



98 Wilmslow Road

Noise impact assessment

11255.1

10th November 2023

Revision C



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11255.1B

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1 Summary

- 1.1 This report assesses the noise impact on the proposed residential development at 98 Wilmslow Road, Manchester, M14 5AL. The development comprises 42 residential units, ground-floor commercial spaces, parking, and associated infrastructure.
- 1.2 The noise assessment follows current planning policy, standards, and Manchester City Council's (MCC) Planning & Noise Technical Guidance. It also considers the Professional Practice Guidance on Planning & Noise (ProPG) and the Acoustics Ventilation and Overheating (AVO) guide.
- 1.3 Noise levels from road traffic and other sources were measured at the site. Based on the results of the survey carried out a digital geometric acoustics model (DGAM) was prepared to predict the façade and external amenity areas' noise levels.
- 1.4 Façade solutions to achieve suitable internal noise levels in habitable rooms are summarised in Table 1. Potential acoustic ventilation strategies are suggested based on the constraints. Figure 1 shows the sound insulation treatments required for each façade.
- 1.5 Where mechanical ventilation systems are employed for whole-dwelling ventilation, the noise limits set out by AD-F are identified in Table 9.
- 1.6 Suitable criteria and floor solutions to control noise transmission between ground-floor uses and first-floor dwellings are specified in Section 13. The exact floor solutions to achieve these requirements will need to be developed once full details of the construction typology and the plant room configuration are available.
- 1.7 At this stage details regarding the specific type of use for each proposed retail unit are not known and therefore the relevant limits for commercial noise, including any potential fixed plant are identified in Table 11.
- 1.8 Open windows are not acoustically suitable to mitigate overheating in habitable rooms. It is recommended that alternative provisions are made to mitigate overheating in habitable rooms.
- 1.9 The concerns previously raised by the MCC (letter ref. 133748/FO/2022) regarding an increase of activity on Grandale Street and the detriment to the residential amenity of nearby properties on Grandale Street have been addressed. Details are provided in Section 15. Table 11: Lowest representative LA90,15min (source: Lighthouse Acoustics (Doc. Ref. 0874/APR1))
- 1.10 Based on the implementation of the recommendations provided in this report, the noise impacts are expected to remain below the Lowest Observed Adverse Effect Level (LOAEL) and therefore the development is considered to be suitable for residential development in line with the recommendations of the National Planning Policy Framework (NPPF) and the Noise Policy Statement for England (NPSE).



Figure 1: Sound insulation requirements for each façade

Location	Habitable room	Glazing performance	Potential AD-F whole dwelling ventilation strategy	Trickle ventilator performance	
				Req. performance	Example suitable proprietary vents (others also feasible)
Façade 1	Bedroom	≥ 39 dB R _w + C _{tr} (e.g., 8.5 mm lam glass + 16 mm cavity + 10.5 lam mm glass)	Mechanical ventilation with heat recovery (trickle ventilators not feasible)	N/A	
	Living room / Kitchen	≥ 29 dB R _w + C _{tr} (e.g. 4 mm glass + 16 mm cavity + 6 mm glass)	Mechanical ventilation with heat recovery (trickle ventilators not feasible)	N/A	
	Corner Living room / Kitchen	≥ 33 dB R _w + C _{tr} (e.g. 6 mm glass + 12 mm cavity + 10.5 mm lam glass)	Mechanical ventilation with heat recovery (trickle ventilators not feasible)	N/A	
Façade 2	Bedroom	≥ 35 dB R _w + C _{tr} (e.g., 6 mm glass + 12 mm cavity + 12.38 mm lam glass)	Mechanical ventilation with heat recovery (trickle ventilators not feasible)	N/A	
	Living room / Kitchen	≥ 26 dB R _w + C _{tr} (e.g. 4 mm glass + 16 mm cavity + 4 mm glass)	Mechanical ventilation with heat recovery (trickle ventilators not feasible)	N/A	
Façade 3	Bedroom	≥ 31 dB R _w + C _{tr} (e.g., 4 mm glass + 16 mm cavity + 10 mm glass)	Mechanical ventilation with heat recovery (trickle ventilators not feasible)	N/A	
	Living room / Kitchen	≥ 26 dB R _w + C _{tr} (e.g. 4 mm glass + 16 mm cavity + 4 mm glass)	Mechanical ventilation with heat recovery (trickle ventilators not feasible)	N/A	
Façade 4	Bedroom	≥ 31 dB R _w + C _{tr} (e.g., 4 mm glass + 16 mm cavity + 10 mm glass)	Continuous mechanical extract ventilation; <i>or</i> Mechanical ventilation with heat recovery (trickle ventilators not required)	Either: 1 x 4000 mm ² EA vent, ≥ 38 dB D _{ne,w} + C _{tr} <i>or</i> 2 x 2000 mm ² EA vents ≥ 41 dB D _{ne,w} + C _{tr}	Greenwood 5000ea.ac1 (window mounted)
	Living room / Kitchen	≥ 26 dB R _w + C _{tr} (e.g. 4 mm glass + 16 mm cavity + 4 mm glass)			Greenwood 2500ea.ac2 (window mounted)
Façade 5	Bedroom	≥ 31 dB R _w + C _{tr} (e.g., 4 mm glass + 16 mm cavity + 10 mm glass)	Continuous mechanical extract ventilation; <i>or</i> Mechanical ventilation with heat recovery (trickle ventilators not required)	Either: 1 x 4000 mm ² EA vent, ≥ 31 dB D _{ne,w} + C _{tr} <i>or</i> 2 x 2000 mm ² EA vents ≥ 34 dB D _{ne,w} + C _{tr}	Simon Framevent
	Living room / Kitchen	≥ 26 dB R _w + C _{tr} (e.g. 4 mm glass + 16 mm cavity + 4 mm glass)			Simon Acoustic EHA
EA = Equivalent Area, as defined by Approved Document F. The number or trickle vents required must follow Approved Document F requirements, depending on the no. of bedrooms for each apartment unit.					

Table 1: Summary of minimum façade sound insulation treatment

2 Introduction

- 2.1 A development consisting of a residential accommodation block, comprising 42 no. residential units (Use Class C3) with ground floor commercial restaurant / cafe and retail units (Use Class E and sui generis), car parking, cycle parking and associated infrastructure is proposed at 98 Wilmslow Road, Manchester, M14 5AL.
- 2.2 Apex Acoustics has been commissioned to undertake an assessment of the potential noise impact on the proposed development site in support of a planning application.
- 2.3 The site survey data included in the acoustic planning report previously carried out by Lighthouse Acoustics (Doc. Ref. 0874/APR1) was taken into consideration.
- 2.4 This report aims to identify appropriate acoustic design parameters and how these may be achieved in practice.
- 2.5 The site location is shown in Figure 2.



Figure 2: Site location outlined in red (source: Google Earth)

3 Planning policy and noise criteria

3.1 National Planning Policy Framework (NPPF)

3.2 The National Planning Policy Framework (NPPF) (Reference 1) sets out the Government's planning policies for England and how these should be applied. It provides a framework within which locally-prepared plans for housing and other development can be produced. In respect of noise, Paragraph 174, 185 and 187 of the NPPF states the following:

3.3 Paragraph 174:

"e) 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..."

3.4 Paragraph 185:

"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:

- a) 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 life⁶⁵ [See Explanatory Note to the Noise Policy Statement for England],
- b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason;

3.5 Paragraph 187:

"Planning policies and decisions should ensure 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. "

3.6 Noise Policy Statement for England (NPSE)

3.7 The Noise Policy Statement for England (Reference 2) states three policy aims as follows:

"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; and
- where possible, contribute to the improvement of health and quality of life."

3.8 The NPSE defines adverse noise impact as follows:

- No Observed Effect Level (NOEL)
This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.
- Lowest Observed Adverse Effect Level (LOAEL)
This is the level above which adverse effects on health and quality of life can be detected.
- Significant Observed Adverse Effect Level (SOAEL)
This is the level above which significant adverse effects on health and quality of life occur

3.9 The first two aims of the NPSE require that no significant adverse impact should occur and that, where a noise level which falls between a level which represents the lowest observable adverse effect and a level which represents a significant observed adverse effect, then according to the explanatory notes in the statement:

"... all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life whilst also taking into consideration the guiding principles of sustainable development. This does not mean that such effects cannot occur."

3.10 It is considered that meeting the internal ambient noise level limits given in BS 8233, which are in line with those given by the World Health Organisation (Reference 8) adequately achieve the first and second aims of the NPSE.

3.11 Manchester City Council Planning & Noise Technical Guidance, October 2022

3.12 The Manchester City Council (MCC) Planning & Noise Technical Guidance (Reference 5) aims to provide help and advice in relation to noise in a planning context to encourage good acoustic design. It outlines what is expected in relation to current guidance and policy with the aspiration that new developments achieve the highest possible standards without compromising the health and well-being of people that live and work within the City of Manchester.

