

Studio Maurice Shapero

18 Highgate Road, Hayfield, High Peak, Derbyshire. SK22 2JL. info@mauriceshapero.com.

www.mauriceshapero.com. 07830 153 229.

Condition 5 – Acoustic Insulation and Ventilation Strategy

Planning Ref: 131047/FO/2021

Site Address: 35 Liverpool Road, Manchester

Date: 22 June 2025

This statement is submitted to discharge **Condition 5** of the planning approval, which requires a scheme for acoustic insulation, mechanical ventilation, and overheating mitigation to meet the internal noise criteria set out in BS8233:2014 and WHO Guidelines.

(a) Acoustic Insulation and Mechanical Ventilation

All glazing has been specified based on the detailed site-specific assessment carried out by dBx Acoustics, and is tailored to local façade noise levels.

- **Front (north) elevation windows** are subject to higher ambient noise due to road traffic and commercial premises. These are specified to achieve a minimum of **42 dB Rw + Ctr**. This is noted on drawing **GA-013** and supported by the acoustic survey.
- **Rear (south) elevation windows**, serving the living and dining spaces, are subject to significantly lower ambient noise levels (53 dB LAeq). A minimum acoustic performance of **31 dB Rw + Ctr** has been specified, as noted on drawing **GA-006**, in line with the acoustic report recommendations.

All glazing systems are **triple-glazed units**, and window frames are sealed using airtight tapes and expanding foam as detailed in the **glazing detail drawing W-014**, ensuring performance is not compromised at installation.

The required internal noise levels will be achieved throughout:

- Bedrooms (night-time 23:00–07:00): ≤ 30 dB LAeq, and ≤ 45 dB LAmax,F (not more than 15 times per night)
- Living rooms (daytime 07:00–23:00): ≤ 35 dB LAeq

To maintain internal acoustic performance, a **whole-house MVHR (Mechanical Ventilation with Heat Recovery) system** will provide continuous background ventilation. This removes reliance on openable windows and ensures effective air change while preserving acoustic insulation.

There are **no lift shafts**, and **service risers** will be acoustically treated in accordance with best practice.

Party walls between the dwelling and neighbouring properties will be acoustically upgraded using a construction comprising **75x50mm softwood studs and noggins**, spaced **25mm off the existing brick wall**, with **100mm Rockwool Sound Insulation Slab** in the cavity and **12mm birch-faced BB grade plywood** internally. This system provides robust airborne sound insulation in line with **Approved Document E**.

The internal building fabric and roof construction also contribute to the acoustic envelope, with all construction details designed to exceed minimum regulatory requirements.

(b) Overheating Assessment and Noise Mitigation

An MVHR system is specified with **summer bypass and comfort cooling**, which forms the basis of the overheating mitigation strategy. This allows thermal comfort to be maintained with windows closed during warm weather, avoiding acoustic compromise.

The MVHR design includes flow and attenuation criteria, with internal sound levels in occupied rooms limited to **25 dB(A)**. This is detailed in the accompanying **Mechanical Services Specification** by the environmental engineer.

(c) Post-completion Verification

A **post-completion acoustic verification report** will be submitted prior to first occupation, confirming that internal noise levels and ventilation requirements have been achieved. Any identified shortfalls will be addressed through further mitigation as agreed with the LPA.

Attachments:

1. **GA-013 Front Elevation Drawing** – Acoustic specification for high-noise façade
2. **GA-006 Rear Elevation Section** – Acoustic specification for quiet façade
3. **W-014 Glazing Details** – Triple-glazing, airtight seals and insulation
4. **dBx Acoustics Report (April 2021)** – Site-specific noise survey and glazing requirements
5. **Mechanical Services Specification (31/07/2024)** – MVHR system, comfort cooling, acoustic attenuation, overheating mitigation



Client: Calum McGowan

Architect: Maurice Shapero

Weaver's Cottage, Liverpool Road, Manchester

31/07/2024

Mechanical Services Specification – DRAFT FOR COSTING

1. Introduction

- 1.1. This specification has been compiled for Calum McGowan, and covers a domestic project at Liverpool Road, Manchester and specifically the retrofit of a Grade II listed mid-terrace masonry building with an architecturally expressive new build extension at the rear.
- 1.2. The dwelling will be a very low energy, 3-bedroom townhouse, with high standards of performance from an energy and comfort perspective: the Passivhaus/EnerPHit standard is being targeted and this needs to be reflected in the expected holistic approach to site supervision and workmanship.
- 1.3. The purpose of this specification is to describe the Performance Design for the Mechanical Services to be installed at the property.
- 1.4. This document along with associated documents that are referenced, captures the design, installation, testing and commissioning requirements for the project. The sketches and specification indicate the design concepts that have been developed to date and represent the design intent with some developed detail. Any contradictions found within the documents are to be highlighted to the works coordinator/architect for clarification.
- 1.5. The works covered are as follows:
 - Heating and comfort cooling system
 - Domestic hot water
 - Ventilation.

2. General Requirements

- 2.1. Initial equipment selections, duct and pipe sizes have been identified. The contractor shall ensure that the services are coordinated with building structure and that adequate space is provided.
- 2.2. Final installation design will be down to the installer to provide the client with a fully functioning and efficient system.
- 2.3. The contractor is responsible for the following – non-exhaustive – list of considerations:
 - Detail of all access requirements for maintenance of services in order to ensure that all plant and equipment associated with the services can be safely and easily maintained
 - Detailed design and location of any brackets and supports related to services and associated plant
 - Final valve selection and locations
 - Detailed ductwork and pipework routes ensuring clearances for safe operation of all equipment
 - Spatial coordination of all services
 - Setting to work and commissioning of all related plant and equipment
 - Provision of commissioning reports in accordance with building regulations

- Liaison with statutory authorities to arrange the provision of new or amended utilities, if required.

3. Standards Generally

- 3.1. The works must - as a minimum - comply with current British/ European Standards, the requirements of the Local Planning Authority and the UK Building Regulations.
- 3.2. The target airtightness is an air change rate of 1 ach when tested at 50 Pa according to the enhanced (Passivhaus) testing protocol. Commissioning rates have been provided as part of this specification. Further information on best practice and the testing protocol can be provided on request. This requires all penetrations through the building envelope to be carried out neatly, tightly sealed and insulated using proprietary air tightness products.
- 3.3. All products are to be installed strictly in accordance with their supplier's recommendations and guidance.
- 3.4. Thermal insulation will be A-rated (Green Guide), with zero Ozone Depletion Potential (ODP) and a Global Warming Potential (GWP) <5.

4. Operation and Maintenance

- 4.1. The Contractor shall provide a record of all modified and new installations (drawings, schedules, and commissioning records), including:
 - Annotated drawings showing all services, components and sizes
 - Maintenance and servicing details
 - Copies of all guarantees and warranties
 - Copies of user manuals and manufacturer instructions
 - Test & commissioning test certificates, including copies of calibration certificates
 - Meter readings (at Practical Completion).

5. Design Criteria

5.1. Fabric performance

- Existing masonry wall (ambient external) 0.358 W/m²K
- Existing masonry wall (against ground) 0.363 W/m²K
- New concrete wall (ambient external) 0.175 W/m²K
- New concrete wall (against ground) 0.201 W/m²K
- Existing Pitched Roof 0.148 W/m²K
- New Flat roof (warm structure) 0.135 W/m²K
- New Flat roof (cold structure) 0.189 W/m²K
- Existing Ground Floor 0.207 W/m²K
- New Ground Floor 0.106 W/ m²K
- Windows and rooflights (overall / average over project – check window schedule and frame values) 0.85-1.00 W/m²K
- Solid doors 1.0 W/m²K
- Airtightness target (1acph, EnerPHit) 1.75 m³/h/m² @50Pa (positive and negative pressures)

5.2. Design Temperatures

- Temperature difference Internal (20 °C) to External (-4 °C) dT = 24K
- Flow & return temperatures, heat sink 48 °C /41 °C (dT 7K)
- Water storage temperature 48 °C, with fortnightly boosted legionella cycle
- Heat pump design output to be achieved at -7 °C external temperature.

