

SPRATT+HAMER



Noise Impact Report

Project Details

Client	Onward Homes
Client Address	Watson Building 4 Renshaw Street Liverpool L1 2SA
Site Address	Land Located at Pennington Street Levenshulme Manchester M12 4QJ
Reference	22304E

Quality Assurance

Prepared by	Phil Lodge BSc (Hons) PGDip AMIOA
Reviewed by	Alejo Garcigoy MSc MIOA
Authorised by	Ben Bielicki BSc (Hons) MIOA
Issue date	25/09/2025

Revision History

Version	Date	Editor	Notes
V1	11/09/2025	Phil Lodge	First issue
V2	25/09/2025	Phil Lodge	Updated in line with latest drawings



Contents

1	Executive Summary.....	5
2	Introduction.....	6
2.1	Noise Impact and Vibration Assessment	6
3	Assumptions, Limitations & Uncertainty	7
4	Planning Policies, Guidance and Criteria	8
4.1	National Planning Policy.....	8
4.2	Criteria.....	10
4.2.1	Local Planning Authority Criteria	10
4.2.2	BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings.....	10
4.2.3	WHO Guidelines for Community Noise	11
4.2.4	BS 6472-1:2008 Guide to Evaluation of Human Exposure to Vibration in Buildings.....	11
4.3	Criteria Summary	11
5	Site Description	12
5.1	Subjective Observations	12
5.2	Weather.....	12
6	Noise Measurement Procedure.....	13
6.1	Survey Date(s).....	13
6.2	Personnel Present	13
6.3	Survey Equipment Used.....	13
6.4	Calibration	13
6.5	External Ambient Sound Measurements	13
6.5.1	Monitoring Position 1.....	13
6.5.2	Monitoring Position 2.....	14
6.6	Vibration Measurements.....	14
6.7	Location Plan of Measurement Positions.....	15
7	Results and Analysis.....	16
7.1	External Ambient Sound Measurement Analysis in Accordance with BS 8233:2014.....	16
7.2	Nighttime L_{AFmax} Analysis.....	16
7.2.1	Nighttime L_{AFmax} at Monitoring Position 1.....	16
7.2.2	Nighttime L_{AFmax} at Monitoring Position 2.....	17
7.3	Vibration Measurement Results in Accordance with BS 6472-1:2008.....	17



8 Recommendations.....18

8.1 Glazing & Ventilation 18

8.2 Habitable Room Ceilings in Loft Space 18

8.3 Notes on Ventilation 18

8.4 Open Window Assessment in Accordance with Approved Document O 19

8.5 External Amenity Space.....20

9 Calculation Methodology.....21

9.1 Building Elements.....21

10 Estimated Performance.....22

11 Conclusion.....23

12 References.....24

12.1 Drawing References 24

Appendix.....25

Figure 1: Photograph showing Monitoring Position 1.....25

Figure 2: Photograph showing Monitoring Position 2.....26

Measurement Results 27

Proposed Site Plans 29



1 Executive Summary

A noise assessment has been conducted for a proposed residential development comprising 14 no. purpose new-build dwelling houses at the land located at Pennington Street, Levenshulme, Manchester, M12 4QJ.

The assessment is to be submitted as part of a planning application for the development site to Manchester City Council in response to pre-application advice.

The assessment considers the impact on potentially noise sensitive neighbouring residential premises in comparison with BS 8233: 2014 and the World Health Organisation guideline criteria. Vibration will be evaluated in comparison with BS 6472-1:2008.

All results and recommendations are within the BS 8233:2014 and WHO guidelines for noise within a residential dwelling and external areas provided the proposed specifications are implemented, including glazing and ventilation.

Vibration dose value results indicate a low probability of adverse comment due to vibrations.



2 Introduction

Onward Homes has instructed Spratt and Hamer Limited to undertake an environmental noise and vibration survey in order to assess the impact from the nearby railway line and local traffic network, as well as other general noise within the local environment, which may have an impact on future residents of the proposed development.

The proposed development site is an existing vacant plot of land. It is proposed to erect 14 no. new build dwelling houses with associated outdoor amenity space.

This report is prepared solely for Onward Homes. Spratt and Hamer Limited accept no responsibility for its use by any third party.