3.13 The Sections of the guide which are relevant to the proposed development are as follows:

3.7.1.1 Residential Developments: The Council has adopted the following noise limits for residential properties:

- Bedrooms (night time - 23.00 - 07.00) 30 dB L_{Aeq} (individual noise events should not normally exceed 45 dB $L_{Amax,F}$ by more than 10 times)
- Living Rooms (daytime - 07.00 - 23.00) 35 dB L_{Aeq}
- Gardens and terraces (daytime) 55 dB L_{Aeq}

3.7.1.3 Mixed Use Developments: Where a planning application includes a proposal to contain a potentially noisy development within the same building as a noise sensitive use or vice versa the noise survey should consider the transfer of noise between the noisy and noise sensitive uses. An example of where this should be considered would be a proposal for a bar or club within the same building as residential properties (see section 3.6.1.2).

3.7.1.5 Industrial / commercial developments: 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.'

Noise and vibration from fixed plant / equipment: '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'.

Where fixed plant, equipment or machinery is attached to a building the vibration caused by it can pass through the building structure and cause structure borne noise elsewhere in the building. Where it is to be installed in or on a building containing a noise sensitive use structure borne noise should be considered in the noise assessment and adequate control measures should be proposed. An example of where this would be required is where there is a proposal to install ventilation equipment on the roof of a residential apartment block or it could be an air source heat pump attached to the side of a building.

5.3.1.6 Ventilation & Overheating: An overheating assessment might not always be undertaken for a project and without this information it is difficult to identify noise impacts that may occur during the overheating condition. It is recommended that either where a condition has been imposed to control internal noise levels for residential development or where overheating may be an issue, the guidance provided in the AVO Guide is followed.

3.14 Professional Practice Guidance on Planning & Noise

3.15 Professional Practice Guidance on Planning & Noise: New Residential Development (ProPG) (Reference 7) is a guidance document on the management of noise within the planning system in England for new build housing developments.

3.16 The document draws together guideline limits for internal noise levels from external transport sources from other sources of guidance, including BS 8233 (Reference 8) and the World Health Organisation (WHO) Guidelines for Community Noise (Reference 9).

3.17 These criteria are consistent with those required by the Local Environmental Health Department and are presented in Table 2.

Activity	Location	Guideline upper limit, dB		
		L _{Aeq, daytime}	L _{Aeq, night-time}	L _{AFmax}
Resting	Living room	35	-	-
Dining	Dining room	40	-	-
Sleeping (daytime resting)	Bedroom	35	30	45

Table 2: Internal noise level requirements

3.18 The daytime period is defined as the 16 hours between 07:00 to 23:00 hours and the night-time period is defined as the 8 hours between 23:00 to 07:00 hours.

3.19 With regards to the night-time L_{AFmax} criterion, ProPG states:

"In most circumstances in noise-sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45 dB L_{Amax,F} more than 10 times a night."

3.20 It is considered that the adopted internal ambient noise level targets align with the LOAEL following the terminology of the NPSE, such that meeting these targets adequately achieves the aims of the NPPF and NPSE.

3.21 ProPG states:

"Once internal L_{Aeq} levels exceed the target levels by more than 10 dB, they are highly likely to be regarded as "unacceptable" by most people, particularly if such levels occur more than occasionally."

3.22 Internal ambient noise levels 10 dB above the daytime and night-time values in Table 2 are therefore identified as the SOAEL.

3.23 Appendix A of the ProPG collates the results of various studies on sleep disturbance due to individual noise events, and states the following:

"it can be concluded that at night (2300 - 0700 hrs) a significant effect on sleep disturbance e.g. behavioural awakening, is likely to occur where the maximum sound level at the façade of a building with partially open windows is above:

- 85 dB L_{Amax, F} (where the number of events exceeding this value is ≤ 20); or
- 80 dB L_{Amax, F} (where the number of events exceeding this value is > 20)."

3.24 These values are identified as a SOAEL in the situation where windows are partially open.

3.25 ProPG guidance on external amenity area assessments "reflects and extends the advice contained in BS 8233:2014 and the current Government guidance in PPG-Noise". Relevant guidance from these sources is summarised in the document as follows:

- "If external spaces are an intrinsic part of the overall design, the acoustic environment of those spaces should be considered so that they can be enjoyed as intended."
- "The acoustic environment of external amenity areas that are an intrinsic part of the overall design should always be assessed and noise levels should ideally not be above the range 50-55 dB L_{Aeq, 16 hr}."
- "These guideline values may not be achievable in all circumstances where development might be desirable. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces."

3.26 The BS 8233 'desirable' value of 50 dB L_{Aeq, 16 hr} in external amenity areas is identified as the LOAEL.

3.27 Following DEFRA guidance (Reference 10) on the possible identification of LOAELs and SOAELs, 66 dB L_{Aeq, 16 hr} is identified as the SOAEL.

3.28 AVO Guide

3.29 Section 2.4 of ProPG refers to the importance of providing a thermal comfort/cooling strategy to reduce the potential impacts of noise on future occupants of new residential development.

3.30 The AVO guide (Reference 6) is intended to demonstrate good acoustics design as described in the ProPG when considering IANLs guidelines.

3.31 The document provides guidelines for environmental noise from transportation sources and internal noise from mechanical services such as ventilation.

3.32 Following a process of Good Acoustic Design for the site layout, the AVO Guide suggests three steps to consider the impact of noise on potential amenity:

- Characterise the noise impacts on the proposed development
 - Evaluate and advise the implications and constraints of ventilation strategies
 - Evaluate and advise the implications and constraints for strategies to mitigate overheating.
- 3.33 The AVO Guide indicates a two-stage process to determine the risk of adverse noise effects while using opening windows for ventilative cooling. The guidance is detailed in Appendix A.

4 Noise sources and measurements

4.1 Measurements

4.2 Measurements of the existing noise environment at the proposed site were previously carried out by Lighthouse Acoustics and Apex Acoustics at various monitoring positions.

4.3 Noise survey carried out by Lighthouse Acoustics

4.4 Lighthouse Acoustics conducted an environmental noise survey from 13:00 hours on Friday 25th February 2022 to 11:00 hours on Monday 28th February 2022.

4.5 Measurements were taken at two positions shown in Figure 2. At Position A, the microphone was located 5 meters from the east facade of the existing building at a height of 3 meters above ground level, overlooking Wilmslow Road and Grandale Street. At Position B, the microphone was 1 meter from the north facade of the existing building at a height of 3 meters above ground level, overlooking the existing car park.

4.6 The sound level meters and calibrators used meet the technical specifications of BS 7445 and have current calibration certificates traceable to national standards. The equipment was field-calibrated before and after the measurements, with no significant drift in sensitivity.

4.7 The Weather was suitable for sound measurements throughout the whole measurement period - light winds, no rain, dry roads, and stable temperatures.

4.8 The equipment used is listed in Table 3 and the results of the survey are stated in Table 5.

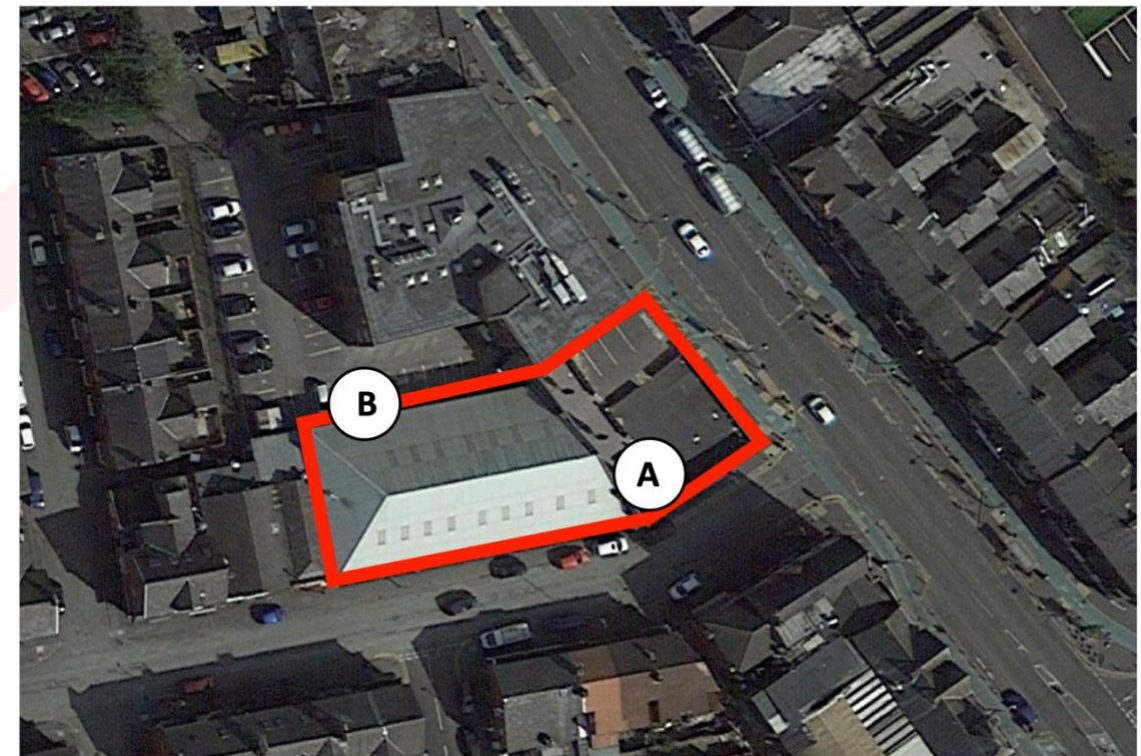


Figure 3: Adopted measurements positions (source: Lighthouse Acoustics (Doc. Ref. 0874/APR1))

