are octave bands, in which the mid-frequency of each band is twice that of the band below it.

L_{Aeq}

This is the equivalent steady sound level in dB(A) containing the same acoustic energy as the actual fluctuating sound level over a given time period.

Reverberation Time (RT or sometimes T₃₀ or T₆₀)

This is the time taken for the reverberant sound energy in an enclosure to decay one millionth of its equilibrium value, i.e. by 60dB, after the source has been switched off. The reverberation time is frequency dependent and it is customary to measure its value in octave or one-third octave bands. Reverberation occurs when sound waves are repeatedly reflected from each surface of the room.

Sound Reduction Index (SRI)

Difference measured between the amount of energy flowing towards the wall in the source room and the total amount of energy entering the receiving room (usual range 100 - 3150Hz for one third octave band values). The SRI varies with frequency and is measured in a laboratory in either octave or one-third octave bands.

$SRI = L1 - L2 + 10 \log (S/A)$, where:

L1 = Noise level in the source room

L2 = Noise levels in the receiving room

S = Surface area of test specimen

A = Equivalent acoustic absorption area in the receiving room

Weighted Sound Reduction Index (R_w)

This is a weighted single figure descriptor of the sound insulation performance of a partition measured under laboratory conditions. The procedure used to quantify the R_w is to compare the sound reduction index (SRI) in each of the one-third octave bands from 100Hz to 3150Hz against a set of standard reference curves.



Appendix B – Noise Survey Data

Start	Position	Time	L _{Amax}	L _{Aeq}	L _{A10}	L _{A50}	L _{A90}
22/09/2022							
10:15:00	A	5min	64.7	48.8	51.0	35.9	30.8
12:04:32	A	5min	76.6	68	72.2	65.6	56.8
12:05:00	A	5min	81.7	65.2	68.8	60.8	51.5
12:10:00	A	5min	80.8	64.9	68.3	61.4	53
12:15:00	A	5min	76.2	64.2	68	61.8	52.3
12:20:30	A	5min	88.8	67.4	69.9	62.6	54.8
12:25:12	A	5min	77	65.2	69.1	62.6	54.9
12:30:00	A	5min	84.6	65.9	69.1	63.1	55.2
12:35:06	A	5min	76.7	64.5	76.7	64.5	76.7
12:40:00	A	5min	78.8	65.1	78.8	65.1	78.8
12:45:00	A	5min	71.7	65.1	71.7	65.1	71.7
13:00:52	A	5min	84.8	67.8	70.9	61.6	56.7
13:03:58	A	5min	77.9	64.7	68.8	62.2	56.8
13:05:00	A	5min	80.6	65.8	69.3	63.2	57.9
13:15:00	A	5min	84.2	70.3	74.1	65.8	60.5
13:17:00	B	5min	82.7	66.2	69.4	62.9	59.6
13:20:00	B	5min	74	65.6	69.5	62.8	59.5
13:25:00	B	5min	75.5	67	71	64	59.8
23/09/2022							
10:00:48	B	4min	86.3	71.2	75	67.7	57.1
10:05:00	B	5min	82.2	70.5	74.7	67	59.9
10:10:00	B	5min	76.2	73	75.2	72.8	70.5
10:18:48	B	5min	79.3	71.5	75.1	69.8	65.2
10:20:00	B	5min	86.9	72.8	76.4	70.1	62.6
10:25:00	B	5min	84.9	68.6	72.3	63.6	50.9
10:30:00	B	5min	87.4	69	72.6	64.6	54.1
10:35:00	B	5min	78.8	68	72.4	64.4	54.1
10:40:00	B	5min	79.8	68.5	73.2	63.8	53.2
10:45:08	C	5min	86.6	68.4	72.2	65.5	53.7
10:50:00	C	5min	81.3	68.7	72.8	65.8	54.5
10:55:00	C	5min	79.3	68.2	72.7	64.1	54
11:00:08	C	5min	78.9	68	72.5	64.2	55.3
11:05:00	C	5min	80.3	68.8	73	65.6	57.6
11:10:00	C	5min	79.5	68.3	72.4	65.1	56.1
11:15:00	C	5min	78.4	66.5	71.1	61.4	51.4
11:20:08	C	5min	80.3	68.8	73.2	65	56.9
11:25:00	C	5min	83.8	67.2	71.6	62.7	53.5
11:33:58	D	1min	74.6	63.7	66.8	62.1	56.7
11:35:00	D	5min	70.8	62.6	66.7	60.4	50.7
11:40:00	D	5min	75.4	63.9	67.8	61.6	51.8
11:45:00	D	5min	74.7	62.5	66.2	60.5	50.4
11:50:00	D	5min	76	62.4	66	60.3	50.8
11:55:00	D	5min	75.3	63.9	67.4	62.2	55.7
12:00:00	D	5min	71.8	62.8	66.6	60.9	52.2
12:05:08	D	5min	71.3	63.4	67.5	61.6	49.5