This document has been prepared using the various documents listed within the appendices of this report, together with drawings, technical information and additional verbal representations made by third parties. We have not audited nor independently verified the content or accuracy of any of the documents and information provided to us in the preparation of this report.

If additional information comes to light subsequent to the production of this report, we reserve the right to revise our opinions and the conclusions reached within this report.

2.1 Noise Impact and Vibration Assessment

Spratt and Hamer Limited have undertaken an environmental noise and vibration impact assessment at the above site with noise and vibration levels measured externally over a 6-hour period, consisting of a three-hour daytime measurement (07:30 – 10:30) and a three-hour nighttime measurement (23:00 – 02:00). The measurements were carried out during weekdays on a Monday and Tuesday. The monitoring periods are deemed to be representative of peak traffic noise conditions.

This report will state the measured noise and vibration levels and will refer to guidance relevant to the nature of this survey whilst considering Local Planning Authority guidance and conditions.



3 Assumptions, Limitations & Uncertainty

- a. All suggested specifications require a good level of workmanship and for materials to be installed as the manufacture intends. Any poor workmanship may lead to weaknesses in the sound attenuation provided by the building elements.
- b. It is assumed that the sound pressure levels and vibration dose values measured on site during the peak traffic times are typical of the site.
- c. It is assumed that the technical data provided by glazing and ventilation manufacturers is up to date and correct.
- d. It is assumed that drawings and information supplied by Onward Homes and DK-Architects are up to date and correct.



4 Planning Policies, Guidance and Criteria

The planning policies and criteria listed below are taken from associated relevant guidance documents, all of which should be considered for the internal and external noise and vibration levels.

4.1 National Planning Policy

The National Planning Policy Framework (NPPF) December 2024 set out the Government's planning policies for England and how they are expected to be applied. It provides a framework within which the Local Authorities are to prepare local plans and use their planning powers to minimise the adverse impact of noise. It should contain the following in relation to noise impacts.

187. Planning policies and decisions should contribute to and enhance the natural and local environment by:

'preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability.'

198. Planning policies and decisions should also ensure that 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. In doing so they should:

'mitigate and reduce to a minimum potential adverse impact resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life'

NPPF previously characterised noise by grading and recommending actions and different effect levels as reproduced in Table 1.



SPRATT+HAMER

Perception	Examples of outcomes	Increasing effect level	Action
No Observed Effect Level			
Not present	No Effect	No Observed Effect	No specific measures required
No Observed Adverse Effect Level			
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

Table 1: Noise exposure hierarchy based on likely average response



4.2 Criteria

4.2.1 Local Planning Authority Criteria

No specific criteria or conditions have been put forward by the Local Authority. However, the following methodology was agreed with the Local Authority, in accordance with email communications with Rebecca Twigg-Purcell, Environmental Officer at Manchester City Council.

- A shortened 3-hour daytime survey conducted during the rush hour period.
- A shortened 3-hour nighttime survey.
- A Friday-to-Monday survey to be undertaken at a later stage in order to allow the planning process to progress.

4.2.2 BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings

The British Standard BS 8233:2014, Guidance on Sound Insulation and noise reduction for buildings, provides appropriate internal levels of noise within dwellings, flats and rooms in residential use when unoccupied.

Section 7.2.2 'Internal ambient noise levels in dwellings' of BS 8233: 2014 states that 'In general, for steady external noise sources, it is desirable that the internal ambient noise level does not exceed the guideline values in Table 4'.

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Room	35 dB $L_{Aeq,16hour}$	–
Dining	Dining room/area	40 dB $L_{Aeq,16hour}$	–
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

Table 2: Table 4 of BS 8233:2014 Indoor ambient levels for dwellings

Note 7 of section 7.7.2 states 'Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed up to 5 dB and reasonable internal conditions still achieved'.

In addition, Note 4 of section 7.7.2 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 $L_{Amax,F}$ (SIC), depending on the character and number of events per night. Sporadic noise events could require separate values'.

In the absence of a specific performance criterion within BS 8233 for short-term noisemaxima, reference can be made to guidance published by the WHO. In particular, the WHO publication 'Guidelines for Community Noise' (1999), from which the guidance given in BS 8233: 2014 is itself derived, states that 'for a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB L_{AFmax} more than ten to fifteen times per night'.