Equipment	Model	Serial No.
Class 1 Sound Level Meter	Casella 633C	0721320
Preamplifier	Casella 495	001414
Microphone	Casella 251	1025
Class 1 Sound Level Meter	Casella 633C	2811231
Preamplifier	Casella 495	001239
Microphone	Casella 251	1841
Class 1 Sound Calibrator	Casella 120/1	3864878

Table 3: Equipment used (source: Lighthouse Acoustics (Doc. Ref. 0874/APR1))

4.9 Noise survey carried out by Apex Acoustics

4.10 Apex Acoustics conducted a noise survey on Tuesday the 12th of July and Wednesday the 13th of July 2023. The survey aimed to determine typical environmental and background noise levels and followed BS 7445-2 guidelines (Reference 17).

4.11 Measurements were taken at positions P1 and P2, as indicated in Figure 4. For position P1, the microphone was attached to the 2nd-floor window on 1 Grandale St, 4.5 meters high, and measurements were taken for 10 hours, i.e. from 5 pm to 12 pm on Tuesday and from 10 am to 1 pm on Wednesday. At position P2, the microphone was placed on a tripod, 2 meters high and 1 meter from the existing residence's facade, and measurements were taken for 7 hours, from 8 pm to 12 pm on Tuesday and from 10 am to 1 pm on Wednesday. The data collected during the site survey is presented in Table 5.

4.12 The main noise sources were noted to be road traffic noise on Wilmslow Road. Intermittent vehicle movements occurred on Grandale Street during the survey and were noted to be associated with local residents and nearby businesses.

4.13 The sound level meters and calibrators used for the measurements have up-to-date calibration certificates that are traceable to national standards. The equipment was field-calibrated before and after the measurements, with no significant drift in sensitivity noted. Throughout the survey, the weather conditions were dry, and the wind speeds remained below 5 m/s.

Equipment	Model	Serial no.
Sound Level Meter	NTi XL2	A2A-11084-E0
Calibrator	Larson Davis CAL 200	10665
Sound Level Meter	NTi XL2	A2A-20287-E0
Calibrator	Larson Davis CAL 200	19379

Table 4: Equipment used

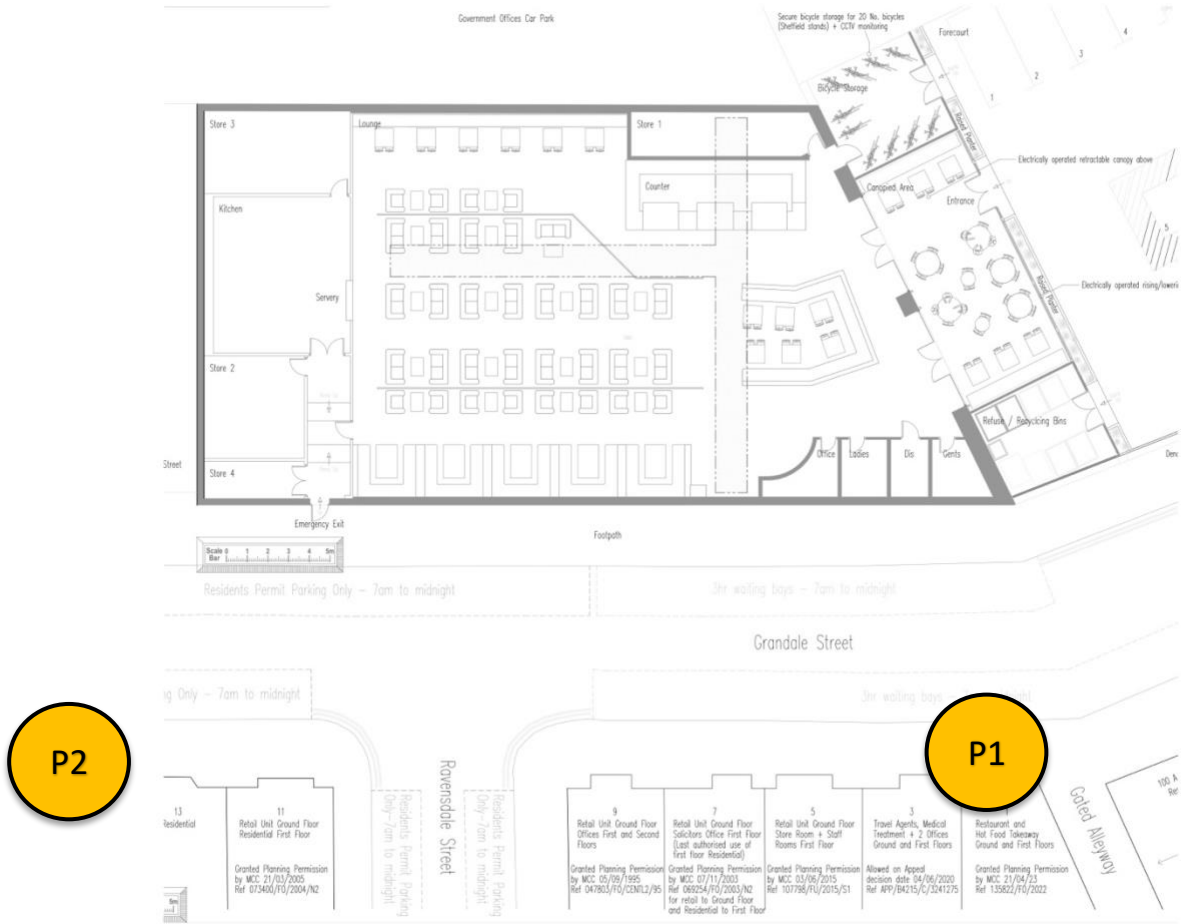


Figure 4: Noise-sensitive receivers and adopted measurement positions

4.14 Results

4.15 The measured daytime and night-time noise levels are shown in Table 5.

4.16 Table 6 shows the highest maximum night-time noise levels from specific events at Positions A and B. The 93 dB L_{AFmax} level was not exceeded more than 10 times at Position A, and the 75 dB L_{AFmax} level was not exceeded more than 10 times at Position B. Therefore, these levels are used as the design case to determine compliance against ProPG Note 4 of Figure 2.

Position	Parameter	dB(A)	Octave band centre frequency, Hz Measured A-weighted noise levels, dB							
			63	125	250	500	1k	2k	4k	8k
A	Daytime, LAeq, 16 hr	66	45	48	53	61	64	57	48	38
	Night time, LAeq, 8 hr	69	45	50	57	65	66	57	44	34
B	Daytime, LAeq, 16 hr	58	42	49	49	53	53	42	36	31
	Night time, LAeq, 8 hr	57	41	47	49	52	52	41	32	29
P1	Daytime, LAeq, 9 hr	65	42	47	52	59	60	58	53	45
	Night time, LAeq, 1 hr	67	45	49	54	63	64	57	55	50
P2	Daytime, LAeq, 6 hr	60	43	43	51	54	56	53	48	42
	Night time, LAeq, 1 hr	62	49	48	51	55	56	54	52	46

Table 5: Measured A-weighted noise levels

Position	Measured 11 highest maximum noise events during the night-time											
A	LAFmax dB	107	101	97	97	95	95	94	94	94	93	93
	Source	Traffic (vehicles passing by) and people shouting										
B	LAFmax dB	83	82	81	80	70	79	78	78	76	75	75
	Source	Traffic (vehicles passing by) and people shouting										

Table 6: Measured LAFmax events during the night time period

5 Achieving the required internal noise levels

5.1 Façade noise levels

5.2 The proposed development has varying exposure to external noise sources and therefore the previously mentioned DGAM was also used to predict noise levels at the proposed development's various façades. Calculations have been carried out to predict the façade day and night-time noise levels.

5.3 Figure 5 shows the calculated noise levels at each proposed façade based on its exposure and proximity to transportation noise sources. Table 7 summarizes the predicted free-field noise levels at each façade location resulting from the DGAM analysis. The octave band noise levels were adjusted to match the single figure A-weighted noise levels.

