GM Fire Stations - Blackley

Noise Impact Assessment Report

Client:
Greater Manchester Combined Authority
146 Bolton Road, Swinton
Manchester, M27 8US

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JAMESON ACOUSTICS

Consultants in acoustics, noise and vibration

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Document Control

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0	21-02-2023	AJ	First issue
1	02-05-2023	AJ	Updated to reflect revised scheme design
2	15-05-2023	AJ	Update to Section 9.0

This report has been prepared with all reasonable skill, care and diligence for the sole benefit, use and information of the aforementioned Client in accordance with the purposes and terms agreed between ourselves and the Client. The liability of Jameson Acoustics Limited in respect of the information contained within this report will not extend to any third party.

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Executive Summary

Planning permission is sought for the redevelopment of Blackley Fire Station on Rochdale Road, Manchester. The redevelopment will see the demolition of the existing fire station building and erection of a new modern facility.

Jameson Acoustics Limited has been commissioned to undertake a noise assessment to supplement the planning application.

A 24-hour background noise survey has been undertaken and subsequently used to set plant noise emission limits for the development in line with BS 4142, BREEAM and the requirements of the Local Planning Authority. It is envisaged that the risk of adverse plant noise impacts can be mitigated through sensible design and plant selection/attenuation.

An acoustic feasibility study indicates that acceptable internal noise levels can be achieved within the new building with appropriately specified facade solutions, such as acoustically-rated windows and acoustically-attenuated (or hybrid / mechanically assisted) ventilation strategies.

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1.0 Introduction

Planning permission is sought for the redevelopment of Blackley Fire Station, on Rochdale Road, Blackley. The redevelopment will see the demolition of the existing fire station building and erection of a new modern facility.

The new building will be subject to road traffic noise from Rochdale Road and the surrounding road network. The facility will also require the installation of new items of building services plant which will have the potential to emit noise to the locality.

Jameson Acoustics Limited has therefore been commissioned to undertake an assessment of the potential noise impacts *onto* and *from* the proposed development when operational.

Our findings are presented herein.

2.0 Objectives

To review national and local planning policies/requirements and relevant design standards and good practice guides that will inform the noise impact assessments.

To carry out a baseline environmental noise survey at the site over a 24-hour period, capturing typical weekday day/night noise levels in accordance with BS 7445 and BS 4142.

To propose plant noise emission limits in accordance with BS 4142 and the Local Authority requirements.

To assess environmental noise impacts onto the development and advise on how this may influence design strategies (primarily with the specification of windows and ventilators).

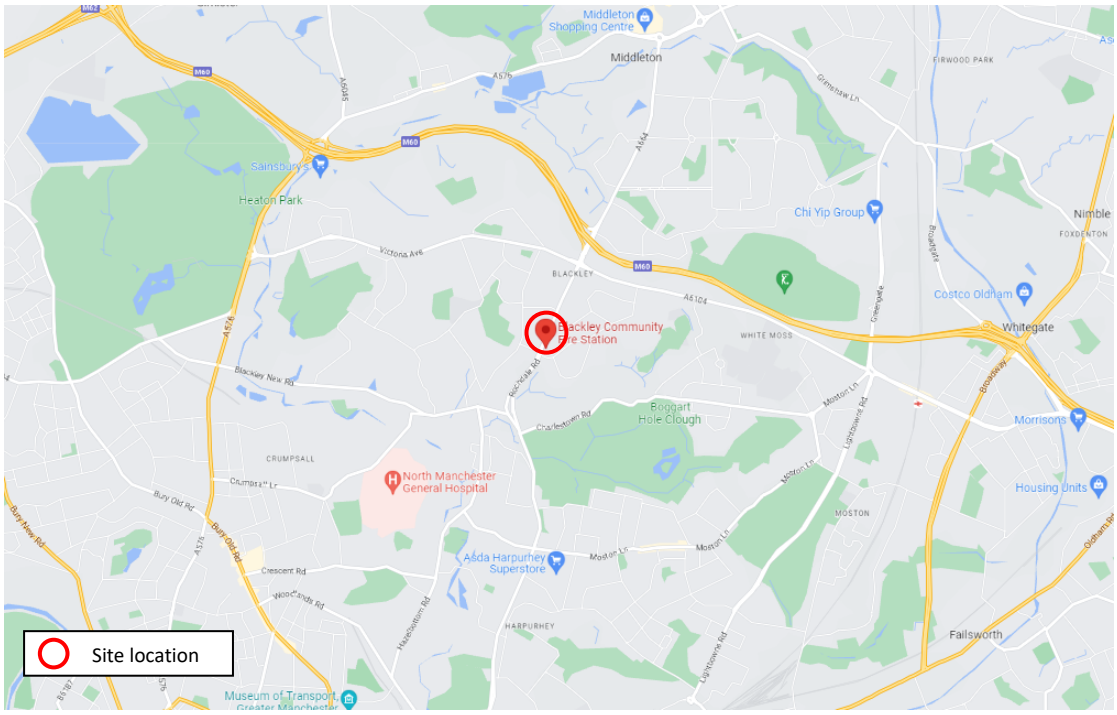
To advise on noise control and noise mitigation measures as required/appropriate.