The WHO publication 'Guidelines for Community Noise' (1999) has since been updated in 2018; however, it is widely accepted by Local Authorities that L_{AFmax} 45 dB is the target level for short-term noise maxima between 23:00-07:00.



4.2.3 WHO Guidelines for Community Noise

In 1999, the WHO (World Health Organisation) published Guidelines for Community Noise, stating the following internal noise levels are applicable within dwellings.

Specific Requirement	Critical Health Effect (s)	L_{AeqT} (dB)	Time base, T (hours)	L_{AFmax} (dB)
Outdoor living area	Serious annoyance, daytime and evening	55	16	-
	Moderate annoyance, daytime evening	50	16	-
Dwelling, indoors	Speech intelligibility and moderate annoyance, daytime and evening	35	16	-
Inside bedrooms	Sleep disturbance, night time	30	8	45
Outside bedrooms	Sleep disturbance, window open (outdoor values)	45	8	60

Table 3: A Summary of the Guidance Noise Levels

4.2.4 BS 6472-1:2008 Guide to Evaluation of Human Exposure to Vibration in Buildings

Structural vibration in buildings can be detected by the occupants and can affect them in many ways; their quality of life can be reduced, as can their working efficiency.

This part of BS 6472 describes how to determine the vibration dose value, VDV, from frequency-weighted vibration measurements. The vibration dose value is used to estimate the probability of adverse comment which might be expected from human beings experiencing vibration in buildings.

Vibration dose value ranges which might result in various probabilities of adverse comment within residential buildings.

Place and time	Low probability of adverse comment $m.s^{-1.75}$ 1)	Adverse comment possible $m.s^{-1.75}$	Adverse comment probable $m.s^{-1.75}$ 2)
Residential buildings 16-hour day	0.2 to 0.4	0.4 to 0.8	0.8 to 1.6
Residential buildings 8-hour night	0.1 to 0.2	0.2 to 0.4	0.4 to 0.8

Table 4: Vibration Dose Value Ranges in Accordance with BS 6472-1:2008

1) Below these ranges adverse comment is not expected.

2) Above these ranges adverse comment is very likely.

4.3 Criteria Summary

In order to meet the requirements of Manchester City Council, the assessment and recommendations will be made in accordance with *BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings* and *WHO Guidelines for Community Noise*, following the agreed methodology with the Local Authority.

Vibration dose values will be assessed in accordance with *BS 6472-1:2008 Guide to evaluation of human exposure to vibration in buildings*.



5 Site Description

The proposed development site comprises a vacant plot of land in Levenshulme, a town located approximately 4.5 kilometres southeast of Manchester city centre. The surrounding context is characterised by a mix of commercial and residential land uses.

Immediately to the west, the site adjoins an elevated railway line sitting between Ardwick Station and Levenshulme Station and serving Manchester Piccadilly Station, with train movements occurring approximately 3–4 times per hour, without any disruptions occurring on the day of the survey. Further to the west, it is the location for a sports ground comprising six football pitches, operating from 16:00–23:00 on weekdays and 09:00–23:00 on weekends.

Approximately 120m east of the development site runs Stockport Road (A6) which is a 2-way road experiencing high levels of traffic flow, including bus routes and HGVs.

Immediately to the north and south are Pennington Street and Park Grove, respectively, both of which carry low volumes of local residential traffic. Existing residential housing with associated outdoor amenity lies to the east of the site, accessed via Pennington Street.

Along the A6 is where most of the commercial activity takes place, including a bakery (Maihan Bakery), a restaurant (Lahori Karahi), and others.

The noise profile of the area is dominated by traffic flow and train passings, mixed with other noise sources secondary in nature.

5.1 Subjective Observations

During the site visit, road traffic noise levels were generally low, with only occasional emergency vehicle sirens emanating from the A6 road were audible. Train movements along the adjacent railway line were noted to exhibit relatively low noise emissions and no discernible structural vibration, likely attributable to the low operational speeds of the trains.

5.2 Weather

Weather conditions during the survey were dry with light winds ($0.1 - 2.1 \text{ ms}^{-1}$) and occasional gusts and an average temperature of 16.4°C .



6 Noise Measurement Procedure

6.1 Survey Date(s)

Monday 18/08/2025 from 23:00 – Tuesday 02:00

Tuesday 19/08/2025 from 07:30 – 10:30.