Façade affected	Parameter	dB(A)	Octave band centre frequency, Hz				
			A-weighted free-field noise level, dB				
			125	250	500	1k	2k
Façade 1	L _{Aeq,16 hr}	69	50	56	63	67	61
	L _{Aeq,8 hr}	72	52	60	67	69	61
	L _{AFmax}	93	-	-	-	-	-
Façade 2	L _{Aeq,16 hr}	63	44	50	57	60	55
	L _{Aeq,8 hr}	66	47	55	62	63	55
	L _{AFmax}	87	-	-	-	-	-
Façade 3	L _{Aeq,16 hr}	60	42	48	54	57	52
	L _{Aeq,8 hr}	62	43	51	57	59	51
	L _{AFmax}	83	-	-	-	-	-
Façade 4	L _{Aeq,16 hr}	58	42	48	52	55	51
	L _{Aeq,8 hr}	60	42	49	55	57	49
	L _{AFmax}	81	-	-	-	-	-
Façade 5	L _{Aeq,16 hr}	55	46	46	50	50	39
	L _{Aeq,8 hr}	54	44	46	49	49	38
	L _{AFmax}	72	-	-	-	-	-

Table 7: A-weighted external free-field noise levels

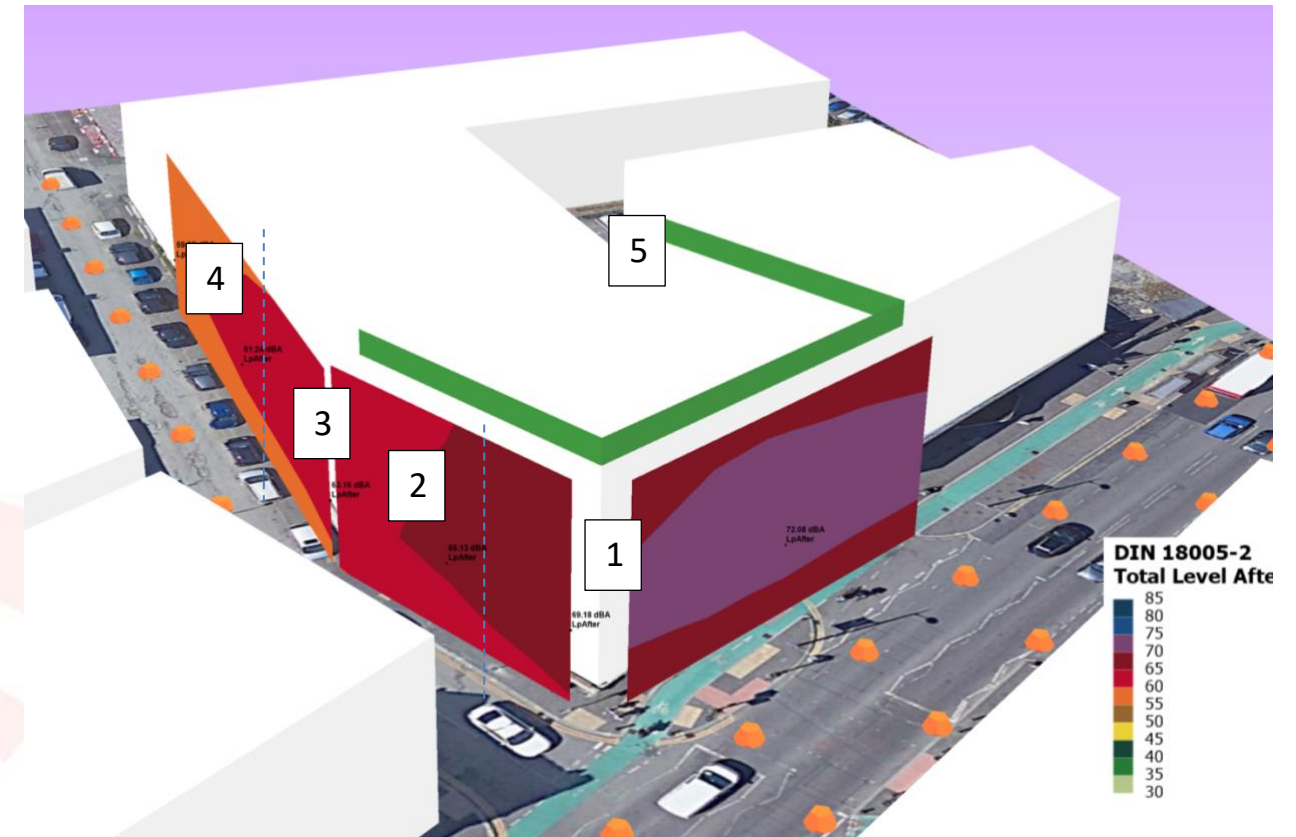


Figure 5: Calculated facade noise levels L_{Aeq,16hr} (2 m from the facade surface)

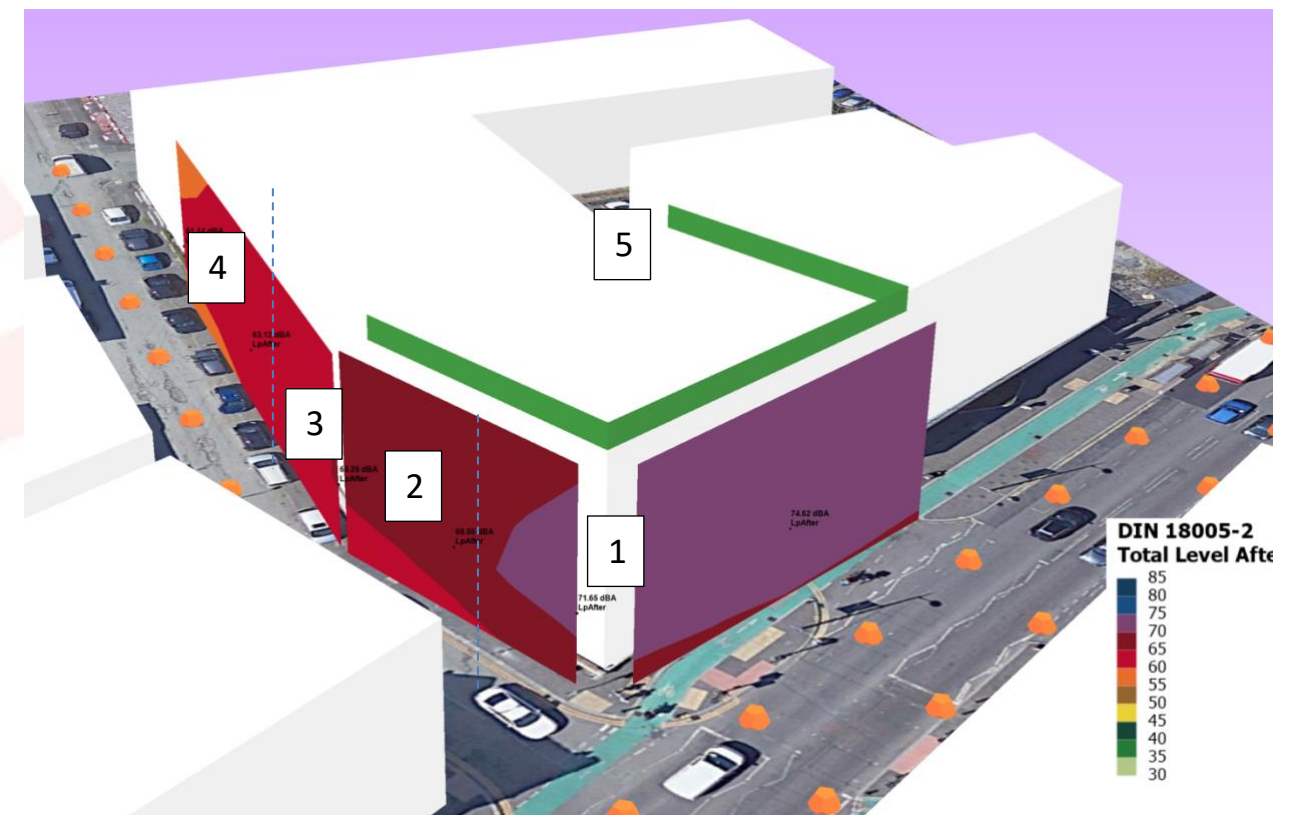


Figure 6: Calculated facade noise levels L_{Aeq,8hr} (2 m from the facade surface)

5.4 Façade acoustic requirements

- 5.5 To determine facade and ventilation solutions that achieve suitable indoor noise levels (IANLs), the methodology in BS 8233 (Reference 8) and BS EN ISO 12354-3 (Reference 16) was followed. The typical reverberation time of 0.5 seconds across relevant frequencies for a furnished living room from ISO 16283 (Reference 18) was applied to both living rooms and bedrooms.
- 5.6 IANLs were calculated for each façade identified in Figure 5 and Figure 6, focusing on rooms exposed to the highest noise levels and with the largest window area to room volume ratio. The architect provided room dimensions and characteristics including windows, external walls, and volumes. Noise transmission through masonry elements is considered to be negligible.
- 5.7 Table 1 shows the minimum glazing and ventilator requirements for each façade to achieve suitable IANLs in rooms most exposed to external noise. Noise levels in similarly protected but less exposed rooms will also comply with targets.
- 5.8 Table 8 presents the calculated IANLs based on the identified minimum performance requirements. Appendix C provides a sample calculation for the most affected location using manufacturer test data for example products.
- 5.9 Based on the proposed façade sound insulation provision and the level and frequency of the measured maximum noise event, 45 dB $L_{Amax, F}$ is unlikely to be exceeded more than 10 times per night and is therefore below the LOAEL described in paragraph 3.19.

