



DESIGN ENGINEER SUSTAIN

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Great Jackson Street, Plot D

Manchester

Ventilation Statement

QA

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Section 1 - Introduction

This statement has been prepared in support of the planning application for the development of the Great Jackson Street Mixed Use Scheme located on Great Jackson Street in Manchester.

The proposed new development works include 1 number mixed use tower which includes:

- 3 Basement Car Park levels and mechanical plant rooms
- Ground level front of house and residential amenity areas
- Staff back of house and refuse areas
- Residential apartments including penthouses
- Amenity at the top of the tower including gym, swimming pool and restaurant facilities.

Alongside this building is a proposed new office development providing grade A office space over 5 storeys. The office building consists of ground floor entrance/reception and deli/café facility with back of house space, then with four storeys of office space above.

This statement has been produced to detail the supply and extract ventilation strategy for the proposed development and describes how ventilation requirements have been incorporated into the design of the buildings, including the underground car parking areas.

Futureserv have been appointed by Renaker to produce a Ventilation Statement in support of a planning application for the construction of a 70-storey mixed use residential tower in Manchester.

This Ventilation Statement has been prepared to illustrate the proposed ventilation designs. It addresses the building regulation requirements described within Approved Document Part F, 2021 for ventilation to the various facets of the proposed development.

The statement also highlights the need to provide complete, energy efficient, fully working and balanced ventilation systems that can:-

- Deliver sufficient outdoor fresh air to occupants;
- Deliver good indoor air quality;
- Ensure acceptable internal noise levels are not exceeded;
- Assist in the removal of heat gains;
- Remove odours, contaminants and moisture;
- Avoid cold draughts;
- Assist in avoidance of summertime overheating;
- Provide summertime night time cooling of the building fabric when required;
- Provide an easily controlled and maintainable system;
- To prevent cross infection (by full fresh air and negative pressure regime);
- To recover heat from the exhaust air stream for re-use in the fresh air supply.

Futureserv Consulting Engineers have collaborated with the design team in order to provide a holistic solution for the building that will provide an efficient envelope and contain intelligent building services reducing the environmental impact of the proposed development whilst providing comfortable living and working accommodation.

Section 2 - Design

The ventilation design shall comply with the following building regulation approved documents and standards:

Design Standards

The ventilation systems will be designed in accordance with recognised UK and industry best practice.

Design will be based on standards and guidelines, including:

- British and European Standards (BSI).
- Chartered Institution of Building Services Engineers (CIBSE).
- Building Services Research and Information Association (BSRIA).
- Building Research Establishment (BRE).
- Heating & Ventilating Contractors Association (HVCA).
- Guidance on the Control of Odour and Noise from Kitchen Exhaust Systems (DEFRA)

Statutory Requirements

Ventilation systems design will also be based on the following Statutory Requirements:

- The Building Regulations.
- Clean Air Act 1993.
- The Control of Pollution Act 1974 and Amendment Acts.
- The Construction (Design and Management) Regulations 2015.
- British Standards and Codes of Practice.
- Manchester City Council Planning Conditions & Requirements.

Section 3 – Ventilation Rates

Area/Room	Ventilation Criteria
Dwellings	To meet Approved Document Part F of the Building Regulations - "Means of Ventilation" Section 5, New dwellings, System 4 – Continuous mechanical supply and extract with heat recovery (MVHR)
Basement Car Park	To meet Approved Document Part F of the Building Regulations - "Means of Ventilation" Section 6, New buildings other than dwellings. Ventilation of Car Parks. Designed to 10 ACH for smoke clearance.
Staff/ Managers Office. Residents Lounge & Meeting Rooms. Entrance & Reception.	10l/s/person
Staff Change and WCs	6 ACH
Parcel & moving in Stores	2 ACH
Refuse	5l/s/m ²
Mechanical and electrical plant rooms	To be provided with natural ventilation or mechanical ventilation as appropriate to their use. Basement rooms larger than 200m ² to be provided with 10 ACH for smoke ventilation.
Residents Gym and Studios	20l/s/person
Private & Commercial restaurant Kitchens	To be calculated following guidance within Sections 5 and 10 of DW172 Building Engineering Services Association – Specification for: Kitchen Ventilation Systems

Section 4 - Ventilation Strategy

4.1 - Basis of Design

The ventilation strategy has been designed to comply with the Building Regulations approved document Part F Means of Ventilation 2021, and the Domestic and Non-Domestic Ventilation Compliance guides.