6.2 Personnel Present

Luke Owen BSc AMIOA

6.3 Survey Equipment Used

Manufacturer	Model	Serial No.	Description
Rion	NL-52	01032413	Integrating Sound Level Meter and Real Time Analyser
Pulsar	Pulsar 105	93357	Acoustic Calibrator
Rion	NL-52	00976149	Integrating Sound Level Meter and Real Time Analyser

Table 5: Survey Equipment Used

6.4 Calibration

The sound level meters were calibrated with the field calibrator to a level of 94.0 dB @ 1 kHz prior to and on completion of the survey. No significant drift in calibration was observed. The meters used during the survey are precision grade Class 1.

Calibration certificates are available on request.

6.5 External Ambient Sound Measurements

The measurement locations chosen during the survey were deemed suitable for the determination of the noise levels able to impact upon the façades of the proposed development.

The sound level meters at monitoring position 1 (MP1) and monitoring position 2 (MP2) were set to measure broadband and 1:1 octave centre frequency bands L_{Aeq} , L_{A90} , L_{A10} and L_{AFmax} in 10-second and 5-minute intervals, respectively.

6.5.1 Monitoring Position 1

A microphone was placed on a tripod 19m from the centre of the railway line and 3m from the ground in free-field conditions. The sound level meter was set to record WAV file audio recordings for all maximum sound level events above 70 dBA. The meter was set to measure the complete 3-hour day and nighttime periods.



6.5.2 Monitoring Position 2

A microphone was placed in free-field conditions, 1.5m above the ground in the northeast corner of the site next to Pennington Street. The sound level meter was set to record WAV file audio recordings for all maximum sound level events above 70 dBA. The meter was set to measure throughout the complete survey periods.

6.6 Vibration Measurements

A digital seismograph was placed 24m from the railway and securely fixed to the concrete surface, in order to create a solid connection.

The digital seismograph was configured to measure Vibration Dose Values (VDV) over 3-hour monitoring periods during both daytime and nighttime. Measurements were captured along the X, Y, and Z axes, with the X axis aligned parallel to the railway track.



6.7 Location Plan of Measurement Positions

The location plan below shows the proposed development and positions of the monitoring equipment.



Figure 1: Indicative Location Map. Image taken from www.google.com/maps



7 Results and Analysis

7.1 External Ambient Sound Measurement Analysis in Accordance with BS 8233:2014

The following table presents the measured results from all monitoring positions. In order to provide a more robust assessment, the maximum $L_{Aeq,15min}$ for daytime and night time will be used.

Monitoring position	Day, Time	Time Period	Time Base T	$L_{Aeq,T}$ (dB)	Highest $L_{Aeq,15min}$ (dB)	L_{AFmax} (dB)
1	Monday 23:00-02:00	Nighttime	3hr	38.4	42.0	30.7 – 68.9
	Tuesday 07:30-10:30	Daytime	3hr	45.0	46.2	-
2	Monday 23:00-02:00	Nighttime	3hr	44.3	49.2	47.4 – 77.1
	Tuesday 07:30-10:30	Daytime	3hr	48.6	48.7	-

Table 6: Measurement Results Summary

7.2 Nighttime L_{AFmax} Analysis

The L_{AFmax} measured during the night time (23:00-07:00) has been analysed. WHO Community Noise Guidelines states “For a good night sleep it is believed that indoor sound pressure should not exceed approximately 45 dB L_{AFmax} more than 10 – 15 times per night (Vallet & Vernet 1991).

7.2.1 Nighttime L_{AFmax} at Monitoring Position 1

The WAV file recordings and frequency spectrum data indicate that the highest L_{AFmax} 68.9 dB at 01:09 and subsequent events were from train pass-bys.

As such, 68.9 dB will be used for the assessment at this monitoring position this is considered representative of other L_{AFmax} events during the nighttime period.



7.2.2 Nighttime L_{AFmax} at Monitoring Position 2

The following table presents the 10 highest L_{AFmax} events during the nighttime period at monitoring position 2.