5.3. Ventilation rates

5.3.1. Part F and Passivhaus Supply & Extract criteria were used – see commissioning rates.

5.3.2. Habitable room sound limit, 25 dB(A); plantrooms and wet rooms, 35 dB(A)

5.4. Hot water storage

5.4.1. Storage of 45L/person, 4 people

5.4.2. Recovery time from cold 1h10 min (w/o immersion); 50 min (w 3kW immersion)

5.4.3. Heat loss factor (max) 1.0 kWh/day.

6. MVHR Ventilation System

- 6.1. Description: Install new, complete mechanical ventilation system with comfort cooling and heat recovery (MVHR).
- 6.2. Locate MVHR unit on the second floor; Zehnder ComfoAir 450 or Adroit DV245, or equivalent in all aspects including heat exchanger type, automatic and variable summer bypass, electric defrost element, heat recovery (temperature) efficiency >85%, total fan power <0.45 Wh/m³ and with F7 and G4 filters.
- 6.3. The maximum design flowrate, to be achieved on a medium speed setting, is 62 l/s (225 m³/h). Medium / at home setting will be 162 m³/h.
- 6.4. Install framing beneath unit or vertical patten to support it, allowing space for gravity condensate drain connection, and allow sufficient space above to install 150mm dia. ducts with 50mm foil-wrapped, closed cell insulation ($\lambda \leq 0.038$ W/mK).
- 6.5. Connect 32mm Hepv0 (waterless) trapped waste to underside condensate drain and run to nearest drainage stack.
- 6.6. Installation to allow for inspection, cleaning and filter replacement.
- 6.7. Install LCD controller and boost switches as required. Unit controls to be demonstrated to client and remote control to be included.
- 6.8. Ductwork to be rigid steel from Lindab push fit Safe seal range including spiral ductwork, bends, tees, and couplings; 125 and 100mm diameter.
<https://publications.lindab.com/UK/BigBlueBook/?page=1>
- 6.9. Supply and extract ductwork running within the heated/cooled zones to have wrap of 25mm open cell insulation ($\lambda = 0.035$ W/mK) or be of the pre-insulated (double walled) type.
- 6.10. Intake and Exhaust ductwork to be insulated with 50mm foil wrapped closed cell insulation (Armaflex class O, or equivalent). Ensure insulation is fitted without constrictions and according to manufacturer's recommendations.
- 6.11. External terminals to be installed in gable wall or through roof pitch, Intake and Exhaust grilles/cowls (Zehnder) to be spaced apart while maintaining no more than a 0.5m duct run from unit internally.
- 6.12. High level supply and extract room terminals, with plenum and backed with damper from Lindab Aluminium range – model to be agreed with client.
- 6.13. Primary and cross talk attenuation to be provided using Lindab Circular straight silencers type SLU.
- 6.14. All ducts and terminals to be kept protected from dust and debris with effective sealing of exposed ends using temporary cover.
- 6.15. Provide electrical connection and isolation switch to MVHR unit (<1m).
- 6.16. Install LCD controller in accessible place, ideally the plantroom, and connect as per manufacturer's instructions.
- 6.17. Provide ethernet cabling as necessary.
- 6.18. Install boost switches in kitchen and bathroom – ensure these are connected to the unit and included in commissioning.
- 6.19. Installation to comply with Building Regulations and IEE wiring Regulations.
- 6.20. Commissioning to comply with the Building Regulations (Part F) and Passivhaus enhanced commissioning requirements and best practice.
- 6.21. Airflows to be measured at terminals at normal and boost settings.
- 6.22. Refer to commissioning flowrates (to follow), Passivhaus MVHR Commissioning Requirements, and final protocol sheets.

- 6.23. Provide completed sheets to the client as a record.
- 6.24. Check filters are clean at handover and provide 2No spare sets.
- 6.25. Install an additional module for summer comfort cooling with condensate connection and water connection to reversible heat pump.

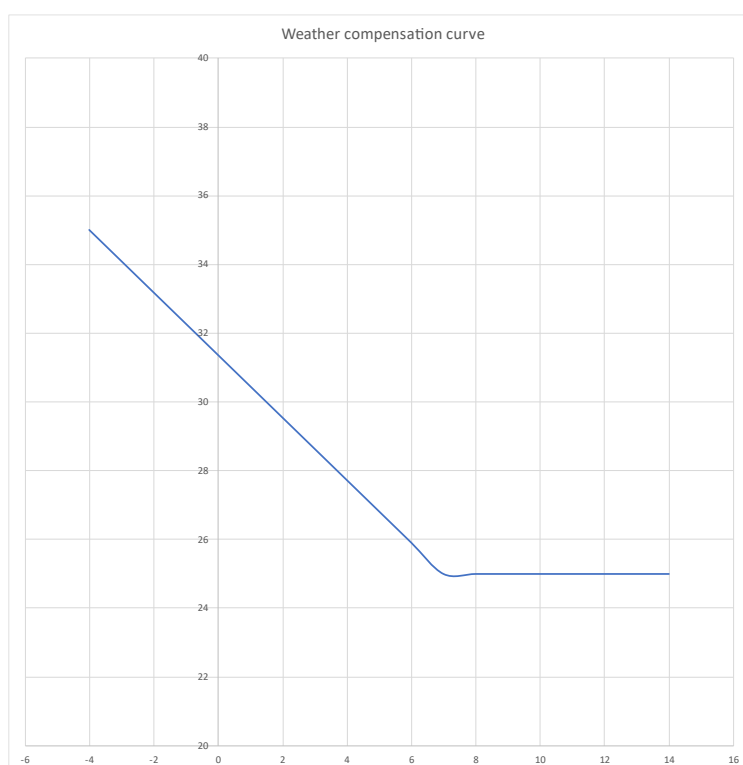
7. Heating System

- 7.1. Install new, complete Air Source Heat Pump (ASHP) heating and hot water system, including but not limited to:
- 7.2. 1 no. fully modulating 6kW monobloc heat pump and all accessories including expansion vessel, insulation, fixings and controls (inc. weather compensation). Base cost and performance on Viessman's Vitocal 151-A or NIBE S2125-8 models. Check clearances are physically possible.
- 7.3. Locate unit on the external terrace close to the wall as per the Architect's drawings. Extend pipework distribution to the internal hydronic unit/hot water cylinder and HP accessories which are to be located in the dedicated basement plantroom.
- 7.4. A buffer tank is envisaged (as part of the hydronic unit), in order to buffer demand from the ASHP in cooling mode. Installer to check final system volume and manufacturer's recommendations.
- 7.5. The ASHP will provide hot water for the underfloor heating system throughout at a design flow temperature of 35°C, maximum dT of 7K.
- 7.6. Domestic hot water is the priority input: the flow temperature will be boosted to 55°C on receipt of the signal to allow enough heat exchange to the cylinder.
- 7.7. Room heat outputs for the underfloor heating system are reported in the following table.
- 7.8. Floor areas (and active areas) to be taken from the Architect's layouts.
- 7.9. Note that towel rails will be direct electric and are not taken into account in the output calculation, except for the Second floor shower room. See Architect's specification.
- 7.10. The UFH pipework in the basement will be set in the screed layer below the half brick/tile finish in the existing part of the floor.
- 7.11. In the basement extension, again the pipework will be set in the screed, but please note the design intent for this space is for a "beach effect" covering. A non-insulating protective sheet will protect the screeded floor, covered by a 30mm "sand effect" gravel. The R factor assumed for this covering is 0.2 m²K/W and will need confirming with the client.
- 7.12. At upper levels (Ground and First), the UFH system will be a complete system suitable for suspended timber floors, with insulation and heat spreader plates as required.
- 7.13. Low temperature radiators – operating with the same flow temperatures as the UFH system - will be included on the Second Floor – [Eskimo Design, Gordon](#) or [Outline](#) type, finish to be agreed with client.
- 7.14. Some zone control is envisaged to allow the client to adjust as desired. Install adjustable a thermostatic control valve at the main living space UFH manifold on each floor, but with a locked minimum setting so as not to cause excessive cycling of the heat pump.
- 7.15. Type of controls, app functionality and schedule to be agreed with the client prior to commissioning.
- 7.16. Please allow for a return commissioning visit for fine tuning in the winter or mid-season.
- 7.17. Heating (weather) compensation curve: HCC control should be set according to the graph below.

Estimated Room-by-Room loads (W) for -4°C external temperature

Room Location	Internal Design T	Underfloor Heating		
		Room Loads	W/m2	UFH zone
	°C	W		
B1				
Corridor	18	203	39.4	B1. Ancillary
Stairs	18	0		inc.
Plantroom	18	63		inc.
Below stairs	18	12		inc.
Electrical room	18	24		inc.
Bedroom	18	278	23.9	B2. Bedroom
Utility	18	51		inc.
Bathroom	22	154	35.3	B2. Bedroom
Reception room (full atrium height)	21	503	35.7	B3. Reception
Reception room (under box)	21	205		inc.
Reception room (under balcony)	21	93		inc.
GF				
Lobby	18	35	29.8	01. Reception
Stairs	18	54		inc.
Reception	18	366	34.3	01. Reception
Pantry	18	51		inc.
Kitchen/dining	18	423	33.5	02. Kitchen
Bridge		inc.		
FF				
Stairs	18	103		inc.
Landing	18	98	45.5	11. Bedroom
Extension / library	21	436	33.9	12. Extension
Bedroom	18	368	29.8	11. Bedroom
Bathroom	22	253	35.3	13. Bathroom
Dressing room	21	57	33.9	13. Bathroom
SF				
Radiators	T _{int}	@dT=(32.5-T _{int})K	Type	
Stairs	18	34		inc.
Living (double height)	21	503	Eskimo Design, Gordon or Outline	
Living (under mezz.)	21	314	Eskimo Design, Gordon or Outline	
Shower room	22	64	Towel Rail (electric)	
Mezzanine	18	276	Eskimo Design, Gordon or Outline	
TOTAL OUTPUT REQUIRED		5085		

Suggested weather compensation curve



X-axis: External Temperature (°C) ; Y-axis: Flow Temperature (°C)

- 7.18. New distribution pipework will be 22mm, with minimum 16mm UFH pipework.
 - 7.19. Pipework, fittings and valves will be insulated with min 25mm Armaflex class O, or equivalent. Use proprietary fixings that don't squash the insulation layer (cable ties are not suitable) and install to manufacturer's recommendations.
 - 7.20. Connect to the DHW cylinder's primary heat source heat exchanger.
 - 7.21. Fill, flush, pressure test and treat closed system water systems as per latest standards.
 - 7.22. Balance and commission the system in accordance with the design outputs and criteria set out in this specification.
 - 7.23. Prepare comprehensive documentation as necessary for ongoing operation and maintenance in plain English.
8. Cold and Domestic Hot Water System
- 8.1. Description: Install a complete and fully operational cold water and domestic hot water system based on manifold & microbore distribution (individual 10mm Cu pipes to each outlet, insulated where external / in unheated space and to current regulations).
 - 8.2. Install a complete and fully operational domestic hot water system based on heat pump primary coil or heat exchanger, electric immersion hot water storage and manifold & microbore (individual 10mm Cu pipes to each outlet) to current regulations and to include the following.
 - 8.3. 1 no. hot water storage tank: use Viessman Vitocal or NIBE's fully integrated indoor unit to match heat pump selected.
 - 8.4. *Alternative cost option:* standard 210L, heat pump compatible DHW cylinder (unvented) with indirect HP heating coil and immersion heater fitted with PV diverter. Before proposing an alternative, check dimensions and clearances are compatible with space allocated.