This document describes the basis of the design and outline scope of ventilation works for the various parts of the proposed development.

Abstract from Approved Document Part 'F'

Table 5.1a Extract ventilation rates

Room	Intermittent extract	Continuous extract	
	Minimum rate	Minimum high rate	Minimum low rate
Kitchen	30 l/s adjacent to hob; or 60 l/s elsewhere	13 l/s	Total extract rate should be at least the whole dwelling ventilation rate given in Table 5.1b
Utility room	30 l/s	8 l/s	
Bathroom	15 l/s	8 l/s	
Sanitary accommodation	6 l/s	6 l/s	

Table 5.1b Whole dwelling ventilation rates

	Number of bedrooms in dwelling				
	1	2	3	4	5
Whole dwelling ventilation rate ^{a, b} (l/s)	13	17	21	25	29

Notes:

a. In addition, the minimum ventilation rate should be not less than 0.3 l/s per m² of internal floor area. (This includes all floors, e.g. for a two-storey building add the ground and first floor areas.)

b. This is based on two occupants in the main bedroom and a single occupant in all other bedrooms. This should be used as the default value. If a greater level of occupancy is expected add 4 l/s per occupant.

4.2 – Apartment Ventilation

The living space ventilation systems will be designed to operate continuously at low speed air volumes created by energy efficient fans. This will allow the construction of a tightly sealed and correctly ventilated environment reducing thermal heat loss through reduced infiltration, whilst at the same time improving air quality and reducing the occurrence of moisture and mould.

To provide minimum fresh air rates to the living spaces each habitable space will be provided with a whole dwelling mechanical ventilation heat recovery (MVHR) system. This system comprises of a continuous mechanical supply and extract ventilation unit located in a suitable position based on the space design.



Image of Wall Mounted MVHR units

The units will be provided with a high level of heat recovery efficiency for example an integrated counterflow heat recovery cell designed to aid part L compliance of the Building Regulations as detailed within the energy statement associated with this planning application.

The air volumes will be determined to satisfy the requirements of the Approved Document Part F of the Building Regulations (see abstract from Approved Document Part F).

Each unit will intake fresh air and discharge exhaust air through the façade. The intake and exhaust louvres will be located a suitable distance apart to prevent cross contamination.

An intake supply filter inside the unit will be provided to remove incoming particulate and pollen matter.

The ventilation unit will remove air from the bathrooms and kitchens and provide air to the habitable rooms; namely the bedrooms and the living spaces, this will be via a rigid flat ductwork system with supply and extract air grilles located in the ceilings.

These systems shall operate day to day automatically and be controlled to vary ventilation rates via EC/DC motors' as they receive signals from one of the interconnected sensors and controllers such as a humidity sensor. When a signal is received the fans shall vary their speed proportionally or on a trickle and boost principle. The units may also be provided with manual control by means of switch control serving kitchens and ensembles.

Ventilation extract boost will be operated by a switch located in the kitchen. The MVHR will also incorporate summer bypass.

The units shall have the facility to commission the supply and extract fans individually via inbuilt minimum and maximum speed adjustments, or alternative wired remote-control unit. The fans themselves shall have independent, infinitely variable speed control.

The ventilation systems will be designed in rooms to meet the noise levels stated within available Acoustic design specifications. These figures will apply for all supply and extract systems.

Louvres on the façade shall be required for connecting the MVHR ventilation ductwork intake and discharge points to outside.