Monitoring Position 2		
L_{AFmax}	Time	Description
77.1	01:05	Emergency Siren
66.4	02:05	Car pass-by
66.1	00:50	
66.1	00:45	
64.7	02:00	
64.4	23:05	Sports car revving
62.5	23:55	Car pass-by
61.6	00:05	
61.3	01:35	
61.0	01:25	

Table 7: Highest L_{AFmax} Events

Analysis of the WAV file recordings and corresponding frequency spectrum data identified that the highest L_{AFmax} events, measured at 77.1 dB, was attributed to an emergency siren. This event is not considered representative of the ambient sound environment.

Further analysis suggests that subsequent events are likely associated with normal vehicle pass-bys, with the sixth highest event of 64.4 dB generated by a sports car, whose frequency spectrum showed elevated low-frequency energy. As such, it will be used for the assessment at this monitoring position as this is considered representative of other L_{AFmax} events during the nighttime period as well as provide a robust approach. Further measurement results can be found in the appendix.

7.3 Vibration Measurement Results in Accordance with BS 6472-1:2008

The following table shows the vibration results for the daytime and night time periods.

Measurement Period	VDVx ($m.s^{-1.75}$)	VDVy ($m.s^{-1.75}$)	VDVz ($m.s^{-1.75}$)
07:28 – 10:34	0.018	0.018	0.018
23:13 – 02:07	0.017	0.017	0.017

Table 8: Vibration Measurement Results for Daytime and Night time period

The results show the maximum VDV for the daytime period to be $0.018 m.s^{-1.75}$.

The results show the maximum VDV for the night time period to be $0.017 m.s^{-1.75}$.

These results indicate a 'low probability of adverse comment' due to vibrations.



8 Recommendations

In order to provide a robust approach, the estimated internal noise levels attributed by the external noise sources for both day and nighttime periods have been assessed using the following methodology:

Plot 1

- The highest measured $L_{Aeq,15mins}$ at MP2 noise levels for both day and nighttime periods, with a distance correction applied.
- The L_{AFmax} maximum value analysis for the nighttime at MP2, distance corrected.

Plots 2 – 14

- The highest measured $L_{Aeq,15mins}$ at MP1 noise levels for both day and nighttime periods.
- Representative L_{AFmax} value (L_{AFMax} analysis) from the nighttime measured at MP1.
- A partial shielding correction is applied to account for the proximity of the wall partially shielding the railway line.
- No distance correction will be applied, thereby representing a worst-case scenario, as the monitoring position is closer to the railway.

The above, along with the building element evaluation will provide the basis for the following recommendations.

8.1 Glazing & Ventilation

The glazing and ventilation specification in bedrooms & living rooms should consist of double-glazed unit in well-sealed frames and a quality mechanical system or a passive acoustic vent as shown in the table below.

Room	Glazing	Ventilation
Bedrooms	6mm glass / 16mm air / 4mm glass	Greenwood Vent 5000EA + 1 Acoustic Set or Mechanical MVHR ventilation
Living rooms		

Table 9: Specification

8.2 Habitable Room Ceilings in Loft Space

All ceilings in bedrooms within the first floor at every house and all ceilings within the bungalow should consist of 1 no. standard 12.5mm plasterboard with 100mm 45kg/m³ mineral fibre laid above the plasterboard, fitted tightly between the joists.

8.3 Notes on Ventilation

NOTE 5 in section 7.7.2 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.”

It should be noted that it's the responsibility of Onward Homes to ensure that the ventilation strategy is sufficient to meet the requirements of Building Regulations Approved Documents F and O.

It is our understanding that all dwellings may be ventilated either with passive vents or mechanically ventilated. If the proposed dwellings are to be mechanically ventilated, the system is to be designed by



a suitably qualified engineer or M&E consultant. The system should be designed so the cumulative internal ambient sound levels are not exceeded. Typically, a good quality MVHR system, when operated at mean capacity should not pose a significant contribution. Furthermore, Approved Document F states in Section 1.7:

“Account should be taken of outside noise when considering whether openable windows are appropriate for purge ventilation.

NOTE: Although there is no requirement to undertake noise testing, achieving the levels in the following guidance would ensure good acoustic conditions. The average A-weighted sound pressure level for a ventilator operating under normal conditions and not at boost rates should not exceed both of the following.

30dB $L_{Aeq,T}$ for noise-sensitive rooms (e.g. bedrooms and living rooms) when a continuous mechanical ventilation system is running on its minimum low rate.