- 8.5. Accessories include (but are not limited to) pressure reducing valve, check valve, pressure and temperature relief valve and expansion relief valve; Tundish; Expansion vessel (system volume to be calculated) incl. mounting bracket and 3/4" x 22mm adapters; 1 No 3 kW immersion heater 1.3/4" BSP; PV diverter kit (fitted); High limit thermostat (fitted); Powerline to ethernet adapter; Ethernet cable, controller with LCD display.
 - 8.6. To minimize energy consumption, commission the hot water cylinder to store hot water at 50°C and distribute at 48°C, at the required water pressure and using a thermostatic mixing valve.
 - 8.7. The cylinder has a backup electric immersion heater. To minimize the risk of legionella, commission the immersion heater controls to bring the temperature of the stored water up to 60°C for an hour once a fortnight, at a time when sanitary fittings are unlikely to be used (e.g. middle of the night).
 - 8.8. Connect the cylinder's hot water draw pipe to a 32mm manifold, with [10] No connections (incl. 1 spare, capped and sealed), and with appropriate supports. The hot water temperature in the distribution pipework is maintained by ensuring short runs from the distribution manifold in 10mm copper pipework direct to fittings, to be fixed at adequate intervals, and in accordance with the supplier's recommendations.) Final outlet numbers to be taken from architect's drawings and service routes to be coordinated with the Client.
 - 8.9. All hot water pipework to be insulated with 25mm closed cell insulation.
 - 8.10. Install the hot water service in accordance with Building Regulations Part G.
 - 8.11. To regulate water consumption, flow restrictors shall be installed to pipework serving all fittings.
 - 8.12. Any incoming cold water pipework (pre/post water meter) up to the heated building envelope is to be thermally insulated and vapour sealed.
 - 8.13. Connect the mains cold water to supply the hot water cylinder with a cold water feed, using compatible (copper) pipework.
 - 8.14. In-line isolation valves to be included in accessible locations (provide access) to facilitate maintenance.
 - 8.15. Route and conceal all domestic hot and cold water services pipework within the intermediate floor, within internal partitions or within boxing out with access panels to fittings wherever possible.
 - 8.16. Complete connections to all sanitary fittings.
 - 8.17. Note a search of the postcode returns a result of being in a soft water area.
9. Design Standards
- 9.1. As a minimum, install in accordance with the UK Government's Domestic Building Services Compliance Guide and the Domestic Ventilation Compliance Guide (latest versions).
 - 9.2. Also refer to the Passivhaus Trust Good Practice Guide MVHR for single dwellings for Best Practice.
 - 9.3. Follow the Manufacturer's recommendations and obtain warranties.
 - 9.4. Design and Installation Codes (non-exhaustive list)
 - UK Building Regulations and Approved Documents
 - British Standards and European Norms (EN)
 - BS EN 806 Specifications for installations inside buildings conveying water for human consumption. Part 1: General, Part 2: Design, Part 3: Simplified Method, Part 4: Installation, Part 5: Operations and Maintenance
 - BS 8558 Guide to the design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages.
 Complementary guidance to BS EN 806

- BS 8000-15 Workmanship on building sites. Code of practice for hot and cold water services (domestic scale)
- The Plumbing Engineering Services Design Guide, CIPHE
- Water Regulations Advisory Scheme (WRAS).
- Building & Engineering Services Association, sheet metal ductwork specification to DW 144
- IEE Wiring Regulations BS7671
- The Control of noise at Work Regulations
- Construction (Design & Management) Regulations
- Health & Safety at Work Regulations
- HSE L8 – Legionnaire's Disease, Control of Legionella Bacteria in Water
- CIBSE Guides (except where noted)
- BSRIA Guides (except where noted)
- MCS guidelines as applicable.

9.5. Always refer to the latest editions of the documents and identify discrepancies to the client in a timely fashion.

Notes:

Windows - Acoustic Performance -
all windows to the front (North) facade. The window system (including glazing, frame, and seals) must provide: Minimum acoustic performance of: 42 dB Rw + Ctr. This is to ensure compliance with internal noise targets for bedrooms under BS8233:2014 and WHO Guidelines, specifically: ≤30 dB LAeq,8h (average night noise) ≤45 dB LAmx,F (maximum noise from external events)

External maximum noise levels at the site are up to 87 dB LAmx,F, based on the Noise Impact Assessment and pre-COVID ambient data. No trickle vents: MVHR is used for background ventilation. Windows must be well sealed when closed. Window frame, seals, and installation must not compromise acoustic performance of the glazing. Manufacturer to provide certification or third-party test data confirming compliance with Rw+Ctr ≥ 42 dB.

Paint Removal
Paint shall be removed using a specialist chemical cleaning system appropriate for use on historic masonry. A non-caustic, pH-neutral, gel-based paint remover designed for traditional brickwork will be used. The product must be low-impact, biodegradable, and suitable for porous, soft clay bricks. All chemical cleaning products and methods must be approved by the Local Planning Authority (LPA) prior to commencement.

Apply the chemical by hand in accordance with the manufacturer’s instructions. Dwell time and coverage will be carefully controlled to avoid overexposure. Remove residue using low-pressure warm water wash or gentle steam cleaning, such as a Thermatech or DOFF system. Mechanical scrubbing will be avoided to prevent abrasion of the brick surface.

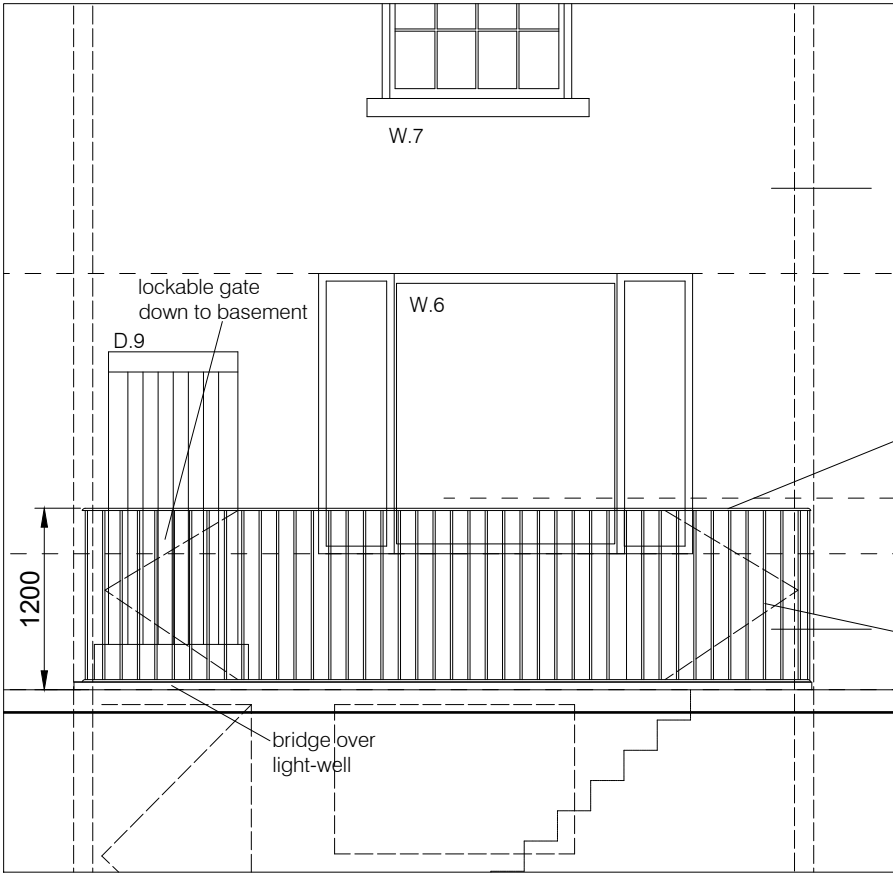
Lime Mortar Re-pointing -
Rake out joints to a minimum depth of twice the joint width, or until sound mortar is reached (usually 20–25mm). Rake by hand only, using small hand tools like a plugging chisel, quoint, or mortar rake. Do not use angle grinders or power tools - these can damage bricks. Avoid damaging the arrises of the bricks. Remove all dust and debris from joints using a soft brush and light water spray.

Mortar Mix - Natural hydraulic lime - NHL 3.5.
Aggregate: Clean, sharp washed sand, well graded, a local sand to match colour/texture of existing. Make provision to add various types of brick dust to produce a number of colours / shades - for the client to choose. Once a few colours have been chosen sample areas of pointing 600mm square to be prepared for client approval.