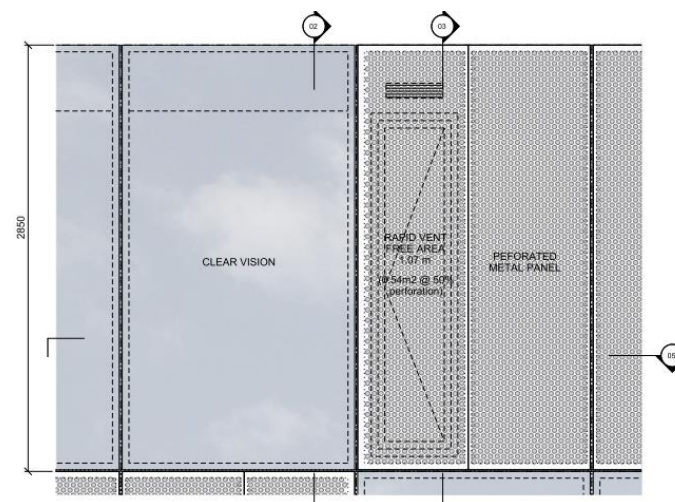
Attenuators will be installed to reduce external noise.

Cookers will be provided with recirculation hoods, as specified during detailed design.

Purge Ventilation

Purge ventilation, giving the occupant final control over their environment, will be provided by minimum effective free area natural ventilation openings in the building façade and a boost mode on the MVHR units. These openings shall only be used for purge and user overheating comfort and day to day ventilation shall be provided by the mechanical systems.

Purge Ventilation shall be provided to each habitable room (Bedrooms and Living / Kitchens) within each apartment. Purge Ventilation shall be provided via rapid/purge panel vents installed in the façade. These openings are to be provided alongside an MVHR summer/purge boost mode (as required) which shall be operated locally via a manual switch within each apartment.



Purge Ventilation Panel Detail

It should be noted that the purge panels are purely for user comfort and shall satisfy the building regulations compliance for purge ventilation for odour control and to offset summertime overheating.

Effective ventilation area openings shall be in line with the minimum requirements set out in Approved Document Part F of the Building Regulations including Appendix B.

4.3 –Amenity Spaces

Local Heat Recovery units shall be provided to supply tempered fresh air to each of these spaces. The units shall be located locally within the ceiling voids of the area served discharging to atmosphere via local louvres within the facade. The units shall be of the heat recovery type as per Mitsubishi Lossnay units or equal and approved. The units shall generally comprise of the following sections: -

- Return air fan
- Air intake louver
- Motorised shut off damper
- Fresh air filter (F7 Grade Filter)
- Extract filter (M5 Grade Filter)
- Counter flow heat exchanger (providing heat recovery)
- Supply fan
- Local controllers provided on each office floor plate.

The systems shall be controlled to supply a constant air volume during occupied hours to meet minimum fresh air requirements and be provided with manufacturers controls package to ensure fresh air rates and temperatures are maintained at comfortable levels and allow connection to the central building management system.

The spaces shall be ventilated to provide 10l/s per person.

Heat Recovery units shall be mounted within the ceiling void and these will be routed via rigid ductwork to supply and extract grilles located in the ceiling.

Intake and exhaust ductwork will be insulated to prevent condensation. Louvres on the façade shall be required for connecting the ventilation ductwork intake and discharge points to outside.

Attenuators will be installed to reduce external noise intrusion.

4.3.1 – Entrance and Reception

The entrance and reception areas will be provided with a dedicated ventilation system. Outside air will be provided at 10 l/s per person as per the CIBSE guide recommendation. These areas will be served by filtered heat recovery supply and extract units located within ceiling voids of each space.

Outdoor air intake and exhaust louvres will be formed at high level in the ground floor façade. These shall be separate at a distance from each other to minimise recirculation of intake and exhaust air flows.

4.3.2 – Residents Lounge, Meeting Room & Co-working areas

These areas will be provided with a dedicated ventilation system. Outside air will be provided at 10 l/s per person as per the CIBSE guide recommendation. These areas will be served by filtered heat recovery supply and extract units located within ceiling voids of each space.

Outdoor air intake and exhaust louvres will be formed at high level in the façade. These shall be separate at a distance from each other to minimise recirculation of intake and exhaust air flows.

4.3.3 – Restaurant Facility (Shell & Core Provision)

A commercial restaurant unit has been identified at level 70 at the top of the tower. Therefore, whilst this facility will be provided on a shell & core basis, we have designed in the requirements for the commercial kitchen ventilation provision for the future fitout.