Start	Position	Time	L _{Amax}	L _{Aeq}	L _{A10}	L _{A50}	L _{A90}
12:10:00	D	5min	75	63.8	67.6	61.3	49.9
12:15:00	D	5min	72.6	63.5	67.2	61.6	53.7
12:20:00	D	5min	77.5	64.1	67.8	62.1	53
12:25:00	D	5min	73.3	63.3	67.2	60.9	53
12:30:00	D	5min	75	64.1	67.5	62.9	52.4

Table B1 – Fully tabulated daytime noise measurement results at Station Works site, Radcliffe

Start	Position	Time	L _{Amax}	L _{Aeq}	L _{A10}	L _{A50}	L _{A90}
26/09/2022							
23:07:00	A	5min	77.6	58.7	55.4	38.4	30.8
23:12:00	A	5min	73.7	52.7	49.8	35.2	27.5
23:17:00	A	5min	76.4	56.2	51.9	35.9	27
23:23:00	B	5min	67.5	46.6	47.2	36.1	27.4
23:28:00	B	5min	77.9	61.7	65.6	40.8	32.4
23:36:00	C	5min	77.2	55.8	54.2	34.4	29.1
23:41:00	C	5min	72.9	54.3	54.4	36.7	28.9
23:46:00	C	5min	73.7	51.6	47.3	33.1	27.7
23:52:00	A	5min	77	57.1	55.5	42.8	32.8
23:57:00	A	5min	87.6	59.2	58	45.6	34.7
27/09/2022							
00:02:00	A	5min	67.6	49.8	53.8	42.9	33.1
00:08:00	B	5min	82	61.5	54.3	40.5	29.9
00:13:00	B	5min	64.4	42.5	44.6	35.1	27
00:18:00	B	5min	63.6	40.6	40.8	31.4	26.8
00:24:00	C	5min	65.1	43.3	46	36.8	29.6
00:29:00	C	5min	64.1	45.2	47.8	38.3	30.6
00:34:00	C	5min	71.7	51.4	51.3	39.3	29

Table B2 – Fully tabulated night-time noise measurement results at Station Works site, Radcliffe



Appendix C – Noise Survey Data from 2016 study

Start	Position	Time	L _{Amax}	L _{Aeq}	L _{A10}	L _{A50}	L _{A90}
26/05/2016							
22:40:32	1	5min	60.5	47.7	48.6	-	46.2
22:45:32	1	5min	50.4	46.7	47.8	-	45.7
22:56:48	2	5min	72.7	56.8	59.6	-	40.2
23:01:48	2	5min	71.5	56.9	61	-	40.4
23:06:48	2	5min	70	54.8	58.3	-	39.5
23:15:22	3	5min	68.8	54	57.4	-	35
23:20:22	3	5min	74.1	58	61.7	-	39.7
23:25:22	3	5min	75.1	58.8	61.3	-	35.5
23:34:04	4	5min	70.6	57.4	62.3	-	37.3
23:39:04	4	5min	75.6	56.6	57.8	-	35.6
23:44:04	1	5min	72.6	57.3	61.1	-	36.6
23:53:48	1	5min	53.1	46.4	47.1	-	45.3
23:58:48	1	5min	51.9	46.3	46.9	-	45.3
07/06/2016							
15:51:18	1	5min	66.8	51.7	55.8	-	43.1
15:56:18	1	5min	54.6	45.5	47.7	-	42.2
16:01:18	1	5min	63.7	48.8	51.7	-	42.6
16:06:18	1	5min	57.2	45.3	47.1	-	42.4
16:13:52	1	5min	59.3	48.5	52	-	43.4
16:18:52	5	5min	56	46.8	48.7	-	43.4
16:28:52	5	5min	66.7	54.3	56.4	-	50.8
16:33:52	5	5min	75.1	56.7	58.2		51.2
16:38:52	5	5min	68.6	55.3	57.4		52.1
16:45:40	6	5min	79.4	60.6	63.6		50.5
16:50:40	6	5min	66.3	57.8	60.7		51.7
16:55:40	6	5min	65.3	57.5	60.8		48.2
16:59:58	2	5min	73.4	63.3	66.4		54.2
17:04:58	2	5min	73.8	63.6	66.9		56.2
17:09:58	2	5min	78	64.9	68.3		54.5
17:17:12	4	5min	79.1	66.4	70.1		53.3
17:22:12	4	5min	82.8	67.5	70.3		56.7
17:27:12	4	5min	85.1	67.5	70.8		54.7