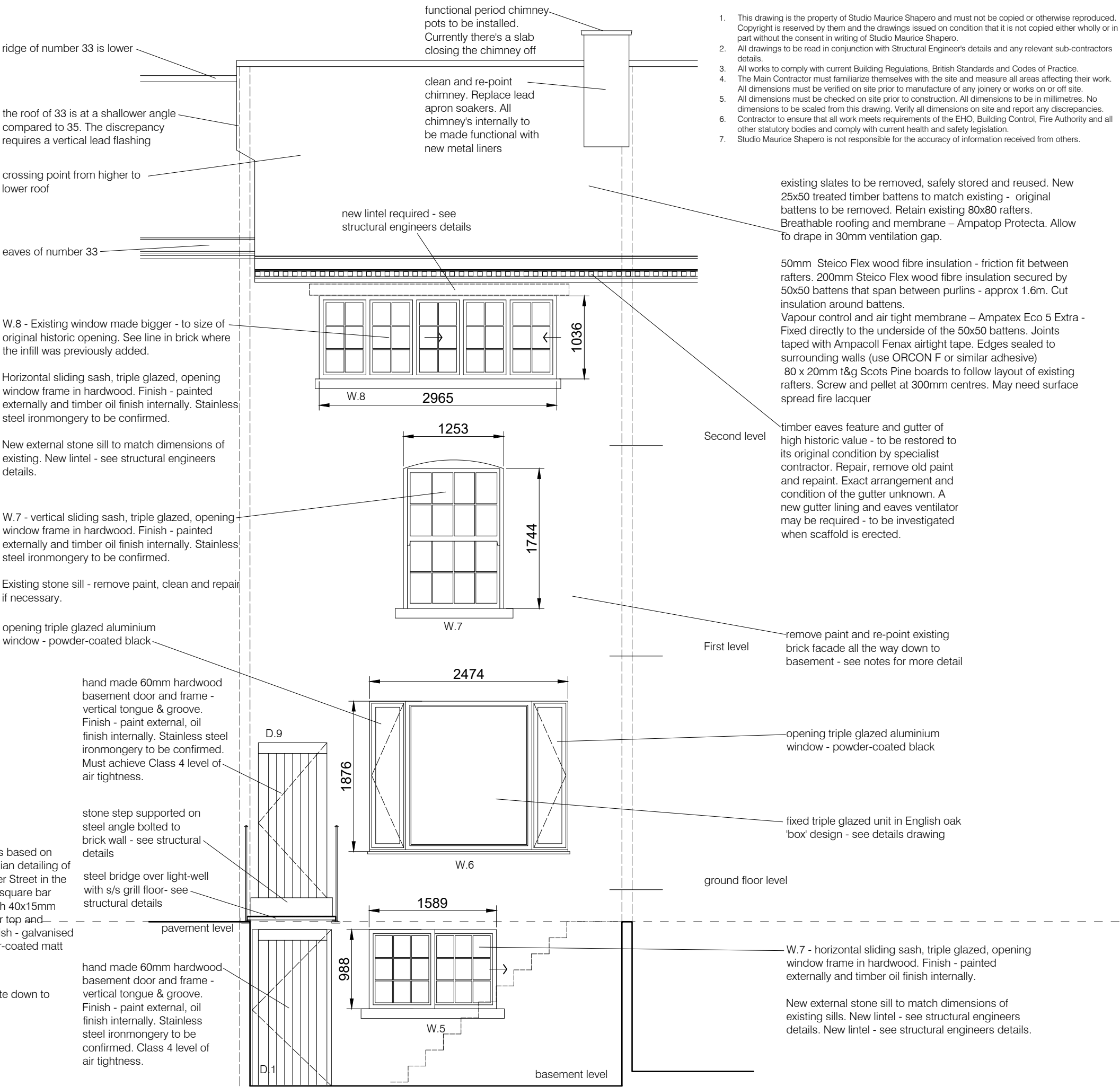
NHL mix: 1 part NHL : 2.5–3 parts sand. Avoid additives.

Pre-dampen joints (avoid saturation) just before pointing. Apply mortar in layers if joints are deep - allowing each layer to “firm up” before applying the next. Compact the mortar firmly into the joint using pointing irons or wooden tools.

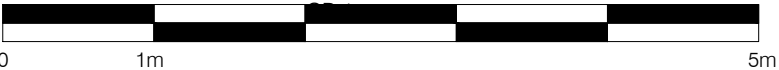
Finish flush, not overfilled or smeared on the face of the brick. Texture and profile should match original historic style.



Front Elevation Showing Railings - 1:50



Front Elevation Section through light-well- 1:50

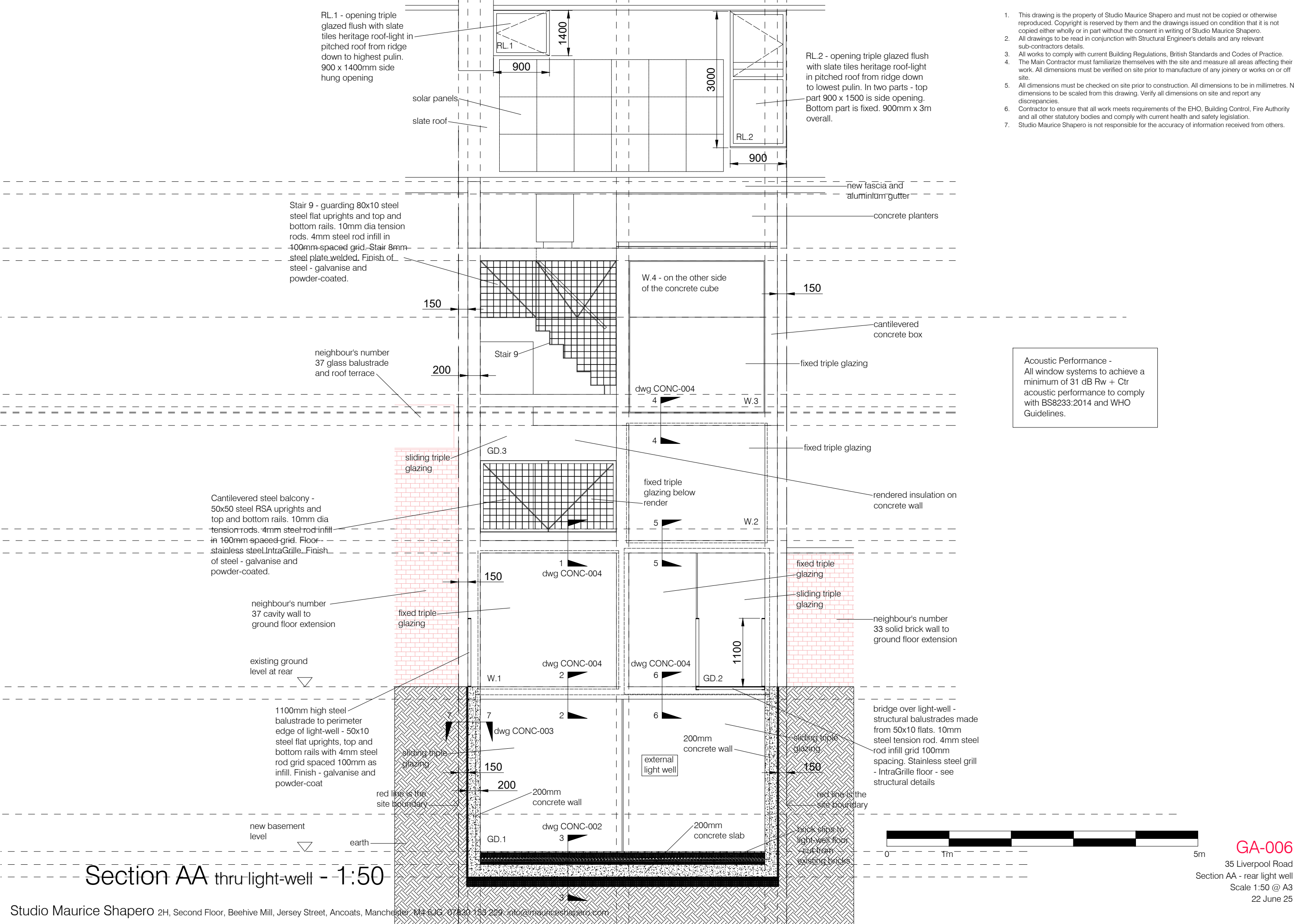


1. This drawing is the property of Studio Maurice Shapero and must not be copied or otherwise reproduced. Copyright is reserved by them and the drawings issued on condition that it is not copied either wholly or in part without the consent in writing of Studio Maurice Shapero.
2. All drawings to be read in conjunction with Structural Engineer's details and any relevant sub-contractors details.
3. All works to comply with current Building Regulations, British Standards and Codes of Practice.
4. The Main Contractor must familiarize themselves with the site and measure all areas affecting their work. All dimensions must be verified on site prior to manufacture of any joinery or works on or off site.
5. All dimensions must be checked on site prior to construction. All dimensions to be in millimetres. No dimensions to be scaled from this drawing. Verify all dimensions on site and report any discrepancies.
6. Contractor to ensure that all work meets requirements of the EHO, Building Control, Fire Authority and all other statutory bodies and comply with current health and safety legislation.
7. Studio Maurice Shapero is not responsible for the accuracy of information received from others.

GA-013

35 Liverpool Road
Front Elevation
Scale 1:50 @ A3
2 June 25

- 1. This drawing is the property of Studio Maurice Shapero and must not be copied or otherwise reproduced. Copyright is reserved by them and the drawings issued on condition that it is not copied either wholly or in part without the consent in writing of Studio Maurice Shapero.
- 2. All drawings to be read in conjunction with Structural Engineer's details and any relevant sub-contractors details.
- 3. All works to comply with current Building Regulations, British Standards and Codes of Practice.
- 4. The Main Contractor must familiarize themselves with the site and measure all areas affecting their work. All dimensions must be verified on site prior to manufacture of any joinery or works on or off site.
- 5. All dimensions must be checked on site prior to construction. All dimensions to be in millimetres. No dimensions to be scaled from this drawing. Verify all dimensions on site and report any discrepancies.
- 6. Contractor to ensure that all work meets requirements of the EHO, Building Control, Fire Authority and all other statutory bodies and comply with current health and safety legislation.
- 7. Studio Maurice Shapero is not responsible for the accuracy of information received from others.



Section AA thru light-well - 1:50

timber eaves feature and gutter of high historic value - to be restored to its original condition by specialist contractor. Repair, remove old paint and repaint. Exact arrangement and condition of the gutter unknown. A new gutter lining and eaves ventilator may be required - to be investigated when scaffold is erected.