NB: For a description of the acoustic terminology used herein, please see Appendix A.

3.0 Site Description

3.1 Location

The site is located on Rochdale Road in Blackley and falls within the jurisdiction of Manchester City Council. See Location Plan below.



Location Plan (© maps.google.co.uk)

3.2 Description

The site currently comprises a single building (to be demolished) with associated emergency driveway, and rear yard providing staff parking and outdoor training facilities (including vehicle cutting area).

Access to the site is off Rochdale Road, a busy thoroughfare for traffic and buses linking the city centre to the M60 in the direction of Middleton.

To the south, the site is bounded by a former ex service men's social club (not in use). In all other directions are residential dwellings.

The nearest noise sensitive residential property lies to the north: a house at number 1060 Rochdale Road.

The noise climate on-site is dominated by road traffic on Rochdale Road.

See site plan below.

3D Site Plan (© maps.google.co.uk)

4.0 Development Proposals

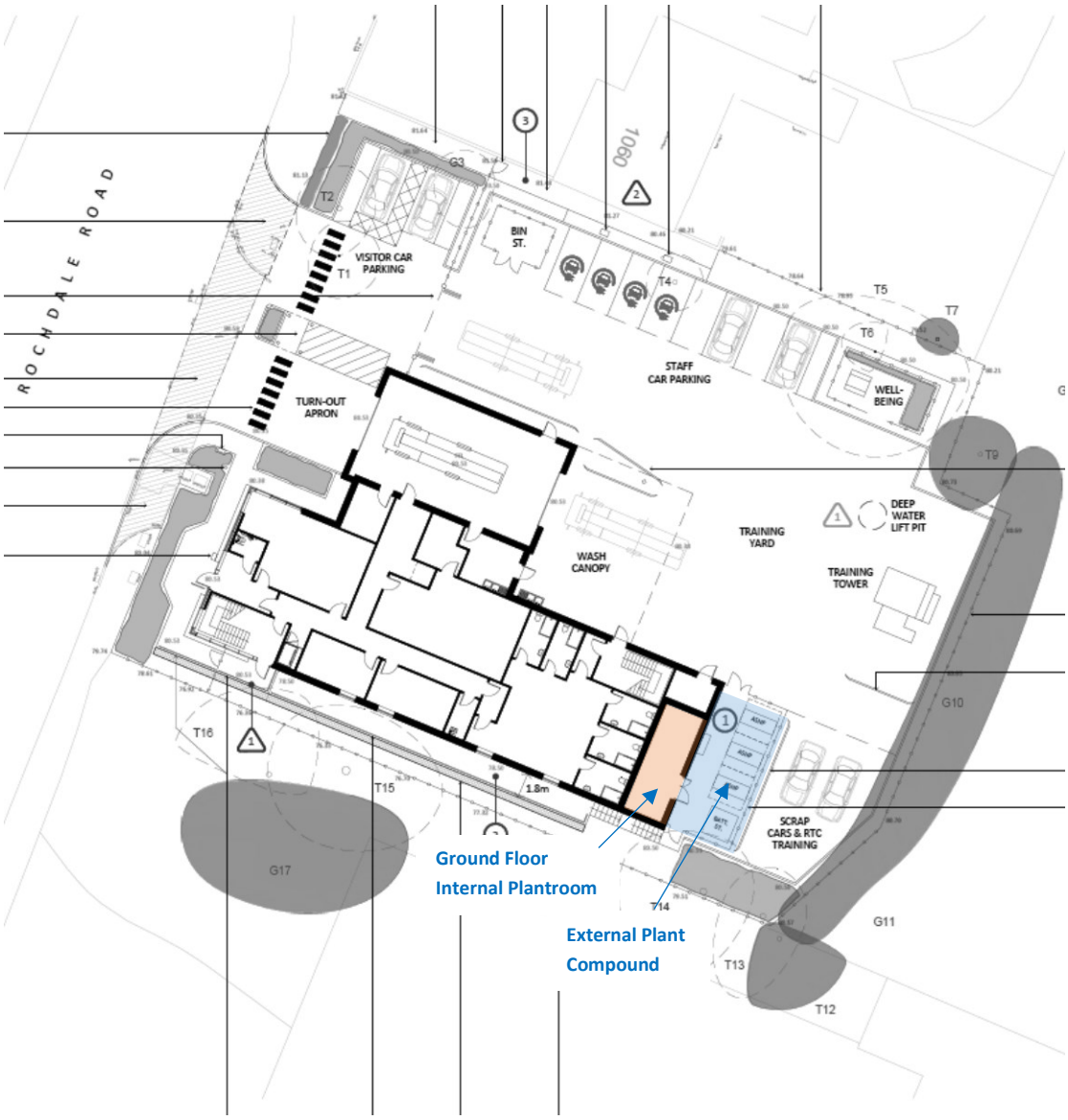
The proposals are to:

1. Demolish the existing building.

2. Erect a new building in approximately the same footprint as the previous. The building will maintain its emergency driveway onto Rochdale Road. The building will be two-storey and will contain similar facilities as the existing station, with offices, training rooms, social spaces, a gym, study rooms and the emergency appliance (engine) bay with associated changing/locker rooms. Building Services plant will be contained to a ground floor plant room on the east gable of the building, and a ground level plant compound to the south-east of the site within the facility's rear training yard.

3. The rear training yard will remain and be slightly reconfigured. Parking will extend across the full northern site boundary, with training area remaining as is, on the east edge of the site. A new training fire tower will be added.

See below Proposed Site Plan showing designated plant areas.



Proposed Site Plan

5.0 Planning Policy, Legislation & Assessment Guides

5.1 National Planning Policy

National planning policies are set out in the following:

- Noise Policy Statement for England [NPSE], 2010;
- National Planning Policy Framework [NPPF], 2021;
- National Planning Practice Guidance – Noise [PPGN], 2019.

These documents provide a qualitative approach to noise assessments. See Appendix B for a detailed description of each.

5.2 Local Planning Requirements

5.2.1 Local Authority Development Plan

Manchester City Council's [MCC] Core Strategy was adopted on the 11 July 2012 and is the key document in the Manchester Local Plan. It sets the out the long-term strategic policies for Manchester's future development and will form the framework that planning applications will be assessed against.

The Core Strategy requests that all new developments follow the 'Development Principles' and accord with the design guidance set out in the Supplementary Planning Documents. In accordance with Policy DM1, this includes the effects on amenity due to noise generated by a new development and, conversely for noise sensitive uses (e.g. residential), the effects of environmental noise onto the new development.

MCC's Supplementary Planning Document relating to noise is their 'Planning & Noise, Technical Guidance' published in October 2022 by their Environmental Protection Team. This document provides guidance to applicants and consultants concerning the assessment and prediction of environmental noise associated with a particular development. The key elements relevant to this development are summarised below.

5.2.2 Specific Guidance on Noise

In relation to commercial developments, MCC's guidance advises that "*BS 4142 should be used to assess the likely impact of noise from industrial and commercial sources at noise sensitive premises*".

The Council consider that new developments should contribute and enhance the area in which they are located and where possible, i.e. prevent 'noise creep', contribute to the

improvement of people's health and quality of life as per the NPSE. With this in mind, the design objective should be:

'The development should be designed so as to achieve a rating level of 5dB (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location.'

For fixed plant, the Council advises a BS 4142 assessment that demonstrates that:

'Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating level of 5dB (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location'.