Location	Room affected	Calculated internal level		
		Daytime dB $L_{Aeq, 16\text{ hr}}$	Night-time dB $L_{Aeq, 8\text{ hr}}$	Night-time dB $L_{Amax, F}$
Façade 1	Bedroom	25	28	44
	Living room	33	-	-
Façade 2	Bedroom	25	28	45
	Living room	34	-	-

Table 8: Summary of calculated worst-case internal noise levels

5.10 Noise and Approved Document F ventilation conditions

- 5.11 The proposed development will be required to comply with Part F of the Building Regulations regarding whole dwelling ventilation, as described in Approved Document F (AD-F) (Reference 13).
- 5.12 Based on the ventilation strategies in AD-F, the façade sound insulation with provision for whole dwelling ventilation can be assessed with windows closed.

- 5.13 Purge ventilation as described in AD-F is the manual ventilation of rooms or spaces at a relatively high rate to rapidly dilute pollutants and/or disperse water vapor. Purge ventilation can be achieved through natural means (e.g. openable windows) or mechanical means (e.g. fans).

- 5.14 For AD-F purge ventilation conditions, ProPG states:

"It should also be noted that the internal level guidelines are generally not applicable under "purge ventilation" conditions as defined by Building Regulations Approved Document F, as this should only occur occasionally (e.g. to remove odour from painting and decorating or from burnt food)."

- 5.15 Considering this guidance, briefly opening windows is acceptable for these occasional events without adverse effects on occupants.

- 5.16 It should be emphasized that the above is not intended as a ventilation strategy design, which is the responsibility of others. If the actual ventilation details vary from those described, the proposed details should be reassessed for acoustic performance.

- 5.17 Where mechanical ventilation is preferred or required for whole-dwelling ventilation, AD-F specifies that the average A-weighted sound pressure level for a normally operating fan should not exceed the noise levels stated in Table 9.

Room type	Continuous mechanical system MEV or MVHR		Intermittent system
	Min. low rate	Min. high rate	Operational
Bedrooms, living rooms	30 dBA	-	-
Kitchens, bathrooms	-	45 dBA	45 dBA

Table 9: AD-F noise criteria for mechanical ventilation systems

6 Sound insulation between the dwellings and ground floor

- 6.1 The sound insulation between the dwellings and other parts of the building with different use classes is required to achieve the criteria in Approved Document E (AD-E) (Reference 15) as a minimum.
- 6.2 Regarding ground-floor retail units where the dominant noise source is considered to be talking at a normal level, the required level of sound insulation set by AD-E is considered suitable to provide sufficient insulation and privacy between these spaces and the first-floor dwellings.
- 6.3 If some of the envisaged ground floor retail units are expected to be particularly noisy, it is recommended that the criteria for sound insulation between premises with noisy activities and habitable rooms in dwellings achieve Class C limits. These criteria are identified in Table 10.

Adjacencies	Reference document	Required Airborne sound insulation
Between ground-floor uses and the first-floor dwellings	AD-E	$\geq 45 \text{ dB } D_{ntw} + C_{tr}$
Between potentially noisy ground floor uses and first-floor dwellings	ISO 19488	$\geq 60 \text{ dB } D_{ntw}$

Table 10: Required and proposed criteria between dwellings and other use classes

- 6.4 The exact floor solutions to achieve these requirements will need to be developed once full details of the construction typology and the plant room configuration are available. However, for reference, the following floor constructions are suitable in principle:
- 6.5 Floor between ground-floor uses and the first-floor dwellings:
- 150 mm concrete (circa 360 kg/m²).
- 6.6 Floor between potentially noisy uses and the first-floor dwellings:
- 150 mm concrete (circa 360 kg/m²);
 - Min 100 mm cavity filled with 100 mm mineral wool insulation (min. 10 kg/m³);
 - 2 plasterboard layers (min. 21 kg/m²), such as 12.5 mm Gyproc SoundBloc or equivalent, fixed via resilient hangers or clips.

7 Commercial noise

- 7.1 At this stage, details regarding the type and use of each retail space are unknown. It is assumed that high-risk uses for the proposed retail spaces will be required to submit a noise impact assessment to demonstrate compliance with the noise emission limits set by the Manchester City Council (MCC), as detailed in Section 3.13.
- 7.2 For reference, the MCC requires that "The development should be designed to achieve a rating level at least 5dB(A) below the typical background noise level at the nearest noise sensitive location."
- 7.3 Table 11 states the lowest representative background noise levels ($L_{A90,15min}$) recorded by Lighthouse Acoustics at each measurement position. These background noise levels should be used as reference levels to determine compliance with the MCC criteria as required.

Nearest Noise Sensitive Receptor	Lowest representative $L_{A90,15 \text{ min}}$	
	Daytime	Night-time
Front & Side (East & South)	58	50
Rear (North & West)	50	48

Table 11: Lowest representative $L_{A90,15min}$ (source: Lighthouse Acoustics (Doc. Ref. 0874/APR1))

8 Noise and overheating

- 8.1 The AVO guide states:
- "The Level 1 site risk assessment is based on external free-field noise levels and the assumed scenario where a partially open window is used to mitigate overheating. The Level 1 assessment is sufficient for developments on 'Negligible' risk sites (as defined by Table 3-2). The Level 2 assessment is recommended for 'High' risk sites. For 'Low' and 'Medium' risk sites, a Level 2 assessment can optionally be undertaken to give more confidence regarding the suitability of internal noise conditions. This may be particularly appropriate for sites in the 'Medium' risk category."
- 8.2 A high noise risk is identified during the daytime and night-time for the purpose of utilising open windows to provide thermal comfort to the habitable rooms on all façades and as such a Level 2 assessment has been carried out. Internal levels are calculated for the daytime only as night-time acoustic conditions associated with overheating are covered by Approved Document O (Reference 14).
- 8.3 The Good Homes Alliance (GHA) Early Stage Overheating Risk Tool (Reference 20) is used to assess the potential overheating risk. The GHA Tool with estimated risk for the proposed development is presented in 0, and indicates a score in the high-risk category for overheating.
- 8.4 A high risk of overheating is interpreted as there is the potential for a long duration for which windows will be required to be open to maintain thermal comfort; this informs noise levels that may be suitable, determined using the AVO diagram presented in Figure 7.
- 8.5 A level difference of 13 dB is assumed for a window between fully open and tilted, as per Appendix C of the AVO Guide. Table 12 states the predicted daytime internal ambient noise levels with open windows along with the upper guideline levels described in the AVO Guide, depending on the duration. The results indicate that the anticipated internal noise levels are above a Significant Observed Adverse Effect Level limit for habitable rooms on all facades, and therefore open windows are not considered acceptable for the purpose of providing thermal comfort to habitable rooms on the front and side façades of the proposed development.
- 8.6 A detailed overheating assessment (e.g., dynamic modelling using CIBSE TM59, Reference 19) may be used to determine possible alternative mitigation solutions.
- 8.7 The AVO guide recommends that mechanical noise to control overheating is limited to 30 dB L_{Aeq} for bedrooms and 35 dB L_{Aeq} for living or dining rooms. If required, such limits should be considered when selecting specific units.