45dB $L_{Aeq,T}$ in less noise-sensitive rooms (e.g. kitchens and bathrooms) when a continuous operation system is running at the minimum high rate or an intermittent operation system is running.”

Externally, a well-designed mechanical ventilation system is likely to be inaudible at the nearest receptor, with supply and exhaust vents typically not surpassing 35 dB(A) at 1 meter.

The glazing and ventilation suggestions have been calculated assuming the windows are tightly closed. However, it must be noted that windows are suggested to be openable to provide rapid or purge ventilation or means of escape.

8.4 Open Window Assessment in Accordance with Approved Document O

Approved Document O establishes that in locations where external noise may be an issue (...), the overheating mitigation strategy should take account of the likelihood that windows will be closed during sleeping hours (11pm to 7am).

Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits.

- 40dB $L_{Aeq,T}$, averaged over 8 hours (between 11pm and 7am).
- 55dB L_{AFmax} , more than 10 times a night (between 11pm and 7am).

As can be seen in the table below, considering the sound reduction of 13dB of a partially open window, noise levels do not exceed 53dB in all façades. In addition, maximum levels analysis shows that 55dB L_{Amax} has not been exceeded more than 10 times at any of the plots.

Plot	Room	Time period	Measured External $L_{Aeq,T}$ (dB)	ADO criteria*	ADO exceedance
Plot 1	Bedroom	Night time (23:00 – 07:00)	45.6	53.0	-7.4
Plots 2 - 14			41.6	53.0	-11.4

Table 10: ADO Analysis

*with open window R_w of 13dB

Consequently, the overheating mitigation strategy should take account of the likelihood that windows may be open during sleeping hours and therefore the minimum free areas of Approved Document O simplified method can be met.



It should be noted that an Approved Document O assessment is required to be undertaken using the $L_{Aeq,8hour}$ and L_{Amax} criteria over the 23:00–07:00 period. Please note the results may be adjusted once the long-term survey is carried out.

8.5 External Amenity Space

The architect's drawings show gardens in association with all plots, predominantly to the rear.

Section 7.7.3.2 of BS 8233:2014 states:

'For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ 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.'

During the daytime, the most exposed garden at plot 1 is expected to experience an $L_{Aeq,3hour}$ of 50.2 dB which is just 0.2 dB over the WHO Guideline values for moderate annoyance. This is considered a negligible exceedance and, as such, an acceptable level for outdoor amenity.

The most exposed garden associated with plots 2 to 14 is expected to experience an $L_{Aeq,3hours}$ of 46.8 dB, which falls 3.2 dB below the lower guideline value.

Consequently, acceptable noise levels are anticipated across all external amenity areas.



9 Calculation Methodology

Calculations for the BS 8233:2014 assessment have been based on the rigorous calculation method of BS 8233:2014 and BS EN 12354-3.

The calculations aim to meet the requirement of Approved Document F (ventilation). However, Part F expert advice must be sought. If more ventilation is required, further calculations may need to be carried out.

All room dimensions used in calculations for the ground floor are based on drawings provided by the architect. See appendix – Site plans.

External walls are to be constructed of a timber framework structure. A typical timber frame construction with lightweight cladding has been adopted for the assessment.

The calculations assume each room has a reverberation time of 0.5 seconds in living rooms and 0.4 seconds in bedrooms.

The predictions also have been calculated assuming all windows are tightly closed.

9.1 Building Elements

The following table shows the expected performance of the glazing and ventilation.

Element	Description	$R_w/D_{n,e,w}$ (C ; C_{tr}) (dB)	Octave Centre Frequencies (Hz) SRI / $D_{n,e}$ (dB)					
			125	250	500	1k	2k	4k
Glazing	6mm (16) 4mm	32 (-2;-4)	21	20	26	38	37	39
Ventilation	Greenwood Vent 5000EA + 1Acoustic Set	39 (-2)	39	38	31	44	43	40

Table 11: Glazing & Ventilation SRI

The selected units or products described have been used as a guide to form part of the specification. Other similar units or products can be used provided they can achieve the given minimum acoustic performance.



10 Estimated Performance

The following table compares the estimated performance values with the measured values at the most exposed habitable rooms and outdoor amenity areas.