5.3 Assessment Guides

5.3.1 BS 4142: 2014

British Standard BS 4142 looks at the assessment of noise of a commercial / industrial nature. It describes methods for rating and assessing outdoor sound of an industrial and/or commercial nature "*on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident".* In relation to this development, this includes sound from fixed installations, comprising M&E plant and equipment.

The assessment method is based on the difference between the measured 'background sound level' without the influence of any industrial noise source, and the 'rating level' of the industrial source, at the receiver location. The standard states that:

- "*a difference of around +10 dB or more is likely to be an indication of a significant adverse impact*";
- "*a difference of around +5 dB 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*".

5.3.2 BREEAM

The project is target BREEAM credits under Sections Hea 05 and Pol 05 of the BREEAM V6 New Construction Manual. Section Hea 05 relates to the acoustic performance of the building and Section Pol 05 relates to the reduction of noise pollution.

Three credits are available under Section Hea 05, including one for achieving indoor ambient noise levels that are generally in line with BS 8233: 2014.

A single credit is available under Section Pol 05 by carrying out an assessment of plant noise output from the scheme in line with BS 4142: 2014. Noise levels must be measured or determined for:

1. existing background noise levels.
2. noise rating level from the proposed building.

The noise level from the assessed building must be at least 5 dB blower than the background noise throughout the day and night.

6.0 Baseline Noise Survey

6.1 Procedure

Automated noise level measurements were taken from 12:00 hours on Monday 30 January to 12:00 hours on Tuesday 31 January 2023 at a single on-site position. This position [Position 1] was selected to establish the existing daytime and night-time background noise levels representative of those at the nearest noise sensitive residential properties.

The microphone was mounted on a pole and fitted to a metal railing on the northern site boundary, as illustrated in the Figure below. The microphone was fitted with a windshield and mounted approximately 1.5 metres above the ground in free-field conditions.

The equipment was programme to continuously log all relevant A-weighted broadband (dBA) and linear spectral noise level indices, including L_{eq}, L_{90}, L_{10} and L_{max}, over 15-minute and 1-hour intervals.

Additional manned sample road traffic noise level measurements were taken with a handheld sound level meter at the front of the building, approximately 8 metres back from roadside edge of Rochdale Road. These measurements [Position 2] were taken between 11:00-14:00 hours on Tuesday 31 January 2023. A 10-minute measurement per hour was taken; each considered representative of the noise climate in its respective hour.

All measurements were taken in general accordance with BS 7445-1: 2003 '*Description and Measurement of Environmental Noise*'.

3D Site Plan showing measurement positions (© maps.google.co.uk)

6.2 Instrumentation

The instrumentation used for the survey is summarised below. The sound level meters were hand-calibrated at the beginning and end of the survey periods. No significant deviations in calibration level were noted.

Description	Equipment	Serial Nr	Lab Calibration Expiry	Lab Calibration Certificate Nr
Class 1 sound level meter	Svantek 971A (with Type 7152 microphone)	131635 (85533)	1 Nov 2024	2 Nov 2022
Class 1 sound calibrator	Cirrus CR:515	57570	8 Nov 2023	182770

6.3 Weather Conditions

During the manned survey (and upon set up / collection of the automated survey), weather conditions were calm, road surfaces were dry, wind speeds were low and the sky was generally patchy/overcast. Based on internet weather reports for the full duration of the automated survey, conditions remained suitable for obtaining representative measurement results with no periods of rainfall. Wind speeds remained sufficiently low and temperatures range between 2°C and 9°C.

6.4 Observed Noise Climate

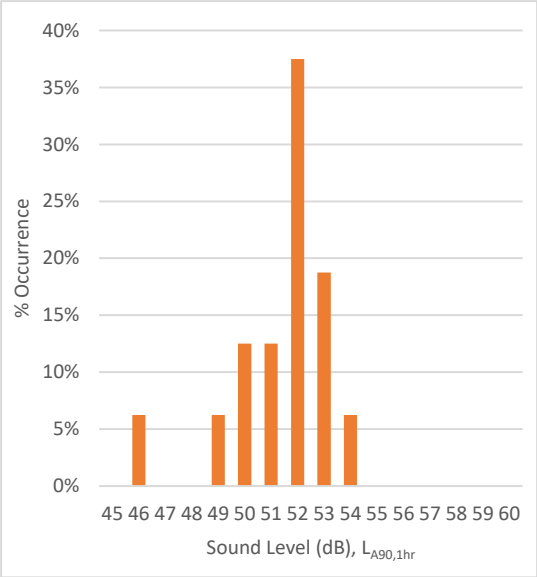
Due to the nature of the survey, i.e. unmanned, it is not possible to describe the noise climate throughout the duration of the survey period. However, on install and collection (and during the manned survey) the noise climate was dominated entirely by road traffic on Rochdale Road.