50

Ampacoll Fenax - plasterable airtight tape - warm side of the insulation

80mm Square edge wood fibre insulation boards - UdiTHERM SK with 6mm base coat - Baunit RK70N lime plaster. 3mm finish coat Baunit RK70N

8mm Baunit Viton Fein - Levelling lime plaster

80

9

100mm Pro Klima Contega Solido Exo air tight window tape. stick to back of window frame and onto brick reveal

25mm Square edge wood fibre insulation reveal boards - UdiTHERM SK to all window reveals

Pro Klima Contega Fiden Exo 20mm expanding foam tape

- \ Vapour control and air tight membrane – Ampatex Eco 5 Extra - Fixed directly to the underside of the 50x50 battens. Joints taped with Ampacoll Fenax airtight tape

Komprimax tape to seal the reveal insulation to the window

All windows are sealed with 100mm Pro Clima Contega Solido Exo air tight window tape stuck to back of window frame and onto brick reveals and Pro Clima Contega Fiden Exo 20mm expanding foam tape.

Diagram illustrating the cross-section of a window reveal assembly, showing the integration of the window frame, insulation, and structural elements.

Labels and Components:

- Gowercroft Joinery (or similar approved) triple glazed side sliding sash windows - Acoustic Performance -
- The window system (including glazing, frame, and seals) must provide: Minimum acoustic performance of: 42 dB Rw + Ctr
- Air tightness - class 4
- W.9
- Komprimax tape to seal the reveal insulation to the window
- hard wood sill
- 25mm Square edge wood fibre insulation reveal boards – UdiTHERM SK to all window reveals
- 100mm Pro Clima Contega Solido Exo air tight window tape. stick to back of window frame and onto brick reveal
- 8mm Baunit Viton Fein – Levelling lime plaster
- Pro Clima Contega Fiden Exo 20mm expanding foam tape

Section - 1:5

— 8mm Baunit Viton Fein —
Levelling lime plaster

2 June 25

Studio Maurice Shapero 2H, Second Floor, Beehive Mill, Jersey Street, Ancoats, Manchester. M4 6JG. 07830 153 229. info@mauriceshapero.com



35 Liverpool Road, Manchester

Noise Impact Assessment

dBx Acoustics Ltd
Beehive Mill
Jersey Street
Manchester
M4 6JG
0161 711 0320

Project: 21032 Liverpool Road,
Manchester

Client: Maurice Shapero

Date: 29 April 2021

Contents

Introduction..... 3

Basis of Noise Assessment..... 3

Site Description 8

Environmental Noise Survey 11

Environmental Noise Survey Results..... 13

Building Envelope Sound Insulation 15

Building Services Noise Emissions 17

Conclusions..... 18

Appendix A – Glossary of Acoustic Terminology..... 19

Revision History

Revision	Date	Revision Details	Author	Checked
R01	29/4/2021	Original Issue	<div>DocuSigned by: <i>Matt Jones</i> 45C749F61A3B42E...</div> <div>Matt Jones MEng AMIOA</div>	<div>DocuSigned by: <i>Ben Tomlin</i> 2DD2C00AF12B454...</div> <div>Ben Tomlin BSc MIOA</div>



Introduction

dBx Acoustics Ltd has been appointed by Maurice Shapero to carry out a noise survey and noise impact assessment for the proposed residential development at 35 Liverpool Road, Manchester, M3 4NN.

The development comprises of converting an existing commercial unit into a single residence. An extension to the rear is also proposed.

A glossary of acoustic terminology has been supplied in Appendix A in order to assist the reader.

Basis of Noise Assessment

The principal aims of the assessment are summarised below:

- Assess the suitability of the site for residential accommodation;
- Control noise breakout from building services and any noise generating uses associated with the proposed development to nearby sensitive receptors.

The noise impact assessment is based on the following:

- Local Authority criteria;
- BS 8233:2014 '*Guidance on sound insulation and noise reduction for buildings*';
- World Health Organisation (2000) '*Guidelines for Community Noise*';
- BS 4142:2014 '*Methods for Rating and Assessing Industrial and Commercial Sound*'.

Manchester City Council: Assessment Criteria

It is understood that Manchester City Council (MCC) use NPSE, BS 8233:2014, WHO Guidelines for Community Noise 1999 and BS 4142:2014 as a basis for their noise impact assessments.

MCC's specific noise requirements are summarised below;

- Bedrooms (night time 23:00-07:00h) 30 dB $L_{Aeq,8h}$ (individual noise events should not normally exceed 45 dB L_{Amax} more than 15 times)
- Living Rooms (daytime – 07:00-23:00h) 35 dB $L_{Aeq,16h}$
- Gardens and terraces (daytime) 55 dB $L_{Aeq,16h}$.

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 ($dB_{L_{Ar,Tr}}$) of 5 dB below the typical background $L_{A90,T}$ level at the nearest noise sensitive location.

Noise Policy Statement for England (NPSE)

NPPF affirms that National Policy Statements form part of the overall framework of national planning policy, and should be a material consideration in decisions on planning applications. The Noise Policy Statement for England came into force in 2010 and states:

This Noise Policy Statement for England (NPSE) should apply to all forms of noise including environmental noise, neighbour noise and neighbourhood noise. The NPSE does not apply to noise in the workplace (occupational noise).

Noise Policy Vision

Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.

Noise Policy Aims

Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- *avoid significant adverse impacts on health and quality of life;*
- *mitigate and minimise adverse impacts on health and quality of life; and*
- *where possible, contribute to the improvement of health and quality of life.*

The NPPF noise aims widely reflect those in NPSE. The NPSE does however include some context within the explanatory note to assessing noise impact and uses established concepts from toxicology currently being applied to noise impacts, these include:

- **NOEL** – *No Observed Effect Level*. 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.
- **SOAEL** – *Significant Observed Adverse Effect Level*. This is the level above which significant adverse effects on health and quality of life occur.
- **LOAEL** – *Lowest Observed Adverse Effect Level*. This is the level above which adverse effects on health and quality of life can be detected.
- However, it is clear that it is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times.

The table on the following page is extracted from the Government's Planning Practice Guidance on noise¹. It summarises the noise exposure hierarchy, based on the likely average response.

Table 1 - Noise Exposure Hierarchy

Perception	Examples of outcomes	Increasing effect level	Action
Not noticeable	No effect	No observed effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life	No observed adverse effect	No specific measures required
		Lowest observed adverse effect level (LOAEL)	
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude. E.g. turning up the volume of the television; speaking more loudly; where there is no alternative ventilation, having to close windows are some of the time because of the noise. Potential for some reportedly disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed adverse effect	Mitigate and reduce to a minimum
		Significant observed adverse effect level (SOAEL)	
Noticeable and disruptive	The noise causes material change in behaviour and/or attitude e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep the windows closed most of the time because of the noise. Potential for sleep disturbance result in difficulty in getting to sleep. Premature awakening and difficulty getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant observed adverse effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate the effect of noise leading to psychological stress or psychological effects e.g. regular sleep deprivation/awakening; loss of appetite; significant, medically definable harm e.g. auditoria and non-auditory	Unacceptable adverse effect	Prevent

¹ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69533/pb13750-noise-policy.pdf

BS 8233:2014: 'Guidance on sound insulation and noise reduction for buildings'

Internal Noise Level Limits

BS 8233 gives guidance for noise levels within residential properties. It discusses appropriate criteria for reasonable rest and sleep conditions and provides noise levels which are considered to provide appropriate conditions in accordance with WHO guidelines. The guidance on limits from the standard is reproduced in Table 2, below;

Table 2 - Internal Ambient Noise Limits, BS8233

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

It should be noted that these levels represent the average noise level over the 16-hour day or 8-hour night period. This potentially means that higher noise levels may be experienced internally over a shorter period of time (e.g. individual passing trams or vehicles). These equivalent noise levels over a period of time are the best representation of the average noise level and are generally the main focus when it comes to evaluating noise exposure.

Under the updates to BS 8233 in 2014, for both day and night time cases, a relaxation of up to 5 dB is considered to provide "reasonable internal conditions" where development is considered necessary or desirable.

To assess the maximum noise levels, the World Health Organisation (WHO) document "Guidelines for Community Noise: 1999" recommends that maximum noise levels ($dB L_{Amax,F}$) do not exceed $45dB L_{Amax,F}$ more than 10-15 times a night.

BS 8233 also states that for traditional external amenity areas, such as gardens and patios, it is desirable that the external ambient noise level does not exceed an upper guideline of 55 dB $L_{Aeq,T}$. It is also recognised in BS 8233 that this may not be achievable in higher noise environments.

BS 4142:2014 'Methods for Rating and Assessing Industrial and Commercial Sound'

BS 4142:2014 sets out a procedure for assessing noise impact whereby a Noise Rating is determined and compared with the existing local Background Sound Level.

The Rating Level ($dB_{L_{A,T,r}}$) is evaluated from the Specific Noise Level by including several, cumulative corrections to account for factors such as distinguishable tone, impulse, intermittency or other readily distinguishable sound characteristics.