Location	Room	Time period	Measured External		Estimated Internal / External		Criteria		Exceed. $L_{Aeq,T}$ (dB)	Exceed. L_{AFmax} (dB)
			$L_{Aeq,T}$ (dB)	L_{AFmax} (dB)	$L_{Aeq,T}$ (dB)	L_{AFmax} (dB)	$L_{Aeq,T}$ (dB)	L_{AFmax} (dB)		
Plot 1	Bedroom	Daytime	49.9	-	22.2	-	35.0	-	-12.8	-
		Nighttime	50.5	67.0	17.0	44.8	30.0	45.0	-13.0	-0.2
	Living room	Daytime	49.9	-	23.8	-	35.0	-	-11.1	-
Plot 2-14	Bedroom	Daytime	50.8	-	25.6	-	35.0	-	-9.4	-
		Nighttime	46.7	73.7	18.7	43.1	30.0	45.0	-11.3	-1.9
	Living room	Daytime	50.8	-	25.0	-	35.0	-	-10.0	-
Outdoor Amenity		Daytime	50.2	-	50.2	-	55.0	-	-4.8	-

Table 12: Estimated performance



11 Conclusion

Internal Ambient Noise Levels

- Typical glazing and ventilation strategy has been specified. Once this is incorporated, the internal noise level criteria is expected to be achieved in all habitable rooms in accordance with BS8233, thereby discharging the anticipated Local Authority conditions.

External Amenity Area/s

- Noise levels within the gardens of the proposed dwelling houses are expected to be acceptable throughout the development, particularly those associated with plots 2 to 14. Further improvements are expected following the installation of any perimeter fencing.

Vibration

- Vibration dose value measurements are well below the lower boundary of 'low probability of adverse comment', as presented in BS 6472-1:2008. It is therefore apparent that vibration due to railway traffic will not be a cause for concern for future residents.

Further Considerations

- As requested by Manchester City Council, additional long-term survey and subsequent assessment shall be undertaken, incorporating measurements over the period from Friday to Monday.



12 References

National Planning Policy Framework (NPPF)

BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings

World Health Organisation Guidelines for Community Noise

BS 7445-1:2003 Description and measurement of environmental noise – Part 1: Guide to quantities and procedures

BS 6472-1:2008 Guide to evaluation of human exposure to vibration in buildings

www.google.co.uk/maps

12.1 Drawing References

1351-100D-Proposed Site Plan

1351-101-House Type A – 1B2P M4-3 Bungalow

1351-102-House Type B – 2B4P

1351-103A-House Type C – 2B4P Corner Unit

1351-104A-House Type D – 3B6P

1351-105A-House Type E – 3B6P Corner Unit

1351-602A-Proposed Site Plan



Appendix

Figure 1: Photograph showing Monitoring Position 1



Figure 2: Photograph showing Monitoring Position 2



SPRATT+HAMER

Measurement Results

Monitoring Position 1

Day	Time Period	Time Base T (mins)	$L_{Aeq,T}$ (dB)	L_{AFmax} (dB)	L_{A90} (dB)	L_{A10} (dB)
Monday	Nighttime	15	44.3	41.8 – 68.0	40.9	47.4
			42.0	38.6 – 55.9	39.8	44.7
			39.1	36.0 – 53.4	37.5	41.2
			40.0	36.6 – 52.9	38.4	42.0
			39.9	35.1 – 58.4	37.9	42.1
			38.9	35.1 – 58.9	36.9	41.2
			37.8	33.2 – 56.6	35.7	39.9
			36.0	32.1 – 54.4	34.2	38.1
			37.1	31.6 – 67.5	34.5	39.6
			39.0	33.6 – 68.9	36.9	41.3
			39.0	35.2 – 54.6	37.4	41.0
			37.0	33.5 – 56.5	35.6	38.7
			34.9	30.7 – 45.7	33.5	36.6
Tuesday	Daytime	15	45.7	41.2 – 64.1	44.0	47.9
			44.8	41.0 – 55.5	43.5	46.4
			45.0	41.4 – 59.9	43.5	46.9
			44.0	41.3 – 55.1	42.7	45.8
			46.2	44.7 – 54.9	44.5	48.4
			45.6	39.3 – 59.3	43.8	47.8
			44.7	40.4 – 60.0	43.2	46.4
			44.8	41.1 – 55.5	43.3	46.7
			45.2	41.9 – 60.5	43.7	47.2
			44.7	40.2 – 55.3	43.4	46.4
			44.7	40.4 – 65.0	42.3	47.2