6.5 Survey Results & Analysis

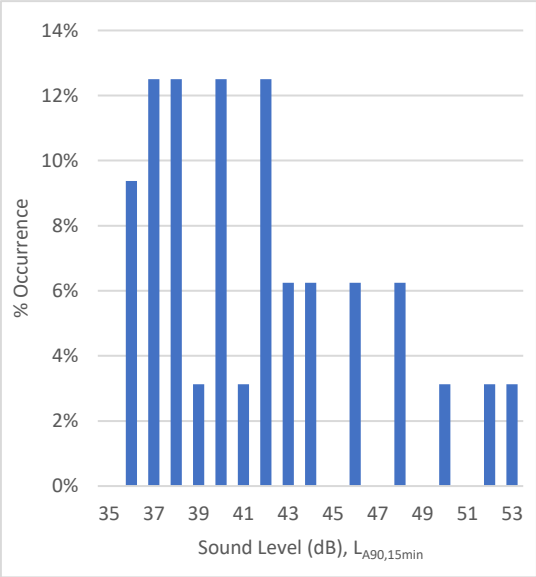
6.5.1 Automated Noise Survey (Position 1)

The results of the automated survey have been plotted on Time History Graph 22019-2-G1 enclosed in Appendix C. The graphs present the broadband A-weighted L_{A90}, L_{Aeq} and L_{Amax} noise levels logged at Position 1 over 15-minute intervals.

In accordance with BS 4142, the representative daytime and night-time background noise levels have been determined through statistical analysis of the survey results. The following graphs illustrate the % occurrence of each noise level through daytime and night-time periods.



Daytime



Night-time

The 'representative' background noise levels shall be taken as 50 dB $L_{A90,1hr}$ daytime and 38 dB $L_{A90,15min}$ night-time.

6.5.2 Manned Noise Survey (Position 2)

The results the manned road traffic noise survey at Position 2 are summarised in the following table in the form of A-weighted broadband L_{Aeq}, L_{A90}, L_{A10} and L_{Amax} noise levels.

Position	Period	Sound Level (dB)			
		L_{Aeq}	L_{A90}	L_{A10}	L_{Amax}
2	11:00-12:00	72	65	75	86
	12:00-13:00	71	65	74	80
	13:00-14:00	72	66	75	82

7.0 Plant Noise Emissions

7.1 Limits

Based on the surveyed 'representative' background noise levels and the requirements of the Local Authority and BREEAM Pol 05, we propose the following plant noise emission limits to be achieved at 1m from nearby residential windows with all plant operating simultaneously.

Receptor	Plant Noise Rating Limit, $L_{Ar,Tr}$ ref. BS 4142 (dB)	
	Daytime (07:00-23:00)	Night-time (23:00-07:00)
1m from windows of any nearby dwelling	45	33

Noise shall be assessed in accordance with BS 4142:2014 with corrections applied for any plant emitting noise of a tonal or irregular quality. Emergency plant items (e.g. standby generators, smoke extract equipment) should be subject to more relaxed criteria.

The above limits shall be subject to the final approval of the Local Authority.

7.2 Plant Design Proposals & Noise Mitigation

Mechanical plant will comprise local air extract fans (WC, kitchen, garages, dry rooms, etc.), an internally-mounted MVHR (Welfare), with 3nr air source heat pumps (condensers) located within the external plant compound.

Provisions shall be made for the selection of low noise equipment, silencers, enclosures, screens and other acoustic attenuation measures as necessary to achieve the above noise limits.

We would comment that the above limits are not considered to be particularly onerous, given the significant distance separating the proposed external plant compound and the nearest dwellings (circa 40 metres to house nr 1060 Rochdale Road). At this stage it is envisaged that the risk of excessive building services noise can be mitigated by design. The local authority may, however, wish to secure this with a suitably worded condition of planning.