A new mechanical supply and extract system shall be designed following the guidance outlined in DW172 (Building Engineering Services Association – Specification for: Kitchen Ventilation Systems). The extract air volumes shall be calculated based on the kitchen equipment proposed by the kitchen design specialist. A dedicated AHU is proposed to be provided at roof level above level 70. Air shall be extracted from the kitchen via the kitchen canopy. Ultraviolet (UV) filtration shall also be provided. Mechanical supply make up air shall be provided to the kitchen via the AHU.

In addition to the UV filters, Electrostatic Precipitator (ESP) filters shall be provided within the extract ductwork system prior to exhausting out to atmosphere. The combination of the UV and ESP filters shall mitigate the risk of grease build up within the extract system and odours exhausted to atmosphere.

The kitchen extract systems shall be designed and installed in accordance with DEFRA Guidance on the Control of Odour and Noise from Kitchen Exhaust Systems. This shall include provisions for access at in line with HVCA 171 – Kitchen Ventilation Systems.

The exhaust air from the system shall be exhausted away from residential elements such as openable windows or intake louvres for apartments.

The system shall comprise of bifurcated fans, attenuation and all associated localised grease/smoke removal and odour neutralising equipment. The kitchen exhausts shall terminate at roof level with the required filtration to satisfy the DEFRA guidance documentation for the control of odour & noise from commercial kitchen extract systems.

Fresh make up air will be required to the kitchens provided by supply only ventilation units with air-conditioned air if required. This will all form part of the tenant's cat B fitout installation works.

4.4 – Toilets, Refuse, Cleaners & Plant area Ventilation

Toilet, refuse and cleaners rooms will be ventilated by means of mechanical extract systems with the fan units located locally to the space they are serving. Make up air shall be provided naturally via one of the following methods: undercut doors, door transfer grilles, transfer ducts or make-up air drawn directly from outside via a louvred façade. Subject to the extent of air volumes required.

The local WC extract fans shall be complete with the following.

- Time clock controller
- Electronic fan speed controller
- Fan auto changeover facility
- Duty/share facility which changes the lead fan every 12 hours
- AV mounts
- Back draught shutters
- Ductwork distribution system rising vertically through the building

Plant areas shall be naturally ventilated through louvred doors/louvres in the façade.

4.4.1 – Mechanical and Electrical Plantrooms

All plant rooms shall be provided with ventilation as appropriate to their use either natural via louvred doors or minimum 2 ACHs if basement wet plantrooms.

4.4.2 – Refuse Stores

All proposed refuse areas are to be provided with appropriate dedicated extract ventilation. Refuse store extract ventilation shall be provided via an extract fan and ducting system that shall exhaust foul air to atmosphere at ground floor level, away from public spaces and air intakes.

A refuse holding area and refuse store is located at the Ground Level. This will use mechanical extract ventilation which will be provided in line with current

industry standard practice levels as set out in BS 5906:2005 - Waste management in buildings - Code of practice. A localised extract air fan will be located at high level (soffit mounted), within each refuse store, to provide 5 l/s-m² of mechanical extract ventilation.

This is in accordance with ASHRAE, Ventilation for Acceptable Indoor Air Quality, 62.1-2004, TABLE 6-4 Minimum Exhaust Rates. This extract ventilation will be ducted to the louvered façade. Supply air make-up will be drawn from the adjacent areas and via infiltration through intake louvres along the elevation to external.

Bin stores shall be ventilated at 5l/s /m² via a fire rated fan. All ductwork external to the bin store shall be fire rated.

4.5 – Smoke Ventilation System

A smoke clearance system shall be installed that shall operate automatically in the event of a fire within the residential sections of the development.

The contractor shall provide an automatic opening vent (AOV) at the head of each of the stair cores. This shall open automatically at the dictates of the fire control panel to provide make up air for the smoke clearance system. Air shall be transferred to the corridor through the door opening onto the affected floor from the stair core.

A grille complete with fire damper (Lobby Ventilator) located at high level within the residential corridor shall open automatically at the dictates of the fire control panel to allow the passage of smoke from the affected corridor, into the mechanical smoke shaft formed within the core area. A dedicated corridor smoke detector located at each level shall be used to actuate the fire damper at the affected floor.