Table 13: MP1 Measurement Results



SPRATT+HAMER

Monitoring Position 2

Day	Time Period	Time Base T (mins)	$L_{Aeq,T}$ (dB)	L_{AFmax} (dB)	L_{A90} (dB)	L_{A10} (dB)
Monday	Nighttime	15	47.5	57.3 - 74.1	36.4	44.9
			41.8	52.7 - 54.8	34.3	42.0
			43.5	49.8 - 54	36.9	43.3
			43.4	49.9 - 62.5	34.7	43.1
			41.9	54.2 - 61.6	34.6	41.8
			42.1	49.4 - 60.4	30.8	40.2
			38.5	47.6 - 54.8	30.3	38.8
			44.8	55.5 - 66.1	30.8	45.5
			49.2	50.7 - 77.1	34.1	41.9
			44.2	55.3 - 61	36.0	44.3
			43.1	51.5 - 61.3	34.5	43.1
			39.4	47.4 - 50.7	32.7	39.6
			44.5	55.3 - 66.4	34.1	44.7
Tuesday	Daytime	15	46.5	53 - 57	41.5	46.6
			47.6	51.6 - 72.8	41.1	47.5
			45.6	53.3 - 60.5	41.3	45.7
			48.7	57.3 - 59.2	41.9	49.2
			48.0	59.2 - 62.1	41.1	47.6
			46.9	54.1 - 64	39.4	46.7
			46.9	55.3 - 60.7	41.7	47.0
			47.9	56.8 - 72	42.0	47.9
			47.7	56.6 - 62.1	41.4	47.6
			47.9	55.7 - 71.3	39.7	46.9
			46.1	53.5 - 58	39.8	46.0

Table 14: MP2 Measurement Results



Proposed Site Plans



Glossary of Acoustical Terms

A-weighting

Noise levels are corrected to represent human response to sound.

L_{Aeq}

This is a continuous equivalent of time varying noise, or effectively the average measured (A weighted) noise level over a defined period of time.

$L_{Aeq,16hour}$

A 16 hour long measurement of the L_{Aeq} over the period between 07:00 and 23:00, also known as a daytime measurement.

$L_{Aeq,8hour}$

An 8 hour long measurement of the L_{Aeq} over the period between 23:00 and 07:00, also known as a night time measurement.

L_{AFmax}

The highest, or maximum A-weighted sound pressure level measured over a specified time period. The 'F' defines a time weighting in Fast.

L_{A90}

The A-weighted noise level or average level which is exceeded for 90 percent of the measured time period. Also known as a background level.

L_{A10}

The A-weighted noise level or average level which is exceeded for 10 percent of the measured time period.

1:1 & 1:3 octave spectrum analysis

A single measurement that is separated into frequency bands to allow for a more detailed analysis of the noise source in question.

R_w

The weighted sound reduction index of a partition or facade. A single number value based on the performance of a partition between two rooms across the frequency range 100Hz to 3150Hz. The level is adjusted for the effects of reverberation and background noise.



$D_{n,e,w}$

The weighted level difference of a partition or façade which takes into account a small element such as a grill or vent.

SEL (sound exposure level)

A measure of A-weighted sound energy used to describe a particular event, such as a train pass. It is the sound energy, which, if occurring over one second would contain the same energy as the event.

Free field sound pressure

Is where the radiation or spread of sound is completely unaffected by the presence of any reflecting surfaces or boundaries.

Low Frequency Noise

A term generally used for sound below a frequency of 100 to 150Hz.





SPRATT+HAMER

Online

sprattandhamer.co.uk

Email

info@sprattandhamer.co.uk

Birmingham

Lewis Building, Bull Street
Birmingham, B4 6AF
0121 828 3120

London

100 Borough High Street,
London, SE1 1LB
0203 286 2019

Liverpool

23 Roscoe Street, Liverpool
L1 2SX
0151 933 6186

Manchester

Peter House, Oxford Street
Manchester, M1 5AN
0161 521 9383