At this early stage in design, our preliminary guidance for the 3nr external condensers would be to specify units that can each achieve the following maximum sound pressure levels (assuming the unit will have night duty setback modes).

Daytime standard duty (07:00-23:00):	**68 dBA at 1m**
Night setback duty (23:00-07:00):	**56 dBA at 1m**

8.0 Activity Noise Emissions

The facility will continue to operate as it currently does once the existing building is replaced with the new. For nearby residents, the reorientation of the site is not expected to have any effect on the levels of noise emitted from fire fighter training, emergency vehicle movements or staff vehicle movements. All of these occur largely in the same location as current.

Furthermore, the new building does not intend to house any notably noise-generating rooms; all room uses are similar in nature to those currently housed in the existing building.

It is therefore considered unnecessary to assess operational activity noise output as part of this application.

9.0 Achieving Internal Noise Levels (within New Building)

Based on the results of the noise survey, incident daytime ambient $L_{Aeq,1hr}$ noise levels onto the façades of the development are expected to be as below.

In line with the BREEAM manual, internal ambient noise level targets in the main occupied spaces would typically be as follows.

Room	Internal Ambient Noise Level, dB $L_{Aeq,T}$
Community/training room, Single Person Office, Quiet Room	40
Study Room	40 (35 night)
Multi-Person Office, TV/Mess Room, Gym, Kitchen/Dining	45

These limits would apply during normal operating conditions. A relaxation in the above limits for boost ventilation conditions (e.g. purge, or during the hotter summertime days to avoid overheating) would be sensible.

During normal operating/ventilating conditions, the above suggests facades would, in most cases, need to provide an outside-to-inside sound level difference of around 20-30 dB. On this basis, we would provide the following preliminary acoustic design guidance for windows and ventilation strategies.

Element	Preliminary Acoustic Guidance
Windows	• Enhanced double glazed window configurations are likely to be required for the training room and offices / study rooms that are in the **red** and **orange** façade zones (wrt the Figure above). In these areas, window ratings might be in the region of 30-33 dB R_w+C_{tr}. An example glass configuration for this might be 10-16-6mm. • In the **green** and **blue** zones, more conventional double glazing should suffice. For example, 6-16-6mm double glazing.
Ventilation	• For all spaces it shall be assumed that windows are normally closed and alternative means of ventilation will be provided that does not comprise the acoustic integrity of the façade. • With relaxations in noise levels for boost/summertime, *some* reliance on openable windows to provide rapid ventilation should be feasible.

The above demonstrates that acceptable internal noise levels can be achieved through the use of common façade design/building methods with appropriate acoustic performances.

10.0 Conclusions

Planning permission is sought for the redevelopment of Blackley Fire Station on Rochdale Road, Blackley, Manchester. The redevelopment will see the demolition of the existing fire station building and erection of a new modern facility.

Jameson Acoustics Limited has been commissioned to undertake a noise assessment to supplement the planning application.

A 24-hour background noise survey has been undertaken and subsequently used to set plant noise emission limits for the development in line with BS 4142, BREEAM and the requirements of the Local Planning Authority. It is envisaged that the risk of adverse plant noise impacts can be mitigated through sensible design and plant selection/attenuation.

An acoustic feasibility study indicates that acceptable internal noise levels can be achieved within the new building with appropriately specified facade solutions, such as acoustically-rated windows and acoustically-attenuated (or hybrid / mechanically assisted) ventilation strategies.

Appendix A – Acoustic Terminology

dB Decibel - Used as a measurement of sound level. Decibels are not an absolute unit of measurement but an expression of ratio between two quantities expressed in logarithmic form.

dB(A) The human ear is more susceptible to mid-frequency noise than the high and low frequencies. The 'A'-weighting scale approximates this response and allows sound levels to be expressed as an overall single figure value in dBA. The $_A$ subscript is applied to an acoustical parameter to indicate the stated noise level is A-weighted (e.g. $L_{Aeq,T}$ in dB). Noise levels in dBA do not have a linear relationship to each other; for similar noises, a change in noise level of 10dBA represents a doubling or halving of subjective loudness. A change of 3dBA is only just perceptible.