The assessment of the impact depends upon the margin by which the Rating Level of the specific sound source exceeds the Background Sound Level. An initial estimate of the impact of the specific sound is made by subtracting the Background Sound Level from the Rating Level, while considering the following points:

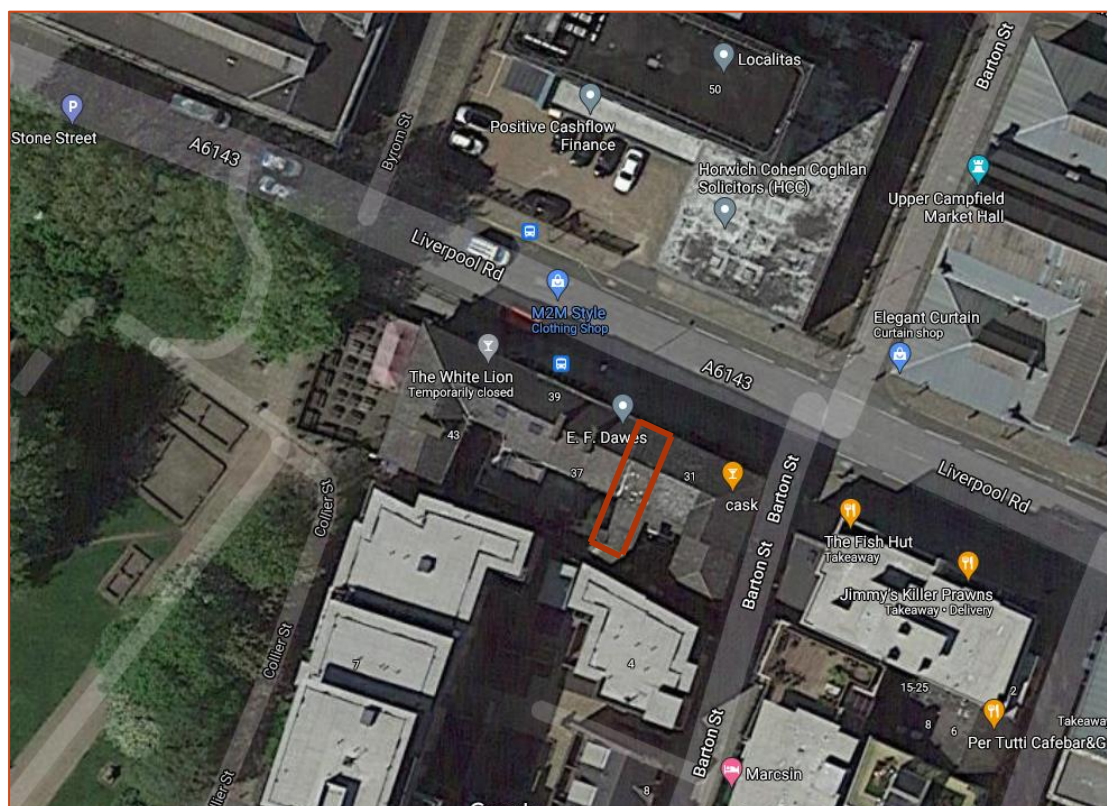
- a) Typically, the greater this difference, the greater the magnitude of the impact.
- b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
- d) The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

Site Description

Site Description

The development comprises the refurbishment of an existing (but currently unoccupied) commercial unit building at 35 Liverpool Road, Manchester, M3 4NN, as indicated in Figure 1, below.

Figure 1 – Site Location Plan



The building is located on Liverpool Road, which has frequent traffic of cars and light commercial vehicles, with the occasional HGV. Surrounding the site are a number of bars and pubs, with Cask to the east and The White Lion to the west. The nearest noise sensitive receptors (NNSRs) have been considered to be 39 and 41 Liverpool Road, which are understood to be residential properties.

Noise Sources

During the daytime, the noise across the site was caused by road traffic on Liverpool Road, with background noise being caused by road traffic from the surrounding road network. Maximum noise events observed were caused by HGV pass-bys on Liverpool Road.

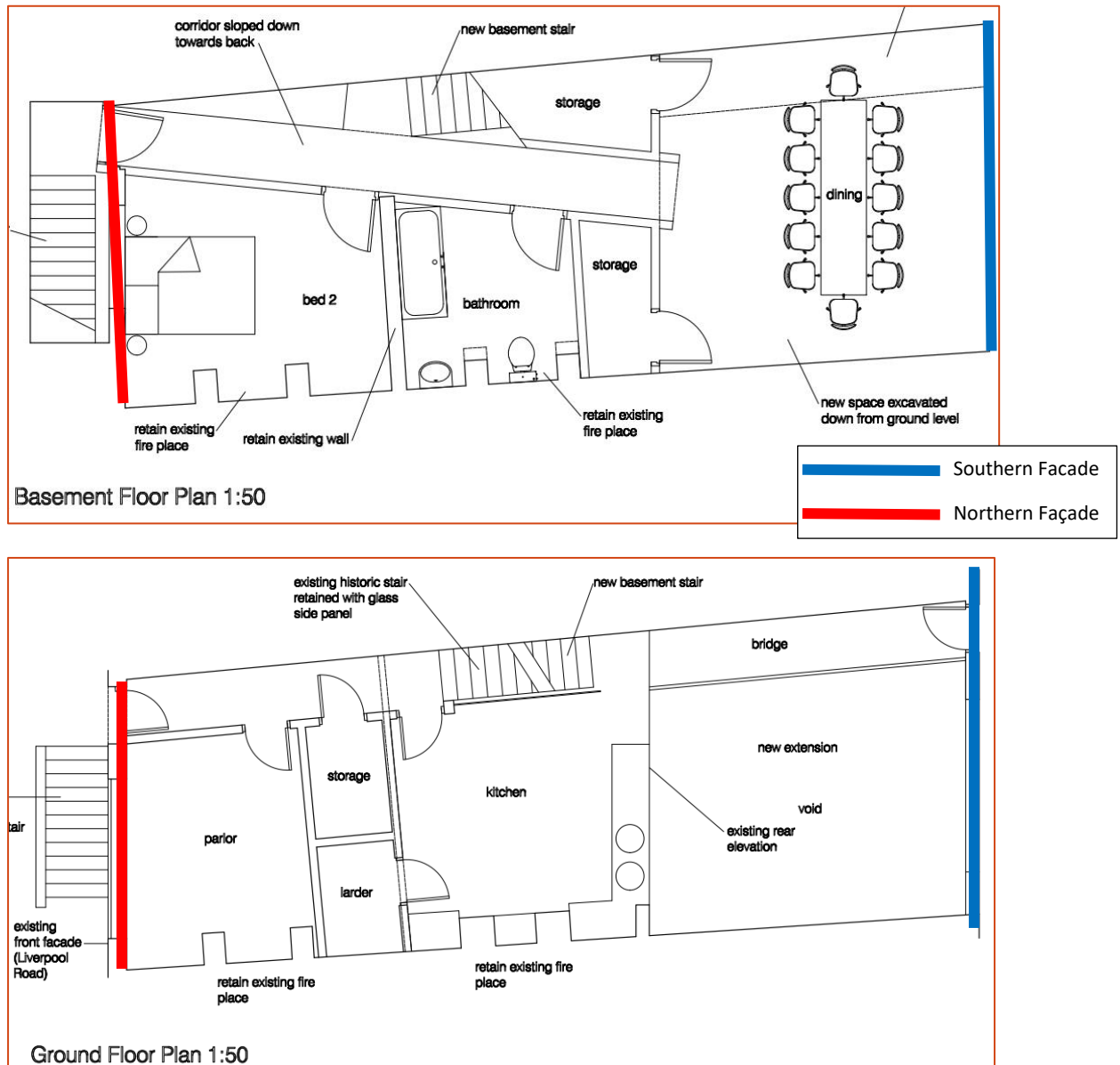
At night, the noise source observed was distant plant operating from the surrounding area. The background source was distant road traffic with maximum noise events observed being caused by HGV passes on Liverpool Street.