Façade	Parameter	Internal noise level, dBA	AVO Guide internal upper limit, dBA (long duration)
Façade 1	Daytime, $L_{Aeq,16\text{ hr}}$	56	≤ 40
Façade 2	Daytime, $L_{Aeq,16\text{ hr}}$	50	≤ 40
Façade 3	Daytime, $L_{Aeq,16\text{ hr}}$	47	≤ 40
Façade 4	Daytime, $L_{Aeq,16\text{ hr}}$	45	≤ 40
Façade 5	Daytime, $L_{Aeq,16\text{ hr}}$	42	≤ 40

Table 12: Calculated internal noise levels in habitable rooms with windows open for ventilative cooling

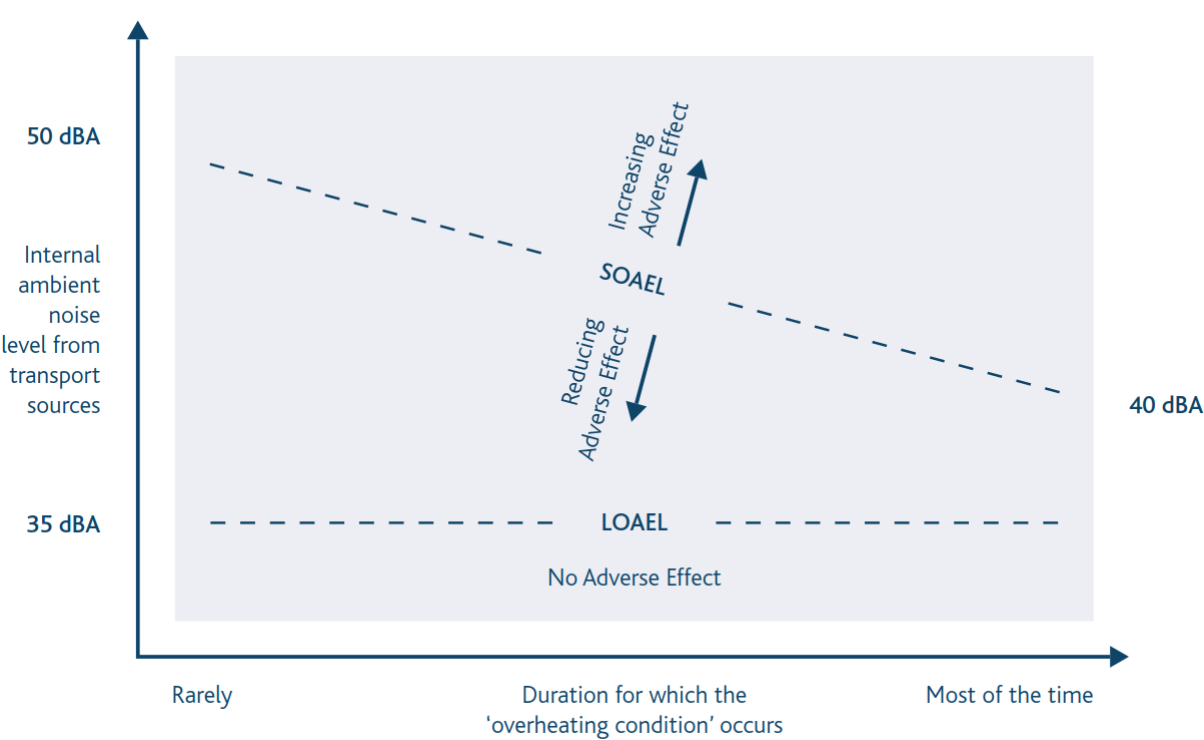


Figure 7: AVO Diagram for the most exposed rooms, daytime

9 Regarding previous reasons for refusal relating to noise

9.1 As noted in the planning permission refusal letter (ref. 133748/FO/2022) from Manchester City Council (MCC), reason number 3 for refusal related to concerns about increased noise impacts on nearby residential properties from the proposed development:

“3) The proposed development would give rise to an unacceptable increase in activity on Grandale Street in the form of comings and goings, vehicular movements and noise associated with the proposed residential and commercial uses to the detriment of the residential amenity of nearby residential properties on Grandale Street, Ravensdale and Hibbert Street contrary to policy DM1 of the Core Strategy”

Policy DM1 is a development management policy within Manchester's Core Strategy that was adopted in 2012. It covers the overall design principles and strategic approach that new development in Manchester should adhere to. Some of the policy's key aspects are as follows:

- All new developments should have regard to the local context and contribute positively to an area's character and identity. Things like scale, density, layout, materials, and architectural style should enhance the existing built environment;
- New development should be integrated into the surrounding area and connect well with existing streets, public spaces and movement networks. It should not disrupt these networks.

9.2 Pedestrian comings and goings

9.3 Currently, neither the national nor the Manchester City Council acoustic framework provides guidance on establishing, measuring, or assessing pedestrian comings and goings related to residential or commercial developments. It's also worth noting that pedestrian traffic to adjacent residential or commercial buildings is generally not considered to generate noise that would be detrimental to residential amenity.

9.4 Moreover, the proposed development has 12% less commercial space than what currently exists on the site. This reduction in commercial floor area can reasonably be expected to result in fewer pedestrian trips to and from the commercial spaces. With fewer people walking to and from the commercial areas, there would likely be less noise generated by pedestrian activity compared to the levels created by the existing commercial use. Given the decreased level of pedestrian traffic expected from the smaller amount of commercial square footage, the acoustic impact from people accessing the commercial spaces of the proposed development would be reduced when compared to the number of pedestrians accessing the current larger commercial area.

9.5 Vehicle comings and goings

9.6 To determine the potential impacts caused by changes in road traffic noise associated with the proposed number of residential units and the proposed commercial floor space, the principles in the Design Manual for Roads and Bridges (DMRB) (Reference 24) were considered. The document sets out procedures for undertaking the environmental assessment of new road schemes, including assessing noise impacts from road traffic. Although the DMRB applies to new road schemes, the principles can also be applied to assessing noise from road traffic in general.

9.7 According to the DMRB, the significance of effect depends upon a number of factors, including the magnitude of change, the sensitivity of the receptor, the absolute noise level and the acoustic context. The DMRB categorises operational road traffic noise into the magnitude of change bands. The short and long-term classification scales are provided in Table 13 and Table 14.

9.8 According to the information provided by the transport consultant, regarding road traffic associated with the proposed development, the following 4 scenarios are possible:

- Scenario 1: 100% of the road traffic would access the site from Wilmslow Road;
- Scenario 2: 50 % of the road traffic would access the site from Wilmslow Road and 50 % would access from Grandale Street;
- Scenario 3: 50 % of the road traffic would access the site from Grandale Street and 50 % would access from Ravensdale Street;
- Scenario 4: 100% of the road traffic would access the site from Grandale Street.

9.9 An assessment has been carried out for scenario 4 as it represents a worst-case scenario in terms of impacts on Grandale Street. According to the information provided by the transport consultant, the annual average daily traffic (AADT) associated with the development is expected to be 91 vehicles. If we consider the traffic data statistics, on Ravensdale Road, published by the Department for Transport¹ it is concluded that the annual average daily flow is 454 motor vehicles. This equates to a potential change in the noise environment of 0.8 dB² which translates to a negligible effect. In practice, the expected change is likely to be even smaller for the following reasons:

- The traffic statistics on Ravensdale Street only go up to the year 2008, i.e. recent statistics are expected to show considerably higher traffic flows;
- The level of current AADT traffic on Grandale Street is likely to be higher than on Ravensdale Street and therefore the increase is likely lower than 0.8 dB;

¹ See details here: <https://roadtraffic.dft.gov.uk/manualcountpoints/944430>

² i.e. $10 \cdot \log(545/454) = 0.8 \text{ dB}$

- It is unlikely that all vehicle movements will consistently occur via Grandale Street, i.e. vehicles are expected to take different routes which would again result in lower noise levels change.

Short term magnitude	Short-term noise change (dB L _{A10,18h} or L _{night})
Major	Greater than or equal to 5.0
Moderate	3.0 to 4.9
Minor	1.0 to 2.9
Negligible	Less than 1.0

Table 13: DMRB Classification of the magnitude of noise change (short-term)

Long term magnitude	Long-term noise change (dB L _{A10,18h} or L _{night})
Major	Greater than or equal to 10.0
Moderate	5.0 to 9.9
Minor	3.0 to 4.9
Negligible	Less than 3.0

Table 14: DMRB Classification of the magnitude of noise change (long term)

9.10 Other considerations

- 9.11 The existing use of the site includes a 180 to 200-seat restaurant operating daily. Prior to this, the site was used as a vehicle repair shop. As such, there is already a long-standing history of commercial use at this site, with associated activity and noise levels typical of the area.
- 9.12 The stretch of Wilmslow Road near the site is considered lively and vibrant in the evening with high hourly foot traffic volumes. Therefore, the existing sound environment is consistent with mixed-use areas and is considered unlikely to be adversely impacted by the proposed development.
- 9.13 Furthermore, it is understood that the Rusholme & Moss Side Resident Parking Scheme is due to start on the 15th of November 2023. Based on the information provided by the MCC, there will be parking restrictions on Grandale St and residents only parking on adjoining residential streets between 7 a.m. and midnight. With these restrictions in place, future patrons of the proposed commercial units (for which the use has not been defined yet) are expected to park in local car parks which are likely to be accessed from Wilmslow Road, reducing potential short-time impacts near noise-sensitive receivers on Grandale Street.

9.14 As stated in Section 7, noise from the proposed retail units will be assessed per MCC Planning & Noise Technical Guidance. If compliant with the relevant criteria, noise impacts are expected to avoid adverse effects on the closest sensitive receivers, being those of the development itself, and the existing residential dwellings on Grandale Street.

9.15 In summary, the Residents Parking Zone being introduced, future noise assessment of any commercial tenants, and local context align with Policy DM1 by ensuring that the proposed development integrates into the vibrant mixed-use area without adverse noise impacts on residential amenity. This demonstrates that the noise impact concerns of reason 3 for refusal are appropriately addressed.