$L_{Aeq,T}$ $L_{Aeq,T}$ is the equivalent continuous sound pressure level. It is an average of the total sound energy measured over a specified time measurement period, *T*.

$L_{10,T}$ L_{10} is the noise level exceeded for 10% of the measurement period *T* (i.e. the quietest 10% of the measurement) and has, for many years, been used in the assessment of road traffic noise.

$L_{90,T}$ L_{90} is the noise level exceeded for 90% of the measurement period *T* (i.e. the quietest 10% of the measurement) and is often used to describe the 'background' noise level.

L_{max} L_{max} is the maximum sound pressure level recorded over the measurement period, *T*. L_{max} is often used in assessing scheduled environmental noise 'events' (such as train passbys), particularly at night where such events may cause sleep disturbance.

R_w The weighted sound reduction index, R_w, is a single figure description of sound reduction as defined in BS EN ISO 717-1. It is single-number quantity which characterizes the airborne sound insulating properties of a material or building element over a range of frequencies. The R_w is calculated from sound insulation measurements taken in an acoustic laboratory. Sound insulation ratings derived from site measurements are invariably lower than the laboratory figures and are referred to as the apparent weighted sound reduction index, R'_w.

$D_{n,e,w}$ The weighted element-normalised level difference, $D_{n,e,w}$, is a single figure description of the sound insulation performance of small building elements, such as a trickle ventilator.

C_{tr} C_{tr} is correction term applied against the sound insulation single-number values (e.g. R_w) to provide a weighting against low frequency performance. The reference values used within the C_{tr} calculation are based on urban traffic noise.

Appendix B – Planning Policy & Assessment Guides

Planning Policy

- **Noise Policy Statement for England (NPSE)**

  The Noise Policy Statement for England (NPSE) launched in March 2010 states the long-term vision of Government noise policy is to "*promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development*".

  The long-term vision is supported by the following aims; through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

  - Avoid significant adverse impacts on health and quality of life;
  - Mitigate and minimise adverse impacts on health and quality of life;
  - Where possible, contribute to the improvement of health and quality of life.

  The intention is that the NPSE should apply to all types of noise apart from noise in the workplace (occupational noise).

  The NPSE introduces a three-tier concept for the assessment of noise impacts onto a receptor:

  - **NOEL – No Observed Effect Level:** The level below which no effect can be detected and below which there is no detectable effect on health and quality of life due to noise.

  - **LOAEL – Lowest Observable Adverse Effect Level:** The level above which adverse effects on health and quality of life can be detected.

  - **SOAEL – Significant Observed Adverse Effect Level:** The level above which significant adverse effects on health and quality of life occur.

  There are no numeric thresholds relating to each of the above. The NPSE acknowledges that the severity of noise impacts vary depending upon the type of noise, the type of receptor, the duration (on-time) of the noise, the characteristics of the noise, the time of day, the day of the week, etc.. As a result, the definition of what constitutes an SOAEL is somewhat flexible.

- **National Planning Policy Framework (NPPF)**

  The National Planning Policy Framework (NPPF) was first published in 2012 and sets out the government's planning policies for England and how these are expected to be applied.

The latest revision of the NPPF (July 2021) states that planning system should **contribute to, and enhance**, the natural and local environment by (amongst others) "*preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, water or* ***noise pollution*** *or land stability*."

The express inclusion of noise in the NPPF means that it is a material planning consideration for local planning decisions.

Paragraph 123 of the NPPF document states that planning policies and decisions should aim to:

"A*. Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;*

B*. 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;*

C*. Recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and*

D*. Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason."*

NPPF advises that decisions relating to planning applications should ensure "…*new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development."*

To achieve this, new developments should *"mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life"* and should also *"identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason*."

The NPPF recognises that "…*new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed*."

- **Planning Practice Guidance on Noise (PPG)**

The National Planning Practice Guidance (PPG) is a web-based resource, launched by the Department for Communities and Local Government (DCLG) in March 2014 to support the NPPF and make it more accessible. It advises on how planning can manage potential noise impacts in new development. The guidance is regularly reviewed and updated and noise is listed as a specific category. The guidance is for ad hoc developments, as major infrastructure is covered by overarching National Policy Statements.