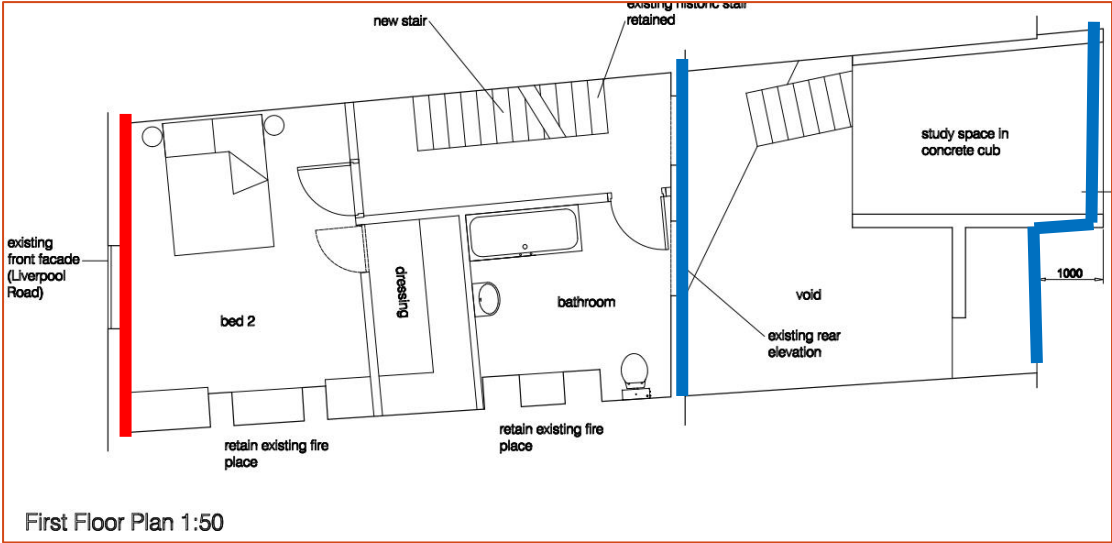
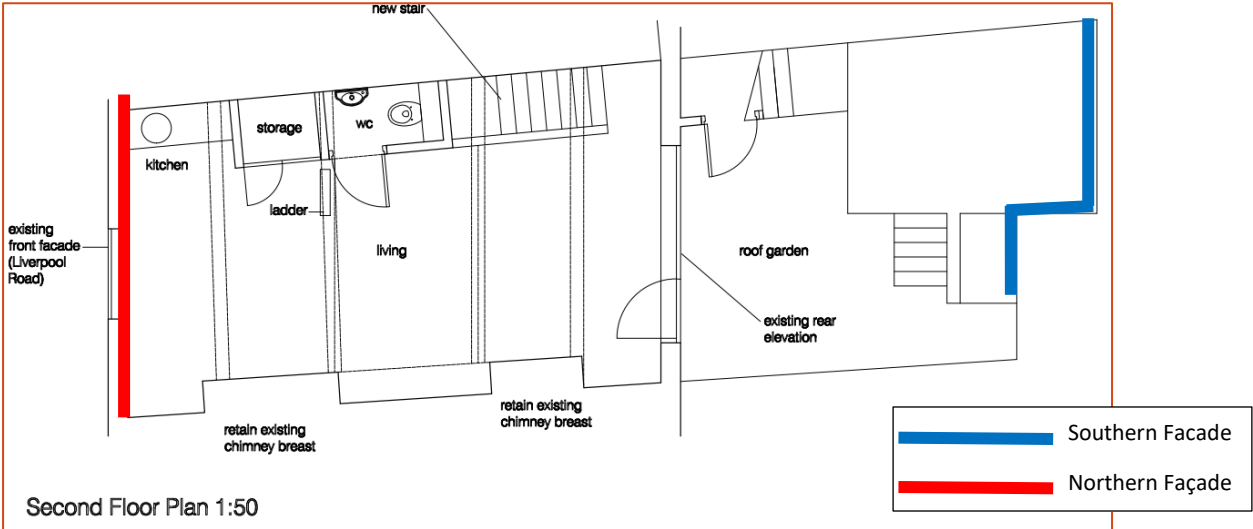
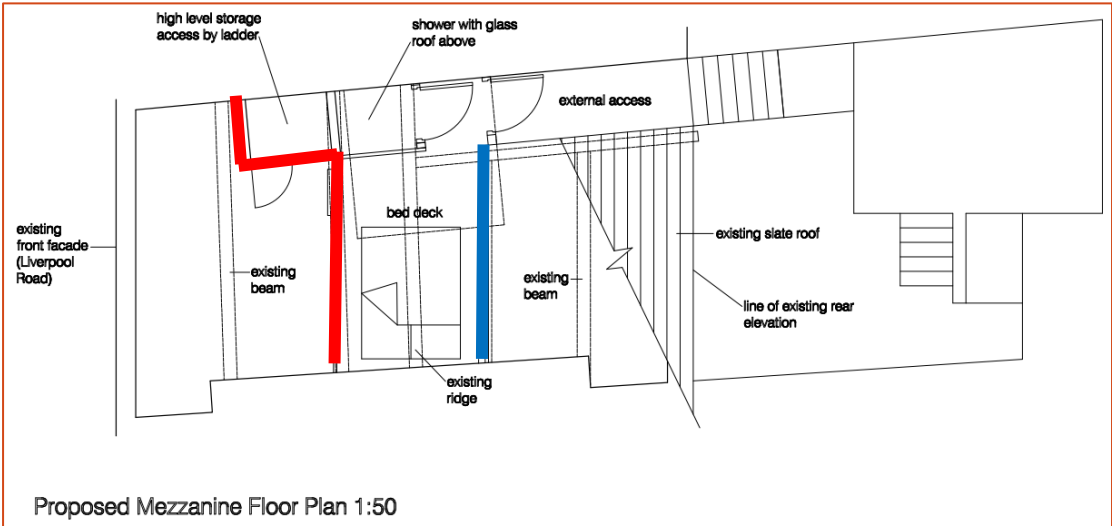
Some noise associated with the nearby bars/pubs would also be expected during the night-time period when COVID restrictions are fully lifted. This is discussed in the *Environmental Noise Survey Results* section of this report, below.

Proposed Development

The proposed development comprises one house shared over the four existing floors with a proposed mezzanine level and extension to the south. Figure 2, below, shows the proposed layout of the building and the façade references.

Figure 2 – Proposed Floor Plans



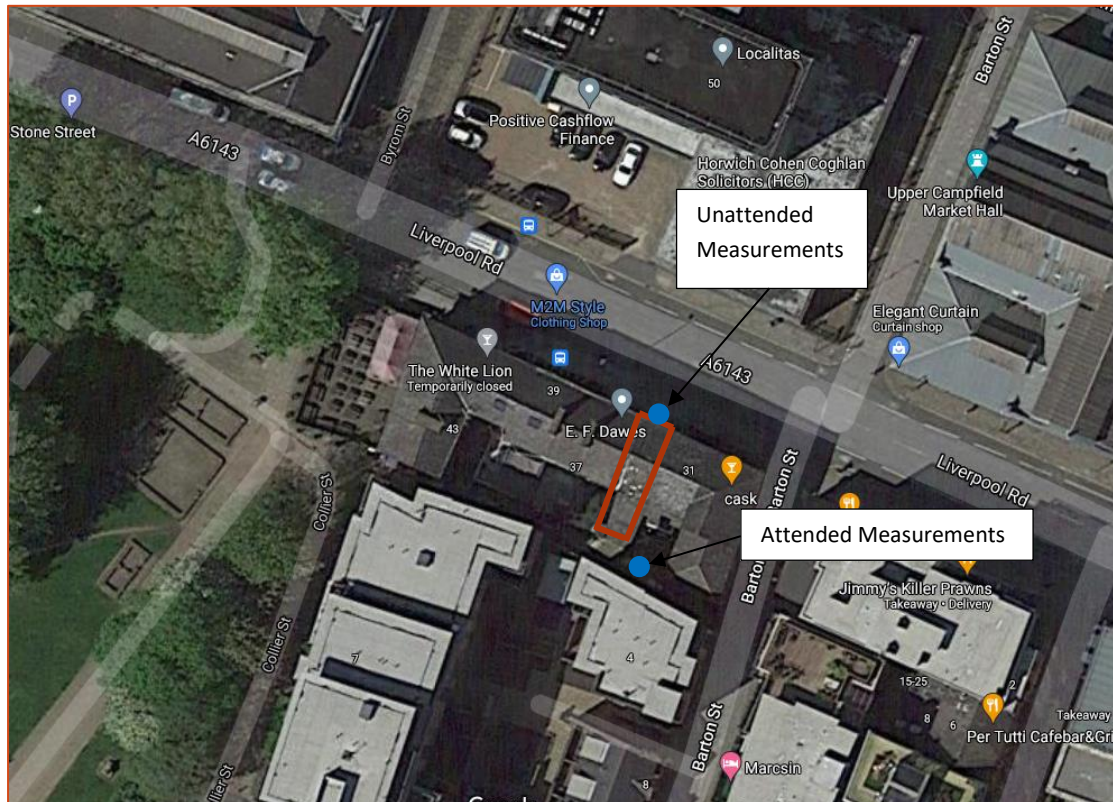


Environmental Noise Survey

Methodology

To assess the noise environment at the site, a unattended noise survey was carried out on Friday 9th and Tuesday 13th April 2021 (daytime and night-time). Additional attended measurements were taken on the night between Tuesday 20th and Wednesday 21st April 2021. The measurement locations are shown in Figure 3, below.

Figure 3 – Site Location Showing Measurement Locations



The unattended measurements were taken out of a second floor window at 35 Liverpool Road, approximately 0.5m from the façade, while the attended measurements were taken down the alley to the rear of the site, approximately 5m from Barton Street.

The night-time attended measurements were carried out between 00:00h and 01:00h, which, as the surrounding pubs/restaurants were closed at that time due to COVID restrictions, is considered representative of the quietest period at night outside of COVID restriction, as the background noise comprised constant distant plant noise.

Weather Conditions

Weather conditions during the measurement periods were generally cloudy and dry. Wind speeds were within suitable parameters for the measurement of environmental noise (i.e. generally under 5 ms⁻¹). All microphones were protected with a windshield for the duration of the survey.

Equipment

The equipment used during the environmental noise survey is detailed in Table 3, below.

Table 3 – Equipment used in the environmental noise survey

Equipment	Manufacturer & Part No. (Unattended/Attended)	Serial Number (Unattended/Attended)
Sound Level Meters	NOR140/Cirrus CR:171C	1405619/G300656
Pre-amplifiers	NOR 1209/Cirrus Pre-amp	15526/9136F
Microphones	NOR 1225/MK:224	168247/211733D
Calibrators	NOR1251/Cirrus CR:515	33827/87921

The sound level meters were calibrated before and after measurements, with no significant drift recorded. An accredited laboratory calibrated the equipment not more than two years prior to the measurements being made, with the exception of the calibrator, which had been calibrated not more than one year prior to the survey.

Environmental Noise Survey Results

Measured Unattended Noise Levels

A summary of the unattended noise levels measured are presented in Table 4, below.

Table 4 – Summary of unattended measured noise levels

Date	Period	Ambient Noise Level $L_{Aeq,T}$ (dB)	Background Noise Level L_{A90} (dB)	Highest maximum Noise Level $L_{Amax,F}$ (dB)
Friday 9 April 2021	Day*	67	53	96
	Night	60	41	93
Saturday 10 April 2021	Day	67	51	103
	Night	61	43	86
Sunday 11 April 2021	Day	65	49	90
	Night	60	45	90
Monday 12 April 2021	Day	68	56	99
	Night	62	44	97

*Indicates only part of the period was measured.

The unattended measurements can be considered as representative of the façade noise levels.

Measured Attended Noise Levels

A summary of the measured attended night-time noise levels is presented in Table 5, below. The measurements were carried out between 00:00h and 01:00h, representative of the quietest period at night, as the background noise was constant plant noise.