10 Conclusion

- 10.1 This noise assessment concludes that the proposed 42-unit residential development at 98 Wilmslow Road is suitable for the site, subject to implementing the facade, floor, and ventilation solutions specified to control noise ingress.
- 10.2 These recommendations align with current policies and technical guidance on planning and noise control.
- 10.3 The assessment addresses prior concerns related to noise, raised in reason 3 of the refusal regarding increased activity on Grandale Street and possible impacts on Ravensdale Street and Hibbert Street.
- 10.4 The assessment demonstrates, through a worst-case scenario, there would be negligible noise increase on Grandale Street arising from traffic associated with residents of the proposed development.
- 10.5 As the commercial floor space in the proposed development is 12% lower than the existing commercial floor space on the site, noise arising from traffic and future comings and goings relating to the commercial use is likely to be lower than the existing use.
- 10.6 There are no National Planning Policies or MCC policies criteria or guidance for measuring the possible noise impacts of future residents walking to and from a residential development. This is because any noise arising from residents walking to and from a development is not deemed to have any adverse impact.
- 10.7 With the noise control measures in place, the development can provide acceptable living conditions and align with the NPPF and NPSE.

11 References

- 1 National Planning Policy Framework, Department for Communities and Local Government, July 2021 .
- 2 Noise Policy Statement for England, Department for Environment, Food and Rural Affairs, March 2010.
- 3 Core Strategy and Urban Core Plan for Gateshead and Newcastle upon Tyne 2010-2030, 2014.
- 4 Planning Practice Guidance – Noise:
<http://planningguidance.planningportal.gov.uk/blog/guidance/noise/noise-guidance/>
- 5 Manchester City Council Planning & Noise Technical Guidance, November 2022:
https://www.manchester.gov.uk/downloads/download/5199/information_for_developers
- 6 Acoustics Ventilation and Overheating, Association of Noise Consultants (ANC), 2020.
- 7 Association of Noise Consultants (ANC), Institute of Acoustics (IOA) and Chartered Institute of Environmental Health (CIEH), "ProPG: Planning & Noise - New Residential Development," May 2017.
- 8 BS 8233: 2014, Guidance on sound insulation and noise reduction for buildings.
- 9 Guidelines for Community Noise, Edited by Birgitta Berglund, Thomas Lindvall, Dietrich H Schwela, World Health Organisation, 1999.
- 10 AECOM Environment on behalf of DEFRA, NANR316 Possible options for the identification of SOAEL and LOAEL in support of the NPSE, December 2015.
- 11 BS 7445:2003, Description and measurement of environmental noise. Guide to quantities and procedures.
- 12 Architects Drawings NCCSL-PHS-XX-00-SK-A-00-(05-08).
- 13 Approved Document F 2021 Edition, The Building Regulations 2000.
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- 16 BS EN 12354-3:2000, Building Acoustics – Estimation of acoustic performance of buildings from the performance of elements – Part 3: Airborne sound insulation against outdoor sound.
- 17 Practical Acoustic Design – the Apex Method, Proceedings of the Institute of Acoustics Vol 36 Pt 3 2014. Full paper and Poster presentation at Institute of Acoustics Conference 2014, available to download from www.apexacoustics.co.uk
- 18 BS EN ISO 16283-1:2014 Acoustics – Field measurement of sound insulation in buildings and of building elements – Part 1: Airborne sound insulation.
- 19 TM59 Design methodology for the assessment of overheating risk in homes, CIBSE 2017.
- 20 The Good Homes Alliance Early Stage Overheating Risk Tool, free download available from <https://goodhomes.org.uk/overheating-in-new-homes>
- 21 How loud is too loud? noise from domestic mechanical ventilation systems, International Journal of Ventilation, 2019. J Harvie-Clark, N Conlan, W Wei, M Siddall.
<https://doi.org/10.1080/14733315.2019.1615217>

- 22 The London Plan, Chapter 5: London's response to climate change, Policy 5.9.
<https://www.london.gov.uk/what-we-do/planning/london-plan/current-london-plan/london-plan-chapter-five-londons-response/poli-8>
- 23 Assessing noise with provisions for ventilation and overheating in dwellings. Harvie-Clark J, Chilton A, Conlan N, Trew D; Building Services Engineering Research and Technology. 2019;40(3):263-273. <https://doi.org/10.1177%2F0143624418824232>
- 24 Design Manual for Roads and Bridges (DMRB), 2021 – National Highways



Appendix B Acoustics, Ventilation and Overheating

B.1 Ventilation conditions

B.2 The term "ventilation" is used here to refer to the ventilation required for reasonable indoor air quality (IAQ), as described in Approved Document F (AD-F).

B.3 There are three types of ventilation considered necessary to achieve good indoor air quality:

- **whole dwelling ventilation**, required continuously while the dwelling is occupied, for fresh air for the occupants to breathe and to disperse pollutants;
- **extract ventilation**, required to overcome the build up of water vapour in wet rooms (e.g. kitchens and bathrooms); and
- **purge ventilation**, which is manually controlled ventilation at a relatively high rate to rapidly dilute pollutants and / or water vapour from occasional activities, such as painting and decorating, or smoke from burnt food.

B.4 The AVO Guide links the indoor ambient noise levels identified as LOAELS with the provision of whole dwelling ventilation, as described in AD-F. Table 3-1 from the AVO Guide is reproduced in Figure 8.

Table 3-1 Indoor Ambient Noise Levels resulting from transport noise sources - ADF ventilation condition

Ventilation condition	Operational condition of System	Desirable internal ambient noise level from transport noise sources
Part F - Whole dwelling ventilation	Systems 1 & 2: Background ('trickle') ventilators open to provide whole dwelling ventilation in the winter period. Additional ventilation required at other times of the year – windows are assumed to be ajar for assessment [Note 2].	Guideline values from Table 4 of BS 8233:2014.
	System 3: Continuous mechanical extract with background ('trickle') ventilators open [Note 2].	
	System 4: Continuous mechanical supply and extract with heat recovery (MVHR) – no trickle vents required.	
Part F – Purge Ventilation [Note 1]	Option 1: Opening external window(s) meeting requirements described in Appendix B of Part F.	No specific acoustic criterion needs to be met in a room using purge ventilation for the purpose of rapidly diluting indoor pollutants.
	Option 2: Manually controlled fan extracting 4 air changes per hour.	

Figure 8: AVO Guide noise level guidance while providing whole dwelling ventilation

B.5 The AVO Guide approach - noise from mechanical services

B.6 Recommended guideline levels for internal ambient noise limits from mechanical services are taken from Figure 3-4 the AVO Guide, reproduced in Figure 9, which collates guidance from various sources.

B.7 For bedrooms, a more prudent limit of 26 dB(A) is adopted based on the conclusions of “How loud is too loud? noise from domestic mechanical ventilation systems” by Harvie-Clark et al (Reference 21) which reviews research from across Europe and North America into the impacts of noise from domestic mechanical services.

B.8 The proposed levels adopted for this assessment are taken from these guidelines.

Ventilation condition	Possible system or design solution	Desirable internal ambient noise levels from mechanical services
ADF – Whole Dwelling Ventilation	System 3: Continuous mechanical extract (MEV), minimum low ventilation rates	Bedrooms ≤ L _{Aeq} 26 or 30 dB [Note 1]
	System 4: Continuous mechanical supply and extract with heat recovery (MVHR), minimum low ventilation rates	Living Rooms ≤ L _{Aeq} 30 dB
ADF – Extract Ventilation	System 1: Intermittent extract fans	Bedrooms ≤ L _{Aeq} 26 or 30 dB
	System 3: Continuous mechanical extract (MEV), minimum high ventilation rates System 4: Continuous mechanical supply and extract with heat recovery (MVHR), minimum high ventilation rates	Living / Dining Rooms ≤ L _{Aeq} 35 dB Bathroom / WC / Kitchen ≤ L _{Aeq} 45 dB
ADF – Purge Ventilation	Manually controlled fan exchanging a minimum 4 air changes per hour	No desirable noise levels are currently proposed based on the lack of evidence of acceptable noise levels when providing purge ventilation for the purpose of rapidly diluting indoor pollutants.

Figure 9: Desirable internal ambient noise levels from mechanical services for ventilation

B.9 The AVO Guide – noise and overheating

B.10 The AVO Guide has an implicit concept of *adaptive acoustic comfort*, i.e. where occupants have control over the internal environment, they are likely to have greater tolerance of increased noise levels when they are balancing their exposure to external noise and thermal comfort with opening windows.

B.11 This concept is explained by the main authors of the AVO Guide in "Assessing noise with provisions for ventilation and overheating in dwellings" by Harvie-Clark et al (Reference 23).