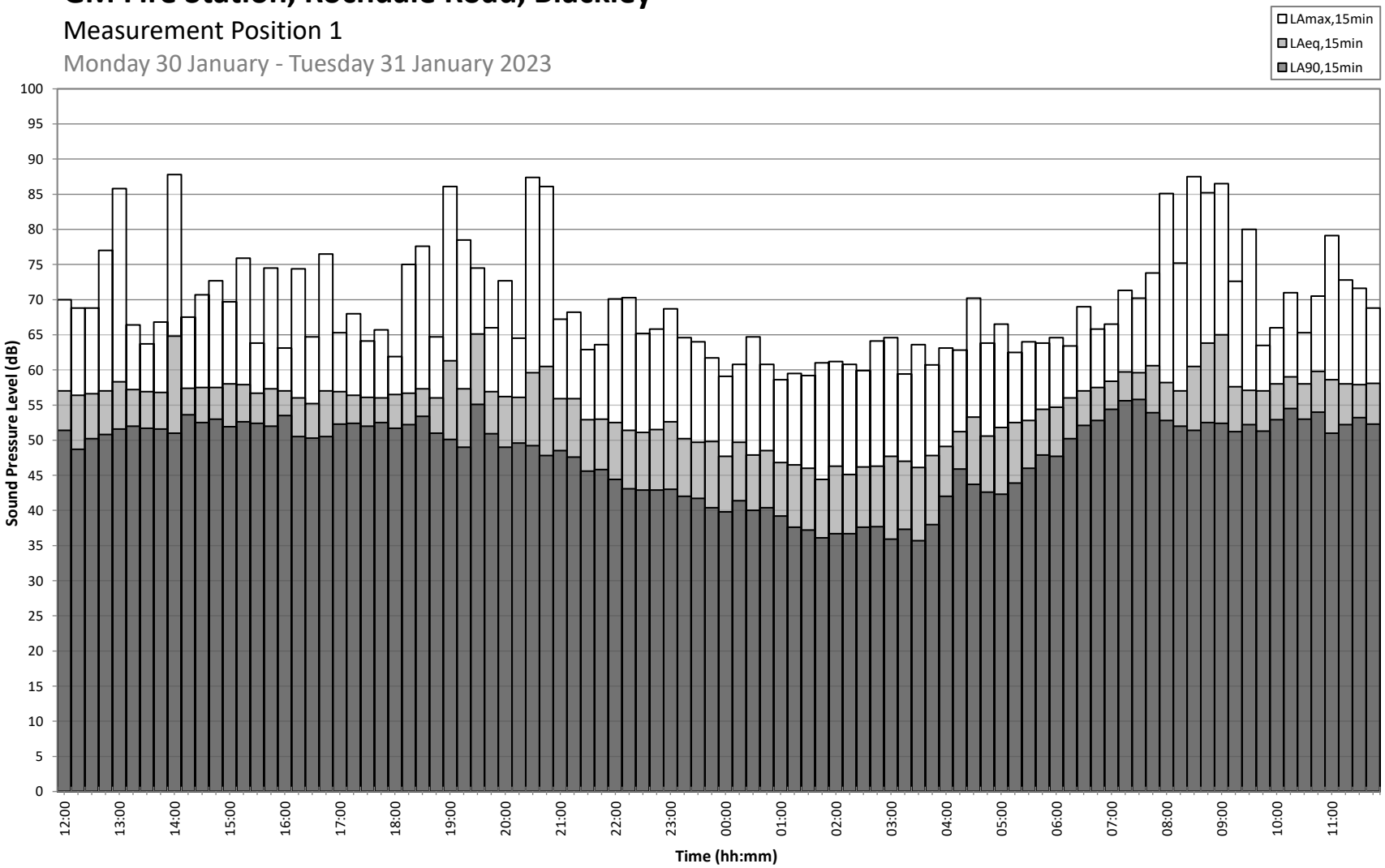
PPG provides the following tabulated summary of the effects of noise exposure (in terms of health and quality of life) associated with noise generating and sensitive developments.

Response	Examples of Outcomes	Increasing Effect Level	Action
No Observed Effect Level			
Not present	No effect	No Observed Effect	No specific measures required
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

Appendix C – Noise Survey Time History Graph

GM Fire Station, Rochdale Road, Blackley

22019-2-G1

Measurement Position 1

Monday 30 January - Tuesday 31 January 2023