Table C1 – Fully tabulated noise measurement results from 2016 at Station Works site, Radcliffe

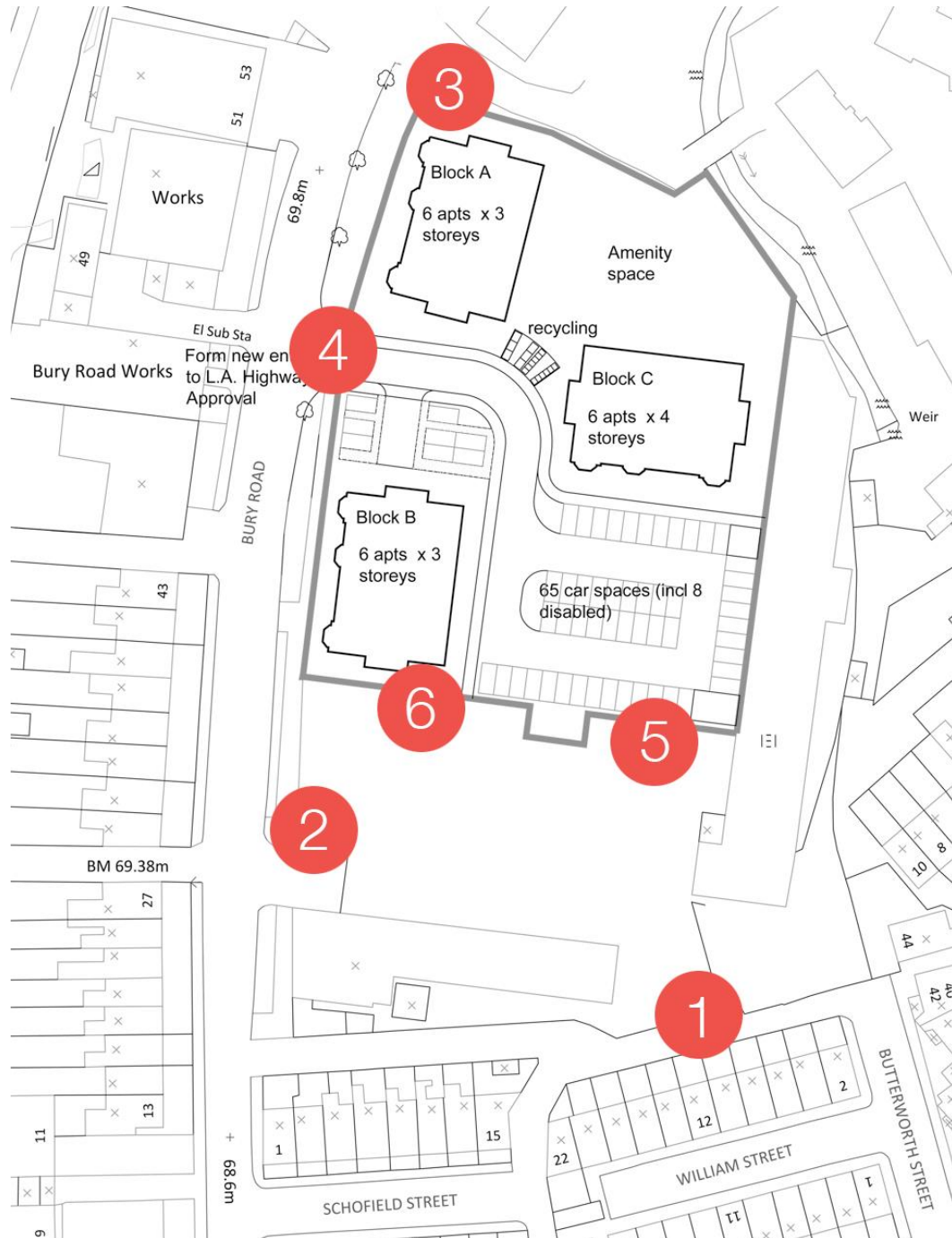


Figure C1 – Measurement positions employed in 2016 noise study