Smoke fans at roof level, controlled automatically by the fire control panel, once energised shall extract smoke from the building through the automatic opening vents. The fans shall be run in duty / standby mode to ensure operation in the event of a fan failure.

The system shall be designed to operate on only one level at a time, on first activation.

All plant items associated with the system shall also be fed by the Generator to ensure operation when the electricity supply is interrupted.

The control panel for each system shall be located at the foot of the stair core adjacent to the fire personnel entry point.

4.6 – Basement Level – Car Park Ventilation Systems

The basement car park covers three levels in an area below the tower, office & podium with an entry/exit via a ramp.

A fully mechanical extract ventilation system compliant with Approved Documents B & F of the current Building Regulations and designed in accordance with British Standard BS7346: Part 7: 2013 is to be installed.

The system is to be designed to provide smoke dispersal in accordance with BS7346: Part 7: 2013 Clause 9 in the event of fire.

Fresh air will be drawn into the car park via the ramp. The roller shutters will open in the event of a fire to maximise the makeup air into the carpark. Contaminated air will be extracted via two main extract fans mounted in parallel. The main fans will be located in a dedicated plant room and discharge at ground floor via louvres within the façade of the building. Local impulse/jet fans will be strategically located around the carpark to direct the smoke to the louvres and smoke shaft arrangement.

CO monitoring will be adopted to reduce energy consumption and to reduce the running costs for day to day ventilation by varying the rate of ventilation according to the level of traffic movement.

Daily Ventilation

Under “normal” ventilation conditions, air will be drawn through all parts of the car park at a rate equivalent to approximately 3 air changes per hour and the induction fans will operate at low speed.

CO pollution levels will be continually monitored. On detection of CO levels rising beyond 20ppm, the induction fans will operate at low speed to mix and dilute the CO gases for extract via the main fans.

Should the CO level continue to rise to 30ppm, the air change rate will increase to 6 per hour.

The main extract fans will vary in speed according to the exhaust pollution levels within the car park, thereby providing the 3 to 6 air changes per hour.

Fire Condition

A fire signal will be received via the smoke detection system.

On detection of fire, the main fans will operate at full speed and the extract damper serving the non-fire floors will close, increasing the airflow to at least 10 air changes per hour to the fire floor. The induction fans on the fire floor will activate at high speed, with those on the non-fire floors being switched off.

A fire service’s override switch will be installed to enable the attending fire service personnel to switch the system off if required. The fire service’s switch will be wired back to the main control panel.

In order to achieve good distribution of air flow, the mechanical extract ventilation will be supported with impulse fans located around the car park.

4.7 – Pool Ventilation Systems

The pool hall shall be mechanically ventilated by means of a dedicated air handling unit. The unit shall be located within the dedicated pool plant area located below the pool and shall discharge to atmosphere via louvres within the façade at this level. Distribution ductwork shall connect between the external louvres and the plantroom AHU. The unit shall be of the heat recovery type and shall generally comprise of the following sections: -

- Return air fan
- Air intake louvre
- Motorised shut off dampers
- Fresh air filter
- Extract filter
- Counter flow heat exchanger (providing heat recovery)
- Supply fan
- Heating/cooling coils
- Humidity control
- Microprocessor based control panel c/w humidity sensor

The system shall be controlled to supply a conditioned air volume to the pool hall during occupied hours to meet the environmental conditions of the space. minimum fresh air requirements and be provided with manufacturers controls package to ensure fresh air rates and temperatures are maintained at comfortable levels and allow connection to the central building management system.

The air handling unit shall be mounted within the plantroom and will be routed via rigid and treated ductwork to supply and extract grilles located in the pool hall ceiling. Intake and exhaust ductwork will be insulated to prevent condensation.

Louvres on the façade shall be required for connecting the ventilation ductwork intake and discharge points to outside. Attenuators will be installed to reduce external noise intrusion.