Table 5 - Summary of night-time measured noise levels

Start Time (hh:mm)	End Time (hh:mm)	Ambient Noise Level $L_{Aeq,T}$ (dB)	Background Noise Level L_{A90} (dB)	Highest maximum Noise Level $L_{Amax,F}$ (dB)
00:04	00:19	48	42	75
00:19	00:34	48	42	64

Measurements were taken in free-field conditions.

Previously Measured Noise Levels

Given the Covid19 lockdowns in 2021, which are likely to have affected noise levels, a review of noise levels measured before the lockdowns was undertaken, to determine whether the measured noise levels in the survey are representative of the noise environment at the site.

To determine the impact of lockdown restriction/entertainment venue closures, a *Nova Acoustics* report, 'No 39 – 41 Liverpool Road: Noise Impact Assessment and Noise Survey', (MCC Planning reference 117116/LO/20107) has been reviewed.

The measured noise levels detailed in this report are summarised in Table 6, below;

Table 6 - Summary of previously measured noise levels

Period	Ambient Noise Level $L_{Aeq,T}$ (dB)	Background Noise Level $L_{A90,T}$ (dB)	Highest maximum Noise Level $L_{Amax,F}$ (dB)	Typical Maximum Noise Level $L_{Amax,F}$ (dB)
Daytime	69	63	103	86
Night-time	69	62	100	87

As shown in Table 6, the measured daytime and night-time ambient noise levels are the same during normal conditions. The daytime levels are similar to those measured by dBx Acoustics, but night-time noise levels are significantly higher than those measured during Covid restrictions. The difference in the night-time ambient noise levels are likely due to the pubs/bars in the surrounding area being open at the time of the survey.

Noise Levels Used In The Assessment

With the previously measured daytime and night-time ambient noise levels being the same, using the same value for the daytime and night-time noise levels in this assessment would be representative of the noise environment of the site under normal conditions. The highest measured daytime ambient noise level of **68 dBL_{Aeq,16hour}** has therefore also been used as the night-time ambient noise level in the assessment.

To assess the maximum noise levels impacting the site, the number of maximum noise levels should be considered. The maximum noise levels shown in Tables 4, 5 and 6 are the highest maximum noise levels measured, however, these only occurred once and can be considered as atypical. The typical maximum noise level used in the assessment is **82dBL_{AF,max}** as this presents the 'typical' maximum noise level, exceeded just 10 times over the survey period.

To assess the noise levels impacting the southern façade, the difference between the measured unattended noise levels on the northern façade and the measured attended noise levels on the southern façade can be calculated. The northern façade noise levels used in the

assessment can then be corrected by this difference to determine the façade noise levels on the southern façade.

The lowest background noise levels measured at the northern and southern facades have been used to set plant noise limits at the respective NNSRs.

The noise levels used in the break-in assessment are presented in Table 7, below.

Table 7 – Noise levels used in the assessment

Facade	Daytime Ambient Noise Level (dB $L_{Aeq,16hour}$)	Daytime Background Noise Level (dB $L_{A90,16hour}$)	Night-time Ambient Noise Level (dB $L_{Aeq,8hour}$)	Night-time Background Noise Level (dB $L_{A90,15min}$)	Night-time Maximum Noise Level (dB $L_{Amax,F}$)
Northern	68	50	68	41	82
Southern	53	43	53	42	68

Building Envelope Sound Insulation

Internal Ambient Noise Criteria

The internal noise criteria which have been adopted for the proposed development using BS 8233:2014 and WHO guidelines are outlined in Table 8, below.

Table 8 – Internal ambient noise criteria

Daytime (07:00 – 23:00 hrs)	Night-time (23:00– 07:00 hrs)	
$L_{Aeq, 16h}$	$L_{Aeq, 8h}$	L_{Amax}
35 dB	30 dB	45 dB ¹
¹ It is generally agreed that this limit would not apply to atypical night-time maximum events. The previous version of BS 8233:1999 stated that, “...individual noise events should not normally exceed 45 dB L_{Amax} .”		

External Noise Break-In Assessment

Based on a reduction in external noise levels to internal noise levels of 15dB for a partially opened window (based WHO 1999), allowable external noise levels are therefore 50dB $L_{Aeq,T}$ outside living rooms in the day, and 45dB $L_{Aeq,T}$ and 60dB $L_{Amax,F}$ outside bedrooms at night.

It can be seen in Table 6 that the **required internal ambient noise levels cannot be achieved using open windows for natural ventilation.**

The required internal ambient noise levels can therefore only be achieved with closed windows, and ventilation will need to be provided via alternative means.

Due to the layout of the second floor and mezzanine layout, the living space with the bed deck has been considered as one room.

Based on the predicted noise levels on each elevation with windows, the requirements for the glazing and ventilators required to achieve the internal ambient and maximum noise level limits have been calculated, as detailed in Table 9, below.

Table 9 – Glazing and Ventilator Sound Insulation Requirements

Façade	Room	Period	Glazing Sound Insulation Performance, $\text{dBR}_w (+ C_{tr})$	Example Glazing Construction, mm	Ventilator Sound Insulation Performance, $\text{dBD}_{n,e,w} (+ C_{tr})$
Northern (Liverpool Road)	Second floor Living space	Daytime & Night-time	31 (25)	4mm/Thermal Cavity/4mm	33 (33)
	Basement and First Floor Bedrooms	Night-time	36 (29)	10mm/Thermal Cavity/4mm	46 (41)
Southern	Second floor Living space - rooflight	Daytime & Night-time	31 (25)	4mm/Thermal Cavity/4mm	26 (22)

The glazing configuration shown in Table 9 is a suggestion only, and alternative configurations may be acoustically suitable.

Windows may be openable at the resident's discretion for purge ventilation purposes, however, must be well sealed when closed. The frames should not downgrade the sound insulation performance of the glazing.

The southern façade also has a door into the second floor living space. This door should have a minimum sound insulation performance of **29 dBR_w and 25 $\text{dBR}_w + C_{tr}$** . An example door construction is a standard solid core door which should be well sealed around the door frame.

The external walls should have a sound insulation performance of at least **10dB** higher than the glazing or door. This would be expected to be achieved with a standard cavity masonry wall.

The sound insulation performance of the roof is not onerous and the existing roof, assuming it is in good condition, should have a sufficient sound insulation performance when lined with plasterboard with mineral fibre in the cavity.

External Amenity Areas

Looking at the provided floor plans, there are external amenity areas located on the southern façade of the proposed development. The predicted external ambient noise level during the daytime period is around $53 \text{ dBL}_{\text{Aeq},16\text{hr}}$, which is below the BS8233 upper guideline value of $55 \text{ dBL}_{\text{Aeq},16\text{hr}}$.

Building Services Noise Emissions

Manchester City Council typically require a plant noise limit of a rating level 5 dB below the background noise levels during the period of operation. The rating level is defined in BS4142 and described above. Based on the background noise levels presented in Table 7, the rating levels at the nearest noise sensitive receptor can be calculated. These are presented in Table 10, below.

Table 10 – Rating levels at the nearest noise sensitive receptor.

Receptor	Facade	Daytime Rating Noise Level (dBL _{Af,Tr})	Night-time Rating Noise Level (dBL _{Af,Tr})
Residences (39 & 41 Liverpool Road)	Northern	45	36
	Southern	38	37

Conclusions

dBx Acoustics Ltd has been appointed by Maurice Shapero to carry out a noise survey and noise impact assessment for the proposed residential development at 35 Liverpool Road, Manchester. The proposed development comprises a single residence over four floors with a mezzanine level.

To assess the noise environment at the site, a noise survey was conducted across the site by dBx Acoustics. This was reviewed in conjunction with previously measured noise data.

Using the measured noise levels, calculations have been undertaken to determine the requirements for glazing and ventilators to achieve internal noise level limits in compliance with BS8233:2014 and Manchester City Council.

It has been determined that natural ventilation by means of openable windows **will not be** appropriate for this site and ventilation via trickle vents is suggested. Minimum sound insulation requirements for glazing, ventilators, external wall, roof and doors have been provided.

Plant noise limits have been set such that plant noise at the nearest noise sensitive properties would not be expected to affect residential amenity.

On this basis, noise should not be a limiting factor in any planning application.

Appendix A – Glossary of Acoustic Terminology

Decibel, dB	A unit of level derived from the logarithm of the ratio between the value of a quantity and a reference value. For sound pressure level (L_p) the reference quantity is $2 \times 10^{-5} \text{ N/m}^2$. The sound pressure level existing when microphone measured pressure is $2 \times 10^{-5} \text{ N/m}^2$ is 0 dB, the threshold of hearing.
L	Instantaneous value of Sound Pressure Level (L_p) or Sound Power Level (L_w).
Frequency	Number of cycles per second, measured in hertz (Hz), related to sound pitch.
A weighting	Arithmetic corrections applied to values of L_p according to frequency. When logarithmically summed for all frequencies, the resulting single "A weighted value" becomes comparable with other such values from which a comparative loudness judgement can be made, then, without knowledge of frequency content of the source.
$L_{eq,T}$	Equivalent continuous level of sound pressure which, if it actually existed for the integration time period T of the measurement, would possess the same energy as the constantly varying values of L_p actually measured.
$L_{Aeq,T}$	Equivalent continuous level of A weighted sound pressure which, if it actually existed for the integration time period, T, of the measurement would possess the same energy as the constantly varying values of L_p actually measured.
$L_{n,T}$	L_p which was exceeded for n% of time, T.
$L_{An,T}$	Level in dBA which was exceeded for n% of time, T.
$L_{max,T}$	The instantaneous maximum sound pressure level which occurred during time, T.
$L_{Amax,T}$	The instantaneous maximum A weighted sound pressure level which occurred during time, T.