- | Risk category for Level 1 assessment ^[Note 5] | Potential Effect without Mitigation | Recommendation for Level 2 assessment |
|---|--|---------------------------------------|
| <p>$L_{Aeq,T}$ ^[Note 3] during 07:00 - 23:00</p> <p>$L_{Aeq,8hr}$ during 23:00 - 07:00</p> <p>High</p> <p>65 dB</p> <p>55 dB</p> <p>Medium</p> <p>60 dB</p> <p>50 dB</p> <p>Low</p> <p>55 dB</p> <p>Negligible</p> <p>50 dB</p> <p>45 dB</p> | <p>Increasing risk of adverse effect</p> | <p>Recommended</p> <p>Optional</p> |
| | <p>Use of opening windows as primary means of mitigating overheating is not likely to result in adverse effect</p> | <p>Not required</p> |

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Table 3-3 Guidance for Level 2 assessment of noise from transport noise sources^[Note 1] relating to overheating condition

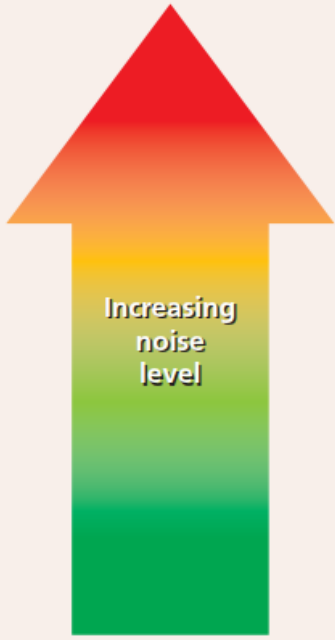
Internal ambient noise level ^[Note 2]			Examples of Outcomes ^[Note 5]	
$L_{Aeq,T}$ ^[Note 3] during 07:00 – 23:00 ^[Note 6]	$L_{Aeq,BH}$ during 23:00 – 07:00	Individual noise events during 23:00 – 07:00 ^[Note 4]		
> 50 dB	> 42 dB	Normally exceeds 65 dB $L_{AF,max}$	Noise causes a material change in behaviour e.g. having to keep windows closed most of the time	Avoiding certain activities during periods of intrusion. 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.
			Increasing likelihood of impact on reliable speech communication during the day or sleep disturbance at night	At higher noise levels, more significant behavioural change is expected and may only be considered suitable if occurring for limited periods. As noise levels increase, small behaviour changes are expected e.g. turning up the volume on the television; speaking a little more loudly; having to close windows for certain activities, for example ones which require a high level of concentration. Potential for some reported sleep disturbance. Affects the acoustic environment inside the dwelling such that there is a perceived change in quality of life. At lower noise levels, limited behavioural change is expected unless conditions are prevalent for most of the time. ^[Note 8]
≤ 35 dB	≤ 30 dB	Do not normally exceed $L_{AF,max}$ 45 dB more than 10 times a night	Noise can be heard, but does not cause any change in behaviour	Noise can be heard, but does not cause any change in behaviour, attitude, or other physiological response ^[Note 9] . Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.

Figure 11: AVO Guide guidance for Level 2 assessment of *internal* noise from transportation sources during the overheating condition

Appendix C Example façade sound insulation calculations

Bedrooms	
Volume, V / m^3	27.5
Window area, S / m^2	2.4
Reverberation Time, T / s	0.5
Number of vents feasible	0

Daytime $L_{Aeq, 16 \text{ hr}}$ (dB)	dB(A)	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz
External free-field noise, L_{1in}	69	50	56	63	67	61
Glazing: 8.5 (44.1)/16/10.5 (55.1) mm, R		26	33	44	52	57
Equation 1, $L_2(a)$	25	21	20	16	12	2

Night-time $L_{Aeq, 8 \text{ hr}}$ (dB)	dB(A)	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz
External free-field noise, L_{1in}	72	52	60	67	69	61
Glazing: 8.5 (44.1)/16/10.5 (55.1) mm, R		26	33	44	52	57
Equation 1, $L_2(a)$	28	23	24	20	14	2

Living rooms	
Volume, V / m^3	47.5
Window area, S / m^2	2.4
Reverberation Time, T / s	0.5
Number of vents feasible	0

Daytime $L_{Aeq, 16 \text{ hr}}$ (dB)	dB(A)	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz
External free-field noise, L_{1in}	69	50	56	63	67	61
Glazing: 4/16/6 mm, R		24	21	28	42	43
Equation 1, $L_2(a)$	33	21	30	30	20	13

Night-time $L_{Aeq, 8 \text{ hr}}$ (dB)	dB(A)	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz
External free-field noise, L_{1in}	72	52	60	67	69	61
Glazing: 4/16/6 mm, R		24	21	28	42	43
Equation 1, $L_2(a)$	37	23	34	34	22	13

Table 15: Example calculations for dwellings facing Facade 1

Appendix D Early-stage overheating risk tool

EARLY STAGE OVERHEATING RISK TOOL

Version 1.0, July 2019

This tool provides guidance on how to assess overheating risk in residential schemes at the early stages of design. It is specifically a pre-detail design assessment intended to help identify factors that could contribute to or mitigate the likelihood of overheating.

The questions can be answered for an overall scheme or for individual units. Score zero wherever the question does not apply. Additional information is provided in the accompanying guidance, with examples of scoring and advice on next steps.

Find out more information and download accompanying guidance at goodhomes.org.uk/overheating-in-new-homes.



KEY FACTORS INCREASING THE LIKELIHOOD OF OVERHEATING

Geographical and local context				
#1 Where is the scheme in the UK? See guidance for map	South east	4	0	
	Northern England, Scotland & NI	0		
	Rest of England and Wales	2		
#2 Is the site likely to see an Urban Heat Island effect? See guidance for details	Central London (see guidance)	3	1	
	Grtr London, Manchester, B'ham	2		
	Other cities, towns & dense sub-urban areas	1		

Site characteristics				
#3 Does the site have barriers to windows opening? - Noise/Acoustic risks - Poor air quality/smells e.g. near factory or car park or very busy road - Security risks/crime - Adjacent to heat rejection plant	Day - reasons to keep all windows closed	8	4	
	Day - barriers some of the time, or for some windows e.g. on quiet side	4		
	Night - reasons to keep all windows closed	8	4	
	Night - bedroom windows OK to open, but other windows are likely to stay closed	4		
#9 Are immediate surrounding surfaces in majority pale in colour, or blue/green? Lighter surfaces reflect more heat and absorb less so their temperatures remain lower; consider horizontal and vertical surfaces within 10m of the scheme				
			1	0
#10 Does the site have existing tall trees or buildings that will shade solar-exposed glazed areas? Shading onto east, south and west facing areas can reduce solar gains, but may also reduce daylight levels				
			1	1

Scheme characteristics and dwelling design				
#4 Are the dwellings flats? Flats often combine a number of factors contributing to overheating risk e.g. dwelling size, heat gains from surrounding areas; other dense and enclosed dwellings may be similarly affected - see guidance for examples				
			3	3
#5 Does the scheme have community heating? i.e. with hot pipework operating during summer, especially in internal areas, leading to heat gains and higher temperatures				
			3	0
#11 Do dwellings have high exposed thermal mass AND a means for secure and quiet night ventilation? Thermal mass can help slow down temperature rises, but it can also cause properties to be slower to cool, so needs to be used with care - see guidance				
			1	0
#12 Do floor-to-ceiling heights allow ceiling fans, now or in the future? Higher ceilings increase stratification and air movement, and offer the potential for ceiling fans				
			>2.8m and fan installed	2
			> 2.8m	1

Solar heat gains and ventilation						
#6 What is the estimated average glazing ratio for the dwellings? (as a proportion of the facade on solar-exposed areas i.e. orientations facing east, south, west, and anything in between). Higher proportions of glazing allow higher heat gains into the space	>65%	12	4			
	>50%	7				
	>35%	4				
#7 Are the dwellings single aspect? Single aspect dwellings have all openings on the same facade. This reduces the potential for ventilation						
Single-aspect		3	3			
Dual aspect		0				
#13 Is there useful external shading? Shading should apply to solar exposed (E/S/W) glazing. It may include shading devices, balconies above, facade articulation etc. See guidance on "full" and "part". Scoring depends on glazing proportions as per #6						
				Full	Part	0
		>65%	6	3		
		>50%	4	2		
		>35%	2	1		
#14 Do windows & openings support effective ventilation? Larger, effective and secure openings will help dissipate heat - see guidance						
		Openings compared to Part F purge rates				0
		= Part F	+50%	+100%		
Single-aspect	minimum required	3	4			
Dual aspect		2	3			

TOTAL SCORE	10	=	Sum of contributing factors:	19	minus	Sum of mitigating factors:	1
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High	12	Medium	8	Low
score >12: Incorporate design changes to reduce risk factors and increase mitigation factors AND Carry out a detailed assessment (e.g. dynamic modelling against CIBSE TM59)				
score between 8 and 12: Seek design changes to reduce risk factors and/or increase mitigation factors AND Carry out a detailed assessment (e.g. dynamic modelling against CIBSE TM59)				
score <8: Ensure the mitigating measures are retained, and that risk factors do not increase (e.g. in planning conditions)				