4.8 – Office Ventilation Systems

Local Heat Recovery units shall be provided to supply tempered fresh air to the office spaces. The units shall be located locally within the ceiling voids of the area served discharging to atmosphere via local louvres within the facade. The units shall be of the heat recovery type as per Mitsubishi Lossnay units or equal and approved. The units shall generally comprise of the following sections: -

- Return air fan
- Air intake louvre
- Motorised shut off damper
- Fresh air filter (F7 Grade Filter)
- Extract filter (M5 Grade Filter)
- Counter flow heat exchanger (providing heat recovery)
- Supply fan
- Local controllers provided on each office floor plate.

The systems shall be controlled to supply a constant air volume during occupied hours to meet minimum fresh air requirements and be provided with manufacturers controls package to ensure fresh air rates and temperatures are maintained at comfortable levels and allow connection to the central building management system.

The spaces shall be ventilated to provide 10l/s per person.

4.8.1 – Entrance and Reception

The entrance and reception areas will be provided with a dedicated ventilation system. Outside air will be provided at 10 l/s per person as per the CIBSE guide recommendation. These areas will be served by filtered heat recovery supply and extract units located within ceiling voids of each space.

Outdoor air intake and exhaust louvres will be formed at high level in the ground floor façade. These shall be separate at a distance from each other to minimise recirculation of intake and exhaust air flows.

4.8.2 – Office areas

These areas will be provided with dedicated ventilation systems. Outside air will be provided at 10 l/s per person as per the CIBSE guide recommendation. These areas will be served by filtered heat recovery supply and extract units located within ceiling voids of each space.

Outdoor air intake and exhaust louvres will be formed at high level in the façade. These shall be separate at a distance from each other to minimise recirculation of intake and exhaust air flows.

4.8.3 – Toilets, Refuse, Cleaners & Plant area Ventilation

Toilet, refuse and cleaners rooms will be ventilated by means of mechanical extract systems with the fan units located locally to the space they are serving. Make up air shall be provided naturally via one of the following methods: undercut doors, door transfer grilles, transfer ducts or make-up air drawn directly from outside via a louvred façade. Subject to the extent of air volumes required.

The local WC extract fans shall be complete with the following.

- Time clock controller
- Electronic fan speed controller
- Fan auto changeover facility
- Duty/share facility which changes the lead fan every 12 hours
- AV mounts
- Back draught shutters
- Ductwork distribution system rising vertically through the building

Plant areas shall be naturally ventilated through louvred doors/louvres in the façade.

4.8.4 – Mechanical and Electrical Plantrooms

All plant rooms shall be provided with ventilation as appropriate to their use either natural via louvred doors or minimum of 2 ACHs.

4.8.5 – Refuse Stores

All proposed refuse areas are to be provided with appropriate dedicated extract ventilation. Refuse store extract ventilation shall be provided via an extract fan and ducting system that shall exhaust foul air to atmosphere at ground floor level, away from public spaces and air intakes.

A refuse holding area and refuse store is located at the Ground Level. This will use mechanical extract ventilation which will be provided in line with current industry standard practice levels as set out in BS 5906:2005 - Waste management in buildings - Code of practice. A localised extract air fan will be located at high level (soffit mounted), within each refuse store, to provide 5 l/s-m² of mechanical extract ventilation.

This is in accordance with ASHRAE, Ventilation for Acceptable Indoor Air Quality, 62.1-2004, TABLE 6-4 Minimum Exhaust Rates. This extract ventilation will be ducted to the louvred façade. Supply air make-up will be drawn from the adjacent areas and via infiltration through intake louvres along the elevation to external.

Bin stores shall be ventilated at 5l/s /m² via a fire rated fan. All ductwork external to the bin store shall be fire rated.

5.0 – Conclusion

The ventilation strategy improves on the fundamental principles of the Building Regulations and will make a contribution to reducing the annual CO₂ emissions of the proposed development.

The proposed development will incorporate energy reduction measures in the ventilation systems to reduce the carbon footprint of the site using heat recovery devices and energy efficient fan selections.

Waste heat will be recovered by the mechanical ventilation heat recovery (MVHR) systems. This type of ventilation will help to reduce heat demand and provide filtered air to the apartments thus promoting healthy living conditions for the occupants. All fans and motors shall be specified to incorporate energy efficiency accredited technology and appropriate controls.